TRANSPLANTING A RAIN FOREST: NATURAL HISTORY RESEARCH AND PUBLIC EXHIBITION AT THE SMITHSONIAN INSTITUTION, 1960-1975

A Dissertation

Presented to the Faculty of the Graduate School

of Cornell University

in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

by

Steven William Allison

August 1995

TRANSPLANTING A RAIN FOREST:
NATURAL HISTORY RESEARCH AND PUBLIC EXHIBITION AT THE SMITHSONIAN INSTITUTION, 1960-1975

Steven William Allison, Ph.D.

Cornell University 1995

Twentieth-century natural history exhibitions from the Smithsonian Institution and other natural history museums are analyzed for the source of their authority as scientific and public representations of nature. This study contrasts naturalists' place-specific evolution-based conception of nature to the abstract system-oriented paradigm of ecologists. It renders problematic assumptions about the ease of transferring formalized knowledge from the technical sphere into the public domain.

Examples from the Denver Museum of Natural History and the American Museum of Natural History during the 1930s-1950s outline the historical overlap between natural history exhibition and research. The central case at the Smithsonian Institution's National Museum of Natural History traces the transformation of a tropical rain forest habitat group first planned for a botany hall in the early 1960s into an example of an ecosystem in a projected ecology hall. The rain forest group was finally constructed as a symbol of fragile habitat in an environmentalist exhibition in the 1970s. Present-day exhibitions connected to the historical context come from the British Museum (Natural History) and the National Zoological Park in Washington, D.C.

Between 1960 and 1975, exhibit-making at the National Museum of Natural History shifted from the traditional curator-controlled system to one dominated by professional writers and designers. This was accompanied by a shift in exhibit content from interpreting objects to portraying scientific concepts , and a growing interest in systems ecology over systematics. Simultaneously,

design aesthetics derived from mass communication and World's Fair exhibitions changed from realistic to more abstract.

Manuscripts, correspondence, and oral histories are used to interpret extensive visual evidence. The analytical tools of the social studies of science and technology are applied to these primary sources.

The successive meanings given the tropical rain forest demonstrate its interpretive flexibility, suggesting that no single meaning exists against which the rest can be judged. Tacit knowledge encoded with the inscription devices used to construct a habitat group shows that the more realistic a representation appears to be, the more interpretive work has been required to create it. Abstract exhibits stand as an independent rhetorical strategy incommensurable with, not parasitic upon, the genre of realistic representation.

It is concluded that the representations of nature inside natural history museums are culturally compelling and authoritative, both for scientists and the public, because they retain a concrete physical basis that the products of laboratory science do not.

BIOGRAPHICAL SKETCH

Steven William Allison was born in 1965 in Portland, Oregon. His maternal grandmother was born in a tent in the Palouse Country of Washington State, and his father's father witnessed Halley's Comet in 1910. Frequent family camping trips wandering the alpine shoulders of the Cascade Range instilled in the young Allison an irrational love for wildflowers and open spaces.

An obsession for making animated films during his high school years hampered the development of his social skills, but fueled his desire to produce science television documentaries. He graduated with Highest Honors from Woodrow Wilson High School in Portland, Oregon, in 1983. He completed a B.A. in Biology *summa cum laude* with Honors from the Robert D. Clark Honors College at the University of Oregon in 1988. His honors thesis was titled "The Migration of Neural Crest Cells in Live Zebrafish Embryos."

A year in a molecular biology lab sequencing DNA convinced him that his liberal arts education had ruined him for laboratory research. He therefore entered Cornell's Ph.D. Graduate Field in the History of Science and Technology (Department of Science & Technology Studies) in 1989, and received the M.A. in January of 1992.

Succumbing to Ithaca's wiles, he also became a singer-songwriter while living in a cooperative known equally for its radical leanings and its superlative vegetarian meal plan.

His interest in museums began at a tender age; after visiting a collection of Northwest Indian artifacts, he cried vigorously upon being informed that he could not pursue a career as a professional Indian.

Dedicated to the memory of Lillian E. VanNatta Allison, 1909-1994. A job well done and a job never left undone were her quiet watchwords.

ACKNOWLEDGMENTS

From the moment I arrived at Cornell, Bruce Lewenstein has provided pragmatic and insightful counsel and the willingness to let me set off into relatively uncharted territory. Trevor Pinch, Peter Dear, and Peter Taylor have helped me to bring the tools of their respective trades to bear upon the public understanding of science. Special thanks to Sheila Jasanoff for insightful comments when this project was in its final stages. Lillian Isacks, Deb VanGalder and Valorie Adams have repeatedly rescued me from Cornell's voluminous, baffling paperwork.

At the Smithsonian Institution Archives, Pamela Henson's equally inexhaustible good cheer and knowledge of the history of the Institution have not just kept me on the right track, but kept me in the running. Jon Eklund at the National Museum of American History gave me an indispensable intellectual and logistical home at the Smithsonian in the early stages of my work. Marc Rothenberg and the staff of the Joseph Henry Papers have helped enormously to make my dissertation year productive and enjoyable.

Dr. Bob Bloomfield of the Department of Exhibits and Education at the British Museum (Natural History) not only opened his filing cabinets but gave generously of his time and expertise in allowing me to study the Ecology Exhibition. Jaren Horsley and Ric Hider of Amazonia at the National Zoological Park were similarly kind. The hospitality of the archivists of the Smithsonian, the Denver Museum of Natural History, the American Museum of Natural History, the BM(NH), the Buffalo Museum of Science, and Boston University all made my work full of serendipitous discovery.

A particular word of gratitude must go to all who consented to interviews as part of the SI Archives' Oral History Project. Their willingness to share their lives and memories was a precious and humbling gift.

I owe the final clarity of this manuscript to Jodi Bunnell, who chased after me with her red pencil through the final revisions. Her moral support was as invaluable and motivating as her ruthless copy editing and fastidious proofreading.

My family provided endless hours of telephone psychiatry, genuine interest in my work, and the lifelong love and respect that valued and supported my life as a scholar. Mousemates during four-and-a-half years at Stewart Little gave stunning dinners, kitchen conversation, outlandish parties, and all told, a "good place to live." Thanks to John Saponara, Renée Perry, Bennett Kottler, Jon Legge, and Rebecca Efroymson for keeping me in touch with "real" science. Mary of Haven has constantly reminded me that doing the right thing can be both creative and compassionate.

This project was supported in part by a National Science Foundation Research Training Grant Fellowship from the Cornell Department of Science and Technology Studies, a Smithsonian Institution Predoctoral Fellowship, the generousity of Harold W. Allison, and National Science Foundation Dissertation Improvement Grant #SBR-9310655 to Bruce Lewenstein and Steven Allison. All errors of fact or interpretation remain solely my own.

TABLE OF CONTENTS

Biographical Sketch ... iii
Acknowledgments ... v
Table of Contents ... vii
List of Figures ... xi
List of Tables ... xvi
List of Abbreviations ... xvii
Chapter One: Introduction
A Window on Nature & Natural History
    Preamble ... 1
    Why Study Natural History Museum Exhibits? ... 3
    Goals & Propositions ... 6
        One ... 6
        Two ... 6
        Three ... 7
    Historical Context of the Overlap Between Exhibits & Research ... 7
    The Origins of Life Groups, Habitat Groups, & Dioramas ... 11
    Natural History Museums & the Sociology of Scientific Knowledge ... 17
        Natural History Exhibits As Scientific Rhetoric ... 22
        Even Natural Kinds Have Interpretive Flexibility ... 27
        Explaining Interpretive Flexibility ... 29
        The Role of SSK ... 38
    Interrogating the Public Communication of Science ... 40
        Pipeline Model of Science Communication ... 41
        Visitor Studies ... 42
        Professionalization of Exhibit-making ... 43
    Chapter Summary ... 44
        Chapter Two: Prehistory ... 46
        Chapter Three: Rain Forest as Field Site (Proposition One) ... 46
        Chapter Four: Rain Forest as Ecosystem (Proposition Two) ... 47
        Chapter Five: Rain Forest as Environmentalist Icon (Proposition Three) ... 48
        Chapter Six: The Ecology Gallery at The Natural History Museum, London ... 50
        Chapter Seven: Living Rain Forest Exhibits ... 50
        Chapter Eight: Conclusions ... 51
Chapter Two: Prehistory
The Overlap of Exhibition & Research before 1960
    Introduction: Habitat Groups As Field Research ... 53
    Tacit Knowledge & Sense of Place at the AMNH ... 55
        The Coyote Group & Choosing a Background ... 58
        The Mountain Beaver Group & Botanical Knowledge ... 61
        Recovering the Interpretive Work of Exhibit-making ... 72
    Translation & the Construction of the Field at the DMNH ... 75
        Habitat Groups, Sense of Place, & Ecological Principles ... 84
        Finding/Creating a Field Site ... 91
    Exhibit Modernization & Botany at the Smithsonian ... 101
        Exhibition Eschewed ... 103

Rapprochement? 117
Conclusion: Botanical Interests/Botanical Aesthetics 122
Chapter Three: "The Hall of Plant Life"
Rain Forest as Field Site, 1960-1967
Introduction: Botany Undertakes a Partnership with Exhibits 126
Early Plans for the Hall of Plant Life 128
Influences From Other Museums 129
Commitment to Drama 131
The Virtual Visitor 136
Realism as a Rhetorical Strategy 139
The Romance of the Field 142
Botanical Accuracy & Raising the Status of Botany 150
Alternatives to realism 157
British Guiana Trip Combines Science & Art 175
Overlapping Scientific Collecting with Exhibit Work 175
Bringing the Field Into the Museum 188
Popularization & Justifying Museum Science 208
Selling Botany 208
Selling Museum Science 211
Conclusion: The Hall of Plant Life Come to a Close 217
Chapter Four: "The Hall of Living Things"
Rain Forest As Ecosystem, 1968-1970
Introduction: The Interpretive Flexibility of the Rain Forest 219
Separating the Strands 221
The Partnership Between Exhibition & Research Unravels 224
The Status Quo 225
A Consultant for the Insect Hall 229
Ripley's Conceptual Bent 235
"An Emphasis on Research" 235
Ideas Over Objects 239
Designers & Design Aesthetics 241
The End of an Era 242
New Players, New Paradigms 247
The Rain Forest Redefined 261
A New Ecology: From Communities to Systems 261
"No Better Way of Doing This" 266
Another Definition Requires Another Rain Forest 272
Conclusion: The "Hall of Living Things" Goes on Ice 285
Chapter Five: "It All Depends"
Rain Forest as Environmentalist Icon, 1970-1974
Introduction: From Systems Ecology to Ecological Politics 287
Hall 10 Shelved on the Eve of Earth Day 289
Ecology, Environment, & the Public 290
Environment & the Upheaval of the 1960s 291
Environment in the Press 292
Environment & Ecology in Farb's Time-Life Volume 295
The Smithsonian Responds to Environmentalism 300
Environmental Education 305
Casting Existing Research as Environmentally Relevant 307

Objects versus Concepts, Round Two ... 309
Restarting Hall 10 ... 309
Outside Designers, Outside Aesthetics ... 314
The Biome as General Organizing Principle ... 317
Biome as Activist Trope ... 318
The Rain Forest as Biome ... 321
"Banks of Coruscating Multi-hued Lights" ... 330
Camels & Jackrabbits Make Strange Diorama Partners ... 339
The Rain Forest Finally Gets Built ... 345
Public Reaction to "It All Depends" ... 351
How Radical Was Radical? ... 353
Epilogue: Biological Meaning Dissolved ... 359
Conclusion: the Many Faces of the Rain Forest ... 367
Chapter Six: "Ecology"
Museum Interpretation & Education in the 1990s
Introduction: Contemporary Comparison & Contrast ... 374
A Brief Tour of "Ecology" ... 376
The Rain Forest ... 377
The Connections Diorama ... 377
The Quadrascope ... 383
The Barn ... 383
The Green Man ... 386
Points of Comparison ... 386
Institutional Context ... 388
Content Coordinators ... 393
Designers ... 396
Exhibition Genre ... 397
Exhibition Argument ... 400
Visitor Evaluation & Representing Nature ... 404
The Rain Forest: Wilderness vs. Countryside ... 407
The Barn: Familiar Image as Teaching Tool ... 414
The Connections Diorama: Humpty Dumpty Stays Broken ... 416
Interpretation vs. Education: Objects vs. Concepts Revisited ... 420
Conclusion: Wither the Natural History Museum? ... 426
Chapter Seven: Nature Under Glass
Rain Forest as Icon of Biodiversity in the 1980s & early 1990s
Introduction: Explaining Jungle Fever ... 430
Embodying Biodiversity ... 435
The Evangelism of Conservation Biology ... 436
Technical Definitions/Rhetorical Functions ... 438
New Loci of Realism ... 442
Competing with TV: New Aesthetic Demands ... 443
Through Naturalists' Eyes ... 445
Reinventing the Zoo ... 451
New Mediations, New Realism ... 463
Current Rain Forests in Museums ... 463
Sense of Space vs. Sense of Place ... 469
Hybrids Proliferate ... 472
Nature Under Glass ... 478

More Art to Conceal Art: Systems Ecology Serves Realism 484
Conclusion: Celebrating Hybrids 498
Chapter Eight: Conclusion
"Forward to Nature"
Introduction: The Neurosis Which Is Reality 501
Goals & Propositions Revisited 503
One 503
Two 504
Three 505
Rhetorical Strategy & the Interaction of Genre & Argument 506
Interpretive Flexibility Explained 510
Tacit Knowledge Replaced by Formal Knowledge 516
Inscriptions in Museums Retain Physicality 518
Tacit Knowledge & Inscription in Tension 519
Translation: Transformation or Through the Pipeline? 521
Recovering the Nature of Natural History 523
Crossing the Boundary Between Art & Science 523
Descriptive Inscription Is Hard Work 525
Implications for the Public Communication of Science 528
Defects in the Pipeline Model of Science Communication 529
Do Education & Museums Mix? 532
Realism & Simplification in Popular Science 536
Coda: New Imaginings of Nature in Natural History Museums 539
References
Manuscripts 545
Oral Histories 547
Unprocessed Interviews & Personal Communications 548
Images 549
Bibliography 550

LIST OF FIGURES

Figure 1.1. James Thurber, "The Owl in the Attic," 1931. 2
Figure 1.2. Mountain Goat and Caribou life groups in three-sided cases, first floor of the Natural History Building, Smithsonian Institution, *ca.* 1920s. 13
Figure 1.3. Comparison of inscription process for laboratories versus natural history museums. 35
Figure 2.1. Planning model of North American Mammal Hall, American Museum of Natural History, 1931. 56
Figure 2.2. Coyote Group showing Yosemite Valley, North American Mammal Hall, American Museum of Natural History, finished 1949. 59
Figure 2.3. Mountain Beaver Group showing Mt. Rainier, North American Mammal Hall, American Museum of Natural History, finished 1954. 62
Figure 2.4. Sea bass cast painted by Reginald Sayre for Hall of Marine Life, American Museum of Natural History, *ca.* 1947. 64
Figure 2.5. Olympic National Park background field study for Mountain Beaver Group, North American Mammal Hall, American Museum of Natural History, by James P. Wilson, August 1952. 65
Figure 2.6. Olympic National Park lupine field study for Mountain Beaver Group, North American Mammal Hall, American Museum of Natural History, by Reginald Sayre, August 1952. 67
Figure 2.7. Mount Rainier National Park lupine field study for Mountain Beaver Group, North American Mammal Hall, American Museum of Natural History, by Reginald Sayre, August 1952. 68
Figure 2.8. Detail of Mountain Beaver Group showing animal feeding on lupine, North American Mammal Hall, American Museum of Natural History, finished 1954. 69
Figure 2.9. Robert Niedrach hunting birds, undated. 80
Figure 2.10. Robert Niedrach filming a bird nest, undated. 81
Figure 2.11. Robert Niedrach, with bird blind, identifying a plant in the field, undated. 82
Figure 2.12. Sonoran Desert Group, Colorado Museum of Natural History, completed 1924, dismantled 1936. 86
Figure 2.13. Golden Eagle Group on sandstone cliff, Denver Museum of Natural History, completed 1914, dismantled 1936. 88
Figure 2.14. Sonoran Desert Group depicting Superstition Mountain, Arizona, Mead Hall of Ecology, Denver Museum of Natural History, completed 1941, refurbished 1992. 90
Figure 2.15. Golden Eagle Group, depicting Daniels Park, Colorado Mead Hall of Ecology, Denver Museum of Natural History, completed 1938. 92
Figure 2.16. Eagle blind built by Robert Niedrach, Weld County, Colorado, June 1931. 95
Figure 2.17. Golden Eagle nesting ledge and blind, MacArthur Ranch (Daniels Park), Colorado, May 1936. 97

Figure 2.18. Blaschka glass flower bouquet, Harvard Botanical Museum, 1889. 105
Figure 2.19. Marcelle Marchand in Spring section of the Bausch Floral Diorama at the Rochester Museum of Arts and Sciences, 1946. 107
Figure 2.20. Paul Marchand molding wax plant leaves at the Buffalo Museum of Science, 1937. 108
Figure 2.21. Paul Marchand painting a model orchid at the Buffalo Museum of Science, 1938. 109
Figure 2.22. African mammal exhibit in "World of Mammals," Hall 14, National Museum of Natural History, opened 1959. 125
Figure 3.1. Floor plan of second floor of the Natural History Building, 1961. 134
Figure 3.2. Floor plan of first floor of the Natural History Building, 1961. 135
Figure 3.3. Preliminary floor plan sketch for Hall of Plant Life by David Lellinger, 1964. 141
Figure 3.4. Kaieteur Falls, British Guiana, from the air, 1962. 147
Figure 3.5. Smithsonian botany exhibits expedition team at the base of Kaieteur Falls, British Guiana, 1962. 148
Figure 3.6. *Giant Panda*, by Robert Bateman, 1985. 153
Figure 3.7. "Anatomy of Vascular Plants" exhibit in the botanical gallery at the British Museum (Natural History), 1962. 163
Figure 3.8. Arizona desert diorama in the botanical gallery at the British Museum (Natural History), 1962. 166
Figure 3.9. Saguaro National Monument Near Tucson, Arizona habitat group in the American Museum of Natural History, finished *ca.* 1955. 168
Figure 3.10. Life-sized African rain forest diorama in the botanical gallery at the British Museum (Natural History), 1962. 171
Figure 3.11. North Kenya Group in the Rowland Ward Memorial Pavilion, British Museum (Natural History), completed 1960. 174
Figure 3.12. Post-expedition press conference in Georgetown, British Guiana, 1962, showing Sayre's background panorama. 176
Figure 3.13. Post-expedition press conference in Georgetown, British Guiana, 1962, showing herbarium specimens collected. 177
Figure 3.14. Thomas Soderstrom and Richard Cowan pressing herbarium specimens in field camp, Kaieteur Falls, British Guiana, 1962. 179
Figure 3.15. 741-foot high Kaieteur Falls, British Guiana, 1962. 181
Figure 3.16. Lionel Chacon and Richard Cowan collecting specimens near Kaieteur Falls, British Guiana, 1962. 182
Figure 3.17. Exhibit Department inventory of rain forest model parts, page 1, 1963. 185
Figure 3.18. Reginald Sayre working on field diorama, British Guiana, 1962. 191
Figure 3.19. Photo of Kaieteur Falls, British Guiana, from new gorge trail, 1962. 192
Figure 3.20. Sketch of Kaieteur Falls from new gorge trail, by Reginald Sayre, British Guiana, 1962. 193
Figure 3.21. Richard Cowan molding buttress tree bark in latex, Kaieteur Falls, British Guiana, 1962. 194

Figure 3.22. Mora (Buttress) Tree field sketch by Reginald Sayre, British Guiana, 1962. 195
Figure 3.23. Reginald Sayre removing latex soil mold, Kaieteur Falls, British Guiana, 1962. 199
Figure 3.24. Striped-leafed Bromeliad *in situ*, Kaieteur Falls, British Guiana, 1962. 202
Figure 3.25. Paul Marchand modeling a striped-leafed bromeliad in wax, Kaieteur Falls, British Guiana, 1962. 204
Figure 3.26. Model stripe-leafed bromeliad in "South America: Continent and Culture," Hall 23 of the National Museum of Natural History, opened October 1975. 205
Figure 4.1. Scale model for grasshopper model built by Richard Rush Studios for planned insect hall, NMNH, *ca.* 1967. 234
Figure 4.2. Swamp exhibit in the Aquatic Birds Building of the Bronx Zoo, *ca.* 1967. 246
Figure 4.3. *Booster*, by Robert Rauschenberg, 1967. 250
Figure 4.4. Traditional specimen arrangement in the Hall of South American Archeology, NMNH, *ca.* 1950. 257
Figure 4.5. New-style interpretive exhibit in the Hall of South American Archeology, NMNH, *ca.* 1955. 258
Figure 4.6. "The Cave: Community in Darkness" concept sketch for Hall of Living Things, by Joseph Shannon, *ca.* January 1970. 260
Figure 4.7. Concept sketch for rain forest group and viewing ramp in Hall 10 of the MNH by Joseph Shannon, 1968. 270
Figure 5.1. Adaptation exhibit (Zone III) model for "It All Depends," designed by Robert Gersin Associates, September 1972. 326
Figure 5.2. "Biosphere" exhibit model for "It All Depends," designed by Robert Gersin Associates, September 1972. 331
Figure 5.3. Biome exhibit script by Ralph Caplan, written comments by Leo Hickey, pp. 1-2, May 1972. 334
Figure 5.4. Detail of desert biome kiosk, "It All Depends" opening, April 5, 1974, in Hall 10 of the National Museum of Natural History. 340
Figure 5.5. Desert biome kiosk, "It All Depends" opening, April 5, 1974, in Hall 10 of the National Museum of Natural History. 342
Figure 5.6. Exhibit department mock-up of rain forest for "It All Depends," *ca.* 1972. 347
Figure 5.7. Exterior of the rain forest enclosure in "It All Depends," Hall 10 of the National Museum of Natural History, *ca.* 1973-74. 348
Figure 5.8. Fluted tree in rain forest section of "It All Depends" in Hall 10 of the National Museum of Natural History, November 1973. 349
Figure 5.9. Buttress tree with background mirrors in rain forest section of "It All Depends" in Hall 10 of the National Museum of Natural History, December 1974. 350
Figure 5.10. Choice and Consequence area (Zone V) of "It All Depends" opening in Hall 10 of the National Museum of Natural History, April 5, 1974. 355
Figure 5.11. Visitor action area (Zone V) of "It All Depends" opening in Hall 10 of the National Museum of Natural History, April 5, 1974. 358

Figure 5.12. Demolishing rain forest trees in Hall 10 of the National Museum of Natural History, February 1975. 361
Figure 5.13. Installing rain forest plant models from "It All Depends" in "South America: Continent and Culture," Hall 23 of the National Museum of Natural History, before October 1975. 362
Figure 5.14. View from Rotunda entrance of "South America: Continent and Culture," Hall 23 of the National Museum of Natural History, October 1975. 363
Figure 5.15. Flute tree and Waiwai headdress case in "South America: Continent and Culture," Hall 23 of the National Museum of Natural History, opened October 1975. 365
Figure 5.16. Buttress tree and canoe paddles in "South America: Continent and Culture," Hall 23 of the National Museum of Natural History, opened October 1975. 366
Figure 5.17. Stilt root tree, Kaieteur Falls, British Guiana, 1962. 368
Figure 5.18. Stilt root tree color study, by Reginald Sayre, British Guiana, 1962. 369
Figure 5.19. Stilt root tree in rain forest section of "It All Depends," Hall 10 of the National Museum of Natural History, December 1974. 371
Figure 5.20. Stilt root tree and agouti in Rain Forest section of "South America: Continent and Culture," Hall 23 of the National Museum of Natural History, opened October 1975. 372
Figure 6.1. Exhibits in the Ecology gallery discussed in this chapter. 378
Figure 6.2. Rain forest theme in entryway to the "Ecology" gallery, The Natural History Museum, London, opened March 1991. 379
Figure 6.3. Glass "chasm" in the "Ecology" gallery, The Natural History Museum, London, opened March 1991. 380
Figure 6.4. Cameraman mannequin looking into the Connections Diorama in the Introduction area of the "Ecology" gallery, The Natural History Museum, London, opened March 1991. 381
Figure 6.5. Looking through a viewing slit into the Connections Diorama in the Introduction area of the "Ecology" gallery, The Natural History Museum, London, opened March 1991. 382
Figure 6.6. "Quadrascope" video wall illustrating water cycle in the "Ecology" gallery, The Natural History Museum, London, opened March 1991. 384
Figure 6.7. Population dynamics section of the Barn exhibit in the "Ecology" gallery, The Natural History Museum, London, opened March 1991. 385
Figure 6.8. Green Man statue evoking connection of humans to the rest of the environment in the concluding "Man" section of the "Ecology" gallery, The Natural History Museum, London, opened March 1991. 387
Figure 6.9. Rain forest setting in the entryway to the "Ecology" gallery, The Natural History Museum, London, opened March 1991. 410
Figure 6.10. Preliminary design sketch for the Connections Diorama in the Introduction area of "Ecology," The Natural History Museum, London, by Alan Ward, *ca.* 1990. 417

Figure 6.11. Large-scale Leaf Factory exhibit illustrating photosynthesis in the Ecology gallery, The Natural History Museum, London, opened March 1991. 425
Figure 7.1. Amazonia architectural model, National Zoological Park, 1989. 448
Figure 7.2. Visitors in Amazonia habitat, National Zoological Park, 1993. 450
Figure 7.3. Dr. Brazil's office in field station hands-on center of Amazonia, National Zoological Park, 1993. 452
Figure 7.4. Savanna mural painted in background of giraffe pen in the Pachyderm House, National Zoological Park, 1938. 455
Figure 7.5. Great Flight Cage in the Bird House, National Zoological Park, 1935. 456
Figure 7.6. Jungle mural painted in opposite end of Great Flight Cage of Bird House, National Zoological Park, 1935. 457
Figure 7.7. "Tropical Rainforests: A Disappearing Treasure" opened at the S. Dillon Ripley Center, Smithsonian Institution, May 1988. 465
Figure 7.8. Rain forest deforestation exhibit from "Tropical Rainforests: A Disappearing Treasure," opened at the S. Dillon Ripley Center, Smithsonian Institution, May 1988. 467
Figure 7.9. Artificial limestone rock panels designed by The Larson Company in Amazonia habitat, National Zoological Park, 1991. 473
Figure 7.10. Sketch of "branch stake" method proposed to attach living tree limbs to artificial trunks in Amazonia, 1988. 476
Figure 7.11. Exterior of Palm House, Royal Botanic Gardens at Kew, completed 1848, restored 1988. 481
Figure 7.12. Interior detail of iron structure of Palm House, Royal Botanic Gardens at Kew, completed 1848, restored 1988. 483
Figure 7.13. Amazonia water purification system, 1989. 486
Figure 7.14. Amazonia water pumping equipment, 1989. 487
Figure 7.15. Exterior of the Climatron at the Missouri Botanical Garden, completed 1960, renovated 1990. 489
Figure 7.16. Exterior of the Biodôme de Montréal (Olympic velodrome built for 1976 Summer games), opened in 1992. 490
Figure 7.17. Rain forest habitat in the Biodôme de Montréal, opened 1992. 492
Figure 7.18. Artificial buttress tree designed by The Larson Company prior to installation in Amazonia habitat, 1991. 493
Figure 7.19. Completed artificial buttress tree in Amazonia habitat, 1993. 494
Figure 7.20. Interior of the Climatron after installation of tropical rain forest environmental elements in 1990. 496
Figure 7.21. Installing rain forest tree in Amazonia habitat, 1992. 497
Figure 8.1. Detail from Rocky Mountain Bighorn Sheep Group in the "Colorado Hall of Mammals: Edge of the Wild," finished 1952, restored 1994, Denver Museum of Natural History. 542
Figure 8.2. The Tree Top Group in "Explore Colorado" showing South Platte River in background, finished 1948, restored 1992, Denver Museum of Natural History. 544

LIST OF TABLES

Table 6.1. Comparison of characteristics of "Ecology" and "It All Depends." 389
Table 8.1. Summary of analytical framework of natural history exhibit study. 507

LIST OF ABBREVIATIONS

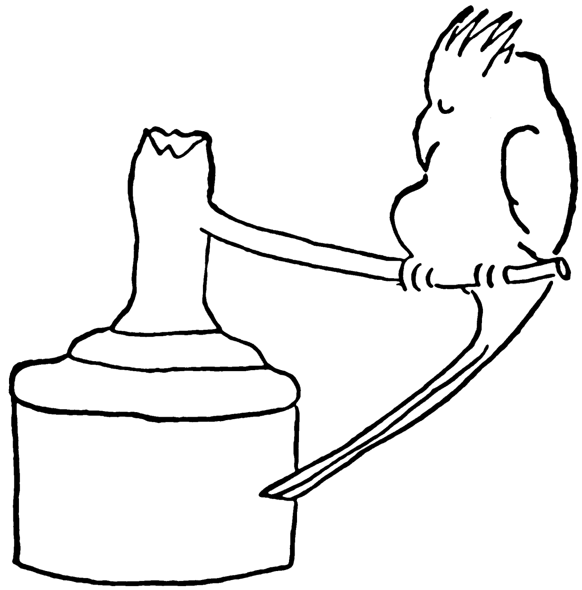
AMNH	American Museum of Natural History (Smithsonian Institution)
BM(NH)	British Museum (Natural History), a.k.a. The Natural History Museum
DMNH	Denver Museum of Natural History
NMNH	National Museum of Natural History (Smithsonian Institution)
NZP	National Zoological Park (Smithsonian Institution)
OPPS	Office of Printing and Photographic Services (Smithsonian Institution)
SI	Smithsonian Institution
SIA RU	Smithsonian Institution Archives Record Unit
STRI	Smithsonian Tropical Research Institute

CHAPTER ONE
INTRODUCTION:
A WINDOW ON NATURE & NATURAL HISTORY

Preamble

Humorist James Thurber is not normally included in the literature on the analysis of museums, and Figure 1.1 represents his sole contribution to the field. What does his absurdist scenario reveal about natural history museums? The pedantic silliness of "ormolu" as a reference to cheap gold-colored clocks aside, Thurber's vignette renders ironic what natural history museums work so hard to create with authority. All of the ambiguities of this particular museum piece—what sort of bird it is, the difference between being stuffed or dead, why it is asleep, and what it is sitting on—are not, from a traditional point of view, supposed to be problematic. There should be no difficulty in understanding what the "dingbat. . .is supposed to represent" because objects on exhibit are either real objects or scientifically-created reconstructions that perfectly mimic reality and submerge the interpretive work that went into their making. If we were taking the owl in the attic seriously, we would know it was of course dead, but stuffed to create the *unmistakable impression* of being *alive*. But in Thurber's eyes, the technology of representation—taxidermy—and the intentions of the owl/cockatoo's creators are no longer transparent and authoritative, but outlandish, inscrutable, and therefore funny.

This dissertation is part of a growing body of scholarship that, like Thurber, refuses to take representations of the natural world in natural history museums for granted. Such a refusal involves unpacking the meanings that have been built into natural history exhibits and recovering the histories of their



Q. My wife found this owl in the attic among a lot of ormolu clocks and old crystal chandeliers. We can't tell whether it's stuffed or only dead. It is sitting on a strange and almost indescribable sort of iron dingbat.

MR. MOLLEFF

A. What your wife found is a museum piece—a stuffed cockatoo. It looks to me like a rather botchy example of taxidermy. This is the first stuffed bird I have ever seen with its eyes shut, but whoever had it stuffed probably wanted it stuffed that way. I couldn't say what the thing it is sitting on is supposed to represent. It looks broken.

Figure 1.1. James Thurber, "The Owl in the Attic." Copyright © 1931, 1959 James Thurber. From "The Pet Department" in *The Owl in the Attic*, published by Harper and Row. Used by permission.

making in an attempt to detail the interests and world-views of their makers and the institutions that house them. To scrutinize the history of exhibits is not merely cynically to refuse to suspend disbelief in the magical space of the museum gallery, but to understand how that magic is constituted and what social and cognitive work it does.

Why Study Natural History Museum Exhibits?

There are several reasons why museums are receiving increasing attention within science studies. Museums of science and technology, natural history museums, and science and technology centers are all institutions where images of science, technology, and the natural world are produced and presented to a broad audience. It has been frequently asserted that museums possess a distinctive cultural authority which both shapes and reflects the interests and concerns of our society.[1] It is one of the goals of this study to explore some of the whys and wherefores of that assertion, and to articulate the strategies used to project that authority.

Though professionals at each type of institution will argue for the singular characteristics of their museum, I want to advocate lumping them together at least for the following reason: most museums involve a rich interplay of visual, verbal, and often aural and kinesthetic texts which can be read and analyzed for meaning, underlying epistemology, and rhetorical strategy. Central to the museum's implied public authority and to its conceptual problematic is how to interpret and authenticate *objects*, which display the alternating Janus faces of raw, direct, cognitive power on one side, and constructed social meanings and

---

[1]Eilean Hooper-Greenhill, *Museums and the Shaping of Knowledge* (London: Routledge, 1992); Susan M. Pearce, *Museums, Objects, and Collections: A Cultural Study* (Washington, D.C.: Smithsonian Institution Press, 1992).

discourses on the other.[2] That is, objects, whether artifacts such as a steam engine or a meteorite, or replicas of natural things or phenomena such as a model dinosaur or a miniature tornado, occupy physical and conceptual space. The museum certifies them to have some relationship to reality that equally elaborate environments in theme parks do not.[3] Precisely what that relationship to reality is and how it is certified are core questions requiring analysis.

What makes natural history museums so interesting for exploring these questions is the fact that not only do they *represent* knowledge about the natural world in their exhibitions, they also *create* much of that knowledge through their research programs. This dissertation explores the implications of thinking of an old-fashioned exhibit, such as a habitat group or a synoptic series of ethnological artifacts, as a piece of scientific knowledge itself. Because of the success of laboratory-based research programs in genetics and physiology in defining the dominant questions of modern biology in the first quarter of the twentieth century, natural history has struggled to maintain its identity as a cognitively vigorous, conceptually innovative enterprise.[4] It is therefore interesting to

---

[2]Bruno Latour uses the Janus image to describe the seemingly contradictory characteristics of "ready made science" and "science in the making." On one hand, ready made science is settled and obviously true, while science in the making is contentious and its truth negotiated (Bruno Latour, *Science In Action: How to Follow Scientists and Engineers Through Society* (Cambridge, Massachusetts: Harvard University Press, 1987), pp. 4-12). Museum objects can be seen in the same way as being both obviously real and negotiated into existence.

[3]The Exploratorium in San Francisco is one of the pioneering interactive science centers, and the miniature tornado is one of its canonical and often-imitated exhibits. Its existence suggests that science centers are museums of phenomena. Because of the extra layers of interpretation required to make these objects real, the authority of their authenticity is even less transparent than for steam engines or meteorites (Steven W. Allison, "Twice-Domesticated Phenomena: How a Science Center Reconstructs the Laboratory in the Exhibit Hall," paper presented at the annual meeting of the Society for the Social Studies of Science, Purdue University, October 19-21, 1993).

[4]Garland E. Allen, *Life Science in the Twentieth Century* (New York: Wiley, 1975), pp. 8-19.

consider the practices of exhibit-making as a window on natural history in its own right. The idea of "exhibits-as-science" might seem surprising given that at present, most natural history museums view their public exhibits as more educational vehicles than manifestations of technical scholarship. By examining the transition from exhibits-as-science to exhibits-as-communication, I wish to clarify both how exhibits could be thought of as part of the scientific enterprise and how they came to be separated from it.

The core case study used in this dissertation to outline the divergence of exhibition and research in natural history museums comes from the Smithsonian Institution's Museum of Natural History during the 1960s and early 1970s. Comparative material from the American Museum of Natural History in New York and the Denver Museum of Natural History sets the scene for the beginning of the Smithsonian episode. Material from the British Museum (Natural History) and the National Zoological Park follows up on the contemporary implications of the main case. The Smithsonian case charts the fate of a tropical rain forest habitat group that was initially collected from British Guiana in 1962 for a hall of botany. In 1967, the botany hall was canceled and the rain forest exhibit became an example of an ecosystem for a "Hall of Living Things." Financial obstacles prevented the project from being completed as planned in 1970, but finally in 1974, the rain forest became part of "It All Depends," an exhibition that put an activist environmentalist gloss on natural history. That show was short-lived, and some of the rain forest plant models were installed in 1975 in the "South America: Continent and Cultures" hall as the background to anthropological artifacts, where they can still be seen today.

Theoretical and empirical material from museum studies, the sociology of scientific knowledge, the history of biology, science communication, and environmental history will be used in this analysis. Manuscript materials, oral histories, extensive photographic documentation, and published contemporary accounts form the body of primary evidence. The primary analytical stance of this study comes from the sociology of scientific knowledge, which claims that both the processes and products of science are socially constructed.

The following section asserts three nested overarching goals and general propositions. Following them is a brief treatment of the historical origins of the overlap between exhibits and research, the exhibition forms that arose from that overlap, the theoretical tools of the sociology of scientific knowledge that will be used for analyzing the material, and the assumptions of the public understanding of science program that the analysis challenges. This chapter will finish with a synopsis of the empirical material and the conclusions it suggests.

Goals & Propositions

One

Goal: to delineate how natural history museum exhibits have attempted to shape our perceptions of nature, and in doing so, to define what counts as "natural."

Proposition: natural history museum habitat groups and their descendants do not copy nature into the exhibit hall in a transparent fashion, but create a *version* of nature informed by the epistemologies, aesthetics, practices, and institutional interests of the exhibit-makers.

Two

Goal: to understand changing representations of nature in terms of a change in the scientific definition of nature from the descriptive, particularistic world-view of the naturalist to the abstract cybernetic systems approach of post-World War Two ecology.

Proposition: though conceived as a popular exhibit genre, realistic habitat groups reflected the naturalists' valuation of the specific field site as irreducible to more general terms, whereas later more abstract exhibits drew on an ecological paradigm that saw natural systems in terms of abstract functional units.

Three

Goal: to understand the rise of abstract exhibits in terms of changes in exhibit-making practice from a direct involvement of scientists and artists to the control of the exhibit process by educators and designers.

Proposition: whereas the scientists and artists based habitat groups on their field experience in order to show museum visitors the wonders of their field sites, designers and educators in the 1960s and 1970s wanted to repackage existing ecological information to promote environmental awareness.

Historical Context of the Overlap Between Exhibits & Research

Underlying the three goals and propositions stated above is a portrait of natural history museums as institutions where esoteric science and public exhibition were an integrated set of practices and goals in the nineteenth century. By the 1960s, these practices had diverged at the Smithsonian. Although the existing literature has pointed to this idea, with a few exceptions, it has not been articulated as explicitly as this study aims to do by covering the period when the partnership between exhibition and research was dissolved at the Smithsonian.

One can easily make a prima facie claim that since science in general was not a distinct social identity or ideology in the United States until at least the late nineteenth century, it should not be fundamentally surprising that natural history collecting and exhibition overlapped both public spectacle and serious investigation.[5] However, there are more specific features of museum science that signal a more profound overlap. After looking at how reconstructions of extinct animals exemplify this overlap, I will turn to the genre of the habitat group, invented in the early twentieth century. As Proposition One indicates, this exhibit type is the central problematic here.

In the case of vertebrate paleontology, mounted skeletal reconstructions of dinosaurs and extinct mammals such as mastodons and giant sloths are still iconic exhibits at every natural history museum in the western mold. In fact, they are iconic today precisely because nineteenth-century museum-builders considered them indispensable artifacts for projecting an up-to-date image of their collections. For example, when it opened in 1882, the Redpath Museum in Montreal featured a plaster cast of the British Museum's giant sloth, the *Megatherium*, bought from Henry Ward's Natural Science Establishment, according to Susan Sheets-Pyenson, as "a status symbol for new museums."[6] Even though it was only a cast, and no *Megatheria* ever lived in Canada, it was a part of the Redpath's effort to rise above the standing of a mere colonial outpost possessing only local specimens. Sally Gregory Kohlstedt also calls the *Megatherium* cast a "status symbol to new museums."[7] In 1864, Ward had produced twelve sets of the cast and sold eight, mostly to university museums such as Yale's.[8] In Sheets-Pyenson's words, "Images of Victorian palaces of science danced in the heads of museum directors in the hinterland, and they

[5]Nathan Reingold and Ida H. Reingold, eds., *Science in America: A Documentary History, 1900-1939* (Chicago: University of Chicago Press, 1981), pp. 1-6.

[6]Susan Sheets-Pyenson, *Cathedrals of Science: The Development of Colonial Natural History Museums During the Late Nineteenth Century* (Montreal: McGill-Queen's University Press, 1989), p. 57.

[7]Sally Gregory Kohlstedt, "Henry A. Ward: The Merchant Naturalist and American Museum Development," *Journal of the Society for the Bibliography of Natural History*, 1980, *9*:647-661, on p. 650.

[8]*Ibid*., p. 657, note 20.

sought to create reasonable facsimiles under adverse circumstances." To do so, they "tried to display broad collections, selected to represent the diversity of the animal, vegetable, and mineral kingdoms on a worldwide scale."[9]

Aside from the status of possessing such a curiosity, why were these exhibits so important? At first glance, it seems that reconstructed fossil skeletons in the exhibit halls were a direct result of the scientific practice of the paleontologists: they went out and dug up large extinct vertebrates and had to have some place to put them once they got them put back together. Charles Willson Peale's American Mammoth, which he and his sons excavated and assembled in 1801, is an early example of the intermingling of scientific inquiry and public display. Charles Coleman Sellers describes Peale's mammoth reconstruction as equal parts comparative anatomy and public spectacle. The feet were assembled by comparison to a modern elephant. But the tusks were attached upside-down, walrus-like, on the premise, contrary to the opinion of the comparative anatomist Cuvier, that what had been known as the "great American Incognitum" was a fierce carnivore.[10] Peale was part of the generation of natural philosophers who came before American science was restricted to practitioners possessing the proper credentials and conducting properly esoteric research. Therefore his interest in popular museum exhibition was hardly distinguishable from, and indeed was largely propelled by, his radical Republican moral and social philosophy, which emphasized education and uplift of the common people.[11]

---

[9]Sheets-Pyenson, *Cathedrals of Science*, pp. 11-12.

[10]Charles Coleman Sellers, *Mr. Peale's Museum: Charles Willson Peale and the First Popular Museum of Natural Science and Art* (New York: W. W. Norton, 1980), pp. 124-144.

[11]*Ibid*., p. 94, pp. 148-149.

However, Ron Rainger's history of vertebrate paleontology at the American Museum of Natural History in New York City during the heyday of expeditions and reconstructions in the late nineteenth and early twentieth centuries shows that the relationship between technical research and public exhibition became more complicated and that by the end of the century, an overlap between technical research and public exhibition had to be constructed.[12] According to Rainger, by late century, professional paleontologists primarily concerned with taxonomy, morphology, and comparative anatomy frequently worked with disarticulated bones and not reconstructed skeletons.[13] Thus even though American museums housed literally tons of fossil animals in the last quarter of the nineteenth century, public reconstructions were not widespread. Yale was one such institution, and according to Kohlstedt's account of Ward's *Megatherium* cast, the cantankerous dinosaur-hunter Othniel C. Marsh wrote Ward in 1876 concerning the giant sloth, "I can use the space, I think to better advantage scientifically but may have to sacrifice something to the public."[14] Although Ward was quite concerned with the scientific accuracy of his specimens and had consulted Harvard paleontologist Jeffries Wyman to determine the proper stance for the *Megatherium*, Marsh saw little basic educational value in the mounted specimen; it did not fit into his research program.[15]

But at the American Museum of Natural History, Henry Fairfield Osborn worked vigorously to re-insert exhibits of reconstructed extinct animals into the culture of paleontological research. Osborn desired to mount a series of

---

[12]Ronald Rainger, *An Agenda for Antiquity: Henry Fairfield Osborn and Vertebrate Paleontology at the American Museum of Natural History, 1890-1935* (Tuscaloosa, Alabama: University of Alabama Press, 1991), pp. 1-5.

[13]*Ibid.*, pp. 89-91.

[14]Kohlstedt, "Henry A. Ward," p. 657, note 20.

[15]*Ibid.*, p. 650.

reconstructions of dinosaurs and extinct mammals that would tell an evolutionary story about the dangers of over-specialization and the subsequent degeneration of a species—issues which worried him with regard to human eugenics.[16] As a Social Darwinist, Osborn wanted to depict extinct prehistoric animals in dramatic, active poses that would show nature's struggle for survival as a moral antidote to citified decadence. But these were not the issues addressed or forms of representation previously utilized by vertebrate paleontology, and to create the exhibits he wanted, Osborn used his considerable financial and social power to reshape the scientific goals of his field.[17]

Alongside traditional taxonomical work, the staff of the American Museum's Department of Vertebrate Paleontology had to conduct extensive technical research on such problems as muscle attachment, joint articulation, and the load-bearing capacities of bones and muscles.[18] Importantly, this was research that had not previously much concerned professional paleontologists. Osborn's "agenda for antiquity," as Rainger calls it, was a driving force behind making public exhibits part of the scientific practice and culture of vertebrate paleontology at the American Museum.

The Origins of Life Groups, Habitat Groups, & Dioramas

While paleontologists were creating reconstructions of extinct animals for museum exhibits, zoologists were doing the same thing for extant species. The exhibit genre displaying stuffed birds and animals in lifelike poses and settings began as public spectacle in the nineteenth century and was at first rejected by serious museums as too artistic, sensationalized, and not properly scientific. However, by the early twentieth century, the idea had been legitimized in

---

[16]Rainger, *Agenda for Antiquity*, pp. 149-150.
[17]*Ibid*., pp. 1-7.
[18]*Ibid*., p. 219.

American natural history museums to such an extent that today such items have joined extinct vertebrate skeletons as canonical natural history exhibits.[19] The three terms "life group," "habitat group," and "diorama" are now used almost interchangeably in the museum world, largely because the theoretical commitments and craft skills that created the distinction between them no longer dominate exhibition practice.

At the turn of this century, "life groups" were, as the term suggests, originally life-sized groups of actual preserved specimens of animals accurately mounted in realistic poses meant to provide the viewer with information about the animals' anatomy, social behaviors, and eating habits when they were alive. These groups were often contained in three- or four-sided glass cases, and a base was constructed to suggest natural terrain and vegetation, though this was generally minimal. Figure 1.2 shows the mountain goat and caribou life groups in the Smithsonian Institution's Natural History Building in the 1920s.[20] The new museum life groups were considered superior to the exaggerated or sensational poses previously given animals mounted for popular spectacle.[21] Life groups were to provide the viewer with accurate natural history information not conveyed by study skins (the usual format for museum specimen collection and storage of birds and mammals). At the Smithsonian, life groups prevailed until the 1950s because the zoology curator from 1911 to 1943, Leonhard Stejneger, opposed habitat groups. He wanted the visitor to be able to see all

---

[19]Karen Wonders, "Exhibiting Fauna: From Spectacle to Habitat Group," *Curator*, 1989, *32*:131-156; Karen Wonders, "The Illusionary Art of Background Painting in Habitat Dioramas," *Curator*, 1990, *33*:90-118; Karen Wonders, *Habitat Dioramas: Illusions of Wilderness in Museums of Natural History* (Stockholm: University of Uppsala, 1993).

[20]Taxidermist and conservationist William Temple Hornaday invented the life group genre at the Smithsonian in the first part of the century (Carlos E. Cummings, "Flowers Reproduced in Wax: Synthetic Nature Then and Now," *Hobbies*, 1941, *21*:68-73, on p. 69).

[21]Wonders, "Exhibiting Fauna," p. 143.

Figure 1.2. Mountain Goat and Caribou life groups in three-sided cases, first floor of the Natural History Building, Smithsonian Institution, *ca*. 1920s. OPPS neg. #28587 courtesy Smithsonian Institution.

sides of the specimen, and backgrounds prevented this.[22] Watson Perrygo was the taxidermist who collected and mounted zoology exhibits from the 1920s through the 1960s. When he wanted to install a background in a new iguana group in the early 1930s, Perrygo recalled that Stejneger told him point blank, "Young man, as long as I'm here we won't ever have a background painting group in this museum."[23]

Although "habitat groups" did not allow viewing from all sides, they recreated the animals' habitat, and it was this approach that was highly developed at other American natural history museums during the first half of the twentieth century. The American Museum's ornithologist, Frank Chapman, took credit in 1902 for the addition of a painted background and accurate accessories to his bird groups as the birth of the genre as we know it. From the beginning, Chapman stipulated that the background "depicts, or is a composite approximating an actual location."[24] In 1956, advocating habitat groups for anthropology, Smithsonian ethnologist John Ewers argued that the older life group's "realism was impaired by the distracting sight of adjoining cases crowded with unrelated materials showing through their plate-glass backgrounds."[25] While realism for Stejneger meant being able to get from the setting the most information about the animals by seeing them from all sides, Ewers expressed the notion of realism favored by habitat group builders who wanted to create a separate, distinct place for each of the groups. To do so, as much attention was paid to the details of the terrain, vegetation, and background

---

[22]Ellis L. Yochelson, *The National Museum of Natural History: 75 Years in the Natural History Building*, reprinted 1990 ed. (Washington, D.C.: Smithsonian Institution Press, 1985), p. 92.

[23]Watson M. Perrygo, "Oral History Interviews," 1978, SIA RU 9516, Box 1, p. 48.

[24]Quoted in Wonders, "Exhibiting Fauna," p. 146.

[25]John C. Ewers, "New ethnological exhibits United States National Museum, Washington," *Museum*, 1956, *9*:28, p. 28.

as was to the mounting of the animals themselves. Beyond giving information about plants and animals, these groups sought to place the viewer in an archetypal, choreographed moment at the place represented.[26]

The terms life group and habitat group are now often used interchangeably, since the original objections to habitat groups have faded into obscurity. Similarly, a "diorama" referred specifically to small scale models of landscapes, towns, etc., or life-sized scenes. These were also common in history museums, and did not include actual preserved material collected from the field. These exhibits were more evocative than naturalistic, and in the case of scale models, provided an overview or compression of space that allowed an omniscient viewpoint instead of a participatory one. Recently, all three types of exhibits tend to be lumped under the heading "diorama," and the earlier terms are used less except by exhibit professionals trained in the old school.[27] "Life group" and "habitat group" are used more or less interchangeably by the Smithsonian botanists. For the exhibit preparators, "diorama" is still reserved to refer to a small scale model, either as an exhibit on its own, or a mock-up (a term also used by the preparators) of the life-sized group. A distinction that remains in use today is the difference between the term "exhibit" to designate a single case or item, and "exhibition" to refer to the entire hall or gallery devoted to one subject area or theme.

---

[26]Haraway, "Teddy Bear Patriarchy," pp. 29-30.

[27]Wonders discovered that the application of the term "diorama" to miniature models was a 1940s corruption of the original term coined by Daguerre in 1822 to refer to a life-sized illusionistic scene. Furthermore, habitat groups began once again to be called dioramas in popular usage by non-museum professionals in the 1950s (Karen E. Wonders, "Natural History Dioramas: A Popular Art Idiom in the Museum Context" (M. A. thesis, University of Victoria, 1985), pp. 4-12). She therefore calls what Chapman named "habitat groups," "habitat dioramas" (Wonders, "Habitat Dioramas"). I prefer to use the terms as consistently as possible as the actors used them.

Karen Wonders has almost single-handedly articulated the history of habitat groups in natural history museums. Her contribution to understanding of the genre, especially its earliest origins, is enormous and invaluable. However, her approach is primarily that of the art historian and focuses more on the background painters than the naturalists or preparators. The relationship between the artisanship of the habitat group and the scientific research involved in its making remains to be investigated. Wonders conceives of the intersection of art and science in primarily cognitive terms. She explains the descriptive character of natural history (a notion I will frequently invoke) with the observation, "Shapes, colours, tones, textures and patterns are qualities that cross over to aesthetics, and should be discussed in terms of how we recognize and interpret the images in our visual field."[28]

From a science studies perspective, this emphasis on the means of producing "illusionistic" habitat groups for the sake of illusionism cuts the analysis off from understanding how the theoretical questions of natural history (behavioral, ecological, and what are now called biogeographical issues) were encoded in habitat groups, and how social and institutional networks shaped them. This dissertation assumes that cognitive factors such as those Wonders invokes are the raw materials of the system, but that social factors are the primary causes in shaping the final outcome. From the vantage point I want to use, the questions become: "Why was an illusionistic style deemed the appropriate one for representing nature?" and, "Besides an increased desire to cater to the public, what scientific and institutional resources made room for habitat groups in museums?"

I propose that habitat groups resulted from a close partnership between naturalist-scientists and naturalist-artists, and that in fact their partnership

---

[28]Wonders, "Habitat Dioramas," p. 226.

involved a set of overlapping and complementary skills that created not just popular exhibits but museum knowledge in general. That is, naturalists relied on the expertise of preparators to work with materials they needed for esoteric study as well as public exhibit. This was first described by Susan Leigh Star, who discusses the attempts of taxidermists to form a professional identity around their special skills as an active part of this interpenetrating partnership.[29] Star emphasizes that the methods and techniques of taxidermy in turn involved observational skills resembling and sometimes extending those of the scientists to produce objects for scientific study or public viewing. Furthermore, the taxidermists failed to achieve the status they sought, not owing to their lack of skill, but because of the overall marginalization of natural history by laboratory science during the first quarter of the twentieth century.[30] To augment Wonders, art and science are not bound up on simply the aesthetic level, but in the everyday work that embodies aesthetics as well as contests to define what counts as knowledge about the natural world.

Natural History Museums & the Sociology of Scientific Knowledge

In the natural history museum, most objects in the collections are conceded to exist, but their authenticity and meaning (that is, their provenance and what they stand for or represent) may be contested or require considerable interpretive effort to establish. Museologist Susan Pearce argues that a natural history specimen such as a stuffed magpie "is always present as both sign and symbol: a symbol in its interpretation, but a sign in its true and perpetual

---

[29]Susan Leigh Star, "Craft vs. Commodity, Mess vs. Transcendence: How the Right Tool Became the Wrong One in the Case of Taxidermy and Natural History," in *The Right Tools for the Job: At Work in Twentieth-Century Life Sciences*, eds. Adele E. Clarke and Joan H. Fujimura (Princeton, N.J.: Princeton University Press, 1992), pp. 257-286.

[30]*Ibid*., p. 258.

relationship to the natural world."[31] This sounds right, because we instinctively want to agree that the stuffed magpie is "more real" than, say, an audio animatronic magpie in a Disney ride. After all, we have it on good faith that the museum magpie is what remains of a once-living bird that was killed by real lead shot in a real field location, and not assembled from dyed chicken feathers, etc. But that knowledge of its provenance is all that distinguishes the stuffed magpie from the reconstructed *dodo* or *archaeopteryx* (both extinct) that *was* assembled from dyed chicken feathers, etc. And outside the museum in popular culture, this hierarchy is even more tenuous. Umberto Eco coined the term "hyper-reality" to describe how simulated immersion experiences such as theme parks, historical recreations, or waxworks can feel "more real than real" because of their heightened (and often lurid) drama and iconography.[32]

This phenomenon notwithstanding, there is generally consensus among museum theorists that, in fact, people still go to museums not to have experiences that will thrill them more than a theme park, but because there is, after all, something special about seeing objects like an actual moon rock. Museum historian Edward Alexander asserts, "Museum objects, so real and so convincing, constitute an important part of the human heritage and give their beholders a feeling of continuity and cultural pride."[33] Seeing the *actual* U.S. Constitution certifies the citizen's membership in our democratic society in a way that seeing a copy does not. Millions of Americans would not make the pilgrimage to the monuments of Washington, D.C. (including the Smithsonian museums), every year if there were not some intrinsic appeal of authenticity.

---

[31] Pearce, *Museums, Objects, and Collections*, p. 30.

[32] Umberto Eco, "Travels in Hyperreality," in *Travels in Hyperreality: Essays* (New York: Harcourt Brace Jovanovich, 1986), pp. 1-58.

[33] Edward Alexander, *Museums in Motion: An Introduction to the History and Functions of Museums* (Nashville, Tennessee: American Association of State and Local History, 1979), p. 15.

However, the distinction between sign and symbol—the real object and its intended or received meaning—-is ultimately fuzzy, because what Pearce attributes to sign (the magpie's realness), is also part of its status as a symbol. It can be argued that the pose the magpie was mounted in, the habitat it was placed in, the label that was written for it, all are constructions and not "found." This willingness to take the natural history object's "true and perpetual relationship to the natural world" for granted is the blind spot of the museum studies literature, even though the constructedness of the authenticity of historical artifacts has been well-recognized.[34] The philosophical framework and empirical methodology of the "sociology of scientific knowledge" is well-suited for illuminating this blind spot and showing how natural objects are made real inside the museum because SSK has examined in detail how laboratories construct knowledge about natural entities inside them.[35]

Central to SSK is a "relativist" or "social constructivist" stance that has concerned itself with developing social explanations for how natural entities are certified to exist.[36] Drawing on the philosophy of Wittgenstein and Kuhn, the social constructivist project does not claim in some absolute sense that nature "out there" is irrelevant to the scientific enterprise. But, in a rejection of logical positivism (which attempted to show that once all observations were expressed in an objective "thing-language," true facts could be built up connecting the observations with the rules of formal logic), SSK does claim that nature alone is

---

[34]Spencer R. Crew and James E. Sims, "Locating Authenticity: Fragments of a Dialog," in *Exhibiting Cultures: The Poetics and Politics of Museum Display*, eds. Ivan Karp and Steven D. Lavine (Washington, D.C.: Smithsonian Institution Press, 1990), pp. 159-175.

[35]A canonical anthology of early work influential in defining the field is Barry Barnes and David Edge, eds., *Science in Context: Readings in the Sociology of Science* (Cambridge, Massachusetts: MIT Press, 1982).

[36]David Bloor, *Knowledge and Social Imagery*, 2nd ed. (Chicago: University of Chicago Press, 1991), pp. 3-7; Thomas Kuhn, *The Structure of Scientific Revolutions*, 2nd ed. (Chicago: University of Chicago Press, 1970 [1962]).

insufficient to explain how we know what we know about it.[37] This "methodological relativism," which holds as a central tenet the "symmetrical" explanation of true and false beliefs by the same causal mechanisms, was developed in response to Mertonian sociology of science, which sought to explain how science was done, but did not approach the content of science.[38] Early empirical studies in this project focused on the closure of scientific controversies by "core sets," or small groups of scientists who both define problems and evaluate claims for their solution.[39] Important to an examination of museum science are the laboratory anthropologies that detail the day-to-day material and social practices that generate scientific knowledge.[40] The historical case studies of science that use SSK are equally important to this approach.[41]

The experimental laboratory and the museum are different in at least one key way: nature is excluded from the first and rebuilt in the second.[42] That difference may seem to be definitive, but several specific ideas from SSK can

---

[37]Trevor Pinch, "The Sociology of the Scientific Community," in *Companion to the History of Modern Science*, eds. R. C. Olby, G. N. Cantor, J. R. R. Christie and M. J. S. Hodge (New York: Routledge, 1990), pp. 87-99, on pp. 88-89.

[38]On symmetry, see Bloor, *Knowledge and Social Imagery*, p. 7. For the influence of Mertonian sociology, see Pinch "Sociology of the Scientific Community," p. 89.

[39]For example, H. M. Collins, "The Role of the Core-Set in Modern Science: Social Contingency With Methodological Propriety," *History of Science*, 1981, *19*:6-19.

[40]Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts*, 2 ed. (Beverly Hills: Sage, 1986 [1979]); Karin D. Knorr-Cetina, *The Manufacture of Knowledge: An Essay on the Constructivist and Contextual Nature of Science* (New York: Pergamon Press, 1981); H. M. Collins, *Changing Order: Replication and Induction in Scientific Practice* (London: Sage, 1985); H. M. Collins and T. J. Pinch, *Frames of Meaning: The Social Construction of Extraordinary Science* (Boston: Routledge and Kegan Paul, 1982).

[41]Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985); Martin J. S. Rudwick, *The Great Devonian Controversy: The Shaping of Scientific Knowledge Among Gentlemanly Specialists* (Chicago: University of Chicago Press, 1985).

[42]Knorr-Cetina, *The Manufacture of Knowledge*, p. 4.

simultaneously highlight the difference and bridge the gap. They are the notions of scientific rhetoric and the separate but intersecting idea of interpretive flexibility and its explanatory concepts, tacit knowledge, inscription devices, and translation. These theoretical constructs from SSK will be important means of supporting the three propositions propounded on pages 5-6.

This study construes scientific rhetoric to be the principle that the content of scientific knowledge is inextricably bound up in the representational form in which it is communicated. The use of rhetorical analysis of exhibits will allow for a more complete understanding of the interaction of form and content (which I will call genre and argument) than Wonders. Her analysis concentrated mostly on genre as an internally perpetuated representational form without adequate reference to the influence of content.

Interpretive flexibility refers to the ability of a single body of evidence to be assigned different meanings from multiple points of view. As a basic epistemological condition, it explains why evidence alone cannot settle debates over the meaning of natural entities. In their struggle to reach closure, scientists use the tools of tacit knowledge, inscription, and translation. Because the practices of scientists cannot be put into entirely formal (verbal, logical) terms, tacit knowledge is the name given to the role craft skill and cultural lore plays in generating scientific facts. An inscription device is the *combination* of physical apparatus and practice that creates a representation of a natural entity in the laboratory. Calling the steps involved in generating and deploying scientific knowledge translations emphasizes the extent to which these activities transform, rather than simply repackage, knowledge.

Natural History Exhibits As Scientific Rhetoric

This dissertation frames habitat groups in terms of scientific rhetoric in order to highlight the means by which they are made to tell stories about nature. I do not say "tell stories" gratuitously, but because the classic habitat group was explicitly conceived in narrative terms: the poses of the animals and the season and time of day depicted in the background and accessories were meant to convey unfolding action and relationships.[43] How these narratives are constructed will be examined by an analysis of their visual rhetorics.[44]

Rhetorician Jeanne Fahnestock offers the following aim for rhetorical analysis of any text:

> An analysis of texts from a rhetorical perspective asks what tactics and topics of argumentation are used, how the arguments are arranged sequentially as a series of effects, and how they are actually expressed.. . .The rhetorician is primarily interested in explaining textual features as an arguer's creative response to the constraints of a particular situation.[45]

Reviewing the literature of scientific rhetoric, Malcolm Ashmore, Greg Myers, and Jonathan Potter comment that Fahnestock's program "seem[s] a tall order!" They concede that minute analysis of a scientific text's structure and function using the categories of classical rhetoric helps provide "a way of organizing the complex data of comparisons." However, they also ask, "So what?" implying that finding evidence of scientists using rhetorical devices in their writings does

---

[43]Wayne Robbins, a preparator at the Buffalo Museum of Science, emphasized that the story embedded in the habitat group was its primary educational value (personal communication, September 1993).

[44]Martin J. S. Rudwick, "The Emergence of a Visual Language for Geological Science, 1760-1840," *History of Science*, 1976, *14*:149-195; Martin J. S. Rudwick, *Scenes From Deep Time: Early Pictoral Representations of the Prehistoric World* (Chicago: University of Chicago Press, 1992).

[45]Jeanne Fahnestock, "Arguing in Different Forums: The Bering Strait Crossover Controversy," *Science, Technology, and Human Values*, 1989, *14*:26-42, on p. 27.

not prove anything beyond the fact that scientists, like any other communicators, must use analyzable conventions in their attempts to convince their readers.[46]

A more generous reason to approach science as rhetoric or discourse is that such an analysis can help reveal the various resources available to the scientist communicator and thereby highlight the constructed nature of the scientific text—the omissions, the transformations of the raw data, and the assembly of interpretation. This approach pays close attention to the rhetorical work done by various representational forms. The jargon, "rhetorical work," signals that a scientific text is not accepted as true simply owing to the obvious quality of its data or the logical soundness of its inferences. It must actively persuade readers to accept its assertions and take them on board.[47] Along with narrative structure, the visual elements of scientific texts such as graphs, photos, and diagrams are powerful rhetorical tools which are deployed in different discursive contexts and for different purposes.[48]

It is with that broader goal in mind rather than the narrow application of established classical rhetorical definitions and categories that natural history exhibits will be treated as three-dimensional texts and certain of the practices employed by the naturalists and exhibit-makers will be called "rhetorical

---

[46]Malcolm Ashmore, Greg Myers and Jonathan Potter, "Discourse, Rhetoric, Reflexivity: Seven Days in the Library," in *Handbook of Science and Technology Studies*, eds. Sheila Jasanoff, *et al*. (Thousand Oaks, California: Sage Publications, 1995), pp. 321-342, on pp. 328-329.

[47]Bruno Latour and Françoise Bastide, "Writing Science--Fact and Fiction: The Analysis of the Process of Reality Construction Through the Application of Socio-Semiotic Methods to Scientific Texts," in *Mapping the Dynamics of Science and Technology*, eds. Michel Callon and John Law (London: Macmillan Press, 1986), pp. 51-66; Latour, *Science In Action*, pp. 21-62; Charles Bazerman, *Shaping Written Knowledge: The Genre and Activity of the Experimental Article in Science* (Madison: University of Wisconsin Press, 1988).

[48]Nigel G. Gilbert and Michael Mulkay, "Working Conceptual Hallucinations," in *Opening Pandora's Box: A Sociological Analysis of Scientists' Discourse*, (Cambridge: Cambridge University Press, 1984), pp. 141-171; Greg Myers, *Writing Biology: Texts in the Construction of Scientific Knowledge* (Madison: University of Wisconsin Press, 1990).

strategies." In order to highlight how these practices create an identifiable representational form such as the habitat group, I will call the *form* an exhibit takes its *genre*. A realistic exhibit belongs to the genre of realism not because it is objective and more accurate than an exhibit belonging to the genre of abstraction, but because it follows established conventions and is produced by a recognized body of practice. According to Fahnestock's definition, the exhibit-makers are "arguers"—people who have a point of view and a point to get across. Although Chapter Two focuses primarily on exhibits as the products of inscription devices, Chapters Three through Seven look at how various groups of exhibit-makers became arguers and what they wanted their exhibits to argue. Their planned exhibits argue for seeing the world in a certain way, and the mechanics of that argument can be detailed by rhetorical analysis.

To take the second part of Fahnestock's definition, considering textual features as "creative responses to the constraints of a particular situation," the move to treat exhibits as rhetoric also highlights the ways in which different conceptual or theoretical arguments (content) require different genres (forms) of representation. It will be seen that a holistic picture of nature as place requires an inscription device that will preserve the elements of place in the version of nature translated into the exhibit hall. Seeing nature as ecosystem and energy flow entails a stripped-down, schematic representation that emphasizes the abstract principles over the particulars. I am employing this perspective explicitly as a corrective to implications in the public understanding of science literature that disagreements about form arise only in a second phase of discussion after content presumably has been agreed upon. The turn toward rhetorical analysis firmly asserts that disagreements about genre are also disagreements about argument. This will come to the fore strongly in Chapters Five and Six.

Because the museum is a three-dimensional place, the idea of the exhibit as text is problematic if the analogy is applied too rigorously. It is therefore not my intention to attempt to find the same rhetorical devices at work in the exhibit hall as are found in verbal texts. Rather, visual rhetorical devices can be seen as strategies and elements of visual representation that do persuasive work in various contexts. In their study of the discourse of biochemists, sociologists of science Nigel Gilbert and Michael Mulkay found that the level of realism of illustrations portraying cell metabolism was greater for semi-popular accounts than in more technical versions.[49] For Gilbert and Mulkay, realism means portraying a concept or entity in a fashion that renders it familiarly physical by using "visual metaphors with objects from the everyday world" so that the thing looks like it occupies physical space, and is therefore "real."[50] For example, diagrams published in *Scientific American* of cell membrane structure give a molecule's-eye view of the scene. They contrast to the schematic diagrams in scientific texts, which used only lines, arrows, and chemical names to represent components of the system which were at the time literally invisible. The diagrams were not really "pictures" (though Gilbert and Mulkay call them that), but flowcharts documenting a process occurring in a chemically-defined space.

Most interestingly, Gilbert and Mulkay's scientist respondents were in substantial agreement that the more *realistic* images were in fact not more *accurate*. They felt that the realistic pictures, which gave a sub-microscopic system known primarily in chemical terms a mechanical physicality, were, along with being optically impossible, in fact more speculative and therefore potentially misleading.[51] However, they also perceived physicality to be necessary in communicating to a literal-minded lay audience for whom

---

[49]Gilbert and Mulkay, "Working Conceptual Hallucinations," p. 157.
[50]*Ibid*., p. 162.
[51]*Ibid*., pp. 155-156.

understanding was equated with *seeing*.[52] For museum habitat groups, naturalists viewed realism as a means of maintaining both the scientific accuracy and popular appeal of the exhibit.

To construe "realism" as a genre of exhibit-making is to look for the uses realism is put to and its resonances with the epistemology of its users. A realistic exhibit is not one whose verisimilitude is taken for granted analytically, but one that strives for a verisimilitude defined with respect to established features of the genre. Some of the rhetorical strategies deployed in habitat groups are place-specificity in plants, animals, time of day, season, and locale; a casual sense of the randomness of nature (damaged leaves, hoof-prints in the sand) while portraying a condensed, heightened moment that encapsulates many hours of real-time observation. Extreme detail in plant modeling, lighting effects, and the perspective created by the background mural all contribute to the "illusionistic" qualities of the habitat group.

Analyzing museum exhibits as examples of scientific rhetoric makes it clear that the different versions of the rain forest as it was represented at the Smithsonian were incommensurable. Each embodied a different body of knowledge, practice, and way of seeing the world. Each is meant to have a different impact on its viewers and to further the specific goals of its makers. Considering realistic or abstract representations to be alternative cognitive or institutional commitments removes the hierarchical relationship between them which generally considers the abstract mode to be dependent on the realistic mode (since the products of the realistic mode are thought of as less removed from the original material). This move is intended to reorient debate away from evaluations of accuracy (accuracy being another thing that is negotiated, not a given) toward examining the goals and interests underlying each approach.

---

[52]*Ibid*., pp. 160-162.

Even Natural Kinds Have Interpretive Flexibility

Unlike the laboratory, which is admittedly filled with artificial conditions, the field site seems like that final place to find undeniably real nature with a singular meaning: a rain forest is a rain forest is a rain forest. The case of the Smithsonian rain forest exhibit suggests otherwise. Central to understanding what happened to the rain forest exhibit planned for the Smithsonian is what H. M. Collins calls the "potential local interpretive flexibility of science which prevents experimentation, by itself, from being decisive." According to Collins, delineating interpretive flexibility involves identifying the social mechanisms of closure in ending scientific controversies.[53] Finally, Collins argues that the mechanisms of closure must be ultimately traced out of the laboratory and into the cultural milieu of society at large.[54]

Trevor Pinch and Wiebe Bijker adapted the concept of interpretive flexibility to examine the invention of the bicycle in nineteenth-century Britain.[55] They show how various social groups redefined and rebuilt the bicycle around their own needs and interests. To young male enthusiasts, the high-wheeled Penny Farthing was a thrilling challenge, whereas for women seeking wholesome exercise, it was a dangerous menace. Negotiations between the groups eventually led to a variety of bicycles, including the "macho" Invincible

---

[53]H. M. Collins, "Stages in the Empirical Programme of Relativism," *Social Studies of Science*, 1981, *11*:3-10, on p. 4. See also H. M. Collins, "An Empirical Relativist Programme in the Sociology of Scientific Knowledge," in *Science Observed*, pp. 85-114.

[54]Collins, "Stages in the Empirical Programme of Relativism," p. 7.

[55]Trevor Pinch and Wiebe Bijker, "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, eds. Wiebe Bijker, Thomas Hughes, and Trevor Pinch (Cambridge, Massachusetts: MIT Press, 1987), pp. 17-50.

model and the "safety" Lawson's Bicyclette.[56] Indeed, today there is no such thing as "the" definitive modern bicycle.

Pinch and Bijker show how objects, in this case, human-made artifacts, come to have various meanings. Sociologists and semioticians of museums have made it clear that museum objects do not speak for themselves.[57] Framing museum objects in terms of their interpretive flexibility yields two further insights that semiotic analysis does not. First, it emphasizes examining the social groups of people interacting around and reinventing the object, and drawing out their motives for shaping the artifact the way they do. Not only is there no such thing as an archetypal modern bicycle, but to understand any bicycle means understanding the interests and activities of its makers and users.

This approach retains the focus on the way in which physical practice and action interact with "meaning" in the philosophical or conceptual sense. A mountain bike or a racing bike is not meaningful as an abstract category, but only as something people make and use—its meaning comes from what can be done with it. That is the key attitude I want to take with the rain forest exhibit. How is nature (both in the museum and in the field) physically and socially constructed and to what end? One reason for detailing the story of the interpretive flexibility of the bicycle is that although the original studies of scientific controversy emphasized the process of closure—paring back competing versions of how the world works—Pinch and Bijker's technological example highlights the proliferation of meanings.[58]

---

[56]*Ibid*., pp. 28-30.

[57]Sharon Macdonald and Roger Silverstone, "Rewriting the Museums' Fictions: Taxonomies, Stories and Readers," *Cultural Studies*, 1990, *4*:176-191; Mieke Bal, "Telling, Showing, Showing Off," *Critical Inquiry*, 1992, *18*:556-594; Ivan Karp and Steven D. Lavine, eds., *Exhibiting Cultures: The Poetics and Politics of Museum Display* (Washington, D.C.: Smithsonian Institution Press, 1990).

[58]On the closure of controversy, see Collins, "Stages in the Empirical Programme of Relativism," p. 4.

As the following chapters will demonstrate, this case study does not find ultimate closure to the process of defining the rain forest in museum exhibitions. Rather, the rain forest remained a continually flexible resource for the entire period studied, and was constantly subject to reinterpretation and redefinition by shifting groups of actors (there is no stable core set over the entire period, either). However, this study does share with both projects the strong desire to explain the changes in the rain forest's meaning inside the museum in terms of larger cultural trends and movements. Because of its standing as a locus of intersection between the public and private spheres, the natural history museum is an ideal place to examine this causal linkage.

Explaining Interpretive Flexibility

The existence of interpretive flexibility will be demonstrated by identifying the successive meanings attributed to the tropical rain forest in the case studies to follow. However, explaining how exhibit-makers attempted to overcome interpretive flexibility and achieve closure by representing stable scientific knowledge requires the additional theoretical tools of tacit knowledge, inscription, and translation. The following chapters will show that these ideas were not uniformly used by all actors during all stages of the episode, but, as the constituent parts of incommensurate world views, were seen to have varying utility and relevance to the research and exhibit-making enterprise.

An Affinity for Place Requires Tacit Knowledge

Michael Polanyi first called knowledge that could not be formalized in words "tacit knowledge," and made it part of his critique of logical positivism.[59] In everyday terms, we use tacit knowledge to ride a bicycle (of whatever type) or

---

[59]Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (New York: Harper and Row, 1964 [1958]).

paint someone's portrait: we can do it, but we cannot say exactly how, and we have had to practice it to get it right. According to traditional conceptions of how science operates, the "materials and methods" section of scientific papers were supposed to allow other scientists to reproduce the reported experiment. But as sociologists of science have looked at the activities that constitute doing science, they have discovered that tacit knowledge undergirds scientific practice, no matter how detailed the methods section or laboratory manual might be.

In the canonical study on the subject, Harry Collins shows that tacit knowledge plays an indispensable role in the successful replication of an experiment. Observing scientists' efforts to build a copy of an experimental new type of laser, Collins found that the instrument could only be made to work after repeated consultations with and even visits to the laboratories of the designers of the first laser. One of the builders of the original successful laser commented, "Even today there is no clear idea about how to get this thing working properly. We are even now discovering things about how to control the performance of these devices which are unknown." Even when successful modifications to the laser were motivated by formal theoretical considerations, it would turn out that the theory was not the reason why the modification worked.[60] The bottom line was that there were things that could only be properly understood by physically doing them, or working directly with the person who had first developed the successful practice. Written instructions--what Collins calls the "algorithmical model"-- could not substitute for direct experience or iterated verbal discussion with the experts--the "acculturational model."[61] Collins concludes that one

---

[60]Collins, *Changing Order*, pp. 57-58.

[61]*Ibid*., p. 57. Although direct experience that cannot be verbalized is the strict definition of tacit knowledge as Polanyi uses it, Collins explicitly also applies the term to the Wittgensteinian notion of "participation in a [socially transmitted] form of life." (*Ibid*., p. 77, note 5). I will use the term, following Collins, to refer both to the more completely cognitive tacit knowledge gained

traditional cornerstone of the scientific method—repeatability of experiments—-is often difficult, challenging, and never to be taken for granted.[62]

To build a museum recreation of nature successfully requires tacit knowledge for the same reasons tacit knowledge is required to build a laboratory laser successfully. Armchair exploring is no substitute for an expedition. Going to the field is paramount in order to experience it in its totality first-hand. This is because part of what the museum exhibit is meant to convey to the visitor is some of the intangible emotional excitement of being on the spot. Furthermore, the demands upon the preparator to reproduce pieces of nature in physical terms mean that the preparator's work cultivates a highly developed observational acuity. A powerful awareness of the object is required to paint it or model it. This competence has been widely recognized among scientific illustrators and scientists alike.[63] Crucially, these craft skills are learned by apprenticeship and not formal classroom education.

Tacit knowledge will be used to bring out the particularistic character of the naturalist's gaze and the attendant place-specificity of the habitat group. By that I mean that the museum taxonomist constantly walks the line between attributing observed differences between specimens to individual variation within a group (lumping) or considering those differences to constitute a new group (splitting). Even though taxonomists approach each new specimen as a unique case, they are always making a judgment as to whether it fits into the existing pattern or modifies it. Taxonomists' apprentice-style training, which passed the tacit knowledge of taxonomy from teacher to student, was designed

---

from individual direct experience and the socially learned tacit knowledge that results from a combination of informal verbal interaction and personal experience (see also *Ibid*., pp. 58-63).

[62]*Ibid*., pp. 28-49.

[63]Ann Shelby Blum, *Picturing Nature: American Nineteenth-Century Zoological Illustration* (Princeton: Princeton University Press, 1993), pp. 20-46.

to sensitize them to the nuance of variation.[64] This way of learning to see is not easily formalized by lists of written rules. Even written dichotomous keys used to identify organisms require practice to use them correctly.

As another example of the naturalist's vision, the cytogeneticist Barbara McClintock expressed her observational insights in highly particularistic terms that the growing field of molecular genetics could not understand.[65] She specifically criticized molecular biology for missing the phenomenon of transposition of genetic elements because molecular biologists were too wrapped up in the sweeping theoretical claims of the hierarchical central dogma and were not well-enough trained in observation to be able to see patterns in individual variation.[66] Stephen Jay Gould called her work the "triumph of a naturalist," stating that McClintock's willingness to look for causes of variation that molecular genetics dismissed as random or meaningless was the hallmark of the naturalist's way of seeing the world.[67] Tacit knowledge, such as McClintock's or a museum taxonomist's, significantly contributes to the naturalist's rich, inductive conception of the world.

As Chapters Four through Six will show, later groups of exhibit-makers composed of professional designers and writers tended to ignore the tacit knowledge of the field in their representations. Rather, they focused on the formalized algorithmical knowledge of "ready-made science."

---

[64]Mary P. Winsor, *Reading the Shape of Nature: Comparative Zoology at the Agassiz Museum* (Chicago: University of Chicago Press, 1991).

[65]Evelyn Fox Keller, *A Feeling for the Organism: the Life and Work of Barbara McClintock* (New York: W. H. Freeman, 1983); Barbara McClintock, "Oral History Interviews," 1980, Cornell University Archives.

[66]Fox Keller, *A Feeling for the Organism*; p. 179; Barbara McClintock, "Oral History Interviews," 1980, Cornell University Archives.

[67]Stephen Jay Gould, "Triumph of a Naturalist," *New York Review of Books*, 29 March 1984, pp. 3-6.

Habitat Groups Are Created by Inscription Devices

As a participant observer in a biochemistry lab at the Salk Institute in the 1970s, the philosopher-turned-sociologist Bruno Latour saw that activities in the lab revolved around transforming pieces of nature, such as experimental rats, into useful representations:

> The whole series of transformations, between rats from which samples are initially extracted and the curve which finally appears in publication, involves an enormous quantity of sophisticated apparatus.. . .By contrast with the expense and bulk of these apparatus, the end product is no more than a curve, a diagram, or a table of figures written on a frail sheet of paper.. . .Thus, the main upshot of the prolonged series of transformations is a document which, as will become clear, is a crucial resource in the construction of a "substance."[68]

What is important here is that messy, ungainly, and time-consuming processes can be turned into a form that is tidy, compact, and time- and place-independent. Only then is "nature" cognitively useful in the human social domain of conferences, journal referees, conferences, and eventually, textbooks.

Latour and Woolgar give the entities in the lab that carry out these transformations the name "inscription devices":

> "[M]achines" [such as centrifuges] transform matter between one state and another.. . .By contrast, a number of other items of apparatus, which we shall call "inscription devices," transform pieces of matter into written documents. More exactly, an inscription device is any item or apparatus or particular configuration of such items which can transform a material substance into a figure or diagram which is directly usable by one of the members of the office space.[69]

Raw data is not removed enough from nature to be analytically useful to the principal investigators interpreting and writing up the experiments created by their technicians. Although a sample tube backs up a graph, the graph tells the

---

[68]Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts*, 2nd ed. (Beverly Hills: Sage, 1986 [1979]), p. 50.

[69]*Ibid*., p. 51.

story and makes the point. These "immutable mobiles" are what circulate in the scientific economy.[70] This is what Latour and Woolgar mean when they state that the inscription "is a crucial resource in the construction of a 'substance.'"

Furthermore, Latour and Woolgar are explicit on the point that the inscription device is not just a single physical apparatus:

> This notion of inscription device is sociological by nature. It allows one to describe the whole set of occupations in the laboratory, without being disturbed by the wide variety of their material shapes. For example, a "bioassay for TRF" counts as *one* inscription device even though it takes five individuals three weeks to operate and occupies several rooms in the laboratory. Its salient feature is the final production of a figure.[71]

An inscription device is the constellation of people and machinery that creates inscriptions, or abstracted bits of nature. Taking the entire complex together is important, since it is difficult to say at exactly which step in the chain of transformations the substance the figure represents first comes into existence.

Applied to exhibit-making, the idea of inscription as transformation from one domain to another, where the field is the analog of the lab bench and the exhibit hall is the analog of the final publication, delineates how nature is captured, made knowable, disciplined, idealized, and abstracted by the knowledges, practices, and equipment used to create the museum exhibit. Figure 1.3 summarizes the inscription process in the laboratory and applied to the natural history museum. In the laboratory, pieces of nature have been captured and turned into inscriptions, which pass into what Latour and Woolgar call the "secretariat"—the place inhabited by the principal investigators and administrative staff—where the inscriptions are used to create publications, which pass into circulation outside the lab (these are, of course also brought into

---

[70]Bruno Latour, "Drawing Things Together," in *Representation in Scientific Practice*, eds. Michael Lynch and Steve Woolgar (Cambridge, Massachusetts: MIT Press, 1990), pp. 19-68.

[71]Latour and Woolgar, *Laboratory Life*, p. 51 note 5.

the lab and affect future lab work). Several similarities and differences are immediately clear. The museum can be said to produce inscriptions, but they remain physical entities, and require "people outside" to come inside to interact with them.

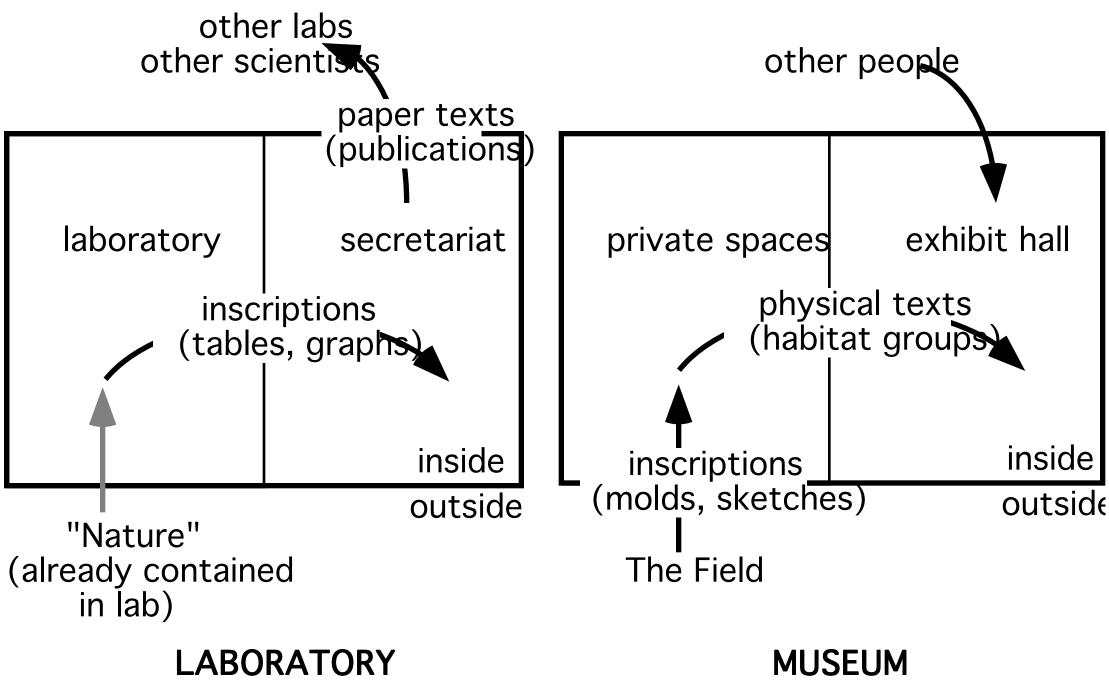


Figure 1.3. Comparison of inscription process for laboratories versus natural history museums. Left side after Latour and Woolgar, *Laboratory Life*, p. 46.

In the coming chapters, the exhibit-makers' stock products—the background painter's field studies and photos, the mammalogist's skins, skeletons, and photos and measurements of animal carcasses, and the accessory man's preserved specimens, plant molds, and color studies and sketches—will be introduced in detail. Admittedly, they are not all paper documents such as those generated by the laboratory inscription devices. Because they exist in the museum world, they are still material objects, and as such, have not been abstracted as completely as the lab's physical entities. However, they *are* pieces of raw nature that have been transformed into a condensed, preserved form that can be more readily transported back to the museum than the original specimens. Once inside the private spaces of the museum, these inscriptions will be used to generate habitat groups, the equivalent of the publication in the lab world. In the case of each of the items named above, they have been collected for their value in identifying and isolating a specific aspect of the field site that is considered to embody its essence. The museum lab is the intersection of the private spheres inhabited by the curators and the preparators. The preparation lab was called a laboratory early on because it was used to prepare scientific specimens as well as exhibit specimens. As Chapter 5 will show, that changed at the Smithsonian in the late 1960s as part of the dissociation of exhibits from research.

How Nature is Translated Into the Museum

Describing plant models as products of inscription devices does not imply that the natural history field site is identical to a laboratory in the strict sense, because controlled experiments are obviously not carried out there. However, another feature of laboratories that empirical studies of laboratory life have revealed is the way in which the laboratory "translates" nature through it. That is, there is a loop formed between the outside of nature and the inside of the lab in which nature is first brought into the lab and domesticated in order to be represented, and then laboratory conditions themselves are extended outside in order to sustain the effectiveness of the instrumentalities developed inside the lab. In this case, Bruno Latour's metaphor of translation draws on the meaning of the word both as the process of interpreting one language in another, and as the act of moving from one place to another.[72] Habitat groups involve translations in both of these senses: as representations, they create a new version of nature and they literally move nature into the museum hall.

Latour claims that "the very difference between the 'inside' and the 'outside', and the difference of scale between 'micro' and 'macro' levels, is precisely what laboratories are built to stabilize or undo."[73] If for this analogy the private spaces of the museum are considered to be the functional equivalent of the laboratory, then Latour's analysis is quite appropriate, for the assumptions and practices that inform both the museum work and field study create an isomorphism between the two while at the same time maintaining certain distinctions. That is, the museum group could not be built without input from the field site, but the field site could not be successfully examined without the technologies developed inside the museum space. The metaphor of translation thus also takes on the meaning of transformation; it is not a mapping process, but a creative one, in which the entity being translated is not the same after translation as it was before.

---

[72]Bruno Latour, *Science In Action: How to Follow Scientists and Engineers Through Society* (Cambridge, MA: Harvard University Press, 1987), p. 117.

[73]Bruno Latour, "Give Me a Laboratory and I Will Raise the World," in *Science Observed: Perspectives on the Social Study of Science*, eds. Karin D. Knorr-Cetina and Michael Mulkay (London, Beverly Hills: Sage, 1983), pp. 141-170, on p. 143.

Latour uses a reconstruction of Louis Pasteur's successful and legendary development of a vaccine against anthrax in his microbiology laboratory in Paris in the 1880s to show how laboratories succeed by first taking nature into them for study, but then must make the field conditions resemble the laboratory conditions in order to extend the efficacy of laboratory procedures into the field. According to Latour, Pasteur's success hinged on his ability to make the laboratory an "obligatory passage point," meaning that future solutions to the anthrax problem would not be found in terms of public health, but microbiology.[74] With the invention of the anthrax vaccine, microbes became the definition of the disease. Translation was accomplished with the following set of moves: First microbes were isolated and domesticated in the laboratory. Then the field was remade to include crucial elements of lab conditions in order for the microbes domesticated in the lab to have efficacy in the field. The dirt and confusion of the barnyard had to be disciplined enough for an animal to be successfully inoculated.[75] Latour's point is that science is made universal by extending its networks, rather than drawing on pre-existing universality.[76] The next chapter will use Latour's conception of translation to show how the mediations of the museum hall can also structure the naturalist's experience of the field site.

The Role of SSK

Highlighting the interpretive flexibility of something as natural as the tropical rain forest in the field means that whenever we are confronted with a representation of nature, understanding it involves going beyond the surface quality of the content and asking who has created the representation and to what

---

[74]*Ibid*., pp. 146-147.
[75]*Ibid*., pp. 150-151.
[76]Latour, *Science in Action*, p. 248.

end. Because tacit knowledge becomes transparent when explaining the basis of scientific knowledge, and because the process of inscription and translation can be contested, the rain forest in the museum possesses considerable interpretive flexibility. Looking at elements of a field expedition as inscription devices shows that the more real something has been made to look, the more work has gone into making it look that way. This is a slightly different result from that seen in laboratories, which is that successive rounds of interpretation and inscription lead to successive rounds of abstraction away from the original natural entity. Bringing out the practices used to translate nature into the exhibit hall will show that the field site is transformed at the same time as the habitat group is built. There is no raw nature anywhere to be found.

The insight that realism as a genre of scientific representation is heavily mediated in turn provokes a re-evaluation of claims by other biologists that natural history itself was atheoretical and "merely" descriptive.[77] If natural history habitat groups required well-developed interpretive skills, then the charge of mere description must be understood as part of a strategy to marginalize the questions and modes of inquiry of natural history. Natural history and experimental biology are indeed two different enterprises, but not for the reasons the detractors of natural history have claimed.

The habitat group is in one respect a "hard case" for looking for the social construction of science. Science studies has generated compelling evidence for the notion that the knowledge laboratories produce results from socially mediated processes rather than being determined entirely by the original input

---

[77]In 1905, Frederick Clements, one of the founders of American ecology who sharply differentiated ecology from natural history, stated that natural history "lends itself with insidious ease to chance journeys or to vacation trips, the fruits of which are found in vague descriptive articles" (quoted in Joel B. Hagen, "Ecologists and Taxonomists: Divergent Traditions in Twentieth-Century Plant Geography," *Journal of the History of Biology*, 1986, *19*:197-214, on p. 200).

from raw nature. The successive rounds of inscription and abstraction of laboratory data are precisely what give the data instrumental value: a curve on a graph is more useful to *knowing* and communicating the phenomenon than the actual set of samples that generated the graph. But the habitat group as a genre of representation appears at the outset to be so literal, such an exacting copy of nature rather than an abstraction of it, that the conceptual distance between the field site and the museum hall could be assumed to be much shorter than that between the laboratory sample and the journal article. But it turns out that building a realistic exhibit requires *more* primary interpretive work than building a concept-based exhibit that relies on already finished knowledge. This finding, coupled with the demonstration of the interpretive flexibility of the rain forest, reinforces the idea that *all* representation is heavily mediated, and that realism is a representational genre identifiable not by its privileged claim to authenticity, but by the way in which it constructs a claim to authenticity.

Interrogating the Public Communication of Science

Finally, taken together, SSK and scientific rhetoric have important implications for models of the public understanding of science. Habitat groups are a peculiar hybrid of popular exhibit and scientific research. As such, they call into question the standard assumptions of the transmission of scientific knowledge from scientists to the public.

I prefer the label "public communication of science" instead of its cousin, "public understanding of science," in order to differentiate this study from the sizable industry devoted to the assumption that the "public" (whoever they may be) does not know enough about science and that their scientific literacy should be increased by whatever means possible.[78] Much of the attention that

---

[78]"Scientific literacy" is probably better called "scientistic literacy" because most measures of science literacy, such as the commonly cited Science

museums themselves pay to their exhibition practice focuses on identifying a message to convey, determining the best means of communicating that message, and then evaluating the degree of the message's uptake by the visitor.[79] An exhibition's success or failure is based on whether enough visitors recognized and deciphered the intended message. Rather than entering into the debate to formulate an instrumentally more effective means of communicating to the museum visitor, I take those discussions to be of interest in analyzing *how* a message is selected and projected and *what* the museum community comes to recognize as counting as effective communication. Those methods and standards have changed dramatically over the last several decades in response to a combination of aesthetic, cultural, and scientific forces, and have largely been influenced by the identities and interests of the exhibit-makers. I do hope that such a historical perspective might be useful to those who are involved in the present round of stock-taking in museums, for, as Chapters Six and Seven show, some elements of the debates over exhibition practice during the 1960s and 1970s are again at play today.

Pipeline Model of Science Communication

The field of science communication has taken the positivistic attitude that scientists generate objective truth and that it is this hard core of knowledge that science writers and teachers translate and often distort in order to make it

---

Indicators, heavily penalize respondents if they so much as read their horoscope, indicating not just scientific knowledge but scientistic thinking (J. D. Miller, "Scientific literacy: a conceptual and empirical review," *Daedalus*, 1983, *112*:29-48; critiqued in Brian Wynne, "Public Understanding of Science," in *Handbook of Science and Technology Studies*, pp. 361-388). However, other studies show that members of the "non-attentive public" may be quite knowledgeable about specific issues (reviewed in Bruce V. Lewenstein, "Science and the Media," in *Handbook of Science and Technology Studies*, pp. 343-360, on p. 353).

[79] R. S. Miles, "Museums and the Communication of Science," in *Communicating Science to the Public*, eds. David Evered and Maeve O'Connor (Chichester: Wiley, 1987), pp. 114-130.

publicly digestible. All errors in public versions are attributed to this imperfect translation process. I refer to this as the "pipeline model of science communication," since the dominant metaphor of the model considers scientific information to be a tangible substance that can be unidirectionally transferred from the esoteric to the public spheres without qualitative alteration.

But what does a translation error mean when the production and communication of knowledge are wrapped up in the same process and carried out by the same institution? Before the 1960s, that was frequently the situation in natural history museums. The historically close proximity of research and representation makes the natural history museum a microcosm that highlights the interface between esoteric and public scientific knowledge. This dissertation visits that field site to examine the scientific, institutional, and social structures that replaced the overlap between exhibition and research with the division of labor that typifies the present-day science communication industry.

Visitor Studies

On the museum visitor side of the equation, many museums have recently recognized that their discourse involved elites speaking to other elites or down to the masses. This has led to a variety of outreach programs intended to attract the interest of traditionally "non-attentive" segments of the public.[80] These outreach initiatives have involved breaking down the category of non-attentive, which define interest in science in certain ways, and instead have sought to identify specific interests and sensibilities of previously marginalized groups. But exhibit-makers still use the non-attentive public as a monolithic target audience to the extent that they dismiss the opinions of partisans or experts of any sort

[80]Jon D. Miller, "Reaching the Attentive and Interested Publics for Science," in *Scientists and Journalists*, eds. Sharon Dunwoody, Sharon M. Friedman, and Carol Rogers (New York: Free Press, 1986), pp. 55-69.

(Chapter Six). Since more recent studies of public knowledge of science show that non-technically trained people have sophisticated local knowledge, and frequently have an opinion, the category of non-attentive tends to collapse and with it the target audience of the exhibition.

Visitors are not well-represented in this study, largely because the exhibition followed in the Smithsonian case was not built for over a decade. However, tacit theories of the visitor are present in the early stages, and these can be contrasted to the more fully-developed concept of the visitor present in the 1989 "Ecology" gallery at the Natural History Museum in London, which will be discussed as a comparison to the Smithsonian case.

Professionalization of Exhibit-making

According to the conventional wisdom of science communication, scientists are too over-trained to popularize their own work. Museum educators see designers as better equipped to communicate than scientists because they are trained in the tools of visual communication, and they believe that those skills are not part of the scientist's vocabulary. At the same time, John Burnham accuses scientists of withdrawing from the popularization process in the first quarter of the twentieth century, abdicating their civic duty to spread the gospel of science, and leaving the field open to inadequate coverage of science.[81] However, George Ehrhardt argues that professionally-organized public relations efforts such as what became the American Chemical Society's Science Service actively shaped popular science reporting.[82] Ehrhardt's conclusions set a useful precedent for this study by showing that popularization and image-shaping were

---

[81] John Burnham, *How Superstition Won and Science Lost: Popularization of Science and Health in America* (New Brunswick, New Jersey: Rutgers University Press, 1987).

[82] George R. Ehrhardt, "The Creation of Popular Science Writing, 1915-1945," paper presented at the Annual Meeting of the History of Science Society, New Orleans, October 12-16 1994.

not universally avoided by scientists. The claim, then, that scientists cannot or will not create publicly accessible representations of their work must be examined more closely.

The preceding sections have laid out the theoretical underpinnings and ulterior motives of this study. By looking at both the generation and dissemination of scientific knowledge through the lens of the social construction of science, it is hoped that current debates of exhibit style and content can move beyond complaints over accuracy to examine the involvement of natural history exhibitions in cultural conceptions of nature.

Chapter Summary

Why examine exhibits at the Smithsonian when habitat groups were never a large part of its repertoire? One of the main aims of this study is to develop further the idea of the historical overlap between exhibition practice and scientific research at natural history museums. Other published cases have well-established the conceptual and practical intersections of research and public representation in American natural history in the late nineteenth and first half of the twentieth centuries.[83] Along with those studies, others have also explored how exhibits are not simply mirrors of nature or culture, but instruments of social and political elites in their efforts to shape public discourse in the areas of race, colonialism, and science.[84] Environmental historians have focused on nature writers such as Rachel Carson as important forces in shaping awareness of

---

[83] Rainger, *Agenda for Antiquity*; Star, "Craft vs. Commodity;" Elizabeth B. Keeney, *The Botanizers: Amateur Scientists in Nineteenth-Century America* (Chapel Hill, North Carolina: University of North Carolina Press, 1992).

[84] Haraway, "Teddy Bear Patriarchy"; Tracey Teslow, "Representing Race: Artistic and Scientific Realism at the Field Museum of Natural History," *Science as Culture*, in press; George Stocking Jr., ed., *Objects and Others: Essays on Museums and Material Culture* (Madison: University of Wisconsin Press, 1985); Karp and Lavine, *Exhibiting Cultures*; Robert W. Rydell, *World of Fairs: The Century-of-Progress Expositions* (Chicago: University of Chicago Press, 1993).

conservation issues.[85] Museum exhibits are another place to look for publicly promoted attitudes about nature. It might seem that a further study of the AMNH's North American Mammal Hall, which was created expressly to memorialize America's wild places and creatures, could synthesize these three threads of scientific practice, political power, and relationships with nature from the turn of the century through the 1950s. Such a study remains to be done.

Instead, the case of the Smithsonian's rain forest exhibit and how it went from being part of a botany hall to an image of environmentalism is significant in the following way: this case spans the transition from more traditional exhibits such as the habitat group to the contemporary style influenced heavily by the communication theory and design trends of the World's Fairs of the 1950s and 1960s. It offers the chance to see how traditional exhibit forms and the institutional configurations they involved were transformed during the 1960s.

Finally, by covering a transition period rather than a period of *status quo* (a move equivalent to the focus on controversy in science studies), the specificity of a genre's particular rhetorical strategies to their given argument is highlighted. This case shows that new representational forms are entailed by the shift in argument from the conception of nature as a *place* to a notion of nature as a *system*. That claim is the companion to the idea of an overlap between exhibition and research. Studies of the rhetoric of science have shown that genre and argument (form and content) are not easily pulled apart. As Ashmore, Myers, and Potter state in their review of this literature, "It is not just a matter of how *it* is put; the *it* is mixed up with the *putting*."[86]

---

[85]Robert Gottlieb, Forcing the Spring: The Transformation of the American Environmental Movement (Washington, D.C.: Island Press, 1994); Donald Worster, Nature's Economy: A History of Ecological Ideas (Cambridge: Cambridge University Press, 1977).

[86]Ashmore, Myers, and Potter, "Discourse, Rhetoric, Reflexivity," p. 322.

Chapter Two: Prehistory

The story of this dissertation proceeds as follows: As a prologue to the transformations the Smithsonian rain forest exhibit experienced in the 1960s, the Botany Hall project will be situated in the broader natural history museum landscape after World War Two, including habitat groups at the American Museum of Natural History and the Denver Museum of Natural History. New York's North American Mammal Hall is an example of the technology at its height. Furthermore, the Smithsonian preparator who worked on the rain forest in all its incarnations was trained at the AMNH, so that he represents a concrete transfer of craft knowledge between the two institutions. The Denver Museum represents an important exemplar of American habitat groups, both because it had invested extensively in traditional habitat groups from the 1930s through the 1950s, and because the Smithsonian botanists were quite favorably impressed by those exhibits when they began their own project in 1960.[87]

After World War Two, the Smithsonian undertook an ambitious and comprehensive Exhibits Modernization Program, which included the early plans for the Botany Hall. However, the botany staff initially resisted exhibit-making as an unwanted drain on time and resources available for research.

Chapter Three: Rain Forest as Field Site (Proposition One)

Chapter Three engages the assertion of Proposition One that "natural history museum habitat groups and their descendants do not copy nature into the exhibit hall in a transparent fashion, but create a *version* of nature informed by the epistemologies, aesthetics, practices, and institutional interests of the exhibit-makers."

---

[87]New York and Denver were selected as the top two North American museums for their habitat groups in Wonders' survey of background artists (Wonders, "Natural History Dioramas: A Popular Art Idiom," p. 302).

Between 1960 and 1966, the original plans for the Botany Hall at the National Museum of Natural History called for a traditional set of habitat groups recreating habitats from the Western Hemisphere, including a tropical rain forest in lush and exacting detail. The genre of realism results from the naturalist's epistemology of description: a complete description of a field site requires its replication in the exhibit hall because the individual variation of the flora and fauna is a key feature to be represented and therefore cannot be reduced to anything more abstract.

The institutional and intellectual high-water mark of this period was the Botany Department's 1962 expedition to then-British Guiana, which merged collecting specimens for scientific study with collecting material for the hall. A Smithsonian-produced film about the expedition called *The Leaf Thieves* explicitly incorporated the overlap of research and representation into the museum's public projection of its scientific mission. The cognitive and interpretive skills of the model-makers engaged in replicating botanical specimens in the field resembled the botanists' ways of seeing. The tradition and function of realistic habitat groups will be further highlighted by comparison to the contemporaneous botany gallery at the British Museum (Natural History).

Chapter Four: Rain Forest as Ecosystem (Proposition Two)

According to Proposition Two, "though conceived as a popular exhibit genre, realistic habitat groups reflected the naturalists' value of the specific field site as irreducible to more general terms, whereas later more abstract exhibits drew on an ecological paradigm that saw natural systems in terms of interchangeable parts." In this chapter, the shift in the meaning of the rain forest from field site to ecosystem demonstrates the above claim. Chapter Four delineates the interplay between intellectual and institutional factors, showing how both the scientific concepts available for deployment and the actors who deployed them shifted.

In 1967, institutional pressures forced cancellation of the botany hall, but the rain forest material was saved by being merged with an expanded treatment of animal life based on the also in-progress insect hall. The amalgam was renamed the Hall of Living Things, and the rain forest would have served to illustrate the wider idea of the interconnection of life and the physical environment. By then, an ecosystem was no longer seen in technical terms as strictly an association of plants and animals dictated by physical parameters such as climate or soil, but had become an interlocking system of energy flow and nutrient cycles. Glossed in ecological terms, the rain forest retained its realism, but became scientifically more abstract as it was transformed from a unique habitat type into an *instance* of the general concept of interrelatedness. An important institutional factor in this transition was that the botanists became less involved in planning the exhibition. Instead, propelled by the active interest of the Smithsonian's Secretary in a "conceptual approach," this phase was shepherded by an established natural history writer contracted originally to write exhibit scripts for the insect hall.

Chapter Five: Rain Forest as Environmentalist Icon (Proposition Three)

Chapter Five will argue Proposition Three, that "whereas the scientists and artists based habitat groups on their own field experience with the aim of showing museum visitors the wonders of their field sites, the designers and educators wanted to repackage existing ecological information as part of a larger agenda for environmental education in the 1960s and 1970s." The societal force of the environmental movement and the institutional dimension of internal financial contingency are most strongly at work in the move from seeing the rain forest as an ecosystem to making it even further into an icon of conservation.

Economic recession in 1971 foreclosed the ambitious plans for the Hall of Living Things. The outside design firm hired to finish the project drew on the activist discourse of the growing ecology movement to make the rain forest function as an icon standing in for all of nature imperiled by human recklessness. This discourse deployed the rhetoric of individual action, as evidenced by the exhibition's new title, "It All Depends," with the punch-line "on you." Completed as a "temporary" exhibition open for only about six months in 1974, this was the only version of the rain forest ever actually built. Though it used the materials originally collected on the 1962 expedition, its realism was significantly attenuated: since there was no longer the need to represent a specific place, the rain forest used mirrors to create an illusion of depth instead of a background mural depicting the actual collection site. The exhibition contained few specimens from the national collections and instead relied on multi-media presentations. The curatorial staff withdrew to the sidelines and the exhibition was built over their aesthetic and scientific objections.

After "It All Depends" was closed, some of the plant models were transplanted in 1975 to the NMNH's present hall on South American cultures, where they were joined with background murals and stuffed animals. There, the rain forest became a set piece for displaying Amerindian artifacts. The rain forest lost its status as a purely biological entity and was redefined in terms of the lifeways of indigenous humans. This final deconstruction of the rain forest illustrates the ultimate interpretive flexibility of the papier-mâché trees and plastic leaves which originally referred to a British Guiana jungle devoid of humans or other animals. The meaning could not have changed more from the botanists' original conception, which explicitly excluded animals as distracting from the plants and defined people as belonging to the province of anthropology.

Chapter Six: The Ecology Gallery at The Natural History Museum, London

In this chapter, analysis of "Ecology" at the British Museum (Natural History), known in London as The Natural History Museum, developed in the late 1980s and opened in 1991, provides useful intellectual, institutional, and social comparisons to the 1974 "It All Depends" exhibition at the Smithsonian. Specific similarities between the exhibitions include a tropical rain forest recreation used as an entrance exhibit, multi-media presentations on contemporary ecology and the environment, and a renewed deployment of the individualized rhetoric of conservation. The debate between the curators, who championed objects, and designers and educators, who favored abstract exhibits, that was first played out at the Smithsonian in the 1960s and 1970s took the shape of a debate between "interpretation versus education" in London, and involved many of the same arguments.

Chapter Seven: Living Rain Forest Exhibits

Chapter Seven looks at the proliferation of current living rain forest exhibits at zoos, aquaria, and science centers across North America during the late 1980s and early 1990s. By exploring the connection between biodiversity as the legacy of natural history and the new realistic representations of rain forests, it shows that realistic representation in the hands of scientist/exhibit-makers has not died out, but has moved out of the museum. "Amazonia," opened in 1992 at the National Zoological Park in Washington, D.C., offers a recent comparison to the earlier period. Like the botanists, the creators of "Amazonia" intended it to highlight the plants of the rain forest and downplay the visual attraction of animals by themselves. As a self-contained living habitat, the exhibit embodies an ecological approach that emphasizes the maintenance of an entire system, as well as relying on realistic hybrids of living and constructed elements to create a "you are there" experience for the visitor.

Chapter Eight: Conclusions

The museum gallery is a place where images and ideologies of science and nature are constructed and inscribed on the artifacts. From this analytical stance, the exhibit hall provides a window onto the exhibit-maker's conceptions of nature, rather than a window onto nature itself, as the exhibit-makers would prefer. Looking through this window will suggest the following conclusions: First, the categories of realism and abstraction in natural history exhibits must be seen as situated solutions to the problem of representing nature. The interpretive flexibility of the tropical rain forest, as seen from the various definitions given it during the episodes covered by this dissertation, means that there is no single representation which can be privileged over the rest. Abstract exhibits are not epistemologically parasitic on realistic representations, while neither is realism any less conceptually sophisticated than abstraction.

This dissertation shows how different rhetorical strategies in natural history exhibition arise from distinct scientific insights deployed by different social groups in response to concerns specific to those groups. That finding—that realistic habitat groups and abstract ecological exhibits have their own logics and conventions—implies that the two are ultimately incommensurable. They do not simply create different maps of the "same" information, but competing conceptions of the world. Furthermore, these competing conceptions of the world—natural history and systems ecology—each involve highly-differentiated practices and bodies of knowledge that lead to their respective emphasis on realistic and abstract representations of nature.

When examined through the medium of the habitat group, natural history can be seen to encompass an inductive, sophisticated picture of the world that values uniqueness as much as generalized pattern. The act of description is not at all straightforward and cannot be dismissed as atheoretical. For environmental history and current conservation efforts, this implies that new frames for the natural must necessarily be constructed and not found: even in the field, nature is not found but made.

Pipeline models of science communication are ultimately hierarchical and aim to maintain the authority of scientific establishments and knowledges to set the rules and subject of discourse. For science to maintain its authority in a post-modern world of general cynicism and questioning of totalizing concepts of progress, new mechanisms for conceiving and communicating scientific information and process must be developed.

Finally, if natural history museums are to survive as unique cultural institutions into the next century, they must retain their emphasis on exhibiting and interpreting physical objects, making them as concrete as possible. Even though they are full of mediations, their physicality is still the key to their particular authority.

CHAPTER TWO
PREHISTORY:
THE OVERLAP OF EXHIBITION & RESEARCH BEFORE 1960

Introduction: Habitat Groups As Field Research

This chapter sets the stage for the story of the Smithsonian's attempts to reproduce a rain forest in the Museum of Natural History between 1960 and 1975. The background includes the wider context of the relationship between research and exhibition in American natural history museums in general and the local institutional resources, interests, and practices available at the Smithsonian. These two halves help explain why the later efforts at the Smithsonian to create a partnership between botanical research and exhibits were unsuccessful. That partnership was an alien idea imposed on the botanists rather than historically being an integral part of the practices of their field.

Rather than attempting an exhaustive survey of exhibit content and practice at all possible relevant museums to portray the "typical" museum, two institutions will serve as models because of their reputations in the habitat group genre, their specific influences on the Smithsonian botany hall, and the theoretical elements they explicate. The first is the American Museum of Natural History in New York City. Home to early habitat group pioneers such as Frank Chapman and Carl Akeley, the AMNH's habitat groups are among some of the best in the world, and reflect an enormous financial and institutional commitment to collecting and preparing animals, foreground materials, and backgrounds both in the field and in the museum. It was in this setting where Reginald J. Sayre, the preparator responsible for collecting and eventually building the rain forest at the Smithsonian, was trained.

The second model institution is the Denver Museum of Natural History. It is significant because for a museum of its small size compared to the Smithsonian or American Museum, it has had a large and vigorous exhibit program focusing on habitat groups created from primary materials. Furthermore, Smithsonian botany curator Richard Cowan visited the Denver Museum in 1960 and was greatly impressed by its exhibits and the methods Denver naturalist Robert J. Niedrach used to create them. Thus both New York and Denver had a tangible impact on the botany hall project at the Smithsonian in terms of transfers of skill and ideas.

The training and practices that Reginald Sayre brought to the Smithsonian and the insights that Richard Cowan gained from Denver were the right ingredients for creating botanical habitat groups at the Smithsonian. However, the SI's botanists had not been part of the tradition of overlapping research and exhibition practice. Their model for public outreach was based more on extending their own professional practices of specimen collection and identification to interested members of the public than on creating exhibits that reproduced their field sites. This meant that in spite of an exhibits modernization program that revitalized exhibits throughout the Smithsonian during the 1950s, the botanists were among the last and the most reluctant of the museum departments to join the program.

New York and Denver share in common the overlap between research and exhibition work involved in creating habitat groups. While other studies have uncovered this overlap, this chapter further explores what Star calls the "material culture of science."[1] Viewing the material culture of science through

---

[1]Susan Leigh Star, "Craft vs. Commodity, Mess vs. Transcendence: How the Right Tool Became the Wrong One in the Case of Taxidermy and Natural History," in *The Right Tools for the Job: At Work in Twentieth-Century Life Sciences*, eds. Adele E. Clarke and Joan H. Fujimura (Princeton: Princeton University Press, 1992), pp. 257-286, on p. 257.

the analytical lenses of tacit knowledge, inscription devices, and translation addresses Proposition One, which claimed in part that "natural history museum habitat groups and their descendants do not copy nature into the exhibit hall in a transparent fashion, but create a *version* of nature."

The case studies from New York and Denver show that exhibit-makers use tacit knowledge about unique characteristics of the field to direct their use of inscription devices in order to translate nature into the exhibit hall. Their work is in some ways a direct analogy to the way laboratory equipment translates invisible entities into charts and data. Although the final habitat group was in fact an idealization of the field site, its goal was to transport the viewer of the exhibit in the museum hall back out to the actual place in the field. This picture of the functions of habitat groups and exhibit-making practices contrasts with the culture of the earlier generation of Smithsonian botanists, who had no established history of an overlap between exhibition and research. Before joining the exhibits program, they did not see the knowledge and practice of exhibit-making as intersecting with their own professional skills and approach.

Tacit Knowledge & Sense of Place at the AMNH

Planning for the American Museum of Natural History's Hall of North American Mammals began in the 1920s, but construction did not begin until the mid-1930s. A press release issued at its opening in 1942 states that it was intended to "replace the old interpretation and 'stuffed animal' appearance of museum exhibition as shown in the old mammal hall, built in 1890."[2] Figure 2.1 is a model of part of the hall as it was conceived in 1931. The museum's desire to replace the "stuffed animal" appearance of older exhibits suggests a move away

---

[2]Jean Wiedemer, [opening of North American Mammal Hall], 29 March 1942, American Museum of Natural History Department of Library Services Special Collections, p. 1.

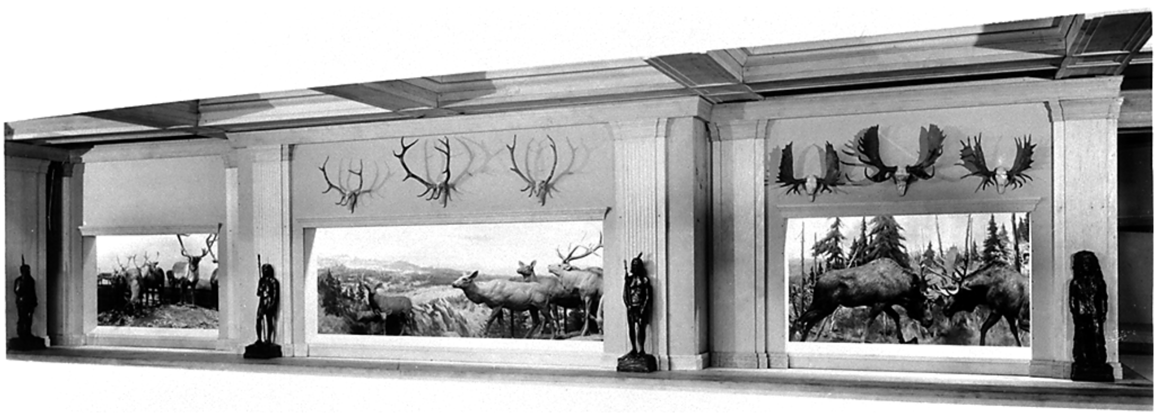


Figure 2.1. Planning model of North American Mammal Hall, American Museum of Natural History, 1931. Masking in original. Neg. #329685 courtesy Department of Library Services, American Museum of Natural History.

from exhibits in the style of big game hunting taxidermy. However, the trophy antlers mounted above the habitat group windows in the model clearly show the origins of the conservation movement in the elite sportsmen's clubs such as the Boone and Crockett Club, founded by Theodore Roosevelt in 1886 and later including prominent conservationists such as Gifford Pinchot.[3]

The press release indicates that the hall's new groups had a higher calling than to simply improve accuracy. They were to preserve scientifically America's vanishing wilderness:

> Realizing also that in many instances America's wildlife is still continuing to disappear before the advance of civilization as well as through changing climatic conditions governing the native habitats of these animals, F. Trubee Davison, President of the Museum, has directed its expedition program principally to the North American continent since the summer of 1935, for extensive collections of our existing animals.[4]

The bronze statues of Indian braves posted between each group highlight the irony of the hall's theme of preserving the vanishing natural wonders of the American wilderness. Native Americans were by then seen by whites as another part of nature; they had gone the way of the buffalo, and their loss could be mourned rather than their extermination desired.[5]

In order to convey the loss of "native habitats," the new exhibits needed to reproduce *place*. The Museum tied its conservationist argument in the hall explicitly to the genre of realism:

---

[3]Robert Gottlieb, *Forcing the Spring: The Transformation of the American Environmental Movement* (Washington, D.C.: Island Press, 1994), p. 23. The Boone and Crockett Club sponsored the Alaskan Brown Bear Group in the hall (floorplan for the Hall of North American Mammals, 1942, AMNH Department of Library Services Special Collections, Box: Department of Mammalogy North American Mammal Hall Memorabilia).

[4]Wiedemer, opening of North American Mammal Hall, p. 1.

[5]William H. Truettner, ed., *The West As America: Reinterpreting Images of the Frontier, 1820-1920* (Washington, D.C.: Smithsonian Institution Press, 1991).

> As in the Akeley African Hall on the floor above, the American animals are mounted in realistic life settings of their native plains, forests, swamps, mountains and deserts—a vista of North America's natural wonders and tremendous space—recreated by Museum scientists and artists as an enduring heritage and inspiration to the American people [sic].[6]

This passage conveys the emotion and ideology that had to be reproduced in the new habitat groups along with the animals, plants, and backgrounds. Reproducing the "natural wonders" of North America like the Grand Canyon and Yosemite Valley was an inspirational enterprise as much as a scientific one. In order to carry out this mandate, the partnership between the Museum's scientists and artists involved two sorts of tacit knowledge.

The first sort of tacit knowledge that the exhibit-makers had to possess in order to communicate the sense of place was the first-hand experience of the gestalt of the field: the impressionistic totality of what it feels like to be in the place that cannot be formalized in words but must be experienced and communicated visually. The construction of the Coyote Group in the North American Mammal Hall during the late 1940s illustrates the challenges in capturing place as a whole. The second sort of tacit knowledge involved in reproducing the field site in the exhibit hall is the culturally-transmitted skill of differentiating individual items in the field and modeling them. This idea frames Reginald Sayre's expertise in working on the Mountain Beaver Group for the North American Mammal Hall.

The Coyote Group & Choosing a Background

Figure 2.2 shows the Coyote Group set in Yosemite Valley National Park. The background artist for the group, James P. Wilson, cited the Coyote Group as a specific "example of where a fairly definite locale was chosen in advance but had to be modified in the field." In a 1960 oral history interview, he recounted,

---

[6]Wiedemer, opening of North American Mammal Hall, p. 1.

Figure 2.2. Coyote Group showing Yosemite Valley, North American Mammal Hall, American Museum of Natural History, finished 1949. Neg. #320494 courtesy Department of Library Services, American Museum of Natural History.

> It was decided that the group was to be laid in the valley in order to include such principal landmarks as El Capitan and Yosemite Falls. Although I had never been there, I knew from studying the maps that it was going to be difficult because they are on the same side of the valley, only six miles apart.. . .So we substituted Bridal Veil Falls.. . .We actually spent two days riding around, going up and down the valley on bicycles—we had no cars with us—looking at all possible localities before we selected the one chosen.[7]

If the group was to represent a specific spot on which the museum visitor could actually stand in the field and see the same view, the locale of the group could only be properly established by a thorough field investigation. The matter could not be settled by maps or memory alone.

Along with getting the geometry of the spot right, there was an intangible element that had to be captured if the finished group was to be "an enduring heritage and inspiration to the American people." Wilson wrote from Yosemite Valley about the new site the team chose:

> The foreground is a beautiful meadow, enclosed by trees. The swift-flowing Merced River curves around a bend and across the picture, and its banks are studded with quantities of wild azalea.. . .It is the most beautiful spot you could imagine. I am representing the morning light which shows the modeling of the cliffs to the best advantage and gives some interesting back-lighted effects on the right hand side of the picture. The painting is now well under way.[8]

Wilson was concerned as a painter to create a defined moment in time and space. Choosing the moment that showed the place to its "best advantage" required him to spend time observing the valley in all its aspects, getting to know it intuitively and emotionally. This sort of knowledge gained in the field was not something that could be readily transferred to another person. Wilson stated

[7]James Perry Wilson, "Oral History Interview," 1960, AMNH Department of Library Services Special Collections, Artist File, p. 8.

[8]James P. Wilson to James L. Clark, 15 June 1946, AMNH Department of Library Services Special Collections, Box: Preparation Department North American Mammal Hall Original Drawings.

that sometimes another artist would complete the background from the field studies, "but the ideal arrangement is for the same person who did the background studies in the field to do the finished background. I always remember something Mr. Leigh [Wilson's mentor at AMNH] said to me: 'The most valuable things that [the] painter brings back from the field are in his mind.'"[9] Wilson's statement expresses the extent to which the background studies and photographs are ultimately only mnemonic devices; they do not successfully contain all of the information necessary to paint the background on the diorama shell in the exhibit hall. Highlighting the "most valuable things" in the painter's mind as a form of tacit knowledge recovers the elusive skill required to know a place.

The Mountain Beaver Group & Botanical Knowledge

The second kind of tacit skill involved in reproducing a place is less nebulous and falls more squarely into the category of the culturally-acquired skill of making laboratory experiments and equipment work.[10] Although the specialized practices of botanical and exhibits collecting look distinct from one another, they share underlying observational skills. The existence of those skills shows that if the scientist's representation of the world is privileged over the artist, it is not because the scientist sees the world more "accurately" than the artist. The central theme of the story of the Mountain Beaver Group is the model-maker's tacit skill in recognizing and reproducing characteristics of organisms he deems to be essential in reproducing place. Figure 2.3 shows the Mountain Beaver Group in the North American Mammal Hall, which portrays a site on the south flank of Mt. Rainier in Washington State. Built in 1952, the group shows

---

[9]Wilson Oral History, p. 10.

[10]See discussion in Introduction and p. 77, note 5, of H. M. Collins, *Changing Order: Replication and Induction in Scientific Practice* (London: Sage, 1985).

Figure 2.3. Mountain Beaver Group showing Mt. Rainier, North American Mammal Hall, American Museum of Natural History, finished 1954. Neg. #322822 courtesy Department of Library Services, American Museum of Natural History.

the rodent (not really a beaver) harvesting its favorite food, the alpine flower called lupine. The field team was composed of mammalogist T. Donald Carter, background painter James P. Wilson, and model-maker Reginald Sayre.

Sayre had come to the Museum in 1947 after studying commercial art at the Pratt Institute on Norman Rockwell's suggestion.[11] His first job was to paint the sea bass cast still on exhibit in the marine hall (Figure 2.4) because the curator had rejected a previous artist's attempt. Sayre recounted that when the curator saw his efforts, she exclaimed, "Now that's a fish!" He jokingly attributed his success to his teenage experience painting signs for fish markets in New York.[12] This anecdote demonstrates not only Sayre's talent for observation, but the negotiation of what counts as a realistic representation of a natural object. Like plants, fish are difficult to exhibit because they must be completely recreated rather than simply stuffed, and rendering "fishiness" sufficient to satisfy an ichthyologist was not trivial.

As with the Coyote Group, selecting the final locale of the group required actually visiting the field site. Early plans for the hall originally specified that the mountain beaver group would be located in the Olympic National Park, another rugged habitat typifying the sub-alpine beauty of the Pacific Northwest.[13] The expedition team collected animals, plants, and background materials from both sites before the decision was finally made to use the Mt. Rainier site. Wilson's panoramic field study from Hurricane Ridge in the Olympics (Figure 2.5) shows that the view of the meadow with the Olympic range in the far distance, while beautiful, is obviously not as dramatic as the closeness of Mt. Rainier dominating

---

[11]Reginald J. Sayre, "Oral History Interviews," 21 July 1992, Record Unit 9565, SI Archives, Tropical Rain Forest Exhibits, p. 30.

[12]*Ibid*., p. 28.

[13]"Hall of North American Mammals Group Plan," 14 July 1937, AMNH Department of Library Services Special Collections, Box: Department of Mammalogy North American Mammal Hall Memorabilia.

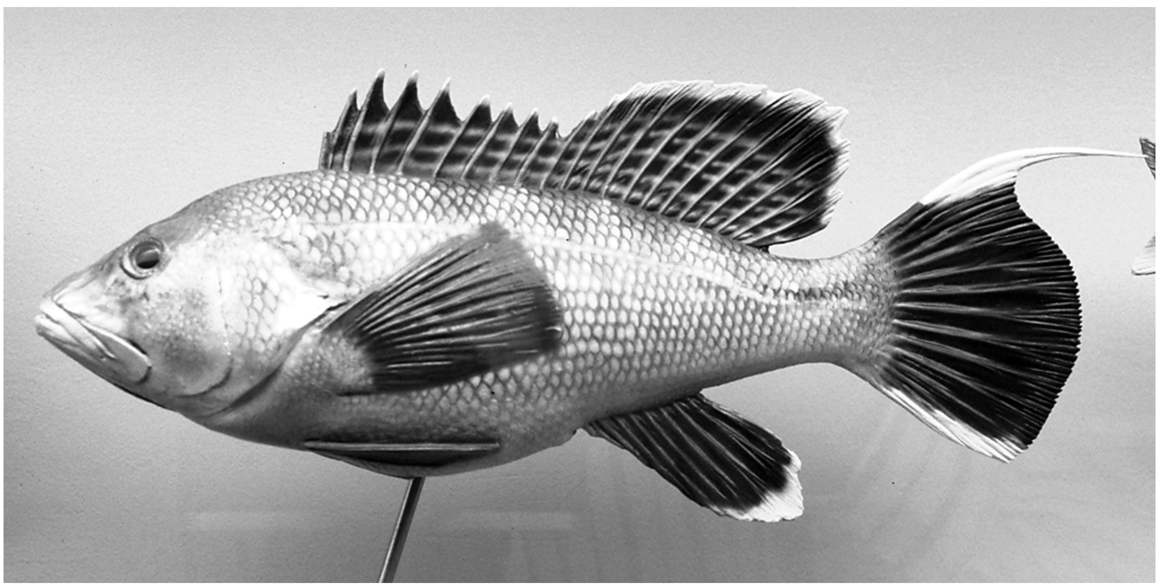


Figure 2.4. Sea bass cast painted by Reginald Sayre for Hall of Marine Life, American Museum of Natural History, *ca.* 1947. SWA photo.

Figure 2.5. Olympic National Park panoramic background field study for AMNH Mountain Beaver Group looking south from Hurricane Ridge, by James P. Wilson, August 1952. Oil on canvas board, 40x10 inches. Courtesy Department of Library Services, American Museum of Natural History.

the background of the group as it was finally built. That in and of itself is less interesting than the situation that arose because the team had collected from both sites before selecting one for the group.

In an interview, Sayre described the field color sketches he had made of lupines collected from each site (Figures 2.6 and 2.7):

> SAYRE: And this you see, is lupine, too, but you notice this?
> ALLISON: The leaves—
> SAYRE: They're different. When I went, the [botany] curator at that time was [Henry K.] Svenson.. . .He said, "You don't need to collect this twice because they're the same." I said, "I don't know. I've worked on these flowers and I find out there's some difference between one and the other when you go to a different area to get it."
>
> But, you see, the Mountain Beaver feeds on this. And it comes out of the hole and he bites them off and he stacks them by the hole. And when he gets hungry he comes up by the hole and eats and pulls some more down—and we had to show that in the group.[14]

Sayre's discussion of his recognition of two distinct varieties of lupine in tandem with the natural history of the mountain beaver in the last paragraph indicates the central role the lupine played in the narrative of the group (Figure 2.8 is a detail of the group depicting the animal feeding on the plant). To him, the mandate that "we had to show that in the group" entailed showing the proper lupine for *that* mountain beaver to be eating.

Ironically, here is a situation where the botanist, whose technical and institutional authority made him the gatekeeper and guarantor of the exhibit's accuracy, would have settled for a more general portrayal of the plants in the group than the technician, whose status and knowledge are commonly overlooked. On one hand, the botanist is trained to create verbal descriptions of certain plant parts based on a rubric of taxonomically relevant characteristics. When a taxonomist walks the line between lumping and splitting, drawing

---

[14]Sayre Oral History, p. 19.

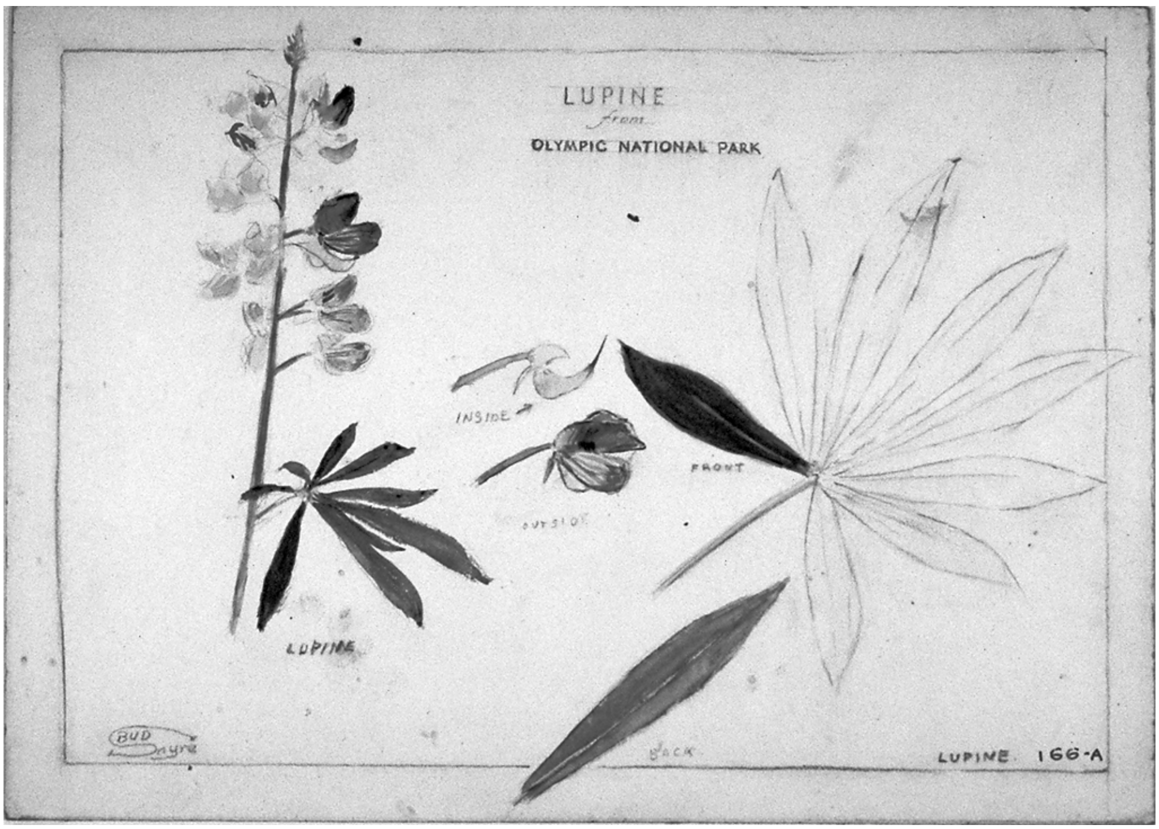


Figure 2.6. Olympic National Park lupine field study for Mountain Beaver Group, North American Mammal Hall, American Museum of Natural History, by Reginald Sayre, August 1952. Pencil, ink, and watercolor on paper, 11x8 inches, courtesy Reginald J. Sayre.

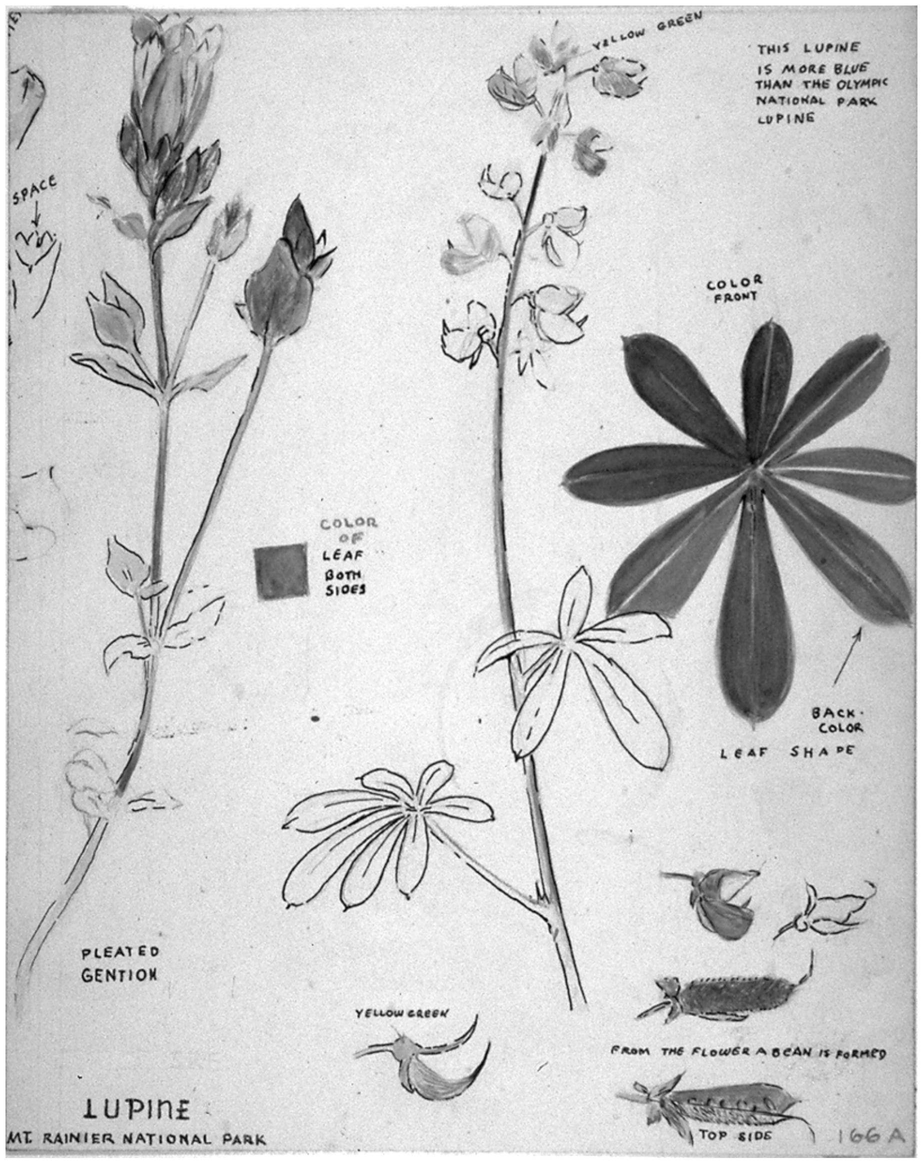


Figure 2.7. Mount Rainier National Park lupine field study for Mountain Beaver Group, North American Mammal Hall, American Museum of Natural History, by Reginald Sayre, August 1952. Pencil, ink, and watercolor on paper, 9x11 inches, courtesy Reginald J. Sayre.

Figure 2.8. Detail of Mountain Beaver Group showing animal feeding on lupine, North American Mammal Hall, American Museum of Natural History, finished 1954. Neg. #322824 courtesy Department of Library Services, American Museum of Natural History.

similarities and differences, not all variation between specimens is considered to be important or noteworthy. If Svenson saw the lupines from Mount Rainier and the Olympics as part of the same species, that definition would suffice.

But Sayre, the artist, whose powers of observation had been developed by the demands of his job to replicate exactly the plant in another visual medium, considered the difference between two varieties to be significant. Even though mammal collectors might label their specimens as being separate races to distinguish local populations, these variations were not always an essential difference from a phylogenetic point of view. However, because of his mandate to represent place, Sayre needed to see and maintain such a difference. Accuracy of representation involved accuracy of *place* as well. Not any lupine would do to feed the mountain beaver, but only the lupine *really* from Mount Rainier, as signified by its unique leaf shape.[15] Both Sayre and Svenson possessed highly developed abilities to distinguish variations between specimens, but because they had different goals, they reached different conclusions about the significance of that variation.

Even though invoking "*really*" might seem to be table-pounding on the analyst's part, the record is clear that the collectors and preparators routinely saw the crux of the exhibit's authenticity as being the closest possible match of the location of the animals and plants collected to the locale of the background. The accession cards for the mountain beaver specimens collected for the group indicate that they were taken in the same vicinity as where the background

---

[15]If this skill might be considered a rarity, one of the Smithsonian botanists, a fern taxonomist, recently related in an interview how in preparing a drawing, his botanical illustrator sometimes sees characters he had overlooked in his examination of the specimen (David Lellinger, personal communication, July, 1992).

studies were executed.[16] Although the exhibit team was unable to collect coyotes from Yosemite Valley proper, they reported with great satisfaction that "the Park naturalist told us that last winter, at that very spot [selected as the setting for the group] he saw a coyote pull down a decrepit old buck deer."[17] By the 1950s, when the smaller groups such as the mountain beaver were being completed, the wilderness and wildlife that the habitat groups reproduced and drew upon for their raw materials were fading, and it became harder and harder to collect in the scenic areas selected as sites. Special permits were required to collect weasels in a state park in Maine.[18] Although the marten group was supposed to show the marten at Crater Lake National Park in Oregon, by 1959 the Crater Lake marten was listed as "endangered and vanishing," and could not be collected there.[19]

Sayre's skill in identifying lupines was tacit knowledge in that it was something he had learned himself from his own observations. Far from being a rarity, the model makers' high level of tacit expertise in natural history was a central feature of their professional identity. The early numbers of the journal *Curator* are filled with papers doing boundary work to define and formalize many ideas and relationships in the museum world, such as "The nature of the Natural History Museum."[20] One such article by George Peterson, who was

---

[16]The AMNH Mammalogy Department's specimen catalog cards for all of the mountain beavers in the collections list each locale as a race: "*Aplodontia rufa rufa*, *Aplodontia rufa rainierii*," etc.

[17]Wilson to Clark, 15 June 1946.

[18]T. Donald Carter to Maine State Park Commission, 23 July 1958, AMNH Department of Mammalogy Archives, File: Correspondence; Roland T. Cobb to T. Donald Carter, 4 August 1958, AMNH Department of Mammalogy Archives, File: Correspondence.

[19]Thomas J. Williams to T. Donald Carter, 29 June 1959, AMNH Department of Mammalogy Archives, File: Correspondence.

[20]Karl P. Schmidt, "The Nature of the Natural History Museum," *Curator*, 1958, *1*:20-28.

Technical Supervisor of the Exhibition Department at the American Museum while Sayre was there, gives detailed instructions for making artificial plant leaves and parts, but ends with this firm admonition:

> No techniques or methods, no matter how highly developed or skillfully carried out, can succeed in giving life to artificial plants unless the preparator is himself completely familiar with all aspects of the plant in its growing state. He must have observed nature itself with such care that he will recognize, not only by his artistic instinct, but also by his highly trained eye, any fold or permutation of an artificial plant that is not consistent with its appearance in nature.[21]

Peterson's statement shows that Sayre's attitudes were not simply one man's pride of workmanship, but a part of an established corporate culture. Furthermore, the importance of the preparator's "highly trained eye" is demonstrated by the fact that Peterson's claim for its necessity comes following over twenty pages of step-by-step instructions on leaf molding and fabrication. He would not have made such a claim, even as an afterthought, if he had hoped, by formalizing a largely craft-based process, to deskill the job and recruit less professional practitioners. Rather, his claim that the preparator's tacit craft skill scientifically ensures that the model is "consistent with its appearance in nature" cuts against the enormous rhetorical weight of his formal instructions.

Recovering the Interpretive Work of Exhibit-making

The members of the field expedition and the equipment they bring with them constitute various Latourian inscription devices (recall Latour and Woolgar's stipulation that the inscription device is a sociological entity and not simply a mechanical apparatus). The materials generated by the exhibit expedition, such as preserved and catalogued mountain beaver bodies, Sayre's lupine sketches, or Wilson's background study, are the inscriptions produced by

---

[21]George E. Peterson, "Artificial Plants," *Curator*, 1958, *1*:12-35, on p. 34.

the inscription devices. This characterization highlights both the amount of interpretive work required to create the sketches, etc., and the fact that they are representations and not raw data. Though they remain in the realm of physical matter, they are not mere replications, such as the products of Latour's "machines" in the lab, like centrifuges, which merely "transform matter between one state and another."[22] Rather, the measurements, sketches, and color specifications are inscriptions because they embody a captured and translated piece of nature in an interpretively usable form. The habitat group can be construed as a three-dimensional text assembled in the museum from the inscriptions created by the inscription devices used on the field expedition. The habitat group is created from physical materials in a visual rather than verbal representational space, but still encodes a point of view, contains information, and tells a story in the same way a written text does. Seeing Sayre's work as part of an inscription device highlights the expertise required to generate realistic representations of nature. He aspired to reproduce the lupines precisely, but to do so involved transforming nature from one form to another.

Therefore, the caveat that the inscriptions generated by a natural history exhibit field expedition remain in the material world is in fact the crucial difference between the lab and the museum. It reflects the naturalist's interest in the field site as a unique gestalt. Although considerable abstraction and idealization is required to create the habitat group, the final product maintains a reference back to the "raw" data in a way that the laboratory publication does not. Unlike systems ecology, which reduces the natural system to a set of circuit-like patterns of energy flow, the habitat group is an abstraction masquerading as a reproduction. This is what background painter James Wilson meant when he

---

[22]Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts*, 2nd ed. (Beverly Hills: Sage, 1986 [1979]), p. 51.

used the phrase “Art to conceal art” to describe the work the habitat group is meant to do.[23] His statement caps a discussion in an oral history interview on the painter’s goals for a habitat group (Freund and Zallinger are other artists):

> FREUND: The success of a group of this kind is whether or not you have created a complete illusion, is it not?
> WILSON: That is my ambition. . .to make people forget that it is a painting at all. To transport them to the world of this area. [ellipsis in original]
> ZALLINGER: That is when it is a representation rather than a painting.
> WILSON: Well, it’s not copying nature.
> FREUND: The most flattering comment I think I ever heard on a habitat group was made by a four year old boy. When he looked at it he said, “Oh, out of doors.”[24]

This transcript, particularly Zallinger’s statement, reveals an interplay between the artist’s pride in his observational and drafting skills and his desire to render those skills transparent. Unlike “fine artists,” who frequently abstract their subjects and whose skill as a painter is commonly judged on the degree and creativity of the abstraction and subjective interpretation, the background painters did their utmost to hide their skill rather than advertise it. Ironically, their success also meant that they were not taken seriously as “real” artists.[25]

If the expedition goes out into the field with inscription devices and returns with inscriptions, then the exhibit “lab” is the “secretariat” of the museum (Figure 1.3). It is the place where the inscriptions are combined and used to stamp out wax or paper leaves, or paint rock molds, etc., and the final three-dimensional text is produced. This enterprise is both independent from and reliant on the field site. It is independent from the field to the extent that it

---

[23]Wilson Oral History, p. 33.

[24]*Ibid*., p. 27.

[25]Background artists rarely received recognition in the “legitimate” art world precisely because their work was seen as mere duplication or popular illustration (Karen Wonders, “The Illusionary Art of Background Painting in Habitat Dioramas,” *Curator*, 1990, *33*:90-118, on pp. 104-105).

has captured the physical parts of nature it needs. But it is still connected to the field site to the extent that the proper use and interpretation of the inscriptions depends on the tacit knowledge of the naturalist-preparators and their experience in the out-there field site.

The close connection of the field site to the museum lab points out a crucial difference between the experimental laboratory and the museum that has to do with the way the boundaries between inside and outside are drawn. As Figure 1.3 shows, for the laboratory, nature is brought inside only in piecemeal terms. Everything happens inside the lab. In the laboratory world, the field as a *place* does not exist. Instead the field exists only as a source of raw materials to be processed through the lab's inscription devices. Furthermore, while the laboratory secretariat creates texts that leave the laboratory, the visual representations created by the museum continue to require a space of their own, thus requiring the viewer of the representation to come into the museum rather than receiving the text as a publication. While the laboratory exists to reduce the physicality of nature, the museum exists to retain it. Whereas experimental science is reductionistic, natural history favors a holistic picture of nature.

Translation & the Construction of the Field at the DMNH

Cases from the Denver Museum of Natural History suggest that central to the making of the habitat group is the making of the field site. That symmetrical relationship between the museum hall and the field is best explained by the Latourian notion of translation outlined in the Introduction. The attitude in Denver toward habitat groups was, in some respects, not typical at all: the Museum continued to build full-scale habitat groups in the traditional style through the 1960s and even 1970s.[26] Since most of this dissertation tells the story of the decline of the habitat group as a viable exhibit genre, the tenacious commitment in Denver to the institutional practices of expedition, collection, and preparation might seem merely compulsively anachronistic, and not the proper subject for comparison. But precisely because the habitat group formed the very core of the Denver Museum's scientific and public identity, such a dedication to the genre throws its practices and assumptions into sharp relief.

For much of the Denver Museum's history, constructing habitat groups for public exhibition almost completely propelled the practice of traditional natural history field research and collecting.[27] Although the Museum's Annual Report for the Department of Birds in 1913 discusses gaps in the taxonomical study collections and proposes completing them, it was observed in 1914, "Since a far greater interest has been manifested in the habitat groups, it has been deemed advisable to discontinue work on the systematic collection until such time as adequate space is available to carry out and complete this along its proper lines."[28] In the ensuing years, the interest in habitat groups remained strong. This was so largely because the two most important men in shaping the Museum's priorities and exhibits, Alfred M. Bailey and Robert J. Niedrach, were naturalists of the old school who came into influence before the "union card" of the Ph.D. was a requirement. They styled themselves as ecologist-naturalists, not

---

[26]Work on the groups for the Botswana Africa Hall continued through the 1970s ("Information about the Botswana Africa Hall," 1980, DMNH Archives Exhibit Information Notebook).

[27]Called the Colorado Museum of Natural History until 1948, the museum was incorporated in 1900, but the first part of the building was not completed until 1908. Its first professional director was Jesse D. Figgins, hired in 1910, who came from the preparation department at the AMNH (Kris Haglund, *Denver Museum of Natural History: The First Ninety Years*, (Denver: DMNH, 1990)).

[28]*Colorado Museum of Natural History Annual Report* (Denver: 1913) p. 23; *Colorado Museum of Natural History Annual Report* (Denver: 1914), p. 27.

taxonomists, and worked when Colorado was still genuinely wild and the basic natural history of its organisms incompletely documented.

Bailey was director of the museum from 1936 until 1969, and had also been curator of Birds and Mammals in the 1920s. Niedrach worked at the museum from 1912 (he was then twenty-three years old)—nearly the beginning of the museum's full-fledged existence—until 1970. He held the title of Curator of Birds from the 1930s until his retirement. Both men were involved in the planning, collecting, and construction of most of the habitat groups installed from the 1930s through the 1960s—almost four decades of shaping the museum's exhibits and collections.

In his unpublished autobiography, Bailey wrote that there was "nothing in my family background to have aroused an interest in nature." His father was a lawyer in Iowa City, but his stepmother encouraged his outdoor interests, and his elder brother by six years took him fishing and hunting. Bailey recalls, "I dreamed of trapping in the Maine woods, of following [William Temple] Hornaday's footsteps in India.. . .I visited the [University of Iowa] museum and gazed with admiration at the trophies assembled there." That museum was to be the major influence on his career: he took up taxidermy at fifteen, and soon after met the Museum's head, Professor Holmer R. Dill, under whom he eventually studied in college.[29]

Interlocking with the museum's influence on framing his experience of nature was Bailey's pursuit of the sportsman's life from an early age. His father gave him his first shotgun at age twelve (1906) because "he would rather Alfred

---

[29]Alfred M. Bailey, "Field Work of a Museum Naturalist: Foreword," 1974, DMNH Archives, Box: A. M. Bailey Autobiography, p. 1; Beth Elaine Bailey Clark, "He Did for a Living What Rich Men Do on Vacations: A Biography of Alfred M. Bailey (1894-1978)," 1993, Denver Museum of Natural History Archives, p. 9.

would blow his fool head off than to read himself blind."[30] This echo of Teddy Roosevelt's doctrine of the "strenuous life" reverberated through Bailey's entire professional career. Later he would write,

> Field work in Colorado in the late 1930's and during the next twenty years was a constant delight, for we knew many places where camps could be made and few people would be seen. . .Bob Rockwell was an ardent sportsman and merely needed to mention that he planned a few days away from the office—and Niedrach and I could always think up a good excuse to go along. . .for all work afield included photography and collecting specimens for study and display.[31]

This lack of differentiation between the identity of sportsman and naturalist was common at the turn of the century.[32]

Bailey pursued a generalist's course at the University of Iowa, studying botany, geology, and zoology, and went to Laysan Island in the Pacific in 1912-1913 on an expedition to exterminate the rabbits that threatened nesting sea-birds.[33] Before becoming director of the Denver Museum, Bailey worked at the Louisiana State Museum for three years; was the first representative of the U.S. Fish and Wildlife Service in Juneau, Alaska, from 1919 to 1921; rode 2000 miles on mule back across Abyssinia with the Field Museum; and was Director of the Chicago Academy of Sciences from 1927 to 1936.[34] He brought to the Denver

---

[30]Clark, "What Rich Men Do on Vacations," p. 5. Clark is Bailey's daughter, and the title she gave the manuscript explicitly frames Bailey's life in terms of the great elite hunters and gentlemen naturalists of the nineteenth and early twentieth centuries. It also implies that Bailey was superior to the "rich men" in that he was not merely a dilettante, but pursued his vocation as a true professional.

[31]Alfred M. Bailey, "Field Work of a Museum Naturalist: Western Slope," 1974, DMNH Archives, Box: A. M. Bailey Autobiography, p. 1.

[32]Karen Wonders, "Exhibiting Fauna-From Spectacle to Habitat Group," *Curator*, 1989, *32*:131-156, on p. 148.

[33]Clark, "What Rich Men Do on Vacations," pp. 14-18.

[34]Alfred M. Bailey, "Some Thoughts on Retirement," in *Denver Museum of Natural History Annual Report*, (Denver: 1969), pp. 14-15, p. 14.

Museum considerable field experience as well as a professional familiarity with the American museum world.

Just five years older than Alfred Bailey, Robert Niedrach's life and career paralleled Bailey's closely, and they shared an intimate working relationship and vision for the Denver Museum. Like Bailey, Neidrach grew up outdoors at the turn of the century. He was raised in Hudson County, New Jersey, and turned to taxidermy as an outgrowth of his interest in birds.[35] He began working on habitat groups at the Denver Museum in 1912, and worked on exhibits for the next sixty-five years. Like Bailey, he belonged to a generation of sportsmen-naturalists. A shotgun was as familiar and indispensable a tool for him as a camera or field guide (Figures 2.9, 2.10, and 2.11).

Though he had no college education, Neidrach's knowledge of natural history was acclaimed by his colleagues. In the preface to their co-authored *magnum opus*, *Birds of Colorado*, Bailey wrote of Neidrach,

> Bob Niedrach has been especially gifted in knowing *where* and *when* to do our exploring. I would be remiss if I did not acknowledge my indebtedness to him for allowing me to share the results of his patient field work, for we have spent glorious days in the field at all seasons of the year, from the plains to the tops of our high mountains. Many Denver citizens owe their interest in natural history studies to early association with RJN, especially men who in their younger day belonged to the Boy Scouts. Undoubtedly, he would be considered an "old-fashioned" field naturalist who has no specialty—but instead has had an interest in all forms of life, and their ecological associations.[36]

The Museum's botany curator repeated Bailey's sentiments at Niedrach's retirement in 1970, stating, "In the opinion of not a few of his associates, Dr. Niedrach is as close to being an all-around naturalist (a vanishing species!) as can

---

[35] *Denver Museum of Natural History Annual Report* (Denver: 1970), p. 14.

[36] Alfred M. Bailey and Robert J. Niedrach, *Birds of Colorado*, vol. 1 (Denver: 1965), p. 2.

Figure 2.9. Robert Niedrach hunting birds, undated. Neg. #0088-042-9 courtesy Denver Museum of Natural History Photo Archives.

Figure 2.10. Robert Niedrach filming a bird nest, undated. Neg. #0086-161-18 courtesy Denver Museum of Natural History Photo Archives.

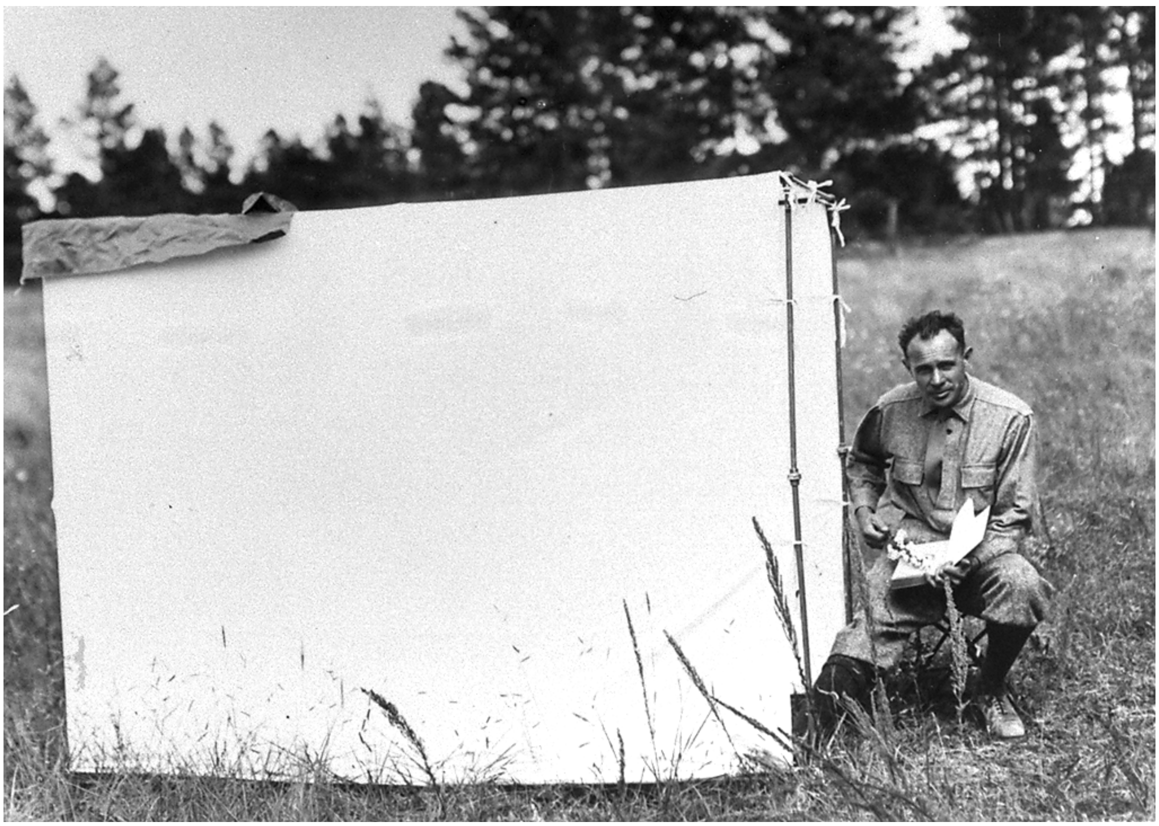


Figure 2.11. Robert Niedrach, with bird blind, identifying a plant in the field, undated. Neg. #0091-66 courtesy Denver Museum of Natural History Photo Archives.

be found in any age of specialists."[37] The University of Colorado gave him an honorary M.S. in 1953 and a Ph.D. in 1967.[38] After his retirement, the Museum's trustees, in a dedication plaque to Niedrach, called him "one of the leading ecologists and ornithologists of the twentieth century."[39] Given that ecology had changed dramatically during the 1960s, largely eclipsing the sort of ecology Niedrach practiced, this claim borders on hyperbole. Niedrach wrote nothing of his own about either natural history or museums, letting Bailey narrate the accounts of their joint efforts. Instead, the exhibits he built were his texts and the means by which he summarized and communicated the knowledge he had gathered about the natural world. He was therefore not a scholar and certainly not a theorizer by conventional measures. Nonetheless, Smithsonian botanist Richard Cowan reported quite favorably in 1960, "He's a man without even finished high school education but with a great deal of observing powers."[40]

The Denver Museum construed its exhibit program to be part of its essentially scientific, rather than merely educational, institutional identity. The Museum wanted to belong to the national and international network of research in natural history, although its standing was not at first sufficient to make it a forceful institutional authority. Even though museum archaeologists found the first Folsom point in New Mexico in 1926, proving that humans had inhabited North America for 8000 years longer than previously estimated, it was not until outside authorities observed another point being excavated the next year that the find and its associated claim were generally accepted.[41]

---

[37]DMNH 1970 *Annual Report*, p. 14.

[38]*Ibid*., p. 17.

[39]*Ibid*., p. 15.

[40]Richard S. Cowan, "Denver," ca. 18 June 1960, SI Archives Record Unit 155, National Museum of Natural History Office of the Director, Records 1948-1970, Subject Files Series 1, Box 15, p. 1.

[41]Haglund, *Denver Museum of Natural History: The First Ninety Years*.

The Museum was quick to claim ties to the elite of the profession where possible. The Annual Report in 1950 observes, "Many who received early training in the Denver Museum have become noted in the field of science elsewhere. Alexander Wetmore, Director [sic] of the Smithsonian Institution,. . .was employed as a taxidermist in 1909, and no doubt his field experiences in Colorado were of great value to him in later life."[42] Not only did the museum claim to have had an influence on Secretary Wetmore's formative years as a scientist, but it also could claim an on-going collegial relationship with him. Reporting on the Museum's expedition to Central America in 1936, Bailey acknowledged the assistance of Wetmore and the AMNH's bird curator and exhibit innovator, Frank M. Chapman.[43]

Habitat Groups, Sense of Place, & Ecological Principles

During Bailey and Neidrach's tenure, over fifty habitat groups were rebuilt or installed from scratch.[44] A comprehensive survey of them is beyond the scope of this chapter. This section focuses on the history of the Golden Eagle habitat group as an exemplar for the Museum, revealing that according to the principle of translation, the exhibit and the field site constitute one another in a symmetrical relationship of construction. Along with highlighting the museum naturalist's approach to the field, the story of the Golden Eagle Group illustrates Denver's explicit framing of the habitat group as an "ecological" setting giving equal importance to place, plants, mammals, and birds. According to Karen Wonders, even before the invention of technical modern ecology, habitat groups were associated with holistic portrayals of relationships in nature.[45] Bailey used

---

[42]*Denver Museum of Natural History Annual Report* (Denver: 1950), p. 46.
[43]*Colorado Museum of Natural History Annual Report* (Denver: 1936), p. 17.
[44]*Denver Museum of Natural History Annual Report* (Denver: 1974), p. 13.
[45]Wonders, "Exhibiting Fauna," p. 147.

C. Hart Merriam's scheme of "life zones" to bring the more implicit holism of older habitat groups into the foreground and place them within a more theoretical framework. Bailey made this move as a part of a larger effort to rebuild the museum's exhibits during the 1930s and 1940s.

Arriving back in Denver in 1936, Bailey set about updating the exhibits:

> The most important project undertaken during the year was to start reconstruction of group cases on the second floor of the main building. It was recommended by the Executive Committee that new electrically lighted exhibits, similar to those in the large museums of the east, with curved backgrounds, domed ceilings and tilted glasses, should be installed.[46]

The phrase "large museums of the east," indicates that Bailey was ambitious to join the ranks of the larger, older, and more prestigious institutions of the eastern urban areas. In the same report, he indicates that Denver staff had visited the Field Museum in Chicago and the Carnegie Museum in Pittsburgh for advice on the new habitat group construction. Like other museums, the first generation of groups had been built in four-sided glass cases with square tops and often only partial backgrounds. For example, Figure 2.12 shows the 1924 Arizona Desert Group. The transparent part of the case above the mountains was masked on the photographic negative, and appears as plain white, to hide whatever happened to be behind the case.

Even if a case had a complete background, its square corners limited the illusion of looking into a far distant sky or vista. Figure 2.13 shows the first Golden Eagle Group, completed in 1914, in which the join of the back and the top of the case is visible just above the flying bird's right wing. The Annual Report for that year describes the group as follows:

---

[46]*Colorado Museum of Natural History Annual Report* (Denver: 1936), p. 11.

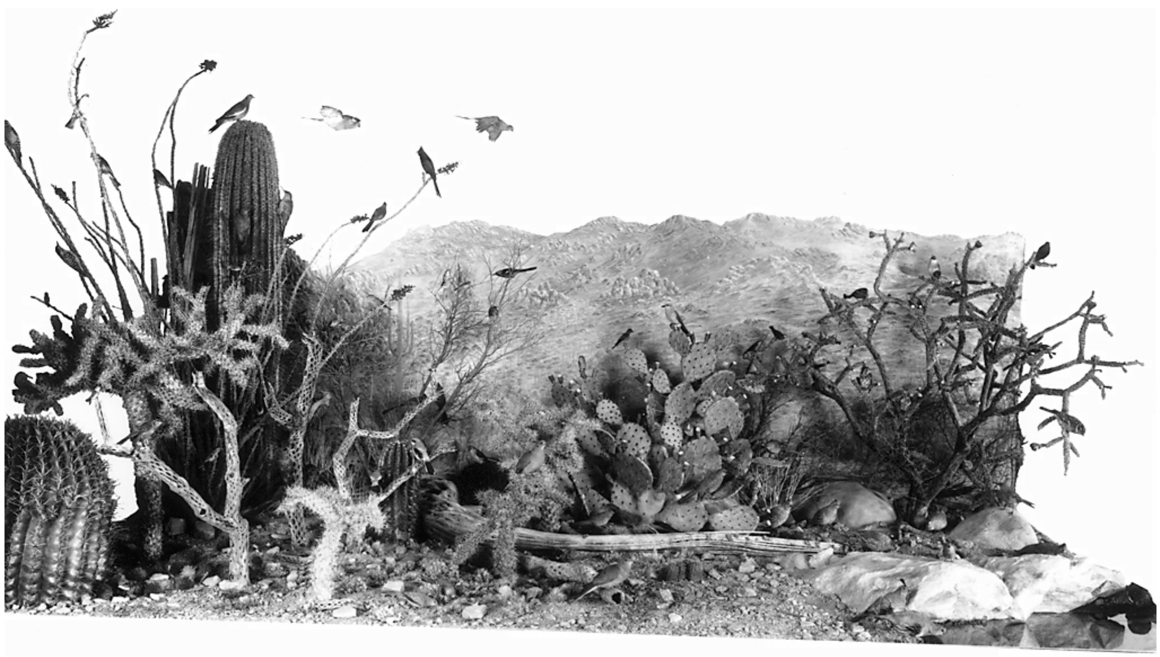


Figure 2.12. Sonoran Desert Group, Colorado Museum of Natural History, completed 1924, dismantled 1936. Masking on original. Neg. #1532B courtesy Denver Museum of Natural History Photo Archives.

> A stage in the home life of the bird is illustrated by the nest on a sandstone cliff, with the two young birds and both adults, the effect being to suggest the morning feeding time. As the case is made high, a good representation of distance and height to the nest is secured and this effect is further augmented by suspending one of the parents immediately above the nest-ledge.[47]

In this situation, the high case helped to mitigate the problem of the corners. Interestingly, this description of the group does not include a specific location: the scene is simply a "sandstone cliff" and the photograph shows that background is not painted convincingly enough to imply that it reproduces any particular place. The crudeness of the backgrounds in this generation of exhibits can also be seen in Figure 2.12. Furthermore, Figure 2.13 shows that the pose of the flying bird is most likely modeled on the attitude of a bird catching its prey and not landing on the nest. Its wings are on a downbeat which would lift the bird, not slow its descent, and its trajectory would have it crashing into the rocks behind the chicks.[48] These two points are important not because they are errors smugly detected in hindsight, but because they illustrate that the group was not based on the sort of field work that Bailey and Niedrach would make the cornerstone of the Museum's research and exhibits. Until they began their observations of golden eagle nests, few had been closely observed, and the taxidermist who mounted the 1914 specimens was much more likely to have seen birds taking prey on open terrain than landing on a restricted nesting ledge. Errors like this spurred Bailey and Niedrach to conduct extensive fieldwork in order to update the accuracy of the behaviors depicted in the displays.

---

[47] *Ibid*., p. 26.

[48] This error in the group is not simply my supposition. To anticipate the story, from his own field observations, Bailey later wrote, "Suddenly one of the birds folded its wings and dropped straight downward, to straighten and land directly on the ledge" (Alfred M. Bailey and Robert J. Niedrach, "Filming the Golden Eagle," *American Forests*, 1939, *45*:446-449, 476-477, on p. 476).

Figure 2.13. Golden Eagle Group on sandstone cliff, Denver Museum of Natural History, completed 1914, dismantled 1936. Neg. #1084B courtesy Denver Museum of Natural History Photo Archives.

They were also motivated by a desire to recast some of the exhibits in a more comprehensive "ecological" framework. In the museum's Annual Report of 1936, Bailey announced the new exhibit program:

> The ecological groups in this new exhibition hall will feature Colorado habitats. Because of the great range of altitude in the state, zonal conditions vary between the tops of the highest mountains and the plains in the same way they do between the plains and the Arctic coast. It is planned to show in large habitat groups, with suitable panoramic backgrounds, plant associations of the five zones of the state from the Alpine down to the Upper Sonoran and to feature such birds and small mammals as are characteristic of the zone portrayed.[49]

In his autobiography, Bailey recounts the source of "life zones" as an organizing principle for the hall:

> Plants and animals have preferred habitats where they are more numerous than elsewhere, and botanists and zoologists recognize that each form of life has certain requirements for its existence. C. Hart Merriam was one of the early scientists who discussed the distribution of plants and animals—as a result of his studies in the mountains of Arizona. He named seven life zones, each characterized by the type of vegetation dominant at specific elevations and the animals associated with that plant life.. . .For the most part we have followed Merriam's nomenclature in Museum publications and Colorado exhibit labels, changing elevations for the different zones, for timberline is lower as one travels northward, due to temperature.[50]

Merriam's concept defined habitat in terms of climate, claiming the same effect for moving north in latitude as going up in elevation on mountains. In turn, distinct assemblages of plants and animals would be found in each habitat type.[51] For example, the new Sonoran Desert Group (Figure 2.14), finished in 1941, was re-designed to fit into the life zone paradigm. Although the habitat

---

[49]*Colorado Museum of Natural History Annual Report* (Denver: 1936), p. 11.

[50]Alfred M. Bailey, "Field Work of a Museum Naturalist: Life Zones," 1974, DMNH Archives, Box: A. M. Bailey Autobiography, p. 11.

[51]Donald Worster, *Nature's Economy: A History of Ecological Ideas* (Cambridge: Cambridge University Press, 1977), p. 196.

Figure 2.14. Sonoran Desert Group depicting Superstition Mountain, Arizona, Mead Hall of Ecology, Denver Museum of Natural History, completed 1941, refurbished 1992. SWA photo.

occurs outside of Colorado, it was important because it completed Merriam's conceptual series of climate change with elevation.

Environmental historian Donald Worster notes that Merriam's principles were widely illustrated by natural history museum habitat groups, but that other scientists soon agreed that habitat could not be defined solely by temperature changes, as Merriam's scheme did. However, Worster asserts that Merriam's idea was important to the birth of modern ecology:

> [I]t began, not with a floral and faunal catalogue of Arizona, but with the distinctions between habitats from which emerge their respective biological communities.. . .It was. . .a new departure, a reordering of old data into a distinctly ecological scheme that would stimulate a new kind of research into the structure and dynamics of each of these zones.[52]

Worster's portrait of the impact of the life zones concept on the development of ecology provides a clue as to why Merriam's system was so congenial to the museum setting. The habitat group, like Merriam's system, was a means of ordering a data set. Unlike a synoptic collection, which served as a physical catalogue enumerating the organisms, the habitat group using Merriam's scheme created a picture of an assemblage of organisms in conceptually meaningful relationships. Furthermore, it added an additional criterion for selecting the place to represent beyond the simple scenic value of the background (though scenic value was still a factor).

Finding/Creating a Field Site

Figure 2.15 shows the new Golden Eagle Group completed in the Mead Hall of Ecology in 1938. Installed in one of the new domed cases with no visible corner joints, the background is much more convincing, and the birds are posed more naturally. The larger female, perched to the side, has just brought a rabbit

---

[52]*Ibid*., p. 197.

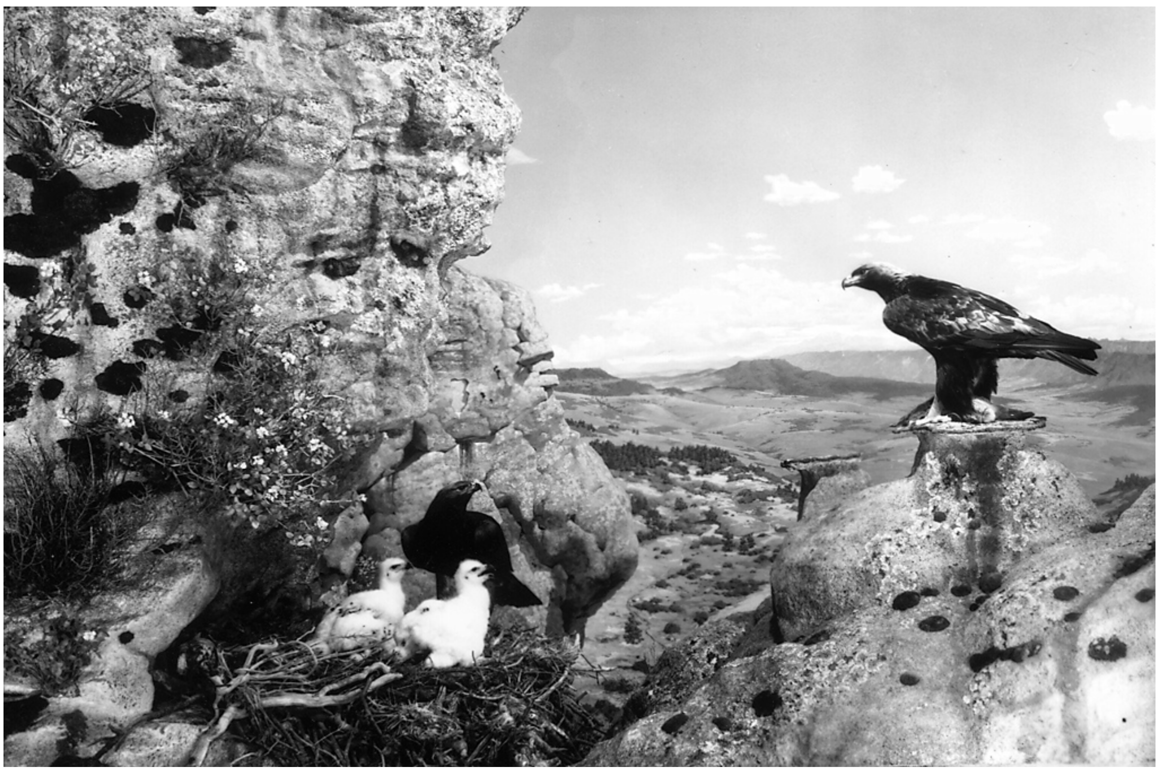


Figure 2.15. Golden Eagle Group, depicting Daniels Park, Colorado, Mead Hall of Ecology, Denver Museum of Natural History, completed 1938. Neg. #5410 courtesy Denver Museum of Natural History Photo Archives.

to feed the chicks. In contrast to the 1914 group (Figure 2.13), Bailey's description of the new group in the Annual Report reflects his interest in specificity of place, and the last line alludes to the field studies he and Niedrach were conducting:

> In the Golden Eagle Group a pair of adult birds and two downy young are shown on their nesting ledge along the face of a conglomerate cliff near Daniels Park. The background shows Pike's Peak in the distance, with a broad valley sloping away from the nesting site to the distant foothills near Devils Head, as viewed from the picturesque bit of country given the City and County of Denver by Miss Florence Martin. Several pairs of eagles have lived in this section for many years, making their nests in various locations along the cliffs or in high Douglas firs.[53]

And in fact, this group resulted from several years of ongoing observations of golden eagle nests, which, according to Bailey, had not been previously undertaken by naturalists because of the birds' notorious shyness and the general inaccessibility of their nests.[54]

Those observations comprise an intimate feedback loop between exhibit-making technology and natural history field research. This is a surprising assertion because models of science popularization have long assumed a linear, unidirectional flow of knowledge from the site of production (usually the lab) to the site of popularization (the mass media, or in this case, the museum gallery).[55] However, for the eagle project, the field observations were themselves dependent on the technologies used in the exhibit hall. The exhibit was not simply a result of observation, but to an extent made observation possible to begin with.

---

[53]*Colorado Museum of Natural History Annual Report* (Denver: 1938), p. 31. A subtext of Bailey's comment here is that along with educating the public about nature, the group also memorializes the philanthropy of one of Denver's leading society figures.

[54]Bailey and Niedrach, "Filming the Golden Eagle," p. 446.

[55]Stephen Hilgartner, "The Dominant View of Popularization: Conceptual Problems, Political Uses," *Social Studies of Science*, 1990, *20*:519-541, on pp. 519-520.

Bailey and Niedrach's work that lead to the Golden Eagle Group typify this relationship. As early as 1931, before Bailey became the Museum's Director, he and Niedrach had experimented with a bird blind designed to blend in with the cliffs where the eagles lived. Figure 2.16 shows that it was built with what Bailey described as a "burlap top covered with stone and sand."[56] The projecting snout was designed to accommodate the lens of a movie camera, and it was in this blind in June of 1931 that the two naturalists took their first movies of golden eagles feeding their chicks.[57] Hunters and photographers had of course built blinds before, but the methods of camouflage were generally cruder and aimed at concealing the movements of the occupant. For example, Figure 2.11 shows Niedrach seated beside a portable white canvas bird blind. But the eagle blind, which so closely mimicked the specific field site itself, suggests that museum display technology had become a tool for the field naturalist.

This possibility is borne out by Bailey and Niedrach's subsequent activities. In 1936, they undertook to film golden eagles in the area eventually depicted in the 1938 group. Bailey had begun collecting natural history film footage while he was the director of the Chicago Academy of Sciences, and was nationally well-known for his public lectures illustrated with film.[58] From the start, this project *constructed* the field site more than it recorded purely empirical observations. Bailey's autobiography recounts the genesis of the project:

---

[56]Bailey and Niedrach, *Birds of Colorado*, p. 221.

[57]*Ibid*., p. 221.

[58]Cornell ornithologist Olin Pettingill wrote, "Among the elite of the all-time natural history lecturers, a Bailey program is always an assurance of exotic adventures, illustrated by a superlative film" (Olin Sewall Pettingill, Jr., ed., *The Bird Watcher's America* (New York: McGraw Hill, 1965), p. 133).

Figure 2.16. Eagle blind built by Robert Niedrach, Weld County, Colorado, June 1931. Neg. #B-349-13 courtesy Denver Museum of Natural History Photo Archives.

> In the fall of 1935 Bob had located a ledge on McArthur's ranch in a canyon south of Denver, near Daniels Park, where the rolling prairie of the Upper Sonoran merged with precipitous escarpments, scrub-grown hillsides, and stands of majestic ponderosa pines typical of the foothills of the Lower Transition Zone. It was an ideal place for an eagle to build and as there were several pairs in the general vicinity, Bob wondered if eagles could be enticed to build a nest. Consequently he gathered debris similar to that used by the birds in constructing their nests, placed the material on that ledge and was rewarded the following spring when a pair of eagles occupied the site.[59]

Behind the claim that the ledge was "an ideal place for an eagle to build" from an eagle's point of view is the fact that it really was an ideal place for an eagle to build for Niedrach's purposes. Bailey's prose suggests that the spot was also ideal to locate a habitat group for the museum: it clearly caught his scenic imagination, and fit into the life zone scheme as a point between the Upper Sonoran and Lower Transition Zones. Furthermore, Niedrach's "experiment" was not merely a matter of wondering if "eagles could be enticed to build a nest," but conducted because "not one" of the eyries at the Douglas County site "was suitable for photography."[60] Thus the location chosen for observation was not only a general area, but an exact spot selected by the naturalists, not by the birds according to their own interests and needs.

That May, "Niedrach had erected a blind of plaster-over-wire, covered with sand, and painted to resemble the walls of the canyon."[61] Figure 2.17 shows the second blind suspended from the cliff. "When it was anchored it looked not unlike the surrounding rocks. We had an ideal view of the nest—just eighteen feet away."[62] Although it was square and boxy, with no attempt made

---

[59]Alfred M. Bailey, "Field Work of a Museum Naturalist: Golden Eagle 1936," 1974, DMNH Archives, Box: A. M. Bailey Autobiography, pp. 1-2.

[60]Bailey and Niedrach, *Birds of Colorado*, p. 221.

[61]Bailey, "Museum Naturalist: Golden Eagle," p. 2.

[62]Bailey and Niedrach, "Filming the Golden Eagle," p. 448.

Figure 2.17. Golden Eagle nesting ledge and blind, MacArthur Ranch (Daniels Park), Colorado, May 1936. No Neg. # courtesy Denver Museum of Natural History Photo Archives.

to mold it to the shape of the cliff, its method of construction and paint job to match the local rocks came from the craft of the exhibit-maker in the museum hall. Once in position, Bailey and Niedrach spent many hours in the tiny blind, which had "no place for feet except dangling in space," frequently without any action for their camera:

> I sat on that sharp rock from early morning until 4:30 p.m. without a glimpse or a sound from a passing eagle. The nest was in total shadow with little reflected light upon it, so I called it a day, my scientific bump of curiosity not sufficiently strong for me to wait longer.[63]

When the female did come back to the nest, "The roof of the nesting ledge was so low, however, that she would get her head in the shadows in a most irritating way, and although she spent half an hour feeding the fuzzy fellows, the photographic results were discouraging."[64] Here, what counts as observation is not what the animals do, but what can be successfully captured by the movie camera, and it turned out that the otherwise picturesque hand-picked nesting site was not completely ideal after all.

Rather than give up or find another site, Bailey and Niedrach reached another conclusion:

> It was evident that we would have to work on the ledge. The following day, with the aid of block and tackle, hammer and chisel, we pounded away at the flint-like rock. After an hour and a half enough was knocked off the canyon wall so our adult could not hide herself from the camera's eye.[65]

Again, the "correct" or "real" representation of nature is not what is found, but what can be properly photographed. The observer is not an invisible element, but a force that shapes every aspect of the conditions of observation, from the location to the very configuration of the location.

---

[63]Bailey, "Museum Naturalist: Golden Eagle," pp. 2-3.
[64]Bailey and Niedrach, "Filming the Golden Eagle," p. 449.
[65]*Ibid*., p. 449.

But the willingness to alter the field site did not end with changing the landscape to afford better lighting. A further problem of composition and choreography stood in the way:

> At last, the female landed on the front edge of the nest, completely obscuring the young, and complacently fed them without giving the photographer a chance for a single picture of the performance.. . .
> With block and tackle we once more visited the eagle's nest, to carry on a few alterations. We wanted our young at the back of the nest, at our left, and we did not want the adult with her back to the camera. The portion of the nest nearest the blind was worked over so that the adult would have a poor landing field, while a good resting place was built at the right and rear of the nest. The young fellows did not resent the intrusion; they sat bolt upright and hissed occasionally but did not seem to be afraid.[66]

The birds were not just any birds, but "our young," and when the naturalists manipulated the nest like doll furniture, their absolute possession of the field site and its inhabitants is complete. If sculpting the cliff to give better light could perhaps be justified on the grounds that the birds didn't really care exactly what their cliff looked like (a potentially debatable claim), rearranging the nest seems like such a complete intervention as to remove any claim to either natural setting or behavior from the subjects. But Bailey's assurance that the eagle chicks "did not resent the intrusion" and "did not seem to be afraid" seeks to reestablish the authority and validity of the resulting film footage. In fact, their labors did finally lead to glorious triumph:

> The changes we had made in the nest proved worthwhile. The female landed broadside to the camera, inspected the blind rather leisurely, then walked to the center of the nest and fed the young with bits of meat torn from an unfortunate rabbit. At last our endurance contest was over. In spite of the motion [picture] camera, she continued her care of the young, giving us all the footage we desired for the time being.[67]

---

[66] *Ibid*., p. 449.
[67] *Ibid*., p. 477.

Bailey's characterization of the affair as an "endurance contest" suggests epic struggle and implies the value of the footage: not just anyone can go out and set up a movie camera and get these images.

What is astonishing about this episode is not the simple fact that Bailey and Niedrach intervened in the field site, for even the simple selection of one field site over another constitutes intervention. Rather, the surprise is the continued, aggressive, and wholesale transformation of a previously "natural" space into the equivalent of an outdoor museum exhibit or movie studio. The process of selecting the initial site, installing the blind, and then altering both the rock cliff and the eagle's nest itself, all strongly resemble the process of designing a museum habitat group. For the habitat group, even as it purported to be an exact recreation of a specific spot, always involved considerable idealization and synthesis of materials found in the area. It is easy to imagine exhibit-makers remodeling artificial rocks to catch the light properly, and one would in fact *expect* them to pose the mounted animals and accessories so as not to upstage one another (the fundamental rule of good theater). Aesthetics shape the sense of what accuracy means in the museum exhibit, for as AMNH background painter James P. Wilson said, the habitat group is "not copying nature."[68]

But it is surprising to find aesthetics modulating accuracy in the field, where the positivistic assumption is that what is found is given, and it is the observer's job to cope with those givens. Under that assumption, the final exhibit could be criticized for inaccuracies introduced in the process of idealizing the field site in order to transfer it into the museum. But if the field site itself is not "real" either, then both the field observations and the museum representation are caught in a self-referential loop of idealization, observation, and re-idealization. Obviously the assumption of linear transmission of raw observational

---

[68]Wilson Oral History, p. 27.

information from the "outside" of the field to the "inside" of the museum is false, and another means of understanding the process is required. Even simply reversing the causal arrow, as has been implied above, to suggest that the inside of the museum has shaped the outside of the field, is, taken by itself, inadequate. The steps in creating the Golden Eagle Group can be understood by an analogy to Latour's characterization of the laboratory as taking some aspect of nature into the lab, but then making the field site resemble the lab closely enough that the practices developed in the lab will remain effective in the field.[69]

In the case of the eagle observations, not only did Bailey and Niedrach use a blind created with the techniques devised to simulate nature in the museum in order to simulate nature in the field and avoid detection by the eagles, but they also had to shape the field site to their specifications as observers, even though they were ostensibly "merely" watching what would happen without them. This example explodes the twin myth that the museum replicates raw nature as it is found, and that the field site is indeed a piece of raw nature.

Exhibit Modernization & Botany at the Smithsonian

The brief case studies from New York and Denver indicate the highly developed relationship between natural history research and exhibition in some American natural history museums during the first half of the twentieth century. The theoretical tools of tacit knowledge, inscription devices, and translation illuminate the partnership between museum scientists and exhibit-makers that combined knowledge, practice and goals for representation.

The Smithsonian case itself has not been used to introduce the idea of the isomorphism between technical research and exhibition because habitat groups

---

[69]Bruno Latour, "Give Me a Laboratory and I Will Raise the World," in *Science Observed: Perspectives on the Social Study of Science*, eds. Karin D. Knorr-Cetina and Michael Mulkay (London, Beverly Hills: Sage, 1983), pp. 141-170.

never became a well-established exhibit genre there in the same way they did elsewhere. From its founding, the Smithsonian had cast itself as the hub of a network of correspondents, collectors, and scientists, drawing material from a succession of government expeditions, a growing academy, and amateur enthusiasts of all stripes. Underfunded and understaffed in a city which, though the nation's capital, was neither a financial nor an industrial center, the Smithsonian had few ties to the philanthropic urban elites who financed the grand expeditions and exhibits of museums in New York, Chicago, Pittsburgh, and Denver. This institutional context helps explain why the Smithsonian's botany curators were initially so reluctant to be drawn into exhibit work.

Unlike other fields of natural history such as geology or paleontology, whose public exhibits of gemstones or dinosaur reconstructions had been built into the professional ethos of the field much earlier, the Smithsonian botanists had no tradition of nor taste for exhibits at the end of World War Two. Comprising the most conservative department at the museum, the botanists initially resisted being drawn into plans promoted by science and technology curator Frank Taylor to upgrade exhibits all over the Smithsonian. Taylor, whose career at the Smithsonian began in 1922 at the age of nineteen and spanned some sixty years, returned from World War II to find that "everything looked even worse to me because I had been away from it, and. . .it looked a little more shabby than it had before."[70] Trained as an engineer at MIT after joining the Smithsonian, Taylor's professional identity centered on the national collections and how to exhibit them. But all of the Natural History curators did not share his commitment to exhibitions.

When botany, entomology and physical anthropology were the only major subject areas of natural history at the Smithsonian not represented by public

---

[70]Frank A. Taylor, "Oral History Interviews," 1974, SIA RU 9512, p. 68.

exhibits at the time, why were the botanists so reluctant to remedy that deficiency? In short, they did not see the lack of exhibits as a deficiency.

Exhibition Eschewed

In the summer of 1948, head curator E. P. Killip of the Department of Botany, responding to Taylor's request for information on the status of exhibits in his department, tersely replied, "This department maintains no exhibits and never has had any. We do not believe the time is opportune for starting public exhibits in botany."[71] Soon after, at the first meeting of Taylor's Subcommittee on the Modernization of Exhibits, Killip held his ground under questioning from physical anthropologist T. Dale Stewart:

> Killip: "Botany doesn't have suitable material for exhibits. It would be extremely difficult to start something like the glass flower exhibits at Harvard."
>
> Stewart: "With modern plastics, something good could be produced. Wouldn't you like to have something in botany such as the Museum of Natural History has on birds showing mechanical flight, etc.?"
>
> Killip: "I don't believe it could be done in Botany."[72]

Underlying this skepticism toward the feasibility of botany exhibits was the assumption that popularization and research had very little to do with one another. Killip was clearly not familiar with the plant replication technologies developed for habitat groups, more than likely because he did not consider habitat groups themselves to be appropriate for botany exhibits. This is

---

[71]E. P. Killip, "Department of Botany--Modernization of Exhibits," 12 August 1948, SIA RU 155, Director, National Museum of Natural History, 1948-1970, Box 10. At this time, the botany department was still located in the Smithsonian Castle, and would remain there until 1965, when the wings were completed on the Natural History Building (Ellis L. Yochelson, *The National Museum of Natural History: 75 Years in the Natural History Building*, reprinted 1990 ed. (Washington, D.C.: Smithsonian Institution Press, 1985), p. 10).

[72]"Minutes, first meeting of the subcommittee on Modernization of Exhibits, Taylor chair," 12 August 1948, SIA RU 155, Director, National Museum of Natural History, 1948-1970, Box 10.

indicated specifically by his invocation of the Harvard glass flowers as the paradigm for botanical exhibits unattainable by the Smithsonian.

Indeed, the glass flowers are a world-celebrated collection which were and are un-duplicable. Built by Dresden glassmakers Leopold and Rudolf Blaschka between 1887 and 1936, each model was crafted from scratch. Leopold Blaschka made the bouquet shown in Figure 2.18 in 1889 as a gift to Elizabeth Ware and her daughter Mary, who together had funded Harvard's contract with the Blaschkas to produce the glass flowers.[73] The models are unique in both their breathtaking life-like quality and the exacting artisanship that created them. So singular was the Blaschka's accomplishment that almost from the beginning of the collection, stories circulated about the "secret" and "lost" methods used to create them; at the Smithsonian, Killip was under the impression that the method had been lost.[74] Given the Blaschka's reputation, Killip's perception seemed to be that the model-maker's skill was artistic rather than scientific. As Stewart attempted to point out to Killip, there were other completely viable means of reproducing plants for exhibits that, while labor-intensive, did not rely on lost methods or Old World artists.

For example (to prefigure the story of Chapter Three), just a couple of years before Killip first rejected botany exhibits at the Smithsonian, Buffalo-based model-makers Paul and George Marchand created the plant models for an ultra-realistic habitat group featuring a panorama of the wildflowers of all four seasons of western New York State at the Rochester Museum of Arts and Science.

---

[73] Richard Evans Schultes and William A. Davis, *The Glass Flowers at Harvard* (Cambridge, Massachusetts: Botanical Museum of Harvard University, 1992 [1982]), pp. 1-12. Ironically, because the models were photographed out of their display cases for the book, it is nearly impossible to tell from the photographs that they are not actual plants.

[74] *Ibid*., pp. 1-12; E .P. Killip, "Department of Botany: Future Exhibitions," 26 August 1948, SIA RU 155, NMNH Office of the Director, Records 1948-1970, Box 15.

Figure 2.18. Blaschka glass flower bouquet, 1889. Hillel Burger photo courtesy Botanical Museum of Harvard University.

Figure 2.19 shows one of Paul's young daughters looking at the trilliums in the spring section. Along with including the Marchand's plant models, the diorama featured simulated breezes, a stream with real running water, and sound and lighting effects. It was called a "crowning monument" to the "civic liberality" of the donor who paid for it, indicating the Rochester museum's conscious cultivation of social status through philanthropic sponsorship of scientific exhibits, something that the Smithsonian did not do.[75] During the 1930s, the Marchands perfected a method invented by their father to make plant models using beeswax casts of molds made from fresh plants.[76] In Figure 2.20, Paul is ladling hot wax into the bottom half of the leaf mold, which he next would press with the top half. He then assembled the parts and painted them with an airbrush (Figure 2.21). He was still using this basic technique in the 1960s when he made field models on the Smithsonian's botany hall expeditions. Like the other preparator-naturalists of his time, Marchand was quite knowledgeable about the organisms he reproduced. But Killip was not aware of men like Marchand who crossed the line between art and science.

Killip's disinterest in exhibitions is surprising only if the Smithsonian is considered solely as a museum whose primary function was public exhibition. But in fact the institution was chartered with a decided ambivalence towards collecting anything at all, much less putting collections on public display. The first Secretary of the Smithsonian, the physicist Joseph Henry, fought for research

---

[75]Arthur C. Parker, "The Wild Flowers of Western New York: Being an account of our Floral Diorama," *Museum Service: Bulletin of the Rochester Museum of Arts and Sciences*, 1946, *19*:301-31. The beloved diorama was dismantled in the late 1980s amid much "hue and cry" from the community. The water was kept running until the mid-1970s, when the stream sprang a leak and flooded a lower floor (Lee Kemp, librarian of the Rochester Science Center and Museum, personal communication, 10/94).

[76]Carlos E. Cummings, "Flowers Reproduced in Wax: Synthetic Nature Then and Now," *Hobbies*, 1941, *21*:68-73, pp. 70-71.

Figure 2.19. Marcelle Marchand in Spring section of the Bausch Floral Diorama built by Paul and George Marchand at the Rochester Museum of Arts and Sciences, 1946. Courtesy Rochester Museum and Science Center; Rochester, New York.

Figure 2.20. Paul Marchand molding wax plant leaves at the Buffalo Museum of Science, 1937. Neg. #19994 courtesy Buffalo Museum of Science; Buffalo, New York.

Figure 2.21. Paul Marchand painting a model orchid at the Buffalo Museum of Science, 1938. Neg. #20472 courtesy Buffalo Museum of Science; Buffalo, New York.

as the prime focus, and only acquiesced to large-scale collecting when Congress mandated that materials collected from various government-financed expeditions be deposited at the Smithsonian.[77] On the other side of the debate was Spencer F. Baird, Henry's assistant and the Smithsonian's second Secretary, who was a great advocate of museums and collections.[78]

Seventy-five years later, that ambivalence was rooted deeply in the scientists' institutional identity. Killip wrote in 1950, "We firmly believe that scientific work comes before exhibition," and in an oral history interview, Frank Taylor recalled the "predominant attitude" of the research staff toward exhibits as being "rather negative."[79] In a 1977 popular volume on the Smithsonian the exhibit chief at the Museum of History and Technology characterized the curators' historical attitude toward exhibits as deeply conservative, so that when designers and artists were brought in during the 1950s as part of the exhibit modernization program, "Their entrance into the ranks of the Smithsonian professional staff would dramatically alter the status quo of 100 years."[80] In sum, exhibits did not belong to the botanists' culture or consciousness; they were more worried about catching up on identifying the backlog of specimens that had accumulated during the war.[81]

---

[77]Robert V. Bruce, "The Smithsonian, Seedbed of Science," in *The Launching of Modern American Science*, (Ithaca: Cornell University Press, 1987), pp. 196-197.

[78]*Ibid*., pp. 198-199.

[79]E. P. Killip, "Comments on Preliminary Report on Exhibition Subcommittee for Exhibits ," 1 October 1948, SIA RU 155, Director, National Museum of Natural History, 1948-1970, Box 10, p. 2; Taylor Oral History, p. 67.

[80]Benjamin Lawless and Marilyn S. Cohen, "The Smithsonian Style," in *The Smithsonian Experience: Science-History-The Arts. . .The Treasures of the Nation*, eds. Joe Goodwin and Judy Harkison (New York: W. W. Norton, 1977), pp. 52-59, p. 52.

[81]E. P. Killip, "Annual Report, Division of Plants, for year ending June 30, 1947," 30 June 1947, SIA RU 272, Department of Botany, 1885-1970, Box 17.

Given Killip's antipathy for exhibits, the botanists' operative model for interaction with the public (to the extent that they had one) must be found in their professional practice. Collecting, cataloging, classifying, and exchanging herbarium specimens comprised the core activities of botany as it was practiced by all sorts of amateurs in the nineteenth century and remained crucial after the complete professionalization of the field by the twentieth century.[82] As the common currency of the botanical world, exchanging herbarium specimens between institutions for identification formed an economy of botanical knowledge that exploited the expertise distributed in the network and allowed each herbarium to expand its holdings beyond its individual ability to collect.

Killip's 1950 annual report advocated more field work in order to build up further scientific capital, and quotes another curator, who reasons,

> When explorations are not undertaken for a period of years our available duplicates necessarily dwindle, and we cannot make the large distributions to other institutions which have been associated with the division in the past. This, in turn, is reflected in a decrease in the volume of incoming material.[83]

The phrase, "associated with the division in the past," makes the explicit claim that in exchanging specimens, the botanists not only had knowledge to gain, but a reputation to maintain. In fact, the Smithsonian scientists, who according to Taylor, commanded considerable international respect in systematics, conceived of the institution's reputation entirely in terms of its scientific status. In defense of their interests, they resisted Taylor's exhibits program if it would divert funds from their research or make demands on their time.[84]

---

[82]Elizabeth B. Keeney, *The Botanizers: Amateur Scientists in Nineteenth-Century America* (Chapel Hill, North Carolina: University of North Carolina Press, 1992), pp 9-22.

[83]E. P. Killip, "Third Annual Report, Department of Botany" 1950, SIA RU 272, Department of Botany, 1885-1970, Box 18.

[84]Killip, "Comments on Preliminary Report on Exhibition Subcommittee for Exhibits;" Taylor Oral History, pp. 74-75.

What did that reputation for generous exchange have to do with non-botanists? Although the botanists did not wish to expand their brief into the public sphere through the non-scientific means of exhibits, they were willing to include the public at least partly within their own private sphere. Their approach is rooted in the nineteenth-century model of natural history collecting and research. Before and during the professionalization of American botany, scientists relied heavily on specimens collected by non-scientists. Even though the esoteric concerns of plant taxonomy and morphology came to exclude amateur practitioners, the collecting practices, networks of communication, and transfer of materials remained quite similar.[85] In fact, the Smithsonian actively promoted the role of amateur collectors, drawing on materials sent to Washington by correspondents from all regions and walks of life.[86]

Because of the history of American botany itself, the Smithsonian botanists were prepared to interact with the public, but in a manner largely undifferentiated from their professional activity. This approach was reinforced in part by the sole directive of the SI's benefactor, James Smithson which was, to found an institution for the "increase and diffusion of knowledge among men."[87] From its inception and to the present day, the Smithsonian's curatorial staff continually receives inquiries for information on all manner of subjects. Cornelia Sears argues that "routine public inquiries" to the Smithsonian at the turn of the century stand as a body of popular attempts to participate in creating and using scientific knowledge by interacting with the Smithsonian's scientific authority and expertise. These inquiries ranged from offering natural history

---

85Keeney, *The Botanizers*, pp. 22-37 & 123-134.
86*Ibid*., pp. 32-33.
87Bruce, "Seedbed of Science," pp. 187-200.

specimens and curiosities to the SI to requests for information verifying or disproving press accounts of sea monsters and other freaks of nature.[88]

The botanists maintained files of information for replying to public inquiries, and, according to fern taxonomist David Lellinger, identified specimens submitted by professional colleagues and citizens alike.[89] In an episode often written up in profiles of Smithsonian science, grass expert Thomas Soderstrom began to observe what turned out to be the once-in-120-years' flowering and die-off of a bamboo species in the early 1970s. The readers of *Smithsonian* magazine and high school biology classes nationwide were enlisted to collect and send samples that Soderstrom used to pinpoint the extent and timing of the phenomenon.[90] His use of publicly-submitted materials to solve the scientific puzzle of the bamboo die-off is a good example of amateur botanizing maintained within the technical network. The botanists' relationship with the public was not "public outreach," which is the modern favorite phrase for packaging technical science for public consumption on the assumption that technical information in its native form is not relevant enough to interest the public. Instead the botanists carried on what could be called "public inreach," drawing the public into the scientists' sphere through collecting projects and making information available if not quite on a collegial level, at least in the same

---

[88]Cornelia Sears, "Letters to the Smithsonian: Rethinking the Production and Consumption of Scientific Knowledge," paper presented at the Annual Meeting of the History of Science Society, New Orleans, October 12-16, 1994.

[89]For example, SIA RU 272, Department of Botany, 1885-1970, Box 33; David Lellinger, "Oral History Interview," 13 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 24.

[90]National Museum of Natural History, The Smithsonian Institution, *The Magnificent Foragers: Smithsonian Explorations in the Natural Sciences* (Washington, D.C.: Smithsonian Exposition Books [Norton], 1978), pp. 107-108.

form of discourse. Thus instead of trying to make their science every-day enough for mass appeal, the botanists chose to treat the public like scientists.[91]

Another sign of the undifferentiated approach to public information-giving can be seen in Killip's response to Taylor's initial query quoted above, which actually *did* include a concession to participating in exhibitions. However, Killip's suggestion for potential exhibit involvement stayed firmly in the arena of the botanists' esoteric research practices:

> In connection with an exhibit of the local fauna and flora, in the Natural History Building, there is a small series of herbarium specimens, which were assembled and installed some years ago.. . .Many of these specimens are inadequate and in poor condition, and should be replaced. We suggest that the botanical portion of this exhibit be placed under the Department of Botany, which will do the necessary work of renovating it as opportunity permits.[92]

By exhibiting herbarium specimens, the botanists collapsed the category of public representation into the esoteric form.

One could accuse the botanists of plain laziness. Herbarium specimens were readily at hand when models of plants or other exhibits were not. But more importantly, if an exhibit is a visual means of representing nature to a viewer, then herbarium specimens were what counted for the botanists as the standard means of representing the plant world. As inscriptions, herbarium specimens constituted the botanists' problematic, both creating and constraining the class of questions botanists asked and could ask. This is probably another reason why Harvard's glass flowers came to Killip's mind when he rejected the possibility of botany exhibits at the Smithsonian. The glass flowers are not displayed in

---

[91]Similarly, the Berkeley Museum of Vertebrate Zoology was a "cultural centre" for amateur naturalists in the first quarter of this century, even though the museum's entrance is still marked "NO PUBLIC EXHIBITS" (Susan Leigh Star and James R. Griesmer, "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39," *Social Studies of Science*, 1989, *19*:387-420, on p. 404 & p. 391).

[92]Killip, "Modernization of Exhibits."

habitat groups, but as single models in glass cases organized in a teaching series by botanical family. They function as herbarium sheets in a magical state of superior preservation. So even though Killip believed they were impossible to duplicate, their form and organization were acceptable, having been generated by familiar professional practices and conventions.

A non-technically trained museum visitor observing the pressed and dried plant or model-as-herbarium sheet would therefore have access to the same characters botanists deemed taxonomically relevant in classifying a specimen and determining evolutionary relationships. But such an exhibit would not convey anything about its life history or habitat, questions which might be more commonly on the mind of a visitor who was not a taxonomist, and which the narratives built into habitat groups were intended to address. In the instances of plant identification and exhibiting herbarium specimens, the public could gain access to the knowledge contained in the national collections provided they were willing to act or see like botanists.

Even though the botanists during this period saw no natural overlap between their activities and public exhibits such as habitat groups, there is an underlying similarity between the tacit knowledges required to do taxonomy and reproduce plants for exhibits. As an indicator of the profound continuity in practice and approach to botany at the Smithsonian, the botany department's current fern taxonomist David Lellinger is only the third curator to hold the position since William R. Maxon became the first official fern curator in 1899. Lellinger came to the Smithsonian in 1963 after two summer internships as a botany graduate student in 1960 and 1961. During his internships, he was apprenticed to Conrad V. Morton, who had been at the Smithsonian since 1926, and had in turn trained under Maxon.[93]

---

[93]Lellinger Oral History, pp. 2-4.

Lellinger's voice and experience thus speaks across nearly a century of botanical collecting and research:

> [T]o work effectively in a herbarium is a matter of two things. One is long experience. The other is to have the ability to understand the variability of species as that is represented in the specimens. Of course working with a person who is master of that is a terrific leg up.[94]

According to Lellinger, the ability to distinguish variability is the tacit knowledge of *learning to see* that is developed by close work with a mentor. Such a skill is quite similar to Sayre's skill in differentiating lupines. Even though Sayre believed the difference between the two lupines was important while Svenson the botanist did not, they shared the same culturally-transmitted skill in recognizing that a difference existed. In taxonomic parlance, Sayre was a "splitter:" he defined more separate groups because he saw small variations as the sign of place. Svenson was a "lumper" who expected to find variation within a species. He grouped the two populations together because his criterion was evolutionary relatedness and they did not appear to be different enough to warrant their own species.

The key tie between botanists' and exhibit preparators' practice was that both learned their respective trades through an apprenticeship process. Lellinger expanded on the way taxonomists transmitted tacit knowledge:

> Morton's office in the [Smithsonian] Castle was about twenty-by-twenty, and the main piece of furniture was a big table in the middle. He had a typing table on his side, and my little desk was on the other side. We were doing identifications. He would show me the specimens, open the sheets on the table. At first he explained the genera. Once I got to know the genera, then he would explain the common species. Then he would give me the easy genera, species of easy genera to work on, and he would identify species of the hard genera.[95]

---

[94] *Ibid*., p. 3.
[95] *Ibid*., p. 3.

In this situation, the tacit knowledge being transmitted is not how to build or operate a piece of laboratory equipment, but something even more difficult to formalize: a way of seeing. In Harry Collins' terminology, the scientific knowledge to be "maintained" in the herbarium was the taxonomical system itself and the heuristics (not algorithms) used to organize the specimens.[96]

The fundamental difference between the botanists' and exhibit-makers' practice was that although questions of plant distribution were important to plant systematists, they did not see place in the same way as the habitat group did. The herbarium sheet was more like the inscription from a laboratory instrument, turning the three-dimensional plant into a two-dimensional entity. The herbarium specimen, though "real," was also a step away from the physicality and verisimilitude of the plant model in a habitat group. As such, the sense of place of the field was attenuated in the herbarium (though not altogether lost as it is in the laboratory), while it was amplified in the exhibit hall. The realness of the model was the realness of the field, and it would be that definition of the real that Richard Cowan and the botanists during the 1960s would focus on when they finally began planning the Hall of Plant Life. Forging that link involved going below the practices of identifying plants to the botanists' underlying desire to explore new worlds and claim them for science.

Rapprochement?

However, adopting the realism of the field would come only once the botanists were pushed into the role of exhibition-making. Frank Taylor and his institution-wide exhibits modernization program sharply challenged the botanists' internally-generated, collections-based mode of public interaction.

---

[96]Collins uses the term "maintaining scientific knowledge" to emphasize the point that skill-based knowledge is socially transmitted by working directly with a practitioner rather than printed texts (Collins, *Changing Order*, pp. 51-78).

Though its natural history exhibitions in particular lagged behind many of the privately funded museums, the Smithsonian in general enjoyed the status of the nation's museum. Taylor found himself lobbied by staff from other museums who complained that as long as the Smithsonian remained backward, it was difficult for them to extract money from their own institutions to upgrade exhibitions.[97] Although Taylor's personal drive and initiative at the Smithsonian are not to be underestimated, his project was also part of a larger national trend.

According to Taylor, the drive to overhaul museums after World War Two was less the result of the sort of social agenda derived from natural history that Rainger describes for Henry Fairfield Osborn's program at the American Museum earlier in the century, and more the result of new exhibition technologies and aesthetics such as vertically mounting specimens and directly silk-screening labels, which Taylor first saw at the Field Museum of Natural History in Chicago.[98] These innovations came from the great industrial expositions and World's Fairs of the 1930s and 1940s, which were highly ambitious attempts at shaping post-War consumer culture. The ideology propelling these activities was not concerned with social decadence, as Osborn was, but with constructing and promoting a thirst for progress.[99]

Taylor's 1948 subcommittee on the Modernization of Exhibits included the head curators of all the divisions of the Smithsonian. Taylor was ultimately disappointed in the committee's final report, which maintained that research should not be sacrificed for exhibitions, although the importance of exhibitions was recognized in principle.[100] Perhaps it was this diplomacy mixed with

---

[97]Taylor Oral History, p. 73.

[98]*Ibid*., pp. 78-79.

[99]Robert W. Rydell, *World of Fairs: The Century-of-Progress Expositions* (Chicago: University of Chicago Press, 1993), pp. 1-10, 115-118.

[100]Taylor Oral History, pp. 73-75; Killip, "Comments on Preliminary Report on Exhibition Subcommittee for Exhibits."

ambivalence that is recorded in the meeting minutes that recount E. P. Killip's pessimism about exhibits, for they go on to say, "Other members of the committee were of the opinion that Botany should be represented by exhibits."[101] There was also some sense that public interaction must be more in lay terms than quasi-professional forms, for another member of the committee remarked that exhibits should be instructive on "the very lowest level."[102]

Clearly bowing to the pressure of the committee, Killip soon after produced a document describing the possible contents of an eventual botany hall. Its preamble is circumspect, acknowledging, "We realize that such exhibitions are properly a function of the National Museum, and we believe that entertaining and educational displays of botanical subjects can and should be made." But Killip reiterated deferentially, "We feel, however, that this new activity ought not be undertaken at the expense of time and space now given to research and curatorial work at the National Herbarium."[103] Whereas Killip had previously insisted to the committee that the Harvard glass flowers were an inappropriate standard to emulate, here he took T. Dale Stewart's earlier suggestion and stated more optimistically that the Harvard glass flowers, "which show the structure of flowers and their adaptations to methods of pollination, have always been popular" and, "Although their process is said to have been lost, new plastics may well make near duplication possible."[104]

Though cautious and perhaps begrudging, Killip's outline of the contents of a possible Hall of Plant Life served to set several important parameters for

---

[101] "First meeting of the subcommittee on Modernization of Exhibits," p. 5.

[102] *Ibid*., p. 6

[103] Killip, "Future Exhibitions," p. 1.

[104] *Ibid*., p. 3.

later plans. Most notably, Killip's list of places to replicate inside the museum with life groups forms the core of later such lists:

> The American public likes to travel and see what the rest of the world looks like. We could organize dioramas showing such scenes as an Arctic meadow in full bloom; an Andean paramo, with its curious "frailejones"; a dense jungle along the Amazon; a high-mountain scene from Yunnan, with rhododendrons, primroses, and other brilliantly flowered plants; or a desert with its cacti and other succulents.[105]

Of these, all but the scene from Yunnan, China, remained on the list until the botany hall was finally canceled in 1966. Although it was later decided that the botany hall should focus on the museum's area of expertise, the western hemisphere, the implicit criteria for the Yunnan group is in perfect resonance with the rest: "brilliantly flowered plants" are dramatic, eye-catching, and awe-inspiring, just as are the "curious frailejones" of the Andean paramo. Mention of a tropical rain forest is also telling, for the tropical rain forest group would become and remain the center of the botanists' imaginative attention for the hall. Tied up with the rain forest, the concept of drama also remained at the center of the botanists' attitude toward exhibits. Though Killip connected dramatic exhibits to a public that "likes to travel," the next chapter will show that dramatic, realistic exhibits also stemmed from the botanists' own experiences in the field.

Killip's last plan is also the first sign of a shift away from simply making professional practice available to the public. Instead of volunteering to replace dusty old herbarium specimens on public display, Killip acceded that "the public is little interested in herbarium specimens, which usually show little flower coloring. However, near the Roosevelt African lion group there are exhibited plants preserved in the natural color by the Fessenden process, regarding which

---

[105] *Ibid*., p. 2.

we receive frequent inquiries."[106] Killip finally opened the door to representations of plants that derived their reality not from the quality of the scientific knowledge that could be extracted from them, as from the highly stylized and technical format of the herbarium sheet, but from their naturalness and life-like preservation in the museum.

I say "derived their reality" rather than saying that the plants preserved with their fresh-picked color are "more real" because I want to argue for "reality" as a constructed category, not some Platonic metric against which all versions will be compared. That is, the herbarium specimen is literally more real than a plant model because it *is* the original item collected from the field and therefore enjoys a privileged ontological status. But the model or otherwise preserved specimen *looks* more *like* what the actual specimen looked like in the field, and as such is a visually more robust sign referring to the *in situ* version.

However, the botanists did intend to manage their replications of reality tightly in order to construct a way of seeing no less particular and interpretation-laden than an herbarium specimen. Even though these life groups would be exacting slices of nature, Killip specified, "No animal life should be present in the scenes as this would distract the attention from the plants."[107] Another proposal from the same period articulates that concern more fully: "no animal life (except possibly insects) should be included, as this inevitably distracts the attention from the plant life exhibited, which is then viewed merely as a background rather than the principal object of interest."[108] Two things are important about this caveat. First, it shows how a tension between the exhibit as replication and construction was built into the botanists' discourse from the very

---

[106] *Ibid*., p. 3.

[107] *Ibid*., p. 2.

[108] E. P. Killip, "Department of Botany," 21 February, 1950, SIA RU 155, Director, National Museum of Natural History, 1948-1970, Box 10.

beginning. Exactitude of replication became the goal for both the botanists and the exhibits staff in charge of creating the models. But there is also the tacit recognition that “natural” though the scene would appear in the exhibit hall (the signs of artifice will be completely suppressed) significant interpretive work will have gone into creating that *version* of the natural.[109]

Secondly, the specific filter applied to reality (excluding animals) reveals the botanists’ anxiety that their subject matter and, by extension, their field, was not held in high esteem by the public. It is telling that the botanists did not perceive any threat from *insects* in their exhibits, entomology being another field which did not enjoy the glamour and attention given to zoology with its impressive big game animals to exhibit. With that complaint in the foreground, the plan for a nature without animals can be read as a part of the botanists’ effort to promote plants as worthy of study and appreciation in their own right and not as part of the marginalia of biology. Not only would the Hall of Plant Life show interesting scientific facts about plants, it would raise their status (and presumably the botanists’ status) in the eyes of the visitor.

Conclusion: Botanical Interests/Botanical Aesthetics

It would be more than a decade before the botanists’ professed interest in exhibits was converted into concrete intellectual and institutional commitment. In the meantime, Frank Taylor rallied a new exhibits modernization committee

---

[109]Another way to characterize the difference between the herbarium specimen and the lifelike model is to consider the amount of interpretation built into the model. Viewers of the herbarium specimen must have greater skill to decipher the nature of the plant, whereas the model-maker has already decoded the plant and viewers of the model need not reconstruct the plant in their minds in order to make sense of it. This is much like the case of skill in technical instruments, where even though a machine may appear to deskill a given worker, the skill has been transferred from its use to its construction, and the total skill in the system has increased rather than declined (Joseph O’Connell, “Metrology: The Creation of Universality by the Circulation of Particulars,” *Social Studies of Science*, 1993, *23*:129-173, p. 135).

which was truly devoted to improving exhibits.[110] Throughout the 1950s, Taylor and others worked to reshape the public spaces of the Smithsonian, bringing in commercial artists who, according to another member of the new committee, "with little or no previous museum experience, and, hence, free from all traces of the traditional museum rut, have brought to bear on their work a familiarity with plastics and synthetic fibers and other new materials, and a willingness to use color far more daringly and effectively than would have been the case with museum trained personnel."[111] By 1960, when botany curator Richard Cowan was designated to oversee the botany hall project, he found himself working with an exhibits program significantly more established and professionalized than what existed in 1948.

In the intervening years, many halls in the natural history building were modernized, including the "World of Mammals," which featured quite contemporary exhibit styling and subjects. Viewed at the museum as both scientifically sophisticated and popularly appealing, "The World of Mammals" was often later held up as a "model for effective interpretation of biological concepts to the public."[112] The key word is "concepts," for the hall does not emphasize life groups (there are a few), but instead features economic topics such as "Destructive Mammals" (like gophers and rats) and ecological and evolutionary subjects. The lions shot by Teddy Roosevelt were given a new savanna background with zebras to watch, but another group of African animals stands on a gravel platform with modern wood paneling curving behind it. They are not part of another place, but part of the museum's architecture. As

---

[110] Taylor Oral History, pp. 76-77.

[111] Herbert Freidmann, "Modernizing Exhibits—the U.S. National Museum," October 26, 1956, SIA RU 155, Director, National Museum of Natural History, 1948-1970, Box 14, p. 3.

[112] John C. Ewers, "New ethnological exhibits United States National Museum, Washington," *Museum*, 1956, *9*:28.

Figure 2.22 shows, the stuffed giraffe leans out from an alcove that looks like a trendy department store of the period. That design highlights the anachronistic nature of the botany hall as it was conceived between 1960 and 1966.

As the next chapter will detail, central to the botany hall was a set of ambitious habitat groups of plants and their habitats in the Western Hemisphere, more or less following Killip's 1950 list. But because the botanists had no previous investment in a particular exhibition format, and innovations in exhibition in the 1950s and 1960s tended away from life groups, the question arises as to why they chose the habitat group as the predominant genre for the botany hall. The next chapter will suggest that the choice and development of life groups for the botany hall provides important clues about a new generation of young Ph.D. botanists hired during the Sputnik-inspired expansion of the museum after 1957. Their conception of their professional work and knowledge, their assumptions about museum visitors, and their goals for "selling botany" combined the traditional naturalist's appreciation for the field with the growing need to operate in a cultural context increasingly dominated by Big Science.

Figure 2.22. African mammal exhibit in "World of Mammals," Hall 14, National Museum of Natural History, opened 1959. Neg. #429A courtesy Smithsonian Institution.

CHAPTER THREE
"THE HALL OF PLANT LIFE":
RAIN FOREST AS FIELD SITE, 1960-1967

Introduction: Botany Undertakes a Partnership with Exhibits

Bringing botanical research and exhibition together was hard work because the Smithsonian botanists lacked a history of doing public exhibitions of any sort, much less an involvement with the popular genre of the habitat group. But once compelled to consider the proposition, new staff hired in the late 1950s and early 1960s made the public exhibit program a natural part of their own technical sphere in two symmetrical moves that traversed the public and private sides of exhibits in both directions. First, they aligned their science with exhibit practice and quickly seized on the exhibit expeditions as an opportunity to do scientific collecting. Second, in the opposite direction, they viewed the habitat group as a means of pulling the visitor into their field sites, thereby conveying something of the atmosphere that stimulated their own passion for their work.

The last chapter told stories about exhibit-making at the American Museum of Natural History and the Denver Museum of Natural History and outlined the Exhibits Modernization Program at the Smithsonian in the 1950s and the botany curators' initial resistance to participating in exhibit-making. This chapter begins in 1960, when a relatively new botany curator, Richard Cowan, was appointed to develop plans for a Hall of Plant Life in the Smithsonian's Museum of Natural History. Cowan enthusiastically embraced the project and formulated a plan for the hall that featured several life-sized habitat groups recreating unique botanical scenes in the Western Hemisphere. Chief among them was the proposed tropical rain forest, which, given the emphasis on the Tropics of several members of the botany department, came to serve as the scientific and imaginative anchor of the hall. Cowan led an expedition to Kaieteur Falls in British Guiana in early 1962 that included another young botanist, Thomas Soderstrom, and model-makers Reginald Sayre and Paul Marchand. The team brought back an enormous quantity of exhibit materials and botanical specimens. The next year, Cowan took a team to Baja California to collect for a desert group. In 1966, Soderstrom, Sayre, and Marchand collected materials for an Andean páramo group in Colombia.

Throughout this period, the botany staff continued to discuss the technical content of the hall, though they never reached the scripting stage. Then in 1968, the botany hall was canceled when Secretary S. Dillon Ripley used a reorganization of the entomology department to end the program to modernize subject area-based halls. Ripley favored high-concept exhibits that addressed socially relevant issues such as drug use and the environment.

Given that the botanists had no previous experience in exhibit-making, how did they conceive the genre of the habitat group as intersecting with their practices, aesthetics, and interests? Focusing on the role that the tropical rain forest group came to play in the hall will show that the botanists viewed the habitat group as a means of promoting botany to the public. The habitat group served this purpose by taking the public to the field sites the botanists found so emotionally enthralling and intellectually stimulating. The botanists wanted to use the exhibit-makers' inscription devices to encode their own tacit knowledge of the field in the habitat group. The process of translating nature from the field and into the exhibit hall involved the symmetrical process of constructing natural verisimilitude in the museum and idealizing the field. Finally, the botanists saw their promotional activities as necessary during the post-Sputnik 1960s when the practitioners of natural history in general and taxonomy in particular felt themselves losing out to Big Science.

This chapter is organized as follows: First, a discussion of the early plans for the Hall of Plant Life shows the influences of other museums on Cowan's thinking, how a sense of drama was central to the rain forest exhibit, and how the visitor was accounted for in this period. Second, I will argue that the genre of realism was necessary to convey the romance of the botanists' field sites, to elevate the status of botany above window-dressing for animals, and as a part of a package of exhibits including more abstract presentations. Next, the expedition to British Guiana will frame the ways that exhibits and research were made to overlap, both by simultaneously doing scientific and research collecting, and by attempting to bring the field into the museum. Finally, these efforts will be explained in terms of the botanists' argument promoting both the content and pursuit of botanical knowledge to the public.

Early Plans for the Hall of Plant Life

Richard Cowan came to the Smithsonian in 1957 after nearly nine years at the New York Botanical Garden, during which time he received his Ph.D. from Columbia University for working on the classification of the legume family. He became assistant director of the MNH in 1963 and was appointed director in March of 1966. In the spring of 1960, he was placed in charge of the botany hall project and the curatorial staff was asked to develop ideas about what the hall should contain.[1] In June, he visited several museums, including the Denver Museum, the American Museum, the Field Museum, and the Harvard Museums, to assess the state of the art of botanical exhibitions and evaluate various

[1] A. C. Smith to File, 28 April 1960, SIA RU 155, Director, NMNH, 1948-1970, Box 10.

exhibition strategies. He quickly gravitated toward habitat groups and accurate models as the preferred means of representing plant life.

Influences From Other Museums

Cowan's museum tours convinced him that verisimilitude played a key role in constructing the authenticity and appeal of an exhibit. At the Field Museum of Natural History in Chicago, he observed that the botany halls were nearly devoid of visitors except for the hall containing models and dioramas. He reported, "I was very surprised to find as many as a dozen and a half people by actual count going through this hall with some care.. . .I didn't question any one but I am sure that they were looking at these excellent models much in the same way that they would look at attractive plants in a greenhouse."[2] His observation implies that highly accurate models could cause a suspension of disbelief, compelling visitors to view the models as if they were the real thing. Whether this was true or not for the visitors, Cowan himself clearly saw the exhibits in these terms. He saw the realism of the models as working to take the visitor outside the museum's walls (or conversely, bringing another place inside the museum), where the real thing would be more frequently encountered. The greenhouse analogy was more appropriate than a field site, since most of the Chicago plant models were not part of habitat groups, but arranged in relative isolation in a synoptic series of all the plant families.

Even though the models impressed Cowan for their accuracy and beauty, he did not believe the synoptic arrangement was very interesting to visitors.[3] He categorically dismissed the exhibits of economically important fibers and woods as "deadly," and bemoaned the "drudgery and boredom" of the "case type of

---

[2]Richard S. Cowan, "Chicago (Tape No. 2)," *ca.* 16 June 1960, SIA RU 155, Director, NMNH 1948-1970, Box 15, p. 8. The reports from Denver, Chicago, Pittsburgh, and Boston are rough transcripts of dictation tapes.

[3]*Ibid*., p. 9.

exhibiting" in the economic botany halls.[4] Though the habitat groups seemed to attract the visitor's attention, Cowan felt that their shells were too shallow "to portray with any great success the illusion of great depth and distance."[5]

He was quite impressed, however, by the Denver Museum of Natural History's numerous habitat groups, calling them "very excellent." Along with relating in considerable technical detail many of Robert Niedrach's techniques, including lighting and painting methods, Cowan reported that he "especially appreciated. . .the sense of drama he had."[6] Cowan explicitly tied Niedrach's sense of drama to taking the visitor to the field:

> Mr. Niedrach was very enthusiastic about the possibility of starting such exhibits from almost your foot level. He felt, and I am inclined to agree with him at this point, that the viewer would have a sense of being actually within the view which he is observing. This may or may not be true, something we should take up with our exhibits department in the future.[7]

Stimulated by Niedrach, Cowan speculated on the feasibility of a concave glass front to the exhibit case instead of the conventional picture-window front: "This may be entirely impractical but if one could step into a curved glass with the same sort of curved painted background, this illusion of being within the habitat. . .would be greatly heightened, I should think. . .and the total impression of realism could be increased."[8] Cowan also was impressed by the Tree Top Group, which depicted a heron rookery at the top level of the trees. He immediately saw the possibilities for showing the canopy of the rain forest:

---

[4]*Ibid*., p. 7.
[5]*Ibid*., p. 8.
[6]Richard S. Cowan, "Denver," *ca.* 18 June 1960, SIA RU 155, Director, NMNH 1948-1970, Box 15, p. 1.
[7]*Ibid*., p. 2.
[8]*Ibid*., p. 5.

> I talked with Mr. Neidrach about this and he brought up the possibility. . .that you might have a two-viewing level system in such an exhibit, that is, you might pass through such an exhibit on the ground level and then perhaps go up another place into what we would try to create the illusion of being the first branches of the tropical rain forest to see the epiphytes, flowering vines, and various other things.[9]

This idea remained in the various designs for the rain forest at the Smithsonian until the late 1960s, when financial limits permanently laid to rest the possibility of an upper-level view. In all, Cowan's early proposals appear modest in contrast to be schemes that were to follow. These examples establish that he based the exhibits strategies for the Smithsonian's botany hall on an awareness of the state of the art at the time.

Commitment to Drama

Cowan's interest in the details of habitat group construction indicates that he viewed the specifics of execution to be important in understanding the function of the genre as a whole. His attention to these details also suggests that he did not see an absolute the division of labor between exhibit-making and scientific content. He did not see his role as the exhibit's curator simply as being to provide technical information to the preparators for them to make manifest. Rather, he was clearly enthralled by the ability of the technology of the habitat group to create drama and wonder in the exhibit hall. It is important to see the extent to which Cowan was drawn into the technique of habitat group building as suggesting a resonance between the drama and wonder produced by the exhibit genre and the drama and wonder he felt in his own professional experience in the field, and the tropical rain forest in particular.

The Kaieteur Falls site in British Guiana seems to have been chosen quite early on. Cowan had been to another part of the biogeographic region called the

---

[9] *Ibid.*, p. 7.

Guiana Highlands in 1954-55 on an expedition with the New York Botanical Garden and so was familiar with the region overall.[10] A description of the tropical rain forest group planned for the Hall of Plant Life Cowan circulated to the botany department staff in December of 1960 reveals how much drama propelled realism:

> We have envisioned this as a dimly-lit, open passage through the lowland rain forest of tropical America, and in order to facilitate the traffic through the Hall and to preserve the illusion of being in such a forest, an entrance and an exit path are shown. You will note that a partition divides that end of the hall into two parts, the partition being painted with a forest mural. Midway in this partition I have suggested a 2-way screen on which could be projected a brightly lighted waterfall. Thus, a visitor passing through the hall in either direction would see through the lianas, understory-shrubs, and tree seedlings a waterfall in much the same way as such scenes are viewed in nature.. . .In this exhibit we would plan to introduce the authentic sounds of birds, monkeys, a distant waterfall, etc. It has been suggested that a "woodsy" odor be reproduced in this exhibit but this may not be desirable. I feel that while there may seem to be more emphasis than necessary on the rain forest, it is justified because such regions are of great importance both biologically and economically and from the standpoint of doing something dramatic I think it is unexcelled as a subject.[11]

From tentative musings on curved plate glass to a full-scale, walk-through replication with sounds and smells, this rain forest could not be too real as far as the botanists were concerned. Phrases such as "preserve the illusion," "viewed in nature," "authentic," and "dramatic," all make the rain forest group a visual text composed of inscriptions designed to transport the visitor to another place. Cowan's move at the end of the passage to justify such an elaborate exhibit shows that this sort of exhibit existed in the context of several exhibit styles and

---

[10]This expedition attempted to correlate vegetation patterns with underlying bauxite ore so that possible mining sites could be determined from aerial photographs (SIA RU 7356, Richard Sumner Cowan Papers, *ca.* 1952-1985, Box 4; Richard S. Cowan, "Oral History Interviews," July, 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 12).

[11]Richard S. Cowan to Department of Botany Staff Members, 19 December 1960, SIA RU 155, Director, NMNH 1948-1970, Box 15.

subjects, and its selection demonstrates the importance it held in his own imagination.

The massive scale of this exhibit called for more vertical space than the hall originally assigned to the project. The following year, the museum's director agreed that the botany hall should be moved from Hall 26 on the second floor of the MNH (Figure 3.1) to Hall 10, one of the three two-story halls on the first floor directly off the rotunda (Figure 3.2). He justified the move to the Secretary as a combination of meeting the botanists' exhibition needs and highlighting their status within the institution: "The botanists have felt that the present floor plan of Hall 26 would restrict their exhibit, which will include some large items (i.e., a section of a rain-forest).. . .Also, since botany is one of the four major disciplines of the MNH, it should be represented on the main floor."[12] That move was perhaps one of the keys to the rain forest's survival over the next decade, for the vision of building a two-story rain forest in Hall 10 captured and held several different groups of exhibit-makers in the course of the period.

Drama was also a crucial part of a program to sell botany to the visitor. In 1963, the year after the exhibit team returned from British Guiana, Cowan again prescribed dramatic exhibits as the antidote to botany's image problem: "Recognizing a lack of popular interest in this subject, considerable attention should be given to the development of highly dramatic exhibits. To this end, several habitat-groups are described below."[13] His valuation of the habitat group as attractive and dramatic made it the perfect means of stimulating popular interest in the plant sciences.

---

[12]A. C. Smith to Leonard Carmichael and Remington Kellogg, 1 August 1961, SIA RU 155, Director, NMNH, 1948-1970, Box 10.

[13]Richard S. Cowan to John Anglim, 16 April 1963, SIA RU 363, NMNH, Office of Exhibits, *ca*. 1960-1980, Box 28.

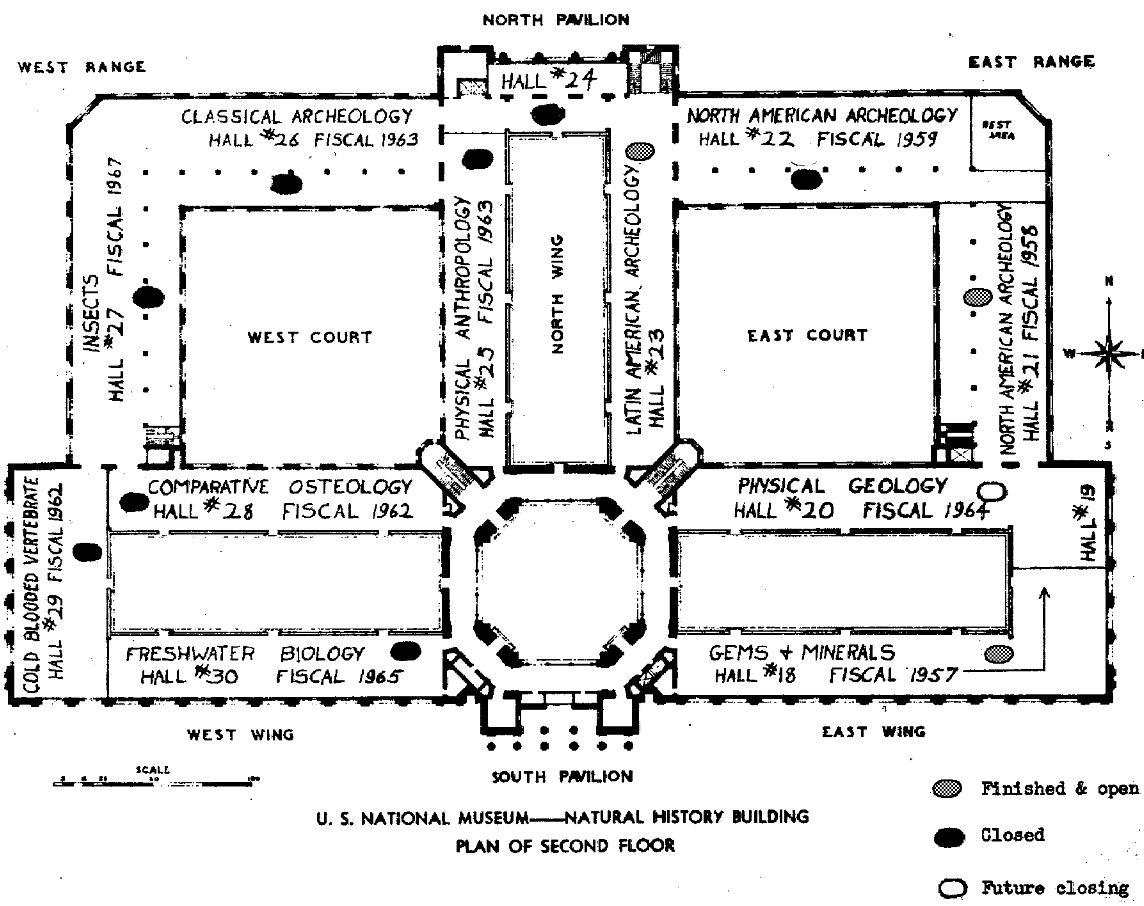


Figure 3.1. Floor plan of second floor of the Natural History Building, 1961. The Hall of Plant Life was originally slated for Hall 26 (upper left). SIA RU 155, Box 10, courtesy the Smithsonian Institution.

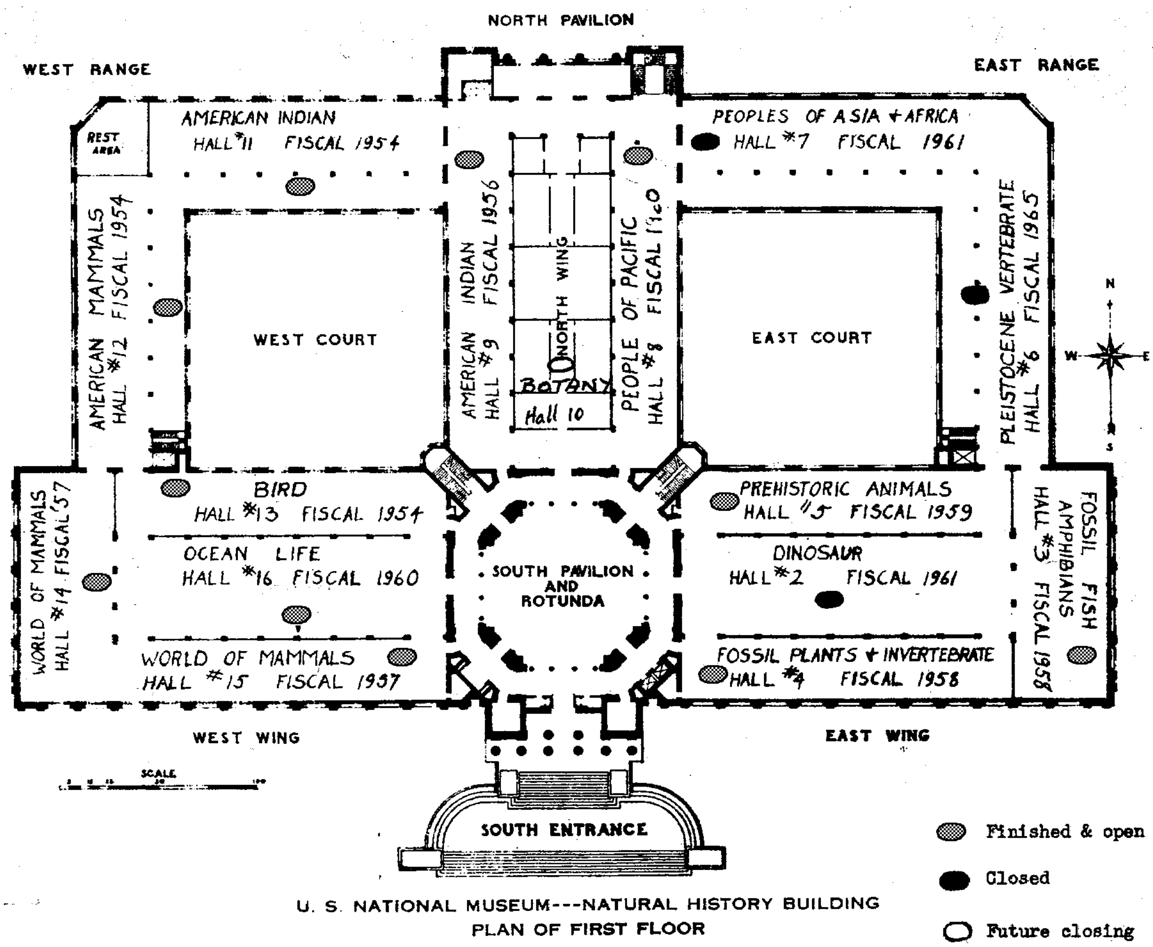


Figure 3.2. Floor plan of first floor of the Natural History Building, 1961. The botany hall has been moved to Hall 10 (center above Rotunda). SIA RU 155, Box 10 courtesy the Smithsonian Institution.

Not all of the botany curators unconditionally embraced the emphasis on habitat groups Cowan advocated for the hall. One commented on a later formulation of the hall, "I hope that all of the exhibits will not be dedicated too strongly toward the eye catching and the spectacular. I think some things should be meaty with content worthy of the most scholarly of our visitors and of our staff—something more than just a spectacle."[14] Cowan did not think he was sacrificing meat for spectacle. He saw the so-called "topical" exhibit cases with more technical content as balancing the spectacular nature of the habitat groups.

The Virtual Visitor

The notion of "popular attention" was part of a conception of the visitor that was largely based on conventional wisdom and informal observations and experience. The present field of "visitor studies" with quantitative surveys and evaluation instruments was an invention of experimental psychologists starting in the late 1960s, and did not arise from within the museum profession itself.[15] Up until and during the Hall of Plant Life period at the Smithsonian, the curators and exhibit-makers alike relied on their own accumulated experience and sensibilities to create what could be called the "virtual visitor." This label is particularly appropriate for the saga of the rain forest, since real visitors were in fact not present at all in the system until "It All Depends" came and went in 1974. Before that, all references to the visitor were based on general assumptions about museums and their educational function. Such assumptions were probably more useful in guiding exhibit design than many modern "scientific" studies are today, which are frequently little more than marketing surveys.

---

[14]W. R. Ernst to Richard S. Cowan, 7 February 1964, SIA RU 155, Director, NMNH 1948-1970, Box 15.

[15]An early example that later attracted Secretary Ripley's attention at the Smithsonian was Chandler Screven, "The Museum as a Responsive Learning Environment," *Museum News*, June, 1969, pp. 7-10.

In the late 1940s, botany curator E. P. Killip rationalized habitat groups because "[t]he American public likes to travel."[16] He declared this claim without explanation as common knowledge that provided a context for transporting the visitor to a field site in the museum hall: load the kids in the car and drive to the museum or to Yellowstone. The museum habitat group would be successful, Killip implied, because the American penchant for travel meant that visitors already had a motivation and framework for viewing exotic places.

Along with assuming that the visitor would bring a motivation for seeing certain sorts of exhibits with them, the exhibit-makers also made assumptions about the visitor's educational level. John Ewers was an ethnologist who was at that time working on the Smithsonian's new National Museum of History and Technology.[17] In 1960, as the botany hall was being first considered, he expressed admiration for the exhibits in the newly-opened "World of Mammals:"

> I am impressed by the fact that many of the topical exhibits involve biological principles about which most people have a smattering of knowledge, but illustrate them in a way that makes these principles clear and even exciting. They appear to conform to the old exhibition dictum "Something new about something known makes a good educational exhibit."[18]

Ewers' dictum indicates that exhibit-makers assumed at least a modest measure of scientific education in their visitors. Today, many museums assume no particular or even general knowledge on the part of their visitors, and, as will be

---

[16]E .P. Killip, "Department of Botany: Future Exhibitions," 26 August 1948, SIA RU 155, Director, NMNH 1948-1970, Box 15, p. 2.

[17]Ewers was trained in museum work while a field curator for the National Park Service and Curator of the Bureau of Indian Affairs Museum of the Plains Indian. He came to the Smithsonian in 1945 and worked with Frank Taylor on the Exhibits Modernization Program before working on the MHT (now the National Museum of American History) during the late 1950s and first half of the 1960s. He brought considerable exhibits experience from outside the Smithsonian as well as having a long career at the SI (*Guide to the Smithsonian Archives* (Washington, D.C.: Smithsonian Institution Press, 1983), p. 356).

[18]John Ewers to A. C. Smith, 12 July 1960, SIA RU 155, Director, NMNH 1948-1970, Box 15.

discussed in Chapter Six, they explicitly target segments of the audience they believe have no previous understanding of the subject matter.

The curators were well aware that visitors would bring with them different levels of interest in the technical material. Fern curator David Lellinger expressed this with the statement, "Viewers are considered to be in two classes—strollers and seekers. The former will see things presented vertically and more or less at eye level. The latter are given, in addition, horizontal surfaces with more information."[19] Lellinger elaborated on the definition of "strollers:"

> Well, if you walk through a hall, you see the "strollers." They're just kind of going through, usually eyes glazed by that time. They're not really going to absorb very much. And then there are other people who are really rather interested and they'll stop to read things. In those days, I don't know that we had access to any technical information about how you design an exhibit to make it interesting so that people will stop.[20]

Lellinger reconstructed the curators' knowledge of the "strollers" as the result of casual observation rather than formal study.

Another way that the curators expressed their understanding of the competence of their target audience was through the assumption that the exhibit should be interesting and accessible to pre-teens or early teen-agers. Cowan in his oral history interview concurred with Lellinger that this notion was primarily a convenient conceit:

> I think it was sort of conventional wisdom, if you will. And I don't know if anybody ever put it down in writing, that we prepared exhibits at the Smithsonian for, as I said, about ten or twelve, something like that.. . .Because that reached the most people. So, in general, we were writing for young people, partly at least.[21]

---

[19]David B. Lellinger, "Preliminary Design Comments Hall of Plant Life," 8 February 1964, SIA RU 155, Director, NMNH 1948-1970, Box 15.

[20]David Lellinger, "Oral History Interview," 13 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 25.

[21]Cowan Oral History (1992), p. 8.

One anonymous curator began his remarks on exhibits suggested for the botany hall by saying, "Approaching the topic with the mind of a fourteen year old I offer the following: Things to be eliminated."[22] But this approach does not yield a single strategy to simplify all of the subject matter or to make it all flashy. On one hand, the mind of the fourteen-year-old yields the admonishment to "Avoid over emphasis on maps. Globe is fine, but additional large maps seem unnecessary."[23] Maps will bore or confuse the fourteen-year-old. But further down the list is the recommendation that "Included with exhibits particularly near the Deciduous Forest could be some sort of rack with files of illustrated plants or other source of plant identifications for those (however few) who might be interested."[24] This suggestion assumes a high level of interest for the hypothetical teenager, and aligns with the botanist's own notions about traditional botanizing as discussed in the last chapter. It echoes botany curator Stanwyn Shetler's desire for the hall to cater to the "reflective and repetitive museum goer."[25] Framing the audience as an archetypal young person was more a convenient heuristic and a rhetorical strategy for advocating certain exhibit types than a central dogma structuring the entire project.

Realism as a Rhetorical Strategy

Cowan's early plan for the rain forest group quoted above was full of lush detail and drama. After the Kaieteur Falls expedition, the proposed level of detail and drama increased even further. In the same outline of the hall in which Lellinger discussed the "seekers and strollers," he painted the following picture

---

[22]"For attention of those interested in committee planning Hall 10," 1965, SIA RU 155, Director, NMNH 1948-1970, Box 15.

[23]*Ibid*.

[24]*Ibid*.

[25]Stanwyn Shetler to Richard S. Cowan, 6 February 1964, SIA RU 155, Director, NMNH, 1948-1970, Box 10.

of the rain forest section (Figure 3.3 shows the sketch of hall's layout that accompanied this description):

> Entrance interest and realism—It is necessary to build the illusion of entering the rain forest. This is done with a sloping pier (nice hollow boards) rising perhaps 2 feet in 15. A dugout lashed next to the pier can be seen from the rotunda, perhaps gently rocking with the current. Looking left, the viewer sees the rain forest across the river, and, straight ahead, the river going out of sight around a bend ahead. The sun (heat lamps) produces some discomfort. Turning right into the darkened forest, it is much cooler and darker. Day and night come and go in perhaps a 5-minute cycle.
>
> Light and sound considerations—An endless 4 (or more) track playback tape machine reproduces 4 different sound tracks and the cycling of the lights, which are dimmed and brightened. All is in synchrony with a clock outside (see below), which tells the visitors what time it is in the rain forest. Three of the speakers are at about 20 feet height. Monkeys call back and forth. As the waterfall is glimpsed to the right, a speaker at eye level, turned very low, brings our attention to it.[26]

This is a recipe for nothing less than total immersion, from the specification for "nice hollow boards" on the pier to make a satisfying sound, to the heat lamps which actually produce "some discomfort" in order properly to simulate the tropical sun. Lest it sound too outlandish, recall that the floral diorama built by the Marchands in Rochester in the 1940s (Figure 2.19) included breezes, running water, and sound and light effects.

Taking the near-mania for realism evident in Lellinger's proposal as a given, this section examines how the botanists selected realistic exhibits as the most desirable means of representing plants themselves as well as botany as a subject. That is, they chose habitat groups not simply because they saw them as the appropriate popular genre for grabbing public interest, but because the sense of drama they experienced at their field sites was part of the message they wanted their exhibits to convey. Furthermore, although later museum design professionals would attribute the high accuracy of hand-made accessories in

---

[26]Lellinger, "Preliminary Design Comments Hall of Plant Life."

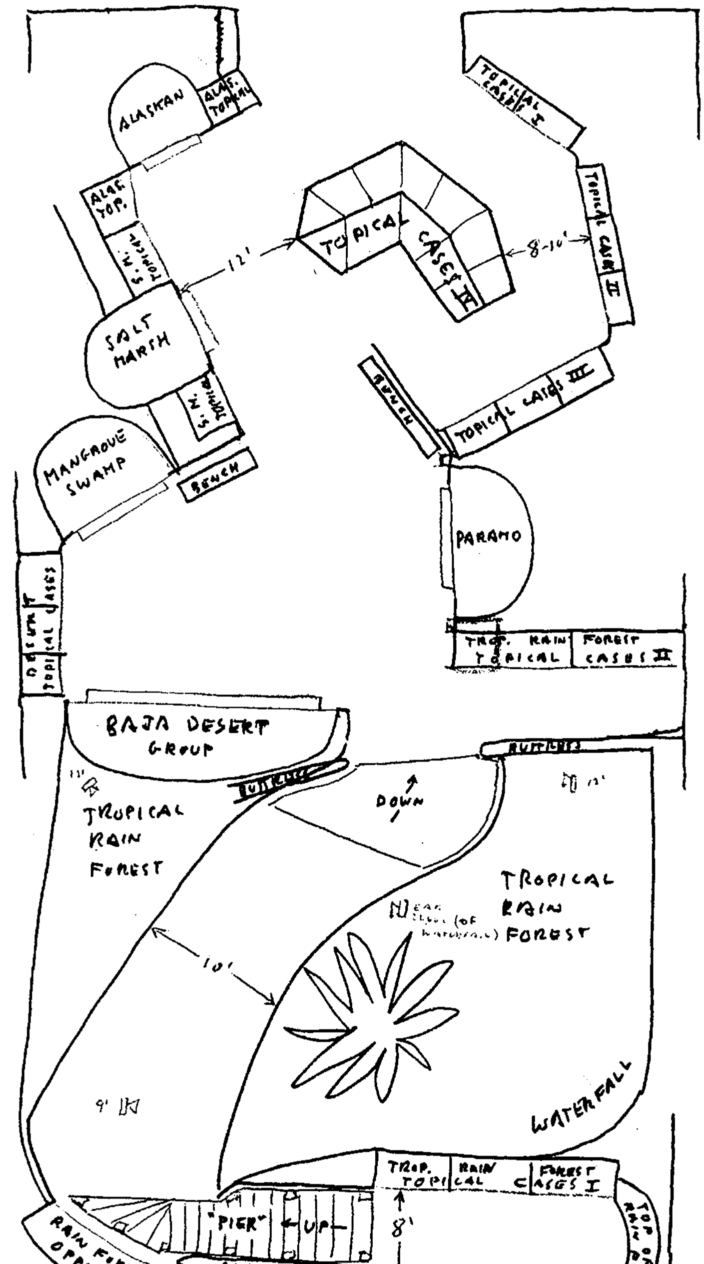


Figure 3.3. Preliminary floor plan sketch for Hall of Plant Life by David Lellinger, 1964. SIA RU 155, Box 15 courtesy the Smithsonian Institution.

habitat groups to the old-school preparators and artists, it is clear that the botanists themselves evaluated the various modeling technologies for accuracy. Increasing the credibility of plant models was to them crucial to bringing plants to the foreground in habitat groups, rather than functioning as window dressing for animals. Finally, the botanists chose habitat groups from among several available genres of exhibits with varying degrees of naturalistic presentation, meaning that they saw the realistic habitat group doing specific work.

The Romance of the Field

First of all, the botanists saw the realistic habitat group as the rhetorical strategy best suited to convey the romance and excitement of the field site gestalt to the visitor. This desire ran beyond the calculated effort to build an exhibit with popular appeal, and to the wellspring of their own motivations for following the professional paths they had chosen. Cowan recounted the reasons why he had become interested in the tropics:

> I'll tell you another thing that stimulated my interest, too, was reading early on, long before Kaieteur, was A. Conan Doyle's *Lost World*.. . .It's a fascinating story. It's a hypothetical story of course, but it was based on the travels of Robert and Richard Schomburg in that very area—Rorima, actually, the mountain called Rorima—but in that same general area. And they went up on top and found dinosaurs and all of that, you know. This area had been separated for millions of years and the dinosaurs were still there and everything.
>
> Well, and you know, you look for odd things like giant bromeliads as a part of convincing people that you're looking at something very, very different, something unique. "You've never seen anything like this before."[27]

Cowan invokes Conan Doyle's book in the middle of a discussion about archetypal rain forest features that would be required in the habitat group.

---

[27]Cowan Oral History (1992), p. 17. Arthur Conan Doyle, *The Lost World: Being an Account of the Recent Amazing Adventures of Professor George Summerlee and Mr. E. D. Malone of the Daily Gazette* (London and New York: Hodder and Stoughton, 1912). The book was reprinted in the U.S. again in 1943 and 1954 (National Union Catalog).

Cowan allowed that buttress trees and lianas were "two elements, just to give an example, that would say, 'rain forest.'"[28] Those items are a part of the iconography of rain forests, and set up the defining characteristics of what the place *ought* to look like. But *Lost World* is about the exotic and the mysterious, and Cowan's love for the book signals that what drew him to the rain forest was the new and mysterious more than the already known. So in the last paragraph of the passage, he added giant bromeliads to the list of essential rain forest elements which are to make the viewer think, "You've never seen anything like this before." Lianas and buttress trees are needed to make the rain forest believable as a rain forest, but giant bromeliads are needed to make it wondrous.

The sense of adventure and promise of outrageous discovery conveyed by *Lost World* was clearly enticing and infectious. Entomologist and inventor of the term "biodiversity" E. O. Wilson writes in his autobiography, "Almost all my life I have dreamed of the tropics. My boyhood fantasies drifted far beyond the benign temperate zones of Thoreau and Muir.. . .My favorite novel was Arthur Conan Doyle's *Lost World*, which hinted that dinosaurs might yet be found on the flat summit of some unclimbed South American *tepui*."[29] Conan Doyle's portrait of the tropics similarly whetted Wilson's appetite for excitement, and even danger, something which could not be satisfied by the "benign temperate zones." Wilson frames several of his early expeditions around his compulsion to find solitude and be the first scientist to see a place.[30]

---

[28]Cowan Oral History (1992), p. 16.

[29]Edward O. Wilson, *Naturalist* (Washington D.C.: Island Press, 1994), p. 139.

[30]The chapter he begins with the *Lost World* discussion is about an early trip in Mexico where he attempted to climb to the timberline of the volcano Orizaba. He endured a grueling climb in New Guinea because he "wanted the unique experience of being the first naturalist to walk on the alpine savanna of this part of the Sarawaget crest and collect animals there" (*Ibid*., p. 194).

Like Wilson, Cowan's early career was shaped by the desire to discover organisms new to science and literally to blaze new trails as a scientific explorer. He offered this account of the genesis of his interest in the tropics:

> [A]fter I got out of the Navy in 1945, I went back to my home in Indiana and as soon as I could arrange it,. . .I went back to Hawaii with my family for my Master's degree. And I got interested in tropical floras there. The fact that you could go out on mountainsides even on Oahu and any of the other islands for that matter, and there were new things to be found *everywhere*. I've never felt very good about or felt very comfortable with old trails. I like making new trails, new paths. For that reason, I think that psychological background, that psychological quirk, kept me out of teaching myself. I made a conscious decision while I was in Hawaii that I would continue in research because I had two years of teaching in beginning botany laboratories, and sort of doing the same thing year after year really turned me off of teaching![31]

Cowan's restlessness led him away from the rote repetition of the classroom and into the unknown of the field. On the first trip he took to Venezuela with the New York Botanical Garden in 1950, the party was "out of touch with civilization for five months."[32]

Cowan went on to emphasize that scientifically, the field experience was a crucial part of knowing the subject matter:

> It's largely a matter of discovering new things and the opportunity to get wholly new information to put together clearer pictures of relationships and phylogenetic history, that sort of thing. You can do some of that, I suppose, just sitting in the museum, but seeing the things in the live state really can't be beat. [Cowan's mentor at the NYBG, Bassett] Maguire was bringing back fantastic stuff from every trip. He'd been going since 1944, and on one of the trips just before I went down, he brought back one plant of a new genus of the citrus family, and that was pretty exciting—a brand new genus. That explains my interest.[33]

It is this tacit dimension of the field experience, discussed in the last chapter and what Cowan here calls the invaluable chance for "seeing the things in the live

---

[31]Cowan Oral History (1992), p. 12.
[32]*Ibid*., p. 12.
[33]*Ibid*., p. 13.

state," that shaped both his scientific career path and his desire for realistic habitat groups in the botany hall. Even though the concept of "phylogenetic relationships" is fairly abstract, for Cowan and other field naturalists, the idea was most clearly embodied and explained by the field material as experienced in the field. If the idea was to be communicated effectively to the museum visitor, it had to be with a realistic representation of the field, rather than a stripped-down schematic representation of the concept in its pure intellectual isolation. This differs from the representational strategies discussed in the Introduction outlined by Gilbert and Mulkay for biochemistry: the botanists instinctively felt that a stripped-down representation was *less* accurate, since their domain was macroscopic and physical, rather than an abstract chemical world.[34]

Thomas Soderstrom was another young botanist who was drawn to the exotic allure of the Tropics. He came to the Smithsonian as associate curator of grasses in 1960 after serving summer apprenticeships with the incumbent grass man, Jason Swallen, while a graduate student at Yale.[35] Cowan asked him to join the British Guiana expedition team as photographer when the exhibit department photographer got "cold feet-itis" a few months before the trip was scheduled to depart in early 1962.[36] Cowan recalled that

> he was almost embarrassingly enthusiastic about getting to the Tropics. He had never been there before, and he was just like a boy in a candy shop, he was so excited.. . .He got into it immediately philosophically.. . .He was a real communicator in the sense of being excited about his subject and being able to talk to anybody about grasses and making it interesting. In the field, he was excellent with the camera. He was just exactly what we needed.[37]

---

[34]Nigel G. Gilbert and Michael Mulkay, *Opening Pandora's Box: A Sociological Analysis of Scientists' Discourse* (Cambridge: Cambridge University Press, 1984), Chapter 7, "Working Conceptual Hallucinations."

[35]Cowan Oral History (1992), p. 10.

[36]Richard S. Cowan to Thomas R. Soderstrom, 21 November 1961, SIA RU 155, Director, NMNH, 1948-1970, Box 12.

[37]Cowan Oral History (1992), pp. 10-11.

That first trip made its impression, for it was to be only the first of many for Soderstrom. He concluded a short article about the expedition with his memory of leaving Kaieteur Falls: “As we looked from the plane window for the last time at Kaieteur below, our thoughts were filled with the beauty of the Fall and the splendor of the rain forest. Our mission will have been successful if those who view the exhibit in the future will experience a similar feeling.”[38]

Figure 3.4 is Soderstrom’s parting view of the Falls. His expression of “beauty” and “splendor” echoes the rationale for locating the rain forest at Kaieteur Falls that Cowan expressed in the British Guiana press: “Describing the country’s rain forest as ‘the most beautiful scenery I have ever seen,’ Dr. Cowan said that Kaieteur Fall will be the main exhibition at the Institute [sic], because of its beauty.”[39] These two statements capture the extent to which the rain forest’s overall meaning during this period was first and foremost a botanical wonder.

A photograph Soderstrom took at the base of the Falls captures the team in a moment evoking the romantic explorer (Figure 3.5): Sayre stands with binoculars in hand, and the rest contemplate the awesome power of the falls. Seven years later, a live philodendron collected on the trip still thrived in Soderstrom’s office, the botanical equivalent of a big game trophy.[40] This was the fulfillment of a lifelong dream, fueled not by *Lost World*, but by glimpses of

---

[38]Thomas R. Soderstrom, “Preparing a Rain Forest Exhibit for Smithsonian’s New Hall of Plant Life,” *Plant Science Bulletin*, 1965, *11*:1-3., p. 3. Soderstrom inscribed this reprint as follows: “Thanks, Dick, for making possible this nice trip to B. G.” (SIA RU 155, Box 12). It is telling that this account was published in a newsletter for other plant scientists, since Soderstrom might have emphasized the more technical aspects of both the rain forest and the exhibit to this audience.

[39]“7 Million to See Kaieteur Fall: Smithsonians Blaze Trail in Interior,” *Evening Post*, Georgetown, British Guiana, Thursday, 29 March 1962, p. 12 (Paul Marchand papers).

[40]Tom Harney, “Ceylon Lures Soderstrom From Green Grass of Home,” *Smithsonian Torch*, September-October 1969, p. 3, SIA RU 416, Office of Public Affairs, Box 1.

Figure 3.4. Kaieteur Falls, British Guiana, from the air, 1962. The pontoon of the airplane is in the upper right corner. Thomas R. Soderstrom photo #1223 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

Figure 3.5. Smithsonian botany exhibits expedition team at the base of Kaieteur Falls, British Guiana, 1962. Left to right: Lionel Chacon, Reginald Sayre (standing), Rufus Boyan, Richard Cowan (behind Boyan), Paul Marchand, and Charles Sandy. Thomas R. Soderstrom photo #1320 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

living exotic plant life. Much later, Soderstrom wrote to a friend, "My earlier fantasies of traveling to exotic places to collect plants (which I have done) were made as a teenager when I used to visit the Garfield Park Conservatory" in Chicago.[41] The remnant of those fantasies and the memory of the Kaieteur trip no doubt spurred Soderstrom to try to retain the specific identity of the rain forest when it was finally built in the 1970s.

Connecting Cowan and Soderstrom's field experience in the tropics with their interest in habitat groups for the Hall of Plant Life helps to explain why the earlier generation of botany curators did not at first think of habitat groups when pressed to consider botany exhibits in the late 1940s. Recall that for E. P. Killip, the Harvard Glass Flowers were the paradigmatic exhibit form , and that in terms of its process of inscription, the herbarium to a great extent left the field behind. Not only was the Smithsonian botany staff quite small until the late 1950s, but during the Depression and war years, the curatorial staff went into the field infrequently.[42] This institutional culture had an important bearing on the way that the botanists conceived of the field. As discussed in the last chapter, when Killip advocated more expeditions in his report of 1950, it was to collect more material to fuel the exchange of specimens between institutions. He did not justify expeditions on intellectual grounds.

In sharp contrast to the museum-bound staff of the Smithsonian, Cowan characterized his previous home, the New York Botanical Garden as "a vibrant place in terms of people going to the field.. . .every year, if you wanted to. In

---

[41]Thomas R. Soderstrom to Roy Batenich, 1985, SIA Accession No. 89-022, Thomas Soderstrom Papers, *ca.* 1954-1985, Box 3.

[42]The Smithsonian Annual Reports show that there was just a single field trip by the botany staff between 1943 and 1948, inclusive. There was just one trip per year for the entire division in 1940-1942 (Killip went to Colombia in 1940), and none at all in 1938 or 1939. When Killip rejected the idea of exhibits in 1948, he had been on *one* field trip in the preceding decade.

fact, you practically had to fight to stay in."[43] Ironically, even though field work strongly appealed to him, Cowan also left the NYBG for the Smithsonian because he wanted to have the time to actually study the materials he had collected. But he found the situation at the SI "disappointing" because "when I arrived here, I found that nobody was going to the field from botany, at least; it was essentially a static situation in terms of field work."[44] Cowan's perspective balancing field work with museum work processing new specimens made habitat groups reproducing the field plausible in a way that they were not for Killip.

Botanical Accuracy & Raising the Status of Botany

Along with wanting to use a realistic exhibit to reproduce the field site in all its magical wonder in the museum, the botanists tied realistic representations of plants to the status of their field, both in the museum and with the public at large. A later section will detail their motivations for "selling botany;" this section specifically examines how realistic models played a key role in their desire to give botany a higher profile.

Though sounding as technical and nondescript as "hall of botany," the moniker "Hall of Plant Life" provides a subtle clue to the passion that Cowan wanted to share. The phrase "plant life" is loaded with affect—it encapsulated his own passion for plants, which he hoped to convey to the visitor:

> I was fascinated with natural history and I couldn't see any reason why everyone else wasn't, especially plants. Plants seemed to be particularly neglected in terms of what people understood. You asked people about ants and snails and fishes, and they might tell you something—or birds. But if you asked them about plants, they really considered them things that were in the way or something you rested under in the heat of the day. But they didn't have much more of an appreciation of plant life than that.[45]

---

[43]Richard S. Cowan, "Oral History Interviews," 1974, SIA RU 9501, p. 14.
[44]*Ibid*., p. 14.
[45]Cowan Oral History (1992), p. 2.

Here Cowan indicates his bafflement at why plants were so ignored. Fascinated by plants, he wanted to elevate their status above disdain for weeds and taking shade trees for granted. In the next passage, the special significance of the phrase "plant life" comes out:

> My major professor in my undergraduate school was an old boy who took plant life very seriously in a sense.. . .He looked at plants as living things—*really* living things. We all know they're living things, but he talked to them. [Laughter] You may think that's pretty wild, but I think all of us who were botany majors with Doc Bechtel were sort of imbued with that idea that plants were just as much alive, and. . .one could relate to them just as well as if they were butterflies or birds.[46]

Cowan hoped to promote the plant kingdom as intrinsically interesting and on a level of attraction and value with the organisms that typically caught people's fancy. Though Cowan's professor comes off as a bit eccentric, his perception of plants as "*really* living things" belongs to the same discourse as Killip's earlier worry, that animals would "distract the attention from the plants."

That discourse simultaneously reveals the botanists' intense involvement with, and a lingering sense of inferiority about, their subject matter. These concerns underlie the desire for realism in the botany exhibits. A British Guiana newspaper, in describing the Kaieteur Falls expedition team, reported, "Their main object, according to the leader, Dr. R. S. Cowan, is to show the people something of plant life, and to get them to appreciate plants as much as they appreciate animals."[47] Similarly, Soderstrom wrote, "In many American museums, botanical exhibit subjects have long been stifled in favor of 'more interesting' zoological subjects. At best, plants are exhibited merely as background to illustrate the habitat of the animals being portrayed."[48] Writing

---

[46]*Ibid*.
[47]"7 million to see Kaieteur Fall: Smithsonians blaze trail in interior."
[48]Soderstrom, "Preparing a Rain Forest," p. 1.

to an audience of colleagues, Soderstrom's sarcastic "more interesting" in scare quotes suggests that this complaint was not unfamiliar to his readers.

Not only might animals distract from plants in botanical groups, but plants in habitat groups featuring animals were rarely reproduced with as much care as was lavished on the animals. Stanwyn Shetler, another botanist involved in the project, amplified Soderstrom's point when he explained during an interview that this could happen because a less exact plant model would still be credible to the average viewer, though not accurate enough to satisfy a botanist.[49] To illustrate that many representations of nature privilege the animals, he cited the work of celebrated wildlife artist Robert Bateman. In this passage, he refers to Bateman's 1985 painting of a Giant Panda (Figure 3.6):

> [A]t first impression, you would get the feeling that he's treated plants and animals more or less equally, but as a matter of fact, although the setting here is China and sort of out of my realm, I would wager that the little plant that's growing on the rocks there with the moss is unidentifiable. It's credible, because it's done in sufficient detail that it's credible, but it's unidentifiable. Probably the bamboo is as well. But the panda is absolutely explicit. There's no mistaking that.[50]

Plants were pushed into the background by reproducing them with less accuracy. Their lower status did not result simply from the viewer's initial bias, but because a cognitive bias had been built into the representation.

Cowan took up this matter when reporting his impressions of exhibits at other natural history museums gathered during his 1960 tour:

---

[49]Stanwyn G. Shetler, "Oral History Interview," 14 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 9.

[50]*Ibid*., p. 8.

Figure 3.6. *Giant Panda*, by Robert Bateman, 1985. Acrylic on canvas, 48x36 inches. Copyright © Robert Bateman. Reproduced by permission.

> Perhaps the most important element in habitat groups, as well as in other types of biological exhibits, are the three-dimensional models in the foreground. These are constructed of a variety of materials in several ways but never more successfully than at the Chicago Museum.. . .These models are perfect in even the smallest details and they are unique in this respect, for many exhibitors appear to depend largely on mass effect rather than detail to convey realism to a habitat group.[51]

Relying on "mass effect" was particularly offensive to a taxonomist, for whom details are the crucial elements that identify and define the organism's place in the evolutionary fabric of life.

But why else was "mass effect" an inferior rhetorical strategy? It certainly could be impressive, and if the botanists merely wanted to impress their audience, it might have been perfectly adequate. However, in commenting on his report during an interview, Cowan further noted that

> obviously in a botany exhibit, things have got to be as nearly perfect as can be, and that was certainly one of the big problems all along was trying to get realism in big scale exhibits like a rain forest, for example.. . .I certainly agree that past exhibits have been very light on the plant life.. . .The animals have every hair in place but the plants are just background. They're in the same order of importance as the—well, perhaps even less—the background painting.[52]

Here Cowan concurs with Shetler's complaint: plants recede into the *background* and become window dressing. That the plants "obviously" must be "perfect as can be" follows directly from the status of the other elements of a habitat group. Namely, if the perfection of the animals' representation is a sign both of the privilege they are given by exhibit-makers, and their ability to inspire interest and awe in visitors, then the plant models must be similarly perfect in order to play the same part.

---

[51]Richard S. Cowan to A. C. Smith and J. R. Swallen, 7 July 1960, SIA RU 155, Director, NMNH, 1948-1970, Box 11.

[52]Cowan Oral History (1992), p. 7.

In his interview, Cowan expanded on what he meant by "mass effect." He said, "Exhibits of the past were quite content with putting in, well, let's say, a whole mass of elliptic leaves when only one species of the group had such leaves."[53] He did not name specific museums as examples, but close reading of his original 1960 reports suggests that although he was generally impressed with the habitat groups in Denver, the plant models were not always as accurate as he would have liked. Commenting on Niedrach's skill, he wrote,

> The materials that he has used, and he uses them reasonably well I think, really quite well considering that he has had no expert preparators working for him. In WPA days, for example, he used as many as 30 people, but completely untrained people, for the preparation of flower parts and the like for these exhibits.[54]

The qualifiers "reasonably well" and "completely untrained people" indicate that the models were not as accurate as what could have been produced by a master model-maker like Paul Marchand or Reginald Sayre.

This inference is supported by Cowan's further comment that, "The materials used here [Pittsburgh] are mostly the ordinary ones of wax and wire and while the models are not quite as good as those at Chicago they still are much better than those at Denver."[55] The plants models in the Sonoran Desert Group in Denver (Figure 2.14) were made mostly from die-cut paper, having a mass-produced quality to them. As Cowan implied in pointing out that these exhibits were built by WPA labor (as were many at the AMNH), this was much more likely due to financial constraints than Niedrach's lack of discernment. In contrast, according to Soderstrom, each shrub collected in British Guiana for the

---

[53]*Ibid*., p. 17.
[54]Cowan "Denver" report, p. 2.
[55]Cowan "Pittsburgh" report, p. 3.

rain forest group had several sizes of leaves cast in the field in order to reproduce the variation occurring on a given specimen.[56]

Even though the means of reproduction was not as exacting as other museums were able to achieve, Niedrach clearly intended species to be recognizable, and, as figure 2.11 shows, he identified at least some of them in the field. More importantly, Alfred Bailey's use of Merriam's life zone theory (discussed in the last chapter) meant that the habitat groups in the Denver ecology hall were considered to be assemblages of plants, birds, mammals, and reptiles, rather than simply being the context for a charismatic big game animal. Plants were equally important in defining the distinct character of each habitat in the life zone series. The Sonoran Desert Group (Figure 2.14), even though its flowers are not as accurate as Cowan would have liked, emphasizes the spring floral display of the desert rather than animals.[57]

In New York, although plants were accurately modeled, they definitely took a back seat to the animals. Selection of field sites and collecting was generally supervised by the zoologist on the team. According to background painter James P. Wilson, "The mammal man is head of the whole project so his views are of importance. And they should be of importance because he knows the habits of the animals so intimately that he can choose a suitable background."[58] Thus the background was selected not only for its scenic beauty, but for its appropriateness as a location where a specific sort of animal was

---

[56]Soderstrom, "Preparing a Rain Forest," p. 2. A director of the Buffalo Museum of Science also commented that earlier habitat group accessories employed the same leaf pattern for all the leaves on a model tree or shrub (Carlos E. Cummings, "Flowers Reproduced in Wax: Synthetic Nature Then and Now," *Hobbies*, 1941, *21*:68-73, on p. 70).

[57]The peccaries in the group now were not present when the group was first completed (*Colorado Museum of Natural History Annual Report* (Denver: 1942), pp. 18-19).

[58]James Perry Wilson, "Oral History Interview," 1960, AMNH Department of Library Services Special Collections, Artist File, p. 7.

found. Nonetheless, as Sayre's account in Chapter Two of his insistence on having the correct lupine in the Mountain Beaver Group shows, plants were taken seriously. In the case of the lupine, it was central to the narrative of the group, since it composed the Mountain Beaver's primary food (Figure 2.8 shows the Mountain Beaver biting off a lupine stalk). In the 1940s, botanist Henry Svenson, who later advised Sayre on the lupines, wrote a guidebook interpreting the botanical specimens in the habitat groups. The museum recognized, "Our animal habitat groups contain a great number of meticulously prepared reproductions of botanical life which at the present time is of little use to our public."[59] Even though plants were modeled accurately, they were not the primary focus of the exhibits, and the museum realized that their significance was therefore lost on the visitor.

The attention to detail that the Smithsonian botanists advocated was not restricted to getting the shape right. Among other things, Cowan paid specific attention to the way that certain materials seemed to his eye to be better suited for reproducing different kinds of plants. He noticed, "Celluloid for example seems to give a much more realistic quality at least those of temperate zone ones [sic]. The wax seems to give a more heavy, waxy thick quality such as one might find in tropical plants."[60] Not only did the materials have to match the needs of production, they needed to match subtle qualities of the original plants themselves. This eye for detail is certainly a far cry from "mass effect."

Alternatives to realism

The importance of the strategy to transport the visitor to an exotic locale can be seen by looking at the place habitat groups held in the overall

---

[59][Henry K. Svenson Personnel Biography], December 1948, AMNH Department of Library Services Special Collections, Biography Files.

[60]Cowan "Chicago" report, p. 9.

constellation of exhibits types available to the botanists, and the relative importance they assigned to each of them. That is, if the botanists were simply being naive and selecting one of the most typical modes of natural history exhibition, no significance could be attached to the fact that they preferred realism over some other genre. However, the botanists extensively discussed other exhibit types and the role habitat groups were to play in the hall.

The botanists conceived their hall as a combination of habitat groups and "topical cases," containing more didactic material about plant reproduction and variation.[61] Lellinger's sketch for the floor plan (Figure 3.3) shows the combination of habitat groups (curved units) and the topical cases (rectangular units). From his tour of other museums, Cowan concluded that such a balance was necessary:

> If the general aim of the exhibits is to entertain as well as to educate potential viewers, this is achieved to varying degrees by the institutions visited. The Denver Museum, as an example, is devoted almost exclusively to habitat groups, which are very popular with visitors but lacking a commentary in some form, they are primarily entertaining and not necessarily educational. The American Museum in its Hall of Ecology and Hall of North American Forests achieves both objectives remarkably well. The five botanical halls in the Chicago Museum of Natural History are essentially educational and public interest in these exhibits is correspondingly below that in less technical halls.[62]

All habitat groups and no interpretation is not educational, whereas all education and no lovely field site reconstructed in the gallery is a bore.

The smaller exhibits slated for the Smithsonian's botany hall were therefore to do the technical educational work that the habitat group could not do. Cowan explicitly saw the topical cases as complementing the habitat groups:

---

[61]Lellinger, "Preliminary Design Comments Hall of Plant Life;" Richard S. Cowan to John Anglim, 25 February 1964, SIA RU 155, Director, NMNH, 1948-1970, Box 10; Stanwyn Shetler to Richard S. Cowan, 24 February 1964, SIA RU 155, Director, NMNH, 1948-1970, Box 10.

[62]Cowan to A. C. Smith and J. R. Swallen, 7 July 1960.

> It is our intention not merely to present attractive pictures in three dimensions but to provide the basis for instruction. This fact is demonstrated by the fact that each life group is expected to be accompanied by one or more "satellite" cases which will attempt to answer questions that may logically arise in the mind of the eventual viewer.[63]

Thus the topical cases were an integral part of the overall strategy for the hall. Cowan saw them as necessary because of the limitations of the habitat group:

> [W]hat we were trying to do with life groups. . .was raise questions, show people in some cases a cross-section, a segment of nature, and say, "OK, here's salt marsh, or a tropical rain forest, or a little hunk out of the desert—the Western desert." But show it in such a way, and with such realism, that people would be drawn to look at it.. . .
>
> I think very often habitat groups fail miserably because they're just habitat groups. They're three-dimensional pictures in color. That's all very nice, but very often they don't really provide very much learning for the viewer. So the idea of the life group was to grab their attention, raise questions, and then in the topical cases nearby, to answer some of the questions for those who either recognized the questions or were interested enough to follow up on the questions.[64]

The rain forest habitat group would provide a primary sensory experience which would then be interpreted by the more technical exhibits beside it.

Embedded in this division of labor was the assumption that the habitat group was a verbatim "segment of nature" conveniently located in the exhibit hall, and that this representation took priority over the more technical discussions. As the 1964 floor plan shows (Figure 3.3), the habitat groups took up most of the space in the hall. This was in part due to the nature of the two exhibit types—vertical material in topical cases versus considerable depth for a proper habitat group. But it is also clear from the fact that the rain forest consumes almost a third of the hall that the botanists saw habitat groups as

---

[63]Richard Cowan to Herbert Friedmann, 11 September 1965, SIA RU 155, Director, NMNH 1948-1970, Box 15.

[64]Cowan Oral History (1992), p. 8.

worthy of the space. The visitor was meant to see the technical details in light of the actual natural setting rather than vice versa.

Though this may seem like the obvious choice, the later transformations that the rain forest exhibit went through after the Hall of Plant Life was canceled indicate that the privilege given to the rain forest as an interesting place in and of itself resulted particularly from the botanists' "frame of meaning" as field naturalists and systematists.[65] That is to say that the botanists' definition of the rain forest was not defined in "purely" scientific terms (i.e., "Here is the list of all the plants found in the rain forest"). Rather, the notion of the rain forest as a place comes from a cultural definition of botany. Emphasizing botany as a culture as well as a body of knowledge shows how the botanists' shared experience structured the representations of the knowledge they produced.

The botanists selected the genre of realism from among several others available both at the Smithsonian and other museums, some of which more heavily favored abstract exhibit styles. After his 1960 museum tour, Cowan reported that "I can't get very excited" and that he was "reluctant" to have traditional synoptic exhibits which displayed plant series in taxonomical order.[66] The importance of realism of habitat along with the individual plant models is shown by Cowan's view that the famous glass flower models at Harvard, though astonishing in their realism, were not very useful because they were exhibited like so many herbarium specimens.[67] At the Smithsonian, the North American Mammal Hall and the North American Indian Halls completed in 1957 were

---

[65]Pinch and Collins use the term as a synonym for a Kuhnian "paradigm" or a Wittgenstinian "form of life:" the incommensurable world that each social group inhabits defined by practices, questions, theories, language, and subject-matter (H. M. Collins and T. J. Pinch, *Frames of Meaning: the Social Construction of Extraordinary Science* (Boston: Routledge and Kegan Paul, 1982), p. 4).

[66]Cowan "Chicago" report, pp. 9-10.

[67]Cowan "Boston" report, pp. 1-3.

dominated by habitat groups and dioramas with a minimum of topical exhibits.[68] Herbert Friedmann's bird hall, completed in 1956, and the 1959 World of Mammals, curated by Henry Setzer, were both a mixture of the two exhibit types.[69] Physical anthropology and osteology, both opened in 1965, were primarily composed of topical exhibits.[70] John Ewers, who had espoused the "something new about something known" principle of exhibitry, considered the World of Mammals to be a desirable mixture of habitat groups and topical exhibits, and early in the process commended them to the Museum's director as an exemplar for the botany hall.[71] Ewers wrote to Cowan:

> I have been impressed by the way in which scientific principles have been clearly and effectively interpreted in the World of Mammals Hall through careful selection of specimens and brief, very readable labels. I doubt if you could find a better model for effective interpretation of biological concepts to the public than is this hall in our own museum.[72]

Ewers clearly saw abstract exhibits as being necessary to explain general principles. Particularly because the exhibit halls completed toward the mid-1960s used more designer-oriented, topical treatments, the botanists' retention of habitat groups indicates how central they were to their thinking.

The Botanical Gallery at the British Museum (Natural History)

Another case that highlights the role realistic exhibits played in recreating the botanists' field site inside the MNH is the botanical gallery at the British

---

[68] *Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1957), p. 34; *Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1958), p. 38.

[69] *Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1956), p. 36; *Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1960), p. 39.

[70] *Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1965), pp. 99-100.

[71] Ewers to A. C. Smith, 12 July 1960.

[72] John C. Ewers to Richard S. Cowan, 21 August 1961, SIA RU 155, Director, NMNH 1948-1970, Box 15.

Museum (Natural History). The gallery was developed by staff botanist John Cannon beginning in about 1957 and was opened in 1962.[73] The BM(NH) botanical gallery is illuminating because although it also used a mixture of topical cases and dioramas to represent botany and plant life, Cannon approached dioramas quite differently from the Smithsonian botanists.

The underlying difference between the two halls was that Cannon conceived of the BM(NH) gallery as primarily an extension of formal school education, and presented botany in terms of its informational content, whereas Cowan and the Smithsonian botanists saw the museum visit as primarily a visual experience, and sought to communicate the sense of place and inspiration characterized above as the "cultural definition" of botany. Cannon targeted a much higher-level audience than American museums did. He identified students "taking Ordinary or Advanced Level Certificate of Education courses at school as our central group," and suggested that "there are many ways in which a museum gallery can supplement and complement the teacher's work in classroom and laboratory."[74] Figure 3.7 shows the "Anatomy of Vascular Plants" exhibit in the gallery, which was typical in its high density of information and technical detail. In keeping with its content-dense presentation, Cannon made extensive use of photos and textbook-style illustrations. The only specimens were wood samples at the bottom left, and the only three dimensional items were the large-scale models of plant cell packing in the upper left.

---

[73] J. F. M. Cannon, "The New Botanical Exhibition Gallery at the British Museum," *Taxon*, 1962, *11*:248-252, on p. 248.

[74] J. F. M. Cannon, "The British Museum (Natural History) New Botanical Exhibition Gallery," *Nature*, 1962, *196*:411-413, on pp. 411-412. Elsewhere, he equated the level of the sixth form of British grammar school to American high school (J. F. M. Cannon, "The New Botanical Exhibition Gallery at the British Museum (Natural History)," *Curator*, 1962, *5*:26-35, on p. 29). But the "Ordinary" and "Advanced" exams were taken by grammar school and public school children representing the elite of the British selective education system. Those standards were considerably higher than American high school requirements.

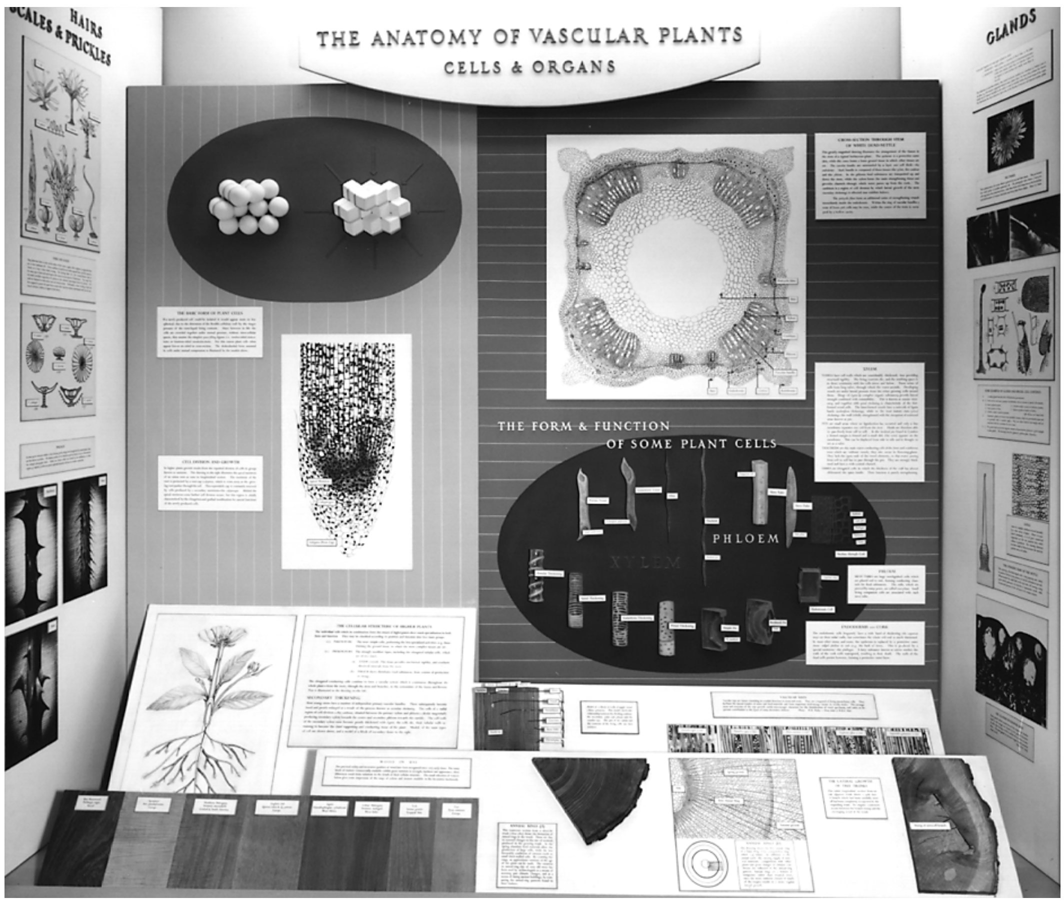


Figure 3.7. "Anatomy of Vascular Plants" exhibit in the botanical gallery at the British Museum (Natural History), 1962. Neg. #117/8 courtesy The Natural History Museum, London.

This treatment differed considerably from Lellinger's desire to provide material of interest to both "strollers and seekers." Cowan also saw the difference when he visited London in 1964. Writing to Cannon afterward, he complimented him on how "fine I think the botanical exhibit has turned out," but added, "As I had suspected, it is more detailed than the people here can appreciate but I am sure it is quite in line with the needs and interests of your people."[75] Even though Cowan was interested in including several of the topics presented in BM(NH) gallery in the Smithsonian's botany hall, he clearly believed that a different treatment was necessary for an American audience.[76]

That Cannon's botanical gallery was more a tool for teaching information than a means of transporting the visitor to another place is evident from his explicit rejection of highly detailed, life-sized (American-style) habitat groups for the gallery. He argued that botanical habitat groups were not "good value for money" (the entire cash expenditure for the entire gallery was £10,000 at the time).[77] His rejection of plant models and habitat groups also follows from his pedagogical goals and the fact that there was no well-developed model-making tradition in British museums for him to draw on.

Like the Smithsonian botanists, Cannon was aware that botany was at a disadvantage when it came to exhibiting its subject matter:

> Plants make very bad specimens for museum display; consequently most of our efforts have been centered around indirect methods such as drawings, photographs and models. It may be argued that a Botanic Garden is the right place to teach people about plants.. . .But as yet botanists have done very little to make Botanic Gardens significant as places of public education."[78]

---

[75]Richard S. Cowan to J. F. M. Cannon, 13 August 1964, SIA RU 155, Director, NMNH 1948-1970, Box 15.

[76]*Ibid*.

[77]John Cannon, "Oral History Interview," 2 September 1994, British Museum (Natural History) Archives. Interview not completely transcribed.

[78]Cannon, *Taxon*, p. 251.

But the solution Cannon saw for this problem diverged significantly from the American approach. He saw potential in botanical gardens because they, unlike museums, possessed and exhibited live, "real" materials. But he faulted them for their lack of interpretation. This was also the heart of his critique of realistic plant exhibits in general. Discussing his gallery in *Curator*, he noted, "The type of model that achieves nothing but superficial imitation has been studiously avoided."[79] He answered an inquiry about exhibit methods by counseling against habitat groups in no uncertain terms: "I would concentrate on an exhibit that can really be used for teaching people something about the area around their homes and not get sidetracked into too ambitious attempts at naturalistic realism."[80] According to him, life-like reproductions of plants were an expensive gimmick, rather than serving any useful purpose.

Unlike the American botanists, who maintained a strong interest in habitat groups while exhibit design changed at the Smithsonian, Cannon thought he could see the handwriting on the wall: "As is now widely recognized in the museum world, the day of the large luxury diorama, unsupported or only equipped with a meagre provision of teaching material, is past."[81] What Cannon meant by an adequate "provision of teaching material" can be seen in the treatment of the Arizona desert (Figure 3.8). It was a relatively small diorama (a few feet across), utilizing a shallow shell (the cactus cutouts cast shadows on the background) and painted "flats" modeled at successively reduced scales to create forced perspective. Only the near foreground included completely three-

---

[79]Cannon, *Curator* , p. 30.

[80]J. F. M. Cannon to Elizabeth Sidaway, 12 October 1962, BM(NH) Archives, Exhibition Gallery DF409/3: Gallery Correspondence.

[81]J. F. M. Cannon, "Some Problems in Botanical Exhibition Work: The New Botanical Gallery at the Natural History Museum," *Museums Journal*, 1962, *62*:167-173, on p. 168.

Figure 3.8. Arizona desert diorama in the botanical gallery at the British Museum (Natural History), 1962. Neg. #117/32 courtesy The Natural History Museum, London.

dimensional models.[82] The experiential value of conveying place specificity was not part of Cannon's rationale. Even though Cannon meant the dioramas to "create the impression of one's being in the area," he deployed that impression largely as "bait to entice the tired visitor forward" rather than an end in itself.[83]

The interpretive materials around the exhibit were the real focus of attention, as Cannon explained in an interview:

> This is the famous Sonoran desert. Having now seen it on a number of occasions, I think we did remarkably well. What we hoped to do was to excite their interest with the diorama, and then point out a lot of the interesting things that were going on there. For instance, this is a diagram [visible in the center of the lower panel] contrasting the climate of London with that in Arizona.[84]

Cannon had not been to the Arizona desert when the group was designed, and in fact, it was based almost entirely on photographs from *Arizona Highways* magazine.[85] Contrast the realism of the BM(NH) desert scene in Figure 3.8 to Denver's desert group (Figure 2.14) or the AMNH's Saguaro group (Figure 3.9), the latter of which was known to Cannon through a photograph. This is the only picture of an American habitat group surviving in the reference files. Compared to either group, the BM(NH) diorama is not nearly as lifelike. But as the quotation above indicates, Cannon was quite proud of having accomplished his goal at a fraction of the cost of the American exhibits, which, though lavish, did not in his opinion involve serious science.

Cannon's approach to the desert diorama comes from an entirely different set of goals than those pursued by the American botanists, who would not have considered creating habitat groups without a field expedition (smaller dioramas of British locales were constructed on the basis of field trips, but they were

---

82Cannon, *Curator*, p. 34.
83*Ibid*., p. 31.
84Cannon Oral History.
85*Ibid*.

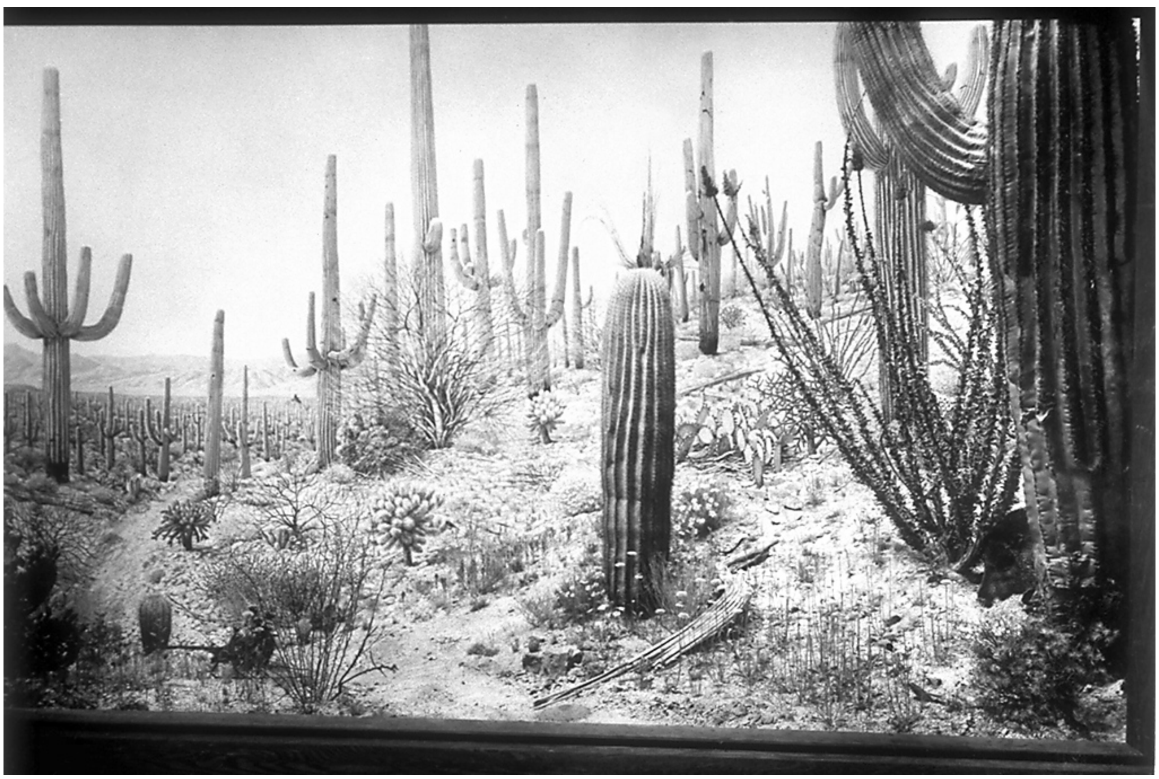


Figure 3.9. Saguaro National Monument Near Tucson, Arizona habitat group in the American Museum of Natural History, finished *ca.* 1955. Neg. #323266 courtesy Department of Library Services, American Museum of Natural History.

rendered with the same method). The BM(NH) exhibit staff member requesting reprints from *Arizona Highways* wrote, "various illustrations in your beautifully produced magazines give an excellent impression, even to those who have never visited your country, of the forms and colour and surroundings of your plants and of their habit and growth, and would be most valuable for reference in our work."[86] Recall James P. Wilson's emphasis in the last chapter on first-hand field experience. Reginald Sayre also indicated that photographs did not accurately convey color or light, and it was for that reason that artists still made color studies in the field.[87]

These contrasting practices point to quite different metrics of realism in use by American and British exhibit-makers. This can be partly tied to the differing conceptions of the educational nature of the exhibits: Cannon wanted to convey technical information, whereas the American botanists were keen to communicate a more intangible sense of *place*. Bound up with this divergent goal is a striking difference in practice, for botanical model-makers were quite rare in Britain.[88] In fact, Cannon knew of only one man in Britain at the time who he felt could do the sort of work that the American museums took for granted.[89] Cannon argued that "plant modeling *at life size* to a standard we regard as satisfactory is notoriously difficult and very costly."[90] Like Smithsonian curator

---

[86]M. R. J. Edwards to *Arizona Highways*, 20 November 1956, BM(NH) Archives, Green Box: Botanical Gallery.

[87]Reginald J. Sayre, "Oral History Interviews," 21 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 61.

[88]I have on purpose said "bound up" because the relationship between intellectual goals and practice is always circular. If certain tools are available, then problems will be solved with them, but tools are obviously also invented to solve perceived problems. It has been my aim to show a symbiosis between intellectual motivations and practice, rather than a one-or-the-other causality.

[89]J. F. M. Cannon to City of Liverpool Museums Director, 22 June 1960, BM(NH) Archives, Exhibition Gallery DF409/3: Gallery Correspondence.

[90]Cannon, *Museums Journal*, p. 168.

E. P. Killip's assessment of the Harvard Glass Flowers, Cannon saw convincing models as a Holy Grail best not sought after:

> In view of the existence of many bad models of botanical subjects, in which the impossible was attempted, it was decided to use models only where a reasonable chance of scientific and esthetic success was assured.. . .In the design of our exhibits a good drawing has always been preferred to an indifferent model.[91]

The "Anatomy of Vascular Plants" exhibit (Figure 3.7) shows that the danger of "indifferent models" was high indeed, for it contained many drawings.

Unlike the desert diorama, the Nigerian rain forest diorama was built at life-size and based on one of the Museum's botanists' reference photos and field expertise.[92] But as Figure 3.10 shows, the modeling was still more evocative than realistic by American standards. The vines that are actual plant material were, according to Cannon, "English Clematis" collected locally.[93] With the exception of a few items in the foreground, where Cannon asserted that "nothing less than specially modeled leaves of actual species will do," the rest of the leaves of the group were cut down and painted from commercially-bought leaves as "the most economic way of creating the impression of a mass of foliage."[94] This was precisely the reliance on "mass effect" that Cowan rejected for the Smithsonian's botany hall.

To hold the BM(NH) dioramas to "American standards" is clearly unfair, but the comparison serves to highlight the difference, rather than pass judgment. This is especially true when Cannon succeeded in constructing his gallery for £10,000, whereas the Smithsonian botany hall was never built partly because it was overly ambitious (by the time "It All Depends was built in 1973-74,

---

[91]Cannon, *Curator*, pp. 29-30.
[92]Cannon Oral History; Cannon, *Curator*, p. 31.
[93]Cannon Oral History.
[94]Cannon, *Museums Journal*, p. 170.

Figure 3.10. Life-sized African rain forest diorama in the botanical gallery at the British Museum (Natural History), 1962. Neg. #117/23 courtesy The Natural History Museum, London.

including the rain forest, one million dollars had been invested[95]). But the difference between what counted as acceptable realism in the two cases is still remarkable. Public reception of the dioramas was mixed. In a batch of reports written by members of the museum's Children's Centre Club (ages 11-13) about the botanical gallery, those that mention the dioramas specifically are almost evenly divided. One states, "I do not like the small dioramas [such as the desert group] at all. . .and the large dioramas are even worse. I was extremely disappointed with them for they are not nearly as realistic and impressive as the ones in the Mammal gallery."[96] But another writer asserts, "The end cases, depicting a rain forest and a mountainous area of Africa are really wonderful. Their realism is such that I have heard many visitors, both foreign and home, exclaim and say that they felt as though they were there."[97] This spectrum of opinion suggests that without previous extensive exposure to habitat groups, the measure of what counted as "realistic" was different than for an American public accustomed to the illusionistic realism of United States museums.

The British lack of interest in habitat groups was long-standing. Even though dramatic taxidermy was popular in Britain and Europe in the nineteenth century, Karen Wonders found that in that period, "mounting wildlife specimens was considered more as a romantic expression of nature than as a technical skill in the service of science." The British Museum maintained that synoptic exhibits

---

[95]James Mahoney to Porter Kier, 12 June 1973, SIA RU 257, Director, National Museum of Natural History, 1973-1975, Records, Box 8.

[96]W. Walters, "Report on the new Botany Gallery," 9 February 1963, BM(NH) Archives, Exhibition Gallery DF409/9. Another complains of the "pokiness [small, cramped appearance] of the end dioramas" (Kenneth Williams, "The Botany Gallery").

[97]K. Rushworth, "The Botany Gallery." Similarly, a thirteen-year-old says, "I thought that the two dioramas were really wonderful, giving a 3D effect. I only wish that more of these scenes could be made for the other galleries in the museum" (Kathleen Botchan, "The Botany Gallery").

were the only proper format for serious representations of science.[98] The only other habitat groups at the BM(NH), referred to by one of the student writers above, are in the Rowland Ward Memorial Pavilion, which commemorates the nineteenth century taxidermist whose firm in 1962 still billed itself as "Taxidermists to the Sportsmen of the World."[99] Three African mammal groups, including the North Kenya savanna group shown in Figure 3.11, were built by Ward's firm during the 1950s.[100] Though the taxidermy is quite credible, the backgrounds are sketchy and do not enjoy the benefit of domed diorama shells or specialized lighting. The join of the ceiling with the curved background and the conventional light fixtures in the ceiling are plainly visible in Figure 3.11. The foreground accessories are also minimal. They show that habitat group technology was never independently developed or imported from the States. The museum's Secretary wrote shortly after the Rowland Ward Pavilion was finally finished in 1960, "Although there are large dioramas in American museums, nothing on this scale has been attempted here before, and the three groups. . .form a most valuable addition to the teaching value of the Mammal displays as well as to the beauty and amenities of the Museum."[101]

---

[98]Karen Wonders, "Exhibiting Fauna—From Spectacle to Habitat Group," *Curator*, 1989, *32*:131-156, on pp. 133-135.

[99]Gerald Best, ed., *Records of Big Game* (London: Rowland Ward, 1962). A bequest from Ward was originally used to buy mounted specimens from Rowland Ward from 1913 through the 1940s ("Extract from the Daily Telegraph of 23 January, 1913. Summary of the Will of JAMES ROWLAND WARD deceased," 1913, BM(NH) Archives, Rowland Ward Memorial Pavilion papers). The remainder was spent on the three groups built in the museum between 1952 and 1960 (J. Woodisse to King-Farlow, 25 February 1952, BM(NH) Archives, Rowland Ward Memorial Pavilion papers).

[100]"News and Notices: Rowland Ward Memorial Pavilion," *Museums Journal*, 1960, *60*:80-81.

[101]W. A. Ferguson to J. J. Fénykövi, 19 August 1960, BM(NH) Archives, Rowland Ward Memorial Pavilion papers.

Figure 3.11. North Kenya Group in the Rowland Ward Memorial Pavilion, British Museum (Natural History), completed 1960. The group originally also include a male giraffe on the right. SWA photo.

British Guiana Trip Combines Science & Art

At the Smithsonian, the high water mark of the Hall of Plant Life project was most certainly the expedition to Kaieteur Falls in British Guiana from January 27 to April 1 of 1962 to collect material for the rain forest group.[102] Two photographs taken at a press conference the expedition team held in Georgetown, British Guiana, after they finished the field work, encapsulate the dual function of the trip. Figure 3.12 shows Cowan explaining the panoramic diorama background Reginald Sayre painted in the field as a guide for the full-sized habitat group in the hall. In Figure 3.13, Cowan discusses herbarium specimens collected for the museum's study collections.[103] This section examines how these two activities were brought together, not only as a matter of convenience, but by conscious effort. The themes developed from the New York and Denver cases about the form and function of habitat groups now come sharply into focus in the Smithsonian case.

Overlapping Scientific Collecting with Exhibit Work

The rain forest group planned for the botany hall captured Cowan's imagination so fully because it embodied a key element of his culture as a botanist: namely, the field. Whereas the American Museum sought to reproduce

---

[102]Richard S. Cowan to Lyman B. Smith, 8 May 1962, SIA RU 7356, Richard Sumner Cowan Papers, *ca.* 1952-1985, Box 1.

[103]Of two articles published in the British Guiana papers, one published the photo of the group showing the herbarium sheets (Figure 3.13) in a story discussing both the scientific and exhibition functions of the expedition ("5,000 plants collected to depict rainfall forest in B.G," *British Guiana Daily Chronicle*, 30 March 1962, p. 5). The other paper ran a photo of the group seated at the table without any props, but proclaimed "About 7,000,000 to 10,000,000 people from all over the world will see a life-size exhibition of British Guiana's Kaieteur Fall, when they visit the Smithsonian Institute later this year" ("7 million to see Kaieteur Fall"). Perhaps the diorama background (Figure 3.12) was not a familiar enough image to be easily explained to the newspaper audience, even though this is the article that quotes Cowan as saying that the goal of the exhibit is to get people to "appreciate plants."

Figure 3.12. Post-expedition press conference in Georgetown, British Guiana, 1962, showing Sayre's background panorama. Left to right: Reginald Sayre, Richard Cowan, Thomas Soderstrom, and Paul Marchand (journalists unidentified). SIA RU 155, Box 12, courtesy the Smithsonian Institution.

Figure 3.13. Post-expedition press conference in Georgetown, British Guiana, 1962, showing herbarium specimens collected. Sayre's diorama background is lying on the table. Left to right: Sayre, Cowan, Soderstrom, Marchand. SIA RU 155, Box 12, courtesy the Smithsonian Institution.

place in its North American Mammal Hall in order to memorialize America's vanishing wilderness, Cowan's desire to replicate place in the Hall of Plant Life stemmed from wanting to take visitors to a place that he found scientifically interesting and to infect them with his interest. This underlying cause of his choice of realism is crucial because I want to insist that the rain forest could not have survived the later changes if it had been viewed at its inception simply as a convenient exhibit strategy for reaching a popular audience. It had to connect to the botanists' professional identity, experience, and practice on a deeper level.

The main way that the botanists naturalized the exhibits trip into their own sphere, making it a natural, or appropriate, part of their world, was to treat the trip as a scientific expedition as well as an exhibits expedition. When Cowan invited Soderstrom to join the team, it was ostensibly to replace the exhibits man who had backed out, but he also chose Soderstrom so that Soderstrom could help him collect technical specimens. Even though "gathering data" for the exhibit was the "primary mission" of the trip, Cowan promised Soderstrom, "You will not be restricted to photography any more than I expect to spend all my time at supervising and advising technically."[104] In fact, they found enough time to collect six or seven sets each of five hundred species of plants during the eight weeks of the expedition.[105] Figure 3.14 shows the two in the field camp working at night by the light of a gas lantern preparing plants to be pressed and dried

---

[104] Richard S. Cowan to Thomas R. Soderstrom, 21 November 1961, SIA RU 155, Director, NMNH, 1948-1970, Box 12, p. 1.

[105] Cowan to Lyman B. Smith, 8 May 1962. Just in their first few days in the field, they collected about a hundred "numbers," or batches of multiple specimens of each species (A. C. Smith to Richard S. Cowan, 16 February 1962, SIA RU 155, Director, NMNH, 1948-1970, Box 12). A "set" referred to a complete herbarium specimen of leaf, fruit, and flower, if available, which would be mounted on a single herbarium sheet. Multiple copies were necessary for the economy of exchange discussed in the last chapter.

Figure 3.14. Thomas Soderstrom and Richard Cowan pressing herbarium specimens in field camp, Kaieteur Falls, British Guiana, 1962. Thomas R. Soderstrom photo #1046 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

onto herbarium paper. Soderstrom later published descriptions of six new species of grasses out of the material collected on the trip.[106]

Cowan discussed how he mixed the two domains together when he chose the Kaieteur site for the habitat group:

> [I]t seemed to me if we were going to spend the money to go into the tropics, we might as well go someplace where we could do botany as well as exhibits.. . .Kaieteur was known to be, by previous botanical visits, a rich place botanically, and a very dramatic place—the Falls themselves are very dramatic. Lots of things about the area were the sort of thing that would give us a dramatic backdrop for the exhibit. So it was a combination of a good place to go for exhibits material and a good place to go for collecting botanical material.. . .
>
> Also, we knew something about it. There was a carbon copy of a rough flora, a preliminary flora, done by a British botanist there, D. B. Fanshaw, and we had a copy of that. He was the Forester in British Guiana at the time.. . . A. C. Smith [MNH Director] of course knew something about the flora, and I had read the papers of Noel Sandwith at Kew [Royal Botanic Garden].[107]

There was enough known to make it both tantalizingly interesting and not too great a risk, but not too much known to make it a routine effort without scientific reward. Drama was certainly not lacking in the 741-foot drop of the Portaro River over Kaieteur Falls (Figure 3.15). Soderstrom also captured the spirit of the field naturalist at work with a shot of Cowan holding a flower clipped from the water's edge and seated in a dugout canoe paddled by one of the team's Amerindian guides, Lionel Chacon (Figure 3.16).

Cowan further made it clear that he was specifically playing exhibits and research against one another:

> Nobody knew what the plants were at the bottom of the waterfall, for example. N. Y. Sandwith at Kew wrote to me before I went down and said, "I hope you find out what that is down at the bottom of the Fall." He had been there, but there was no trail to the bottom of the gorge at that time. I think we cut the first one. . . .

---

[106]"Division of Grasses Annual Report 1963-64," 1964, SIA RU 272, Department of Botany, 1885-1970, Records, Box 21, p. 4.

[107]Cowan Oral History (1992), p. 11.

Figure 3.15. 741-foot high Kaieteur Falls, British Guiana, 1962. Thomas R. Soderstrom photo #1724 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

Figure 3.16. Lionel Chacon and Richard Cowan collecting specimens near Kaieteur Falls, British Guiana, 1962. Thomas R. Soderstrom photo #1594 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

> But it was a question of. . .remembering that it was an exhibits trip but making it botanical at the same time, because after all, whatever we collected contributed to a *picture* of the kind of forest that we were in. We could have gone to Barro Colorado, but. . .things were pretty well known there, and there would have been much less incentive to do any great amount of collecting.[108]

By finding out what was at the bottom of the gorge, the team was contributing to botanical knowledge. Furthermore, since "whatever we collected contributed to a *picture* of the kind of forest that we were in," that knowledge would be directly embodied in the exhibit. Cowan's selection of Kaieteur over Barro Colorado Island in the Panama Canal, the location of the Smithsonian Tropical Research Institute, is also crucial. Given the long-term presence of the Smithsonian in Panama, a more accessible, though perhaps less dramatic, site was logically available.[109] But given Cowan's preference for untrodden paths, Kaieteur was much more enticing, and Barro Colorado was strictly the back-up site.[110] When the forest canopy in British Guiana refused to flower while the team was there, Cowan allowed that the canopy material could be collected at Barro Colorado at a later date.[111]

Cowan's desire to go into new territory had important consequences not only for the botanists but for the exhibit. The exhibits department inventory of the materials collected on the trip shows that for ten of the forty-five plant species collected for the habitat group, "voucher specimens for scientific

---

[108]*Ibid*., p. 15.

[109]See Joel B. Hagen, "Problems in the Institutionalization of Tropical Biology: The Case of the Barro Colorado Island Biological Laboratory," *History and Philosophy of the Life Sciences*, 1990, *12*:225-247.

[110]The AMNH ornithologist Frank Chapman had used a view from Barro Colorado Island in his Birds of the World hall. That group was built in 1927 based on field work done in 1926. Although Cowan never mentioned the AMNH Barro Colorado Group, his other comments clearly indicate that he believed Barro Colorado had already been "done."

[111]Richard S. Cowan to A. C. Smith, 3 March 1962, SIA RU 155, Director, NMNH, 1948-1970, Box 12.

determination" were collected along with the molds and photographs (Figure 3.17 reproduces the first page of this inventory).[112] Because voucher (herbarium-type) specimens were not collected for all of the plants slated for the exhibit, it seems that neither Cowan, Soderstrom, nor their locally-trained botanist-guide, Rufus Boyan, were familiar with those ten to the species level. To identify them required the expertise of other curators and recourse to the reference collections of the herbarium. Choosing Kaieteur Falls for the site of the exhibit meant not just that it was possible to do new science on the side, but that *doing new science was required to build the exhibit*.

Cowan's choice of the exhibit site on scientific grounds in a roundabout way worked to reinvolve the visitor in the botanists' own internal world and work. The justifications for creating the public exhibit can be traced more readily to the botanists' own attitudes and experiences than to a coherent, empirical picture of "the public" and their interests or educational needs. This strategy in some respects echoed the "public inreach" employed by the pre-World War II botanists at the Smithsonian. A significant difference is that while the earlier botanists were willing to treat the public as quasi-botanists for the sake of convenience, Cowan's efforts to draw the public into his realm stemmed from the recognition that the botanists relied on public funds and good will to pursue their professional goals.

Not only was Kaieteur chosen as the specific site for the rain forest for scientific as well as aesthetic reasons, but the inclusion of a rain forest group as the central feature of the Hall of Plant Life reflected the overall emphasis on the Neotropics (tropics of the western hemisphere) at the Smithsonian. David Lellinger believed that the emphasis on tropical botany was specifically chosen

---

[112]"Preliminary Specifications for Rain Forest Exhibit—Hall of Plant Life," 1963, SIA RU 155, Director, NMNH 1948-1970, Box 15.

PRELIMINARY SPECIFICATIONS

FOR RAIN FOREST EXHIBIT - HALL OF PLANT LIFE

In the table which follows, the code number and field name for each item is given in the first column, followed by the number of units of each item which will probably be needed in the exhibit, the approximate area covered by each, the number of model-parts required, and, in the last column, the types of data collected of each item. The abbreviations for these data-types are as follows: D= dried plant parts, usually stems; P= photographs; Pk= material pickled in formalin; PM= plaster mold; RuM= rubber mold; RM= reference model; S= field sketch; V= voucher collection for scientific determination.

Item	No. Units	Area Covered	No. Model-parts	Basic Data
10RF-1 Philodendron	3 plants	6 x 3 ft. ea.	3 bases 25 leaves	P, S, Pk
10RF-2 Wallaba trunk	5 trunks	1 - 2 ft. x 15 ft.	No models but plaster trunks	P, RuM
10RF-3 Leiphaimos	2 or 3 clumps	6 X 6 inches ea.	12 to 15 fls.	P, PM RM, V
10RF-4 Golden Rub	2 trees	6 x 6 ft. each	2000 leaves 500 bracts 100 calices 100 fruits	P, PM, RM, V, Pk, D
10RF-5 Christmas Verbene	2 or3 trees	1 x 1 feet each	40 leaves 20 calices 10 fruits 60 bracts	P, PM, RM, V, Pk
10RF-6 Wallaba Seedlings	COMPLETE EXCEPT FOR TOUCH UP AT INSTALLATION			
10RF-7 Termite nest	COMPLETE			

Figure 3.17. Exhibit Department inventory of British Guiana rain forest model parts, page 1, 1963. SIA RU 155, Box 15, courtesy the Smithsonian Institution.

by the staff to cover an area largely left blank by the agriculturally-oriented land grant universities:

> But through the years, the focus of the NMNH botany department has always been tropical taxonomy. The feeling of the curators has been that the temperate, and especially the U.S. material, can be handled by university herbaria, state natural history organizations, places like that. We've never sought to have a real active North American representation or program.[113]

According to anthropologist Clifford Evans, at one point during the 1960s, the Neotropics were a research locus for over sixty percent of the entire curatorial staff of the MNH.[114] Interestingly, the Smithsonian botanists historically had close ties with the U.S. Department of Agriculture, and many USDA botanists worked at the U.S. National Herbarium.[115] By focusing the institutional identity of the botany department on Neotropical taxonomy, Lellinger drew a line between basic and applied research. The rain forest group was therefore an appropriate symbol of the department's basic research expertise.

Finally, though the botanists did not consider the exhibit work to be identical to their research, another sign of the overlap they created between the two is the way that they used scientific terminology to refer to their exhibit activities. Cowan's script for a small display about the botany hall project constructed for the Smithsonian's Board of Regents after the British Guiana expedition explained, "The purpose of this exhibit is to represent graphically some of the steps involved in gathering and organizing data in the field for subsequent use in the laboratory for constructing a life group."[116] The key

---

[113]Lellinger Oral History (1992), p. 8.

[114]Clifford Evans, "Oral History Interview," 28 May 1975, SIA RU 9508, Senate of Scientists Project, p. 48.

[115]Remington Kellogg, "A Century of Progress in Smithsonian Biology," *Science*, 1946, *104*:132-141, pp. 140-141.

[116]Richard S. Cowan to John C. Ewers, 19 November 1962, SIA RU 155, Director, NMNH, 1948-1970, Box 12.

words are "data," used to describe material destined for the hall, and "laboratory," which referred to the exhibits preparation shop. Correspondence throughout the period consistently refers to exhibit collecting as "obtaining" or "gathering" new "data" and calls the locales to be reproduced "study sites."[117]

As mentioned in the Introduction (see especially Figure 1.3), this choice of vocabulary was neither forced nor gratuitous. Historically, specimens, models, and equipment used by the curatorial staff for their technical research were prepared and manufactured in the preparation lab, which also produced items for exhibit.[118] Then, in the late 1960s, that balance shifted and the model shop came to support the exhibit function more than research.

The passages above have shown that the exhibit collecting trip to Kaieteur Falls was made into a part of the scientific enterprise by Cowan's choice of the field site on scientific grounds and the subsequent collecting activities he and Soderstrom carried out during the trip. Although he did not personally see the exhibits work as doing science, there was a tight feedback between the two.[119] On the institutional level, the trip was justified in terms of the public exhibitions program. But once in the field, the botanists did not simply apply their existing knowledge to direct collection for the exhibit, but actively gathered new scientific knowledge about the place (an underlying factor in choosing that field site), which in turn was applied to both esoteric and public representations of rain forest. Owing to that loop, the boundary between "doing science" in the form of

---

[117]Richard S. Cowan to A. C. Smith, 11 August 1961, SIA RU 155, Director, NMNH 1948-1970, Box 15; Cowan to Ewers, 19 November 1962; Richard S. Cowan to J. R. Swallen, 2 June 1964, SIA RU 155, Director, NMNH 1948-1970, Box 15.

[118]Watson M. Perrygo, "Oral History Interviews," 1978, SIA RU 9516, Box 1, pp. 34-36, 40-41; James Mahoney, "Oral History Interviews," 23 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 31; *Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1968), p. 278.

[119]Cowan Oral History (1992), p. 25.

botanizing and “doing popularization” in the form of exhibits was blurred and crossed in the course of the expedition.

Bringing the Field Into the Museum

The model-maker’s tacit skill and role in the inscription devices in operation on the expedition further shows the ambiguity of that boundary. Although the specialized practices of botanical and exhibits collecting looked quite distinct from one another, they shared the underlying function of creating inscriptions that captured and transported nature from the field to the museum. Building on the last chapter, those similarities further show that the scientist and artist shared similar observational skill. Most importantly, their powers of observation and interpretation were employed for the common goal of recreating the field site in the museum hall as *a field site*—a place to gather knowledge about nature—rather than a representative ecological zone or abstract system.

However, as before, it is crucial to insist that the genre of realism involves constructing the field as much as it does discovering it. In the last chapter, the story of the Denver Eagle Group indicated how the process of translation set up a two-way traffic between the exhibit hall and the field site. While the interchange between the rain forest group and Kaieteur Falls was not quite as dramatic as Bailey and Neidrach rearranging the very nest their eagles occupied, the way the expedition camp became the laboratory in the field was nonetheless a crucial step in constructing the exhibit’s authenticity and scientific credibility.

Model maker Reginald Sayre was recruited to the Smithsonian from the American Museum in 1959 to assist in the Exhibits Modernization Program, and brought with him ten years of experience as an exhibit preparator.[120] Though trained as an artist, and ultimately deferential to the scientific authority of the

---

[120] Sayre Oral History, pp. 23-24.

curators, Sayre did not simply blindly follow their specifications, content with a strict division of intellectual labor. Instead, Sayre developed his own understanding of the subjects he worked on:

> [W]hen new ones [jobs] came in, we'd really make time to do a little research if we weren't sure what we had to do. I spent a lot of time in the library down there, and I got to know the librarian so well, because I had never done anything in natural history until I came to the American Museum. *There* I learned that you've got to be precise about certain things. Most people, they go to work and they do their job every day, but in the museum you can't do it that way.[121]

Sayre clearly did not see himself as a mere technician paid by the hour. Instead, as he conveyed with the story of the lupines told in Chapter Two, he trusted his own judgment and discernment, and took great pride in the knowledge he brought to bear on his model making.

Sayre's discernment was important to the Kaieteur Falls expedition because as the preparator in charge of the overall collecting operation, he not only had to be sure that the right constellation of casts, photographs, drawings, and preserved specimens was collected, but it was also his job to ensure that these elements could be successfully integrated into the proper spatial composition of the habitat group. As noted in Chapter Two in the discussion of the Coyote Group, even if a general location or background was known and desired before the expedition was dispatched, extensive negotiations in the field were often required to arrive at a workable plan for the layout of the group.

This was certainly the case for the rain forest group. Toward the end of February, 1962, after about a month in the field, Sayre wrote this account of the team's work to the head of the natural history lab:

> I have been planning the group as we collected material and I set up a model diorama to make sure of the set up as near as I can. We collected 4 trees of each species and bundled and drying [sic] them

---

[121]*Ibid*., p. 45.

> when the sun comes out and I collected ground moss, tree moss, and made 3 rubber molds of tree bark and a fourth is still drying on the tree. I have several sketches and color notes of trees and leaves and Paul [Marchand] has made many molds and some models of flowers and plants. This is a great team and I am sure it will be a great group.. . .Yesterday our guide cut a trail down to the gorge and we climbed down and got some pictures of the view we want in the group. I made a quick sketch and when we go down again Monday I will make one in color.[122]

Here is an album of the inscription devices Sayre described in his letter: In Figure 3.18, Sayre is working on the small diorama which he constructed in the field to guide the collecting process. Figures 3.19 and 3.20 show Soderstrom's photo and Sayre's "quick sketch" of the view of the Falls from near the bottom of the gorge that they wanted for the background. As Sayre mentioned, Figure 3.21 shows Cowan at work brushing liquid latex onto the bark of a buttress tree while a mold on the fluted tree to the right dried. Finally, Figure 3.22 is Sayre's color sketch of the same buttress tree from which Cowan made the mold.

Why take valuable collecting time to build a toy diorama in the field? As Sayre stated above, it was necessary "to make sure of the set up as near as I can." The field diorama played a central role in orchestrating the collecting process. Understanding the work it does makes it clear why so many different forms of representation were needed to capture the three-dimensional essence of the rain forest. The field diorama was a master map of the group that integrated all of the separate parts created by various inscription devices into the final whole.

The inventory of the materials collected (Figure 3.17) is a stunning testament to the overlap in type of inscription and the magnitude of the endeavor. Forty-five separate species of trees, shrubs, vines, ferns, and epiphytes were collected. In several cases, as the inventory shows for a plant nicknamed in the field the "Golden Rub" (pronounced "rube," short for the plant family

---

[122]Reginald Sayre to John Anglim, 25 February 1962, SIA RU 363, NMNH, Office of Exhibits, *ca.* 1960-1980, Box 8.

Figure 3.18. Reginald Sayre working on field diorama, British Guiana, 1962. Detail from the original photo, which also showed Cowan working on a fern mold to Sayre's right. Thomas R. Soderstrom photo #1460 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

Figure 3.19. Photo of Kaieteur Falls, British Guiana, from new gorge trail, 1962. Thomas R. Soderstrom photo #1633 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

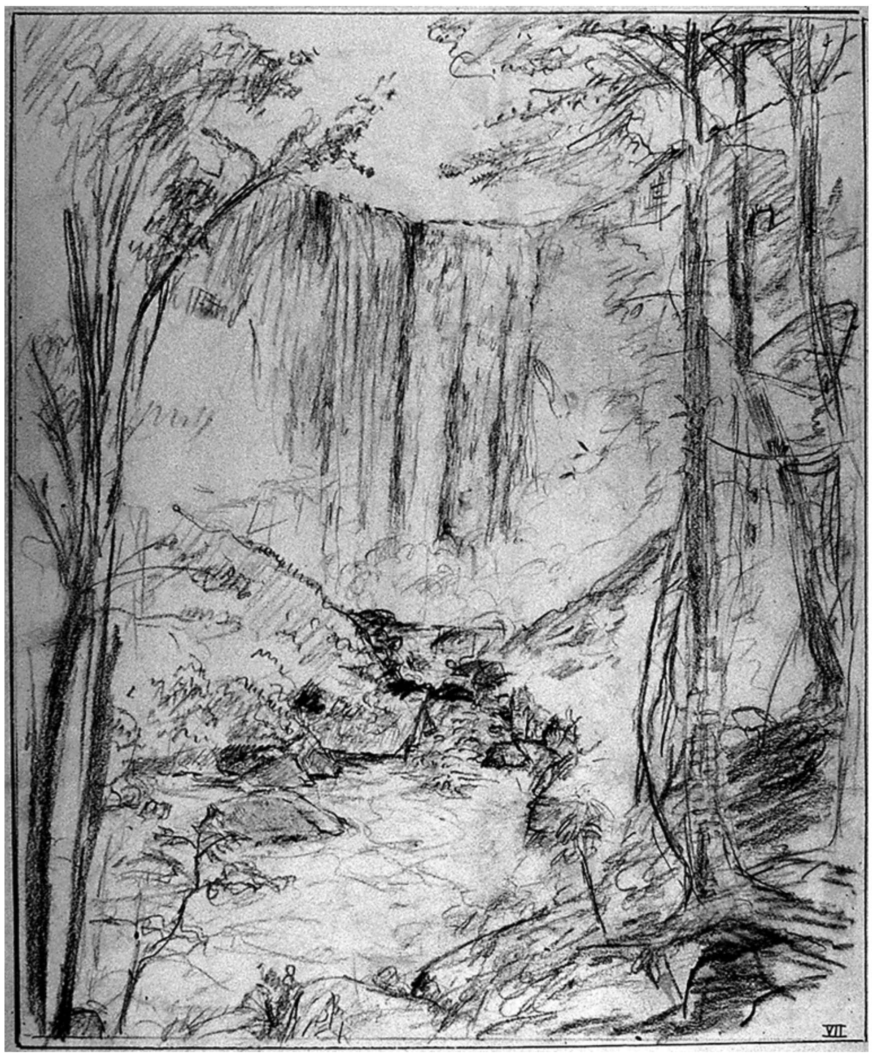


Figure 3.20. Sketch of Kaieteur Falls from new gorge trail, by Reginald Sayre, British Guiana, 1962. Crayon on paper, 15x17 inches, courtesy Reginald J. Sayre.

Figure 3.21. Richard Cowan molding buttress tree bark in latex, Kaieteur Falls, British Guiana, 1962. Thomas R. Soderstrom photo #1180 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

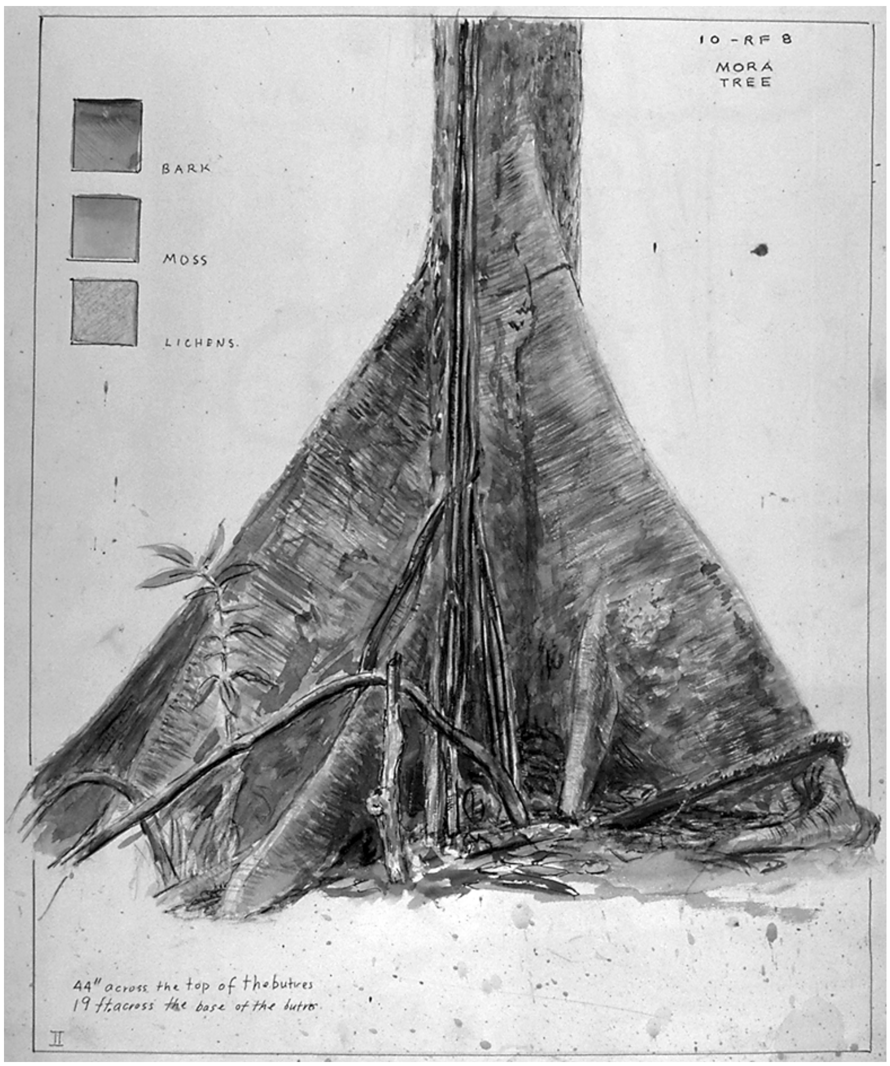


Figure 3.22. Mora (Buttress) Tree field sketch by Reginald Sayre, British Guiana, 1962. Color atlas swatches are along upper left side. Measurements of roots are at the bottom left. The angle of this view is from directly behind Cowan's back in Figure 3.21. Watercolor on paper, 15x17 inches, courtesy Reginald J. Sayre.

Rubiacea), five different types of materials were all collected for the *same* item. They were “photographs,” “dried plant parts, usually stems,” a “plaster mold,” a “reference model” (made by Paul Marchand), and “material pickled in formalin.” For the Golden Rub, the defoliated shrubs of two six-foot trees were collected and individual molds made of each of “2000 leaves, 500 bracts, 100 calices, and 100 fruits.”[123] The shrubs themselves would have been used in the exhibit, with thousands of wax or plastic leaves cast from the molds wired onto the original wood specimen. The use of the technical names for the flower parts is another indication of the preparators’ expertise; just as the taxonomists had to know the names of the parts to identify the plants, the preparators had to know the names of the parts to disassemble and reassemble them.

No one item encoded the rain forest. The photograph of the Falls (Figure 3.19) is too flat because contrasting lighting conditions made it difficult to capture both the forest in the foreground and the falls in the background. It also contained unpleasant nuisances such as the broken tree snag in the middle of the frame. Sayre’s sketch (Figure 3.20) omits the snag and conveys the geometry of the scene, including the depth of the gorge and the dish of the brink of the falls, much better because it reduces the mess of the photograph to a few lines. The rubber molds (Figure 3.21) created a record of the texture of the tree bark, but could not record the correct shape of the entire trunk. For that, the watercolor painting (Figure 3.22) was required. The color notes on the sketch (upper left) are keyed to a “color atlas” allowing the shades to be precisely matched to a standardized set of color swatches for accurate reproduction back in the lab.[124]

In general, photographs did not and still do not reproduce color or depth accurately enough to make color studies and molds obsolete. One reason that the

---

[123]“Preliminary Specifications for Rain Forest Exhibit—Hall of Plant Life,” p. 1.

[124]Sayre Oral History, p. 16.

reliance on *Arizona Highways* photographs as reference materials for the BM(NH) desert group is so surprising from the American point of view is that the deficiencies of photography were widely recognized in the field. Peterson's article on making model plants states,

> A stereo camera with color film will provide three-dimensional color transparencies that are invaluable in all aspects of plant preparation.. . .Although photographs are invaluable, they cannot be depended upon to furnish all the information necessary to reproduce a plant. Basic necessities for a realistic reconstruction include color notations, sketches, and photographs combined with wet and dry plant specimens.[125]

A technology often considered in other contexts to be more real, more accurate than a sketch—photography—was in this case inferior because of its inability to capture important information. The stereo camera helped to preserve depth lost in a normal photograph, but even it did not allow the model-maker to examine the specimen from all angles or to dissect it to determine its construction.

Because of the heterogeneous nature of these materials and their sheer volume, the field diorama was necessary to track and organize them all. It was a visual instruction manual for assembling the various elements involved in creating a concrete, physical place/space. Since, as was emphasized in the last chapter, the habitat group never leaves the realm of the physical, a three-dimensional map to organize the individual inscriptions not only makes sense but is imperative.

Another reason why Sayre was confronted with integrating such a wide variety of materials into a coherent whole was that even though the finished habitat group was to represent a specific spot in the Kaieteur Falls gorge, it was in fact a composite synthesis of materials collected from more convenient

---

[125]George E. Peterson, "Artificial Plants," *Curator*, 1958, *1*:12-35, on p. 14.

locations in the area. Cowan wrote from the field to A. C. Smith, a fellow botanist and director of the museum:

> To answer your question regarding the setting—this has not changed from our final decision that the "diorama" should show the Falls in their entirety. The flora of the gorge is identical in all important respects with the rain forest along the river above the Falls. All we have done is to gather our data at a location which is easily accessible and "flatter" than most parts of the gorge. This location is about a mile, or perhaps a little farther, above the Falls.[126]

Cowan's account once again highlights the paradox of habitat group building: at the same time they reproduce place, they do so by a process of abstraction and interpretation. As with the Eagle Group in Denver, there is no nature as it is "actually seen" anywhere.

This is the genius of the inscription devices encapsulated and commanded by the field diorama. They are the heart of the translation process that captures and domesticates unknown or unwieldy natural phenomena and makes them available for the scientist's manipulation and interpretation in the laboratory. A striking image of this process shows Sayre removing a mold of the soil (Figure 3.23), rendering even the most integral part of the field site, the ground itself, just as portable and readily amplified in multiple copies as a leaf cast or color sketch. This picture is a frame from a film sequence shot by Thomas Soderstrom. In the film, once Sayre removed the mold from the rocks, he rolled it up like a window shade for storage and transportation back to the museum![127] The mold is still physical, but like the trace on the laboratory chart recorder, it exists in a form that is more abstract and therefore more useful as a representation.

---

[126]Richard S. Cowan to A. C. Smith, 3 March 1962, SIA RU 155, Director, NMNH, 1948-1970, Box 12.

[127]Sophy Burnham, "The Leaf Thieves," 16mm color sound motion picture, SIA Accession No. 93-085, Office of Telecommunications, Motion Picture Films, *ca*. 1965-1977, at 13:20 minutes.

Figure 3.23. Reginald Sayre removing latex soil mold, Kaieteur Falls, British Guiana, 1962. 16mm motion picture footage by Thomas Soderstrom, from *The Leaf Thieves* (1964) courtesy Smithsonian Institution Office of Telecommunication.

The inscription embodied by the mold is part of a push-pull relationship between what could be called "visual induction" and "visual deduction." That is, there is a cycle from the particulars, such as the specific plants selected as specimens, to generalities, embodied by the plant molds which can be used over and over (the inductive phase). In turn, these abstracted inscriptions are used to reconstitute a specific place (the deductive phase). This push-pull relationship is striking because creating standard measurements and recording practices is one of the characteristic means by which technoscience (the modern complex of science and technology) extends its universal reach and applicability.[128] Joseph O'Connell has articulated how science creates general standards by "particular material representatives that stand for universal abstract scientific entities in local settings."[129] The color atlas used to record colors on the field sketches operates exactly like physical standard versions of theoretical units such as the volt. They are necessary to carry the definition of voltage from places where volts are known to exist because they can be compared to the standard, to places where volts don't meaningfully exist because there is no standard against which to measure unknowns.[130] Similarly, the color atlas is a portable means of extending definitions of color. Where the rain forest was before a riot of undifferentiated shades of green, the color atlas allows its user to quantify, know, and more importantly, *use* greenness.

This cycle of transformation from the particular to the general and back again that constitutes realistic representation in habitat groups is further

---

[128]Bruno Latour, *Science In Action: How to Follow Scientists and Engineers Through Society* (Cambridge, Massachusetts: Harvard University Press, 1987), p. 249.

[129]Joseph O'Connell, "Metrology: The Creation of Universality by the Circulation of Particulars," *Social Studies of Science*, 1993, *23*:129-173, p. 129.

[130]*Ibid*., pp. 147-150. In the case of the volt, the physical standard is a battery built to exacting specifications whose output is considered to define the volt. Crucially, the theoretical entity is entirely reliant on the physical standard.

illustrated by Paul Marchand's model-making practices. His methods were briefly described in the last chapter as an example of the state of the art of botanical model making in the 1940s and 1950s. By the time he was engaged by the Smithsonian, he was sufficiently well-known for Cowan to call him "one of the two most capable model-makers in the country."[131] Several accounts extol the ultra-realism of his work with anecdotes about how even insects would vainly attempt to find nectar in his fake flowers.[132]

A living bromeliad, photographed *in situ*, is shown in Figure 3.24. Figure 3.25 shows Marchand at work constructing a model of that species of bromeliad in the field camp. Marchand, together with his wax press, paints, molds, and wires, made up an inscription device used in the field to capture a bit of nature. Here is how Sayre described Marchand's method and expertise: "First he collected the plant and disassembled it and would determine how to make the parts in wax to assemble and to make it look real again. He made molds for each part and assembled the wax models back to reality and then painted them identically to the original."[133] Marchand created an inscription that constituted the real as much as he discovered it. The phrases "real *again*" and "*back* to reality" signify a rich, complicated, and bidirectional relationship of the model to the specimen. For Sayre, the model had become as real as the original, and in fact reconstituted the original in all visually important respects. Not only did

---

[131][State Department Instruction detailing British Guiana expedition], 19 December 1961, SIA RU 155, Director, NMNH, 1948-1970, Box 12. The information in this cable was supplied by Cowan.

[132]Howard Whitman, "Nature's Wonder Men," *This Week, Cleveland Plain Dealer*, 19 May 1946, p. 12 & p. 17, on p. 12; Cummings, "Flowers Reproduced in Wax," p. 73; Richard S. Cowan to John C. Ewers, 19 November 1962, SIA RU 155, Director, NMNH, 1948-1970, Box 12, p. 2. Marchand himself was more modest, observing that bees and other insects are more attracted to bright colors in general than exact shape (personal communication, September, 1992).

[133]Reginald J. Sayre, "Video History Interview," 21 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 5.

Figure 3.24. Striped-leafed Bromeliad *in situ*, Kaieteur Falls, British Guiana, 1962. Thomas R. Soderstrom photo #1633 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

Marchand mold and shape each leaf, but he colored the wax copies specifically to match the original. In figure 3.25, he is holding two bromeliad leaves. The left leaf is from the disassembled specimen. He is painting red stripes on the right-hand wax leaf to match the pattern on the specimen leaf. Translated through the molds and paintbrush, the original of Figure 3.24 eventually became the exhibit hall model of Figure 3.26.[134]

Importantly, that process of getting "back to reality" takes the form of a dialog with the real rather than a simple measurement. Concerning Marchand's technique, Sayre added that "sometimes, if you had a smaller leaf, you'd make it shorter just by cutting it off and [smoothing out] the wax."[135] "And then after he finished and he found out he wanted another leaf in there he might do something with the same mold and shape it the size he wanted."[136] Note the subtle intermingling of exact duplication and a judgment about what the thing ought to look like. On one hand, Marchand would make a separate mold for each leaf in acknowledgment of its uniqueness and in the name of accuracy. But he also might decide that the real thing wasn't real enough and needed more leaves to look right. Suddenly the passive technician who slavishly duplicates nature without insight or understanding has become an active artisan with all of the Aristotelian connotations of agency the term implies, interpreting how things are to look and reshaping nature according to a conception of ideal type or internal aesthetic. In the service of the artisan's aesthetic, the parts go from unique individuals to representatives of leafness which can be amplified in multiple copies and then altered to take on the appearance of uniqueness.

---

[134]This model was later made from Marchand's field molds for "It All Depends" and was photographed in the South American anthropology hall.

[135]Sayre Video History, p. 5.

[136]Sayre Oral History, p. 8.

Figure 3.25. Paul Marchand modeling a striped-leafed bromeliad in wax, Kaieteur Falls, British Guiana, 1962. The left-hand leaf he is holding is from the original specimen, and he is painting a matching striped pattern on the second leaf, which is a wax model. Thomas R. Soderstrom photo #1457 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

Figure 3.26. Model stripe-leafed bromeliad, originally cast from Paul Marchand's British Guiana molds for "It All Depends," *ca.* 1973, on exhibit in "South America: Continent and Culture," Hall 23 of the National Museum of Natural History, opened October 1975. SWA photo.

Embedded in the modeling process is the by now familiar tension between uniqueness as a raw material and as a created artifact.

The expedition also hoped to capture the sounds of the field. Cowan had stated in his 1960 brief that the rain forest exhibit was to include authentic sounds. In keeping with the goal of site specificity, not any rain forest sounds would do, but specifically the sounds of the Kaieteur Falls rain forest. A sound recording system was part of the expedition's equipment, but it arrived late and then malfunctioned, so no sound was recorded in the field.[137] Cowan noted in his letter from the field that since the equipment arrived late, "we could not make recordings until now but there is so little animal life that we haven't missed much!"[138] He suggested that they could try to get a suitable recording at Barro Colorado along with specimens for the canopy.

Even though the Kaieteur area was too quiet to make interesting wildlife recordings, the botanists did not give up on making sure the rain forest exhibit had the proper sounds for a rain forest once they were back home. Filed with the exhibit materials was a record catalog in which the title, "Sounds of a South American Rain Forest," was prominently marked.[139] Cowan also wrote to a colleague soliciting recordings of frog calls to use in the exhibit.[140] This is a translation similar to construction of the eagle group at Denver. Even though it purported to be based on empirical collecting, the exhibit was ultimately made up of elements determined to be necessary to convey the correct *a priori*

---

[137] [diagram for placement of tape recorder with 200′ microphone cable+ written instructions for use], 1961, SIA RU 155, Director, NMNH, 1948-1970, Box 12; Richard S. Cowan to Jeremy Woodley, 13 December 1962, SIA RU 155, Director, NMNH, 1948-1970, Box 12.

[138] Cowan to A. C. Smith, 3 March 1962.

[139] Folkways Records catalog of recordings of natural sounds, 1962, SIA RU 155, National Museum of Natural History Office of the Director, Records 1948-1970, Box 15.

[140] Richard S. Cowan to Jeremy Woodley, 13 December 1962, SIA RU 155, Director, NMNH, 1948-1970, Box 12.

impression of what counts as a proper example of the field site. The rain forest would not be authentic without the expected sounds, even if the actual place was not a riot of wild sounds.

Describing the activities of the expedition team in terms of inscription and translation not only highlights the constructedness of the habitat group, but it also reveals the similarity of the exhibit-maker's activities to the practices of esoteric science. That similarity includes the ability to perceive and evaluate morphological variations in individual specimens and the geographical range of those variations (the lupines); identify species by scientific name (the voucher specimens); and characterize the density and relative spatial distribution of organisms in the specific habitat (the field diorama).

To say that the exhibit-makers were *doing* science is a more provocative and risky claim than to say simply that exhibition and research overlapped because the scientists saw the habitat group exhibit genre as congenial to their goals for public education. The weaker claim is certainly the case, but I also want to make the stronger claim that the model-makers' cognitive skills and tacit knowledge of the field so closely resemble those of the scientists that it is now much harder to categorize their work as the final, non-scientific step in the chain of popularization that is presumed to extend from the lab to the public. Granted that exhibit-making does not score well on definitions of science that rely on hypothesis testing or formalized chains of inference. But socially, what the naturalists and model makers did in the field and in the museum overlapped with the practices and culture of the scientists.[141]

---

[141]See Andrew Pickering, "From Science as Knowledge to Science as Practice," in *Science as Practice and Culture*, ed. Andrew Pickering (Chicago: University of Chicago Press, 1992), pp. 1-26. Pickering eschews analysis of representation, whereas this study specifically examines how practice creates representation and uses representation to understand practice.

Popularization & Justifying Museum Science

Finally, with the field experience of the expedition team in mind, we return to the wider reasons beyond intrinsic scientific interest that the botanists had for wanting to take museum visitors to their field site. The botanists' perception that their field was an undervalued area of natural history and the role they saw for realistic exhibits in remedying the situation has already been discussed. This section further examines Cowan's desire to promote botany in particular and his efforts to promote museum science in general. He worked against the backdrop of the post-Sputnik rise of Big Science and the space race, which meant that although there was concern throughout America about scientific and technical competitiveness, the traditional pursuits of natural history were at risk of being even further marginalized in favor of large-scale physics and engineering projects.

Selling Botany

In his 1962 article on the new botanical gallery in London written to fellow plant taxonomists, John Cannon promoted exhibit-making as being in the self interest of the specialist, since "a well-informed public is more likely to support our activities than one that feels that botanists have little time to make their subject intelligible to the layman. It would appear that many museums in the United States of America have a better understanding of public relations than most institutions in Europe."[142] In fact, it was during the 1960s that the Smithsonian began to take public relations seriously.

The high value the New York Botanical Garden placed on field work contributed greatly to Richard Cowan's professional identity. During his time in New York, he also learned to value public outreach. He regularly gave public

---

[142]Cannon, *Taxon* (1962), p. 248.

lectures and wrote book reviews for the NYBG's magazine.[143] That work shaped his conception of the primary purpose and utility of public outreach by scientists: "I think it comes down to my experience at the New York Botanical Garden, where you spent so much time trying to interest and educate people because the Garden depended heavily on income not only from the city but by personal donors and from memberships."[144] This rationale for popularization is based on the unconcealed self-interested need to recruit financial support for research. Though the norms of science eschew public relations campaigns, scientists are very skilled at promoting their projects.[145] What is perhaps surprising is that Cowan's reconstruction is unvarnished by any of the more idealistic claims about what people "ought to know" in order to be informed citizens in a participatory democracy, which are so commonly superimposed over the political agendas of the "public understanding of science" program.[146]

Cowan applied the formulation of public outreach he learned at the NYBG at the Smithsonian. According to him, there had been little previous headway made in planning the botany exhibits during the 1950s. So when head botany

---

[143]Cowan Oral History (1992), p. 26.

[144]*Ibid*..

[145]Dorothy Nelkin, *Selling Science: How the Press Covers Science and Technology* (New York: W. H. Freeman, 1987), pp. 132-153.

[146]A typical example of this rationale is W. F. Bodmer FRS, *The Public Understanding of Science* (London: The Royal Society, 1985). For critiques of the program, see Leon E. Trachtman, "The Public Understanding of Science Effort: A Critique," *Science, Technology & Human Values*, 1981, *6*:10-15; Christopher Dornan, "Science and Scientism in the Media," *Science as Culture*, 1989, no. 7:101-121; Brian Wynne, "Public Understanding of Science," in *Handbook of Science and Technology Studies*, eds. Sheila Jasanoff, Gerald E. Markle, James C. Peterson and Trevor Pinch (Thousand Oaks, California: Sage Publications, 1995), pp. 361-388; Jean-Marc Lévy-Leblond, "About Misunderstandings About Misunderstandings," *Public Understanding of Science*, 1992, *1*:17-21; Steven Shapin, "Why the Public Ought to Understand Science-In-the-Making," *Public Understanding of Science*, 1992, *1*:27-30; Brian Wynne, "Public Understanding of Science Research: New Horizons or Hall of Mirrors?," *Public Understanding of Science*, 1992, *1*:37-43.

curator Jason Swallen "said that he wanted me to get involved in this,. . .I was certainly willing, because I thought it was a great way to try to sell botany a little more than it had been sold. And in a major natural history museum, to have nothing on botany seemed a bit of a travesty on the way things ought to be [laughter]."[147] Whereas the botanists previously conceived of the Smithsonian's reputation entirely in terms of excellence in research, Cowan saw that exhibits were important public signs of the research conducted in the private space of the museum. As part of the wave of younger, university-trained curators hired beginning in the late 1950s, Cowan brought a new instrumental attitude toward exhibits to the botany department. Until then, it had relied on its small but steady government funding and worried little about directly lobbying the public for an increase in its appropriation.

Importantly, this approach aligned the botanists with the exhibits modernization committee and their allies. Characterizing the lack of botany exhibits as a "bit of a travesty" echoes Reginald Sayre's assessment of the situation when he arrived at the Smithsonian in 1960. He recalled telling Watson Perrygo, the taxidermist who spearheaded natural history exhibit renovation,

> "I think you're about ten years behind time with the American Museum." I said, "*This* is the American Museum, the Smithsonian.. . .You've got to modernize. This is the National Museum. And you can't get away with nit-pick work like that anymore." I said, "You've got to keep up with the other museums."[148]

Cowan and Sayre's common commitment to high-quality exhibits led to a very cordial working relationship. Both of them saw exhibits not as frivolous luxuries, but important projections of the scientific reputation of the Smithsonian.

During this time, Cowan also wrote several encyclopedia articles on basic botanical subjects. For example, in 1965, he did the "weed," "seed," "tree," and

---

[147]Cowan Oral History (1992), p. 1.
[148]Sayre Oral History, p. 37.

"mushroom" entries for the Collier encyclopedia.[149] He saw this work as worthwhile because "it gave an opportunity to reduce a great deal of information, technical information, into something that was hopefully readable and understandable by the general public."[150] Far from viewing popularization as a nuisance, Cowan saw it as something of an intellectual challenge. This abiding interest in public education fueled his interest in the exhibits program.

Selling Museum Science

Advocates of higher-quality science communication in the 1960s emphasized scientific literacy in order to enable enlightened public decision-making, preserve democracy, and share a grand "adventure of the human spirit."[151] Although Cowan wanted to communicate the sheer intellectual passion of his work, most of the arguments he made for popularizing the museum's work revolved around the much more instrumental goal of securing the future of the institution. Along with garnering support for his own research, Cowan also saw the exhibits program as a chance to recruit young people to the field of natural history in general:

> [T]here's a lot of feeling among curators that they want to share the excitement that they feel for their discipline, for the subject matter of their discipline, with young people especially. Because. . .if you wait until somebody is fifty or sixty, they may get interested, but the chances are infinitesimally smaller than to try to excite a youngster of eight-ten-twelve,. . .when there's a chance that their minds are not committed, their minds are not set on some sort of stereotype that leaves natural history out of their thinking.[152]

---

[149]Richard S. Cowan, [draft of Collier encyclopedia "seed" article]; [draft of Collier encyclopedia "weed" article], 1965; [response concerning Collier encyclopedia "mushroom" article], 14 January 1965; [response concerning Collier encyclopedia "tree" article], 3 June 1965, SIA RU 7356, Richard Sumner Cowan Papers, *ca.* 1952-1985, Box 4.

[150]Cowan Oral History (1992), p. 26.

[151]Hillier Krieghbaum, *Science and the Mass Media* (New York: New York University Press, 1967) , pp. 4-13

[152]Cowan Oral History (1992), p. 9.

The desire to "share the excitement for their discipline" is explicitly tied to making young people aware not only of the joys of natural history, but that it was an interesting, viable career option. Cowan clearly saw a need to cut against what he saw as prevailing stereotypes of museum science as anachronistic or uninteresting, and it strongly motivated his popularization efforts.

Because of this concern, Cowan wanted exhibits to be inspirational along with conveying specific information. In one of his 1960 reports on other museums, Cowan discussed the inspirational value of objects exhibited under microscopes at the Boston Science Museum, opining, "I think this is something we could use to great advantage because in my own experience I have found young people fascinated by the opportunity of looking through a microscope; a simple thing like this could lead some of the younger viewers into a life of science."[153] Looking through a microscope was less important for what the visitor actually saw in and of itself than for the fascination involved in the act of looking. In the years just after Sputnik, turning young people to a life of science was a pressing national concern in the United States, and Cowan's suggestion can be read as a part of that widespread worry.

Following his desire to promote botany and museum science, Cowan proposed that an educational film be made of the British Guiana expedition. The film he envisioned would make natural history exciting and competitive with high-profile Big Science. Called *The Leaf Thieves* when it was finished, the film was made in 1964 by Sophy Burnham from Cowan's brief, and incorporated footage taken in the field by Tom Soderstrom.[154] The film uses the British Guiana expedition as a core narrative around which to articulate the museum's

---

[153]Cowan "Boston" report, p. 5.

[154]Burnham worked her way from typist-secretary to Assistant Curator of the Smithsonian Museum Service, which was formed in 1958 to operate public programs and respond to public inquiries (Sophy Burnham, "Oral History Interviews," July, 1992, SIA RU 9565, Tropical Rain Forest Exhibits, pp. 1-3).

overall mission of research and education. One of the most interesting features of its portrait of the museum is that the research and exhibition activities are portrayed as an integrated package of knowledge production and representation, rather than two separate enterprises conveniently housed under the same roof.

Because I have analyzed the film extensively elsewhere, I will present here only a short synopsis of the film.[155] The remainder of the section will focus on Cowan's the goals for the film, and note briefly how Burnham carried them out. The first four minutes of *The Leaf Thieves* define contemporary museum science in terms of laboratory equipment and procedures. These sequences set up the core problematic of the rest of the film: how to relate traditional museum practice to "modern science." Next, the film's central segment, running for eighteen minutes, recounts the expedition to Kaieteur Falls. Here science and exhibition begin to merge, for the both the botanists and the exhibits staff are given the identity of explorers and field scientists instead of laboratory scientists. The final six-minute section quite surprisingly depicts the botanists at work in the museum more as clerks than explorers; the exhibits staff at work in the model shop appear active and creative, and they are the ones used to forge a link back to the earlier definition of modern science based on laboratory apparatus.

Although the Secretary did not formally authorize production until after the expedition had returned from British Guiana, Cowan had the film in mind as he planned the trip. When he invited Soderstrom to act as photographer, he asked him to learn to use a movie camera because, he stated, "I would like to have the 16mm documentary to make it available through our educational loan service to schools all over the country. In addition it could be useful for publicity (of the Institution) through such TV programs as Bold Journey and

---

[155]Steven W. Allison, "Making Nature 'Real Again': *The Leaf Thieves*," *Science as Culture*, 1995, *5*(1): 52-79.

Expedition."[156] The mention of these latter two programs (whose titles by themselves suggest their content and style) shows Cowan's intention to portray the adventurous, romantic side of botany and natural history discussed above. The finished version of *The Leaf Thieves* evokes the imagery already described in Figures 3.4, 3.5, 3.15, and 3.16. A sequence showing the group's trip down into the gorge is accompanied by the following narration:

> [Sayre, Soderstrom, Marchand descending] One day they climbed down the precipice, clinging to the tough vines and roots, a good hour descent.. . .
>
> [Falls; party on rocks from above; cliffs and mist, rushing water] Tons of water throwing itself eight hundred feet in a thunderous cascade to the rocks below. They climbed the boulders as high as houses that centuries ago had tumbled from the cliffs above.. . .
>
> [Rapids] Beneath them raced the rapids. The scientists could neither carry cameras and equipment, nor easily collect many plants. The next day they turned to other exploration.[157]

Word choice, such as "clinging to the tough vines and roots. . .Tons of water throwing itself. . .Below them raced the rapids," work in concert with the visuals, sound effects, and the announcer's urgent, booming delivery, to portray the team as heroic, their work exciting and even dangerous, and the knowledge they gained that much more precious for the risk it entailed.

This rhetoric resulted from the feeling that the center of gravity of American science had almost completely shifted to university-based research:

> [A] great deal of research in natural history can go forward independent of natural history museums. Modern trends toward a concentration on research in ecology and social relationships make good progress through field work and theoretical studies which are only indirectly related to taxonomy, systematics, and object-oriented anthropology.[158]

---

[156] Cowan to Soderstrom, 21 November 1961, p. 1.

[157] Burnham, *The Leaf Thieves*, minutes 16:26-18:20.

[158] G. Carroll Lindsay, "Museums and Research in History and Technology," *Curator*, 1962, *5*:236-244, on p. 237. Lindsay was the head of the Museum Service when Burnham made *The Leaf Thieves*.

As one of the largest museum systems in the world, the Smithsonian had a crucial interest in not being viewed as scientifically moribund.

Cowan specifically wanted the film to make biological science careers attractive to young people at a time when making new recruits to science was a pressing national concern in the United States:

> In the forty-one years from 1920 to 1961 only some 12,000 Ph. D.'s were earned in botany, zoology, and miscellaneous biological subjects.. . .Not even these figures, however, adequately show the dearth in the biological sciences of scientists, scientific illustrators, artists, plastics technicians, technical assistants, and other biologically oriented personnel. One reason for this shortage is that many young people who might naturally be attracted to biology as a career are never acquainted with the breadth of opportunity and wide range of skills utilized in the profession.[159]

It is striking that Cowan lumped all levels of expertise and practices into a single, "profession" consisting of "biologically oriented personnel." In debates over scientific authority, scientists often narrow what counts as doing science, whereas Cowan needed to expand the category to recruit new workers.[160]

Cowan connected the general lack of scientific competitiveness in natural history with the need to bolster the work of the museum in particular, again combining the activities of research and representation into one enterprise:

> Using the expedition as the unifying mechanism, and the rain forest as an example, this film would illustrate a few of the biological problems and principles that scientists seek to unravel, such as the inter-relationships of plants and animals. It would aim to indicate the kinds of problems that remain to be solved and the importance attached to a solution of some of them. The film would also show the work of artists and illustrators in the biological sciences, depicting specimens and building models for scientific or exhibit

---

[159]Richard S. Cowan, "copy of memo which Dr. Cowan would send to Dr. Carmichael giving reasons for and asking permission for Sophy to make a film on the expedition to British Guiana," 1 May 1963, SIA Accession No. 91-087, Office of Telecommunications, Records, 1974-1986, Box 5, p. 1.

[160]Stephen Hilgartner, "The Dominant View of Popularization: Conceptual Problems, Political Uses," *Social Studies of Science*, 1990, *20*:519-541, on p. 520.

> use; and it would briefly show the kind of scientific research undertaken with the specimens on return from the field.[161]

Along with the obvious attempt to interest young people in science careers, Cowan wanted make museum science "real science" by showing its intellectual vibrancy, as well as use it as an indirect tool in lobbying Congress for funding:

> [P]eople get the impression that there isn't much left to discover, there isn't much of a frontier in science and biology specifically, because they know so little about it. So the idea there was to give some idea of the excitement of discovery in various areas of the natural history sciences. Also something about how people *do* research. That was important because, again,. . . as long as you have to keep trying to convince legislators, people on the Hill, who have their hands on the purse strings, to let a little money out, you have to continue to do this sort of thing: educating people generally, educating the legislators, the Congressmen in particular.
>
> But very often if the people are, at least I should hope, sufficiently knowledgeable and excited about something, they can bring some pressure to bear by writing letters and calling and so forth to their own representatives.[162]

This latter strategy is decidedly reminiscent of the instrumental function of public outreach that he learned at the NYBG. Again, the connection between what Cowan called knowledge and excitement and what has been elsewhere labeled scientific literacy is not some abstract goal for a civilized citizenry, but the very basic and unapologetic recognition that if science is to be funded, the public must be convinced of its value and interest.

Cowan's desire to remind the public that there are exciting *frontiers* in biology must also be considered against the backdrop of the American manned space program after Sputnik, which Michael Smith argues was conceived of within the government as a means of regaining national competitiveness and re-inventing America's pioneer explorer identity.[163] Furthermore, if biology was to

---

[161]Cowan, "memo which Dr. Cowan would send to Dr. Carmichael."

[162]Cowan Oral History (1992), p. 23.

[163]Michael L. Smith, "Selling the Moon: The U.S. Manned Space Program and the Triumph of Commodity Scientism," in *The Culture of Consumption:*

maintain its share of public funding, it had to compete against highly-charged images of high-tech aerospace engineering and physics. One means of doing so involved directly expropriating or tapping into the potent rhetoric of the post-Sputnik space race. *The Leaf Thieves* directly connects the natural history museum to the space race by including in its imagery of the museum's work a technician polishing a slab of meteorite and an animated graphic of drifting stars and a comet. The opening sequence further connects Smithsonian science to high-tech lab science by showing a technician using a sophisticated C-14 counter to date samples from an archeological site. The narration specifically contrasts this work to the "out of date" image of dusty museum collections.[164] However, to create a compelling portrait of field work that was meant to compete with Big Science, most of the film uses images such as the sequence described above of the expedition team's descent into the Kaieteur Falls gorge, as well as depictions of the work of the model-makers described in the previous section. As a whole, the film works harder to maintain the vitality of the museum's traditional activities than it does to redefine them in terms of the new brand of science.

Conclusion: The Hall of Plant Life Come to a Close

When compelled to, the botanists involved themselves in exhibit work by creating an intersection between their professional practices and interests and the perceived educational functions of public exhibits. They created this overlap of exhibition and research by incorporating important elements of their culture into the rain forest habitat group. These elements included the tacit experience of the romance and excitement of field collecting, along with the attention to observational detail captured by the inscription devices of both the taxonomists

---

Critical Essays in American History, 1880-1980, eds. Richard Wightman Fox and T. J. Jackson Lears (New York: Pantheon Books, 1983), pp 175-209, on pp. 191-198.

[164]Burnham, *The Leaf Thieves*, minute 2:36.

and the model makers. Crucially, these imaginative connections sustained the botanists' interest in the exhibit program. This is demonstrated by the central role the realistic rain forest representation played in the exhibit hall plans along side other, more technical exhibit styles and formats. Unlike their more isolated predecessors, the botany curators of the 1960s also realized that exhibits were an important tool in gaining funding and recruiting labor.

For the next couple of years after *The Leaf Thieves* was made, the Hall of Plant Life proceeded on the course Cowan set, although his duties as museum director beginning in 1966 reduced his involvement. The Baja California and Colombia trips in 1963 and 1966 were cast in the same mold as the British Guiana expedition. Paul Marchand and Reginald Sayre went on both, and background painter Jay Matternes joined the Colombia team headed by Tom Soderstrom.

But other changes at the Smithsonian were to overtake the botanists after 1966. As the next chapter will relate, the exhibits modernization program came to an end when the Smithsonian's eighth Secretary, S. Dillon Ripley, began to make his mark on the exhibit program in the late 1960s. Ripley was uninterested in traditional subject-specific exhibit halls, and in response, the rain forest was converted from a field site to an example of an ecosystem in a "Hall of Living Things" meant to combine both the insect and botany hall projects.

CHAPTER FOUR
"THE HALL OF LIVING THINGS":
RAIN FOREST AS ECOSYSTEM, 1968-1970

Introduction: The Interpretive Flexibility of the Rain Forest

It is tempting to see the botanists' conception of the rain forest as a primary field site as its root, essential meaning, that is overlaid by later actors and ideas. This temptation is reinforced by the fact that the rain forest as field site was the first meaning in the chronology, and that it has been presented as the "traditional" approach. However, the principle of interpretive flexibility suggests that an explanation of the arrival of a competing definition of the rain forest—abstract ecosystem versus concrete field site—must go beyond simply labeling the earlier conception as anachronistic or the new version as a corruption of the true nature of the rain forest. Rather, seeing the rain forest as a natural entity with intrinsic interpretive flexibility means that it will necessarily be cast into a variety of meanings with a variety of uses, no one of which enjoys prior privilege over the rest. In this light, understanding the new definition of the rain forest as an ecosystem involves understanding the representational genres that are both needed by, and follow from, the arguments, skills, and aesthetics of a new group of actors in exhibit-making at the Smithsonian: professional designers and writers.

The last chapter showed that the botanists' rain forest habitat group embodied both their own professional knowledge and passions and the desire to promote natural history to the public. Until 1966 and early 1967, the botany hall program was on the long-range trajectory it had been set upon by Richard Cowan in the early 1960s. Thomas Soderstrom led an exhibits collecting expedition to Colombia in the fall of 1966, and preliminary design was scheduled for fiscal 1968. In early 1967, the museum hired writer Peter Farb to develop the "Hall of Insects and Their Allies," which was to exhibit insect anatomy, behavior, and ecology. The trajectory of both the botany and insect halls was deflected when in January of 1968, Secretary Ripley ordered halls 27 and 30 on the second floor of the MNH to be used as office space for the Entomology Department (Figure 3.1), displacing the insect hall to Hall 10, which had originally been slated for the botany hall (Figure 3.2). In response, Farb developed a scheme to salvage ecological material from the insect hall and the rain forest group from the plant hall to build an ecology hall called "The Hall of Living Things."

In this new hall, the rain forest was meant to typify the interconnections in a complex ecosystem. Farb's plan met with the approval of Director Cowan and Secretary Ripley. In the fall of 1968, a new plan aimed to collect material for the rain forest group at an experimental forest at Belém, Brazil, which had been subjected to extensive ecological scrutiny. Ornithologist Philip Humphrey brokered this plan with the Brazilians. Farb visited Belém in February of 1969 and, as chief exhibit developer, declared the logistical challenges in collecting there to be insurmountable. In May, it was decided to return to the British Guiana material for the understory of the rain forest group. But in October plans for a ramp in the hall to allow viewing both the ground level and the canopy of the rain forest were scrapped because of budget and architectural problems. Farb and designer Joseph Shannon left the Smithsonian in early 1970 when the project foundered on money problems. Thus it was the fall of 1971 before an outside design firm and writer were contracted to take up the project once again.

This chapter explains how the tropical rain forest habitat group first conceived as an exotic botanical field site in the Hall of Plant Life came to be deployed as an example of a complex ecosystem in a Hall of Living Things. The explanation lies in the larger story of a radical shift in how and why exhibits were produced, and who produced them, at the MNH. That shift hinges on the disaggregagation of research and exhibition that was merged together in the last chapters, and with it, a trend away from hyper-realistic exhibits to a progressively more abstract exhibition aesthetic. This period will be analyzed in terms of three linked causes: new actors bringing new practices, new scientific resources that resonated with those practices, and institutional contingencies that provoked change in the exhibits program.

Separating the Strands

The first causal thread of this episode is that the actors in control of exhibit-making changed from curators to writers and designers. This happened partly because of S. Dillon Ripley's concerted efforts to remake the Smithsonian as a whole upon his installation as Secretary in 1964. The professionalization of exhibit-making was also influenced the rise of mass media as a cultural force, and exhibit practices developed for trade shows and World's Fairs that eventually impinged upon the traditional status quo at the Smithsonian.[1]

Second, those new actors—writer Peter Farb and designers James Mahoney and Joseph Shannon—brought new attitudes about how to represent nature in museum exhibits. Trained to see formalized scientific information as a raw material packaged in a medium appropriate to reach an audience, this new generation favored exhibits with a unified story line and abstract content, superseding the curators' object- and research-driven exhibit philosophy.

---

[1]Roger Miles, head of the Department of Exhibitions and Education at the British Museum (Natural History) until 1994, opined, "It seems to me that changes in exhibitions styles have everything to do with changes in society, and—regrettably—nothing, or almost nothing, to do with exhibit research and evaluation" (Roger S. Miles, "Too Many Cooks Boil the Wroth—Exhibits, Teams, Evaluation," keynote address presented at the June, 1992, Visitor Studies Conference, St. Louis, Missouri, p. 1).

Third, the new conceptual approach specifically drew on the science of ecology as a resource in shaping the form and content of exhibits. By the late 1960s, a well-established ecological paradigm defined nature in terms of a system of interlocking, interchangeable pieces and flows instead of irreducibly particular localities and their constituent parts, as the naturalists tended to do. Ripley aggressively promoted the new ecological research at the Smithsonian, but without successfully enlisting the curatorial staff on a large scale. In general terms, this became a conflict between traditional natural history and modern theoretical life science.

Finally, the conceptual resource of ecology came into play due to institutional contingencies that significantly shaped the pace and scope of the exhibit planning process. Administratively mandated changes in the Natural History Building's space and budget crises brought on by the 1970s recession compelled the abrupt changes and reconfigurations of the exhibits program that begin and end the period covered in this chapter.

The new actors drew on formalized ecological knowledge rather than the naturalists' tacit field knowledge. The designers' tools were not the inscription devices used to translate the field into the museum, but communication methods that packaged and moved existing inscriptions.

Reconstructing the period in this way—moving from new actors introducing new attitudes and practice from outside, and utilizing ecology as a response to institutional demands—emphasizes that social causes, as much or more than nature itself, explain the final forms of representations of nature found in exhibit halls. Actors and their interests and practices stay central to the story. At the same time, ideas such as an ecological definition of nature are useful resources for advancing a position in the social world of interests and practice.

This characterization avoids the implication that ideas alone are the underlying causal motor propelling the outcome of debates and negotiations in the system.

The heterogeneity of influences on an exhibition's final outcome has been often commented upon, and museum practitioners might object to placing contingency last. Robert Bud, for example, privileges contingency and suggests that the exhibit-maker's intellectual intention is ultimately the least contributing factor.[2] He argues that the nature of the museum as an image-generating "machine," with physical requirements such as the load-bearing capacities of gallery floors, and institutional requirements such as brokering scholarly versus business interests, dictate an exhibition's shape more than the museum's "myth-making" capacity to create stories evoking the authenticity of objects and their history.[3] The importance of his insight is that it makes floors and funders important actors in a system where the model of a single author realizing a singular vision is clearly spurious. On the other hand, Bud implies that very little meaning can be read off from the final exhibition because it is so largely due to compromise. But except as a corrective to simplistic semiotics, that portrait of exhibit-making is ultimately stifling because it negates any attempt to unpack the ideas either embedded in the exhibition or found by its visitors.

As an alternative, in their study of the way *National Geographic* magazine constructs images, Catherine Lutz and Jane Collins maintain that author's intent need not be considered simply in terms of one author's single intent. Rather, the meanings of the magazine's images result from the constellation of interests and sensibilities of the magazine's editorial council and the individual photographers

---

[2]Robert Bud, "The Myth and the Machine: Seeing Science Through Museum Eyes," in *Picturing Power: Visual Depiction and Social Relations*, eds. Gordon Fyfe and John Law (New York and London: Routledge, 1988), pp. 134-159, on p. 157.

[3]*Ibid*., p. 135 & p. 151 & p. 147.

and editors assigned to a specific project.[4] An anthropological treatment has no trouble seeing how meaning is negotiated into existence. The task of determining the relative contributions of individual actors becomes more complex, but is not impossible.

This chapter acknowledges the importance of contingency, but looks beyond contingency to understand how the exhibit took its final form. It aims to explain how the decision to move the Department of Entomology back into the Natural History Building in 1968 caused the rain forest to change from a botanist's field site to an example of an ecosystem. Although the change was brought on by institutional contingency, the solution to the problem was not only institutional (a shift in the identities of the exhibit-makers), but intellectual as well (a reconceptualization of the meaning of the rain forest exhibit).

The Partnership Between Exhibition & Research Unravels

As Chapter Two related, Frank Taylor began the Exhibit Modernization Program after World War Two. Before the war, according to Taylor,

> Each little division was supposed to do its own exhibits work, and the exhibits work consisted pretty largely of putting an object on a shelf in a case and putting a label by it to tell what it was. The thematic content was simply chronological or would show a progression, the evolution of a device or of an organism, or maybe just a variety of specimens grouped as birds, mammals, or reptiles. And this was considered enough as long as the objects themselves were interesting and spectacular or just the mass of them was impressive.[5]

As Taylor implies by saying "largely" and "simply," the curators' exhibit practice was an extension of their technical research.

---

[4]Catherine A. Lutz and Jane L. Collins, *Reading National Geographic* (Chicago: University of Chicago Press, 1993), pp. 52-54.

[5]Frank A. Taylor, "Oral History Interviews," 1974, SIA RU 9512, Frank A. Taylor Interviews, p. 68.

The Status Quo

Taylor hired trained designers and artists, setting the stage for the later complete separation of curation and exhibition. Throughout the 1950s, the Exhibit Modernization Program worked its way through many of the MNH's exhibit halls. As discussed in the last chapter, some saw the "World of Mammals" exhibition as the crowning achievement of the era. But even though exhibit production was professionalized in some respects, it still maintained close ties with the research enterprise. The curatorial staff still tightly controlled exhibit content until the upheavals of the late 1960s.[6]

Trained as an industrial designer, James Mahoney joined the Smithsonian in 1958 and became head of the MNH exhibits lab in 1967.[7] In an interview, he recalled the curator's traditional approach to exhibition:

> [Y]ou would set up an exhibit hall, a title, and you would commit some certain space in the building to it, and then that scientific staff would plan their collecting trips.. . .[T]hey'd go five years or seven years, or some other discovery or they couldn't bring something back or they didn't find something. In many cases the exhibit halls stood empty. But the funds were sought as part of an exhibits program rather than a collecting program.. . .In the meantime, the exhibit staff were used as preparators. They would make models and casts and do things that may or may not appear in the exhibits. They would be more part of the collections process, used for what they call scientific study, but it's really scientific record keeping, to add to the collections.[8]

Mahoney's observation describes the classic partnership between natural history and exhibit preparation discussed in Chapters Two and Three. But instead of seeing that partnership as an alliance that guaranteed the scientific authority of

---

[6]For the "World of Mammals," a 1958 set of sketches for possible layouts of objects in a particular exhibit case was marked with "No" and initialed by the curator, Henry W. Setzer, indicating that the designer had little discretion (SIA RU 363, NMNH, Office of Exhibits, Records, *ca*. 1955-1990, Box 25).

[7]James Mahoney, "Oral History Interviews," 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 3 & p. 6.

[8]*Ibid*., p. 31.

exhibits and recognizing the complex expertise required to create them, Mahoney saw it as an insular, private empire of technical work that took away from his sphere of public exhibition. From his vantage as a visual communicator, the scientists did not make exhibits for the public, but solely to further their own esoteric interests and projects.

Moreover, until a series of changes in the administration and jurisdiction of the MNH's exhibits lab in the early 1970s, this relationship between the exhibits shop and scientific research remained. For example, a photo caption in the report of the Office of Oceanography and Limnology in 1968 reads:

> Walter Sorrell of the Museum of Natural History Plastics laboratory inspects one of the numerous plankton splitters fabricated by the Office of Exhibits for research at the Smithsonian Oceanographic Sorting Center. The production of such precision scientific instruments is an important contribution of the plastics laboratory to [the] Smithsonian's research program.[9]

This official declaration of the ongoing scientific partnership between the exhibits and research staff not only echoes the earlier relationship between naturalists and preparators, but indicates that it was still a living part of the institutional identity and culture, even though the objects being fabricated were no longer stuffed animals, but more technical "precision instruments" for handling microscopic marine organisms.

The botanists' approach to the botany hall indicates this close association between exhibit and research work. Richard Cowan selected the Kaieteur Falls area of British Guiana because it was relatively unknown scientifically, and Reginald Sayre and Paul Marchand's model-making expertise overlapped with the taxonomical expertise of the botanists. After the British Guiana trip, the botany hall was a decidedly long-term project: in 1963, it was scheduled to open

---

[9] *Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1968), p. 278.

in 1968.[10] In 1965 and 1966, the exhibits lab continued to produce plant models for the Hall.[11] In the fall of 1966, Thomas Soderstrom headed an expedition to the Colombian Andes to collect for a habitat group of the Páramo, another of the groups planned for the hall. The team included Sayre and Marchand, as well as background painter Jay Matternes and photographer Kjell Sandved. Matternes painted a five-panel field study for the background, and Sandved took 3000 photos, some of which were to be part of a slide show in the hall.[12] Sayre, Marchand, and Matternes all belonged to the school of exhibit-making that emphasized permanence and exacting detail. But in late 1967, the hall was given a "low priority," with "[s]pecimen acquisition on a fill-in basis."[13]

The botany and insect halls represented the last uncompleted segments of the original Exhibits Modernization Program. The marine hall had opened in 1963 and T. Dale Stewart's physical anthropology hall, designed by Joseph Shannon, opened in 1965. The botanists and entomologists had been the last to sign onto the program, and even though Cowan and other curators like Soderstrom were genuinely interested in the exhibit project, they never succeeded in building the momentum needed to follow through. They were, in any event, overtaken by Ripley's exhibit agenda and the new approach taken by the design professionals.

---

[10]John Anglim to Frank Taylor, 10 July 1963, SIA RU 155, Director, NMNH, 1948-1970, Box 14.

[11]Photo caption: "Office of Exhibits: Accessories specialist Juan de Pau working on leaf specimens for the hall of botany" (*Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1966), unpaginated plate after p. 52).

[12]Photo of Sayre and Soderstrom examining grass specimens, and Cowan and Soderstrom looking at lichens (*Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1967), p. 113; description pp. 125-127).

[13]Richard S. Cowan to John Anglim, 15 November 1967, SIA RU 155, Director, NMNH, 1948-1970, Box 14.

Even as the botanists followed a traditional conception of exhibits and exhibit-making, there were hints of change. In a May, 1967, meeting of the botanists involved in the project to discuss "resumption of activity on the Hall of Plant Life," the group "discussed re-orientation of the topical area of the hall away from a 'text-book' approach to one built on one or more principal themes."[14] A few months later, a story line for the Hall of Plant Life declared, "Dynamic biochemical processes and interrelations with the rest of nature are so characteristic of the plant world that it would be out of the question to limit the Hall of Plants to a synoptic display of plant models."[15] Though Cowan had originally wanted to avoid simple series of specimens, and the topical cases of the earlier plans were to include more technical subjects, this statement represents a change in perspective in its emphasis on chemical process and relationships, the key themes of a systems approach to biology. These changes presaged the sweeping reconception of exhibit form and content that the new breed of professional exhibit-makers promoted over the next few years. At the same time the botanists agreed to get away from the text-book approach, they also "enthusiastically agreed" to contract a consultant to handle development of the hall since Cowan's administrative duties no longer allowed him to manage the project. The botany staff retained scientific oversight of the project and was to select the consultant.[16] This signaled another step away from the overlap of research and exhibition.

Then, in 1967, the traditional system for curator-controlled exhibit development unraveled abruptly. In January, MNH director Richard Cowan

[14]Richard S. Cowan to John Anglim, 15 May 1967, SIA RU 155, Director, NMNH, 1948-1970, Box 15.

[15]"The Hall of Plants," 12 September 1967, SIA RU 155, Director, NMNH, 1948-1970, Box 15.

[16]Richard S. Cowan to John Anglim, 15 May 1967, SIA RU 155, Director, NMNH, 1948-1970, Box 15.

circulated a memorandum to the curatorial staff titled "Guidelines for Exhibits Preparation." It reiterated the traditional division of labor between curators, who were charged with selecting the "theme. . .specimens. . .and the preparation of a script," and the designers, who were given control over the "aesthetics" of the hall.[17] But that directive was short-lived and appears now as more of a gesture than a policy that was carried out. Just a few months later, free-lance writer Peter Farb was hired to develop the insect hall. Though he was to work in consultation with the entomology staff, it was part of his brief to propose ideas and write scripts—precisely the role assigned to the curatorial staff by Cowan's directive. Also, a Dr. Ulress Lanham was engaged as consultant for the botany hall project, and had begun working with the curatorial staff.[18] Lanham may have written the draft script describing "dynamic biochemical processes," but Cowan terminated his contract when the botany hall was canceled a few months later.[19]

That Cowan's directive on exhibits preparation was more a gesture to a dying system than a robust, proactive policy statement is suggested even further by the fact that Cowan himself by then saw consultants as a means of revitalizing the exhibits program. A brief digression about the origins of the insect hall will illuminate both Cowan's strategy and set the stage for a detailed account of the Hall of Living Things project.

---

[17]Richard S. Cowan, "Guidelines for Exhibits Preparation," p. 1.

[18]Cowan to Anglim, 15 November 1967.

[19]"The Hall of Plants," 12 September 1967, SIA RU 155, Director, NMNH, 1948-1970, Box 15. John E. Anglim to Urless N. Lanham, 22 January 1968, SIA RU 155, Box 15 informs Lanham of cancellation; Richard S. Cowan to Urless N. Lanham, 18 January 1968, SIA RU 155, Box 15 explains in greater detail.

A Consultant for the Insect Hall

The entomology department's attitude toward exhibits seemed to involve the same skepticism that Frank Taylor, the original force behind the Exhibits Modernization Program, had experienced from the scientific staff at large in the early stages of his effort (Chapter Two). In the spring of 1966, the MNH's exhibits chief, Jack Anglim, was optimistic that the mood had changed:

> [W]e have had some difficulties in getting any action started in this hall, due primarily to changes in the chairmanship of the Department of Entomology. This has now been accomplished, and we should begin to move toward a start in this hall.. . .[The entomology staff] gives every impression, on our first meeting, of being interested in producing a good exhibit hall. [20]

However, no one curator wanted to spearhead the project, and Cowan suggested hiring a full-time staff member to work on the insect hall, following the approach taken by the zoology staff with the marine hall. In July, Cowan requested the funds for a consultant from Secretary Ripley.[21]

The entomologists readily accepted the idea of a consultant, as it would keep exhibit work from interfering with their research. However, they wanted to hire a retired entomologist from Purdue University to handle "planning and development" of the hall.[22] This man would have functioned as a surrogate curator in the exhibit-making process. As a colleague hand-picked by the entomologists, even though he would have been an outsider to the Smithsonian, he would have been an insider to the entomologists' culture and perspective, thus effectively perpetuating the traditional system of curatorial control.

---

[20]John E. Anglim to Frank A. Taylor, 18 March 1966, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 13.

[21]Richard S. Cowan to S. Dillon Ripley thru [Sidney] Galler, 11 July 1966, SIA RU 190, Director General of Museums and Director, United States National Museum, 1921-1973, Box 30.

[22]R. S. Cowan to Donald Squires, 3 August 1966, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 13.

However, Cowan's conception of the skills needed in a consultant marks a crucial departure from that tradition. He felt that "there is considerable merit in considering a popularizer of entomology rather than a technical person."[23] This is the first hint that mass communications skills rather than intimate knowledge of the subject matter might be more important to exhibit-making. It was at this same time that Cowan wrote encyclopedia entries on botanical subjects because he was interested in the challenges of conveying technical information to a lay audience (Chapter Three). He recalled that doing public outreach at the New York Botanical Garden taught him that "[t]he over-riding consideration, whether you're writing something or whether you're speaking, is to know your audience sufficiently to know what they could be interested in, to know what their capacity for taking up the information is, what the breadth of their background is."[24] Clearly Cowan worried that a technically-trained entomologist would not be able to assess the needs of the audience.

The Department of Entomology therefore hired Peter Farb to develop a story line and scripts for the insect hall early in 1967.[25] He had written several books on natural history subjects, and came to the Smithsonian's attention as the author of the *Insects* and *Ecology* volumes for the Time-Life Nature Library.[26] Self-taught in natural history, Farb saw himself as more than a popularizer who merely simplified and repeated expert information. He "hated" the term, and preferred the label "synthesizer" to indicate his own intellectual contribution.[27]

---

[23]*Ibid*.

[24]Cowan Oral History (1992), p. 26.

[25]*Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1967), p. 127.

[26]Joseph Shannon, "Oral History Interview," 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 18; Peter Farb, *The Insects*, (New York: Time, 1962); Peter Farb, *Ecology*, 1st ed. (New York: Time, 1963).

[27]John Anglim to Richard S. Cowan, 18 May 1967, SIA RU 155, Director, NMNH, 1948-1970, Box 15; Shannon Oral History, p. 8.

Farb's style quickly impressed the exhibits staff, which had begun to despair at the slow progress of the exhibits program. In 1967, the MNH exhibits chief, Jack Anglim, lamented to his boss, Frank Taylor, "Looking over the halls we are now involved with is a dreary sight. Month after month goes by with no real activity in the part of the curators. We receive promise after promise to have scripts, specimens or specifications to work with."[28] Anglim saw the outside, non-technically trained consultant as an antidote to this moribund state of affairs: "The longer we work with a man such as Peter Farb the more convinced I am that this seems to be the most reasonable method of getting good, exciting exhibits done on schedule."[29] He held Farb up as the sort of person who was needed to work on the botany hall. Not only should the botany consultant be "someone who, for want of a better term, can be considered a 'popularizer'," but who also "must be given a good deal of authority and responsibility to select subject material."[30] From Anglim's point of view, the curators had a poor track record of involvement with exhibits, and outside expertise and initiative were therefore necessary.

In an early planning meeting for the insect hall before Farb arrived, the entomologists "spoke of insect ecology, economics, mimicry, evolution and total history, reaching from the paleontological past to the economic present."[31] The exact interpretation of what ecology meant was being renegotiated during the period, but the phrase "economic present" is a clue to what the entomologists might have had in mind. USDA entomologists worked in the MNH on pest management issues, which would have shaped the curators' interpretation of

---

[28]John Anglim to Richard S. Cowan, 29 March 1967, SIA RU 155, Director, NMNH, 1948-1970, Box 14.

[29]*Ibid*.

[30]Anglim to Cowan, 18 May 1967.

[31]Cowan to Squires, 3 August 1966.

ecology. Even though USDA scientists also worked in the botany department, Cowan's dislike for economic exhibits (Chapter Three) precluded for botany the approach the entomologists took.

Farb took the entomologists' interest in insect ecology and behavior and gave it his own high-concept treatment. One of his ideas for the insect exhibit was a fourteen-foot-long model grasshopper, which was to convey salient features of arthropod anatomy using a light-up console to direct the viewer's attention to various parts of the insect. Figure 4.1 shows a scale model of the grasshopper exhibit, as built by the Chicago firm contracted to do the work, Richard Rush Studios. It was in fact the only part of the insect hall actually to be built, although the completed large model was never exhibited at the Smithsonian. It has been on exhibit at the Boston Museum of Science for many years despite suggestions off and on that it be brought back to Washington.[32]

Ironically, the grasshopper was also the only part of the project that involved the traditional partnership between technical research and exhibit-making, since it required original research to create. In seeking to revise the original contract for the model, Anglim explained that "until our consultants went to work on this project, no detailed knowledge of this insect's anatomy existed any place in the world or in print in any volume."[33] According to Anglim, new scientific knowledge had to be generated for the representation to be possible because "originally, it was not anticipated that certain fine details of the nervous system would be apparent in the model. However, a re-evaluation of these details when magnified to the scale of a fourteen-foot grasshopper shows

---

[32] A. Gilbert Wright, "Oral History Interview," 1983, SIA RU 9523, Box 1, p. 212. The model is still in Boston as of 1993 (SWA).

[33] John E. Anglim to Barwick, 4 December 1967, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 13.

that they will be readily apparent to the visitor."[34] Crossing the boundaries of scale in creating the representation of the grasshopper required more information than had previously existed, and Anglim's tone suggests his pride in the new

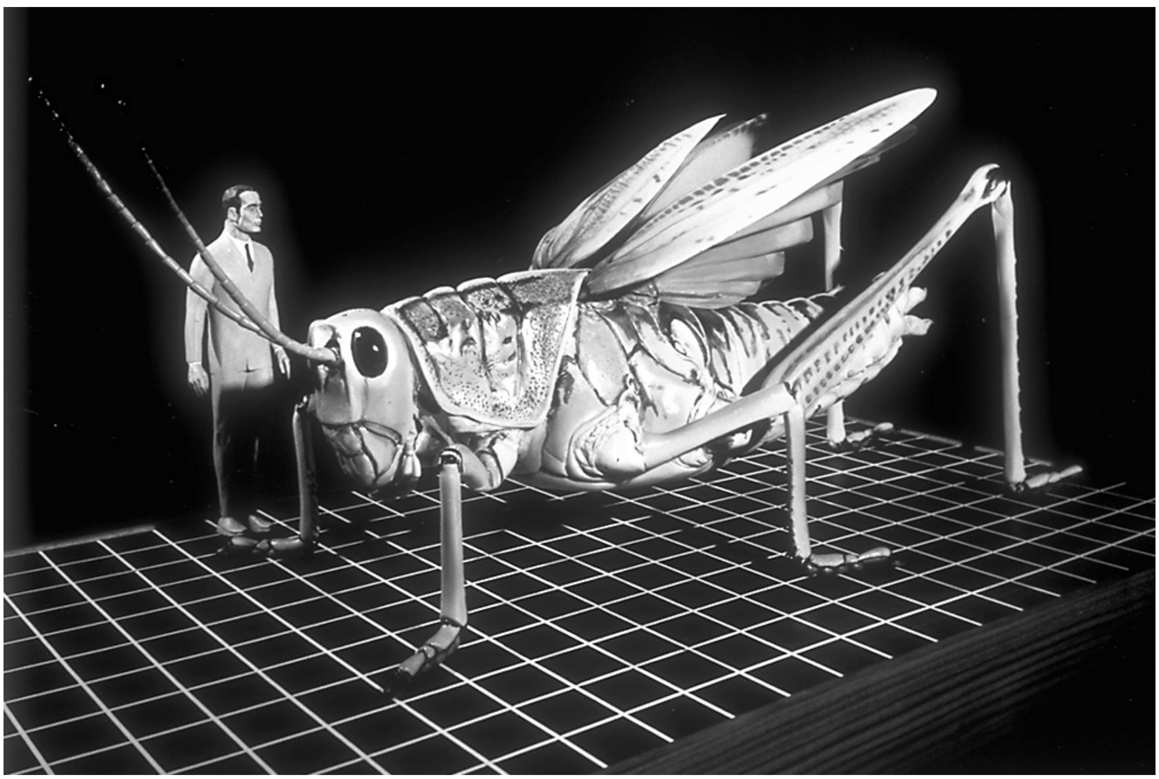


Figure 4.1. Scale model for giant grasshopper exhibit built by Richard Rush Studios for planned insect hall, NMNH, *ca*. 1967. SIA RU 363, Box 8, courtesy the Smithsonian Institution.

34 *Ibid*.

knowledge gained for science. However, since this need was discovered only after the model project was undertaken, there is no indication that Farb originally set out to stimulate research in grasshopper anatomy.

Ripley's Conceptual Bent

Even though January, 1968, marks the official date of the order to move the entomology department back into the Natural History Building and the concomitant cancellation of the botany hall, the hall's status had already become fragile because its slow progress was about to collide with Secretary Ripley's faster-moving agenda for research and exhibition at the Smithsonian.[35] Jack Anglim hinted at the coming collision when he wrote to Cowan about the botany hall in the spring of 1967, "We do have, as you know, some preliminary planning and design on this project but I believe you suggested that there may be some re-evaluation in the light of new or different directions that are involving [sic] because of the Secretary's interest in exhibits."[36]

"An Emphasis on Research"

From the time he became Secretary in 1964, Ripley began to reshape the Smithsonian. To his admirers, he was charismatic and visionary; to his critics, he subverted the traditional mission of the Institution. One of his central goals, to emphasize the Smithsonian's status as a research and educational institution, helps explain his vision for exhibitions during the 1960s. He began by setting about to recover Joseph Henry's original vision for the Smithsonian.[37] Henry vigorously resisted museum collections, and only acquiesced under a

---

[35]Richard S. Cowan to Urless N. Lanham, 18 January 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15.

[36]Anglim to Cowan, 29 March 1967.

[37]*Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1964), p. 2.

Congressional mandate.[38] Ripley similarly wanted to shed the Smithsonian's reputation as "the Nation's attic," and make its research more like a university.[39]

Ripley's vision required significant reorientations of why and how the Smithsonian studied nature. Partly motivating the why was a concern for the environment, which will be examined in the next chapter. For now, it is notable that even in his first report as Secretary, Ripley's fundamental justification for research involved an ultimate desire to address conservation issues:

> Research on wild populations and undisturbed conditions in nature has taken on an aspect of urgency in recent years because so many opportunities for study have changed or disappeared. But man's need to understand his environment and use it sympathetically will require a broad program of observation and research, especially in the tropics.[40]

Though the Smithsonian had long-concentrated on tropical biology, much of the work was basic research motivated by intellectual curiosity and was not politically proactive. Ripley's conservation agenda as a new *raison d'etre* for the Smithsonian's tropical research programs was received with mixed reactions.

In emphasizing research, Ripley took a conciliatory tone:

> A related objective is to strengthen the position, within science as a whole, of those fields of biology which have the entire organism as their object: ecology, genetics, systematics, botany, zoology, oceanography, microbiology, and paleontology, as well as the sciences of man which have so long been central concerns of the Smithsonian.[41]

By listing the traditional areas of study, and specifically singling out anthropology as a Smithsonian specialty, Ripley appeared to be aware of the

---

[38]Robert V. Bruce, "The Smithsonian, Seedbed of Science," in *The Launching of Modern American Science*, (Ithaca: Cornell University Press, 1987), pp. 187-200.

[39]"Senate of Scientists Interviews," 1975, SIA RU 9508, Senate of Scientists Project.

[40]*Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1964), p. 3.

[41]*Ibid*., p. 3.

institution's traditional research paths of organismic biology and not physiology or biochemistry. However, additions to the list, including ecology, genetics, oceanography, and microbiology, all signal a wider scope than the naturalist's traditional interests and methods. And even when traditional methods were used, Ripley wanted to see them applied to environmental problems and questions. For example, STRI scientists and members of the botany department were involved with studies of the biological impacts of a sea-level canal proposed in the 1960s.[42]

Influential members of the curatorial staff had mixed feelings about Ripley's agenda. On one hand, his efforts to make the Smithsonian more like a university were well aligned with the expectations of many younger, university-trained curators. They had chafed under the rigid working hours and bureaucratic chain of command Ripley dispensed with.[43] A. C. Smith, the director of the MNH from 1958 to 1962, had previously been at the National Science Foundation, and began hiring young Ph.D.s as curators. In botany, all of the new curators hired from the late 1950s on held Ph.D.s. The new curators from a variety of fields, including anthropology and zoology, considered themselves to be the Young Turks of the Institution who began pushing to break loose the moribund bureaucracy before Ripley's installation as Secretary.[44]

However, Ripley's deputies often showed their disdain for traditional taxonomy-oriented natural history. Their pejorative appellation, "green eye

---

[42] *Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1968), p. 419; [proposals for collecting at site of proposed sea level canal in Panama/Colombia], 1960-1968, SIA RU 272, Department of Botany, 1885-1970, Records, Box 36. Joel B. Hagen, "Problems in the Institutionalization of Tropical Biology: The Case of the Barro Colorado Island Biological Laboratory," *History and Philosophy of the Life Sciences*, 1990, *12*:225-247, on pp. 243-45.

[43] Clifford Evans, "Oral History Interview," 1975, SIA RU 9508, Senate of Scientists Project, pp. 3-4.

[44] *Ibid*., p. 35.

shade boys," rankled the curators, who in turn called their plans "wild-haired."[45] Ripley, whose primarily instrumental valuation of collections conflicted with that of the curators, saw questions coming out of, rather than applied to, the collections. Fern curator David Lellinger expressed the firm belief that the act of collecting, identifying, and curating specimens is an end of itself, rather than a means to an end:

> [T]he standard assignment, more or less, was a third identifications, a third research, and a third curation and administration. Those two kind of lumped together. That I found a very satisfactory division of one's time, because the best way to improve your research is to improve the collections, which means curation and identifications, and from the curation and identifications come most of your research projects because you see something that isn't right. Then in setting it right, you find something publishable. You usually have to do some research to get to that point.[46]

For the curator, the collection was not simply a repository of information available to other scholars, and the curator merely its file-clerk. Organizing the information raised theoretical questions about the classification system, which is largely an attempt to express phylogenetic relationships, although the debates over traditional taxonomy and cladistics make this more complicated.[47]

Lellinger felt that the intrinsic value of the collections was something Ripley never understood, and something that he actively destroyed with his push to make the Smithsonian into a university by changing its focus:

> It changed from collections—that is, identifications and curation with some research—to mostly research. Ripley was a dilettante, basically, who piddled around with a few birds, but he. . .denigrated taxonomy and set the stage for a change to systematic rather than taxonomic research that was decoupled from collections. As a real museum doing taxonomic research, we've been on the skids practically since Ripley arrived.[48]

---

[45]*Ibid*., p. 50.

[46]David Lellinger, "Oral History Interview," 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 4.

[47]*Ibid*., pp. 14-15.

[48]*Ibid*., p. 9.

Lellinger's indictment echoes G. Carroll Lindsay's observation recounted in the last chapter that much university research does not require museum collections. And even though Ripley's previous experience expanding Yale's Peabody Museum of Natural History contradicts Lellinger's claim that Ripley did not at all care for collections, Ripley clearly set his sights higher at the Smithsonian.[49]

Ideas Over Objects

Everyone who knew Ripley acknowledged that his thinking style was conceptually-oriented, and this alone indicates why in general he downplayed the primacy of objects in exhibits. Replying to a Congressman's inquiry on behalf of a constituent, as was the custom, Ripley wrote,

> In response to the November 28 letter from your constituent, Abbie LeCrone, I must tell you that we do not have an appropriate place to exhibit her photographs of seeds. It is a most interesting subject and we do use photographs from any source to present our exhibits. However, our exhibits are increasingly directed toward the presentation of *ideas* rather than *objects*. [original emphasis][50]

This would be a standard "thanks but no thanks" reply if it were not for the justification that ideas rather than objects were now more important at the Smithsonian. The query itself indicates that the public still saw the Smithsonian as a place where things or representations of things were on display. It suggests both why this justification was necessary and the extent to which the justification was itself novel at the time. While this attitude was what the curatorial staff sensed and mistrusted, it was welcomed with enthusiasm by some of the exhibits staff, whose influences came from popular culture external to the museum.

---

[49]Thomas E. Lovejoy, "Oral History Interviews," 1994, SIA RU 9565, Tropical Rain Forest Exhibits, Interview 3 (unprocessed).

[50]S. Dillon Ripley to John P. Hammerschmidt, 12 December 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 14.

The turn toward "concepts" also reflected Ripley's desire for exhibits to be a "strong social force."[51] That is, he wanted the Smithsonian to join debates of the day, and not confine itself to exhibiting and interpreting past history. That desire, and how it conflicted with the MNH curators, was central to the environmentalist show, "It All Depends," told in the next chapter.

Frank Taylor, the originator of the earlier Exhibit Modernization Program, which was daring in its own time, was more than willing to overhaul the way exhibits were created yet again. In mid-1967, in a memo to Jack Anglim at Natural History, he recognized that the end of an era had come and declared his allegiance to Ripley's new wave:

> Why don't we face up to the realization that the permanent program has just about had its chance and adopt the attitude that the experimental and temporary shows comprise the active and "fashionable" main program?. . .
>
> Mr. Ripley has identified enough new and innovative projects and directions to keep us busy for a long time.. . .Most of these are beyond the capability or interest of our curators, so we would be justified in engaging contract educators, scientists, historians, and others to swing out on a whole new, experimental, and innovative phase of exhibits activity.. . ..Remember we were young once and pushing against the establishment. Now we are a large chunk of the establishment. We should not make it hard for the young to move us. Let us welcome them and join them.[52]

Given this then-radical suggestion of disengaging the curators from exhibition, it is important to emphasize that Taylor saw the traditional close relationship between exhibits and research as the essence of the Institution's identity.

Earlier in 1967, Taylor reported to the SI Council, "The most fundamental inquiry [sic] into the value of museum exhibits, in my experience, has been the

---

[51] "Minutes of the committee to study the future of exhibits," 24 March 1969, SIA RU 190, Director General of Museums and Director, United States National Museum, 1921-1973, Box 31.

[52] Frank Taylor to John Anglim, 12 July 1967, SIA RU 190, Director General of Museums and Director, United States National Museum, 1921-1973, Box 29.

continuing examination of the premise that *A research museum is an amalgam of research, research collections, and exhibits* [original emphasis]."[53] He went on to argue that the public and private roles of the Institution remained inextricably tied up with one another:

> Over the years, the traditional interdependence of these three elements has been cited to resist decentralization of research, laboratories, and collections, to other cities, and to justify the enlargement of research and storage facilities here on the Mall.
>
> In the past we have made decisions on the premise that exhibits have a promotional value that benefits all museum programs. . . .
>
> Though the word "museum" might be restored to its meaning of a community of scholars, the image of the Smithsonian now held in many influential quarters is so strongly that of a public exhibition complex, that it would be wasteful of good will to make any obvious change. Our museums are identified to our society of associates as places where children meet scholars as well as places for promotional entertainment in the proximity of exhibits.[54]

Tapping public good will is the same justification Cowan gave Secretary Carmichael for producing *The Leaf Thieves*, and the need to promote science to the public remained a strong motive for maintaining a strong exhibits program alongside research. In spite of curators' complaints that exhibits siphoned funds and time from their research, Taylor knew that research could not be funded without public support, which was in turn garnered by exhibits.

Designers & Design Aesthetics

The exhibits program was to change drastically, and in many of the ways that Taylor envisioned. Not only were exhibit developers hired on contract with greater frequency, but exhibit technologies and aesthetics also changed dramatically in the 1960s' air of experimentation.

---

[53]Frank A. Taylor, "Experiment on Exhibits," 13 March 1967, SIA RU 190, Director General of Museums and Director, United States National Museum, 1921-1973, Box 29, p. 1.

[54]*Ibid*., pp. 3-4.

The End of an Era

By the mid-1960s, the habitat group, the core technology that was the archetypal representational genre in natural history museums, and which constituted the central approach of the botany hall, was declining in favor inside the museum world. This seems to have occurred due to both practical and intellectual factors. First of all, the new exhibit professionals perceived the habitat group as being too expensive to produce. It is not coincidental that the great halls in the AMNH and Denver were completed during the Depression years when WPA money was flowing, labor was cheap everywhere, and philanthropists stood waiting to make their civic mark. Mahoney described the Smithsonian approach as follows:

> The way they would do exhibits was extremely expensive, time-consuming, and permanent. The classical life grouping, the big behind-glass creation of a scene, the background painting and then the forest and the leaves or whatever it would be, and the taxidermy animals and the lighting and all that—a real art form. Those things got to be fantastically expensive. The ones in the Natural History Building were structural. They were built into the building with steel reinforcing. The background paintings were done on installed walls. They weren't canvas that could be lifted off the wall.[55]

Mahoney further estimated that a single background painting might cost $30,000 to produce.[56] And until the botany hall was canceled in the wake of the entomology department move, this was the genre that the botanists and exhibits staff assumed the hall would belong to.

Next to sheer cost, competition from the aesthetics and characteristics of the mass media was the second greatest factor contributing to the decline of the habitat group. The institutional and epistemological assumptions behind such monumental permanence could not be any more different from the explosion of

---

[55]Mahoney Oral History, p. 33.
[56]*Ibid*.

ephemeral media in the 1950s and 1960s, television being the most influential. The habitat group was not only art, it was truth—objective and immutable—and its permanence was crucial to such a conception of truth. As Donna Haraway argues for Carl Akeley's work, by forever freezing a moment of nature, the group defended against both the decadence of urbanity and the destruction of the original habitat.[57] As the antithesis of the life group, television is fleeting and subjective. Its gestalt is one of constant novelty, rather than preserving any moment, place, or object. In 1970, museologist Alma Wittlin sharply questioned the value of habitat groups in the modern age of electronic communication:

> Should expeditions for the purpose of a hunt for large taxidermy specimens still be counted as priorities of a museum? Who is to benefit from the sight of another static elephant or zebra, and what can a costly exhibit of this kind communicate that could not be more dynamically conveyed by a film taken in the natural habitat of the animal and shown on the television screen? The presumed realism of large habitat groups has a kinship with a Victorian drawing room: both represent canned life.[58]

According to Wittlin, the "canned life" of the "Victorian drawing room" was only "presumed realism," not real realism. In the age of moving pictures, *action* was real, not three-dimensional place.

But this realization came slowly to the MNH. In 1967, a few months after the return of the Colombian Páramo exhibits expedition, Cowan's deputy director, Donald Squires, asked Albert E. Parr of the AMNH to comment on his idea to enhance the older life groups. Squires had previously been chair of the

---

[57]Donna Haraway, "Teddy Bear Patriarchy: Taxidermy in the Garden of Eden, New York City, 1908-36," in *Primate Visions: Gender, Race, and Nature in the World of Modern Science*, (New York: Routledge, Chapman, and Hall, 1989), pp. 26-58, on pp. 28-31.

[58]Alma S. Wittlin, *Museums: In Search of a Usable Future* (Cambridge, Massachusetts: MIT Press, 1970), p. 137.

invertebrate zoology department, and Parr was a long-time museum man who had written extensively on museum practice and theory.[59] Squires wrote,

> I am. . .impressed by the numbers of children viewing these exhibits who have never experienced any of the many sensations of being in a natural environment. It appears to me that one of the functions of the museum of the future would be to permit the urban viewer to experience nature which he may never see in the raw and to gain from such an experience greater appreciation of the art and literature based upon the authentic scene. To make possible fuller experiences, it will be necessary to employ many more of the senses of the viewer and to isolate him from his immediate viewing situation.[60]

Squires went on to describe the scheme for creating realistic sounds and acoustic isolation for the visitor. Though he framed his proposal in terms of the "museum of the future," in fact, the function he saw for the life group—providing urban children with a taste of real nature—is in a direct lineage with the original goals of those who invented the groups to begin with.

This concern with nature "in the raw" and the value of the "authentic scene" sounds like the worries of one of Parr's predecessors at the AMNH, Henry Fairfield Osborn. In 1925, Osborn declared that "the whole theory and practice of American Museum education, [is] namely, to restore to the human mind the direct vision and inspiration of nature as it exists in all parts of the world and as it is becoming known through all the sciences."[61] Osborn was a Social Darwinist, and worried about the decadence of urban culture caused by alienation from nature. Though Social Darwinism had been out of vogue for

---

[59]A. E. Parr, "The Habitat Group," *Curator*, 1959, *2*:107-128; A. E. Parr, "Museums and Museums of Natural History," *Curator*, 1962, *5*:137-144; A. E. Parr, "The Functions of Museums: Research Center or Show Places," *Curator*, 1963, *6*:20-31; A. E. Parr, *Mostly About Museums: From the Papers of A. E. Parr* (New York: The American Museum of Natural History, 1959).

[60]Donald Squires to Albert E. Parr, 22 March 1967, SIA RU 155, Director, NMNH, 1948-1970, Box 10, p. 1.

[61]Henry Fairfield Osborn, "The American Museum and Education," in *Fifty-Sixth Annual Report of the President of the American Museum of Natural History*, (The City of New York: AMNH, 1925), pp. 3-5, on p. 5.

almost half a century by the time Squires wrote to Parr, his concern with "appreciation of the art and literature" indicates a similar worry about maintaining a common cultural discourse that remained connected to undisturbed nature. The habitat group, by providing an exacting yet idealized duplication of wilderness, was the key to that enterprise, and Squires saw adding sound effects and smells as increasing the group's claim of authenticity. These were the same sort of augmentations of the habitat group proposed by the botanists for the rain forest group in the Hall of Plant Life.

However, Parr's response was revealingly skeptical:

> While I am extremely sympathetic to your suggestion, I am sorry to say that I can not be hopeful. First, there is the matter of competition. When habitat groups started they only had to hold their own against paintings, black and white photographic stills, and "menageries." Now we have wide-angle, color movies, TV and zoos. Look at the picture in the last issue (February 1967) of *Animal Kingdom*, p. 5 for the epitaph of the stuffed habitat group. To attempt to continue the race would seem to be spending a lot of money on a born loser. [62]

The picture Parr calls the "epitaph of the stuffed habitat group" shows the Swamp exhibit in the Aquatic Birds Building at the Bronx Zoo (Figure 4.2). Its caption calls it "a brilliant example of the modern habitat enclosure. In this realistic setting of cypress and Spanish moss, birds have nested and reared young."[63] The phrase "modern habitat enclosure" indicates that it was an innovation over the bare cement and bars of the animal cages of earlier zoo exhibits. Parr seemed to feel that these new naturalistic settings for zoo animals would soon overtake the habitat group as the technology that could compete with television in representing nature.

---

[62]Albert E. Parr to Donald Squires, 31 March 1967, SIA RU 155, Director, NMNH, 1948-1970, Box 10, p. 1.

[63]William G. Conway, "A Door to the Out-of-Doors," *Animal Kingdom*, February 1967, pp. 2-11, on p. 4.

Figure 4.2. Swamp exhibit in the Aquatic Birds Building of the Bronx Zoo, *ca*. 1967. Neg. #34317 courtesy Photographic Library Bronx Zoo/Wildlife Conservation Park. © Wildlife Conservation Society. Reproduced by permission.

Parr also pointed out the technical problems in recreating the acoustic "feel" of natural settings, calling into question the pursuit of authenticity. It was as if Parr's long experience, like Frank Taylor's, made him more amenable to a new generation of exhibits instead of more desperate to hang onto the old. This indictment of the habitat group as a "born loser" came from a man who less than ten years previously had written in *Curator*, the museum professional's journal, a capsule history and taxonomy of the habitat group and described the technical advancements in the genre.[64] But his reply to Squires indicates that Parr viewed the purpose and function of habitat groups instrumentally. By then, Parr concurred with Wittlin's criticism of the stasis of habitat groups as eroding their verisimilitude. Parr's worries about their inability to compete with television suggests that he saw them as located in the context of other forms of information flowing in the culture of its own time, rather than having any transcendent power or authority. Parr's turn-about is also another indication of the rapid changes in the museum world during the 1960s.

New Players, New Paradigms

Owing to this changing mood, even though the rain forest group survived, albeit in modified form, it survived primarily at Cowan's insistence. The exhibits staff at the museum could feel the pressure from popular culture that Parr had identified to Squires and were more ready to turn to other more contemporary exhibit formats. The key players shaping the Hall of Living Things project were writer Peter Farb and designers Joseph Shannon and James Mahoney. They aligned their interests, both in the genre and argument of exhibits, with Ripley's vision. Their design philosophy owed more to modern art

---

[64] Parr, "The Habitat Group."

and World's Fair exhibitions than traditional museum displays.[65] Farb's commitment to an ecological treatment of natural history was a distinct departure from even the last pass made by the botanists for the Hall of Plant Life.

Farb was a writer self-taught in natural history whose first notable journalistic achievement was as a feature editor in the early 1950s for *Argosy*, a men's magazine featuring stories about the outdoors and dangerous, manly adventures.[66] He went on to publish several books on natural history subjects before doing *The Insects* for the Time-Life Nature Library in 1962 and the first edition of *Ecology* for the same series in 1963.[67] Along with his interest in natural history, Farb and his wife were, according to Shannon, "very arty:"

> I mean, he knew all the artists and all the—he knew the Capra brothers, the photographers, and his wife knew Richard Estes, and a lot of the artists that were coming along at that time, [Robert] Rauschenberg, all those people, and they were very sophisticated New Yorkers, both of them. They traveled in very fancy circles. It was through them that I met Mark Rothko. . .many that were very active in the abstract expressionist movement in painting. They were just typically terribly well educated, well off, sophisticated New Yorkers.[68]

These associations are not significant for their glamour, but for the intellectual approach these quintessentially modern artists brought to their art. Robert Rauschenberg's work, for example, combined painting and collage of found images and objects that in their abstraction incorporated specific ideas and themes beyond aesthetic composition. His 1967 lithograph, "Booster," was

---

[65]The World's Fairs explicitly reformulated exhibitions in terms of communication theory (Bernard Schiele, "Creative Interaction of Visitor and Exhibition," in *Visitor Studies: Theory, Research, and Practice*, eds. Donald Thompson, *et al*. (Jacksonville, Alabama: Visitor Studies Association, 1993), pp. 28-56, on p. 34).

[66]*Who Was Who in America*, vol. 7 (Chicago: Marquis Who's Who, 1981), p. 187.

[67]An earlier work is Peter Farb, *The Face of North America: The Natural History of a Continent* (New York: Harper and Row, 1963).

[68]Shannon Oral History, p. 18.

inspired by seeing one of the Apollo moon launches live from Cape Canaveral (Figure 4.3). It features an X-ray of Rauschenberg's own body overlaid with the grid of an astronomical chart, and a pair of electric drills on the right. This work was characterized by what one art historian calls a "pro-technology theme" that "celebrates the interaction of man and machine."[69]

According to Shannon, this milieu shaped Farb's exhibit aesthetic: "Peter, especially, was very interested in techniques and especially new, unfolding, the potentiality of new techniques. Interactives, as you said.. . .He was very interested in how best to convey" information.[70] Given that modern art frequently rejected representationalism and realism, it is easy to understand how Farb's taste for modern art went along with a disinterest in conventional realist representations of nature in museums.

Farb would have been an attractive figure to Ripley, who also maintained a strong interest in modern art.[71] Farb wrote Ripley after a meeting promoting the Hall of Living Things project to Ripley in August of 1968:

> I was of course delighted by your enthusiastic reaction. And I was particularly pleased that you detected what we were trying to do in relating the flexibility of world's fair exhibits with the permanence of a museum. Joe Shannon told me on the phone that you also immediately saw that we were trying to take the viewer's attention away from traditional museum "things" and to redirect it to "concepts." When I have a chance next fall I want to write you a memo digging more deeply into the implications of exhibiting "concepts" in a traditional museum, and why it is urgent to make such a transition away from "things."[72]

---

[69]Lawrence Alloway, "Rauschenberg's Development," in *Robert Rauschenberg*, eds. Carroll S. Clark and Kathleen A. Preciado (Washington, D.C.: National Collection of Fine Arts, Smithsonian Institution, 1976), pp. 3-22, on pp. 16-17.

[70]Shannon Oral History, p. 18 .

[71]For example, Ripley fought hard to found the Hirshhorn Museum of modern art (Sophy Burnham, *The Art Crowd* (New York: David McKay Co., 1973), pp. 282-301).

[72]Peter Farb to S. Dillon Ripley, 16 August 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 10.

Figure 4.3. *Booster*, by Robert Rauschenberg, 1967. Color lithograph and silkscreen on paper, 36x72 inches. © 1994 Robert Rauschenberg/Licensed by VAGA, New York, NY. Reproduced by permission.

This account of Ripley's apparently enthusiastic response indicates the convergence of his and Farb's thinking. Farb's stated goal his clearly: to bring the innovative techniques of World's Fairs to traditional (read "out of date") museums, the Smithsonian in particular. Each of the versions of the Hall of Living Things plans show this desire, and it was only at the insistence of others that he retained more standard museum techniques.

For Mahoney, World's Fairs were perhaps the single most influential outside exemplar shaping his thinking about exhibits at the Museum of Natural History. He was formally trained in industrial design, and student projects that began his career in exhibitions included a traveling exhibit for the U.S. Information Agency and a preview in Boston of the 1958 Brussels World's Fair. After joining the Smithsonian, he also visited the 1962 Seattle and 1964 New York World's Fairs.[73] He connected the design trends that shaped the Fairs and his own "business-like" industrial design training to what he tried to bring to the highly traditional, "square" Smithsonian:

> I thought that depending on your message and your audience, you can use different techniques, but I thought that what we were saying was a little more important than the latest craze in techniques. We were doing a lot of different exhibits, and. . .we were trying to be, topically, up to the times, address relevant social issues, and, of course, there always have been two sides of the coin there and two camps inside the museum profession.. . .Should the Smithsonian stick to historic, scientific, technical "accepted knowledge" or delve into socially "relevant" concerns with no fully accepted "answers"?
>
> Then what techniques? Accepted, proven communication media or the more entertaining "media" where the media get as much attention as the message—or more?. . .I usually cut straight through to a couple of very important points. Number one is, what's the message? Number two, what's the audience? How much money do you have? Where are you going to do this?[74]

---

[73]Mahoney Oral History, p. 2 & p. 12 & p. 41.
[74]*Ibid*., pp. 11-12.

Mahoney's view of design meant that he had less affinity for the traditional habitat group than the naturalists did.

In a 1969 memo describing a visit to the AMNH about the same time as the Hall of Living Things project was about to be scaled back, Mahoney wrote that he considered the AMNH and the NMNH to be similar to the extent that "older halls are frighteningly permanent, especially the life groups. But some of these should be saved strictly as great examples of a disappearing art form."[75] Mahoney's statement joins Parr's assessment that in the ferment of the 1960s, the life group had become a pleasant anachronism to be savored like fine art, but no longer the proper vehicle for communicating compelling scientific information of the day. For him they were not loaded with any of the epistemological baggage their inventors had given them.

Permanence and meticulous craftsmanship was the appropriate format for representing the "accepted knowledge" of eternal scientific truth. On the other hand, the mass media, characterized by ephemeral modes of presentation, was the growing locus of discourse about socially relevant issues debated within popular culture and everyday politics. A position taken or event related in newspapers or on television would be rapidly buried and forgotten by the next day's opinions or news. Until the 1960s, the elitist museum world had purposefully held itself above the subject matter and forms being created by popular culture.[76] Ripley's search for relevance connected to Mahoney's view of exhibits. Mahoney's approach depended on the communication theory that developed after World War Two to propel and explain the mass media and

---

[75]James Mahoney to Frank Taylor thru Anglim, October 1969, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 18, p. 5.

[76]For a negative evaluation of the Smithsonian's attempt to become relevant, see Burnham, *The Art Crowd* , pp. 196-219.

advertising.[77] Those same commercial influences had been the driving force behind the Century-of-Progress World's Fairs, which both spoke to and shaped consumer culture between the wars. Visited by millions, they were equal parts spectacle, fantasy, and information. The World's Fairs were in essence enormous public trade shows, advertising and selling an entire cultural package.[78] In the framework of industrial design developed for the World's Fairs and advertising in general, the medium was a carrier matched to the message and the audience.[79]

By the late 1960s, television was an even greater influence in creating popular culture than the World's Fairs had been. Not only did museum people like Alma Wittlin and A. E. Parr struggle to grasp television's impact on their genres of visual representation, but communication theorists in general had a field day explaining, promoting, and speculating on television's role in creating a culture of rapid information exchange. Marshall McLuhan's famous aphorism "the medium is the message" expressed the belief that television and electronic media in general constituted a revolution in the way people (in the industrial West) experienced the world. McLuhan and his disciples credited this revolution with reshaping communication around instantaneous, ephemeral, and dynamic

---

[77]By the late 1950s, communication theory concerned itself with "the choice of channels, the nature of messages,. . .the problem of transmitting meaning" (Wilbur Schramm, "The Challenge to Communication Research," in *Introduction to Mass Communication Research*, eds. Ralph O. Nafziger and David M. White (Baton Rouge: Louisiana State University Press, 1958), pp. 3-28, on p. 6). This theoretical approach to a previously under-theorized set of skills came from a "blossoming forth of studies in linguistics, general semantics, cybernetics, and interpersonal communication" (Thomas R. Lewis, "A Glance Backward," *The Journal of Communication*, 1960, *10*:5-9, on p. 5).

[78]Robert W. Rydell, *World of Fairs: The Century-of-Progress Expositions* (Chicago: University of Chicago Press, 1993), p. 10.

[79]Leon Gordon Miller, "The Industrial Designer: New Member of the Museum Team," *Curator*, 1963, *6*:187-190.

images.[80] McLuhan's pronouncements became buzzwords, and museums concerned about relevance and state-of-the-art presentation turned to him for suggestions. He visited the Smithsonian in 1966, and presided over a 1967 seminar held at the Museum of the City of New York that was attended by the SI's exhibit manager, John Anglim, and Ripley's head of the Office of Education and Training, Charles Blitzer.[81] In a section of the published transcript of the proceedings recounting a visit to the American Museum of Natural History, McLuhan actively ignored three-dimensional specimen and model-based exhibits, showing his clear preference for multi-media "environments" as the "now" communication technology.[82]

Shannon, unlike Mahoney, began his career in exhibits from within the traditional museum culture. Raised in Washington, D.C., he had gravitated to the Smithsonian's old exhibits while a grade-school student during the 1940s:

> I spent. . .an awful lot of time at the Smithsonian, especially the old A & I [Arts and Industries] Building.. . .The two cannons and tanks and airplanes and all kinds of things that would keep our interest. We'd spend whole Saturdays there from the time it opened all the way to the time it closed, my friends and I, and often just we would draw out boat models, spend hours drawing the boat models.[83]

Shannon pinpointed the source of his early fascination with the exhibits:

---

[80]The first formulation of this idea was a fundamental point about rhetoric: "'The medium is the message' can, perhaps, be clarified by pointing out that any technology gradually creates a totally new human environment. Environments are not passive wrappings but active processes" (Marshall McLuhan, "Preface to the Third Printing," *Understanding Media* (New York: McGraw Hill, 1964), p. vi). For the more radical version full of self-referential, playful media, see Marshall McLuhan and Quentin Fiore, *The Medium Is the Massage*, (New York: Touchstone, 1987 [1967]).

[81]SIA RU 190, Director General of Museums and Director, United States National Museum, 1921-1973, Box 29; Marshall McLuhan, Harley Parker and Jaques Barzun, *Museum Communication With the Viewing Public: Exploration of the Ways, Means, and Values of Museum Communication with the Viewing Public* (New York: The Museum of the City of New York, 1967).

[82]McLuhan, Parker, and Barzun, *Museum Communication with the Viewing Public*, pp. 28-30.

[83]Shannon Oral History, p. 2.

> Well, it was the fact that you had this accuracy and these object surrogates, like the ships, and they were so accurate. You know how miniaturization is a fascination for human beings. These things done so perfectly in miniature were terrifically fascinating. Also seeing the different kinds of machine guns and guns, the variations of them was just enough to blow your mind. And those are the things we were interested in.[84]

The old-fashioned exhibits with many different specimens all lined up were precisely what attracted him. Being able to see variations on a theme, a frequent favorite conceit of many curators who favored exhibiting numerous specimens, was, as Shannon said, "enough to blow your mind."

Sophy Burnham, who made *The Leaf Thieves*, experienced the Smithsonian as a child about the same time as Shannon. She, too, enjoyed the rich array of items on exhibit in the old halls in the Arts and Industries Building, and fantasized about bringing order to their chaos. But after she worked for the Smithsonian during the Exhibits Modernization Program, she says,

> I felt such a sense of failure, because I realized that in the beginning, I could go into one of those halls anytime, a *thousand* times over, and would always see something new, and I would be making the connections in my mind. I could go into them again and again and again and never, never, never tire of them. But once they were modernized, they were for visitors who would only come once to Washington, and therefore they were simplified and the mystery was lost.[85]

Bringing order to the chaos of the collections meant pruning back the possible stories the visitor could make them tell, and telling just one story *to* the visitor.[86]

The Exhibits Modernization Program was a precursor to the debates over objects versus concepts during the Ripley years. As Burnham lamented, even the earlier modernization tried to give subjects more defined story lines by removing

---

[84]*Ibid*., p. 3.

[85]Sophy Burnham, "Oral History Interviews," 1992, SIA RU 9565, Tropical Rain Forest Exhibits, pp. 11-12.

[86]Buffalo Museum of Science director Carlos Cummings introduced the concept of story-line in 1940, which became quite influential in the postwar period (Schiele, "Creative Interaction of Visitor and Exhibition," p. 29).

many specimens from display, creating thematic cases, and including more labels. For example, a note on the back of a photo of the South American archeology hall before it was redone in 1954 (Figure 4.4), reads, "Crowded case of old exhibit. No story-telling quality."[87] The hall's new title, "Highlights of Latin American Archeology," also differentiated it from the earlier kitchen sink incarnation, signaling a more thematic treatment. Figure 4.5 shows an exhibit in the new hall designed to convey a story with fewer objects.

From the late 1950s onward, Shannon worked his way up from cleaning silk screens in the exhibits lab to designing entire halls. Before being assigned to the insect hall project at the end of 1966, he had designed individual cases in the "World of Mammals" and several other halls. He designed all of T. Dale Stewart's physical anthropology hall, which opened in 1965, and was assigned the botany hall at about the same time.[88] Having learned design on the job, Shannon primarily identified himself as an artist, and in fact left the Smithsonian in the early 1960s to paint, and did so again at the close of the Hall of Living Things episode when the project was shelved for lack of funds.[89] He noted that he "was into artier things than some of the other designers" at the time.[90] Like most fine artists, Shannon was just as interested in the creative potential of the medium in and of itself as he was in the practical communication problems of

---

[87]SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990 & undated; *Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1954), p. 27.

[88]*Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1967), p. 127; Shannon Oral History, pp. 3-4.

[89]Joseph Shannon to Richard S. Cowan, James Mahoney and John Anglim, 8 October 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15, pp. 3-4, p. 10.

[90]*Ibid*., p. 3.

Figure 4.4. Traditional specimen arrangement in the Hall of South American Archeology, NMNH, *ca*. 1950. SIA RU 363 courtesy the Smithsonian Institution.

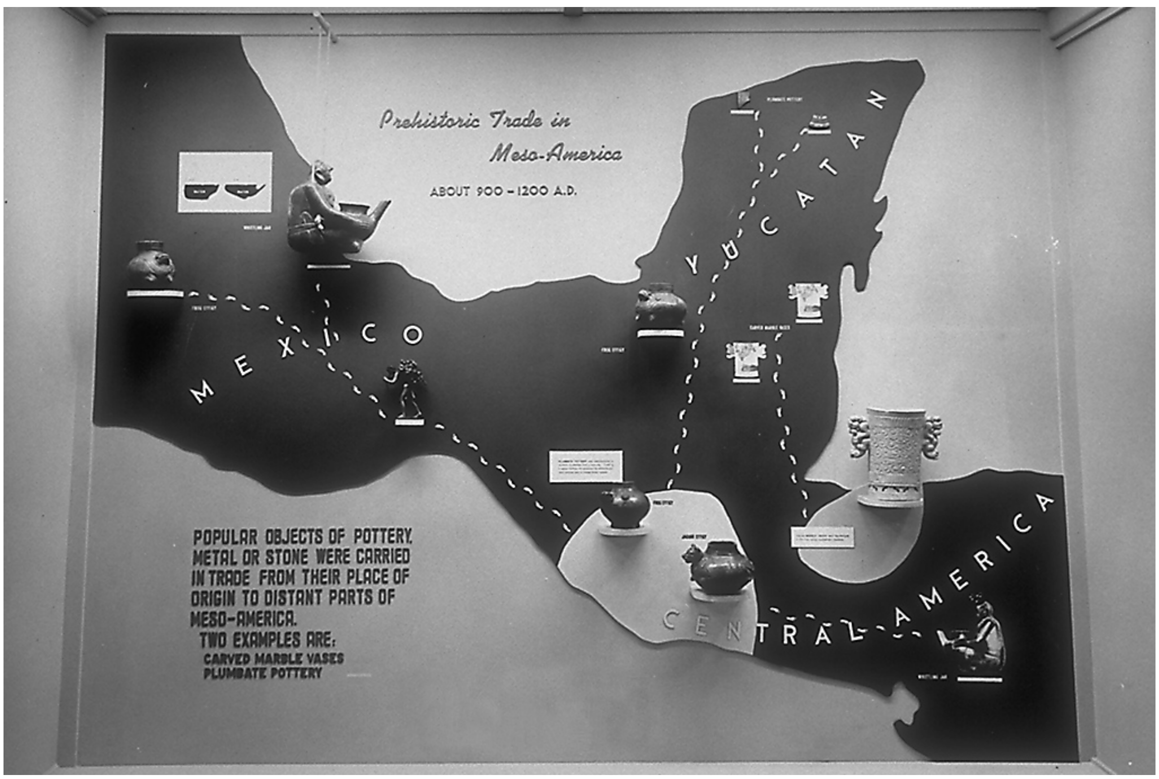


Figure 4.5. New-style interpretive exhibit in the Hall of South American Archeology, NMNH, *ca*. 1955. SIA RU 363 courtesy the Smithsonian Institution.

packaging the message.[91] His artistic approach to design comes through in a sketch for one of the Hall of Living Things exhibits called "The Cave: Community in Darkness" (Figure 4.6). It is striking because its rendering is more evocative than descriptive, more stylized than organizing a specific space. This is not to say that Shannon was incapable of technical renderings, as his 1965 blueprints for the physical anthropology hall amply demonstrate.[92] But clearly Shannon's thinking ran toward the conceptual, and in the early stages of design, his drawing of the cave exhibit suggests more a desire to convey the mood of a gloomy cave than specific information.

And even though his earlier attraction to the "old" Smithsonian had been specifically to the clutter, his artistic sensibilities made for a strong alliance with Farb. He recalls that "when we all met him, we were terrifically smitten," and the two men remained close friends until Farb's death in 1980.[93] Certainly Shannon saw Farb's contemporary approach to exhibits as expressing the sort of professional identity that he wished to see at the Smithsonian. He told the MNH press officer in 1969, "The exhibits staff has only reached maturity within the last seven or eight years—from a professional standpoint almost all of the exhibit halls prepared before that were terribly amateurish—not to the public, perhaps,

---

[91]In an interview, Mahoney drew a sharp distinction between the artist and the designer:

> Basically, the designer is problem-solving. He identifies the problem and the desired end result, and then applies creativity in the use of design elements to solving that particular problem. A designer "organizes" to communicate someone else's feelings (knowledge) in media that are familiar to the target audience.
>
> The artistic approach is quite different. An artist "creates" to communicate his or her own personal feelings in whatever medium. They see a void rather than a need, and then they fill this void in some creative way. (Mahoney Oral History, p. 4)

[92]SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 2.

[93]Shannon Oral History, p. 18 & p. 13.

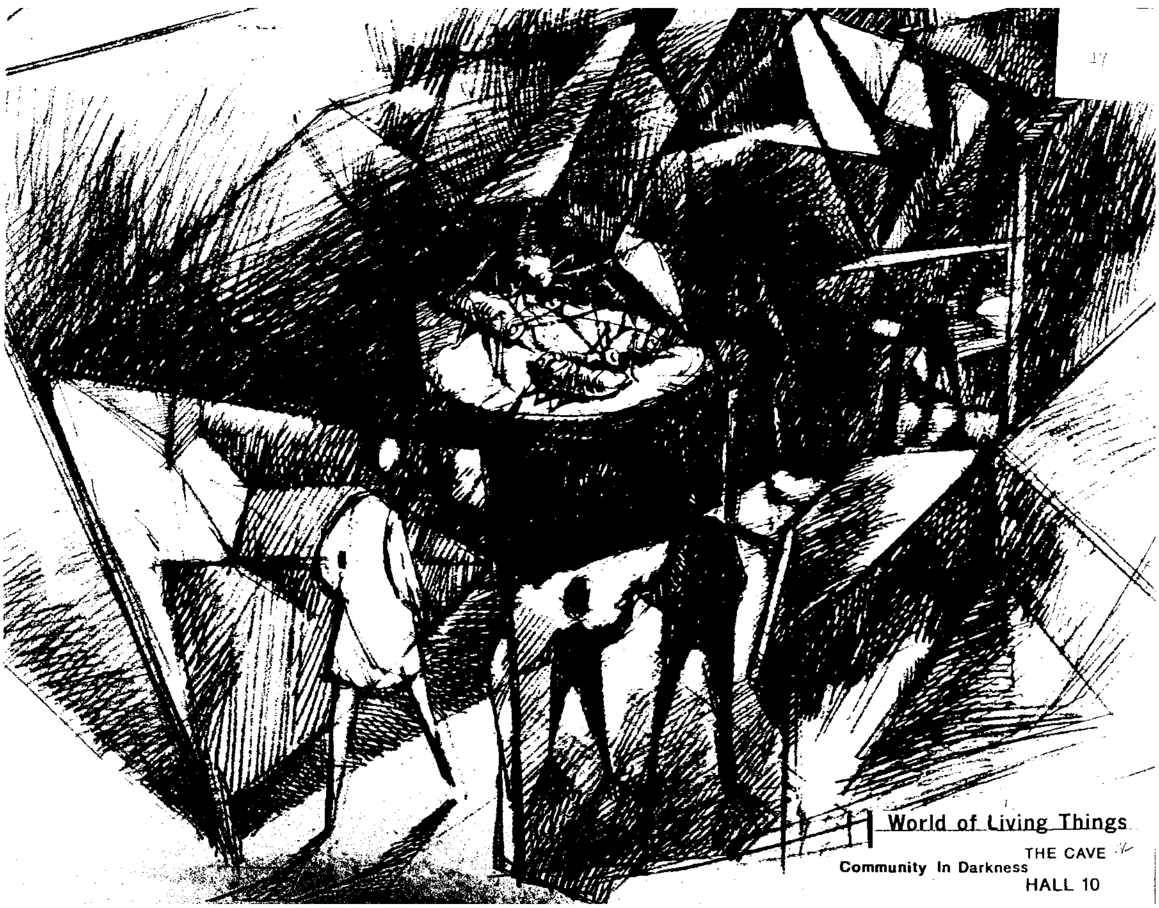


Figure 4.6. "The Cave: Community in Darkness" concept sketch for Hall of Living Things, by Joseph Shannon, *ca*. January 1970. The tableau in the center shows larger-than-life models of cave crickets feeding on a beetle. SIA RU 363, Box 28, courtesy the Smithsonian Institution.

but to other museum professionals. We don't look at them when we walk by."[94] Shannon's rejection of even the earlier "new" halls such as the "World of Mammals" indicates his desire for an extremely up-to-date look and how quickly what counted as up-to-date had changed.

The Rain Forest Redefined

A second crucial element in the redefinition of the rain forest around the concepts it embodied instead of the objects it contained was a new scientific definition of ecology that emphasized systems of energy flow and generalized functional units. This new ecology became a powerful scientific resource for the new exhibit-makers. They did not give the rain forest new meaning simply by abstracting the botanists' original conception of the field site, but by deploying an entirely different scientific frame of meaning that resonated more closely with their packaging approach to communication. This section examines that strategy, first by laying out the difference between the botanists' understanding of ecology and the ecology used by Farb in his Hall of Living Things plans, and then outlining the specific process through which Farb, Mahoney, and Shannon redefined the rain forest as an ecosystem.

A New Ecology: From Communities to Systems

The ecology that the botanists had wanted the habitat groups in the Hall of Plant Life to exemplify was essentially the same as Merriam's life zone scheme built into the Denver Museum of Natural History (Chapter Two). To them, ecology was the study of how plant assemblages or communities were structured by physical and climatic parameters. The plants of a particular place were uniquely adapted to its unique conditions. One of the botany curators

---

[94]Tom Harney, "Conversation with Joe Shannon about proposed Hall of Living things for MNH and about state of exhibits," *ca*. May, 1969, SIA RU 416, NMNH, Office of Public Affairs Records *ca.* 1958-1990, Box 6.

commented on the proposed content for the hall in 1964, "I like the ecological theme of the hall and I hope it will be possible to show some key to the relationship of vegetation, latitude, and precipitation as well as altitude."[95] Also in 1964, Soderstrom sent to Cowan for eventual use in the hall a photograph of Alexander von Humboldt's 1815 altitudinal zonation scheme for the Tropical, Temperate, and Arctic latitudes.[96] Even before the invention of a separate field called ecology, naturalists were interested in the interactions between organisms and their environment in what was previously called "nature's economy."[97] Botany curator Stanwyn Shetler noted in an interview, "We weren't really studying ecology in the modern sense of process and dynamics and quantitative methods and so on. We were really pretty much looking at where organisms lived, how they made their living, sort of ecological dimensions to organismic living."[98] Cowan concurred that "certainly earlier ecology was more a study of the physical environment, as it affects plants and animals, that kind of thing, and communities, depending which ecologist you were reading," adding that by the late 1960s, "a kind of a holistic approach to the subject began to be more popular."[99] The new exhibit-makers seized on this "holistic approach" as the version of ecology they wanted to portray.

But the botanists themselves never became particularly involved with the holistic approach. Fern curator David Lellinger did not see newer ecology as particularly relevant to his work, although concepts such as zonation with

---

[95]W. R. Ernst to Richard S. Cowan, 7 February 1964, SIA RU 155, Director, NMNH, 1948-1970, Box 15.

[96]Thomas R. Soderstrom to Richard Cowan, 7 July 1964, SIA RU 155, Director, NMNH, 1948-1970, Box 15.

[97]Donald Worster, *Nature's Economy: A History of Ecological Ideas* (Cambridge: Cambridge University Press, 1977).

[98]Stanwyn G. Shetler, "Oral History Interview," 14 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 17.

[99]Cowan Oral History (1994), p. 32.

altitude allowed him to track variation within a species across its range.[100] In his opinion, the questions, analytical tools, and practices of ecologists were completely orthogonal to those of the museum curators:

> I feel there is another world of ecology out there, that is an abstract world, which deals with data rather than plants, and vegetation structure and other things that simply don't intersect with a museum at all. In fact, there have been two or three visiting ecologists that have had some space here for a couple of years.. . .As far as I know, they have never looked at a plant specimen, at least not during their time here. They seem to be manipulating data on computers.. . .
>
> I think they are working at this abstract level, which is just different from anything we do. The one thing about museum taxonomy is that it's very concrete. You have specimens, you borrow specimens, you collect specimens, you look at specimens, and then through organizing what you have seen, you come to taxonomic conclusions.[101]

Lellinger draws an explicit distinction between the abstract world of the ecologist's computer models and the concrete world of the curator's specimens.

This abstract world did not just dominate Ripley's plans, but was the overall trend in post-war biology and ecology as a whole. Continuing the movement begun at the turn of the century by physiology and genetics, molecular biology made further attacks on organismic biology in the late 1950s and throughout the 1960s. E. O. Wilson attributes his involvement in constructing theoretical ecology programs during the 1960s to an organized effort to reinvigorate organismic biology during the "molecular wars" started by James D. Watson at Harvard.[102] For example, in creating the theory of island biogeography, Wilson and mathematical ecologist Robert MacArthur used mathematical models to relate causally island size and degree of isolation to

---

[100]Lellinger Oral History, p. 10.

[101]*Ibid*., pp. 10-11.

[102]Edward O. Wilson, *Naturalist* (Washington, D.C.: Island Press, 1994), pp. 218-259.

species distribution and composition.[103] Their theory aimed to explain formally patterns of species migration and proliferation that Wilson had begun to see intuitively in his field work in the South Pacific during the 1950s.[104] In their desire to invent a new field and differentiate it from the earlier world view, MacArthur and Wilson categorically rejected "historical" description as merely "*ad hoc*" and without general applicability.[105]

Similarly, ecosystems ecology, as Howard and Eugene Odum first developed it in the 1950s and 1960s, defined an ecosystem in terms of energy flows and nutrient cycles, rather than assemblages of species adapted to the physical conditions.[106] Crucially, the Odum brothers framed their conception of nature with the cybernetic systems theory that grew out of military command and control research during World War Two and was aggressively extended to other fields via the Macy Conferences in the late 1940s.[107] The Odums represented ecosystems with the graphical conventions and theoretical ideas of the operation of electrical circuits instead of the naturalist's visually descriptive image of nature.[108] These representations treated organisms as functional units rather than individuals. When they conducted one of their early studies on the metabolism of the coral reef of Eniwetok Atoll, they did not even know the

---

[103]Robert H. MacArthur and Edward O. Wilson, *The Theory of Island Biogeography* (Princeton: Princeton University Press, 1967).

[104]Wilson, *Naturalist*, p. 213 & pp. 248-252.

[105]MacArthur and Wilson, *The Theory of Island Biogeography*, p. 5.

[106]In one of his college ecology texts, Eugene Odum calls energy "a basis for what might be called a "first order" classification," that is, the first means of defining the nature of the entity under study (Eugene P. Odum, *Ecology: The Link Between the Natural and the Social Sciences*, 2nd ed. (New York: Holt, Rinehart and Winston, 1975 [1st edition 1963)], p. 14).

[107]Joel B. Hagen, *An Entangled Bank: The Origins of Ecosystems Ecology* (New Brunswick, New Jersey: Rutgers University Press, 1992), pp. 68-74.

[108]Peter J. Taylor and Ann S. Blum, "Ecosystems as Circuits: Diagrams and the Limits of Physical Analogies," *Biology and Philosophy*, 1991, *6*:275-294.

taxonomical identities of the coral species involved.[109] According to Joel Hagen, "In a very real sense, the reef at Eniwetok Atoll was a 'black box' whose total inputs and outputs of energy were being measured."[110] If the ecologists wanted an abstract theoretical representation that was successful because it stripped away detail, the botanists were indeed headed in the opposite direction, for they made it their business to notice, represent, and explain detail.

In this climate, systematics languished, and a spate of reports in the late 1960s and early 1970s attempted to remind the biological community of the fundamental value of taxonomy as the underpinning of other research.[111] When the advocates of theoretical biology claim that the interest in individual specimens lacks explanatory power, they cut against the view that description creates it own form of knowledge. The head of the Smithsonian's Museum Service conceded that "ecological studies beckon the natural history practitioner away from his former single devotion to specimen identification and classification." But, he maintained,

> It must not, of course, be supposed that systematics and taxonomy proceed in a purely mechanical vein of mere identification and classification of specimens without reference to any theoretical or philosophical foundations. At the heart of modern systematics lies the same abiding interest in discovering the how and why of evolutionary change that motivated Charles Darwin a hundred years ago.[112]

---

[109]Hagen, *An Entangled Bank*, p. 103 & p. 138.

[110]*Ibid*., p. 138.

[111]*Systematic Biology: A Survey of Federal Programs and Needs* (Panel on Systematics and Taxonomy, Federal Council for Science and Technology: U.S. Government Printing Office, May 1969); *Systematics in Support of Biological Research* (Charles D. Michener, *et al*., Division of Biology and Agriculture, National Research Council, January 1970). The committee that created the Michener report included Cowan and Squires of the NMNH.

[112]G. Carroll Lindsay, "Museums and Research in History and Technology," *Curator*, 1962, *5*:236-244, on p. 238.

Since the nineteenth century, taxonomists have worked to develop patterns and relationships between organisms.[113] Systematists make individual type specimens stand for an entire species, a representation relying on synecdoche (a rhetorical figure in which naming a part is used to indicate the whole, such as "All hands on board!") for its analytical power. The synecdoche was also at work in the making of the habitat group, where the single part that was collected from the field was used to stand for the whole when the model-maker amplified it in multiple copies. But the advocates of "concept-based" exhibits did not recognize this, and after the botany hall was canceled, there was little overlap in epistemology or practice between the botanists and the designers.

"No Better Way of Doing This"

This background helps explain how Farb could transform the rain forest from a field site into an ecosystem, beginning when institutional contingencies spurred consolidation of the insect and botany hall projects in 1968. What made Farb's version of the rain forest group a "conceptual" rather than object-oriented exhibit was that he made it stand for something other than itself. What the botanists wanted, on the other hand, was a rain forest in itself: a reproduction of the field site reflecting its intrinsic scientific and aesthetic interest.

In response to Ripley's order in early January, 1968, to convert exhibit halls into offices and laboratories for the entomology department, the players in the insect and botany projects met to salvage the situation.[114] Farb wrote the proposal that came out of that meeting, and his self-appointed role of synthesizer shines through in the justification for the new hall:

---

[113]Mary P. Winsor, *Reading the Shape of Nature: Comparative Zoology at the Agassiz Museum* (Chicago: University of Chicago Press, 1991).

[114]John Anglim to Frank Taylor, 11 January 1968, SIA RU 190, Director General of Museums and Director, United States National Museum, 1921-1973, Box 29; Peter Farb to Richard S. Cowan, 16 January 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15, p. 1.

> We feel that we now have a unique opportunity to offer the visitor the introduction to the Museum as a whole, to tie together the approaches of the various halls, and to correct the absence of an ecological approach to some of our older halls. Up to now all halls have been designed as discrete units that conformed not to the living world but to the departmental organization chart. The mammal halls, for example, tell about mammals, but very little about their relationships with other living things, man included, with whom they share their environments.. . .No hall of ecology exists in the Museum that shows the visitor the development of the various forms of life, the life processes they share, the broad principles which govern all life, the interrelationships between all living things and their environments.[115]

This statement is a master narrative aiming to restructure the meaning and purpose of the entire museum, providing a comprehensive, totalizing reconstruction of the museum's form and function. Farb framed the Hall of Living Things project not as a fix for saving the insect and botany projects, but as the remedy for what he saw as the museum's artificially compartmentalized, atheoretical approach to knowledge about the natural world. The suggestion that synoptic, encyclopedic exhibits "conformed not to the living world but to the departmental organization chart," implies that the older exhibits were outmoded both in terms of effective communication and scientifically. According to Farb, ecology was the umbrella under which the new concepts of "life processes," "broad principles," and "interrelationships" properly and accurately characterized nature.

Aware of the political implications of undermining the existing corporate structure, Farb also couched the new conceptual approach as an innovative means of avoiding a turf battle:

> We are all very much aware that the Department of Entomology will lose a hall named after its area of research. However, we prefer to look upon this not as discrimination but as a new departure. We hope that in the future, as old halls come up for revision, we will no longer conceive them as departmental entities.

---

[115]Farb to Cowan, 16 January 1968, p. 1.

> Rather, we envisage the day when each hall will be an interdisciplinary approach to a central concept, when each hall will draw for examples not only on one phylum or one class but upon the whole living world, from microscopic plants to man.[116]

Read with Ripley's attitude toward objects and concepts in mind, the subtext underlying this plan is an attempt to wrest the exhibits from the "green eye shade boys"—those who would merely count, name, and array their specimens. Predicated on the assumption that the older exhibits merely copied and did not interpret nature, Farb's scheme would turn the museum into a place where real stories would be told about how nature actually *functions*, rather than simply how it *looks*, using the encyclopedic collections as the raw materials. However, this new argument would require a new genre to convey it.

Farb's political maneuvering seemed to have been successful, for in 1969, the curators' professional body, the Senate of Scientists, endorsed the overall notion of interdisciplinary exhibits planned by outside consultants:

> It is their consensus that the old, tightly structured and departmentally-controlled exhibit hall concept should be replaced by an exhibition program with the clear purpose of achieving a museum-wide series of halls which interrelates and unifies the concepts and subject matter of the natural sciences. This can be best accomplished by the skilled generalist (i. e., a Peter Farb type) working closely as needed with the scientific staff.. . .In summary, the Senate of Scientists are in accord that they wish to have a museum of ideas and not just of objects.[117]

Rather than being a capitulation to Ripley's forces, this statement indicates that some curators did not see an inherent conflict between objects and ideas.

In his master narrative reinventing the museum, Farb completely redefined the rain forest. Rather than display the rain forest as an exotic place, Farb converted it into a metaphor, a visual rhetorical device aimed at teaching

---

116 *Ibid*., p. 2.

117 "Minutes of the committee to study the future of exhibits," 21 May 1969, SIA RU 190, Director General of Museums and Director, United States National Museum, 1921-1973, Box 31, p. 1.

the visitor something more general and profound about the workings of nature. Farb laid out his first proposal in three columns containing, respectively, "concepts," "as presented in insect hall," and "proposed for revised 'Hall of Living Things.'" The lead concept, not originally included in the insect hall, was the "Biosphere," and was the means of including the botany hall material:

> The visitor will be introduced to that part of the earth, from the soil to the atmosphere, that supports life. No better way of doing this than to take the visitor on a vertical trip through a stratified rain forest. We propose a walk up a ramp from the dark forest floor, largely devoid of life, to the topmost world of sunlight and emergent trees. Fortunately much of the research and collecting have already been completed for the previously proposed Botany Hall. (The high-ceilinged Hall 10 is the last hall in the Museum in which we can build a rain forest.)[118]

Figure 4.7 shows Shannon's rendering of the rain forest ramp and the viewing windows at the canopy level. This passage shows how Farb promoted the rain forest in both conceptual and practical terms. Conceptually, it was a means to an end, the end being to introduce the visitor to the idea of the biosphere, or "that part of the earth, from the soil to the atmosphere, that supports life." That it was a means and not an end in itself is spelled out clearly by the phrase, "No better way of doing this than." From a practical standpoint, the rain forest's presence was justified not only because of its value as a teaching tool, but as a means of taking advantage of the institution's existing investment.

Over the next two years, until the Hall of Living Things bogged down in funding problems, the rain forest was at times central and at other times marginal to Farb's strategy to communicate ecological concepts. Ecological relationships between organisms and the environment were the crucial ideas for Farb. The rain forest, on the other hand, was an example of convenience, and to some extent political necessity. Shannon recalled, "I think at that point,

---

[118]Peter Farb to Richard S. Cowan, 16 January 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15, p. 3.

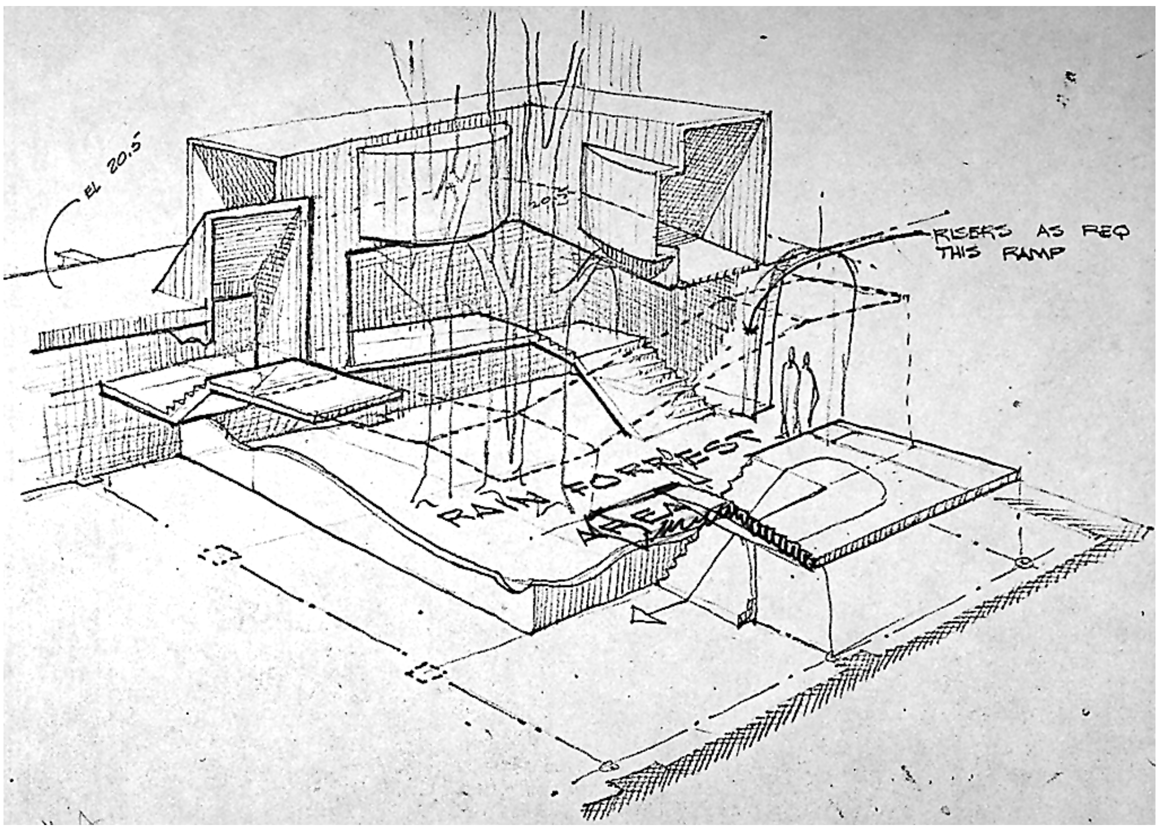


Figure 4.7. Architectural sketch of rain forest group and viewing ramp in Hall 10 of the National Museum of Natural History, by Joseph Shannon, 1968. SIA RU 363, Box 28, courtesy the Smithsonian Institution.

somebody brought up the fact that you could get the same kind of information if you treated it symbolically, from almost any biome, but I think Cowan stood for the rain forest."[119] Although Farb favored a symbolic treatment, the rain forest was required to maintain the alliance with the botanists, Cowan in particular, who viewed it as an emblem of their expertise and world-view. Farb's previous writings were mainly about North American natural history. In the first edition of the Time-Life *Ecology* book, tropical forests are one "biome" among many, and many of the illustrative examples come from temperate terrestrial and marine systems as well as the tropics.[120]

After the January meeting when the Hall of Living Things project was formulated, Cowan anticipated Ripley's positive interest: "I feel that we can proceed as though we had his agreement because this so nearly represents his thinking on science and exhibition."[121] Ripley did respond enthusiastically, and planning continued that spring for three levels of decking to be built in Hall 10 to allow the visitor to walk from the forest floor to the canopy (Figure 4.7).[122] It is evident that Cowan was the prime supporter of a place-specific interpretation of the rain forest even though it stood for a general ecological principle. The minutes of a planning meeting in March indicate that "Cowan expressed an interest in seeing the waterfall retained as background of rain forest, a point concurred in by Farb and Shannon."[123] Cowan's earlier rationale for the

---

[119]Shannon Oral History, p. 24.

[120]Peter Farb, *Ecology*, 1st ed. (New York: Time, 1963). A photo essay on the earth's biomes, or habitat types, appears on pp. 22-33.

[121]Richard S. Cowan to Peter Farb, 23 January 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15.

[122]On a copy of Cowan's proposal to Ripley, Cowan wrote, "Mr. Ripley Says Go!" Richard S. Cowan to S. Dillon Ripley, 24 January 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15. The ramp was advocated in spite of reservations about cost and compromising the architectural integrity of the hall (John E. Anglim to Richard S. Cowan, 29 February 1968, SIA RU 155, Box 15).

[123]A. Gilbert Wright to John Anglim, 8 March 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15, p. 1.

waterfall as "dramatic" would have been a point of agreement with Farb and Shannon, who were also looking for spectacular exhibit implementations, although ultimately of a different sort. To this end, there was shortly afterward some discussion of a return trip to British Guiana to collect material for the canopy, but the expedition never materialized.[124]

Another Definition Requires Another Rain Forest

However, by the fall of 1968, after the formal presentation to Ripley that Farb referred to in his letter outlining their efforts "to take the viewer's attention away from traditional museum 'things' and to redirect it to 'concepts,'" Farb downplayed the necessity to show any one place. In a memorandum to Shannon, he stated, "I believe we are all agreed that we will call our exhibit forest 'A Tropical American Rain Forest.' We will not pin it down to any very exact locality, nor will we bother the visitor with the subtleties of various kinds of tropical rain forests."[125] Such technical niceties—the very sort of accuracy that the botanists desired for their hall as an antidote to the generic foliage that plagued other exhibits—were only a hindrance in Farb's mind to making the rain forest exemplify the central message. A place-specific exhibit was not vital to Farb's plan because "[i]nterrelationships of every sort will be emphasized, and I suspect that this idea, in all its variations, will be the main one made as the visitor climbs to the top" from the forest floor to the canopy. Farb continued, "Second only to interrelationships will be the adaptations of the plants and animals for life in this particular environment."[126]

---

[124]Peter Farb to Thomas R. Soderstrom, 25 March 1968, SI Archives Accession No. 89-022, Thomas Soderstrom Papers, *ca*. 1954-1985, Box 3.

[125]Peter Farb to Joseph Shannon, 19 October 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15, p. 1.

[126]*Ibid*., p. 5.

Farb realized that it would be difficult to select a general group of species that naturally occur together, but he drew up a list he felt was sufficiently generic, roughly located in Panama: "If I put a species in that we learn later is not found in Panama then we can simply eliminate it or substitute an ecological equivalent."[127] What was important about the organisms shown in the exhibit was not that they produce a snapshot of a moment in time in a specific place as did the habitat groups, but that they illustrated a functional ecological assemblage. Each animal or plant stood in as a functional element in a system. Representing a specific place would only undermine the generality of the larger point. That is the incommensurability between the world view of the ecologist and the naturalist.

The tacit knowledge of the field as a place and the naturalist/artists' ability to detect and evaluate variation was not an important resource in Farb's argument. Neither were the inscription devices traditionally used to capture, transport, and reproduce local variation useful in representing the new ecology. The inscriptions created by systems ecology were more like the graphs and numerical data created by laboratories. By emphasizing functional equivalents, these inscriptions removed rather than maintained the physicality of the field.

With a more abstract setting in mind, the return trip to Kaieteur was no longer necessary, and Cowan seemed to accept this. In the fall of 1968, he wrote to former Smithsonian staff member Philip Humphrey requesting his help in arranging to collect materials for the canopy level from the rain forest under study at Belém, Brazil.[128] Humphrey was then working with the Rockefeller

---

[127]*Ibid*., p. 1.

[128]Cowan wrote, "It occurred to me that if you could help us plan to work at the APEG, we could get all we need there or just outside the area" (Richard S. Cowan to Phillip S. Humphrey, 31 October 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15). That implies that even though he was heavily invested in the British Guiana material, it was also his idea to approach Humphrey about Brazil.

Foundation's virus lab at the Instituto de Pesquisas e Experimentacao Agropecularias de Norte, or IPEAN (Institute of Fisheries and Agricultural Experimentation of the North) in Belém.[129] For a brief time, the rain forest exhibit was to be a hybrid between a forest floor from British Guiana and a canopy from Brazil.[130] According to Mahoney,

> Our overall design approach to the Rain Forest exhibit at this point is to produce a "traditional" Rain Forest Floor. The visitor will walk into, beside, and through this exhibit and then enter a tunnel. Once inside the tunnel, the exhibit technique will vary—the exhibit "editorializing" the natural conditions to reinforce the message of the exhibit topic "Discovery of Living Things"[sic].[131]

The distinction that Mahoney drew here, between a "traditional" forest floor and an "editorializing" auxiliary exhibit, emphasized by the use of quotation marks, indicates the rain forest's role as a carrier of the more important message. It was no longer the message itself, but the medium.

However, this hybrid was abandoned almost as quickly as it was proposed. After meetings that included Cowan, Mahoney, Farb, Shannon, and Humphrey, the principals concluded,

> *The* rain forest will be that at. . .Belém, Brazil and the exhibition will present the forest as it would appear at a specific time of day. The time suggested was early morning and will be set based on future discussions between Humphrey and Farb.. . .The existing specimen collections from Kaieteur Falls will be stored and available for use as required.[132]

There is no other evidence to indicate where else the Humphrey/Brazil scheme might have come from. Barro Colorado was also considered just before this (Joseph Shannon to Richard S. Cowan, James Mahoney and John Anglim, 8 October 1968, SIA RU 155, Box 15).

[129]Lovejoy Oral History, Interview Three (unprocessed).

[130]James Mahoney to Richard S. Cowan, 19 November 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15.

[131]*Ibid*.

[132]James Mahoney to Richard S. Cowan and John Anglim, 27 November 1968, SIA RU 155, Director, NMNH, 1948-1970, Box 15.

Farb could not really avoid the distributional problems he had anticipated with a generic representation. There is little doubt that the pressure to present a specific forest at a specific moment came from the scientists, who still adhered to the place-specific paradigm of the habitat group.

Once again, Mahoney's communication perspective lead him to view the goal of precise replication of location and moment as ultimately unattainable. In an interview, he reflected back on the process of building a habitat group:

> You're abstracting nature, and in many cases the approach is to create an ideal. For instance, every taxidermy fox has every hair in place and has pretty eyes and perfect ears. [Laughter] And a full tail. So right away you're into translation, interpretation, and idealism that's almost going into poetry sometimes. All these things—the idea of the ideal fox, or biome—are there when you start out, so you should have to think about it.[133]

Mahoney's training as a designer who packaged ideas, be they promoting commercial products or scientific information, led him to see clearly the interpretive process involved in constructing the traditional life group. Furthermore, he recognized that the more realistic something was to appear, the more interpretation was involved:

> That was a big problem with the rain forest. The scientists wanted to recreate a specific rain forest and have it convincing. It's really not possible. In a way, you know, with enough time and money, anything is possible. But what you would be recreating would be so many square feet of that particular rain forest at a particular second of a particular minute of a particular hour of a particular day, and so on and so forth. It really is daunting.[134]

But because Mahoney did not see the traditional exhibit-makers as being aware of the packaging process, this was daunting because they seemed to be pursuing accuracy for accuracy's sake (the same perception that led to the curators being called "green eye-shade boys"). The remedy was to recover an explicit

---

[133]Mahoney Oral History, p. 24.
[134]*Ibid*., p. 24.

conception of message separate from medium. According to Mahoney, "what you do is you decide what you want to get across, what's important, and you abstract these things and put them together."[135] For him, abstraction was a given part of the process, whereas he saw the traditional efforts to replicate a "particular second" of a "particular day" as an inability to engage in abstraction.

Since transparency of replication was central to the habitat group's effectiveness, explicitly admitting abstraction in a habitat group would take away the primary experience from the visitor and contradict the habitat group's reason for existing in the first place. However, habitat group builders were well aware of the practices of abstraction and translation they employed: James P. Wilson's motto was "art to conceal art."

Cowan's proposal for the Belém expedition to the Brazilian authorities shows this tension between specificity and abstraction:

> Originally it was felt that the tropical rain forest exhibit would be based on materials collected by the Smithsonian Institution in Guyana and that particular elements of the exhibit would illustrate conditions which could be studied and collected in Panama and elsewhere in the New World tropics. However, the more the problem was examined and discussed, the more apparent it became that to prepare a tropical rain forest exhibit that was technically accurate to the last detail, plans should be made to base it on forest conditions pertaining to a specific locality. This would ensure that the exhibit in all its elements would be completely consistent and would avoid the possibility of any of the taxonomic or ecological mistakes which might occur if the exhibit were put together more or less as a mosaic of conditions occurring in geographically widely dispersed forests in the New World.[136]

Even though Farb would have tolerated a less-than-accurate rain forest to illustrate the functionality of an ecosystem, the taxonomists could not, for they

---

[135]*Ibid*., p. 24.

[136]Richard S. Cowan to Alfonso Wisniewski, 30 January 1969, SIA RU 155, Director, NMNH, 1948-1970, Box 15, p. 1.

still adhered to a standard of realism based on their fundamentally particularistic, localized approach to the collection process.

The Belém site was attractive not just for its taxonomical precision. Rather, Belém was part of a redefinition of scientific accuracy around ecological relationships as well. If specificity of place had been the sole need, then British Guiana or Panama would have been perfectly suitable. Cowan had first chosen British Guiana because it was uncharted and dramatic territory. Researchers at Barro Colorado Island in Panama had extensively studied evolutionary relationships and animal behavior during the decades since the construction of the Panama Canal.[137] The material and data that could be gathered from both sites would have fit squarely into the traditional conception of the habitat group.

However, in the years between the earlier expedition to British Guiana and the Hall of Living Things plan, the very argument had changed, and ecological rather than natural history information was the key. The opening lines of Farb's draft script for the hall, written shortly before he left to reconnoiter Belém, read like many of the botanist's earlier proposals: "Upon entering the Hall, the visitor finds himself in the gloomy floor of a tropical rain forest." But then he immediately introduces the message the gloomy rain forest was meant to convey: "He climbs to the leafy canopy of the forest and en route he sees and is told about the major themes of all life: interrelatedness, abundance, diversity, flow of energy from one form of life to another, and adjustments to the environment."[138] It is the primacy of these last concepts in the rain forest's projected meaning that necessitated the trip to Belém to collect a new rain forest.

---

[137]Joel B. Hagen, "Problems in the Institutionalization of Tropical Biology: The Case of the Barro Colorado Island Biological Laboratory," *History and Philosophy of the Life Sciences*, 1990, *12*:225-247; Lovejoy Oral History, Interview Three.

[138]Peter Farb, "Summary: 'Hall of Living Things'," 1 January 1969, SIA RU 155 Director, NMNH, 1948-1970, Box 15, p. 1.

Cowan's proposal to the Brazilians continues that after deciding a single site was necessary to avoid taxonomic and ecological errors, "It soon became apparent that the only tropical rain forest in the New World well enough studied to form the basis for a technically accurate exhibit which would have scientific validity for many years to come was to be found in the ecological reserves of the [IPEAN]."[139] The Belém rain forest was a different rain forest not only in its location, but in its meaning, for the way that it had been studied was fundamentally different from the others.

While the British Guiana jungle had been attractive precisely because it was unknown, and visiting it was an adventure for the scientist, who would then pass the adventure along in the exhibit hall, the forest at Belém was suitable because so much was *already* known about it:

> The Smithsonian Institution believes that the IPEAN and the programs of the Area de Pesquisas Ecologicas do Guama (APEG) are making fundamental contributions to knowledge of tropical rain forest ecology and that it would be highly desirable for the IPEAN and the Smithsonian to collaborate productively in producing the rain forest exhibit based on the Belém work.[140]

Cowan went to British Guiana armed only with a carbon copy of a plant list of the region, but the Belém forest had already been exhaustively scrutinized. Conservation biologist Thomas Lovejoy, who did his graduate work at Belém in the late 1960s because of Philip Humphrey, recalls that they captured and banded birds from the forest floor to the canopy, using large nets sampled around the clock.[141]

Lovejoy's work was explicitly ecosystem-oriented. He was involved with epidemiological studies carried out at the Rockefeller Foundation Virus Lab that aimed to synthesize a model of disease transmission in the system of birds and

---

139 Cowan to Wisniewski, 30 January 1969, p. 2.
140 *Ibid*., p. 5.
141 Lovejoy Oral History, Interview Three.

mosquitoes interacting in the forest canopy.[142] Those questions involved tracing chains of cause and effect through a heterogeneous system. Just as Farb sought to choose animals for display according to their ecological functionality, this research was not based on taxonomical snapshots.

This contrast is the core difference between the motivations behind the traditional habitat group and the concept-oriented exhibit. It also signals the further divergence of exhibit-making and taxonomy. Whereas the earlier rain forest collecting project integrated exhibits and research, the Belém plan sought only to translate ready-made science into exhibits. Farb's report on his trip to Belém in February of 1969 made this strategy clear: "unlike many other rain forests, this one is being studied in a scientific way rather than being merely the occasional visiting place of naturalists."[143] That was the problem, Farb implied, with British Guiana. He thought of the naturalist as merely extracting specimens from the field, rather than developing knowledge about it. In Farb's definition of ecology as the real science, naturalists were no longer real scientists and their field sites no longer yielded scientific data. Using a well-characterized system to build the public exhibit followed from Mahoney and Farb's communication approach, which wanted to locate existing information in the scientific domain and repackage it for the public domain. Rather than creating new knowledge with the materials collected from the Belém rain forest, the exhibit would be linked to existing inscriptions that had removed the physicality of the field.

However, Farb shared the scientists' wilderness aesthetic:

---

[142]*Ibid*.

[143]Peter Farb, "Report on Trip to Belem, Brazil, Research Forest, Feb. 9-17, 1969; administratively confidential," 24 February 1969, SIA RU 363, NMNH, Office of Exhibits, Records. *ca.* 1955-1990, Box 28, p. 8.

> I had the opportunity to compare this forest with a much more remote one in the interior during the four days I spent with the Urubu Indians on the Gurupi. To give you some idea of how remote from the heavy hand of industrial man this one was, I had to fly two hours in a lightplane, then three hours by dugout, then a fast 2 1/2 hours through jungles to the Indian village. The APEG forest, as you know, is not virgin—but I found the Urubu's "virgin" forest considerably more disturbed due to their slash-and-burn agriculture for manioc plantations. If anything, the APEG forest, or at least the parts of it we would use, shows even less disturbance.[144]

Thus the Belém forest was indeed properly wild *looking*, even though it was not really a virgin forest. That ideal was more important than causal accuracy. The desire to show a proper rain forest cut against Farb's interest in showing that the rain forest was indeed populated and even exploited:

> I think it is also urgent to show the presence of man in the forest, but without making a big thing of it. If you recall, in an earlier memo I suggested that we freeze-dry a Tupinambá Indian, but that is no longer under consideration. The last Tupinambá became extinct a few years ago, whereas if he had the courtesy to stay alive he could have had the satisfaction of appearing in the Great Hall of the Smithsonian, which no doubt would have been a source of pride to his family. Phil [Humphrey] had a number of suggestions. I particularly liked his idea of showing a native rubber tree in the varzea with the numerous slash scars of prior tappings and a collecting can attached.[145]

It is hard to know what to make of this discussion. Surely the freeze-drying suggestion was a joke, and it is pedantic to even wonder otherwise.[146] Nonetheless, the proposition, tongue in cheek or not, treats indigenous people as yet another item that could be preserved, transported back to the museum, and exhibited with the same technologies of inscription used for plants and animals. Farb liked rubber tapping as an example of human presence in the rain forest

---

[144]*Ibid*., p. 8.

[145]*Ibid*., p. 18.

[146]The method had been developed and used in the 1960s with some success for small animals (Watson M. Perrygo, "Oral History Interviews," 1978, SIA RU 9516, Box 1, p. 19).

because, unlike the slash-and-burn agriculture practiced by the remote Indians he visited, it does not disrupt the proper appearance of a not-virgin-but-still-undisturbed rain forest.

On the whole, Farb's visit to Belém convinced him that the place was undesirable as a field site, but for reasons that would probably not have occurred to the scientists. He considered the logistical problems of doing work there to be insurmountable. He also detested the "unrelenting bad taste" of the place, admitting that such an opinion was subjective, but held to the assertion that it would "be enervating and will in many subtle ways slow down our entire operation."[147] Farb was a New Yorker who clearly had no romantic love for the privations of the field, and particularly the Tropics. Thomas Lovejoy, on the other hand, recalled his excitement at the chance to go to Belém to be "a nineteenth-century naturalist and study exotic things."[148] Cowan had been provoked by similar dreams—the 1962 exhibits team flew to Kaieteur Falls by amphibious plane and Paul Marchand used a tire buried in the ground to substitute for an air compressor.[149] Having taken the role of scientist-explorers, they took the remoteness and primitive conditions for granted, even relishing them.

Farb's highly negative report also included an outline for the exhibit that echoed the botanists' earlier endeavors in its brief return to a narrative of place: "We all agree that the exhibit should look like the Belém forest during the rainy season, which would be about December to June. The time would be about 7:30 AM when the light in the canopy is already quite strong and there is considerable

---

[147]Farb, "Report on Trip to Belem, Brazil," pp. 6-7.
[148]Lovejoy Oral History, Interview One, p. 3.
[149]Reginald J. Sayre, "Video History Interview," 21 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 6.

activity in the forest."[150] Farb constructed the experience to cut against the museum visitor's expectations of what the rain forest was like:

> A major theme of the lowest level will be the *apparent* absence of animal life. But it is all there if the visitor looks hard enough.. . .We really shouldn't cheat by emphasizing the animals. Rather, I suggest we put it all in just as it is in the forest—hidden—and let the visitor make the discovery of finding things for himself.[151]

Here, the animals are not generalized "ecological equivalents," and the exhibit's psychology is one of perception: learning to see. Finally, this outline further parallels the earlier plans in its discussion of attempts to recreate the environmental ambiance of the rain forest: "Early in planning we discussed how we could keep the exhibit clean and add verisimilitude by having sprays of water drip from the ceiling.. . .Aside from the engineering problems, there is another. In the Belém forest the rain is not a steady drip; it comes once or twice a day in torrents."[152] This was Farb's farthest retreat from a conceptual exhibit.

But in the March 1969 meeting to discuss this report, the exhibit staff retained their businesslike attitude toward communicating concepts to the visitor. Given Farb's doubts about Belém, "Mahoney questioned if a rain forest exhibit was actually required for the hall. He suggested that the exhibition was primarily for presentation of basic concepts, and any biome (e.g., Great Smoky Mountains) would suffice as an introduction to the hall."[153] However, the scientists continued to champion the rain forest:

---

[150]Farb, "Report on Trip to Belem, Brazil," 1969, p. 1.
[151]*Ibid*., p. 2.
[152]*Ibid*., p. 4.
[153]Joseph C. Britton, "Memorandum for the Files," 18 March 1969, SIA RU 155, Director, NMNH, 1948-1970, Box 15, p. 1.

> Cowan and others expressed the feeling that since considerable excitement and mystery is associated with a tropical rain forest in the mind of the public, it would be a disaster to consider substituting a niche of the Great Smoky Mountains for a rain forest display. After further discussion, everyone concurred that the introduction to the hall would be a tropical rain forest display.[154]

This exchange shows the particularistic and inspirational vision of the naturalist. Because of his tacit attachment to the rain forest as a place, Cowan did not see all ecosystems or biomes to be interchangeable examples. For Mahoney and his boss, Jack Anglim, who "suggested stylization of many of the rain forest displays," the principle was the core concern, and its physical instantiation more a matter of aesthetics.[155]

But this negotiated settlement guaranteeing the realism of the rain forest was fragile. Shortly after this meeting, Mahoney suggested again that, as a contingency plan, the exhibit involve "a Tropical Rain Forest stage set—no life-like flora or fauna but instead, art, audio-visual and animation. It could be done very effectively in the area as presently designed."[156] This was a plausible solution because, according to Mahoney, "The exhibit is being done to get across a very specific message—interrelatedness, in over-simplification. It is not a science exhibit. It is an idea exhibit. It will not explain scientific theory or method. It will present a 'way of looking' at the living things around us and be scientifically correct."[157] However, Cowan's special assistant, Joseph Britton, resisted Mahoney's suggestion: "The original goal is to create a 3-dimensional life-like rain forest floor and supplemental life-like ramp displays of the rain forest canopy to demonstrate a biosphere and the interrelatedness of the life

---

[154]*Ibid*., p. 1.
[155]*Ibid*., p. 3.
[156]James Mahoney to Richard S. Cowan and Jack Anglim, 10 March 1969, SIA RU 155, Director, NMNH, 1948-1970, Box 15, p. 4.
[157]*Ibid*., p. 1.

contained therein. There are several alternative methods of achieving this goal. However, one of them does not include creating a rain forest stage set."[158]

In spite of Britton's objections to a "rain forest stage set," Farb continued to see the rain forest in more abstract terms that illustrated a principle rather than existed as a place. Later in the spring, Farb wrote to Mahoney,

> Now that we are liberated from doing a highly realistic Belém rain forest, we can go back to one that emphasizes concepts. I have. . . fitted a sequence for the six viewing areas in the tube and the tube itself. I am quite pleased with it because I think it serves as a much better introduction to the whole Hall than the Belém-type rain forest, with its accent on things and a slice of life.[159]

Farb viewed "concepts" as impossible to convey with "things." At about the same time, Shannon told the Museum's public affairs officer that Hall 10 would be "Multisensory! The rain forest will be naturalistic but from then on things will get increasingly stylized and abstract, symbolic of principles.. . .McLuhanesque is the way Shannon described the multi-sensory assault—on the viewer."[160]

Mahoney shared this approach to the design of the exhibition:

> The visitor enters the floor of the rain forest—finds some steps—and enters a tunnel. As he enters the tunnel, he leaves the overwhelmingly confusing world of reality and enters a world of simple specific basic concepts of life—strongly presented by use of various exhibit (communication) techniques. Due to space and time we cannot afford to produce traditional, fully realistic life groupings. We CAN afford to simulate the essence of the part of nature that we are dealing with at each point. And I think this is what we will want to do. We CAN afford to make as many leaves, etc., as necessary. I think we can (must) design to create the essence of the message.[161]

---

[158]Joseph C. Britton to Richard S. Cowan, 24 March 1969, SIA RU 155, Director, NMNH, 1948-1970, Box 15, p. 4.

[159]Farb to Mahoney, May 21 1969.

[160]Harney, "Conversation with Joe Shannon."

[161]James Mahoney to Peter Farb, 5 November 1969, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 8.

In this passage, Mahoney explicitly employs the communications paradigm that emphasizes packaging and abstracting knowledge. The rain forest itself was "overwhelmingly confusing" in contrast to the "simple" "basic concepts." But by and large, nature was not to be presented as a confusing totality, but in its "essence," which, as a stripped-back, distilled version of nature, would successfully convey the "message" through proper design.

Two final examples show how thoroughly Farb resisted the habitat group genre for the rain forest. In February of 1970, just before the plan was shelved, he made two different suggestions, both completely abandoning a realistic rain forest. One was to use a "Painting on roller of forest from the floor to the air above the highest trees," which would "give the visitor a stylized trip through the altitudes of a tropical rain forest, in the course of which he is introduced to the major themes of living things in general and of the tropical rain forest in particular."[162] A couple of weeks later, Farb rejected the roller idea and suggested to Shannon that the exhibit "Have almost stage set [sic] like Victorian potted palm. Suddenly, directional loudspeaker attracts attention in one direction, moment later sign lights up: 'Adaptation' or 'Interdependence.'"[163] The proposal to use a "directional loudspeaker" and lighted signs that will "attract attention" is a clear example of Farb's belief that a "slice of life" exhibit was too static to communicate the "major themes" he had in mind.

Conclusion: The "Hall of Living Things" Goes on Ice

This chapter has argued that the rain forest was transformed from an intrinsically interesting specific place to an instance of an ecosystem. During the

---

[162] Peter Farb, "Exhibit Unit Script, [hall 10]," 9 February 1970, SIA RU 363, NMNH, Office of Exhibits, Records, *ca*. 1955-1990, Box 18.

[163] Peter Farb, "Spoke to Shannon about changing Rain Forest," 20 February 1970, Boston University, Mugar Memorial Library, Department of Special Collections, Peter Farb Collection, File #10: files on Smithsonian Hall.

late 1960s, owing both to Secretary Ripley's agenda and flagging interest from the scientific staff, control of exhibit form and content at the MNH passed from the scientific staff to design and communication professionals. In alliance with Ripley, the new exhibit professionals brought with them a new aesthetic and epistemology that claimed "concepts" to be more crucial to exhibits than "objects." Acting within this culture, the new exhibit-makers utilized abstract representations of nature provided by new ecological theories to redefine the rain forest exhibit. This definition bypassed the tacit knowledge and inscription devices of the naturalists, instead drawing on laboratory-type inscriptions that were useful precisely because they converted the physical system of nature into an abstract system of circuits and numbers.

Although the ramp up to the upper level of the canopy (Figure 4.7) was canceled in the fall of 1969, the Hall of Living Things project was still "considered THE priority program for the continuation of updated Core exhibitions."[164] But then, shortly after Farb proposed his last ideas in the spring of 1970, the project was abruptly put on hold for lack of funding, and it would be another year before work resumed. In the meantime, both Farb and Shannon left the Smithsonian in discouragement. When it was reactivated, the project would be titled "It All Depends," reflecting the explicitly activist tone the exhibition was given in the period between 1970 and the hall's opening in 1974.

The next chapter delineates that transition and shows how the rain forest was redefined yet again from an ecosystem to an environmentalist icon. The causal elements of this change take the form of outside design firms and the conversion of technical ecological ideas into political imagery capable of galvanizing public opinion around environmental degradation.

---

[164]James Mahoney "For the Record," 7 October 1969, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 8.

CHAPTER FIVE
"IT ALL DEPENDS":
RAIN FOREST AS ENVIRONMENTALIST ICON, 1970-1974

Introduction: From Systems Ecology to Ecological Politics

The last chapter explained how the rain forest group survived the cancellation of the botany hall and how it was re-defined as an example of an ecosystem in Peter Farb's "interdisciplinary" Hall of Living Things. This chapter covers the period between the time Farb and designer Joseph Shannon left the Smithsonian and when the rain forest group was finally completed in 1974 as part of the exhibition titled "It All Depends." The title meant to inspire the visitor to save the environment because it "all depends" on them. It signaled a shift from Farb's plan for an ecological treatment with an activist component to an activist exhibition with an ecological frame. The exhibition design was contracted out to a firm with no science expertise, and the MNH exhibits lab, including Reginald Sayre, built the rain forest with the British Guiana and Panama material. The exhibition story line depended heavily on the concept of the "biome" interpreted as a generalized ecological habitat type in order to emphasize the interconnections of all living things into one system. That definition of a biome drew the intense ire of the curators, both because the idea was inaccurately portrayed, and fundamentally, because they resisted the reductionism of systems theory and its treatment of particular details as undesirable complications to the modeling process. Because "It All Depends" relied heavily on audio-visual equipment that the museum could not keep operating reliably, the museum's director closed it after only about six months, even though it had been planned as a permanent exhibition.

The differences between the Hall of Living Things proposal and the "It All Depends" project are subtle but significant. "It All Depends" ultimately did not directly utilize any of the scripts that Farb wrote.[1] However, its logical structure was similar, emphasizing interdependence and adaptation as ecological principles from which humans were not exempt. The last section of both contained activist materials and imagery. But if the Hall of Living Things was sold to the museum and Smithsonian administration as a way of conceptually uniting the scientific exhibits (and therefore research areas) of the museum as an institution, "It All Depends" was promoted for its public environmentalist message and the urgency of disseminating that message. The exhibit developers almost completely excluded the museum curators. Without them, there was no attempt to connect the exhibition's abstract, multi-media rhetorical strategies with the museum's research activities. The conflict between the designers' views of communication as the transmission of finished, formal knowledge, and the importance of first-hand tacit knowledge in the curator's world-view is a central theme of this episode. Genre and argument were both hotly contested.

This chapter examines how the rain forest exhibit was converted from an example of an ecosystem into an image of the fragile connections being destroyed by human intervention in the environment. This new argument, adapting ecological imagery to an activist program, had been developed by the environmental movement of the 1960s and early 1970s. Driving the project at the Smithsonian was Secretary Ripley's desire for socially relevant exhibitions across the SI and his long-standing interest in conservation issues in particular. But by the time it opened, "It All Depends" was no longer at the forefront of environmental discourse. Instead, it was washed over by a wave that had in

[1]Ronald S. Goor to Richard S. Cowan, 16 February 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 9.

some respects already crested. The shape the exhibition took will be tied to the further institutional supremacy of the design and communication mentality examined in the last chapter. The exhibition's final form highlights even further the struggle between abstraction and place specificity.

Hall 10 Shelved on the Eve of Earth Day

Had it been carried out rapidly, the strategy Peter Farb formulated for the Hall of Living Things in 1968 that linked basic ecological principles to environmental activism would have been a contribution to the emerging movement of the 1960s and early 1970s. Taking its inspiration from Rachel Carson and the counter-culture critique of the American lifestyle of consumption, this movement linked ecology and conservation to "quality of life" concerns surrounding pollution and urban decay.[2] But by the time "It All Depends" opened in April of 1974, it was the product, rather than the producer, of a new stream of environmental discourse.

In July of 1969, Mahoney called Hall 10 "THE priority program in FY 70" and stated the need for "extra funding" to keep the project on schedule.[3] Farb continued to draft scripts during the winter of 1970. But by March of 1970, the project was put on hold when the museum was unable to fund the hall as it was then conceived. When the project was shelved, Joseph Shannon left the Smithsonian to resume his painting career, and Farb shortly after decided to let his contract expire.[4]

---

[2]Robert Gottlieb, *Forcing the Spring: The Transformation of the American Environmental Movement* (Washington, D.C., Island Press, 1994), pp. 7-8.

[3]James Mahoney to Frank Taylor, Benjamin Lawless and John Anglim, 28 July 1969, SIA RU 155, Director, NMNH, 1948-1970, Box 10.

[4]James Mahoney to David Challinor, 18 October 1971, SIA RU 197, Office of the Director, NMNH, Records 1964-1969, 1971-1972, Box 32; Joseph Shannon, "Oral History Interview," August 6 1992, SIA RU 9565, Tropical Rain Forest Exhibits, pp. 10-11; Farb to Shannon, March 17, 1970, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 18. Farb rebuffed Mahoney's later

It is ironic and quite telling that the Hall of Living Things project lost its momentum on the eve of the first Earth Day in April of 1970. If any time would have been ripe for the Smithsonian justify the project in terms of social and scientific relevance and educational obligation, it would have been early 1970. An explanation of the failure to do so and the consequences of delaying the exhibition for over a year involves examining the relationships between exhibition and research at the NMNH, the environmental movement in America at large, and the use the science of ecology was put to in public debate.

The following sections move from the wider context to the exhibition project itself. By 1970, the "environmental crisis" came to be defined by issues first articulated by the counter-culture. The Smithsonian's response to the environmental crisis was largely reactive rather proactive, particularly at the NMNH. Finally, the exhibition, "It All Depends," was the result of conflicting priorities between exhibit designers with highly abstract conceptual goals and a scientific staff with ideas rooted in the theory base of evolutionary biology, which relied on an intimate knowledge of concrete examples and places.

Ecology, Environment, & the Public

The word "ecology" comes, as many popular accounts of the 1960s were fond of pointing out, from the Greek root, *oikos*, meaning "house," and was coined in the 1860s by Darwinist Ernst Haeckel to convey, just as the existing term "nature's economy" had, the analogy of the function and operation of nature to the function and operation of a human household.[5] The term did not achieve widespread use among English-speaking scientists until the twentieth

---

attempts to coax him back to work on the project (James Mahoney to Peter Farb, 5 October 1970, SIA RU 363, Box 18; Mahoney to Farb, 26 October 1971, SIA RU 363, Box 18).

[5]Donald Worster, *Nature's Economy: A History of Ecological Ideas* (Cambridge: Cambridge University Press, 1977), pp. 190-204.

century (the Ecological Society of America was founded in 1915).[6] By 1960, ecology encompassed a wide range of scientific studies examining the succession of plant communities, food chains and population dynamics, and later, energy flow and cycling. Then, during the 1960s, the word ecology also came to name a new political movement that drew its political inspiration, concerns, and tactics less from previous wilderness conservation efforts and more from civil rights activism. Whereas efficient resource management and the heritage value of wilderness had motivated earlier conservationists, lethal industrial pollution and drastic environmental degradation were the core concerns of the new environmentalists.[7] When the first photographs of Earth from space were published in the late 1960s, suddenly the planet was our fragile, lovely home.[8] Ecology as "house" was reinterpreted as a call for "getting our house in order," beyond a technical definition of "nature's economy."

Environment & the Upheaval of the 1960s

Environmental historians generally agree that the ecology movement arose from the wider political upheaval and social ferment of the 1960s.[9] According to Robert Gottlieb, even though nature writers like Rachel Carson sounded the call, political activism around environmental concerns derived from

---

6*Ibid*., p. 206.

7Samuel P. Hays, *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985* (New York: Cambridge University Press, 1987), p. 13 & pp. 21-28.

8Worster, *Nature's Economy*, p. 341. David Perlman, "America the Beautiful?" *Look*, 4 November 1969, pp. 25-27, on p. 25.

9Victor B. Scheffer, *The Shaping of Environmentalism in America* (Seattle: University of Washington Press, 1991); Gottlieb, *Forcing the Spring*; Roderick Nash, *Wilderness and the American Mind*, 2nd ed. (New Haven: Yale University Press, 1973). Mahoney and Shannon also both invoke "the sixties" as "very powerful times" by way of explanation for what went on at the Smithsonian (James Mahoney, "Oral History Interviews," July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, pp. 6, 40; Shannon Oral History, p. 22).

the goals and tactics of the civil rights movement, campaigns for consumer product safety, and New Left critiques of the so-called American Dream. The new environmentalism drew on a cultural and political base distinct from the established wilderness preservation movement. The mainstream conservation movement, which had achieved such significant victories for preserving wilderness in the 1950s and early 1960s, was both taken unawares by the new movement's power and ambivalent or hostile towards its radical politics.[10] The theorists of the ecology movement, such as Barry Commoner, the Odum brothers, and others, synthesized the goals for social justice of civil rights and anti-war protests with the imagery and vocabulary of systems ecology, which represented nature as one vast interdependent system of cycles.

Environment in the Press

Press clippings from Peter Farb's files for the second edition of his *Ecology* book show a classic media frenzy surrounding the environment in the months preceding Earth Day: the major news weeklies all carried cover stories, including the business magazine *Fortune*, and *Science* editorialized on the need for environmental cleanup.[11] Even though *Silent Spring* had been published in 1962, and environmental activism built throughout the 1960s, media attention to pollution did not explode until 1969.[12] The press coverage frequently focused

---

[10]Gottlieb, *Forcing the Spring*, pp. 107-108.

[11]John Pekkanen, "Ecology Becomes a Mass Movement," *Life*, January 1970, pp. 22-30; "The Ravaged Environment," *Newsweek*, 26 January 1970, pp. 30-45; "The Environment: A National Mission of the Seventies," *Fortune*, special issue, February 1970; Philip H. Abelson, "Editorial: Long-Term Efforts to Clean the Environment," *Science*, 1970, *167*:1081.

[12]Leonard Sellers and David W. Jones, Jr., "Environment and the Mass Media," *Journal of Environmental Education*, 1973, *5*:51-57, on p. 53. Even though the exhibit files show the clippings the exhibit makers drew on, it has been argued that the press did not contribute significantly to formulating the activist discourse of ecology. Instead, "the movement of environmental claims seems to have started with interest-group entrepreneurship" which influenced government and eventually the press (A. Clay Shoenfeld, Robert F. Meier and

on the connection between "quality of life" concerns and systems paradigms that had been forged by the social reformers and ecologists. The ubiquity and nearly uniform tone of this coverage indicates that by 1970, the exhibit-makers were drawing on imagery and ideas that were widely circulating in popular culture.

The first step in moving from scientific ecology to political ecology derived a moral imperative from the scientific idea of ecological systems and connections between organisms. An article by science writer David Perlman in *Look* called "America the Beautiful?" highlighted the fragility of ecosystems by emphasizing their intricacy and complexity: "Look for a moment at a concept basic to ecology—the 'food chain.' It is an intricate chain, beginning in the seas, where the evolution of all organisms, including man, began."[13] The move from technical concept (the food chain), to the intricacy of that chain (intricacy evoking a sense of wonder), to the oneness of all organisms (including man), is so swift that this passage makes an unmistakable connection between the science of ecology and the need for humans to rejoin the natural order. The rest of the article gives examples of man's destruction of these fragile, interlinked systems.

Along with holding up the newly discovered science of ecology as the source of an imperative to act, the press also portrayed ecology as the source of concrete solutions to the problem. A special issue of *Newsweek*, entitled "The Ravaged Environment," quotes ecologist Eugene Odum as crediting Darwin with provoking "a simultaneous recognition throughout the world that the whole world is not just the sum of its parts, that the forest is more than a collection of trees." The article continues:

Robert J. Griffin, "Constructing a Social Problem: The Press and the Environment," *Social Problems*, 1979, *27*:38-61, on p. 38); Gottlieb, *Forcing the Spring*, p. 113.

[13]Perlman, "America the Beautiful?" p. 26. Perlman also uses the adjective "intricate" again on the same page.

> Still, for the first half of the twentieth century, ecology to the public often smacked of stuffed animals, bird-watching, and other seemingly irrelevant nature studies. But in the disfigured lands, the sullen waterways and the poisoned air of the century's latter half, the science is undergoing a renaissance."[14]

Ironically, Odum and his brother Howard were two of the inventors of systems ecology, which sought to reduce biological communities to circuit-like cybernetic feedback loops.[15] Even though Odum claimed a lineage back to Darwin for his brand of ecology, it was precisely his project that in part helped make "nature studies" "irrelevant" to the growth of Big Science after World War Two. Systems ecology was experimental, quantitative, and high-tech, which properly fell into the publicly expected definition of modern science. Natural history continued to labor under the onus of being labeled as descriptive, qualitative, and low-tech.[16] Naturalists often looked for unique defining characteristics, whereas systems ecologists pared away detail to make all cases fit into an overarching theory.

Furthermore, the article's disparagement of "stuffed animals" and "bird-watching" as "irrelevant" suggests that the press did not see a connection between environmental activism and the traditional conservation movement. These phrases imply that institutions such as natural history museums, and nature lovers such as members of the Audubon Society, were interested in nature for purely recreational or aesthetic purposes and were not properly equipped to deal with the "disfigured lands" and "sullen waterways." Naturalists were no longer seen as scientists but as connoisseurs—their knowledge did not offer solutions to the problem, but only enhanced their enjoyment of the subject.

---

[14]"Dawn for the Age of Ecology," *Newsweek*, 26 January 1970, pp. 35-36, on p. 35.

[15]Joel B. Hagen, *An Entangled Bank* (New Brunswick, New Jersey: Rutgers University Press, 1992).

[16]There was a methodological "symbiosis" between the military and industrial nuclear industry and systems ecology formed, with researchers taking advantage of readily-available radioactive isotopes to use as tracers in nutrient cycle studies (*Ibid*., pp. 118-121).

Contrary to this popular view, many naturalists had seen their field sites destroyed or organisms vanish, and considered themselves to be conservation-minded. For example, Alfred Bailey of the Denver Museum, an old-time naturalist if there ever was one, included a considerable discussion of the threat of pesticides to birds in his massive *Birds of Colorado*, published in 1965, and advocated banning many of them.[17] However, it was the new ecology, with its "comprehensive and exhaustive" studies at "scores of universities across the nation" using "instrumented field sites" that *Newsweek* championed as the type of information necessary to deal with the environmental crisis.[18]

Environment & Ecology in Farb's Time-Life Volume

Peter Farb's second edition of his *Ecology* book shows the shift of the popular conception of "ecology" from a body of science to a political movement, as well as indicating something about what he might have done with the hall had he been able to see the project through. *Ecology* was published first in 1963 and again in revised form in 1970.[19] It draws on much of Farb's earlier work, as well as publications by the Odum brothers, Marston Bates, and other biologists and ecologists.[20] As a member of a mass-circulation encyclopedia-style set, it represents a moderately sophisticated level of conceptual content aimed at an audience that specifically aspired to educate itself.

Both editions bear the same chapter titles and cover the same ground, but Farb re-wrote the second in significant ways both to update the empirical material and to emphasize the *implications* of ecological information. Although

---

[17]Alfred M. Bailey and Robert J. Niedrach, *Birds of Colorado*, vol. 1 (Denver: 1965), pp. 22-23.

[18]"Dawn for the Age of Ecology," p. 36.

[19]Peter Farb, *Ecology*, 1st ed. (New York: Time, 1963); Peter Farb, *Ecology*, 2nd ed. (New York: Time, 1970).

[20]Farb *Ecology*, 1963, p. 183.

the differences between the two editions in terms of photographs and sidebar stories probably reflect decisions by the Time-Life editorial staff, Farb was responsible for the revision of the main text, and his notes include reprints about environmental issues in the late 1960s, indicating that he was at least in part responsible for the change in tone.[21]

Farb shifted from a lively but general conceptual, historical argument and narrative to an urgent, present-based political, less optimistic discussion. This is apparent from the way the first paragraph of Chapter One constructs the scope and purpose of the book (the rest of the chapter is nearly identical in both editions). The 1963 edition reads:

> Modern man likes to label the abounding world around him with the inclusive word "nature," as if to imply that he can lump together everything outside of his own skin—the multitudes of animals that run, hop, fly, crawl and wriggle, the tens of thousands of plants that range from one-celled algae to lofty redwoods, the diverse environments that range from perennial ice to tropical forest. But for the other living things with whom man shares the planet, "nature" has many different meanings. To a fresh-water turtle, nature is simply its home portion of a stream or pond; to a particular kind of fly, it is a hot spring, and no spring of any other temperature will do; to a lowly plant like the reindeer moss, it is a rock slab in the tundra, and nowhere else.[22]

Words like "abounding," "multitudes," and "diverse" signal that this is a story about the wonders of nature in the grand tradition of most popular nature writing before it. The appositive structure of "Modern man likes to label"— "But for the other living things" is a classic rhetorical form that creates and sets the stage for correcting a presumed preconception on the reader's part. That goal is embodied by the chapter title, "The All-embracing Web," which refers to both the interconnections between living things and the highly specific adaptations of

---

[21]For example, *Newsweek*, *Fortune*, and others are in Boston University, Mugar Memorial Library, Department of Special Collections, Peter Farb Collection, File #10: files on Smithsonian Hall.

[22]Farb *Ecology*, 1963, p. 9.

living organisms to their environment. Finally, the examples given in the last sentence—turtles, flies, lichens, and their streams, springs, and boulders—are quite general illustrations that properly represent the range of life and habitats, but do not carry much emotional baggage. Any of a number of examples would have made the point. In sum, it would not be derogatory to call this a classic textbook introduction to the subject: it inspires the reader, poses the questions, and introduces the players.

Compare that to the rewritten opening paragraph of the 1970 edition:

> Modern man engrossed by his own problems, increasingly isolated from nature in his cities, has only recently begun to rediscover an ancient truth: he represents just one strand in an infinitely complex web of living things that share the earth. Each time he unravels a delicate strand of this web he learns something more about it—usually to his great dismay. The pollutants cast skyward by his smokestacks and automobiles not only endanger his health but are so warming the temperature of the planet itself that they pose a threat to the very life on it; pesticides, while raising his crop yields, have already brought whole populations of mammals, birds and fishes to the brink of extermination; sewage and industrial wastes are already killing off all life in some of the world's largest bodies of water such as Lake Erie and Lake Baikal in Russia. Belatedly, man has become aware that every living thing, himself included, affects every other living thing in an intricate interaction with the land, air, and water.[23]

Gone is the cheery, bemused commentary on modern man's mislabeling, harmlessly enough, of a generic nature. In its place is a dark, alarming story of destruction and the price we pay for our knowledge and power to intervene in and unravel a nature we have become alienated from. By invoking the "infinitely complex web," in the first sentence, Farb immediately and explicitly emphasizes the concept of interdependency that became the core ecological idea used by the environmental movement. This single phrase permeated the

---

[23] Farb, *Ecology*, 1970, p. 9.

environmentalist rhetoric of the 1960s and 1970s and served as a conceptual linchpin much as “biodiversity” does today.[24]

Rachel Carson’s *Silent Spring*, frequently credited as one of the single greatest influences in mobilizing the nation against pollution, relied heavily on the balance of nature and interrelatedness tropes.[25] Carson makes an explicit point of highlighting the indirect effects of pesticide and herbicide use as they move through the food webs of complex ecosystems. In Carson’s tale, robins die because they eat poisoned earthworms, which have eaten poisoned elm leaves, which have been sprayed with DDT to control beetles, whose tunnels gave a foothold to the Dutch elm disease fungus.[26]

In the second edition of *Ecology*, Farb replaced adaptation and the technical concept of ecological niches with the inability of life to adapt to the human onslaught, and the examples in the new version are of real places in immediate danger. The phrases “pose a threat to the very life,” and “brink of extermination” convey an urgency that demands the reader’s attention with an emotional tone absent from the first text. Most importantly, the last sentence indicates that the reason to be interested in ecology itself is no longer general educational enrichment, but because an awareness of the links between man and nature is crucial to our immediate survival.

The first version is not completely devoid of concerns about human impact on the environment. The last chapter in both versions is called “Man versus Nature,” and is a cautionary statement about human exploitation of

---

[24]David Takacs, “Finding Meaning in Biodiversity” (Ph.D. thesis, Cornell University, 1994).

[25]Gottlieb, *Forcing the Spring*, p. 86. However, Hays argues that Carson succeeded because she connected to a broader concern (Hays, *Beauty, Health, and Permanence*, pp. 52-53).

[26]Rachel Carson, *Silent Spring* (New York: Houghton Mifflin, 1962), pp. 100-103.

nature that closes with Francis Bacon's dictum that "We cannot command nature except by obeying her."[27] However, there is again a shift in both tone and specific examples from the original version to the second. The first version worries mainly about overpopulation and contamination from nuclear waste.[28] Using the noble savage imagery of cultural evolution theories in anthropology, Farb describes our progressive alienation from the land as civilization advanced, asking, "Where then did man go astray in cleaving the ties of his heritage with the rest of nature?"[29] Environmental degradation is portrayed in the first edition as an anomaly in human history and a recent product of western greed.

The second edition also includes a section on overpopulation, but concentrates on DDT bioaccumulation instead of radioactivity, and almost self-consciously repudiates the previous edition's valorization of native knowledge: "Modern man sometimes hankers after a simpler past or envies those primitive societies that seem to live in harmony with the natural world. But primitive peoples usually do not enjoy the ecological harmony that romanticists have granted them."[30] Rejecting the noble savage also rejects neo-Luddism or a "back to the land" return to simplicity. Farb's strategy here diverges from much of the rhetoric of the environmental movement, which frequently invoked the moral privilege of indigenous peoples. Ultimately, the politics of the second edition is not that of warning but of action. Since traditional conceptions of the land are either destructive or their beneficence an illusion, Farb holds up the scientific knowledge embodied by ecology as the guide for action:

---

[27]Farb *Ecology*, 1963, p. 170.
[28]*Ibid*., pp. 168-169.
[29]*Ibid*., p. 164.
[30]Farb *Ecology*, 1970, p. 164.

> Neither economic incentives nor population limitation, however, can take the place of an ecological conscience—an awareness of both the benefits and the hazards of every interference with the environment. Already such a conscience has lead to effective group action that has diverted new highways from scenically valuable areas [and]. . .made industries recognize the need for smokeless stacks.[31]

Farb's closing statement justifies the book and the scientific information it contains in the same terms as the opening paragraph: the book conveys not just the raw knowledge of facts, but the value-laden knowledge of *awareness*, which implies a change in attitude and behavior.

The Smithsonian Responds to Environmentalism

The huge surge in media attention and public activism leading to Earth Day and provoking the governmental and private sector initiatives that coalesced around it largely overtook the efforts of the Hall of Living Things project to raise public awareness about environmental issues. From Earth Day on, the Smithsonian was playing catch-up rather than setting a trend. This is not to say that the players in the Hall 10 project were uninterested in the environment and conservation. The fact that it survived its many misfortunes (albeit only briefly) attests to the exhibit-makers' personal and corporate concern.

From the Secretary down, there was the strong belief that the Smithsonian should play a role in technical research and public discourse about the environment during the 1960s. As noted in the last chapter, Secretary S. Dillon Ripley's "emphasis on research" at the Smithsonian included initiatives in oceanography and ecology that expanded the Institution's traditional scope and approach. Conservation biologist Thomas Lovejoy, who studied with Ripley as an undergraduate at Yale in 1961, recalls: "I remember being very impressed that Dillon Ripley, who taught me ornithology, stated that any biologist with a

---

[31] *Ibid*., p. 170.

conscience should spend some time working on conservation."[32] Ripley felt that scientists should be politically involved at a time well before it was widely acceptable for scientists to be activists.[33]

But because the environmental movement of the 1960s was spearheaded by political reformers who drew on technical resources provided by a handful of scientist activists, Ripley's vision of greater activist involvement by scientists through their own work was not easily established at the Smithsonian. As an example of the curators' generally more conservative stance, David Lellinger watched the ferns he studied in Costa Rica turn into a "fossil flora" between the start of his career in 1962 and the 1980s. He acknowledged, "Our own work is very badly affected by the loss of habitat." But his response to the environmental problems of Latin America was resignation "because we have no power." He did not see scientists as being able to operate effectively in the political arena:

> At heart, it's a matter of politics. It's a matter of national will, and most of those countries don't have it. We support our Latin American colleagues through. . .sending Xeroxes, identifying specimens, sending loans. This is what we can do to help them, but in terms of their getting their environmental house in order, I don't think there's much we can do. I don't think there's much they can do. The fundamental problem in most countries is over-population.[34]

In his conception, the scientists' world did not intersect with politics.

During the 1960s, Ripley did succeed in promoting some new research initiatives with environmental ramifications. In his visionary mode, he promoted the idea that systems ecology and its holistic focus on relationships and

---

[32]Thomas E. Lovejoy, "Oral History Interviews," 1994, SIA RU 9565, Tropical Rain Forest Exhibits, Interview Two (unprocessed).

[33]Lovejoy called Ripley "out in front" on conservation issues, and noted that at the time, even though environmental initiatives were gaining momentum, "science was science" (*Ibid*.).

[34]David Lellinger, "Oral History Interview," 13 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 19.

connections should be used as a new educational paradigm for solving a whole range of social and environmental problems.[35] In more concrete terms, Ripley established the Office of Ecology in 1965 as an umbrella for new initiatives in ecological research that its new director claimed "embraces both basic descriptions and ecosystem-oriented studies. It emphasizes studies of significance to both ecological theory and to the understanding of man's place in nature."[36] The Smithsonian's Chesapeake Bay Center for Environmental Studies was founded near Annapolis, Maryland, in 1967. Studies of baseline habitats there were conducted to aid "in the development of both environmental standards and the construction of models for determining the effects of man's accidental or premeditated environmental manipulations in the vicinity of Washington."[37] Ripley wanted ecology at the Smithsonian to be conservation-oriented and socially relevant. But he only achieved this by establishing new entities within the Institution, rather than significantly refocusing the activities of the existing MNH curatorial staff on research questions related to the environment. The curators did not see the Office of Ecology as connecting to their work and in their eyes, its director did not succeed in creating relationships between the curatorial staff and Ripley's initiative for ecological research.[38]

There is no surviving evidence that Ripley was actively involved in shaping the specifics of "It All Depends." However, it is clear that not only did the show enjoy his blessing in its general outline, but that he backed its key characteristics: an overtly activist agenda and tone, a definition of ecology based

---

[35] S. Dillon Ripley and Helmut K. Buechner, "Ecosystem Science as a Point of Synthesis," *Daedalus*, 1967, *96*:1192-1199.

[36] *Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1966), p. 73.

[37] *Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1967), p. 56.

[38] W. Donald Duckworth, "Oral History Interview," 9 February 1976, SIA RU 9508, Senate of Scientists Project, Box 9, p. 49.

on systems theory, and an abstract, "conceptual" style of presentation. Evidence for a specifically activist, normative tone comes from Ripley's reaction to a temporary exhibition on endangered species mounted in late 1968: Frank Taylor reported to Jack Anglim and Richard Cowan, "The exhibit on endangered species has been called a failure by Mr. Ripley. He feels the show lacks the punch it should have, and has stated: 'It will be thought nice by the people already interested, but I do not care about them. It will not reach those who never thought of the problem. We must shock them.'"[39] As for the sort of ecology Ripley wanted in the show, he suggested that G. Evelyn Hutchinson, one of the first ecologists to apply cybernetics and systems theory to ecology, should be consulted for ideas about the ecology exhibition.[40]

Along with Ripley's interest in conservation, other staff members working on Hall 10 felt strongly about finishing the project because of their own convictions. Ronald Goor, a Ph.D. biologist who was Richard Cowan's special assistant, acted as science advisor on the project.[41] At one point in 1972, Goor wrote to Cowan of his frustration with the design process, "If I did not consider the message of Hall 10 of such importance, in the light of the current crisis facing not only Americans, but all passengers on our space-ship Earth, I would not speak as I have in this memo."[42] After re-organization in 1972, Jim Mahoney was no longer chief of exhibits at the Natural History Museum. He headed a new Office of Exhibits Central, which was to meet the needs of all the museums

---

[39]Frank Taylor to John Anglim, 23 December 1968, SIA RU 190, Director General of Museums and Director, United States National Museum, 1921-1973, Box 30.

[40]On Hutchinson, see Hagen (1992), pp. 77-78. Ripley's comment is in Richard S. Cowan to S. Dillon Ripley, 24 January 1968, SIA RU 155, NMNH Office of the Director, Records 1948-1970, Box 15.

[41]Richard S. Cowan, "Oral History Interviews," July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 27.

[42]Ronald S. Goor to Richard S. Cowan, 16 February 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 9.

for specialized exhibit production expertise. However, he continued to manage the Hall 10 project until its completion.[43] He felt that the environment was "something that was important and should be addressed," but recalled, "I approached everything at the museum in a businesslike way, so I mostly stood back and did not get emotionally involved in the issues."[44]

Another player who wanted to see strong environmental statements in the exhibition was Assistant Secretary for Museum Programs Paul Perrot. He was a relative latecomer to the project, arriving in 1972 after having been the director of the Corning Glass Museum. He expressed his opinion in an interview that the activist message of the exhibit could have been stronger still.[45] When the Office of Museum Programs took control of the concluding section of "It All Depends" back from the designers in 1973, Perrot felt that the magnitude of environmental destruction and the urgency of public action needed to be emphasized more strongly. He suggested substituting stronger imagery of environmental damage portrayed in the "action area" saying, "These are just thoughts which might help to emphasize the urgency of doing something."[46]

The scientists, however, were less than enthusiastic about the exhibition's activism. Paleontologist Porter S. Kier replaced Cowan as director of the MNH in January of 1973.[47] Kier was not a supporter of the Hall 10 project—he would

---

[43]James Mahoney, "Oral History Interviews," July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 6.

[44]*Ibid*., pp. 6-7.

[45]Paul N. Perrot, "Oral History Interview," 16 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 9.

[46]Paul N. Perrot to James Mahoney, 11 September 1973, SIA RU 342, Office of the Assistant Secretary for Museum Programs, 1972-1983, Box 91. Goor and an environmental education consultant, Ralf Rohweder, handled this section in-house (James Mahoney to Porter Kier, 28 March 1973, SIA RU 342, Box 91).

[47]*Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1973), p. 314. Cowan lost the directorship after an initiative to move the MNH's scientific staff to the USDA campus in Greenbelt, Maryland, collapsed (Richard S. Cowan, "Oral History Interviews," 1974, SIA RU

later deny that "It All Depends" was intended as a permanent exhibition.[48] Along with the exhibits committee, he did not like what they called its "hard-sell," and he also objected to preliminary scripts for an exhibition on over-population as "propaganda. . .shouting and screaming at our visitors."[49]

Environmental Education

It appears that in spite of Ripley's personal commitment to conservation issues and his efforts to promote ecology at the Smithsonian, there were few staff devoted to environmental education, and the curators tended to justify existing research approaches. The proceedings of a conference held in early April, 1970, at the American Institute of Biological Sciences, titled "Environmental Education: The Adult Public," gives a hint of the way the Smithsonian construed public outreach in the early 1970s. The report includes a statement by Jon Seger, Staff Associate, SI Office of Academic Programs.[50] Seger opens with rhetoric that echoes Rachel Carson's calls for humility before the oneness of nature:

> The task of helping citizens to see their complete dependence upon, and membership *in*, the biosphere is awesome. But for all too long, in the West at least, the "inclusionist" outlook, and its corollary, humility, have been the exclusive property of a few ecologists and mystical poets. In my opinion it is the duty of educators everywhere to "democratize" the insights of modern science. Not until men value harmony above domination over nature will political and technological instruments designed to meet their real needs be even remotely possible.[51]

9501, Richard Sumner Cowan Interviews, 1974; "Senate of Scientists Interviews," 1975, SIA RU 9508, Senate of Scientists Project).

[48]Porter Kier to Paul Perrot, 9 December 1974, SIA RU 257, Director, NMNH, 1973-1975, Records, Box 24.

[49]Porter Kier to S. Dillon Ripley, 2 February 1973, SIA RU 257, Director, NMNH, 1973-1975, Records, Box 8.

[50]Seger was a predoctoral fellow for two years in the Division of Elementary and Secondary Education in 1970 and 1971 (*Smithsonian Year*, *1971*; *Smithsonian Year*, *1972*).

[51]"Environmental Education: The Adult Public," 1970, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 9, p. 53.

Seger made explicit what David Perlman's *Look* article implied: scientific knowledge from the field of ecology contained both the ends and the means of framing a new political order.[52]

Although such a radical conception of the problem called for sweeping systemic change in thought and action, the Smithsonian's actual efforts were modest. Seger offered that the Institution

> has long been a major supporter of original research and has recently advanced its diffusion activities beyond traditional publication to include several very well received film and discussion series. An intensive film and discussion program for the last week in April [Earth Day] and a hall of environmental science [Farb version] are both in the advanced planning stages.[53]

According to an SI press release, the discussion series, "in which the audience is invited to join a panel of experts, is designed to examine a number of challenging and urgent environmental problems facing man." Held at the Natural History Museum in late 1969 and early 1970 and chaired by Richard Cowan, the sessions covered such topics as "Persistent Biocides in the Environment,. . .solid wastes, . . .the disappearance of species and wilderness areas."[54] But as one-time events, their public impact was necessarily low. The exhibition project, which aimed to reach a mass audience, been put on hold by the time the conference was held. In 1970-1971, Seger also prepared for public distribution two bibliographies of environmental readings, and organizations.[55]

---

[52]This idea that ecology provided both a way of understanding the problem and the solutions to solve it was a key tenet of the environmental movement of the 1960s (Hays, *Beauty, Health, and Permanence*, pp. 256-257).

[53]"Environmental Education: The Adult Public," p. 53.

[54]Tom Harney, "'Encounter'—Smithsonian Panel to Examine DDT effects," 1 December 1969, SIA RU 416, NMNH, Office of Public Affairs Records, *ca.* 1958-1990, Box 1, p. 1.

[55]Lynne Manring and Jon Seger, "Selected Resources for the Study of Human Ecology: Perspectives on the Environmental Crisis," 1971, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10; [Jon Seger], "An Introductory Environmental Reading List," 1970, SIA RU 363 NMNH Office of Exhibits, Records *ca.* 1955-1990, Box. 14.

At about the same time, a volunteer with the Division of Elementary and Secondary Education wrote a teacher's guide on ecology. It appears to have been intended to be used in conjunction with a school group museum visit, but mentions no specific exhibits at the MNH.[56] It introduces the basic terminology, by now familiar, that informed ecological conceptions of the environmental problem. Like many of the other materials discussed in this chapter, it includes the ideas of web of life, interrelationships, and adaptations.[57] It seems clear that a fairly small set of concepts derived from technical ecology were circulating in the educational and public spheres during this period, for variants of these phrases occur repeatedly.[58]

Casting Existing Research as Environmentally Relevant

Further indications that the Smithsonian responded to the environmental movement by casting its on-going activities in terms suitable for the times, rather than drastically changing its research or educational priorities or activities, comes from MNH Director Richard Cowan's testimony to Congress in July 1970.[59] In attempting to justify the museum's contribution to science, Cowan characterized the museum as having its "back to the wall" in terms of being underfunded and understaffed.[60] He first appeals to the tone of the times expressing pessimism

---

[56]Caroline B. Davis, "Smithsonian Guided Tours in Social Studies and Science Teacher's Guide Number 14 "Ecology"," 1971, SIA RU 363 NMNH Office of Exhibits, Records *ca.* 1955-1990, Box 14.

[57]*Ibid*., pp. 2-3.

[58]"Natural cycles," "carrying capacity," and "diversity" were key ecological ideas adapted to environmentalism (Hays, *Beauty, Health, and Permanance*, pp. 257-258). Carrying capacity is not a trope commonly seen in the Smithsonian materials.

[59]Richard S. Cowan, "Statement by Richard S. Cowan," *Smithsonian Institution General Hearings before the Subcommittee on Library and Memorials of the Committee on House Administration, House of Representatives, Ninety-first Congress, Second Session* (Washington: U.S. Government Printing Office, 1971), pp. 835-843.

[60]*Ibid*., p. 841

about human nature at the same time he maintains optimism in our scientific and technological abilities to solve the problems we have created:

> Man alone is able to comprehend the environment in relation to his needs and in aesthetic terms as well; in spite of this unique quality, it is also man who despoils, destroys, and desecrates his environment. On the other hand, only the human species can care enough about the environment to repair at least some of the damage. Whatever improvements are made rest squarely on the natural sciences and the knowledge they generate.[61]

The use of the generic term, "man," as the cause of environmental problems defocuses the blame from specific polluting industries or interest groups, and shifts it to the entire human race. Such an abstract indictment attenuates the politically radical nature of the claim, and makes room for the conciliatory optimism scientific knowledge offers.

Cowan then asserted, "We are not late arrivals on the environmental bandwagon—and we are certainly pleased to have so much company on it. Today's concerns for our surroundings by Smithsonian researchers in the life sciences are the modern counterparts of attitudes that were expressed in the earliest formative years of the Institution."[62] In this telling, the Smithsonian was not a scientific anachronism playing catch-up, but an institution that predated and would outlive fads in research. According to Cowan, the naturalist remained an important interpreter of nature alongside advances in other fields.

In an effort to make the Museum's work both continuous with the past and forward-looking, Cowan went on to offer the materials collected by the nineteenth century government-sponsored expeditions and housed at the Smithsonian as constituting a baseline sample before pollutants such as heavy metals, pesticides or radioactive fallout were introduced into the environment.[63]

---

[61] *Ibid*., p. 835.
[62] *Ibid*., p. 835.
[63] *Ibid*., p. 836.

Although that argument was quite sound, it also tended to reinforce the old-fashioned image of the museum, whereas Congress was likely to think that new problems need new answers. Thus Cowan hastened to add that most publications of staff research "are clearly supportive of ecological studies and some are of an advanced order of statistical complexity."[64] This statement makes an effort to bring museum natural history and contemporary ecology together, with ecosystems studies enjoying the privilege as the dominant paradigm of which the museum is "clearly supportive." Furthermore, assuring Congress that some of the Museum's studies "are of an advanced order of statistical complexity" also attempts to legitimize the Museum's work.

Objects *versus* Concepts, Round Two

The past two sections have established that key features of the environmental movement were its origin in social activism and its expropriation of technical ecology, and that Ripley pressed the Smithsonian to embrace this agenda in the early 1970s. They provide the backdrop for how "It All Depends" assumed its final form and the definition given the rain forest group.

Restarting Hall 10

In spite of the demoralizing loss of funding and of the development team of Farb and Shannon, Mahoney indicated that the Hall 10 project was not allowed to die. Ripley continued to see it as part of the new approach to exhibits:

> Jack Anglim, my immediate boss, came to me and told me that not only did we "have to" do Hall 10 but that we—him, me, and others at the Smithsonian who believed that Smithsonian exhibits should be the pace-setters for the museum world, and that included Ripley—*wanted* to do Hall 10.[65]

---

[64] *Ibid*., p. 836.
[65] Mahoney Oral History (1992), p. 17.

However, others observing the exhibits program had the impression that "It All Depends" was essentially reactive rather than proactive. Reporting in an internal memo on a meeting held by Mahoney and the designers to brief the Assistant Secretaries about "It All Depends," finally under way again in 1972, press officer Tom Harney expressed the opinion that

> Planning for it [the Hall] started to evolve back in the 60's and they would probably still be talking and planning and not doing anything if it wasn't for the fact [sic] that the high-pitch of interest in the environmental crisis finally pushed people here into giving it priority and at the same time made it possible for them to get a really big appropriation.[66]

Harney believed that there was not sufficient institutional will to complete the project until compelled to do so by outside forces. Furthermore, he implied that the museum took advantage of a critical mass of interest to gain funding, rather than figuring out how to find the funds to create that critical mass.

Mahoney realized that the exhibition's relevance would dwindle the longer it took to produce it.[67] But in spite of his warnings, little progress was made in 1970, even though massive political changes were taking place outside the Museum, including passage of the Clean Air Act and the founding of the Environmental Protection Agency.[68] Meanwhile, other museums were responding to the environmental crisis. The American Museum of Natural History had already mounted a high-concept audio-visual shock-treatment exhibition called "Can Man Survive?" in 1969.[69] In the fall of 1970 the Field

---

[66]Tom Harney to Carl Larsen, 22 December 1972, SIA RU 416, NMNH, Office of Public Affairs Records, *ca.* 1958-1990, Box 1, pp. 1-2.

[67]James Mahoney, [Hall 10 plan to relate natural history to the environment], early 1970, SIA RU 197, Office of the Director, NMNH, Records 1964-1969, 1971-1972, Box 32, p. 1

[68]Gottlieb, *Forcing the Spring*, pp. 128-129.

[69]"Museum Uses Psychedelic Lights and Electronic Music to Show That Life Can Be Ugly," newspaper clipping dated 25 May 1969, SIA RU 155, Director, National Museum of Natural History, 1948-1970, Box 10; James Mahoney to Frank Taylor thru Anglim, October 1969, SIA RU 363, NMNH, Office of Exhibits,

Museum of Natural History was at work on a traveling show called "Man and His Environment," and tried to interest the Smithsonian in it.[70]

Congress finally received a budget request of $500,000 for Hall 10 in January 1971, as part of the Smithsonian's permanent exhibition program for fiscal year 1972.[71] The budget proposal drew on Farb's original brief, and included Shannon's "Cave" sketch (Figure 4.6). The 1971 "World of Living Things" proposal to Congress explicitly claimed to merge scientific information with political response:

> A major exhibition on the interrelated "laws of nature" is designed which will include both an introduction to ecology and the exposition of worldwide environmental balances and imbalances. Issues and options will be presented to the visitor with the opportunity for him to react to them and to see and consider the consequences of his choices.[72]

The sentiment that humans had to abide by the "laws of nature," which blamed the current crisis on human disruption of the usual balance maintained by those natural laws had by then become a national mantra.[73] Proponents of this equation, assumed that the chance to "consider the consequences" would lead to a change in behavior.

Records, *ca.* 1955-1990, Box 18; Michael Robbins, "An Exhibit Asks the Question of the Century," *Museum News*, September 1969, pp. 11-13.

[70]E. Leland Webber to Richard S. Cowan, 9 November 1970, SIA RU 363 NMNH Office of Exhibits, Records *ca.* 1955-1990, Box. 18; Richard S. Cowan to E. Leland Webber, 17 November 1970, SIA RU 363, Box. 18; John A. Osmundsen, "First Draft (Revised); Preliminary Outline for and Exhibition on Man in His Environment," October 1970, SIA RU 363, Box 18.

[71]"Major Permanent Exhibitions of the Smithsonian Museums in FY 1972," January 1971, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 28. FY 72 ran from July 1, 1971 to June 30, 1972. The budget would have been submitted to Congress in January of 1971 (John F. Jameson, former SI Budget Officer, personal communication September, 1994).

[72]"Major Permanent Exhibitions of the Smithsonian Museums in FY 1972," January 1971, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 28, p. 10.

[73]Hays, *Beauty, Health, and Permanence*, pp. 26-27.

Furthermore, the budget proposal attempted to cover all the bases of the debates about exhibit design, content, and practice:

> The exhibit will combine modern methods of communication through exhibits and the authority of the Museum's scholarly scientists. It will be designed for experimentation, testing, and development of its effectiveness as its use is observed. It will have the flexibility to be up-dated as environmental sciences evolve. It will put the most significant of the Museum's vast collection resources in the service of ideas explaining a vital problem of our times.[74]

This recipe of new-fangled techniques, authoritative science, and social relevance seems to have been convincing, because the project indeed received the $500,000 for FY 1972, and $250,000 was added the next year.[75]

Congress bought the project as a permanent exhibition that would include important objects from the national collections. Mahoney wrote budget officer John Jameson in the spring of 1971 after the budget was submitted, promising that the "exhibit will contain hundreds of specimens, illustrations, and models."[76] At the same time, according to Cowan's cover to Mahoney's memo, "The HALL OF LIVING THINGS is the initial attempt to present IDEAS with

---

[74]"Major Permanent Exhibitions of the Smithsonian Museums in FY 1972," (1971), pp. 10-11. Ripley had mandated that exhibit testing be built into the exhibit. Although Farb and Mahoney acquiesced in deference to Ripley, they agreed that formal "psychological testing" of the sort begun by behavioral psychologist Chandler Screven, which had attracted Ripley's attention, was not useful to them, since it created a jargon-laden analytical framework that attempted statistical analysis of behavioral categories (Peter Farb to James Mahoney, 11 February 1970, Boston University, Mugar Memorial Library, Department of Special Collections, Peter Farb Collection, File #10: files on Smithsonian Hall; James Mahoney to Peter Farb, 11 February 1970, Boston University, Mugar Memorial Library; S. Dillon Ripley to James Mahoney, 21 January 1970, Boston University, Mugar Memorial Library; Chandler Screven, "The Museum as a Responsive Learning Environment," *Museum News*, June 1969, pp. 7-10).

[75]James Mahoney to David Challinor, 18 October 1971, SIA RU 197, Director, NMNH, Records 1964-1969, 1971-1972, Box 32.

[76]James Mahoney to John Jameson, 22 March 1971, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 9.

objects used as illustration, rather than the object orientation of many current exhibition halls."[77]

This continued Ripley's desire to shake up museum exhibition, as originally articulated by Farb. Ripley's other favorite exhibit project at this time was an exhibition on drugs and their historical use and abuse. The drug exhibition was also mounted under the "ideas *versus* objects" banner. The December 1971 press release announcing the show's opening in April 1972 states, "The task of an institution of higher learning such as the Smithsonian is not to passively collect and store facts or to display the artifacts of history and technology but to blend knowledge and artifacts together into an exhibit which will give the visitor a broadened comprehension of a major issue of our times."[78] This was a direct attack on the traditional museum, as well as a claim of social relevance for the museum's new exhibition. Relevance was perhaps an even hotter buzzword than even the environment. The call for relevance formed the root of the counter-culture attacks on the complacency and insularity of academia and other elite institutions such as museums.

In discussing Ripley's disappointment in the endangered species exhibition, Frank Taylor projected:

> We can conclude that in the future a smaller number of the encyclopedic, chronological, retrospective, text book types of exhibits will be produced.. . .
>
> A larger number of exhibits will be required of the kind categorized as social action[,]. . .designed to invoke the museum and its potential for action on the opportunities in the museum's community for the social, cultural, and educational development of all the people.. . .

---

[77]Richard S. Cowan to John Jameson, 23 March 1971, SIA RU 197, Office of the Director, NMNH, Records 1964-1969, 1971-1972, Box 32.

[78][press release of drug exhibit opening in April 1972], 6 December 1971, SIA RU 363, NMNH, Office of Exhibits, Records. *ca.* 1955-1990, Box 11, p. 1.

> A primary objective is to provide newsworthy examples of the importance of museum action today and of the flexibility of museums to act effectively on current problems. To be newsworthy they must be punchy and different or made to appear so.[79]

According to Taylor, the traditional sort of museum exhibition was not useful in the social climate of the 1960s, and effective social action required "punchy" exhibitions. His assessment, when compared to MNH director Porter Kier's objections to the activist tone of the show, also shows how sharply the lines were drawn between the Secretariat and the MNH scientists. When the Hall 10 project got underway again, Mahoney hired an outside design team that favored ideas, alternative media, and relevance over the museum's collections or even its scientific expertise.

Outside Designers, Outside Aesthetics

Because of the funding delay, it was not until the beginning of the new fiscal year in the fall of 1971—fully a year and a half after the project was originally put on ice—that the outside graphic design and writing team of James Ward and Ralph Caplan presented their feasibility study for the exhibition and contracted to do the work.[80] Ward had been recommended to Jack Anglim, the head of exhibits at Natural History, and Ward in turn had recommended Caplan and the firm of Robert Gersin Associates.[81] Ward outlined Gersin's background in a letter to Mahoney:

---

[79]Frank Taylor to Richard S. Cowan, 26 December 1968, SIA RU 190, Director General of Museums and Director, United States National Museum, 1921-1973, Box 30, pp. 1-2.

[80]James Ward, Inc., Robert P. Gersin Associates and Ralph Caplan, "Feasibility Study Report for a Concept Hall Exhibition on the subject of Man's Roles in the Natural World," 15 October 1971, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 9. Both Ward and Caplan declined to discuss their involvement in "It All Depends."

[81]Mahoney Oral History, p. 17.

> The firm's design activities encompasses the five various design disciplines which are: product design; packaging and graphic design; exhibit design; and specialized architecture.
>
> The firm's work in the exhibition field included serving for 3 1/2 years as the overall planning and exhibit design consultant to Hemisfair, 1968. A regional world's fair in San Antonio, Texas. [sic] They also planned and designed the Fair's theme exhibit called "Confluence Cosmos,". . .[which] was a 30,000 square foot exhibit . . .which dramatized the various ways in which man throughout his history has experienced the universe.[82]

The firm was skilled at large-scale planning for private-sector trade shows, but had no previous experience with an object-oriented museum. Products the firm designed included a student microscope, a teaching planetarium, and shipping cartons. The "Confluence/Cosmos" exhibition was composed entirely of multi-media projected images.[83] In an interview, Mahoney explained why a firm with this approach was required for the project:

> There was no one at the Natural History Exhibits Lab staff who had the experience and/or the ability to design a project of this size and complexity within any reasonable time frame. They did, although they would deny it, a lot of things by trial and error. That just would not work on this project, which was to be state-of-the-art with all kinds of media.[84]

Ward and Gersin's selection to complete the project demonstrates the continued belief, first articulated by Farb and Mahoney, that the concept-based exhibition required a contemporary multi-media approach with its aesthetic firmly based in World's Fair design rather than traditional natural history museum exhibits.

Ralph Caplan had previously written for such publications as *Design*, *The Nation*, and *Encyclopedia Americana*. He also worked on the 1964 and 1967 World's Fairs, and wrote "Four Minutes," a short promotional film for *Scientific American*. He was for four years a "consultant to the Commission of College

---

[82]James Ward to James Mahoney, 14 September 1971, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 9.

[83]"Masters of All Trades," *Industrial Design*, 1970, *17*:66-71, pp. 66-71.

[84]Mahoney Oral History, p. 17.

Physics under sponsorship of the NSF," and spent two years "exploring innovative uses of technology in teaching" for the State University of New York[85] He therefore could claim at least some background in science education, but his World's Fair and teaching technology experience meant that like Ward and Gersin, he was a stranger to the culture and interests of a natural history museum. In spite of his experience, Caplan was perceived as a complete outsider by Gilbert Wright, the head exhibit editor for the Natural History Museum, who characterized him as a "novelist" who knew "nothing about science."[86] Wright was a museum man who held a master's degree in zoology.[87] From his point of view, knowledge of the subject matter was a necessity.

Many others at the museum shared this perception that the design team had no scientific credentials or literacy. Both Ron Goor, the museum's content coordinator for the exhibition, and the curatorial staff, who eventually rejected the first batch of scripts as unacceptable, grew frustrated. Gilbert Wright later commented that "Ron and I found from the very outset that as designers they had no regard whatsoever for the content of the hall. If they had been allowed to go their own way, we would have had something very pretty but with very little content."[88] Goor wrote to Cowan shortly after a round of meetings with Ward and Gersin in February 1972, complaining that both of them "seem to have neither the time nor the inclination to become familiar with the Hall 10 subject matter."[89] The curators' criticisms of the scripts were harsh and scathing: one

---

[85]Ward to Mahoney, 14 September 1971.

[86]Harney to Larsen, "Hall 10," 22 December, 1972, p. 2.

[87]A. Gilbert Wright, "Supplemental Sheet 1: Special qualifications and skills," 1960, SIA RU 7331 A. Gilbert Wright Papers, 1936-1981, Box 1; A. Gilbert Wright, "A. Gilbert Wright Chronology," 1975-1980, SIA RU 7331, Box 1; A. Gilbert Wright, "Oral History Interview," 1983, SIA RU 9523, Box 1.

[88]Harney to Larsen, "Hall 10," 22 December, 1972, p. 2.

[89]Ronald S. Goor to Richard S. Cowan, 16 February 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 9, p. 1.

called them “barely literate, very immature, poorly conceived, scientifically inaccurate, and lacking imagination or interest.”[90]

These frustrations are only a hint of the serious disagreements surrounding the exhibition and its genre and argument. They stemmed from the fact that, as shown in Chapter Four, the exhibit-makers viewed design as a deductive process, selecting particulars to fit the general idea (“concepts”). The specific details of did not matter to them in the way that they did to the naturalists, who saw generalities only as arising from particulars (objects) in the cycle of induction discussed in Chapter Three.

The Biome as General Organizing Principle

“It All Depends” was divided into five sections, or zones, progressively moving the show’s narrative logic from our alienation from our environment, to our destruction of it, to our need to recover an understanding of the connections we enjoyed with the rest of the environment, in order to recover from the disaster we had inflicted upon ourselves and the planet.[91] The topics Goor specified for each zone were, respectively, the “man made world of today,” biomes or “regional environments,” niches and adaptation, human cultural adaptation, and solutions to the ecological crisis. Goor described these areas in an early summary of the contents of the hall:

> Zone I. Purpose: to show artificiality and man’s apparent removal from Nature (actually an illusion which the rest of the hall will demonstrate).
> Zone II. The flow of energy and cycles of matter in representative biomes; and a summation of them from the standpoint of a global perspective.
> Zone III. Individual species do not live in a regional environment (biome) but in small environments of their own (niches).

---

[90]Leo J. Hickey to Richard S. Cowan, 24 May 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

[91]James Ward, Inc. “Feasibility Study,” pp. 1-16.

> Zone IV. The main purpose is to contrast man's cultural method of adaptation with the genetic means of all other organisms and to explore the consequences of this new form of adaptation for the physical and biotic environment.
> Zone V. Choices and Consequences. Various exhibits will demonstrate man's past failures and future opportunities to adjust his activities to natural rates of energy-flow and cycles of matter.[92]

The issues of greatest interest here are the portrayal of human's relation to nature in Zones I and V and the way in which Zone II (including the rain forest reproduction) conceived of the functioning of the earth in terms of energy flows in a generalized set of habitat types (biomes).

Biome as Activist Trope

As Chapter Four showed, scientific and aesthetic differences of opinion between the naturalists and the professional exhibit-makers lay at the core of the objects/induction versus concepts/deduction debate. This section further demonstrates that the clash between the curators and the designers arose from incommensurate paradigms of the natural world: one that is particularistic and concrete, and the other that is general and abstract. As "It All Depends" was completed, disputes centered on the use of "biomes" chosen by the exhibit-makers as a central organizing principle for the exhibition. This argument entailed the genre of abstraction, which the curators also contested.

Peter Farb's 1963 edition of *Ecology* states, "A biome can be crudely described as a climatic zone. It has its own pattern of rainfall, its own maximum and minimum temperatures, its own seasons and is own changes of day length, all of which combine to produce a certain kind of vegetation—which, in turn, shelters a unique animal life."[93] An appendix maps out eight "generally recognized land biomes," including tropical; coniferous and deciduous forests;

---

[92]Ronald Goor, "Summary Statement on Zones in Hall 10," *ca.* 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10, p. 1.

[93]Farb, *Ecology*, 1st ed., p. 14.

tundra; grassland; savanna; woodland and chaparral; and desert.[94] In the Hall of Living Things, Farb cast the tropical rain forest into this role because he was more interested in its general structure than the particular species living there.

Frederick Clements, who promoted ecology as an experimentally rigorous alternative to natural history, originated the term biome in the 1940s.[95] The naturalist and nature writer Marston Bates did not use it in his 1950 popular survey of ecological topics written when the subject was still more widely known as natural history.[96] Instead, he referred to the various characteristics of an organism's "environment" in general, such as water, light, altitude, etc.[97] Discussing the characteristic distributions of organisms, Bates outlined Alfred Russel Wallace's "biotic communities." These divide the world into regions based on not only climate and physical geography, but by the specific groups of organisms living there. For example, Europe and Northern Asia are the Palearctic ("old world northern region"), while Central and South America are the Neotropics ("new world tropical region"). According to Bates, Wallace's categories, proposed in 1876, were by the 1950s "very generally accepted by zoologists" as well as botanists.[98]

A decade later, Farb's *Ecology* acknowledged that "while biomes are repeated around the world, each continent. . .has its own particular version of the forest, grassland and the rest, as well as the animals that have adapted themselves to it."[99] However, by the time the term biome appeared in Smithsonian educational materials in the 1970s, the long-standing notion of the

---

[94]*Ibid*., p. 184.

[95]Hagen, *The Entangled Bank*, p. 15; Worster, *Nature's Economy*, p. 214.

[96]Marston Bates, *The Nature of Natural History* (Princeton: Princeton University Press, 1950).

[97]*Ibid*., Chapter Seven, "The Environment."

[98]*Ibid*., pp. 187-191.

[99]Farb *Ecology*, 1st ed., p. 185.

biotic community, which recognized both large-scale groups and local specificity, had been simplified and stripped of its particularity. The "Ecology" teacher's guide for museum tours relied heavily on the notion of biomes defined as "a large area of land or water environment which has a particular climate and characteristic or dominant groups of plants and animals."[100]

Again, the importance of that definition of biome is that it considered the basic ecological unit of analysis to be a generalized set of characteristics, not a specific habitat with local characteristics. The world's deserts, tundra, and tropical rain forests were all lumped together as representatives of the *type* desert biome, tundra biome, or rain forest biome. The grassland biome type listed bison and coyotes in North America in columns next to wildebeest and hyenas in Africa, casting them all as functionally interchangeable parts. Similarly, primates were portrayed as characteristic residents of the rain forest biome, making monkeys, chimps, gorillas, and humans into functional equivalents without regard to location.[101] There is no mention of Wallace's classic names.

Goor employed an explicitly generalized version of biomes, using them as a means of developing a broad discussion of adaptations to the physical environment. This version carried the same basic definition as Farb's, but jettisoned the regional distinctions Farb kept:

> Conditions characteristic of a distinctive biome type enforce a similarity of adaptation in otherwise un-related organisms that may be distantly separated geographically. Ecological equivalents, such as the horse and the kangaroo illustrate how un-related organisms fill similar niches in similar but distant biomes.[102]

---

[100]Caroline B. Davis, "Smithsonian Guided Tours in Social Studies and Science Teacher's Guide Number 14 'Ecology,'" 1971, SIA RU 363 NMNH Office of Exhibits, Records *ca.* 1955-1990, Box. 14, p. 4.

[101]*Ibid*., pp. 7-8.

[102]Ronald Goor, "Hall 10. A Major Exhibit on Ecology, NMNH, The Smithsonian Institution. A Brief Summary to Accompany the Attached Outline of Exhibit Themes," 1 February 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 2, p. 1.

The idea of ecological equivalents used individual animals as place-holders in the larger energy flows and cycles that were a key image in public ecological discourse. Another theme statement by Goor details the connection between energy cycles and biomes that he wanted to develop:

> The earth is finite, and so are its resources—the essentials required by all life: energy, oxygen, water, carbon, nitrogen, space, etc.. . .Many of the essentials exist in alternative forms (CO_2, CO, carbohydrates; N_2, NO_2, NO_2, NH_2) which are interconvertable and which form cycles.. . .Viewed from a different perspective, the cycles are kept in motion. . .by the action of organisms and by the flow of energy through these organisms.. . .
> Emphasis on cycles, energy, means to reduce interspecies competition, means of adjusting population sizes to suit resources—the relation of organisms to cycles of essentials, and energy from the sun—then, are primary concepts to be presented by Hall 10. The Biomes become stages for making the above points.[103]

It should now be clear why for the naturalists, biomes as Goor wanted to use them were not a central category of perception or analysis. Wallace's notion of biotic communities aimed to understand how organisms were distributed around the world, and each community was recognized as having its own peculiarities rather than being the generic equivalent of a group in another place.

The Rain Forest as Biome

The difference between biomes and biotic communities or habitats is quite clearly manifest in the way that the rain forest exhibit finally appeared in Hall 10. Goor expected the rain forest to stand in as a representative of one of the biomes, and as in Farb's scheme discussed in Chapter Four, the rain forest was to signify the great web of connections and adaptations of life. Like Farb's, Ward and Gersin's initial design called for a rain forest that was not ultra-realistic, but one that conveyed the general principles of energy flow and biome type. Ultimately,

---

[103]Ronald Goor, "Another New Statement for Hall 10," 16 February 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 9, pp. 1-2.

however, because the MNH exhibit staff produced it, the rain forest was the only part of the exhibition to retain the genre of realistic place specificity.

When Cowan accepted Farb's Hall of Living Things plan in 1968, he clearly did so in order to save the rain forest habitat group; including a realistic rain forest had become non-negotiable. When the curators deemed Caplan's script for the rain forest lacking in concrete, accurate detail, botany curator Thomas Soderstrom and entomology curator Donald Duckworth stepped in to write the final version. Though Caplan discussed rain forests as a biome in general, he did not relate the specific contents of the British Guiana rain forest to what would be built in Hall 10. To solve this, Soderstrom rewrote the script "in consultation with the production staff and after an inventory of all materials to be used in the exhibit."[104] He did address the specific characteristics of the organisms that were part of the exhibit, such as leaf adaptations to heavy rain, fitting the label copy to the object, rather than the other way around.[105]

There are two reasons why the exhibit-makers repeatedly attempted to abstract the rain forest. The first was the rhetorical strategy of stripping away detail and centering on a grand theme. The second was a more fundamental link between a global perspective of nature as a unitary system and the environmental message intended by the exhibit-makers. Although the overarching concern of the habitat group was to place the viewer in a specific place, the new design made only a nod to place-specificity. In their initial feasibility study, Ward and Gersin declared that

---

[104]Leo Hickey to Porter Kier, 19 March 1973, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

[105]Thomas Soderstrom, "Rain forest script," 19 July 1973, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 2; Thomas Soderstrom, [script and layout for rain forest panels], July-August 1973, SIA RU 503, Box 2.

> it is more convincing, more rewarding, and certainly more dramatic to explore a particular biome than it is to consider biomes in the abstract. The tropical rain forest is a particularly rich model for viewing abundance and diversity of life, stratification, food chains, competition and symbiosis. It is an environment visitors are likely to find exotic, yet not wholly alien.[106]

Although supposedly more interesting than an abstract principle by itself, Ward and Gersin still saw the rain forest as an instance of the principle, a *model* rather than a *place*, neither the source of its definition nor of intrinsic interest. This is because the translation process of their communication approach and reasoning deductively moved from general principle to particulars. More importantly, the particulars existed solely to support the general principle. This contrasts to the naturalists' more inductive approach, which valued general principles derived from particulars, and translated nature via a two-way dialog between the lab and the field. Of course, the general principles the designers wished to communicate could not have been arrived at without particulars gathered in the field. The designers' approach removed both the scientists' tacit knowledge and practice from the process of representing nature in the museum.

The problem is neither that communicators can dismiss induction, nor that naturalists actually entirely rely on it. Rather, the misunderstanding arises because science communication tends to delete the history of the making of scientific knowledge and focus on finished information. At the Smithsonian, the writers and designers did not see themselves as part of the process of generating scientific knowledge. Their self-defined task was to move finished "black-boxed" knowledge from the private to the public domains. Sociologist of science Harry Collins has argued that the perception that scientific knowledge is certain, formalized, and finished increases as one moves away from the "core-set" of researchers actually involved in settling a particular dispute or question. Facts of

---

[106]James Ward, Inc. "Feasibility Study," p. 4.

the matter only really look settled at a distance, measured either as social distance from the laboratory or in time elapsed since achieving closure. According to Collins, "Distance from the scene of creation is the very source of the solidarity of scientific facts."[107] He showed that television programs about science accomplish this by re-staging crucial experiments, thereby creating a sense of drama, but removing the mess of on-going science.[108]

Other studies have shown that scientists' primary complaints about science reporting center on its tendency to remove the seemingly small details and minor caveats that make the information meaningful to scientists, but are deemed to confuse the issue for a general audience.[109] The exhibit designers' repeated insistence on abstract representations of the rain forest belong to this general pattern; they had little interest in preserving the detail and context of discovery (the richness of the field) that was crucial to the naturalist.

This is one of the significant differences between the professional popularizer and the professional naturalist who popularizes. Popularizers are part of the communication pipeline. They primarily deal with digesting the technical literature, which is already at least one step removed from the observations, field sites, and intellectual games and questions in which the naturalist is immersed. The popularizer is not so much wrestling with creating an explanation of the world itself, but of the scientists' representation of the world. It is not that objects cannot show adaptation (for example, sections of the Smithsonian's mammal, bird, and physical anthropology halls do use objects to illustrate adaptation), but that the popularizer is brokering a representation of a

---

[107] H. M. Collins, "Certainty and the Public Understanding of Science: Science on Television," *Social Studies of Science*, 1987, *17*:689-713, on p. 692.

[108] *Ibid*., pp. 700-702.

[109] Sharon Dunwoody, "A Question of Accuracy," *IEEE Transactions on Professional Communication PC-25*, December 1982, pp. 196-199.

representation rather than an immediate engagement with the world. For example, the model for “It All Depends” included graphic panels of animal adaptations instead of actual specimens (Figure 5.1). The objects on posts in front of the graphic panels are binoculars through which the visitor would view the animal adaptation panels. Rather than provide the museum visitor with the same material the naturalist uses to understand adaptations—real animals, either mounted as popularized taxidermy or technical study skins—the design turned the visitor’s experience into a metaphor for the act of observation.

This partly explains how, in the communications arena, if the general principle was the focus, then the museum’s traditional need for particulars to be real objects or accurate models could be set aside. Like Farb’s attempts to abstract the rain forest (for the same reasons), Ward and Gersin further suggested that “Moving images could be projected at the very top and at other levels as well.”[110] Although the “accurate theatricality” of their suggestion might sound like the botanists’ original valuation of drama for the rain forest, this theatricality did not serve “you are there” realism, but was meant to provide the emotional underpinnings for a generalized inference about how living things are connected on a global scale:

> As we now envision it, the rain forest is not a total “recreation.” That would be difficult to construct convincingly.. . .While we wish to give the visitor a feeling of a rain forest and the experience of what happens in it, the tropical rain forest is actually a vehicle for showing how life goes on within a single biome. We want to keep the visitor aware that the factors that sustain life there are essentially those that sustain life anywhere.[111]

---

[110]James Ward, Inc., “Feasibility Study” (1971), p. 4. The suggested technique of projecting images within the rain forest was one the firm had previously used in the “Confluence/Cosmos” trade show exhibit (*Industrial Design* “Masters of All Trades,” p. 67).

[111]James Ward, Inc. “Feasibility Study Report,” p. 5.

Figure 5.1. Adaptation exhibit (Zone III) model for "It All Depends," designed by Robert Gersin Associates, September 1972. The binoculars intended to simulate viewing animals are on stands on the left and right. SIA RU 363, Box 8, courtesy the Smithsonian Institution.

The traditional natural history museum inscription devices developed over the past half-century precisely to construct convincing recreations of nature did not belong to the expertise or vocabulary of a firm specializing in multi-media projections and temporary exhibits. The multi-media design relied on reassembling the ready-made abstract paper inscriptions of the laboratory, such as charts and two-dimensional images, instead of maintaining the traditional physicality of the museum.

Even after more than a year of involvement with the Museum of Natural History, Ward and Gersin's design included very few objects. At the 1972 briefing for the Assistant Secretaries, Harney reported,

> It was evident that as designers,. . .they talked about the aesthetic and symbolic importance of the materials used to construct the exhibit and the significance of the film and video technology incorporated. These were the underlying symbolic themes that Beckman [the drug show designer] had stressed heavily but as we were later to see, were virtually meaningless to eventual success or failure of the exhibit. The reaction [of] the group. . .seemed overwhelmingly favorable.. . .Pointing out that this exhibit contains very few objects from the MNH collections, he [Paul Perrot] asked the designer if some attempt shouldn't be made to relate the Hall's message to the objects found in the other object-oriented halls within the Museum of Natural History. The designer said he thought this might be accomplished at various points through the use of the narrator's voice or by graphics. "As we thought the exhibit out, we continually found that the use of museum specimens wasn't the best way to make our point," he told Perrot.[112]

The first section of this passage, discussing the "symbolic importance of the materials used to construct the exhibit" shows the designers' adherence to Marshall McLuhan's "the medium is the message" dictum, which claims that

112Harney to Larsen, "Hall 10," 22 December, 1972, p. 1. Paul Perrot had also been concerned about the lack of objects in the design earlier in the fall (Paul Perrot to James Mahoney, 3 October 1972, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 18).

form is more important than content in creating meaning.[113] Their pitch seemed persuasive enough to suppress misgivings based on previous experience with the symbolic approach, since Harney reports that the group's response was "overwhelmingly favorable." However, the designers' response to Perrot's question indicates there was a continued assumption that the hall's message (and therefore the media used to convey it) was not related to the museum's history or function. That is, if the designers had been strictly applying a "form influences content" approach to the museum, they might have attempted to understand the museum as a whole (the content) before deciding on what form was appropriate. However, their cultural commitment to multi-media combined with the sense that the environment was a new and radical subject requiring a new and radical treatment, caused them to ignore the museum genre outright.

The tension between the designers and the museum continued throughout the hall's development. The March, 1972, "Summary of concept presentation" initialed by Ward, Goor, and Caplan for Hall 10 first called the tropical rain forest "stylized," but the phrase was revised to read "generalized new world rain forest."[114] The difference between "stylized" and "generalized" is crucial, for "generalized" can still be realistic, and "new world" recovers a bit of specificity. Over a year later, when Thomas Soderstrom took over the script-writing process for the rain forest, he attempted to return to something still closer to a sense of place by suggesting a sign over the door of the rain forest enclosure reading,

---

[113]The aphorism became such a buzzword that McLuhan himself parodied it in his 1967 *bricolage* celebrating the new fragmented, visual media (Marshall McLuhan and Quentin Fiore, *The Medium Is the Massage*, (New York: Touchstone, 1987 [1967])).

[114]James S. Ward, Ronald P. Goor and Ralph Caplan to Richard S. Cowan, *et al.*, 23 March 1972, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 18, p. 4.

"Tropical Rain Forest Kaieteur Plateau, Guyana, Northern South America."[115] That sign was not included in the final hall.

Crucially, the curators and designers diverged not merely in taste in how to frame the same basic information. Fundamentally underlying their disagreement was a difference in ecological theory and explanation. The second overall force propelling the efforts to make the rain forest stand as an instance of the generic concept of the biome was that the deductive approach fit well rhetorically with the message the exhibit-makers wanted to convey. The emphasis on general "factors that sustain life anywhere" served the environmentalist message of the unity of all nature and the claim that we cannot disrupt *any* of the threads in the web of life because they are *all* connected. If any physical place is granted uniqueness, according to this logic, then it will be exempted from the great universal web and we will wrongly assume we can destroy it without damaging anything else. This is problematic, however, because once locked into this web, the implications of our own personal responsibility for our actions are diffused around the entire planet, while at the same time, the individual places we are charged to protect are reduced to cogs in the global wheel, valuable only in as much as they sustain the whole.

Two more examples of exhibits proposed for the hall to illustrate biomes other than the rain forest, one that was killed and one that survived, further illustrate what Gilbert Wright called the designer's "disregard for content." They further highlight the differences between the naturalist's world view and the communicator's goals. One of the exhibits was called the "Biosphere," and was to depict the world's biomes. It was deleted from the design as too expensive sometime in mid-1973, and not because the curators rejected it as inaccurate

---

[115] Soderstrom, [script and layout for rain forest panels].

show-biz glitz.[116] The second exhibit, a modest life group (specimens and foreground accessories *without* a background) depicting the desert biome, was one of the few exhibits besides the rain forest that contained specimens or models. The curators' concerns about the interpretation of this exhibit were also ignored. The curators could play only a minor role at this stage, even when they attempted to step back into the process.

"Banks of Coruscating Multi-hued Lights"

Figure 5.2 shows the model of the "Biosphere" exhibit finished in September, 1972.[117] The March 1972 Hall 10 concept presentation described the Biosphere exhibit as follows:

> As he enters this Zone, the visitor is probably attracted first to a Plexiglas dome with a sphere beneath it. On the sphere he examines the geographical distribution of major biome types as a voice-over describes the limits each biome imposes on the life forms in it. He touches the desert and feels warmth, the tundra and feels cold. He smells the salt air off the sea. In the dome a series of translucent graphic display plates are illuminated, accompanied by voice-over, to explain how the natural cycles tie all biomes together into the biosphere.[118]

The design, with the hands-on sensations of warm and cold, fit into efforts to involve the visitor by stimulating multiple senses.[119] However, this was a token involvement at best, as most of the experience was to watch lights blink on and off in sync with the audio recording.

---

[116]"Design of Hall 10/NMNH, James S. Ward, Incorporated, Robert P. Gersin Associates," 1973, SIA RU 363, NMNH, Office of Exhibits, *ca.* 1960-1980, Box 8; Soderstrom, [script and layout for rain forest panels].

[117]Robert P. Gersin Design Office, ["It All Depends" model: 'biosphere' bubble], 35mm color transparency, 1972. The exhibit was also appeared in the earlier concept model of March, 1972 (["It All Depends" concept model], 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 2).

[118]Ward "Summary of Concept Presentation" (1972), p. 4.

[119]This was one of Ripley's favorite ideas for updating the museum. He promoted "hearies, feelies, and smellies" in order to make the museum more tactile (John Anglim to S. Dillon Ripley, 31 May 1966, SIA RU 155, Director, NMNH, 1948-1970, Box 10).

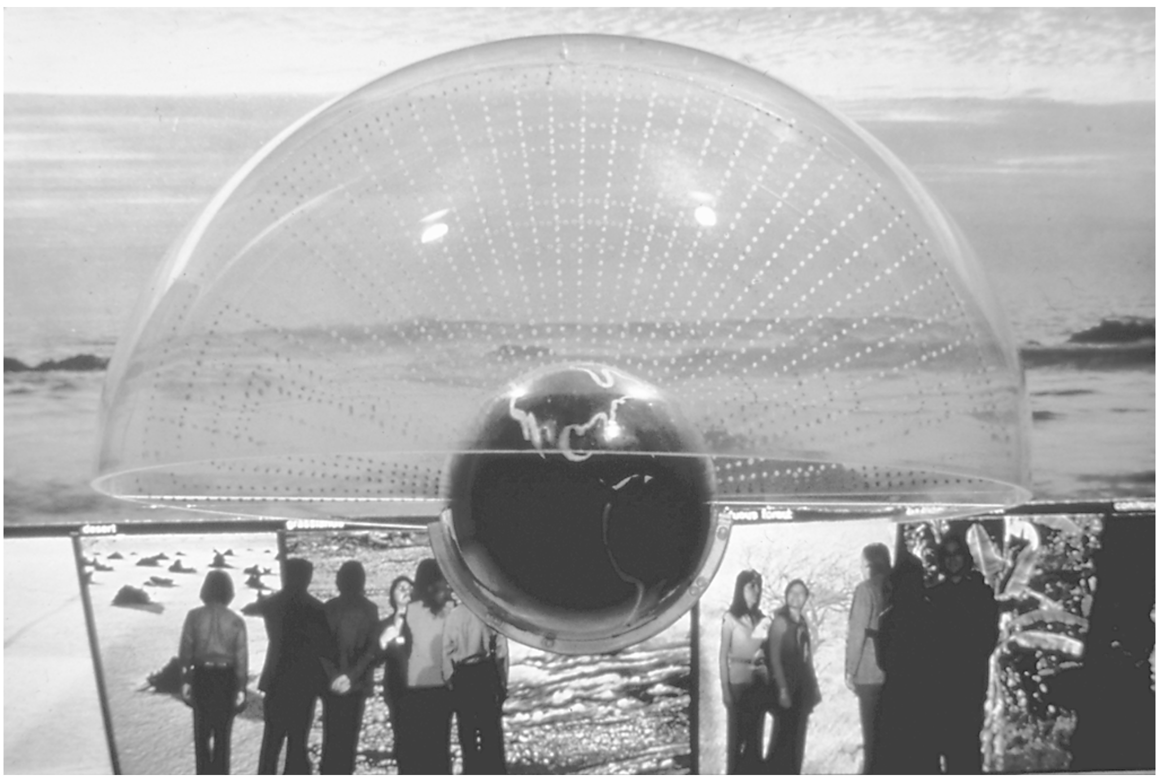


Figure 5.2. "Biosphere" exhibit model for "It All Depends," designed by Robert Gersin Associates, September 1972. SIA RU 363, Box 8, courtesy the Smithsonian Institution.

Caplan's draft scripts for the biosphere exhibit written in May, 1972, drew scathing criticisms from the curator members of the MNH Exhibits Committee. A sampling of their responses to Cowan's request for their comments on the scripts indicates their frustration with both its form and content. Invertebrate zoologist Thomas Bowman repeatedly wrote, "simplistic. . .NO, not so."[120] Oliver Flint, an entomologist, agreed: "Much of this is oversimplified and therefore not quite accurate."[121] To George Zug, a herpetologist, the problem was, "The Caplan scripts are not only misleading but frequently incorrect."[122] Botanist David Lellinger, who had worked on plans for the botany hall, was less charitable, writing, "Incomplete, inaccurate, and incomprehensible. C+ content, D- grammar."[123] George Switzer of Mineralogy worried "that they are too long and too 'gimmicky.' Why can't something be done using SPECIMENS instead of flashing, dimming, fading, shimmering, etc. lights?"[124]

Exhibits Committee chair Leo Hickey, a paleobotanist, deplored the curators' marginalization from exhibit-making. He called the scripts

> barely literate, very immature, poorly conceived, scientifically inaccurate, and lacking in imagination or interest. I can say that no better examples could be found of the wreckage that will result from the removal of the MNH scientific staff from all but a minor advisory role in exhibits planning here.[125]

---

[120]Thomas E. Bowman to Richard Cowan, May 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

[121]Oliver S. Flint Jr. to Richard Cowan, May 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

[122]George Zug to Richard Cowan, May 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

[123]David B. Lellinger to Richard Cowan, May 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

[124]Leo J. Hickey, [annotations to Caplan's May 1972 Preliminary Script], 24 May 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

[125]*Ibid*.

Hickey saw the new audio-visual design approach to be antithetical to the traditional conception and function of the museum. He continued, "Quite aside from their faults as pieces of scientific interpretation, they are not even capable exercises in design and show a total disregard for the needs and unique resources of the Natural History Museum."[126] Given the historically close ties between exhibition and research at the natural history museum, it is easy to imagine why it was hard for Hickey not to take this "total disregard" personally. Assuming that public exhibits were fundamentally linked directly to the behind-the-scenes activities, the curators saw the new approach as not just an effort to improve public education, but as a direct assault on the research identity of the museum. Hickey was clearly offended by the thought that his work would be represented by the new exhibit style:

> I can envision a day when the importation of such excrescenses of pin ball machine technology has replaced whole halls of specimens with banks of coruscating multi-hued lights and a soothing audio background. You just can't cover up shoddy thinking and lack of imagination with gimmickry.[127]

The designers no doubt saw themselves as being highly imaginative in creating a distinctive space and a dramatic experience using new media (recall their interest in "the esthetic and symbolic importance of the materials used to construct the exhibit"). Hickey's comments suggest that his sense of imagination was firmly coupled to intellectual stimulation by the subject matter and realistic representation. If there was such a fundamental disagreement over the very definition of what counted as imaginative, then it is small wonder that there was little else about which the two sides could agree.

Figure 5.3 reproduces the first two pages of Caplan's biosphere script and Hickey's comments on its definition and use of the term, "biome." Hickey's

---

126*Ibid*.
127*Ibid*.

Zone II

Exhibit unit #1

Object: sphere

Subject: biomes and their distribution

Where on earth does life go on? Not everywhere. Not nearly everywhere. Earth is by no means an ideal environment for living things and only a portion of the surface -- the biosphere -- can even support life at all. On land and in the air the extent of the biosphere is defined by trees. It is only as deep as the deepest roots and only as high as the tallest trees, even though birds and insects can temporarily fly much higher. In the sea, living things are found only as much as a few miles down, and most of them are confined to the top 500 feet. Because it includes land, sea, and air -- with global variations in climate -- it is clear that the biosphere is not an environment but a collection of related environments.

?

Biosphere The envelope of life
NOT The earth's surface
NOT True!
Algae fungi in high atmosphere, Deep ocean & Subsurface Anerobic bacteria

?

not a definition

Figure 5.3a. Biome exhibit script by Ralph Caplan, written comments by Leo Hickey, page 1, May 1972. SIA RU 503, Box 10, courtesy the Smithsonian Institution.

2

Your biomes are neither inclusive or equivalent,

AUDIO	VISUAL
These related environments are called biomes. The principle biome types are the tundra,[1] the taiga,[2] the deciduous forest,[3] the grasslands,[4] the desert,[5] and the sea.[6] Each biome provides the essentials of life and imposes environmental conditions on the forms of life that inhabit it.	Each of the six biome areas on the sphere lights up in sequence. You mention later on (p. —)
	a biome is a community of living organisms* not an environment (*Clements)
based on false idea of biome — Biomes, like life itself, come about from the varying amounts of solar energy falling on particular regions.	(6) is not in any sense a biome. A coral reef or estuary would be a biome.
If the real world were as smooth and even as this plexiglass sphere, the arrangement here would be a lot simpler. And perhaps life would be simpler, too.	Not True!
But because mountains and ocean currents are part of our geographical history, biomes are distributed unevenly and the same biome types support different kinds of animals depending on where they are located.	What?
Where they are located is a matter of climate -- of temperature	

Figure 5.3b. Biome exhibit script by Ralph Caplan, written comments by Leo Hickey, page 2, May 1972. SIA RU 503, Box 10, courtesy the Smithsonian Institution.

responses show that he was completely unsympathetic to Goor and Caplan's attempts to portray nature as a universally fragile web. Written like most well-organized popular articles or news scripts, the script uses a classic funnel-style introduction beginning with a very wide teaser question that narrows to a more specific point. In order to portray life on Earth as tenuous and precious, Caplan began with the claim that "Earth is by no means an ideal environment for living things and only a portion of the surface—the biosphere—can even support life at all." Hickey rejected the introductory device, replying that the biosphere is "the envelope of life, not the earth's surface." Caplan next invoked Farb's definition of biomes as a climate type that "imposes environmental conditions on the forms of life that inhabit it." Hickey rejected that definition as well, saying it is "based on [a] false idea of [a] biome," asserting that a biome is properly defined as "a community of living organisms not an environment" (an environment, according to naturalist Marston Bates, being the physical and climactic characteristics of the place).[128] Next, Hickey vehemently rejected as "Not True!" Caplan's statement that "Biomes, like life itself, come about from the varying amounts of solar energy falling on particular regions."

Hickey's harsh reactions seem to be based on a narrow band of judgment about the absolute accuracy of Caplan's statements, rather than an attempt to help clarify the facts in light of the goals of the exhibit. There is no indication that he saw, much less agreed with, the underlying logical connection between the activist argument and the rhetorical function ecological ideas were meant to play. Hickey had no interest in the idea of energy cycles that Goor wanted to

---

[128]Hickey attributes this to Frederick Clements. According to systems ecologist Eugene Odum's introductory college ecology text, "In a given biome the life form of the climax vegetation is uniform, and is the key to recognition" (Eugene P. Odum, *Ecology: The Link Between the Natural and the Social Sciences*, 2 ed. (New York: Holt, Rinehart and Winston, 1975), p. 184). For the definition of an "environment," see Bates, *The Nature of Natural History*, Chapter Seven, "The Environment."

incorporate into a larger portrait of earth-as-integrated-system. This is quite clear in the next script for the Biosphere's energy cycles exhibit. Like the biome presentation, this segment featured moving patterns of colored lights to illustrate the flow of energy through the global systems. Near the end of the narration, the script returns to the theme of complexity and fragility:

> The material cycles [such as carbon or nitrogen] are the engine that runs the only life support system we know. It is a very fragile machine, with a multitude of moving parts. There is no reason—at least was no reason—that it couldn't run forever, if the parts were all left to their own devices. But to upset the delicate balance is the equivalent of throwing a monkey wrench into an internal combustion engine. The difference is that no one knows how to fix the engine.[129]

The engine metaphor works in two directions at once, both comparing the earth to a familiar energy-using mechanism, and claiming that it is not a typical machine that human beings can tinker with. Again, Hickey rejected this strategy with unconcealed anger and belittling language, penciling in, "None of the cycles you have mentioned is fragile. You are confused with things like food chains which you probably don't understand either."[130] Hickey categorically refused to buy into any of the romanticized or activist interpretations of ecological ideas and clearly resisted drawing normative conclusions from scientific ideas.

Goor and Wright, on the other hand, thought, "On the whole the scripts have been very good," but suggested that the engine passage should "make [it] clearer that man is the villain."[131] They clearly felt the scripts served their thematic goals. The next revision was remarkably similar to the drafts the

---

[129]Ralph Caplan, "Zone II Preliminary Script: Energy and Material Cycles," May 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10, p. 7.

[130]Hickey [annotations to Caplan's script], p. 7.

[131]Ronald Goor and Gilbert Wright to Ralph Caplan, thru James Ward and thru James Mahoney, 15 June 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

curators so roundly criticized. The engine passage is almost identical, and the earlier biome passages have been changed to make the barest of concessions to the curator's criticisms.[132] The final version, written in early 1973, did remove the fragile engine image, but the assertion at the beginning of the biosphere script that only a "small portion of the earth's surface can support life" remained.[133] The begrudging level of the changes imply that Caplan was not about to yield to the curators in the face of their hostility to the overall design.[134] Even before they reviewed the final scripts, the Exhibit Committee saw the Hall 10 program as a complete failure, recommending in early 1973 that it be kept open "only long enough to satisfy Congress (6-10 months) before starting to build a new object oriented exhibit around the rainforest-desert-tidal zone nucleus."[135]

In the end, the Exhibits Committee conceded defeat, and when it reviewed the scripts for the last time, Hickey reported to Kier, "In keeping with your guidelines we confined ourselves to correcting only that material which we felt was scientifically inaccurate or misleading and tried to refrain from making any physical changes in the design of the exhibits themselves."[136] The lingering claim that a "small portion of the earth's surface can support life" was the subject of the Exhibits Committee's last major objection to the scripts; Hickey replied,

---

[132] Ralph Caplan, "Revised preliminary scripts: Biomes and their distribution, Energy and material cycles," 26 July 1972, SIA RU 197, Office of the Director, NMNH, Records, 1964-1969, 1971-1972, Box 40.

[133] Ralph Caplan, "Author's final script: biomes and their distribution, Energy and material cycles," 28 February 1973, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

[134] Mahoney largely portrays the curators as uninterested in the exhibits program inspired by Ripley (Mahoney Oral History, pp. 16-17). For their part, the curators saw Ripley's "idea men" as equally arrogant in their disregard for their expertise (Evans Oral History, p. 50).

[135] Leo J. Hickey to Porter Kier, 8 January 1973, SIA RU 257, Director, NMNH, 1973-1975, Records, Box 4.

[136] Leo Hickey to Porter Kier, 19 March 1973, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

"Not correct! About 90% of [the] earth's surface supports life."[137] Shortly after the Exhibits Committee reluctantly passed the scripts, the biosphere and energy exhibit was deleted in order to save about $44,000.[138] The curators won not on principles but because the grandiose plans of the designers could not be sustained even by the quarter-million dollar budget approved for the project that year, which was enormous for the time.

Camels & Jackrabbits Make Strange Diorama Partners

The other major suggestion the curators made in their final review related to a small life group that depicted the desert of the southwestern United States. Just as the rain forest reproduction became the representative biome to illustrate the interconnections of a living system, the desert group was meant to portray the ways organisms adapted to their environment. Figure 5.4 shows a close-up of the finished group in the exhibition. Like the rain forest, the group was built with plant models, casts, and dried materials that the exhibits department had previously collected.[139] In theory, this exhibit could have been a successful use of the specific life group to embody a broader concept. Instead, it became another battle ground for the partisans of objects and concepts.

Several small animals were collected and freeze-dried for the exhibit. Mahoney reported to museum director Porter Kier that "people on the Office of Exhibits Programs staff have seen these orders [for the desert animals] and have voiced strong concern over killing animals. They have voiced their intention to

---

[137]Caplan "Author's final script: biomes and energy cycles."

[138]"Design of Hall 10/NMNH, James S. Ward, Incorporated, Robert P. Gersin Associates," 1973, SIA RU 363, NMNH, Office of Exhibits, *ca.* 1960-1980, Box 8.

[139]These materials probably came from the expedition to Baja California in 1963 for the botany hall, which also included Reginald Sayre, Paul Marchand, and Richard Cowan.

Figure 5.4. Detail of desert biome kiosk, "It All Depends" opening, April 5, 1974, in Hall 10 of the National Museum of Natural History. The gila monster's tail is visible at the far left. Exhibit enclosure cropped from original. OPPS Neg. #74-3477-3A courtesy the Smithsonian Institution.

object to this procedure in whatever way possible."[140] The exhibit staff's objections to killing even the small number of quite common animals (such as a jackrabbit and gila monster) for the desert life group indicate the vast cultural distance between the modern exhibit staff and the traditional exhibit-makers, who were sportsmen-naturalists like Denver's Alfred Bailey and Robert Niedrach. For them, hunting was the perspective from which they enjoyed and experienced the outdoors. Hunting was not problematic for them, even though Donna Haraway has drawn out the profound ironies of the enterprise of killing animals to immortalize them in the life group.[141]

However, the most striking thing about the desert "kiosk" as it was called (the designers abandoned even the traditional names for types of exhibits), was the insistence on using it as what could reasonably be called a "mere" example—a random particular in the service of a principle. The negative used for Figure 5.4 has been cropped to make the desert group appear as realistic as possible. In the photo, the woman with a camera photographing the group from behind suggests that it was indeed sufficiently realistic to provoke suspension of disbelief. However, Figure 5.5 shows the entire desert scene in its triangular case with silk-screened lettering on the Plexiglas. The graphics list several animals and their

---

[140]James Mahoney to Porter Kier, 22 February 1973, SIA RU 257, Director, NMNH, 1973-1975, Records, Box 8. Kier promised to back Mahoney, but the controversy apparently died without further intervention.

[141] All of the naturalist-taxidermists, including Carl Akeley, believed they were killing a few animals to protect the remainder (Donna Haraway, "Teddy Bear Patriarchy: Taxidermy in the Garden of Eden, New York City, 1908-36," in *Primate Visions: Gender, Race, and Nature in the World of Modern Science*, (New York: Routledge, Chapman, and Hall, 1989), p. 34). However, there still remains a rich area of inquiry into how these men used the practices of taxidermy to bridge the enormous aesthetic and moral gap between the concept paintings and the final groups. For in between are the frightening photographs, butcher-shop-like, of the dead, skinned carcasses of the animals. I have reproduced none here by choice, although they are among some of the most arresting images I have seen in the course of this project. Clearly, to analyze this situation would involve unraveling my own subjective response.

Figure 5.5. Desert biome kiosk, "It All Depends" opening, April 5, 1974, in Hall 10 of the National Museum of Natural History. The camel graphic is third from the left on the bottom row. OPPS Neg. #74-3477-1A courtesy the Smithsonian Institution.

adaptations to dry conditions. Among them is a camel. In their final review of the exhibit scripts, the curators indicated that "we would suggest substituting a peccary for a camel which is completely out of place in the American Southwest." Being curators of objects, and seeing the group as depicting a particular desert, they assumed that the label copy would interpret the region depicted in group.[142]

Yet again, the curators were interest in the integrity and authenticity of *place*. The designers, in their focus on general principles, explicitly insisted on mixing and matching abstract inscriptions in order to show that similar adaptations could be found in each biome type *regardless* of its physical location on the planet. Furthermore, the camel rhetorically served the designers better because the camel would do its work quickly precisely owing to its status as an easily recognizable icon for "desert," while the lesser-known peccary would require introducing before its significance as a desert-adapted animal could be grasped. It is arguable that in the end, however, the final "concept" was rendered educationally valueless because of the designers' unwillingness to expand the visitor's understanding and awareness beyond the already recognizable cliché. As Figure 5.5 shows, the camel stayed, even though the scientists offered their expertise to interpret the peccary.[143]

A crucial cultural and psychological difference between the two camps contributed to their profoundly different ways of seeing the world and their efforts to translate nature into the museum. The field naturalists reveled in wild, even uncomfortable conditions: Alfred Bailey sat on a hard rock to watch birds all day and preferred a camp out of sight of people. Richard Cowan sought out

---

[142]Leo Hickey to Porter Kier, 19 March 1973, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10.

[143]Hickey noted, "George Zug [zoology curator] can help rewrite this one if needed. He has already supplied substantial corrections and the ecological analysis of the peccary" (*Ibid*.).

uncharted trails. On the other side, Peter Farb, the sophisticated New Yorker, hated the primitive conditions of Belém. Ralph Caplan, the professional writer, thought lox was a synonym for salmon.[144] If the new exhibit developers embodied the very urban alienation from nature that the field men sought to combat with their habitat groups, how could they ever have conveyed in their exhibits a first-hand appreciation for the specific place?

The ecology of place, particularly Merriam's zonation scheme used at Denver, is a highly "conceptual" template superimposed on nature. It is not "merely" particularistic. But precisely because of the field naturalists' tacit knowledge of the field, they refused to mix and match organisms across locales. For the same reason it was crucial to have the correct lupine in the Mountain Beaver group at the AMNH, the MNH curators did not want camels listed on the desert habitat/biome. The terminology is crucial. A habitat is specific, whereas biome is generic. Desert habitats, though similar, are not identical to one another, whereas the desert biome as the designers deployed it covered all deserts of the world, and made their inhabitants into interchangeable parts.

The curators were ultimately almost completely excluded from the exhibit-making process in Hall 10 not only with regard to their review of the scripts, but at every step of the way. Much of the content derived not from the expertise of the staff or the primary literature itself, but from secondary popular sources. For instance, the exhibits staff specified poses for the creatures in the desert group based on photos and illustrations in Time-Life animal books rather than curatorial knowledge of the animal's behavior or habits.[145] Overall, the

---

[144]Caplan's early script for a film on predation includes a scene of "sharks feeding on lox." Hickey replied, "I really doubt if many sharks wait to have their salmon smoked before eating it" (Leo J. Hickey to Richard S. Cowan, 24 May 1972, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 10).

[145]William Miner to John Gurnee, 19 June 1973, SIA RU 503, Office of Exhibits Central, Records 1935, 1946-1979, Box 2. Miner claimed he had

exhibit staff seemed to feel that the less contact that was required with the curators, the better. Joe Shannon, in a review of the Hall of Living Things project in 1970, made a list of designing do's and don'ts that included the statement, "no curators, amen!"[146] Shannon's attitude is corroborated by Cowan's observation that by hiring outside designers such as James Ward "off in New York City,. . .what we were moving toward, under Mahoney, was a totally disconnected exhibits function. It was totally disconnected from the exhibits staff and from the scientific staff. It was weird, and I couldn't get a handle on it and get it stopped."[147] Cowan's own incredulity at this trend indicates the extent to which the symbiotic relationship between exhibition and research was a fundamental feature of the identity of the long-time museum staff. But it was irrelevant to the design-oriented exhibit-makers.

The Rain Forest Finally Gets Built

After over a decade of planning, the Smithsonian Model and Plastics Laboratory finally built the rain forest as a realistic, though not place-specific walk-through habitat group. Most of its features were created from the molds and casts collected in British Guiana in 1962, although entomology curator Donald Duckworth and members of the exhibits staff made a trip to STRI in Panama in mid-1973 to gather more first-hand information.[148] In spite of the best efforts of the new design team, the lingering necessity of tacit knowledge of

---

requested advice from the curators, but received none (William Miner to Ralph Morrill, 4 June 1973, SIA RU 503, Box 2).

[146]Joseph Shannon, "[Hall 10] Review," 1971, SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 18.

[147]Cowan Oral History (1974), p. 90.

[148]Paul Perrot, "Further Conversation with Mr. James Moorehead of Jack Anderson's Office," 1974, p. 1; Tom Harney, ""It All Depends:" Smithsonian to Open New Ecology Exhibit," March 1974, SIA RU 416, NMNH, Office of Public Affairs Records, *ca.* 1958-1990, Box 1, fact sheet, p, 3.

the field in constructing realistic habitat groups could not be completely exorcised from the exhibit.

Since the show's logic dictated that the rain forest could not be a specific place, there was no need for the background mural depicting Kaieteur Falls. Instead, the rain forest filled a giant hexagonal tower reaching two stories to the ceiling of Hall 10 and faced inside with mylar mirrors. The mirrors reflected in an infinite regress to create an illusion of vast space within the tower.[149] Figure 5.6 shows the scale mock-up of the rain forest trees and enclosure with the mirrors arranged inside. The exterior of the tower appears in Figure 5.7. Figure 5.8 shows the fluted tree and the sense of space created by the mirrors. The large buttress tree modeled in British Guiana (Figure 3.21) appears in Figure 5.9, which also conveys the density and variety of plant models in the group. And, because of the designers' interest in tactile experiences, they had the terrazzo floor covered with a thick sisal pad to simulate the spring of walking on earth.[150]

This rain forest belonged to the genre of realistic representation only because of the commitments of its previous advocates. The abstractions, such as the mirrors, resulted from casting it as an icon of interrelated cycles. The press release announcing the exhibit's opening in the spring of 1974 states one more time that "the rain forest is the symbol of an environment in which [sic] 'It All Depends.' Here all the plants and animals, like actors in a play, are intimately related to each other and if this balance is upset, the whole environment can be placed in jeopardy."[151]

---

[149]Harney, "'It All Depends:' Smithsonian to Open New Ecology Exhibit," fact sheet, pp. 3-4.

[150]Paul N. Perrot, "Oral History Interview," 16 July 1992, SIA RU 9565, Tropical Rain Forest Exhibits, p. 10.

[151]Harney, "It All Depends" press release (1974), p. 1.

Figure 5.6. Exhibit department mock-up of rain forest for "It All Depends," *ca*. 1972. SIA RU 503, Box 2, courtesy the Smithsonian Institution.

Figure 5.7. Exterior of the rain forest enclosure in "It All Depends," Hall 10 of the National Museum of Natural History, *ca*. 1973-74. The fire extinguisher at the bottom right indicates the scale. SIA RU 416, Box 1, courtesy the Smithsonian Institution.

Figure 5.8. Fluted tree in rain forest section of "It All Depends" in Hall 10 of the National Museum of Natural History, November 1973. OPPS Neg. #73-11472-35 courtesy the Smithsonian Institution.

Figure 5.9. Buttress tree with background mirrors in rain forest section of "It All Depends" in Hall 10 of the National Museum of Natural History, December 1974. OPPS Neg. #76-1268-19A courtesy the Smithsonian Institution.

Public Reaction to "It All Depends"

"It All Depends" finally opened to the public on April 5, 1974, after a year of delays, including four months to make the rain forest fireproof.[152] Sadly, the entire exhibition, which had been conceived as the flagship of the museum's new permanent exhibitions for the 1970s and cost over a million dollars, did not survive until the end of the year. Equipment breakdown plagued other sections of the hall from the beginning. Even though multi-projector slide shows and continuous film loops had been used successfully at World's Fairs and trade shows, the MNH did not have the budget or the staff experience to keep the maintenance-intensive installation running.[153] By the fall, Assistant Secretary for Museum Programs Paul Perrot advised MNH Director Porter Kier to close the hall to spare the museum the embarrassment of "the constant flow of bewildered visitors who really do not know what they are doing in that Hall" because the audio-visual presentations were chronically and fatally malfunctioning.[154]

For all of its promise, the real determination of its creators, and the large monetary investment, the show ultimately failed to accomplish its goals, either as a convincing trip to a rain forest or a radical political statement. On both accounts, in spite of the designers' insistence that multi-media was the only appropriate communication medium for the subject, the reliance on multi-projector slide shows and films to talk about the environment undermined rather than drove home the intended messages. Exit interviews were conducted at one

---

[152]James Mahoney to Mr. Ault, 16 January 1974, SIA RU 342, Office of the Assistant Secretary for Museum Programs, 1972-1983, Box 91.

[153]Mahoney Oral History, pp. 41-42.

[154]Paul N. Perrot to Porter Kier, 4 September 1974, SIA RU 257, Director, NMNH, 1973-1975, Records, Box 24.

point, and when asked whether the exhibition made them feel "full" or "empty," many of the visitors interviewed replied "empty."[155]

Writing for the *Washington Post*, Judith Martin (now Miss Manners) seized on the irony that malfunctioning equipment should attempt to discuss the alienation from nature of industrial society. She was not impressed by the predominance of films in the exhibition, and spent most of her article (ostensibly announcing the show's opening) enumerating the various technical problems that had been only partially overcome. Quoting the introductory film's narration that, "Here you are, listening to a magnetically recorded voice, electronically amplified, in a man-made environment called a museum—a museum of natural history. Seems pretty unnatural, doesn't it?" she concluded the article with the biting, terse tag, "Yes, it does."[156] Clearly Martin did not see the irony as cleverness on the designers' part.

Martin also had written about the rain forest earlier in the winter of 1974, when remedying fire hazards delayed the show's opening. Then she called the rain forest "lush" and characterized it as "steamily exuding atmosphere in the middle of the exhibit hall."[157] However, her praise was not unqualified, for she went on to complain that in Hall 10 "it does not rain.. . .It usually rains in rain forests, which is why they call them rain forests, but never mind. There have to be cloudy days. Even in the life of a rain forest."[158] Journalistic petulance aside, it was as if her expectations had been raised to a certain level by certain aspects

---

[155]The actual survey has not yet been located in the SI Archives (the offices involved in visitor surveys in the early 1970s have undergone numerous reorganizations and their files are both voluminous and uncatalogued). This account is the recollection of Pamela Henson, head of the OSIA's Institutional History Division. Her first job at the Smithsonian was to conduct that visitor study (personal communication, 1993).

[156]Judith Martin, "Ecology Exhibit," *Washington Post*, 9 April 1974, p. B2.

[157]Judith Martin, "Tinkering with Mother Nature," *Washington Post*, 14 February 1974, pp. D1 & D5.

[158]*Ibid*.

of the realism of the exhibit, only to be dashed when it was then not realistic in *all* ways she could imagine being salient. Her disappointment in the lack of rain in the otherwise lush forest seems to justify the botanists' earlier single-minded pursuit of realism in their Hall of Plant Life (Chapter Three), and further suggests why A. E. Parr saw living exhibits in zoos as the heir-apparent of realistic replication of nature (Chapter Four). In-house reports of Martin's February visit admitted that "she was not particularly impressed by the exhibit and seemed very casual in asking questions, viewing the films, etc. She was also taken to see the mummy, which impressed her very much."[159] Hall 10's abstraction severely violated Martin's assumptions about the museum experience: the mummy, a less-problematically real object, held her interest more than the high-tech projectors or even the simulated rain forest as it was executed.

In the fall, when the exhibition was shut down off and on, a local newspaper columnist complained, "Having never visited a rain forest, I have tried several times to see one at the Smithsonian."[160] His phrasing indicates his willingness to suspend disbelief—the rain forest at the Smithsonian was properly sanctioned to stand in for an actual one. But that imaginative trust with the museum was broken since the museum did not keep it open, and the rest of his column jokes (but always, in Washington, a humiliating joke) that maybe Congress should investigate the matter of the disappearing rain forest.[161]

How Radical Was Radical?

Reporter Judith Martin's blatant disinterest in the message of "It All Depends" suggests that by 1974, the public was so saturated with the ecological

---

159Leo Hickey to Porter Kier, 15 February 1974 , SIA RU 363, NMNH, Office of Exhibits, Records, *ca.* 1955-1990, Box 33.

160John McKelway, "Things to Do When the Rain Forest's Closed," *Washington Star-News*, 25 November 1974, Metro Life (section B).

161*Ibid*.

theme of interconnectedness and environmental disaster that the exhibition added little to the discourse on the subject.[162] There are other indications that in fact, the radical promise of the exhibition was never really cashed out and that the Smithsonian pulled its punches when it came to discussing the causes and remedies of environmental degradation.

It is undeniable that the creators of "It All Depends," starting with Peter Farb, all wanted to provoke visitors to do something to help the planet. But what was the model of political activism that the exhibit-makers employed? Like much of the popular discourse on environmental awareness then and to the present, "It All Depends," beginning with its title, proposed a model of political participation treating the individual as the unit of action, and with it, the corollary assumption that all individuals share more or less equal responsibility for the problem and the solution (recall Cowan's generic use of "man" to discuss the causes of environmental problems). This model comes out of the grand tradition of American volunteerism working piecemeal within the status quo rather than envisioning the sorts of systemic change pushed by environmental crusaders, who promoted governmental regulation and society-wide changes in consumption habits.[163] For example, in the exhibition, the images of environmental destruction Paul Perrot wanted to see strengthened appeared on the flip cards shown in Figure 5.10. As the photo shows, the section was titled, "It All Depends On?" and the punch line was intended to be that diffuse collective of individuals that is "Us."[164] In this model, visitors were supposed to

---

[162]One study indicates that between 1971 and 1975 there was an average total of twenty-eight environment-related articles per year (over two each month) between eight top circulating magazines in the country. *Reader's Digest* (hardly a bastion of radical politics) alone "reprinted" fifty environmental articles during the period (James S. Bowman and Kathryn Hanaford, "Mass Media and the Environment Since Earth Day," *Journalism Quarterly*, 1977, *54*:160-165).

[163]Scheffer, *The Shaping of Environmentalism in America*, p. 113.

[164]Harney, "It All Depends" press release, p. 2.

Figure 5.10. Choice and Consequence area (Zone V) of "It All Depends" opening in Hall 10 of the National Museum of Natural History, April 5, 1974. OPPS Neg. #74-3477-18A courtesy the Smithsonian Institution.

feel the power and the responsibility to make changes in their own lives as much as they were supposed to agitate for reforms on industrial pollution, etc.

Some people within the museum saw the strategy emphasizing individual behavioral modification instead of larger-scale social and political changes as counterproductive, but none succeeded in changing the course of the project. Cowan's assistant, James Mello, argued in 1972,

> This approach, if I were a visitor, would leave me largely frustrated. I believe the average person recognizes that VERY LITTLE depends on him personally, and that powerful economic, political, and social interactions and forces are largely responsible for our various crises. I don't think this exhibit is directed to what our visitors seek. I don't think it treats its own subject matter well.[165]

But although Mello raised this point almost a year before plans for the concluding part of the exhibition outlining possible action were finalized, his concern was not addressed in any substantive fashion.

In a similar vein, after the exhibition opened, Ellis Yochelson, a USGS paleontologist working in the MNH who was active in recycling campaigns, wrote to Ripley about the show. Yochelson was concerned about the organizations portrayed by the exhibit as helping the environment:

> I refer to material which bears the labels of "Keep America Beautiful" and "Pitch-In." Although there may be a noble aim in picking up litter, both these organizations are essentially industry funded to divert attention from those who produce the items which are littered.. . .I urge that this propaganda be removed from the exhibit before the summer influx of tourists arrives. There are an increasing number of environmental groups aware of the true character of these organizations and I have little doubt but what some harsh letters will be sent to the Institution.[166]

---

[165]James F. Mello, 18 December 1972, SIA RU 197, Office of the Director, NMNH, Records, 1964-1969, 1971-1972, Box 40.

[166]Ellis L. Yochelson to S. Dillon Ripley, 2 May 1974, SIA RU 257, Director, NMNH, 1973-1975, Records, Box 24.

Figure 5.11 shows the exhibit in the concluding section of "It All Depends" that includes the Pitch-In logo of a person throwing litter into a trash can. It appears among literature from a wide spectrum of groups identifying with environmental action, from the Boys Scouts to the EPA. Yochelson essentially shared Mello's concern that the efforts to get visitors involved in environmental clean-up sidestepped both the root causes of and the ultimately necessary solutions to pollution. Yochelson's closing, that visitors who were already activists and could see through the strategy of individual do-goodism would be offended at the Museum's avoidance of the real issues, further implies that Hall 10 mirrored rather than developed new environmental awareness and activism.

Ripley, in consultation with Kier, agreed with Yochelson, but refused to change the exhibit:

> [Indeed] this campaign might be directed towards diverting attention from the responsibilities of industry in the area. However, I feel that most of our visitors are unaware of this aspect and that the "Keep America Beautiful" and "Pitch-In" programs have no doubt influenced many Americans to tidy up our landscape. Although the motivation behind the two programs might be suspect, the results are beneficial. Therefore we will leave the two items in the exhibit unless we find that they cause a negative reaction from our visitors.[167]

Ripley, innovative thinker though he styled himself to be, did not see it as the Smithsonian's job, via "It All Depends," to approach pollution with the same willingness to hold industry accountable as Rachel Carson did in *Silent Spring* or Ralph Nader did in his campaigns for food and drug purity.[168] If visitors entered unaware of the "true identities" of Keep America Beautiful and Pitch-In, they would leave unaware. Provoking visitors to tidy up the landscape was more important than getting them to think about industry's role in pollution.

---

[167]S. Dillon Ripley to Ellis L. Yochelson, 30 May 1974, SIA RU 257, Director, NMNH, 1973-1975, Records, Box 24.

[168]Scheffer, *The Shaping of Environmentalism in America*, pp. 25-28.

Figure 5.11. Visitor action area (Zone V) of "It All Depends" opening in Hall 10 of the National Museum of Natural History, April 5, 1974. This station is also visible in the background of Figure 5.10. OPPS Neg. #74-3477-20A courtesy the Smithsonian Institution.

Finally, Ripley's closing indicates that responding to public opinion was more important to the Smithsonian than working to set it, even though public promotions of both "It All Depends" and the drug exhibition touted them as powerful contributions to public debates.

Epilogue: Biological Meaning Dissolved

By the end of 1974, "It All Depends" was closed permanently and its failure was viewed throughout the museum as an object lesson in how not to do exhibits. The death of "It All Depends" was not, however, the end of the rain forest. The rain forest received yet another meaning when some of the trees and plant models were re-installed upstairs in the "South America: Continent and Culture" hall, which opened in the fall of 1975 and is still extant in the museum.[169] With this move (a literal translation!), the rain forest was redefined from its biological frame as an ecosystem to an anthropological frame as a place where indigenous people live. A detailed case study of the new South American hall would involve examining the MNH's exhibit program through the 1970s. However, it is of great interest to examine how the rain forest became, in Mahoney's words, "stage sets" for native artifacts.[170]

While the Hall 10 saga ground to a close in 1973, anthropologist Clifford Evans was at work on another effort at an interdisciplinary hall, a redo of the Latin American Archeology Hall (Hall 23 on the second floor of the MNH—Figure 3.1). Evans and his wife Betty Meggars had redone the hall in the 1950s (Figures 4.4 and 4.5) to tell stories about pre-contact Latin American cultures. They wanted their new version to embody the research approach they called "ecological archeology," or "human ecology through time." Ecological

---

[169]Tom Harney, "Smithsonian's Museum of Natural History Opens New Hall on South America," 1 October 1975, SIA RU 257 Director, NMNH, 1973-1957, Records, Box 38.

[170]Mahoney Oral History (1992), p. 36.

archeology focused on the influence of environment on cultural development, defining nature in explicitly human terms.[171] Unlike the later incarnations of Hall 10, the ecological archeology plan arose directly out of Evans and Meggars' research at the Smithsonian. Meggars hypothesized that "the aboriginal culture pattern of the terra firme [in Amazonia] represents an equilibrium adaptation to the special characteristics of the rain forest environment."[172]

Evans and Meggars' plans for Hall 23 included a rain forest section before the demise of the Hall 10 rain forest, but with the closure of Hall 10, recycling the rain forest was the only bright side the museum administration could find to the fiasco.[173] After "It All Depends" closed, several of the trees were cut down and transplanted to Hall 23, along with the smaller plant models. In Figure 5.12, Reginald Sayre is demolishing the buttress tree in Hall 10. Figure 5.13 shows Soderstrom, Sayre, and Duckworth, who had all worked on the rain forest for Hall 10, re-installing plant models in Hall 23 (Duckworth is holding Meggars' book). The image of Soderstrom casually holding a model bromeliad evokes both the portability of these inscriptions, as discussed in Chapters Two and Three, as well as the decorative function they fill in the South American hall. In Hall 23, the plant models were joined with background murals and native artifacts. Figure 5.14 is a wide view of the rain forest area of the hall; the flute tree (Hall 10 setting in Figure 5.8) is on the left, and the buttress tree (Hall 10 version in Figure 5.9) is to the right. In their new home, the rain forest models no longer create a strong sense of outdoor place for the visitor: hemmed in by

---

171 Clifford Evans, "Ecological Archaeology: modernization of Hall 23," March 1972, SIA RU 257, Director, NMNH, 1973-1975, Records, Box 8.

172 Betty J. Meggars, "Some Problems of Cultural Adaptation in Amazonia, with Emphasis on the Pre-European Period," in *Tropical Forest Ecosystems in Africa and South America: A Comparative Review*, eds. Betty J. Meggars, Edward S. Ayensu and W. Donald Duckworth (Washington, D.C.: Smithsonian Institution Press, 1973), pp. 311-320, p. 313.

173 Kier to Perrot, 9 December 1974.

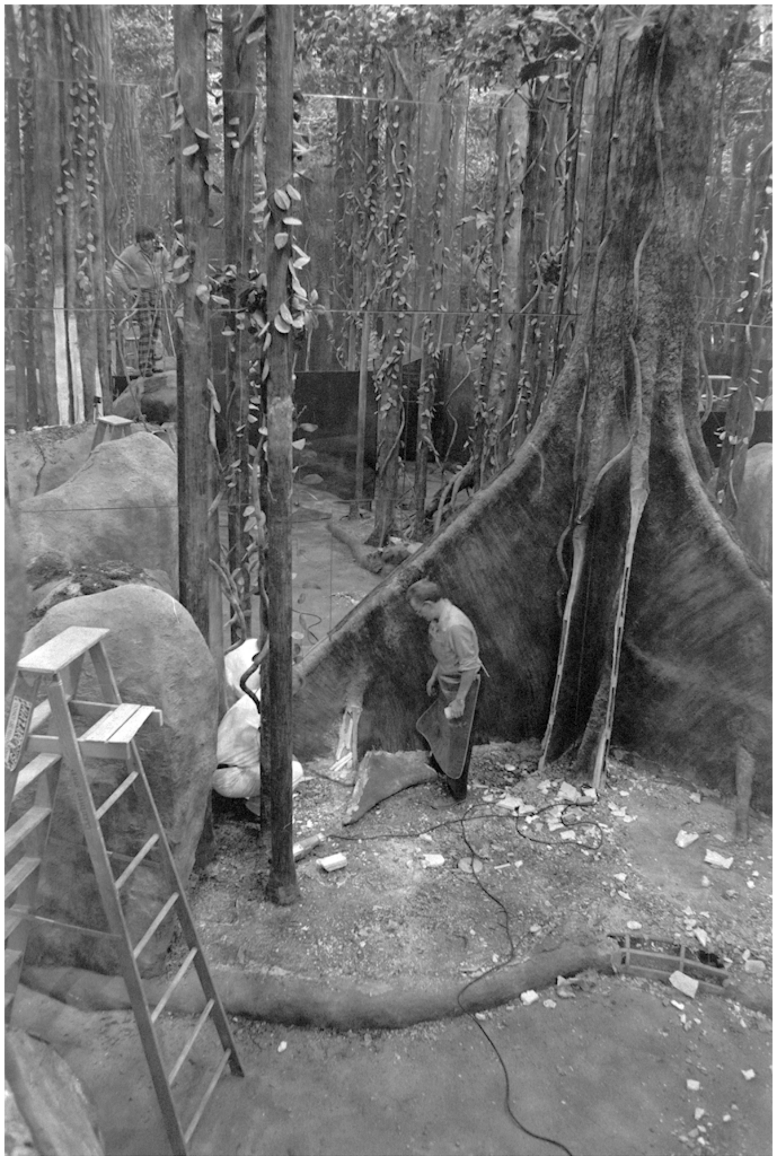


Figure 5.12. Demolishing rain forest trees in Hall 10 of the National Museum of Natural History, February 1975. Reginald Sayre is standing. OPPS Neg. #76-1620-6A courtesy the Smithsonian Institution.

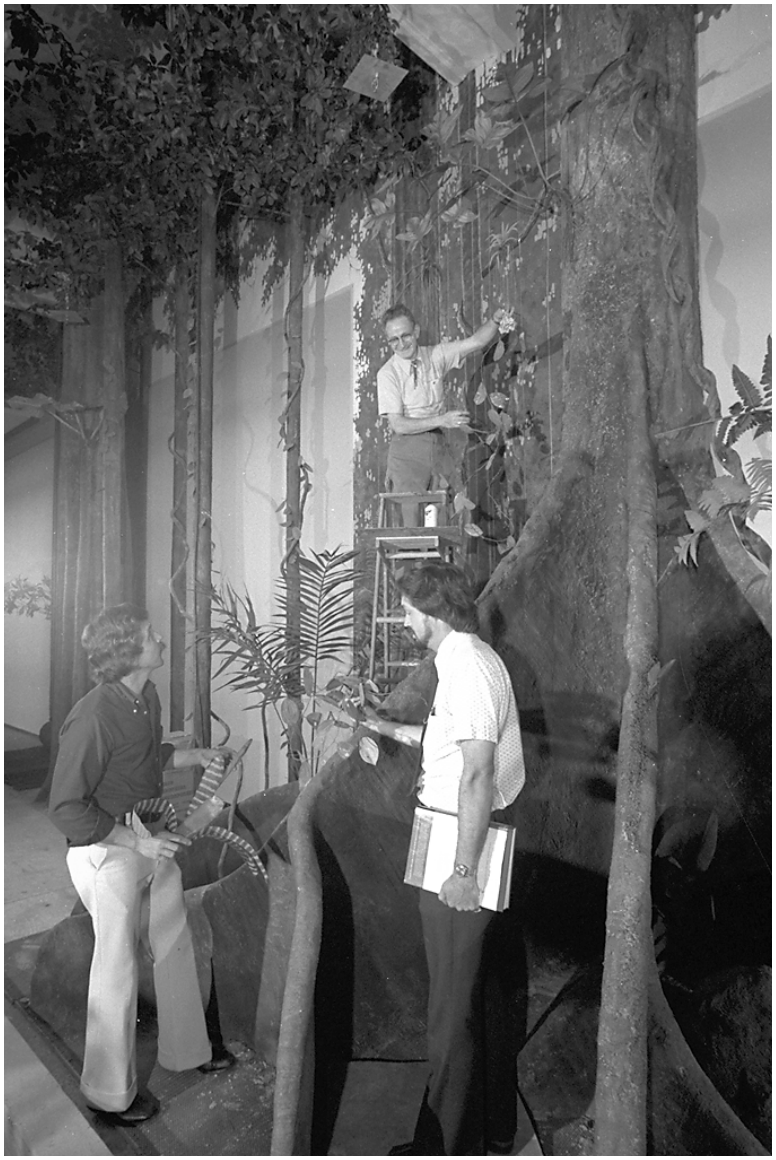


Figure 5.13. Reginald Sayre (on ladder), Thomas Soderstrom (left), and Donald Duckworth installing rain forest plant models from "It All Depends" in "South America: Continent and Culture," Hall 23 of the National Museum of Natural History, before October 1975. Kjell Sandved photo, courtesy the Smithsonian Institution.

Figure 5.14. View from Rotunda entrance of "South America: Continent and Culture," Hall 23 of the National Museum of Natural History, October 1975. OPPS Neg. #75-13681 courtesy the Smithsonian Institution.

railings and poking through the drop ceiling, the trees are decidedly contained *in* the museum. Furthermore, the cases of Amerindian artifacts indicate that we the visitors are not the first people to come to the rain forest.

In this context, the rain forest functioned, as Mahoney put it, as a "background that could be stage sets" for displaying Amerindian artifacts. Although one label refers to the vertical zonation of rain forest trees, the remainder of the exhibits in the hall focus on the peoples of the rain forest. Compare the fluted tree in Hall 10 (Figure 5.8), to the place it occupies behind the Waiwai headdress case in Hall 23 (Figure 5.15). As part of the remnant patch of trees standing on the edge of a field cleared for slash and burn agriculture shown in the background mural, the flute tree is defined in Hall 23 in relation to the human residents of the rain forest. There, the rain forest is explicitly the location and product of slash and burn agriculture, something that Peter Farb rejected as too disturbed and not sufficiently natural (Chapter Four).

Similarly, the buttress tree in Hall 10 (Figure 5.9) does different work in Hall 23 (Figure 5.16). The canoe paddle leaning against the buttress is not there simply to be arty, but because, according to the label *naming the tree*, the paddles are made from the flat buttresses. In moving from Hall 10 to Hall 23, the buttress tree has gone from demonstrating an adaptation to thin soil and competition for light, to a being a ready-made board available for human use. This is entirely different from the previous incarnations of the rain forest, which adamantly rejected the view of nature as a potential extractive resource, and saw human presence as disrupting rather than belonging to the natural system the rain forest was meant to embody.

In sum, the rain forest lost its status as a purely biological entity and was redefined in terms of its interaction with indigenous human populations. This final deconstruction of the rain forest illustrates the ultimate interpretive

Figure 5.15. Flute tree and Waiwai headdress case in “South America: Continent and Culture,” Hall 23 of the National Museum of Natural History, opened October 1975. SWA photo.

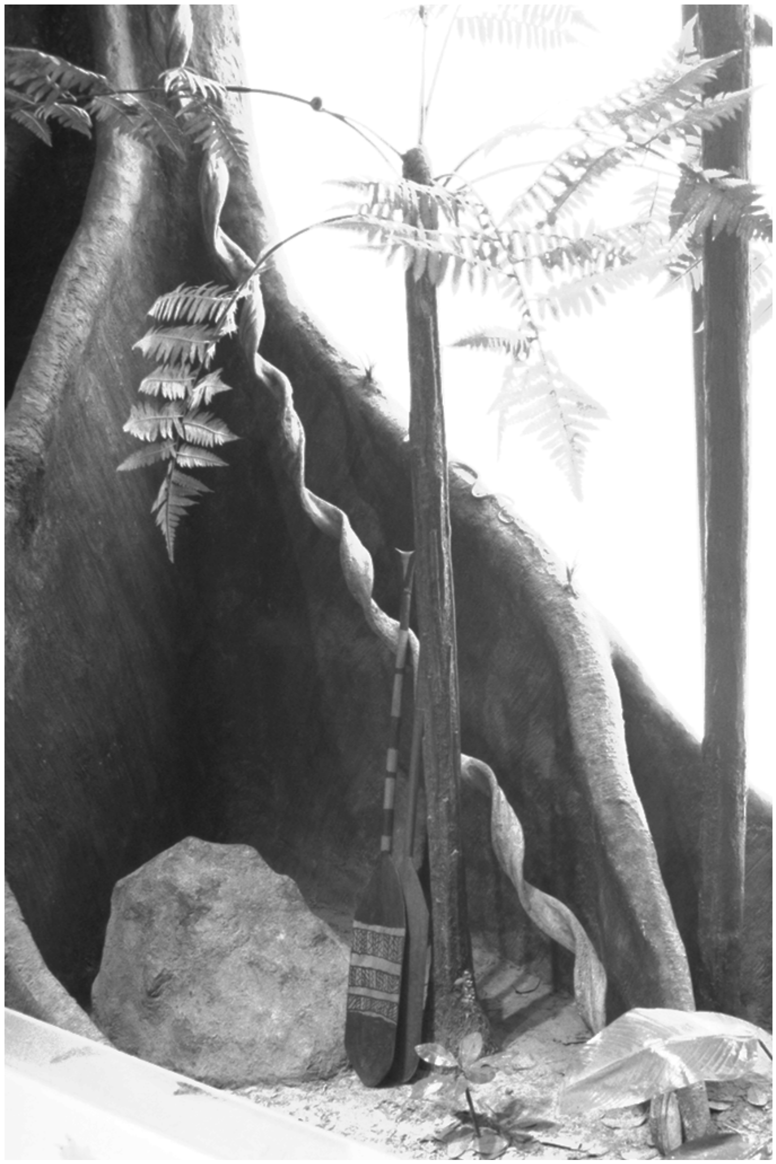


Figure 5.16. Buttress tree and canoe paddles in "South America: Continent and Culture," Hall 23 of the National Museum of Natural History, opened October 1975. The label for the tree reads, "Buttressed Tree. (*Mora excelsa*). The buttresses at the base of the tree provide broad, flat pieces of wood that can be carved to make canoe paddles and other implements." SWA photo.

flexibility of the papiér-mâché trees and plastic leaves that originally referred to a British Guiana jungle devoid of humans or other animals. Indeed the meaning could not have changed more from the botanists' original conception, which explicitly excluded animals as distracting from the plants and defined people as belonging to the province of anthropology. As Hall 23 *is* an archeology hall, it reasonably interprets the land the rain forest grows on as having long-term human inhabitants who both conformed to the demands of the land (lifestyles adapted to seasonal flooding) and made their mark upon it (slash and burn agriculture). This is certainly not a "less real" definition of the rain forest, and it is only surprising to the extent that it directly cuts against the naturalist's conception of the rain forest as untrammeled wilderness.

Conclusion: the Many Faces of the Rain Forest

This final redefinition of the rain forest in the South America hall as a human habitat brings the Smithsonian episode to a close for the purposes of this study. It is now that a retrospective look back across the rain forest's fifteen-year odyssey affords the most dramatic impression of the visual differences between the rain forest's successive transformations. The following series of photos highlights the different inscriptions created of another tree from British Guiana.

Figure 5.17 shows Soderstrom's field photo of a "stilt root tree" *in situ*. Note that it is almost entirely covered in moss, and that it is surrounded by considerable leaf litter on the ground. The background is dark because the photograph was taken under the dense tree canopy with a flashbulb. Even at this most "natural" or "real" stage, the stilt root tree has been transformed into an inscription of a stilt root tree by the poker chip placed on it as a color standard to account for variation in lighting and film. Next, Figure 5.18 shows Sayre's field study sketch of the stilt root tree from a different angle. In it, Sayre

Figure 5.17. Stilt root tree, Kaieteur Falls, British Guiana, 1962. The poker chip (arrow) was used as a color reference. Thomas R. Soderstrom photo #1132 courtesy Department of Botany, National Museum of Natural History, Smithsonian Institution.

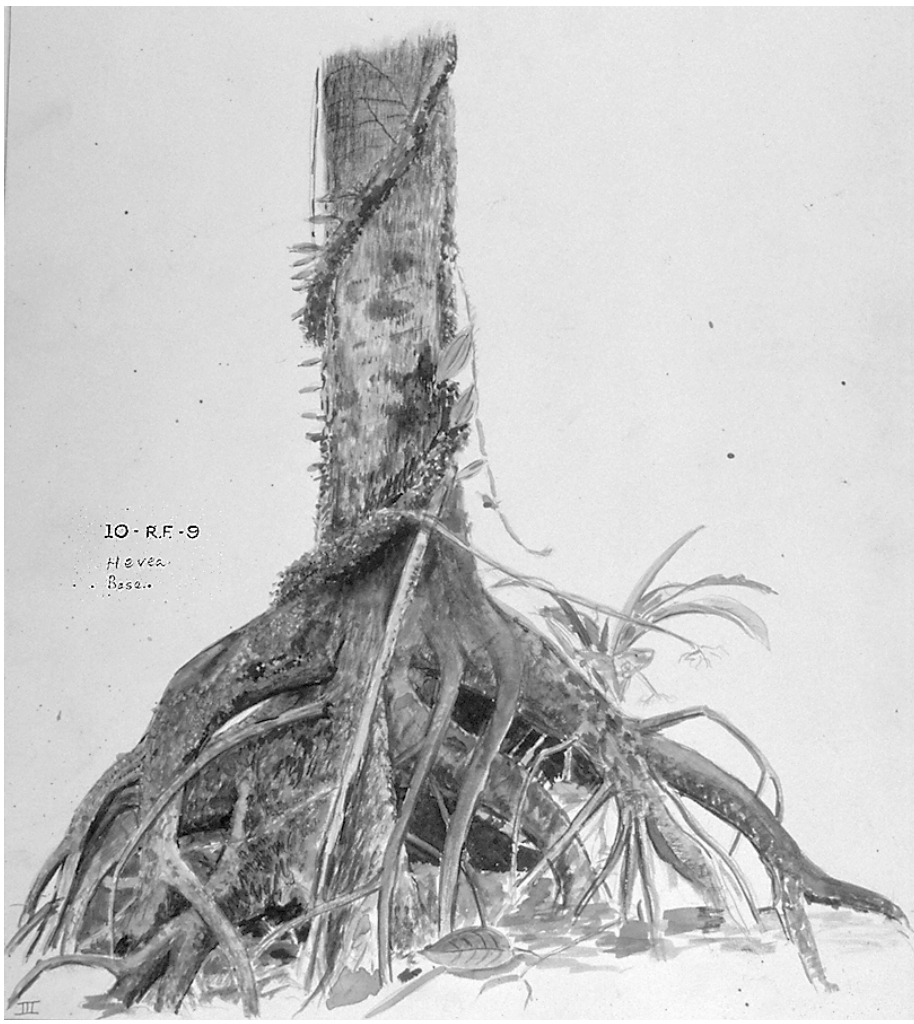


Figure 5.18. Stilt root tree color study, by Reginald Sayre, British Guiana, 1962.

Watercolor on paper, 15x17 inches, courtesy Reginald J. Sayre.

concentrated on the structure of the tree's roots underneath the blanket of moss, conveying their locations and directions more clearly than the photo. This was crucial, because the stilt root tree's complex shape precluded making useful molds of the roots themselves. In Figure 5.19, the stilt root tree has been converted from its flat inscriptions back into three dimensions in Hall 10. Its shape has been considerably simplified from Sayre's sketch, but that does not mean that anything goes. The two descending roots on the right side are clearly visible on Sayre's sketch. Though there is no moss on the model, it has been hung with a few suggestive vines and surrounded by leaf litter as the first two versions indicated. Finally, Figure 5.20 depicts the stilt root tree in Hall 23 behind a small agouti and the corner of an exhibit case.

As the sequence shows, these representations are the same and yet not the same. The last two are the same physical object, but they fulfill very different purposes. In "It All Depends," the stilt root tree (Figure 5.19) was a part of a fragile web that excluded people because people as a species had stepped outside the web and disrupted it. In "South America: Continent and Culture," the "same" stilt root tree (Figure 5.20), when placed as the background to the agouti (the label tells us agoutis are food for indigenous people) and the artifact display cases (containing arrows used to hunt agouti), became part of an inclusive web with humans as an integral part. Here in Hall 23, agouti hunting is just as much a part of "nature's economy" as the chemical cycle of photosynthesis.

This chapter chronicled how "It All Depends" put ecological concepts to work for an activist agenda holding humans accountable for arrogantly trying to step outside of natural cycles. This redefinition of the rain forest by the social group composed of designers, writers, and activists contrasted sharply with the earlier exhibit work, which belonged to the scientific enterprise, and the more recent model of science communication. That model does not generate, but

Figure 5.19. Stilt root tree in rain forest section of "It All Depends," Hall 10 of the National Museum of Natural History, December 1974. OPPS Neg. #76-1268-1A courtesy the Smithsonian Institution.

Figure 5.20. Stilt root tree and agouti in rain forest section of “South America: Continent and Culture,” Hall 23 of the National Museum of Natural History, opened October 1975. The display case on the left contains arrows and hunting implements. SWA photo.

packages, knowledge about the natural world. The exhibition's rhetorical strategy derived more from Secretary Ripley's promotion of ecological research than from the historical interests or expertise of the Museum of Natural History scientific staff. Along with the content being driven by Ripley's conservation goals, the multi-media form of the exhibition derived from Ripley's desire for "punchy" "conceptual" exhibits. By the end of the Hall 10 episode, the curatorial staff had been effectively excluded from exhibit-making because the exhibit designers viewed the specimen-based exhibit as aesthetically boring and educationally useless. However, in light of the previous chapters outlining the richness of "traditional" museum exhibits, this attitude is problematic.

The next chapter brings these questions about the rhetorical strategies of natural history museums and their representations of nature into the present with a case study of the making of the "Ecology" gallery at the British Museum (Natural History) in London. We shall see that the debates between objects and concepts, and over the interaction between exhibition genre and argument, were not peculiar to the Smithsonian in the late 1960s and early 1970s, but are part of a larger, still-unfolding problematic as natural history museums struggle to engage Anglo-American popular culture of the late twentieth century.

CHAPTER SIX
"ECOLOGY":
MUSEUM INTERPRETATION & EDUCATION IN THE 1990s

Introduction: Contemporary Comparison & Contrast

This history of natural history exhibitions lends context to the contemporary museological truism that natural history museums increasingly present highly structured story lines with a continually smaller number of illustrative specimens from the museum's collections.[1] That truism has itself gone unsubstantiated, but now current exhibitions can be better understood in terms of the origins of the trend. The making of the "Ecology" gallery at the British Museum (Natural History) in the late 1980s shows in greater detail how communication and education-based approaches to exhibition design, developed in the 1960s and illustrated by the Smithsonian case study, continue to be contentious in the Anglo-American museum world.

The last two chapters examined the fate of the rain forest exhibit at the Smithsonian when exhibit planning shifted away from a research-driven and object-based system to a design-driven and concept-based approach. "It All Depends," dominated by multi-media, was the result. The anachronistically realistic rain forest was the centerpiece of a rhetorical strategy that applied the science of systems ecology to the political issue of environmental degradation. In order to revisit the transition from exhibits as science to exhibits as communication in a contemporary context, this chapter examines the making of "Ecology," opened in 1991. Since the genre and argument of "Ecology" bears a

---

[1]For another recent version of the curators vs. designers debate, this one at the Field Museum of Natural History in Chicago in the late 1980s, see William H. Honan, "Say Good-bye to the Stuffed Elephants," *New York Times Magazine*, 14 January 1990, pp. 35-38.

number of similarities to "It All Depends," the making of "Ecology" shows that exhibitions participating in the present round of environmental debate and activism continue to draw on ecological ideas of systems and connections to advocate environmental action. Much as was the case at the Smithsonian in the late 1960s and early 1970s, these scientific and political ideas are closely tied at the BM(NH) to an exhibition aesthetic that favors the genre of abstraction.

"Ecology" was the Natural History Museum's (as the BM(NH) is now known) first exhibition built with aid from a corporate sponsor. British Petroleum gave one million pounds (which has roughly the same buying power as one million dollars). Planning began in 1987 to replace the more technical and didactic "Introducing Ecology" exhibition, which had opened in 1978. The new exhibition brief aimed to inform the public about the ecological concepts involved in environmental and conservation issues. Exhibit planners expected the visitor to receive the exhibition's messages in the course of a single thirty-five minute visit.

In 1989, financial pressures from the Thatcher government forced the museum to impose admission fees and cut and reorient its research mission. In the turmoil of the reorganization, Roger Miles, head of the Department of Public Programs, abolished the scientist/designer exhibit development partnership he had established in the 1970s. At the same time, Miles continued to inject contemporary exhibit aesthetics and technologies into the museum. Because of its high-concept architectural treatment of the Victorian exhibition gallery and heavy reliance on multi-media design elements, "Ecology" became a lightning rod for criticism from traditionalist constituencies in historic preservation, natural history research, and the museum-going public.

Several themes from the story of "It All Depends" re-emerge from "Ecology." Along with some similarities in content and organization, "Ecology" was also produced under an exhibit development process that favored designers and educators instead of scientists or objects. The London exhibits department explicitly takes the educationalist approach. This case therefore shows how the earlier conflicts between these two approaches are being played out today.

The visitor is not well-accounted for in the analysis of the Smithsonian case, largely because no exhibits were actually built for most of the period studied. Furthermore, formal visitor studies were in their infancy in the early 1970s and those that survive do not provide useful information. However, during the 1980s, the Natural History Museum made a significant commitment to visitor evaluation. "Ecology" included both formative evaluation designed to assess visitor interests, attitudes, and needs before exhibit development, and summative evaluation aimed at assessing the effectiveness of specific parts of the exhibition and recommending improvements.

A Brief Tour of "Ecology"

What makes "Ecology" such an attractive comparison to "It All Depends" (in an eerie sort of way) is that it is in many respects what "It All Depends" aspired to be, but could not achieve with the money, technology, or design expertise then available. Whatever the critics of "Ecology" might say about its design or educational shortcomings, it is certainly a better exhibit than "It All Depends." The Smithsonian show was considered such a disaster that after it closed, the museum's director denied it had ever been conceived of as anything but a temporary exhibit, when in fact it had been sold to Congress as the star permanent exhibit in the MNH's lineup for the 1970s. Controversial though it was, "Ecology" did not become an orphan, and the museum has made a financial commitment to revise the gallery based on the conclusions of the summative evaluation. Here is a brief tour of the parts of the "Ecology" exhibition that intersect with the issues raised by the Smithsonian case, and that will be examined in greater detail in the course of this chapter. Figure 6.1 shows the location in the gallery of the exhibits discussed below.

The Rain Forest

The rain forest reproduction in "Ecology" allows a direct comparison of its form and message to the various stages of the rain forest exhibit at the Smithsonian. A visitor enters the exhibition through a simulated tropical rain forest that festoons the pillars and ceiling of the Victorian gallery designed by Alfred Waterhouse (Figure 6.2). It is very gloomy; the photograph reproduced here was made by taking a long time exposure. There are the requisite buttress trees, vines, and foliage, as well as a loud audio track with bird calls and the whine of insects. The foliage is made of commercially-produced silk leaves rather than individually-molded models. Its construction makes it more a stage set than a meticulous recreation, relying on what the Smithsonian botanists would have called "mass effect."

The Connections Diorama

Passing through the rain forest, the visitor walks down an impressive frosted glass "chasm" designed by the British architect Ian Ritchie as part of an evocation of the four classical elements of earth, air, fire, and water (Figure 6.3). Along one side, a pair of nature film makers aim their cameras through clear slits in the glass, and video monitors play a program about the African savanna (Figure 6.4). Behind the slits is a diorama that uses some of the Natural History Museum's historical specimens to depict the African savanna brought to life in the video (Figure 6.5). The slits are only about six inches high and three feet wide, so it is difficult to see inside. The diorama is meant to illustrate visually that the science of ecology is "putting the whole story together" and that it is not

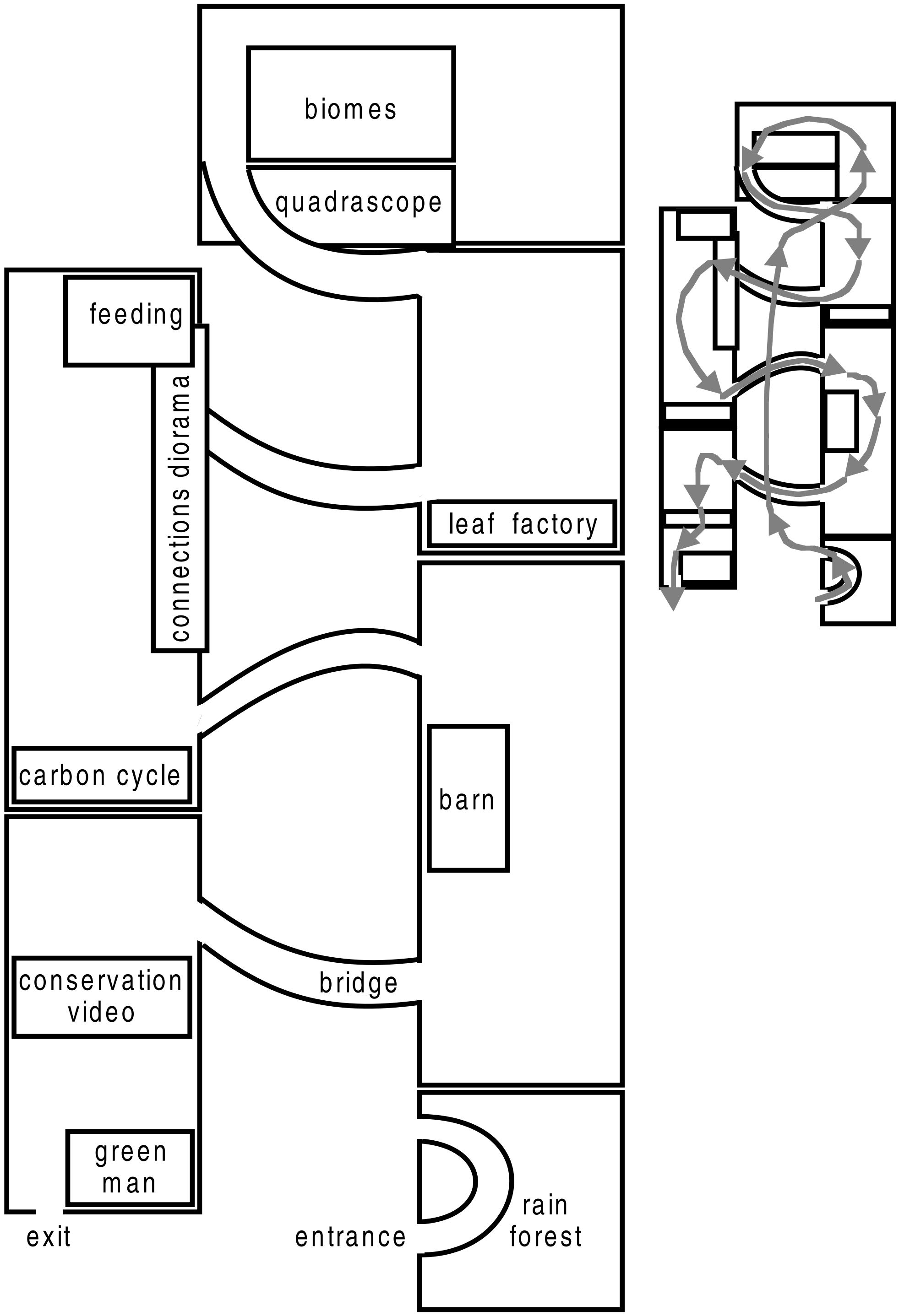


Figure 6.1. Exhibits in the Ecology gallery discussed in this chapter. Inset: route taken by the visitor through the gallery. Except for the Rain Forest, the Connections Diorama, and the Quadrascope, all exhibits are on the mezzanine.

Figure 6.2. Rain forest theme in entryway to the "Ecology" gallery, The Natural History Museum, London, opened March 1991. SWA photo.

Figure 6.3. Glass “chasm” in the “Ecology” gallery, The Natural History Museum, London, opened March 1991. The rain forest is to the right and behind the camera, the Connections Diorama is at the far end of the corridor on the left, and the Quadrascope is at the rear of the gallery. SWA photo.

Figure 6.4. Cameraman mannequin looking into the Connections Diorama in the Introduction area of the "Ecology" gallery, The Natural History Museum, London, opened March 1991. SWA photo.

Figure 6.5. Looking through a viewing slit into the Connections Diorama in the Introduction area of the "Ecology" gallery, The Natural History Museum, London, opened March 1991. The warthog is part of the background painting; the vulture is a stuffed specimen. SWA photo.

possible to see everything in nature at once. With the Connections Diorama, "Ecology" deploys a core message of interrelationships in the function of nature's economy very similar to "It All Depends."

The Quadrascope

Dominating the end of the glass chasm is a twenty-screen video wall called the Quadrascope, which uses angled mirrors around the sides of the monitors to create the illusion that they form a gigantic sphere (Figure 6.6). The Quadrascope plays a program illustrating the water cycle from clouds, to precipitation, to the ocean, and back into clouds again. This exhibit is perhaps the most technically novel and visually impressive in the gallery. It shows how the design ambition propelling "It All Depends" has been successfully fulfilled by modern solid-state multi-media technology (conversely, "It All Depends" shows that multi-media is not brand-new, as some critics seem to think).

The Barn

The most "realistic" exhibit in traditional museum habitat group terms is the Barn, which illustrates the various factors involved in population growth and regulation. Figure 6.7 shows the population dynamics section of the Barn, where a stuffed cat pursues stuffed rats in a naturalistic setting. The label tells the visitor, "The barn is a microcosm of the world outside—inside it populations of different species rise and fall. The size of a population is linked to many factors. It depends on how well the species competes for resources and avoids predators. It is also affected by interactions within the species, such as rivalry over territory." The barn is explicitly set up as a miniature ecosystem, using a domestic scene presumably familiar to the viewer as a model for the rest of nature. The rhetorical link between domesticity and realistic representation in

Figure 6.6. “Quadrascope” video wall illustrating water cycle in the “Ecology” gallery, The Natural History Museum, London, opened March 1991. Taken from the mezzanine, looking sideways into the angled mirrors. SWA photo.

Figure 6.7. Population dynamics section of the Barn exhibit in the "Ecology" gallery, The Natural History Museum, London, opened March 1991. SWA photo.

the barn exhibit significantly contrasts with the relationship between wilderness and realism in the Smithsonian case.

The Green Man

Environmental activism was a key ingredient of "It All Depends," and the Green Man exhibit in "Ecology" shows that environmental activism in the 1990s still relies heavily on the theme of the interconnectedness of all life, with a specific emphasis on human dependence on the rest of nature for survival. Acting as the exhibition's benediction, the Green Man is a twelve-foot high sculpture of a human figure made up of many other organisms in the style of the Renaissance painter Arcimboldo (Figure 6.8). The panels on the reader rail below the statue emphasize the value of biodiversity by showing exotic plants and animals with medicinal or other commercial value. The sculpture evokes the ancient European image of the Green Man, the counterpart of the Earth Mother, which has recently enjoyed renewed visibility in the United Kingdom. The exhibit draws on current pop cultural associations with the environment in order to make the point that our alienation from nature is a false consciousness.[2]

Points of Comparison

Some of the apparent close correspondences between "Ecology" and "It All Depends" are startling. But the gallery's history requires further examination if the presumed relationship between the two exhibitions, time periods, and institutional cultures is to be meaningful. This section outlines specific similarities and differences between the Smithsonian and BM(NH) cases in the following categories: the institutional context, the role and background of the content coordinators and the designers, the exhibition genre, and finally, the

---

[2]Julian Henriques, "The Green Man," *BBC World*, November 1990, pp. 24-32.

Figure 6.8. Green Man statue evoking connection of humans to the rest of the environment in the concluding "Man" section of the "Ecology" gallery, The Natural History Museum, London, opened March 1991. SWA photo.

respective definitions of ecology and environmental activism. Table 6.1 summarizes those contrasts.

Institutional Context

Significantly, both "It All Depends" and "Ecology" were planned and produced during periods of intense flux at their respective institutions. Therefore, rather than being "typical" exhibitions, their form and content are a record of the negotiations and struggles to redefine the function and meaning of exhibit-making and its relationship to the scientific enterprise. Similarities between the two episodes mean that those debates are not idiosyncrasies of each institution, but part of a broader sweep of changes in the museum world that began in the 1960s and are still unfolding. Chapters Four and Five explained the Smithsonian exhibit program in terms of Secretary S. Dillon Ripley's interest in new research programs and conceptual, socially relevant exhibitions and the impact of the mass media and protest movements on popular culture in the 1960s. The British Museum (Natural History) experienced a considerable (and for many, traumatic) reorganization during the late 1980s masterminded by a new director, Neil Chalmers, and provoked by funding cuts made by Prime Minister Margaret Thatcher's Conservative government.[3] As with Ripley's initiatives, Chalmers' efforts were vilified by museum traditionalists and hailed as visionary by a newer generation of exhibit professionals. In each case, the new leader was trying to bring a contemporary scientific and educational approach to an insular institution with a long-standing research tradition.

---

[3]Gareth Huw Davies, "Natural Selection: How the Dinosaur Is Surviving in SW7," *London, The Sunday Times Magazine*, 17 February 1991, pp. 12-15; "The Museum Development Interview: Neil Chalmers," *Museum Development*, March, 1991, pp. 35-40.

Table 6.1. Comparison of characteristics of "Ecology" and "It All Depends."

United States Smithsonian Institution:	**United Kingdom The Natural History Museum:**
"It All Depends" opens 1974.	"Ecology" opens 1991.
Institutional Context	
Ripley's shake-up: Conceptual exhibits. Environmental research & education.	Chalmers' shake-up: Competition in marketplace for visitors & applied research.
Content Coordinators	
Goor: biology Ph.D. Marginal curatorial review. Exhibits and research separate.	Bloomfield: biology Ph.D. Some curatorial review. End of partnership system.
Designers	
Ward: no science background. Industrial designer Caplan: no museum background, some physics teaching & World's Fairs.	Magidson: Ontario Science Center designer. Ward: long-time BM(NH) designer. Ritchie: no science background, architect.
Exhibition Genre	
Heavily programmed central message. Multi-media slide projectors & film loops. High budget ($1M). Low return: temporary, visitors confused.	Heavily programmed central message. Multi-media video and computer interactives. Medium-high budget (£2.7M). Successful return: popular with visitors.
Exhibition Argument	
1970s Earth Day. Environmental degradation. Ecology as politics of laws of natural cycles. Museum joining existing public discourse.	1980s Green Politics. Loss of habitat & biodiversity. Ecology as politics of changing patterns of consumption. Museum joining existing public discourse.

Having no previous museum experience, Chalmers came to the Natural History Museum in 1990 from an academic background as Dean of Science at the Open University, and immediately commissioned a "corporate plan" to make the museum more competitive in both research and exhibition. The corporate plan framed this agenda in the language of commercial marketing: Chalmers stated, "We use the phrase 'market place' because it focuses our attention on the world out there and what it wants from us. It also emphasizes that we're in a competitive world."[4] Like Ripley at the Smithsonian, Chalmers sought to end what he saw as the museum's scientific introversion and public elitism. The corporate plan made the museum a service provider, and the customers, whether school children or research granting agencies, were always right.

Unlike the Smithsonian in the 1960s, where Ripley's desire for socially relevant ecological research was expansionist in nature, Chalmers' drive to make research at the BM(NH) "competitive" was part of severe fiscal belt-tightening in which he eliminated forty-five of the 300 scientific staff positions during the late 1980s.[5] Although curation continued for all of the extant collections, research was curtailed in several areas. It was focused on human health and environmental issues "very relevant to the predicament of the modern world," according to the museum's head of science, such as the tropical disease schistomosiasis and marine nematodes used as indicators of ecosystem health.[6] Setting aside the museum's historical commitment to basic systematics research, Chalmers saw the collections as a database for solving other people's practical problems: "I see us as becoming very much more oriented towards the needs of business and other users, based on a customer/contractor relationship."[7]

---

[4]"Museum Development Interview: Neil Chalmers," p. 35.
[5]Davies, "Natural Selection," p. 14.
[6]*Ibid*., pp. 14-15.
[7]"Museum Development Interview: Neil Chalmers," p. 38.

This was not popular; the scientific staff went on strike over the cuts and argued that the corporate plan “takes us away from systematics, which is what we do best,. . .[and] draws a false and rigid distinction between curation and research.”[8] The latter criticism again exemplifies how the collections stand at the center of the curator’s world. It echoes Smithsonian botanist David Lellinger’s experience that research questions arise from tending the collections (Chapter Four). Rallying to the side of their British colleagues, the Smithsonian’s Senate of Scientists condemned what they viewed as the corporate plan’s negative impact on both exhibitions and research. In a letter to the Minister of Arts, they called it a “nebulous document” that sent the “incontrovertible message that the Museum is to follow rather than lead—usually a recipe for descent into the lowest common denominator.”[9] The Smithsonian scientists clearly viewed a marketing mentality to be a dangerous abdication of the museum’s historical role in scientific and educational agenda-setting, rather than a useful paradigm for greater public involvement and responsiveness.

On the exhibits side, imposing admission charges initially cut museum attendance almost in half, although levels have since recovered.[10] Roger Miles was a curator in vertebrate paleontology who turned to exhibit-making in the early 1970s, and was the head of the Museum’s Department of Public Programs from 1975 until 1994. He saw the upheavals of the 1980s as the chance to continue to get away from much older exhibitions “designed by curators who wanted to speak to other curators.”[11] Miles’ first large new exhibition was “Human Biology,” which opened in 1977 and was designed more like a science

---

[8]Davies, “Natural Selection,” p. 13. Quoted in James Hamilton, “Pay and Display,” *The Spectator*, 1 May 1991, pp. 43-44, on p. 44.

[9]Quoted in Hamilton, “Pay and Display,” p. 43.

[10]Davies, “Natural Selection,” p. 13; Bob Bloomfield, personal communication (September, 1994).

[11]Davies, “Natural Selection,” p. 14.

museum interactive exhibition than a specimen-oriented natural history hall. "Creepy Crawlies," a thematic treatment of arthropod life, replaced the traditional insect hall in 1989, and "Ecology" followed in 1991. A reinstallation of the dinosaur gallery with exhibits emphasizing dinosaurs as living animals rather than skeletal remains opened in 1992. Of these, the dinosaur hall is probably the most sophisticated in communicating broad messages and specific detail, and best at combining modern design, models, and traditional specimens. It is rich because it presents the most recent research on the physiology, natural history, and behavior of dinosaurs, much of it stimulated by increased public demand for increasingly lifelike representations of dinosaurs and their habitats.

Horrified losing object-oriented galleries the revolutionaries called "boring" and "Victorian," aficionados of the older museum approach asserted that with the corporate plan, the museum was forgetting that "what it and no other kind of organization can offer is the unique dialogue between visitor and object. A museum is about material, not about the frisson of special and ephemeral effects, and about the conveyance of knowledge and ideas through the objects in its collections."[12] Once again, the Smithsonian scientists worried that the BM(NH)'s new exhibits represented "a gradual transition to superficial exhibits that impress visually but fail to challenge the intellect."[13] As it was with "It All Depends," their reaction could be interpreted as a generation gap in taste, but it was more fundamentally a difference of opinion about what sorts of stories about the natural world are interesting and particularly suited to the museum genre. Because objects are the core source of the curators' inspiration, evidence, and insight, they see objects as crucial in sharing their conclusions with the

[12]*Ibid*., p. 43.
[13]Quoted in Hamilton, "Pay and Display," p. 44.

public. Their practice and epistemology is bound up with objects in a way that the communications specialists see as a liability rather than an asset.

Content Coordinators

For both "It All Depends" and "Ecology," the content coordinator was not a practicing staff scientist, but someone with scientific training who developed the storyline and informational content of the exhibition. In both cases, scripts and proposals were circulated to the curatorial staff for review, but the content coordinator had the ultimate authority to determine the shape of the show. At the Smithsonian, Ronald Goor was a Ph.D. who MNH director Richard Cowan had hired as his special assistant for exhibits. Goor had not previously worked at the museum in either exhibit-making or scientific research. Goor's background as a young, university-trained, non-museum scientist meant that at the same time he pressed Caplan for scripts with more factual detail, he also embraced Farb and Ripley's "conceptual" style. The scientific authority Goor brought to the exhibit enterprise was that of an academic researcher rather than of a museum curator, and objects were not his primary concern.

Similarly, the primary content coordinator for "Ecology" was Bob Bloomfield, who holds a Ph.D. in genetics and taught on the college level before joining the exhibits staff as a researcher at the Natural History Museum in 1985. Like Goor, Bloomfield is young, has a background in laboratory science, and is concerned about the environment. In an interview, he said that his interest in doing natural history exhibits "comes entirely from a childish love of nature which has never left me." Bloomfield elaborated:

> My childhood was fairly remote and quiet. I had a great love of exploring the countryside and living systems and anything associated with the earth, essentially.. . .I've always, actually, felt concerned and felt motivated to make people aware of what the biological sciences, the earth sciences, are all about. And to make people aware of what some of the risks we as a society are undertaking in the twentieth century.[14]

With the exception of his specific concern about the environment, Bloomfield's "childish love of nature" resonates with the sort of passion for natural history that led Richard Cowan into the field and into popularizing his subject. However, Bloomfield comes from a generation facile with electronic media, and his own personal taste for computer games made multi-media presentations in the gallery more familiar and attractive than they were for the older curators.

The history of the relationship between the exhibition department and the scientific staff at the Natural History Museum is somewhat more complicated than at the Smithsonian, and can only briefly be sketched here. It is interesting, however, because the NHM engaged in a much more explicit attempt to professionalize exhibit-making while still maintaining the scientific authority of the product. The story of the botany gallery at the BM(NH) in Chapter Two shows that in the 1950s and early 1960s, the situation at the BM(NH) was much as it was at the Smithsonian: the curatorial staff completely controlled exhibition content. Because the BM(NH) had not undertaken the wholesale modernization program after World War II that Frank Taylor had instigated in Washington, the professional exhibit staff in South Kensington was much smaller and even less autonomous than at the Smithsonian.

Starting in 1975, under Roger Miles' leadership, museum curators were "seconded," or released from their regular duties and temporarily assigned to the

---

[14] Robert Bloomfield Interview, 31 August 1994, SWA research file. Interviews of BM(NH) staff are untranscribed in their entirety and individual quotations have been taken from the tapes.

exhibits program. They worked in a one-on-one partnership with a designer to develop individual exhibits, and several curator-designer teams might work on a single exhibition.[15] Seconded curators did not strictly work on exhibits about their own specialty, but were meant to bring their overall scientific discernment to the partnership. Rather than serving as a bridge from the subject expertise of the curators to the communication expertise of the designers, the seconding process was a dress-rehearsal for creating partnerships using full-time content developers who held scientific credentials but were hired from outside the museum.[16] Bob Bloomfield came on as a non-curator scientist who could also communicate and interpret the subject matter in the partnership scheme. However, Miles' reorganization left only a token number of partnerships in place before abolishing the partnership system entirely, and Bloomfield became the content coordinator for the entire exhibition.[17] "Ecology" began under the partnership system, but opened during the transition from in-house design and seconded curators to out-of-house design and full-time content coordinators.

Both Roger Miles and Giles Clarke, his successor as head of the exhibitions program at the Museum, firmly believe that although the curators have important knowledge to contribute, when it comes to exhibition design, the communication professionals should be firmly in charge of shaping the raw materials provided by the curators. According to Miles, the old system of curator-controlled exhibits did not work because curators "tend to care about objects, not people, and to worry about their reputation for scholarship, which is inappropriate for most exhibitions." In this system, "Designers are reduced to window display; they function as decorators not communicators, and at best are

[15]Giles Clarke Interview, 31 August 1994, SWA research file; Alan Ward Interview, 1 September 1994, SWA research file.

[16]Clark Interview.

[17]Ward Interview.

involved in damage limitation." Furthermore, Miles saw the system as "blind to the audience."[18] Like Miles, Clarke had an established career as a research scientist (botany) before becoming an exhibit-maker. In an interview, Clarke amplified Miles' position:

> Most curators, in my experience, are obviously very knowledgeable about the subject matter. They carry with them an enthusiasm for the subject matter which can be very infectious, can be a very stimulating way of enthusing other people, too, because it is infectious. The other side of the same coin is that they may well forget how little knowledge the general visitor has, and they may well forget the stage of the process that they need to convince people that this subject is worth spending a bit of time with. . . .
>
> But when talking to people, if it's face to face, then personality matters a lot and curators are often very good at talking with individuals and getting them really enthusiastic about it. And that's a great ability. If we knew how to transfer that face to face enthusiasm for a subject through the distanced learning medium of the exhibition to the visitor, we would have some great exhibitions.[19]

Even though Clarke explicitly identifies the curator's enthusiasm and one-on-one charisma as highly desirable elements in museum exhibitions, neither he nor Miles see the curator as personally capable of translating that enthusiasm into the exhibition. Instead, the professional exhibit developer with scientific credentials must both translate the content and create enthusiasm in the exhibition. The "academic advisor," who, according to Bloomfield, "may or may not be a curator," remains in the picture solely as a guardian of accuracy.[20]

Designers

Within the partnership between designer and scientist, the designer was the visual communication specialist, giving the content an appropriate form.

---

[18]Roger S. Miles, "Too Many Cooks Boil the Wroth—Exhibits, Teams, Evaluation," paper presented at the Visitor Studies Conference, St. Louis, Missouri, 1992, p. 3.

[19]Clarke Interview.

[20]Bloomfield Interview.

Because "Ecology" was produced while Miles was dismantling the partnership system, both in and out of house designers completed the design work. On one hand, Miles recognized that experience with the museum genre was important.[21] Several of the designers on the project had extensive museum experience. For example, Alan Ward, who worked on the introductory section, including the Connections Diorama, had been at the NHM for his entire twenty-year career, and had worked on "Human Biology."[22] Mark Magidson, who worked on the concluding section, including the Green Man, had been at the Ontario Science Center in Canada before joining the NHM staff in 1980.

However, the experienced museum designers were highly constrained by the dictates of the space created by architect Ian Ritchie, who Miles hired to create a contemporary space inside the historic Victorian gallery. Miles had decided that the in-house architectural plan was not innovative enough, and, impressed by Ritchie's work on La Villette, the enormous science amusement park near Paris, brought him in for the express purpose of making a dramatic statement in the gallery.[23] Miles' choice of Ritchie was part of the reorganization that shut down internal design at the museum on the grounds that outside designers brought "new blood" to a "moribund" exhibition program.[24]

Exhibition Genre

Like "It All Depends," "Ecology" was driven by its story line and heavily constrained by its overall design. Ian Ritchie conceived of the glowing white frosted glass chasm in response to his mandate to "create a charismatic structure

---

[21] Miles, "Too Many Cooks," Table 2.

[22] Ward Interview.

[23] Martin Pawley, "Victorian Dinosaur?" *The Guardian*, 5 March 1990, p. 38.

[24] Miles, "Too Many Cooks," Table 2; Davies, "Natural Selection," p. 14.

for the Ecology Gallery."[25] One of Ritchie's main goals for the structure was "Symbolically and emotionally [to] create an awareness of the fragility and [the fallacy of] man's view of himself/herself at the apparent centre of the ecological balance."[26] Ritchie vetoed any attempts to put large viewing windows along the corridor for exhibits as destroying the integrity of his concept. The slits for viewing the Connections Diorama (Figure 6.4) resulted from Ritchie's insistence on this point. Even as the designers struggled to fit their exhibits into Ritchie's structure, in the spring of 1990, a year before the exhibition was scheduled to open, English Heritage, the government historic preservation authority, was outraged by the "wholly inappropriate" modernity introduced into the gallery.[27] Since the Waterhouse building is a "listed" site, English Heritage threatened Ritchie and Miles with jail if the glass chasm was not torn out of the gallery.[28]

The plan went forward, Ritchie and Miles stayed out of jail, but in-house designer Mark Magidson stated in retrospect that the architecture overwhelmed the message.[29] To a large extent, the introductory section is a grand artistic statement but a communication failure. The summative evaluation showed that visitors were more frustrated with the slits than enthralled by the space or impressed by its metaphor of the classical elements of earth, air, fire, and water.[30] As a result, revisions to the exhibition scheduled for the 1995-96 fiscal

---

[25]Ian Ritchie, "British Museum (Natural History) Ecology Gallery: Ground Floor," 22 February 1990, Ian Ritchie Architects.

[26]*Ibid*.

[27]Clare Melhuish, "Unnatural History," *Building Design*, 9 March 1990, p. 4.

[28]Pawley, "Victorian Dinosaur?"

[29]Mark Magidson Interview, 30 August 1994, SWA research file.

[30]Katie Edwards and Sjouke Cappendijk, "A Summative Evaluation of the Ecology Exhibition," June 1994, British Museum (Natural History) Department of Exhibitions and Education, p. 16.

year will include larger windows for the Connections Diorama and other exhibits in the introductory section.[31]

Even though not all of the gallery features multi-media exhibits, they ultimately dominate the exhibition. Along with the gigantic Quadrascope video wall on the water cycle (Figure 6.6), there is a four-screen slide show with touch-screen video kiosks about the various terrestrial biomes, a multi-screen computer interactive on the carbon cycle, and a video program in the end section on conservation issues projected on a screen that becomes transparent to reveal the Green Man behind it. Just as the reporter who wrote about "It All Depends" was not impressed by its use of technology to portray our alienation from nature, some of the reviewers of "Ecology" noted the same incongruity. Citing a quotation etched into the glass in the gallery, "Modern man does not experience himself as part of nature but as an outside force destined to dominate and conquer," one writer, a curator at another museum, observed, "There is plenty of evidence of that dominance in this technological tour de force."[32] Another reviewer called the "quite crude and garish artificiality of the Natural History Museum's new gallery" inappropriate for explaining "the intricate relationships governing the lives and deaths of living creatures."[33]

These attacks are interesting primarily because they indicate how strongly some Britons feel about what the Natural History Museum should look like and contain, and about how nature itself should be portrayed. On the former score, the Connections Diorama (Figure 6.5) is one of the few parts of the gallery featuring items from the museum's "historical" collections. Though there are a

---

[31]Bob Bloomfield (personal communication, September, 1994).

[32]Alec Coles, "Through the Looking Glass: Alec Coles reviews the Natural History Museum's new Ecology gallery and Giles Clarke explains how the gallery evolved," *Museums Journal*, 1991, *91*:20-21, on p. 20.

[33]Victoria Neumark, "Amusement Arcadia," *The Times Educational Supplement*, 11 March 1991.

number of specimens in the exhibits, such as a new, beautifully-prepared tiger (obtained from a zoo) featured in an exhibit on animal feeding, and the barn animals (Figure 6.6), even the more sympathetic reviewers comment that the most memorable parts of the exhibition are the audio-visual exhibits.[34]

Exhibition Argument

Both “It All Depends” and “Ecology” emerged out of periods of increased social and political awareness and activism about the environment. As Chapter Five discussed, the enormous investment of personnel and money in “It All Depends” reflected a public and Congressional perception that the environment was perhaps the single most important domestic issue facing America in the early 1970s. Although environmental concerns took a back seat to resource exploitation in the United States during the Reagan-Bush years, the 1980s saw the rise of pro-environment “Green” politics in Europe revolving around a radical critique of industrial consumerism and Cold-War militarism.[35] Like the American ecology movement of the 1960s, the Green movement of the 1980s, begun in Germany, equipped a political agenda with a scientific vocabulary. One of the more favorable reviews of “Ecology” was by a member of the British Green Party who wrote a syndicated column on environmental politics. He used the exhibition’s opening as an opportunity to go on the offensive against academic scientists who attack the Greens for “‘political abuse’ of their scientific discipline.” He continued:

---

[34]Deirdre Janson-Smith, “On the Relation of Everything,” *New Scientist*, 1991, *129*:42.

[35]Robert Gottlieb, *Forcing the Spring: The Transformation of the American Environmental Movement* (Washington, D.C.: Island Press, 1994), pp. 198-200.

> The purists have always argued that you can't build a political movement out of a scientific discipline. In practical terms that may be true, but unless all political movements are based on a firm understanding of the science of planet Earth, then they are unlikely to have much to offer people over the next few decades."[36]

In the late 1980s, when the BM(NH)'s earlier "Introducing Ecology" gallery was slated for replacement, exhibition planners wanted not only to produce a gallery that was more accessible to an audience with less biology background, but also to address environmental issues. A March, 1989 outline of the new exhibition reconstructs the cultural context as follows:

> In 1988 Prime Minister Mrs. Thatcher's comments on Green issues resulted in ecology and conservation gaining a 'legitimacy' in the U.K. that was previously absent. The media response is very evident and the political arena is bracing itself for the 'Green debate'. Within this broader context the Museum is reconsidering its own position on conservation and environmental issues. The new exhibition will be the first major Museum development to reach the public in this new climate.. . .
>
> The aims of the new exhibition are to explain that a real understanding of ecological processes is essential for an understanding of the complexity and fragility of living systems. It will provide an educational framework for visitors to consider the environmental issues that will become ever more important as we approach the 21st century.[37]

Thatcher's endorsement of a conservation agenda meant both that environmental issues would have become an expected element of the exhibit as the museum carried out its public mandate, and that the exhibit-makers might have felt more empowered to build their own concern for the environment into the show.

Just as the Smithsonian promoted "It All Depends" as raising environmental awareness in the early 1970s, "Ecology" was for a time to include explicit activist messages and resources. Early ideas included displaying a

---

[36]Jonathan Porritt, "Politicizing the Planet," *Gloucester Citizen*, 25 March 1991.

[37]British Museum (Natural History) Department of Public Services, "The New Ecology Exhibition—Outline and Context," 20 March 1989, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files, p. 1.

pollution sensor monitoring London's air quality, and displaying stories and information about environmental interest groups to help visitors take concrete action on their newly-awakened concerns.[38] Less than a year prior to its opening, a sign in the museum promoting the gallery read, "There is much that needs to be explained about green issues such as acid rain and global warming. We do not aim to shock, but it would be unusual if visitors feel comfortable when they see what this generation is doing to deny the next generation a healthy and safe environment."[39] However, planners abandoned their initial enthusiasm for an activist approach in favor of an exposition of the science behind environmental concerns, and so "Ecology" contains little to make the visitor uncomfortable. According to Mark Magidson, who helped design the Green Man, the activist component was purposefully left less concrete than originally planned because, along with questions as to whether it was appropriate for the museum to take a stand on the issues, the show was a permanent exhibition and "the politics is changing, I suppose, faster than the science."[40]

Bob Bloomfield indicated that along with the problems Magidson identified, he wanted the exhibition to address misconceptions and bias about Green issues frequently propagated by both activists and industry in the popular media. According to Bloomfield, rather than drawing an explicitly political conclusion, the exhibition would use the museum's authority "to provide an independent summary about what ecology is all about."[41] The single most common misconception he wanted to attack was anthropocentrism in the

---

[38]Magidson Interview; Anne Hollifield and Mark Magidson, "Pre-progress ideas for Nodes j, l, and m," 12 December 1988, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files.

[39]Quoted in Davies, "Natural Selection," p. 15.

[40]Magidson Interview.

[41]Bloomfield Interview.

conservation debate. He said, "We wanted to shift the emphasis to a much more kind of systems based way of looking at ecology, rather than seeing humans as the center of it all, to see humans a part of a much bigger set of interactions, and in that sense to try to put humans in their place."[42] Bloomfield's strategy shows that twenty years after the first round of environmental debate, rhetorical figures and moral conclusions drawn from the technical vocabulary of systems ecology are still important tools in structuring talk about the environment.

Layered on top of the previously-invented systems message is the idea of biodiversity as a means of encapsulating the totality of life. Bloomfield and Magidson meant the Green Man (Figure 6.8), which is a human figure made up of other organisms in the style of Arcimboldo, to create a striking metaphorical image of man's connection to the rest of life.[43] Magidson explained, "People could very easily ask the question, 'If this little bug died in South America, big deal. How does that affect me?' And we were trying in the end to link people to species."[44] As a rhetorical strategy, the Green Man exemplifies the gallery's emphasis on "affective" experiences by drawing on an image from European pagan mythology rediscovered by New Age practitioners as an icon of the cycle of death and renewal.[45]

Finally, both "It All Depends" and "Ecology" were ultimately reactive in their response to growing environmental awareness. That is not to accuse them of merely jumping onto a bandwagon. Providing authoritative information and

---

[42]*Ibid*.

[43]Arcimboldo was a Renaissance painter known mainly for his allegorical portraits of people made up of fruits, flowers, game, sea life, etc. and representing the four seasons or the classical Greek elements. Art historians suggest that he may have been working from the Platonic idea of the unity of the universe found in the *Timaeus* (Werner Kriegeskorte, *Giuseppe Arcimboldo* (Cologne: Benedikt Taschen Verlag, 1988), pp. 58-60).

[44]Magidson Interview.

[45]Bloomfield Interview; Henriques, "The Green Man."

inspiring experiences to the public on a subject of wide popular interest and genuine importance is a crucial service museums can play. But the results do seem to have fallen short of the claims the respective institutions made for the innovative nature of their exhibitions. They raise the enormously complicated but increasingly crucial question of whether and how publicly-funded institutions, which are among the most powerful loci of patronage of culture and the arts, can go about taking a stand on anything.[46] It is clearly very difficult to do so without either alienating some constituency (and losing funding, audience, or authority), or submerging the normative claim so deeply that it is either lost or cloaked in claims of objectivity.

Visitor Evaluation & Representing Nature

Using the habitat group in Chapters Two and Three to get at naturalists' conception of their world and work focused on the producer's side of the museum equation. But the meaning-making activities of the museum audience have not been well-examined throughout the Smithsonian case. As a corrective, the visitor evaluations carried out at the Natural History Museum on "Ecology" offer a glimpse at the contemporary British museum-going public's assumptions about both the museum and the nature of Nature. These surveys actively construct the visitor in their own way, but although they are not analytically

[46]This question is prompted by the Secretary of the Smithsonian's decision in January of 1995 to cancel a National Air and Space Museum exhibition on strategic bombing that was to include the Enola Gay (the B-29 that dropped the atomic bomb on Hiroshima). The original exhibit script questioned the strategic necessity of dropping the atomic bomb on Japan to end World War Two, and provoked line-by-line negotiations with veteran's groups and threats from Congress to scruitinize and cut the Smithsonian's funding ("Smithsonian Scuttles Exhibit; Enola Gay Plan Had 'Fundamental Flaw'," *The Washington Post*, 31 January 1995, p. A1; Joel Achenbach, "Enola Gay Exhibit: Plane and Simple; Air and Space Museum Focuses on the Hardware, Skirts the Horror," *The Washington Post*, 28 June 1995, p. A1; Ken Ringle, "At Ground Zero: Two Views of History Collide Over Smithsonian A-Bomb Exhibit," *The Washington Post*, 26 September 1994, p. A1).

transparent, they do offer a more empirical picture than that yielded by solely relying on critics' reactions or my own perceptions.

Begun in earnest in the 1960s when psychological and communication theory came to the museum world, visitor studies have come to play a more prominent role in exhibition development since the late 1980s.[47] The early phase of evaluation emphasized measuring the uptake of specific messages, while later researchers have favored a more naturalistic approach aimed at understanding the visitor's experience in general.[48] Recently visitor evaluation has found its institutional justification in the commodification of the museum experience that treats visitors as customers and their behavior during the visit as the consumption of an experience that may or may not include "buying" knowledge. This has resulted from the administrative perception that the museum and its "products" must be marketed to capture a larger share of the leisure time market, and that the museum-as-store must cater to the customer's wants and needs both in style and informational content. This was the subtext of Museum director Neil Chalmers' talk about the museum in the "market place."

Interestingly, this model co-exists with the earlier educationalist model of the museum mentioned above, which assumes a very different relationship with

---

[47]For a recent review of the history and present state of the field, see Bernard Schiele, "Creative Interaction of Visitor and Exhibition," in *Visitor Studies: Theory, Research, and Practice*, eds. Donald Thompson, *et al*. (Jacksonville, Alabama: Visitor Studies Association, 1993), pp. 28-56. One early effort at the Smithsonian was a monumental behavioral study of visitors' actions in the MNH (*The National Museum of Natural History as a Behavioral Environment* (Robert A. Lakota, Smithsonian Office of Museum Programs, 1976)). But it yielded no usable information for exhibition planning and was dismissed by both the MNH administration and the Office of Museum Programs, which was nominally in charge of evaluation (SIA RU 347, Assistant Secretary for Museum Programs, Records, 1968-1979, Box 7). The Assistant Secretary for Museum Programs, Paul Perrot, characterized those studies as "putting a pressure gauge to a flat tire," meaning that they purported to quantify the obvious (Paul N. Perrot, "Oral History Interview," 16 July 1992, Record Unit 9565, Smithsonian Institution Archives, Tropical Rain Forest Exhibits, p. 11).

[48]Schiele, "Creative Interaction of Visitor and Exhibition," p. 32.

the visitor: "This is what you need to know and this exhibition is a failure if you don't leave knowing it."[49] I would like to argue that the consumer choice model tends to mask the one-way transmission dynamic of the educationalist model. That is, the consumer model claims to cater to the visitor-as-customer, whereas the educationalist model still assumes that there is a message that the visitor "needs to know." By casting an educationalist agenda in the language of the marketplace, the museum experience is claimed to have a freedom of choice that does not necessarily exist (in Chapter Four, Sophy Burnham was disappointed to have removed during the modernization program most of the possible stories that the visitor could make the objects tell). This tension deserves greater attention by the museum education field.

Front-end, or formative, evaluation involving structured discussions with selected focus groups was conducted before design for "Ecology" began in order to gauge public understanding of ecology and the interest level provoked by the proposed story line. After the exhibition opened, summative evaluation, consisting of short interviews of twenty different visitors at specific points in the gallery, aimed to find out how visitors responded to the design and content. These evaluations are useful in illuminating the rhetorical function of realism in the gallery. Based on their interpretation of public perceptions of the rain forest, the exhibit-makers used the rain forest as an icon of diversity rather than an opportunity to explain ecological principles or theories. For that, the exhibit-makers purposefully turned to a presumably more familiar example, the Barn. Finally, visitor responses to the metaphorical, artistic design of the Connections

---

[49]Typical of this approach is the attitude, expressed by one of the leading proponents of science literacy, that, "It is legitimate to expect some behavioral change after a visit to a museum. Otherwise we would franchise them to Disney. If we want people to carry away something, we ought to be able to define what that is and measure it" (Jon Miller in "Discussion" of R. S. Miles, "Museums and the Communication of Science," in *Communicating Science to the Public*, eds. David Evered and Maeve O'Connor (Chichester: Wiley, 1987), pp. 114-130, on p. 125).

Diorama differ considerably from their reaction to the realistic approach of the Barn. Though the design concept of the Connections Diorama was quite sophisticated, its message appears to have been largely lost on the visitor. This result has obvious ramifications for understanding the impact of Ripley and Farb's interest in "arty" conceptual exhibits at the Smithsonian in the 1960s, as well as for exhibition design today.

The Rain Forest: Wilderness vs. Countryside

The formative evaluation refracts public vision of the rain forest through an ambivalence about the meaning of ecology:

> Ecology is seen to have two faces. The first of these is good, beautiful, untouched and natural. This face is all about undisturbed wildlife; oak woodlands and field mice, perfect undisturbed food chains, trees, green and God's natural earth. It is an image which is static and familiar, essentially safe and reassuring.
>
> "The pictures that I have seen on rainforests [sic] are big long tall trees and the sun coming down.. . .it looks like somewhere you would like to be, it looks tranquil and how life should be." (Solo/Peer Group Visitors, 18-60 Years)
>
> In stark contrast the second face of ecology is [of] man's impact upon the natural world.[50]

Since people report positive associations with the rain forest, the evaluation recommends addressing public ambivalence as follows:

> The destruction of tropical rainforests is a particularly powerful issue, since it effectively stimulates emotion and hence re-kindles energy in ecology. Rainforests are perceived aesthetically beautiful, exotic and untouched. The imagery associating man's destruction of them, is that of Eden being destroyed. Rainforests are clearly a powerful trigger for stimulating interest in ecology.[51]

The evaluation reports public perception of the rain forest as both an icon of pristine nature and of man's intervention in nature. The last sentence shows the

---

[50]Katie Edwards, Georgie Macleod and Martin Whitworth, "Ecology and the Public: Testing the Waters," November 1988, BM(NH) Department of Exhibitions and Education, p. 7.

[51]*Ibid*., p. 24.

emphasis on affective experiences in the gallery. The formative evaluation did not want to measure what people *know* about rain forests, but instead how they *feel* about them. This distinction is crucial, for in discussing how to connect the exhibition to the visitor's own experience, the report concludes that along with finding examples of immediate personal interest to the visitor, "issues may be indirectly relevant through their presence in my exotic fantasies. Here rainforests are an obvious example."[52]

These passages from the formative evaluation mix the visitors' voice with the evaluators' voice in a way that makes it clear the evaluators have been given the authority to speak for visitors even when not directly quoting them. The phrase "my exotic fantasies" is not a quotation from a respondent, but a projection of the respondent's thoughts and feelings, and it is directly followed by the inference that rain forests are an example of how distant things are made relevant. This shows how evaluations containing empirical material construct, rather than simply report, narratives about the visitor.

Given the formative evaluation's findings, and the ubiquity of the rain forest as an image of biodiversity in discourse about environmental preservation, the rain forest reproduction at the entrance to the gallery is not surprising (Figure 6.2). However, unlike the importance the rain forest group had at the Smithsonian, "Ecology's" rain forest was added relatively late (toward the end of 1989), and the part it plays in the final exhibition is comparatively minor.

Bloomfield explained that the rain forest was meant to convey its message on a "subliminal" level:

> We wanted to detach them from the city and the civilization they've just been walking through to get to the museum. We wanted to lift them out of that and put them briefly, at least, into the middle of a strange and living system. [We wanted] to metaphorically, or physically, to develop the idea that people are a

---

[52]*Ibid*., p. 29.

> part of this kind of overall envelope of natural systems, of ecological systems. . .[and] hopefully create in them the right sort of mood for them to be more contemplative and actually take on board some of the ideas.[53]

The rain forest is meant to function as the Edenic archetype that the formative evaluation identified. The other side of the public image of rain forests, human destruction of the rain forest, appears at the end of the exhibition when the visitor comes around to the back of the rain forest and sees an ax embedded in one of the tree trunks. At first glance, Bloomfield's formulation of the rain forest exhibit's attempt to transport the visitor into another space sounds a lot like the Smithsonian botanists' desire to inspire visitors with the drama and wonder of their field site. Just as Bloomfield wanted to create a feeling, Chapter Three emphasized the imaginative dimension of the botanists' motivations.

However, the botanists' inspirational agenda derived from tacit knowledge of their field experiences. On the other hand, the "Ecology" rain forest does not refract a particular geographical place through the lens of imagination, but remains in a purely imaginative space, creating a mood with what amounts to a set dressing of the gallery (Figure 6.9). That is not to say that the exhibition developers did not want a realistic rain forest reproduction, but it is clear that realistic representation of the sort the botanists insisted on did not play a central role in their approach to the design.

Early plans for the gallery called for natural lighting, and for a time, the architects recommended living plants for the rain forest. The museum rejected this on the grounds that maintaining live plants was seen as too difficult. Simultaneously, other design issue required all-artificial lighting.[54] In early 1990, the Larson Company, an American firm specializing in artificial rock work

---

[53]Bloomfield Interview.

[54]Ian Ritchie (personal communication, September, 1994); Bloomfield (personal communication, September, 1994).

Figure 6.9. Rain forest setting in the entryway to the "Ecology" gallery, The Natural History Museum, London, opened March 1991. SWA photo.

and trees for museum and zoo exhibits (the self-declared "world leader in replicated rain forests") was approached to produce the rain forest exhibit.[55] Because only £50,000 was budgeted for the display, Larson custom-made the larger trees, but ready-made foliage was supplied by their U.K. agent.[56] The contract did not specify locale, beyond the general (and vast) region of the Amazon. Therefore, a place-specific plant list was not necessary: "It was agreed that all parties would provide their own list of suitable specimens and further consultation would take place regarding a final choice. It was generally agreed that the exhibit would be based on an Amazon rainforest."[57] Both the generality of the locale and the fact that Larson's U.K. agent specified foliage in terms of the area it would cover, rather than by individual species, suggest that the rain forest would be built from a standardized conception of the rain forest.[58] Because of fire safety concerns, no molded plastic plants were to be used, but instead Larson supplied so-called "preserved" and silk foliage.[59]

While Larson was installing these elements in the fall of 1990, Bloomfield expressed his disappointment that they did not succeed in creating the desired effect: "The display looks like a formal flower display rather than the rundown, chaotic and debris strewn natural scene we had asked for.. . .The exhibit was to give a strong feel of walking under a forest canopy—this does not seem likely in

---

[55]Andrew Anderson to B. Sutton, 28 December 1989, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files; Neal Potter to Barry Sutton, ca. 1989-1990, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files.

[56]W. A. Livingstone to Neal Potter, 8 March 1990, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files.

[57]Neal Potter to Malcolm McBratney, April-May 1990, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files, p. 1.

[58]Livingstone to Potter, 8 March, 1990.

[59]Potter "Visit to Larson's agent" (1990), p. 1.

its present state."[60] While Bloomfield clearly believed that a certain sort of realism was needed to give the exhibit sufficient drama, he ultimately expressed the opinion that as completed it did create the desired mood.[61]

Like the "It All Depends" rain forest, the "Ecology" rain forest functions as an icon of connectedness and the abundance of nature. At the entrance, a label added after the exhibition opened (Figure 6.9) reads, "Each individual animal, plant and person is just one component in a complex system. Think of the many different life forms in a rainforest. Each one is linked to every other living thing and the environment which surrounds them all." The setting in "Ecology" is an icon because it does its work by playing on the associations people bring with them. Because the rain forest has already been promoted heavily to the public as the icon of biodiversity, the visitor mainly needs to be reminded of that fact rather than convinced of it by new, detailed evidence. This is one difference between the "Ecology" and "It All Depends" rain forest. In the 1970s, the rain forest had not yet been made into a ubiquitous icon of the fragility and endangered status of nature.

The latest summative evaluation of the exhibition does not include the rain forest in its list of areas that visitors were questioned about.[62] Since the evaluation primarily tried to measure uptake of messages and concepts, the museum does not seem to have been worried whether the rain forest functioned effectively as an evocative set-piece. An earlier tracking study that measured the time visitors spent in various parts of the exhibition found that although nearly all visitors (forty-five out of fifty) stopped in the rain forest, they spent only four

---

[60]Bob Bloomfield to Ron Nash, 1 November 1990, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files.

[61]Personal communication (September, 1994).

[62]Edwards and Cappendijk, "A Summative Evaluation of the Ecology Exhibition."

percent of their total time in the rain forest section. This compares to a maximum of fourteen percent of their total time spent in the rest of the introductory section, which includes the Connections Diorama, even though fewer (thirty in fifty) visitors actually stopped to see the introductory section.[63] Even though the path through the rain forest is shorter than the length of the rest of the corridor, there is ostensibly more to see (though less to read) in the rain forest. Thus the rain forest seems to succeed in attracting visitors, but does not hold them.

Reactions were mixed as to whether the rain forest exhibit succeeded in making the viewer feel like they were in a real rain forest. The writer for the professional journal *Environmental Interpretation* gushed:

> A few steps from the light of the museum's reception area and I found myself plunged into the depths of a tropical rainforest, filled with convincing sounds of life in a vine-clad jungle. I was setting off on an ecological journey. Like other visitors to the gallery, I returned with a strong awareness that the future of a balanced, diverse ecology is in our hands.[64]

"Eco-fans" such as this one bring with them a pre-established awe for the rain forest that is triggered, not generated by, the installation in the gallery, and therefore rate it highly in effectiveness and beauty. On the other side of the spectrum, a student of environmental science writing to the museum called the rain forest "the most naturalistic exhibit" in the gallery, but nonetheless characterized it as having been "relegated to a 'roses-round-the-door' effect."[65] Since both writers had commitments to environmental awareness, no simple correlation can be made between previous environmental awareness and a high rating of the rain forest's realism.

---

[63]Sparrow Chen, "Tracking Study Through Ecology Gallery," December 1992, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files.

[64]Jennifer Bowden, "Warming to the Planet," *Environmental Interpretation*, August 1991, p. 29.

[65]Lynda McDonald, before July 1991, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files, p. 2.

The Barn: Familiar Image as Teaching Tool

Even though the formative evaluation identifies the affective value of the rain forest as tapping “my exotic fantasies,” the museum assumes a model of learning that connects technical material to the visitor’s familiar experience. Motivated by the desire to use commonplace examples to relate to what the report calls “my life,” the Barn is the vehicle for the technical ideas of niche and population regulation in an ecosystem. The obviously human-constructed system of the barn is projected as a “microcosm” of the natural world.

The previous “Introducing Ecology” exhibition used a large, fairly detailed diorama of a British oak woodland to exemplify an ecosystem. Visitors surveyed generally liked the diorama, though some thought it had become a bit dingy.[66] But more interestingly, the front-end evaluation for “Ecology” revealed that to an urban British public, the woodlands are not “real” in two senses. First, “Complaints are voiced that oak woodlands are remote, the world of Laura Ashley and fantasy, not my life.”[67] These British museum-goers, at least, did not identify with the woodland because they saw it as the province of storybook characters in designer Victorian country clothes on idyllic picnics. Not part of their own lived experience, the woodland is not “real” on a cognitive level.

Second, the evaluation found that “woodlands are perceived as very safe, and somewhat unreal to the typical urban visitor to the museum. Oak woodlands are something which are seen out of car windows whilst traveling along the M1 [motorway]. This points to the need for closer subject matter, for example, my back garden.”[68] The phrase “perceived as very safe” suggests that

---

[66]Katie Edwards, “Summative Research on Food Chains and Food Webs,” 10 February 1989, British Museum (Natural History) Department of Exhibitions and Education.

[67]Edwards, “Testing the Waters” (1988), p. 15.

[68]*Ibid*., p. 21.

the woodlands are not “real” (and not “natural”) because they are not properly wild. Because the English countryside has been inhabited for centuries, the British experience of the outdoors is not one of untamed wilderness, but of a place that is frequently park-like and necessarily human influenced. The woodland is not “real” on an affective level because it does not pack the same emotional charge that the rain forest does as an image of “how life should be.”

Rather than using “my back garden” or an urban setting as the formative report recommended, “Ecology” substituted a barn for the oak woodland tainted by the unreal snobbery of Laura Ashley.[69] Barns are not exactly part of the everyday experience of most Britons either, but their status as properly natural is not ambiguous. The Barn (Figure 6.7) is a human-made environment standing in as a model for larger, more complicated, and therefore more confusing, “actual” “natural” ecosystems. In a summative evaluation of the Barn, only one person questioned the appropriateness of a domestic scene in an exhibition about ecology. Most visitors liked the Barn very much.[70]

An interesting feature of the Barn is that it comes off as much more realistic than the rain forest (compare Figure 6.7 to 6.9). In fact, 10% of the visitors questioned for the barn survey specifically “mentioned that they thought it was very realistic.”[71] Obviously it was easier to make the Barn convincingly realistic given its indoor setting and the ready availability of cats, rats, and chickens for taxidermy, compared to often endangered and always costly rain forest animals (paper cutouts of a parrot and a toucan are the only visible animals in the rain forest). But it also seems likely that because visitors were

---

[69] *Ibid*., p. 24.

[70] Sixty percent liked the Barn, but the sample size is not indicated. Ninety percent of the visitors stopped to look at it (“Barn Observation Evaluation,” 1991-1993, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files).

[71] *Ibid*.

ostensibly more familiar with barns, the exhibit needed to be more realistic to be believable. Since the Barn is meant to convey stories about competition through niche selection and population regulation by predation, actual specimens stage these narratives. In contrast, the rain forest's message of sheer diversity can rely on mass effect. It seems unlikely that an American museum would have chosen this strategy, since the category of wilderness is too firmly entrenched in the American perception of nature to make a man-made system stand in for a "natural one."[72] If anything, the analogy would point the other direction, from "nature" to the barn.

The Connections Diorama: Humpty Dumpty Stays Broken

Critics of the exhibition were most unhappy about the fact that "Ecology" substituted a multi-media treatment for the more traditional specimen-based exhibit style of the museum.[73] Just as the Smithsonian curators reviewing "It All Depends" saw the turn away from objects as a turn away from intellectual rigor, complaints about the lack of specimens in "Ecology" went along with a view of the modernistic design as insubstantial hype. But if anything, rather than being simplistic as a result of its highly designed exhibits, bits of "Ecology" are too clever and subtle to be appreciated by a first-time visitor untutored in ecology or biology. Figure 6.10 shows an early design sketch of the Connections Diorama and how the individual "pieces" of the plants, animals, and background come together from left to right to form the "whole picture" (as the label puts it) on the far right. The message of the fragmented diorama was, as a label states, "An ecosystem where the whole picture is only revealed as we explore the myriad of

---

[72]Roderick Nash, *Wilderness and the American Mind*, 2nd ed. (New Haven: Yale University Press, 1973).

[73]Coles, "Through the Looking Glass"; Colin Davies, "Green Gimmicks," *Architects Journal*, 10 April 1991, 64- 65; Neuwmark, "Amusement Arcadia"; Hamilton, "Pay and Display."

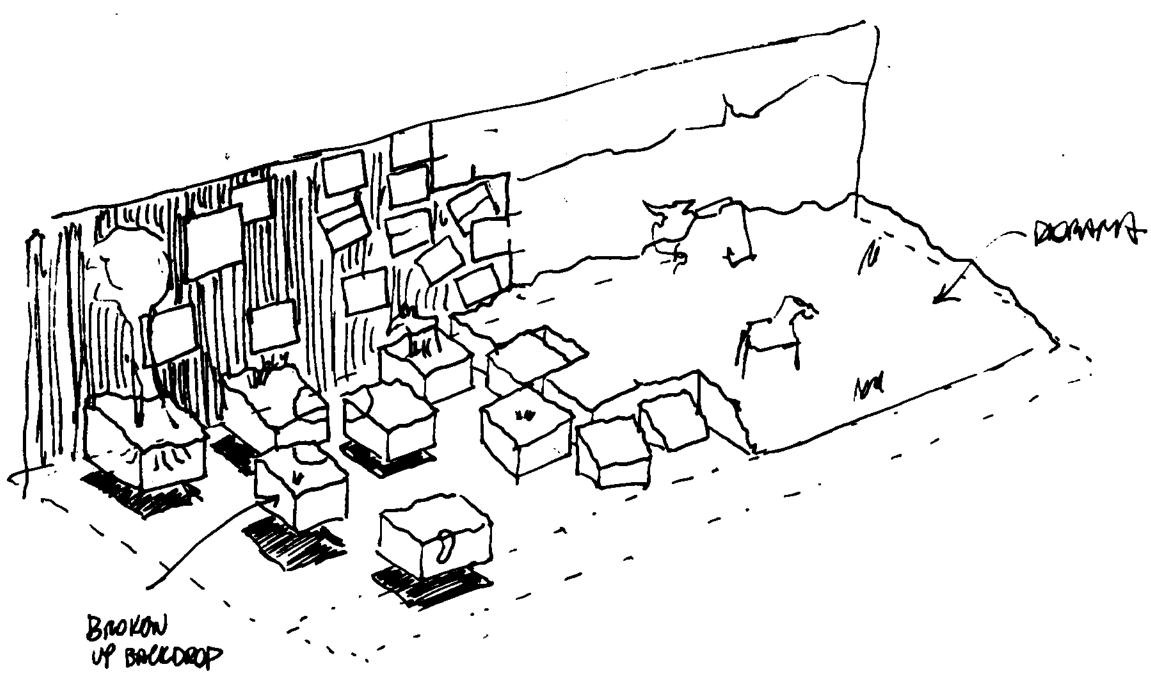


Figure 6.10. Preliminary design sketch for the Connections Diorama in the Introduction area of "Ecology," The Natural History Museum, London, by Alan Ward, *ca*. 1990. Writing at left: "broken up backdrop." Right: "diorama." Courtesy Department of Exhibitions and Education, The Natural History Museum, London.

connections between its living, organic and inorganic components." The various bits were meant to add up to a recognizable whole. Added to the image of fragmentation showed in the sketch was Ian Ritchie's demand for the viewing slits to keep the sweep of the frosted glass from being interrupted (Figures 6.3 and 6.4). The designers then justified the slits in terms of the storyline by adding the cameraman mannequins as a metaphor for observing wildlife from a blind.[74] The video monitors provide, in the form of the classic nature documentary, the fruits of these difficult observations. Like the model binoculars planned for viewing images in "It All Depends," the mannequins simulate, rather than provide an opportunity for, observation.

As a piece of art about science, the "Connections" diorama could be interpreted as a brilliant reflexive statement about the difficulties in synthesizing knowledge of natural systems and relationships. The fragmented diorama deconstructs the traditional assumptions of the genre of realism (which usually so assiduously conceals its own making) by visually suggesting that the image of pristine wholeness is assembled from a variety of parts. The presence of the field observer, in the form of the cameramanniquins, puts the scientist back into the picture, hinting at the tacit knowledge gained from field experience. The video monitors and cameramanniquins struck me as perhaps even an ironic commentary on the primacy of television in structuring our perception of reality. The Connections Diorama and the cameramen blur the boundary between genres of realism and abstraction.

At least one reviewer found the wildlife video ironic, but not in the way the designers intended:

---

[74]Neal Potter to Barry Sutton, *ca*. 1989-1990, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files.

> It is as though the museum has lost faith in specimens; these are hidden behind the frosted glass. If you want to learn anything you have to watch the videos. The designers have concluded that in the 1990s the only way to communicate is through a television screen. So little attention has been paid to displaying the objects that the label of the secretary bird is clearly visible, tied around its leg.[75]

However, the writer, himself a curator at another museum, did not see this irony as playfully making a deeper comment, but rather as a cynical repudiation of the authority and attracting power of real specimens. Like the Smithsonian curators, he took the allegedly casual treatment of the specimen as an insult.

The artistic cleverness of the Connections Diorama notwithstanding, the summative evaluation shows that visitors were not in the mood for metaphors in the halls of *this* museum. Instead of subliminally picking up on metaphors or playful irony, visitors were frustrated because they couldn't see the animals inside. Because of the narrow slits in the glass, the image of the fragmented tableau coming together to form a holistic picture is not at all clear (the bird's-eye view shown in Figure 6.10 is not available in the gallery). Even I, as the over-trained analyst, did not notice the progression until it was pointed out to me. The summative evaluation shows that only two in twenty visitors surveyed about this section "realised that the African scene was compared to a jigsaw puzzle." Half of the group did not like the slits because, according to one visitor, "you can't see as much as you should be able."[76] The Connections Diorama violated too severely their expectations for the established conventions of the habitat group and its usually panoramic vista without providing them any hints as to why, or what to do with their frustration. Visitor frustration with the Connections Diorama recalls Judith Martin's negative reaction to the irony of mechanical things describing man's alienation to nature in "It All Depends."

---

[75]Coles, "Through the Looking Glass," p. 20.

[76]Edwards and Cappendijk, "A Summative Evaluation of the Ecology Exhibition," p. 16.

Even as exhibit-makers rush to update what they claim the public rejects as boring Victorian exhibits that cannot compete with television, the public still has a rather traditional (and not necessarily negative) view of the museum.

Since the museum is trying to compete in a marketplace, and one of the laws of the market is that the customer is always right, the museum has decided to enlarge the slits to allow a better view of the diorama. Granted that exhibits should not routinely frustrate the visitor. But given the original intention and the chance to say something interesting about how we perceive nature, it would have been worth trying to give visitors something to do with their frustration instead of avoiding it entirely. Science studies can give informal science education, and museums in particular, the interpretive resources to portray the complexities of doing science. However, because the museum's educational agenda is content oriented, rather than process oriented, Clarke saw this particular point about the Connections Diorama as too complicated to get across in an exhibition in which visitors spent between fifteen and thirty minutes.[77]

Interpretation *vs*. Education: Objects *vs*. Concepts Revisited

The NHM exhibit staff involved in "Ecology" repeated the theme that the gallery is about a story and not an attempt to explain or exhibit the collections.[78] Bob Bloomfield tied the use of multi-media such as the Quadrascope (Figure 6.6) to the need to communicate the "active and dynamic" processes of ecology with active and dynamic media.[79] Like "It All Depends," the conviction that specimens are intrinsically too passive pervades "Ecology." This examination of "Ecology" adds to the previous discussion of "objects versus concepts" and "curators versus designers" the synonymous notion of "interpretation versus

---

[77]Giles Clarke, personal communication, September, 1994.

[78]Roger Miles asserts that the London system in general is "concerned with messages, not objects" ("Too Many Cooks," p. 5).

[79]Bloomfield Interview.

education."[80] That is, exhibit-makers at the Natural History Museum believe they must go beyond showing visitors objects in order to carry out their a mandate to teach visitors something with wider relevance. This mandate justifies their commitment to contemporary idea-based exhibit practices.

One of the striking differences between the Smithsonian case and the BM(NH) is that the move away from objects at the Smithsonian could be solidly attributed to the exhibit-makers' lack of museum experience, while both Miles and Clarke had scientific backgrounds and then turned to reinventing museum exhibitions. During an interview, I pressed him to identify the source of scientific authority in exhibits when curators played a diminished role:

> ALLISON: Historically, if you look at a natural history museum with a bunch of exhibits that have been put together by curators, it's fairly straightforward to claim that the exhibits then are a reflection of the voice and vision of the curators.. . .Where do we locate the voice of an exhibition that has been created by your department rather than an individual scientist? . . .
>
> CLARKE: [I]t's been the case, especially in natural history museums, but perhaps in science museums generally, that they've come to see their task less as displaying the collections and more of talking about the ideas that are current issues in the subject as a whole. So they've come to have a very much more abstract base than they used to have. Natural history museums, when they were first set up in the last century, were very concerned about showing their best specimens in the same way that an art museum would be. For me these days, that seems less of a necessity for a natural history museum, whereas the significant role that the museum could play in the whole process of public education is more talking about the ideas and processes and concepts of natural history, rather than the things, the specimens.
>
> So when you talk about individual voice, I think it's important that the individual voice that the museum has for the general public is a voice that's relevant to today's issues rather than being based on either Victorian issues or on the curators' own bee in their bonnet. I say that because we are given the duty as a museum by Parliament not only to collect material and conserve it, but also to be a force in public education.[81]

---

[80] John Durant of the Science Museum (London) provided this distinction.
[81] Clarke Interview.

Clarke's answer constructs the following chain of inference: Curators are no longer necessary for exhibition-making because exhibitions are no longer about objects. Exhibitions are no longer about objects because rather than having access to the objects, ideas and theories are the part of science that must be conveyed to the public. The ideas and theories of modern science must be exhibited because of their social relevance. Exhibitions are to be socially relevant because of the Museum's educational mandate from Parliament. Objects have no place in the museum because this chain relies on a totally abstract view of knowledge about the natural world.

The links in this chain show how the argument against objects in museums lines up on scientific, aesthetic, and political fronts. This dissertation has attempted to show that the alliance between the scientific and aesthetic dimensions is not essential: traditional natural history is not merely descriptive; objects can exist in story lines and have their own attractive power with visitors. The politics of rejecting objects merits examination on two accounts. Casting the contemporary exhibition style as necessary to achieve the institution's educational goals results in a diffusion of the agenda-setting process that makes identifying the source and assumptions behind the agenda (whatever it may be) difficult. In further discussion, Clarke indicated that the museum detected "socially relevant" issues by signs such as media coverage, and selected them through general consensus.[82] It seems that this diffuse agenda-setting process led to the unfulfilled promise to make visitors uncomfortable about the state of the environment. On one hand, the museum determined that the environment was an important issue but, at the same time, ultimately felt uncomfortable promoting a specific point of view. Bob Bloomfield saw the mixture of criticism of the show—that it both went too far and not far enough—as proof of its

---

[82] *Ibid*.

balance.[83] Interestingly, half of the visitors interviewed about the gallery's concluding section (eleven in twenty) said they would have liked more specific conservation information, suggesting that the museum need not worry about public uneasiness over activism.[84]

Second, by removing the curatorial voice from the process, the museum has given up the special advantage of the rich overlap between exhibition and research that natural history museums have historically enjoyed. By promoting an educational mandate that emphasizes issues and ideas rather than attempting to draw issues and ideas out of the collections, the museum joins the ranks of popularizers with no intimate connection to the scientific process, but who communicate knowledge as finished fact, free from practice or context.

At the risk of hyperbole, the debate over specimens and dioramas versus interactives and videos is nothing less than a debate over a redefinition of the museum. The moderns do not have a commitment to the genre *per se*, but wish to convey the new set of messages by, if need be, multi-media and video, since these media have become the current vernacular.[85] If the mission of the museum is to communicate messages that somehow transcend the historical purpose of the collections, then this strategy is in fact correct. Earlier exhibit-

---

83For example, a visitor wrote to the museum complaining that the exhibition was too radical for even discussing the *mechanism* of global warming (John F. Pink to Exhibits Manager 'Victoria & Albert Museum' [sic], 27 December 1991, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files; Bob Bloomfield to Pink, 14 January 1991, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files). Other writers saw the lack of extensive discussion of pollution as covering for the exhibit's sponsor, British Petroleum (Tom Lynch to Neil Chalmers, February 1992, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files; Robert Bloomfield to Lynch, 25 February 1992, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files).

84Edwards and Cappendijk, "A Summative Evaluation of the Ecology Exhibition," p. 31.

85For opposition to the communication-driven approach of "Ecology," see Davies, "Green Gimmicks."

makers certainly worked within their own cultural and educational frame. There is no reason, save for tradition, to preserve those techniques if they are no longer effective or part of the culture's lived experience.

A better question, which the communication and design-minded exhibit-makers engage less directly, is precisely why people go to natural history museums. By and large, they don't go to be taught specific facts or ideas.[86] And it seems abundantly clear that people don't visit museums to absorb school-type materials. The formative evaluation for "Ecology" indicated that teen-age school students thought a treatment of photosynthesis and food chains in the new exhibition would be "boring" because that was what they were studying in school at the moment and they didn't want it again in the museum.[87] Furthermore, "Ecology's" makers saw the previous ecology exhibition, "Introducing Ecology," which included extensive treatments of energy cycling and flow, as generally ineffective because it "attracts school parties and academically motivated visitors but has less appeal for the majority of our visitors."[88] But the museum was determined to include the subject of photosynthesis in the exhibition because it was deemed a necessary part of the story line explaining energy capture and flow in ecosystems. The formative evaluation recommended finding a way to make the usually boring subject interesting, and the ultimate solution was the large-scale walk-in Leaf Factory exhibit showing the microscopic cellular structure inside of a leaf (Figure 6.11). This was an attempt to make the process of photosynthesis more physical and dramatic. However, since the chemistry of photosynthesis is a microscopic process, the Leaf Factory still relies on a recorded narration to verbally explain

---

[86]Miles, "Museums and the Communication of Science," p. 121.

[87]Edwards, "Testing the Waters," p. 16.

[88]"Ecology Exhibition—Proposals and Reactions," undated, BM(NH) Department of Exhibitions and Education, Ecology Exhibition Files.

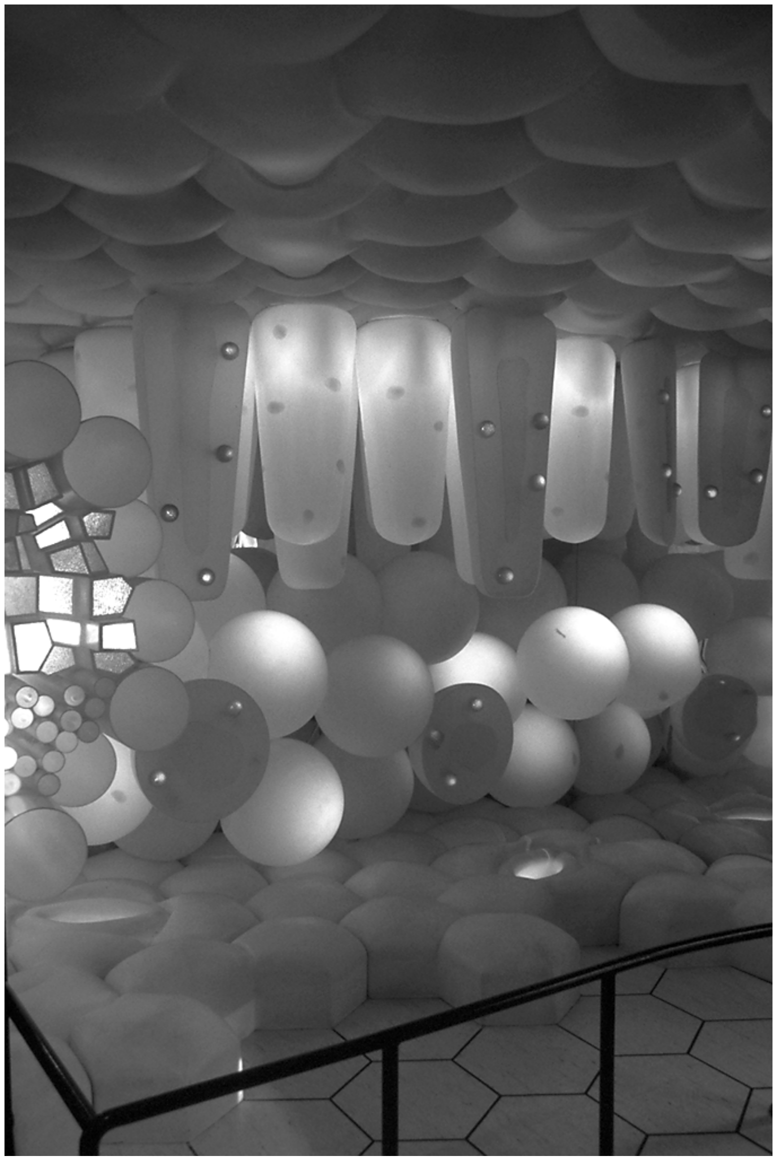


Figure 6.11. Large-scale Leaf Factory exhibit illustrating photosynthesis in the Ecology gallery, The Natural History Museum, London, opened March 1991. SWA photo.

how photosynthesis works, and the summative evaluation showed that not that many people listen to the entire narration.[89] This again brings up the tension between the marketing and educationalist ideologies. If the customer is always right, and the customers don't want to hear about photosynthesis because they already get it in school, why give it to them again?

Instead, people of all ages and educational levels come to the museum to see physical things that play a role in the iconography and ideology of our national or personal identity, or that simply impress us with their age or size or rarity.[90] We go to museums to see real artifacts with established provenance, that is, "real" in one of the several senses explored in this dissertation. An art museum would hardly put its masterpieces in the basement and exhibit only Xeroxed copies with labels or videos. But that is what media-heavy natural history exhibitions do under the rubric of education. Chalmers claimed to have had his eyes opened to the value of the collections, saying "Once you've asked the question, 'What are our collections for and how can we best make use of them for the benefit of the outside world?' then the collections stop being seen as a problem and start being a massive asset."[91] But his statements about the limited exhibition value of the collections narrows rather than expands the concept of what sort of an "asset" collections represent.

Conclusion: Wither the Natural History Museum?

The history of the "Ecology" gallery at the Natural History Museum in London encapsulates the contemporary debate over the previously central role of the museum's collections in both exhibition and research. The BM(NH)

---

[89]Edwards and Cappendijk, "A Summative Evaluation of the Ecology Exhibition," pp. 22-23.

[90]Susan M. Pearce, *Museums, Objects, and Collections: A Cultural Study* (Washington, D.C.: Smithsonian Institution Press, 1992).

[91]*Ibid*., p. 38.

administration and exhibits department devalued the collections as the central ends of museum research and museum exhibitions, and viewed them as the means to broader scientific and educational ends.

Director Neil Chalmers argued that complaints about not exhibiting the collections were misguided because, "Many of the objects are preserved in spirit and they don't look very attractive."[92] Setting aside for a moment the fact that few alcohol-preserved specimens have ever been historically on exhibit (with the exception of the odd Coelacanth or giant squid), the Natural History Museum, and other museums with collections of similar age and condition, is in a genuine bind. Many of the taxidermy specimens originally intended for public exhibition are nearly a hundred years old, and are physically deteriorated, scientifically incorrect, or both.[93] For example, a postcard for sale in the museum shop shows a stuffed gorilla baring its teeth menacingly in a pose that today looks crude and exaggerated. In one of the few cases of public reflexivity to be found anywhere in the museum, the caption on the back deconstructs the pose, stating, "This specimen was prepared when little was known about gorillas except that they were large and powerful. We now know that they are gentle, sociable herbivores, in considerable danger of extinction in the dwindling forests of central Africa."

Giles Clarke explicitly used this problem to justify the choice of multi-media for the "Ecology" gallery:

> Ecologists investigate an active process full of vitality. To do justice to this in an exhibition, the gallery must be a place that reflects the energy and vitality of the subject. Anything that seems like a mausoleum respectfully commemorating past life will not do because the message conveyed contradicts the message intended. In particular, a gallery which depends heavily on specimens of

---

[92]Quoted in Hamilton, "Pay and Display," p. 43.
[93]Bloomfield Interview; Clarke Interview.

> animals which have been captured and killed is redolent of death rather than life. If you do not believe me, ask potential visitors.
> This is a sensitive subject for museum curators whose business is the collection, preservation, and description of specimens. But I am not talking here of a collection accumulated for scientific study. We have prepared an exhibition which aims to inform the general public about ecology.[94]

Clarke's case is persuasive (note also that he draws a sharp distinction between collection and preparation of specimens for exhibition and research). As noted in Chapter Two, even by the late 1950s, some of the American small mammals sought for exhibit at the American Museum of Natural History were already endangered or protected in the areas represented by the habitat groups. The sportsman's logic that justified killing individual animals to protect their kind is clearly untenable today. Interestingly, the summative evaluation of "Ecology" showed that stuffed animals did not bother visitors that some visitors even wanted to see more on exhibit, indicating again that they are an expected part of the genre.[95]

Furthermore, Chalmers' claim that most of the museum's collections are inappropriate for exhibition forgets that museums previously were in fact acutely aware of this problem. When the real thing was not available for exhibition, they went to great lengths to solve it by creating models of fish, invertebrates, plants, etc., made from the originals by skilled preparators and certified as authentic by the curators. The current desire for multi-media exhibitions must be seen as not the only possible solution to the problem of difficult-to-exhibit specimens, but one recent solution arising out of a particular set of technical practices and institutional interests. It is partly the difference

---

[94]Clarke, "Through the Looking Glass," p. 21.

[95]Edwards, p. 32. Anecdotally, I have observed parents reassure small children who did express concern that the animals had been killed wrongfully. There may be either a generational shift taking place, or those assurances could be part of the process of transmitting the rules of how to experience a natural history museum.

between interpretation (providing specimens or surrogates whose authenticity is sanctioned by scientific expertise) and education (portraying an informational story line that has arisen out of a wider context and set of interests).

Without capitulating to the claim that specimens bore today's media-fed natural history museum visitor, one solution to this problem is in fact to go ahead and to give over to the zoos, aquaria, and botanical gardens the function of representing organisms in their environments. This has indeed been the trend to some extent, as the urban places where living wild things can be seen have increasingly placed their exhibits into realistic habitats and added more and more interpretive materials. The next chapter entertains the proposition that the genre of realistic representation of nature has indeed passed from the museum hall to living exhibits. It will examine the growing popularity of living rain forest reproductions since the late 1980s, and will connect their rise to efforts of conservation biologists and their allies to promote species conservation and habitat preservation to a North American audience susceptible to the romantic allure of the Tropics. Chapter Seven will argue that realistic representation is still an important rhetorical strategy in defining nature. Rather than having been decisively shown to be "mere description" by the conceptual space of electronic media, realistic representations employing live organisms rely now more than ever on technical mediations to achieve the illusion of verisimilitude.

CHAPTER SEVEN
NATURE UNDER GLASS:
RAIN FOREST AS ICON OF BIODIVERSITY IN THE 1980s & EARLY 1990s

Introduction: Explaining Jungle Fever

If realism as a representational genre fell from favor in some natural history museums from the late 1960s through the 1980s, their efforts to reconnect urban dwellers to nature have not been totally abandoned in a post-modern popular culture permeated by ephemeral, fragmented, electronic media. The visitor's pamphlet for the Montreal Biodome proclaims without irony, "the Biodôme de Montréal offers a direct link to nature under one roof through the re-creation of four of the most beautiful environments in North and South America."[1] While Social Darwinists in the first half of the century viewed realistic habitat groups as the antidote to the racial degeneration caused by urban decadence, today's makers of realistic habitats use simulated contact with nature to place humans within a living system defined by the idea of biodiversity.

The case study of "Ecology" at the British Museum (Natural History) showed that the debates at the Smithsonian in the 1960s and 1970s over realistic versus abstract exhibit genre and argument were not isolated, but belonged to a growing trend that continued through the 1980s. Much as it did at the Smithsonian, the interpretation-versus-education debate at the BM(NH) went beyond upgrading the museum's ability to communicate natural history and involved taking the museum's authority to speak about nature from the subject experts and placing it in the hands of educationalists.

---

[1] *Biodôme de Montréal: Tribute to Our Living Planet*, Ville de Montréal, 1993.

While some natural history museums have abandoned realistic but static habitat groups for more abstract but active multi-media exhibitions, zoos, botanical gardens, and aquaria have moved from sterile cages to realistic habitat settings of living plants and animals, and particularly tropical rain forests. This new generation of "immersion experiences" proffering direct contact with nature is the contemporary representational genre most analogous in function and intent to the classic museum habitat group. Their popularity indicates that the living rain forests have become the preferred means of transporting the urban visitor to an exotic natural place. There are important differences in the technology used to create habitat groups and these new living habitats and the histories of the institutions that house them. However, the resemblance between museum groups and living habitats is not accidental.

Although I have used the tropical rain forest exhibits at the Smithsonian and the BM(NH) up until now primarily as a convenient means of examining wider theoretical and historical questions about natural history museum exhibition, these cases hold particular interest because their specific subject matter—the tropical rain forest—has become a ubiquitous image in the wave of green environmental activism that gained momentum in the late 1980s. Rain forests have come to be seen as one of the last great wildernesses on the planet, and saving them and the biodiversity they contain has acquired urgency for a host of biologists, grassroots political activists, non-governmental organizations, and nature-lovers in general. Current discussions of the rain forest involve the wider themes that have permeated this study: definitions of the natural, idealized representations of nature as wilderness, and shifting scientific theoretical resources. This chapter therefore continues to look at exhibition practice in general, but in the process provides at least a partial explanation of the popularity of rain forest exhibits in particular.

One reason to consider living rain forest exhibits as the current version of the habitat group is their sheer number. A recent informal science education newsletter lists eleven living rain forest exhibits at zoos, science museums, and aquaria, six of which opened since 1991 (at the Ontario Science Center and zoos in Cleveland, Omaha, Pittsburgh, Portland (Oregon), and Washington, D.C.). The zoo installations cost a total of $61 million.[2] Among others not on this list are the rain forest built into the 1990 restoration of the Missouri Botanical Garden's Climatron, and the rain forest in the Montreal Biodome, which opened in 1992 as part of a replacement for the Montreal Zoo that cost over $40 million Canadian.[3] The newsletter also notes the 1987 Smithsonian Institution Traveling Exhibition Service show "Tropical Rainforests: A Disappearing Treasure," the Milwaukee Public Museum's 1988 replacement of its biology exhibits with "Rain Forest: Exploring Life on Earth," and an Omnimax film that the Science Museum of Minnesota released in 1992. The Boston Science Museum retained its evocative setting for "Disappearing Treasure"; as of February, 1993, that space featured daily live performances of a short play, "The Ballad of Chico Mendez," about the martyred Brazilian rubber tapper and conflicting interests in Amazonia.

This list is by no means exhaustive, but it suggests the large number of rain forest exhibitions opened in the last five years. Without establishing a historical and conceptual context, the seemingly sudden market saturation of rain forest images, products, and experiences as a framing rhetorical strategy of the resurgent environmental movement in the 1980s and 1990s is at first glance

---

[2]Robert Mac West, "Rain Forest Exhibits—Educational Opportunity Knocks," *The Informal Science Review*, 1993, *1*:1-2, 4.

[3]Serge Talbot, "The Biodôme and the RIO," *Quatre Temps (The Friends of the Montréal Botanical Garden)*, Summer 1992, p. 34.

bewildering, for it implies that the rain forest is a new discovery and its destruction a recent phenomenon.

In fact, the case is just the opposite. Long-running scientific engagement with the tropics is not confined to the Smithsonian (Chapters Two-Four). Charles Darwin and Alfred Russel Wallace found both nagging questions about variation and the supporting evidence for evolutionary theories there. They, along with the educated European and American public of the nineteenth century, had been inspired and enthralled by the "immensely popular" accounts of explorers such as Alexander von Humboldt in South America, and later, Henry Stanley in Africa.[4] Fictional accounts ranging from Joseph Conrad's *Heart of Darkness* to Tarzan's several incarnations in Edgar Rice Burroughs' books and in movies (to name only two evocative examples) have further fueled our imaginings about "jungles" broadly put.[5] Because the tropical rain forest is nothing new in either the scientific or public imagination, it is part of a shared iconography of the natural world. Chapter Six suggested that this was how the rain forest exhibit in "Ecology" operated, since it was not detailed enough to provide new information about the rain forest.

The rain forest's prior existence in our common vocabulary makes it available now as a rhetorical resource to be re-formed in current discourse defining nature and our relationship to it. For an example of the living rain forest genre, this chapter will examine the origins and final form of Amazonia,

---

[4]George R. Angehr, *Parting the Green Curtain: The Evolution of Tropical Biology in Panama* (STRI, Panama: Smithsonian Institution, 1989); Alexander von Humboldt, *Personal Narrative of Travels to the Equinoctial Regions of America During the Years 1799-1804* (London: Bohn, 1852-1853); John Bierman, *Dark Safari: The Life Behind the Legend of Henry Morton Stanley* (New York: Knopf, 1990).

[5]Joseph Conrad, *Heart of Darkness*, first ed. (Edinborough: Blackwood, 1899). For a broader survey of tropical themes and influences on art, literature, and film, see Francis E. Putz and N. Michele Holbrook, "Tropical Rain-Forest Images," in *People of the Tropical Rain Forest*, Julie Sloan Denslow and Christine Padock, eds. (Berkeley: University of California Press, 1988), pp. 37-52.

opened at the National Zoological Park in Washington, D.C., in 1992. Examples of other living rain forest exhibits are in the Montreal Biodome and the Climatron at the Missouri Botanical Garden, all installed within a few years of each other during the late 1980s and early 1990s, and all sharing similar exhibition strategies, content, and educational goals. They therefore can be considered as part of a coherent rhetorical strategy that favors realism as a genre for arguing for biodiversity as a definition of nature and for conserving the tropical rain forest.

The two museum exhibitions about rain forests that were also mounted in the late 1980s provide further comparisons. The Smithsonian show began a five-year tour in 1987 and focused on the social and political dimensions of rain forest destruction.[6] The Milwaukee Public Museum opened its rain forest exhibition in 1988. It resembles the form and content of the Smithsonian's planned Hall of Living Things in that it uses tropical biology to discuss basic principles of adaptation, evolution, and ecology (Chapter Four). The Milwaukee project is one of the few contemporary examples to involve the close overlap between the museum's scientific and exhibits staff that was seen in the botany hall period at the Smithsonian (Chapter Three).[7]

The theoretical themes and categories of analysis developed with the earlier case studies illuminate both the specific similarities and differences between the origins, function, and form of the living rain forests and museum exhibits. The principle of interpretive flexibility means that with a new set of actors comes a new definition of the rain forest. A new social group,

---

[6] *Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1988), p. 146. The exhibit's catalog is Julie Sloan Denslow and Christine Padoch, eds., *People of the Tropical Rain Forest* (Berkeley: University of California Press, 1988).

[7] Allen M. Young, "The Rain Forest in Milwaukee," *Curator*, 1989, *32*:229-244.

conservation biologists, have generated the new meaning embodied by the living rain forests. Because of the origins of the concept of biodiversity in tropical biology, realistic representations of the tropical rain forest have been a crucial rhetorical strategy adopted by conservation biologists and their allies for promoting biodiversity to the public. Furthermore, realism in the new rain forests serves the same function and derives from the same motivations as the Smithsonian rain forest habitat group: realism is necessary to carry visitors to the field so that they may partake of the wonder the field biologists experienced.

The technologies of inscription and the process of translation involved in making the new living rain forests show that precisely because they include living materials, status of the living exhibits as "natural" or "real" is even more ambiguous than their counterparts, the habitat groups. The living displays consist of "real" plants and animals hybridized with artificial life support systems and environmental elements such as fiberglass rocks and tree trunks. As representations, they are therefore just as heavily mediated as the museum habitat group. And like museum habitat groups, their success relies on concealing the mediations.

Embodying Biodiversity

In the previous Smithsonian case, actors and the scientific resources they wielded succeeded in redefining the genre and argument of the rain forest exhibit. In the present case, conservationists have similarly made the rain forest into the instantly recognizable icon of the instantly recognizable buzzword, "biodiversity."[8] Public talk about rain forests is not merely an epiphenomenon

---

[8]Before the 1992 Earth Summit, an average of 13 articles per quarter on biodiversity appeared in British magazines and newspapers before the conference. During the conference, coverage peaked at 201 articles, and as of the summer of 1994 there were still 31 articles per quarter, suggesting a considerable saturation of public news sources with the term (Jeremy Cherfas, "B-word or Buzz Word?" *New Scientist*, 6 August 1994, p. 40).

of a diffuse pop culture trend or mass-marketing scheme. Even though commercial forces are now helping to propel rain forest mania, the informal science education industry was originally motivated to construct the public rain forests by the scientific agendas of tropical biologists actively attempting to shape public awareness or their field and subject matter.

The Evangelism of Conservation Biology

A striking change in the two decades between the first Earth Day in 1970 and the 1992 Rio de Janeiro Earth Summit is the shift by many members of the scientific communities involved in tropical and conservation biology from a detached to an activist politics that now more freely countenances a normative educational mission for the public arms of their institutions.[9] This shift-of-course has not been without controversy.

Conservation biologists share with the generation of naturalists before them a boundless passion for their subject matter that provokes the desire to promote their science to the public in order to gain the funding to be able to go on doing their science (see Chapter Three). However, conservation biologists' public appeals differ from those of their elders in two ways.

First, David Takacs has examined how the new field of conservation biology was founded in the 1980s as an explicit vehicle for activism. He characterizes the new generation of scientists as "proselytizing on behalf of nature" in order to "stoke the flames of public concern over a world whose integrity seemed threatened."[10] E. O. Wilson said of his advocacy of

---

[9]This discussion of conservation biology would have been impossible without early discussions with David Takacs. For a comprehensive account of conservation biology and biodiversity, see David Takacs, "Finding Meaning in Biodiversity" (Ph.D. thesis, Cornell University, 1994).

[10]David Takacs, "'Biodiversity': An Idea As Agent for Ecological Change," paper presented at the Conference of the American Society for Environmental History, Pittsburgh, March 6, 1993, p. 1.

biodiversity that the "style of writing is a kind of poetry and science. And it is deliberately so."[11] For biologists like Wilson, going public with coffee-table books, appearing in OmniMax films, and creating living exhibits is not rhetorical excess, but part of an integrated tactic aimed at not only providing the public with information, but the inspiration to act on that information, and, most importantly, a moral framework to shape their action. Of course the field of conservation biology is not completely monolithic in its interests and methods. However, especially in its early years, there was a core set actively working to create at least the impression of a coherent profession out of a loosely allied group of scientific fields and political interests.[12] For example, as the founding editor of the journal *Conservation Biology*, Michael Soulé published a series of editorials attempting to define a common mission and problematic.[13]

Second, while the Smithsonian botanists' agenda in the 1960s was characterized by an effort to draw the public into their sphere of practice and knowledge, Takacs argues that conservation biologists are forming social alliances and developing normative claims that involve "redrawing the boundaries of what it means to be a biologist."[14] At the time when many of the public rain forests were in planning, conservation biologists mounted an aggressive campaign to expand their authority to speak for nature and define conservation policy questions and problems in biological terms. A 1987 opinion

---

[11]*Ibid*., p. 9. Wilson also discusses his role in shaping biodiversity in Edward O. Wilson, *Naturalist* (Washington, D.C.: Island Press, 1994), pp. 354-364.

[12]The "core set" is the small group of actors who are the most active participants in defining and settling scientific controversies (H. M. Collins, "The Role of the Core-Set in Modern Science: Social Contingency With Methodological Propriety," *History of Science*, 1981, *19*:6-19; H. M. Collins, *Changing Order: Replication and Induction in Scientific Practice* (London: Sage, 1985)).

[13]Michael Soulé, "What Is Conservation Biology?," *BioScience*, 1985, *35*:727-734; Michael Soulé, "History of the Society for Conservation Biology: How and Why We Got Here," *Conservation Biology*, 1987, *1*:4-5.

[14]Takacs (1993), p. 1.

piece in *Conservation Biology* states, "I believe that the anthropologist and sociologist, great as their souls might be, are inadequate for conservation. They solve people problems in terms of people. By ignoring nature they fail. The conservation biologist, in the process of saving species, finds new solutions for human survival."[15] In redefining the field, the scientists added a willingness to take an activist stand based on the conclusions of their biological research.

These scientists and their elders differed in their greater willingness to act in a wider social and political sphere. The new breed of tropical biologists explicitly and unapologetically engage in heterogeneous engineering.[16] Instead of staying strictly within the framework defined by traditional collecting, taxonomic description, and professional interaction, they also operate in the political and economic arenas in order to bring about the changes they see as dictated by their biological research. For example, after his research correlated habitat patch size to species survival, Thomas Lovejoy invented the debt-for-nature swap as an economic means of preserving ecologically viable sections of habitat. In the public arena, he launched the successful *Nature* series on PBS.[17]

Technical Definitions/Rhetorical Functions

Takacs shows that the very term, biodiversity, is a rhetorical figure designed to legitimate and formalize an otherwise rather nebulous scientific

---

[15] Archie Carr III, "Diversity," *Conservation Biology*, 1987, *1*:86.

[16] John Law applies this term to Thomas Hughes' portrait of Edison as a system-builder, who engineered not only new technological inventions, but also invented new social relations to make the technology function (John Law, "Technology and Heterogeneous Engineering: The Case of Portuguese Expansion," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, eds. Wiebe E. Bijker, Thomas P. Hughes and Trevor J. Pinch (Cambridge, MA: MIT Press, 1987), pp. 111-134). Edison not only invented the physical entity, the light bulb, but the social entity called a utility company (Thomas P. Hughes, "The Evolution of Large Technological Systems," in *The Social Construction of Technological Systems*, pp. 51-82).

[17] Marjorie Sun, "How Do You Measure the Lovejoy Effect?" *Science*, 1990, *247*:1174-1176.

aesthetic and problem-set under the banner of conservation biology.[18] The rhetorical utility of the term is its flexibility. It is at once an intuitive notion of "richness" or "complexity" of biota that draws on an aesthetic of variety and fecundity, and a potentially technical, quantitative definition that invokes scientific authority and the legitimacy of hard facts and figures. Whether deployed as qualitative or quantitative, public or esoteric, biodiversity is a term whose origin and present instantiation resides in the tropics. E. O. Wilson, in the proceedings of the 1986 Forum on Biodiversity, which served to launch the term and the concerns it stands for, declared that "rain forests serve as the ideal paradigm of the larger global crisis."[19]

The numerical side of the definition of biodiversity is potent because of its ability to galvanize both public and scientific attention. In reconstructing the origins and meaning of the term, biologists will invariably point to the enormous numbers of species found in the tropics compared to temperate regions. National Zoological Park Director Michael Robinson declared, "Tropical Biology is unique. . . .Species diversity there is several orders of magnitude greater than it is in temperate regions."[20] And although the variety of the rain forest has been a key issue from the beginnings of tropical biology, the Scientific American Library's volume on tropical rain forests credits Terry Erwin's 1982 "two-page article" estimating the number of insect species in the rain forest canopy with "shattering" the traditional estimate of the number of species on earth: "With this one deductive leap, the estimate of the world's endowment of biological species

---

[18]Takacs, "An Idea As Agent for Ecological Change"; Takacs, "Finding Meaning in Biodiversity."

[19]E. O. Wilson, "The Current State of Biological Diversity," in *Biodiversity*, ed. E. O. Wilson (Washington, D.C.: National Academy of Sciences, 1986), pp. 3-18, on p. 8.

[20]Michael H. Robinson, "Environmental Problems in the Tropics," in *Environment in Peril*, ed. Anthony B. Wolbarst (Washington, D.C.: Smithsonian Institution Press, 1991), pp. 140-153.

has been revised upward by a factor of 15!"[21] This account of the revolutionary implications of a simple, terse claim (only two pages!) is the book's opening narrative, setting the overall problematic of tropical biology in particular and biodiversity research as a whole. This popular origin story for the present definition of the rain forest in terms of biodiversity is no accident, because as part of the process of creating and deploying the term in the mid-1980s, E. O. Wilson took up Erwin's new figure as the key syllable of the biodiversity mantra.[22]

Beyond simply counting and naming the sheer quantity of species the tropics contain, the second element of biodiversity derived from its tropical origins is a strong desire to account for those numbers with evolutionary theory. As inherently more complex systems defined less by climate and geography than by biotic factors (the reverse of temperate regions), rain forests have posed unique, compelling evolutionary questions from Darwin and Wallace to the present. While ecologists working in the temperate regions looked for causal explanations of plant and animal distribution in physical factors, the tropics have provided crucial data for answering population and distribution questions from an evolutionary point of view.

The centrality of the Tropics to defining biodiversity explains the centrality of tropical rain forest exhibits to promoting conservation biology. The link is neither accidental nor gratuitous. On the numerical side of the definition, the rain forest exhibits all seek to impress the visitor with their variety and productivity. Interestingly, the more recent technical concern with population dynamics and genetic variation has not been taken up in the public

---

[21]John Terborgh, *Diversity and the Tropical Rain Forest* (New York: Scientific American Library, 1992), pp. 1-3.

[22]E. O. Wilson, "The Biological Diversity Crisis," *BioScience*, 1985, *35*:700-706; E. O. Wilson, "The Current State of Biological Diversity," in *Biodiversity*, ed. E. O. Wilson (Washington, D.C.: National Academy of Sciences, 1986), pp. 3-18.

representations of the rain forest. The exhibits rely more on more traditional ideas of adaptation. "It All Depends" contained discussions of adaptation, and the Montreal Biodome similarly emphasizes adaptation to environments and niches in its hands-on center, called "Naturalia."[23] Admittedly, these "just so" stories are probably more satisfying and easier to convey to the public than more abstract statistical and temporal models of species divergence and interaction.

These features of the definition of biodiversity show a significant difference between the science used to promote conservation via the living rain forests in the 1980s and the meaning given the Smithsonian rain forest in the late 1960s and 1970s. The previous strategy to discuss environmental degradation in terms of a fragile, interconnected global system cast the rain forest as a generalized "biome" (Chapter Five). The "web of life" trope then in use drew largely on systems ecology. In contrast, biodiversity frames the rain forest in terms of evolutionary biology, population biology, and biogeography. Rather than focusing on the systems making up "nature's economy," these fields seek explanations of the evolution and distribution of organisms over time. The life histories of specific organisms rather than the function of ecological equivalents are crucial to the framework of biodiversity.[24] Museum scientists at the Smithsonian and elsewhere have been involved in these areas to a much greater extent than in systems ecology. Thus there is a scientific link between museum habitat groups and the living rain forests not only on the basis of their intellectual histories, but their cultural and institutional histories as well.

---

[23]*Biodôme de Montréal: Tribute to our Living Planet*, Ville de Montréal, 1993.

[24]A recent talk by Michigan State University lake ecologist Bill Cooper highlighted the continued difference in outlook between the ecologist and the naturalist. He stated that the exact composition of species in an ecosystem was unimportant as long as the metabolic operations of the ecosystem were sustained over time (Bill E. Cooper, "Ecosystems and Landscapes: Describing and Valuing Whole Ecosystems," paper presented at the American Association for the Advancement of Science, Atlanta, Georgia, 18 February 1995).

If one of the mainsprings of scientists' activism the proliferation of rain forest exhibits is the scientists' anguish at the loss of their beloved *tropical* study sites and their early feeling that social policy should be based on biological fact and not vice versa, then it is not surprising that the exhibits neglect North American habitats, nor is it surprising that they exclude people from their definitions of nature. Rain forest recreations could not do otherwise and still do the work they were constructed to do. People are "unnatural" and therefore destroy the sense of the natural, even though indigenous people have been long characterized as being in a state of nature. But since that has become problematic, and western colonial encroachment has been more damaging, people are left out for the most part. Amazonia includes traces of their presence; there is a dugout canoe in the flooded varzea section, and photos in the lower gallery. The Biodome celebrates native land ethics in quotes and photos in entryway to habitats, but does not include any signs of their presence inside. However, newer realistic habitat exhibits are beginning to include the cultural dimension more explicitly in their recreations of the Tropics.[25]

New Loci of Realism

Having traced the political and scientific thread that runs from the science of conservation biology to the idea of biodiversity to the living rain forest exhibits, this section addresses the specific role realistic immersion experiences play in promoting biodiversity and why the genre of realistic representation of nature has passed from the museum hall to the zoological park. It could be argued that the indoor rain forest exhibits are not a transfer of the museum mentality at all, but a natural and independent result of combining the life-support technologies already developed for botanical conservatories with an

---

[25]Richard Wise, The Larson Company, personal communication, 18 January 1995.

existing trend toward an aesthetic of naturalistic display in zoos. Certainly those two factors have made the living rain forests possible. However, two key elements of the living rain forest exhibits do not stem from these existing traditions, and are best explained by the features previously identified for museum habitat groups. First, these exhibits explicitly frame the visitor's experience of the rain forest in terms of the field scientist's tacit experience and understanding. Second, the level of scientific detail inscribed in the modeled rocks, trees, and plantings in the living rain forests is unparalleled compared to earlier generations of either zoos or botanical gardens.

Competing with TV: New Aesthetic Demands

The rain forest exhibits must face new competitors in mass culture in order to provide a sufficiently authentic "you are there" field experience to an increasingly sophisticated and jaded visitor. In the late 1960s, museum professionals perceived habitat groups to have lost their ability to engage visitors. Even then, A. E. Parr took the position that television had inalterably changed the exhibit designer's task. To recapitulate:

> When habitat groups started they only had to hold their own against paintings, black and white photographic stills, and "menageries." Now we have wide-angle, color movies, TV and zoos. Look at the picture in the last issue (February 1967) of *Animal Kingdom*, p. 5 for the epitaph of the stuffed habitat group. To attempt to continue the race would seem to be spending a lot of money on a born loser. [26]

Parr saw realistic exhibits such as the swamp exhibit in the bird house at the Bronx Zoo (Figure 4.2) as the natural successor to the habitat group in its ability to offer direct contact with nature (Parr wrote his epitaph of the habitat group in reply to a proposal to bring nature to urbanized school-children).

---

[26] Albert E. Parr to Don Squires, 31 March 1967, Smithsonian Institution Archives Record Unit 155, Director, National Museum of Natural History, 1948-1970, Box 10 p. 1.

To extend Parr's point, television and the visual and narrative formats nature programs specifically employed is today a significant influence on the living rain forest exhibits. The heyday of the museum group was the 1920s-1940s, well before color television or movies (Chapter Two). Even though the animals in habitat groups did not move, their three-dimensionality made them more lifelike than the best photographs of the time. The static, ideal moment of the habitat group encouraged a contemplative visitor to engage the gaze of the mounted animals more intimately than could be experienced in any given moment in the out doors. But this opportunity for contemplation does not belong to the television age of ideas the length of sound bites and the stroboscopic image montage of music videos.[27] Marshall McLuhan's pronouncement that the "medium is the message" encapsulated the insight that television and other electronic media did not simply project a continuous newsreel into our homes, but fueled a rapidly evolving aesthetic of motion, sound, and constantly changing points of view.[28]

In particular, nature programs show us plants and animals in places we will probably never visit as both a holistic picture and a structured narrative unfolding in time. The habitat group is inadequate because it does not move or speak, and the old-fashioned zoo or botanical conservatory is inadequate because it isolates its plants and animals from their original location. Television has taught us to see more than the particulars and to expect a context and a story. To maintain their interest level and authority to speak for nature, new

---

[27]Haraway glosses the visitor's experience as communion with nature's essence rather than nature as it would be experienced in the field (Donna Haraway, "Teddy Bear Patriarchy: Taxidermy in the Garden of Eden, New York City, 1908-36," in *Primate Visions: Gender, Race, and Nature in the World of Modern Science*, (New York: Routledge, Chapman, and Hall, 1989), pp. 26-58, on p. 30).

[28]Marshall McLuhan, *Understanding Media* (New York: McGraw Hill, 1964).

representations of nature must offer an equal or greater sense of place, authenticity of experience, and narrative interest than television.

Through Naturalists' Eyes

What counts as realistic is not an absolute metric, but one which shifts over time in relation to the other available means of viewing the world. Nonetheless, the motivations behind the new living rain forest exhibits are quite familiar. Namely, the level of detail of realism (defined by these new standards) found in some of the living rain forest exhibits results from tropical biologists' intellectual and aesthetic passion for their tropical field sites.

The new living rain forest recreations share with the Smithsonian's botany hall life groups their scientist creators' common desire to take the public to the field sites that inspired them and captured their own imaginations. Creating a "you are there" experience, whether it is actually taking celebrities and dignitaries to a real rain forest, producing an OmniMax film or museum habitat group, or building a greenhouse to contain living plants and animals, is both a rhetorical strategy and an imaginative imperative.[29] The immersion experience has been deemed an effective means of communicating a specific informational and emotional point partly because, according to Valerie Crane, an informal science education specialist, "teaching positive affect and self-confidence are considered appropriate goals for informal learning."[30] Although museum educators also stress affective learning, the demands on the immersion

---

[29]Takacs, "An Idea As Agent for Ecological Change," discusses Lovejoy's strategy of taking congressmen to the rain forest to give them a taste for biodiversity.

[30]Valerie Crane, "Understanding the Dynamics of Informal Learning," in *Informal Science Learning: What the Research Says About Television, Science Museums, and Community-Based Projects*, ed. Valerie Crane (Dedham, Massachusetts: Research Communications Ltd., 1994), pp. 177-191, on p. 185.

experience to compete with television mean that museums have been less likely to attempt "you are there" immersion throughout the 1970s and 1980s.

The pedagogical attitude of the immersion experience also aligns closely with tropical biologists' personal experience. Though they have justified the drama and realism of the recreations they planned as pleasing the public, tropical biologists found great pleasure in such things themselves. At the Smithsonian, Richard Cowan repeatedly advocated the rain forest exhibit because of its "dramatic" nature, and his early interest in the tropics was stimulated by Arthur Conan Doyle's *Lost World* and his personal thirst for charting unknown territory. More recently, almost half of the two dozen tropical biologists working in Costa Rica interviewed by Takacs in 1990 named "aesthetics" as an important reason why biodiversity should be conserved.[31] In order to give aesthetic reactions to natural spaces scientific authority, E. O. Wilson coined the term, "biophilia," claiming that love for nature and biodiversity is genetically encoded.[32]

The Amazonia exhibit demonstrates the dramatic appeal of the Tropics to biologists both in the private motivations shaping its construction and the public interpretation of the rain forest experience it offers visitors. The brainchild of National Zoological Park Director Michael Robinson, early plans for Amazonia were grand and ambitious. Before becoming NZP Director in 1984, Robinson had been Deputy Director of the Smithsonian Tropical Research Institute in Panama.[33] The original budget for the facility was twelve million dollars, but when fund-raising fell short in 1989, the project was scaled back to the seven

---

[31]David Takacs, "'Biodiversity' and Its Adherents: A Look at Attitudes Towards This Concept by Scientists Working in Costa Rica," 1990.

[32]E. O. Wilson, "Biophilia and the Conservation Ethic," in *The Biophilia Hypothesis*, eds. Stephen R. Kellert and E. O. Wilson (Washington, D.C.: Island Press, 1993), pp. 31-41.

[33]*Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1984).

million dollar version shown in Figure 7.1.[34] Even though it was not built in the lavish detail Robinson first wanted, Amazonia clearly resulted from the love for the Tropics he developed during a long career as a tropical field biologist. For example, early proposals included an enormous greenhouse gallery with a waterfall, giant buttress tree, and walkways at both the canopy and forest floor level. Behind the waterfall, designated "Robinson Falls" in early planning documents, was to be a "VIP Dining Room," projected to "have a 40′ glass window providing a spectacular view of the forest floor exhibit. Most of the view is screened by the waterfall during visiting hours, and opened by a mechanical system controlled in the facility on command by the Director."[35] This plan did not survive, but shows how Robinson's private passion for the Tropics inspired Amazonia.

Furthermore, public interpretive materials for Amazonia explicitly reconstruct the origins of scientific understanding of the tropics around wonder and drama. A panel near the entrance of the habitat gallery describes how scientists themselves were awestruck by the tropics. An extract from Humboldt's 1799 travels reads, "What magnificent vegetation!. . .Bonpland declares he shall lose his senses if this state of ecstasy continues."[36] The panel also describes Alfred Russell Wallace's feeling upon catching a new species of butterfly: "On taking it out of my net and opening the glorious wings, my heart began to beat violently, the blood rushed to my head, and I felt more like

---

[34]"Aquatics Habitat, Amazonia Reduced Scope of Work," November 1988, National Zoological Park, Ric Hider Amazonia Project Files.

[35]Ed Bronikowski, Ric Hider and Robert E. Mulcahy, "Amazonia Narrative: Biopark Aquatics Exhibit," 13 August 1987, NZP, Ric Hider Amazonia Project Files, p. 9.

[36]Alexander von Humboldt, *Personal Narrative of Travels to the Equinoctial Regions*.

Figure 7.1. Amazonia architectural model, 1989. The life-support systems are housed in the windowless extension of the building in front of the habitat greenhouse. Jessie Cohen photo courtesy National Zoological Park, Smithsonian Institution.

fainting."[37] This label locates the aesthetic experience of the *scientists* in a grand historical tradition full of adventure and romance. And, not only is the entire exhibit designed to produce wonder in the *visitor* (Figure 7.2), but the label also provides the visitor with a means of locating and interpreting their *own* wonder *vis à vis* the experts. The label elevates their wonder above mere open-mouthed naiveté and allies it with the discriminating, trained sensibilities of the scientist.

From the beginning, the exhibit was to speak through the voice of the field biologist. Robinson specified at a planning meeting in 1987, "The overall theme of the forest floor will be following an SI scientist through the jungle and discovering all the wonders of the jungle through intimate glimpses, focusing in like a scientist and a naturalist."[38] A later memo states, "When man is introduced into the habitat, it should be as a scientist. Therefore, the visitor 'becomes' a scientist."[39] Even though the traces of indigenous peoples were to appear in the Amazonia habitat, it was not through their eyes that the visitor was to see the rain forest. In contrast, the SITES exhibition, "Tropical Rainforests: A Disappearing Treasure," told the stories of several actors interested in the rain forest, including scientists, Indians, and ranchers, and invited the visitor to compare them. Amazonia's makers actively selected the biologists' experience from among several possible perspectives.

Amazonia frames the visitor's experience with the scientist's vision via the fictitious persona of Dr. Brazil, a local tropical biologist who serves as the "guide" for the exhibition. Labels describing the natural history of rain forest plants and animals look like pages from Dr. Brazil's field notebooks, which give

---

[37] Alfred Russel Wallace, *A Narrative of Travels on the Amazon and Rio Negro* (London: Reeve, 1853).

[38] "Amazonia Minutes, November 17, 1987," 17 November 1987, NZP, Ric Hider Amazonia Project Files.

[39] May Carr, "Kick off Meeting NZP Aquatics," 14 December 1987, NZP, Ric Hider Amazonia Project Files, p. 4.

Figure 7.2. Visitors in Amazonia habitat, National Zoological Park, 1993. The label on the right is a page from Dr. Brazil's field notebook. SWA photo.

the visitor a peek at his observations. The interpretive center in the basement below the greenhouse gallery is fitted out as Dr. Brazil's field station. Figure 7.3 shows his office, which doubles as a reference area for the Amazonia staff. The other exhibits in the hands-on area are located at work benches displaying the traces of on-going research by Dr. Brazil's graduate students (who could be played by volunteer interpreters). Jaren Horsley, Amazonia's curator and the creator of the Dr. Brazil character, stated that the persona existed as a means of structuring the visitor experience so that the visitor would "see the world from his perspective."[40] A disembodied voice of authority does not convey scientific information. Instead, knowledge appears in the visible presence of a scientist and his work.[41]

Amazonia is not the only recent zoo exhibit to use the field station trope. There are also simulated research stations at the Milwaukee Public Museum, the Bronx Zoo, the Cleveland Metroparks Zoo, and the Washington Park Zoo in Portland, Oregon.[42] These methods specifically anchor the rain forest in the field experience of tropical biologists.

Reinventing the Zoo

Not only did the field biologist's ecological perspective and tacit experience of place contribute to the realism of Amazonia, but the history of zoos

---

[40]Personal communication, 9 July 1993.

[41]This strategy contradicts the distinction Greg Myers developed for popular versus technical scientific articles. Myers argues that more popular stories of natural history subjects delete the scientist from the frame, leaving an essentialist "narrative of nature," while the technical versions included a heavy emphasis on the methods and circumstances of observation in a "narrative of science" (Greg Myers, "The Social Construction of Popular Science: The Narrative of Science and the Narrative of Nature," in *Writing Biology: Texts in the Construction of Scientific Knowledge*, (Madison: University of Wisconsin Press, 1990), pp. 141-192). Dr. Brazil's presence makes Amazonia both a narrative of science and a narrative of nature.

[42]West, "Rain Forest Exhibits—Educational Opportunity Knocks," p. 2.

Figure 7.3. Dr. Brazil's office in field station hands-on center of Amazonia, National Zoological Park, 1993. The setting is used as a work area by the Amazonia staff. SWA photo.

shows a convergent evolution towards realistic habitat exhibits linked to conservation issues. Nineteenth-century zoos could attract the public with the sheer exoticism of their inmates without recourse to "realistic" settings. Designed according to the prevailing architectural theory of "associationism," zoo buildings of the nineteenth and early twentieth centuries connected the exoticism of the animals to the exoticism of the human cultures of the animal's place of origin, such as the Southeast Asian temple constructed in Berlin in the 1870s to house Asian elephants.[43] Though less grandiose, early buildings at the National Zoological Park in Washington, D.C. also drew on associationism.[44] In designing bare cement and steel animal enclosures, the zoo's main worries in maintaining their exhibits (as the animals were and still are called) were the health and safety of the creatures on both sides of the bars.[45]

In the twentieth century, as museums moved to give their specimens a context by building habitat groups, zoos also sought to put their animals in more natural settings. During the 1900s, the German Carl Hagenbeck invented the cageless animal enclosure surrounded by a deep moat.[46] William Mann, director of the National Zoological Park until 1956, was interested in this design in the 1920s, though it was not implemented until after World War Two.[47] During the golden age of the museum habitat group in the 1930s, Mann directed WPA artists to paint background murals in several of the animal houses.[48]

---

[43]Heather P. Ewing, "An Architectural History of the National Zoological Park" (Senior Essay, Yale University, 1990), p. 18; Colin Rawlins, "West Berlin," in *Great Zoos of the World: Their Origins and Significance*, ed. Lord Zuckerman (London: George Weidenfeld and Nicolson, 1980), pp. 3-26, on p. 55.

[44]Ewing, "Architectural History of the National Zoological Park," p. 30.

[45]Franz Maier and Jake Page, *Zoo: The Modern Ark* (Toronto: Key Porter Books, 1990), p. 18.

[46]*Ibid*., p. 18.

[47]Lucile Quarry Mann, "Oral History Interview," 1977, SIA RU 9513, pp. 38-39.

[48]*Ibid*., pp. 52-54.

Figure 7.4 shows the mimosa trees Mann suggested for the wall behind the giraffes in the Pachyderm House in 1937.[49] According to a newspaper account, when the giraffes were first let into the paddock with the mimosa mural, they licked the painted-on leaves, at least momentarily fooled by the backdrop.[50] With the exception of the bars and the giraffes' obvious interest in the people, the 1938 scene of visitors strolling past the animals could depict a habitat group in a museum hall. Even a modestly detailed mural could significantly alter the appearance of an animal enclosure: Figures 7.5 and 7.6 show either end of the Great Flight Cage in the Bird House in 1935. Compared to the side without a mural (Figure 7.5), the end with the mural and the rock-work forming a waterfall (Figure 7.6) is much more appealing. However, the effect was purely evocative and did not portray a specific place or encode ecological relationships as the museum groups had done. The bird house jungle is a storybook jungle in rendering and function.

During the mid-1960s, realistic habitats became part of a move by zoos to include conservation as one of their central themes. Like the museums before them, zoos came to see their exhibits as a place for city-dwellers to commune with nature. In the 1967 article A. E. Parr cited as the "epitaph of the stuffed habitat group," the Bronx Zoo's director, William Conway, wrote that "the time is fast disappearing when zoo people are satisfied with caging alone. There is so much to tell about birds, so much to show."[51] Rejecting the notion that the mere sight of the zoo inmates was enough, Conway claimed that the Swamp exhibit (Figure 4.2), was sufficiently realistic to elicit more natural behavior from the

---

[49]William Mann to Alexander Wetmore, 16 May 1937, SIA RU 46, Office of the Secretary, 1925-1949, Box 144.

[50]"Nicky, Crowd, Welcome Giraffe Quartet to Zoo; Cage Background Too Realistic for Newcomers," *Washington Post*, 14 October 1937, p. 3.

[51]William G. Conway, "A Door to the Out-of-doors," *Animal Kingdom*, February 1967, pp. 2-11, p. 3.

Figure 7.4. Savanna mural painted in background of giraffe pen in the Pachyderm House, National Zoological Park, 1938. Neg. #2091 courtesy National Zoological Park, Smithsonian Institution.

Figure 7.5. Great Flight Cage in the Bird House, National Zoological Park, 1935. This image was cropped on the right side and bottom to remove badly deteriorated areas of the nitrate negative. Neg. #2052 courtesy National Zoological Park, Smithsonian Institution.

Figure 7.6. Jungle mural painted in opposite end of Great Flight Cage of Bird House, National Zoological Park, 1935. Neg. #2049 courtesy National Zoological Park, Smithsonian Institution.

birds it contained, even to the point of nesting and raising young.[52] The realistic setting combined with natural behavior to create a properly ecological surrogate of nature for the visitor :

> A fine collection of living birds affords those already interested a simulated trip around the earth—conveniently and economically. In the presentation of beautiful creatures of natural worlds increasingly remote to increasing urban populations, a living collection may offer anyone superb recreation and an education. Today the zoo is an urban outpost of wildlife and an advocate of the open door to the excitement of natural history.[53]

With the exception of the words, "living," and "zoo," this statement is nearly identical to Henry Fairfield Osborn's purpose for the AMNH, quoted in Chapter Four, "to restore to the human mind the direct vision and inspiration of Nature." Parr recognized that naturalistic zoo exhibits had adopted the habitat group's argument as well as its genre.

The Bronx Zoo was not alone in its interest in more realistic zoo exhibits. According to a 1974 paper by keepers at the Philadelphia Zoo,

> Ideas on the exhibition of birds have changed drastically over the past decade, as increased interest in education and conservation stimulates the replacement of bare perch and sand exhibits with those simulating the birds' natural habitat, which in many cases provide the necessary elements to encourage breeding.[54]

These authors linked education and conservation to realistic exhibits as a means of moving beyond the traditional spectacle of earlier zoos. Importantly, they did

---

[52] *Ibid*., p. 4.

[53] *Ibid*., p. 4. Conway also created the Jungle World exhibit at the Bronx Zoo in the late 1980s, which was one of the first in the new wave of immersion habitat zoo exhibits (Tracey Linton Craig, "Changing the Way People Think," *Museum News*, 1988, *45*:52-54; Richard Wise, personal communication, 18 January 1995).

[54] Charles W. Jr. Rogers and Stephen R. Wylie, "Use of Tropical Plants in Bird Exhibits at the Philadelphia Zoo," *International Zoo Yearbook*, 1975, *15*:252-255, on p. 252.

not rigorously chose plant species native to a particular locale, but ones that were commercially available or readily propagated in-house.[55]

Although the earlier murals at the National Zoo did not create a habitat conducive to breeding, the new habitats were credited with increased breeding in captive birds.[56] For some animals, though, a natural-*looking* habitat was not so important as one which simulated the *function* of the animal's native habitat. In the 1970s, National Zoological Park keepers induced the Lesser Panda to breed by providing it with cement private nesting boxes.[57] The breeding function of exhibit design was not always synonymous with the aesthetic element introduced for human enjoyment. However, both instances highlight zoo involvement with conservation. The Lesser Panda project was part of a species survival plan designed to coordinate captive breeding of endangered species for re-release into the wild. With the emphasis on conservation firmly established by the 1980s, rather than hiding past exhibit practices, the centenary issue of the newsletter of the National Zoo made the new developments the centerpiece of its new legitimacy: "the Zoo has evolved from a hodgepodge collection of single species in barred cages to exhibits that replicate natural ecosystems."[58]

On top of the evolution of realistic zoo exhibits tied to a conservation message, Amazonia laid the vision of the field biologist. In the late 1980s, NZP director Michael Robinson recast the zoo as a "BioPark" that equally emphasized plants and animals in order to illustrate biodiversity and ecological

---

[55]*Ibid*., p. 252.

[56]Theodore Reed, who was director of the NZP from 1956 to 1984, maintained that there was no connection between the murals or moated outdoor exhibits and the animals' "happiness." (Theodore H. Reed, "Oral History Interviews," 1989, 1994, SIA RU 9568).

[57]Theodore H. Reed, "Conservation of Endangered Species Oral History Interviews," 27 September, 1990, SIA RU 9553.

[58]"From Bison to Biopark: 100 Years of the National Zoo," *Zoogoer*, May-June 1989, unpaginated.

interconnectedness.[59] In the service of this mission, Robinson intended Amazonia to deconstruct the zoo experience and undermine the visitors' expectation of seeing animals on exhibit for their convenience. Curator Jaren Horsley indicated that the exhibit does its job when visitors write in the comment log that they want to see "more animals."[60]

Robinson commented to the authors of a 1987 version of the Amazonia scope of work, "You are still not thinking of real biological messages. You are still thinking of conventional zoo and aquarium exhibits." Repudiating the implied exoticism of the zoo, he suggested that they work from the ecology to the specimens: "There are a number of features of cloud forest streams that are really outstanding and you should choose the fishes to illustrate these really important points."[61] Later in the year, Robinson told the Amazonia architects and exhibition development team, "It will be a *biological* setting not a zoo setting."[62] The gestalt Robinson intended for Amazonia to create did not follow from zoo exhibit practices, for he saw his vision of a BioPark as replacing rather than evolving from the conventional zoo approach. Whereas the murals painted in the animal enclosures at the zoo in the WPA days provided a more aesthetic setting for visitors to view the animals, the artificial rock-work and trees of Amazonia were *just as important as the animals* in communicating biological messages such as stream ecology.[63]

---

[59]Michael H. Robinson, "Afterword: The Once and Future Zoo," in *Smithsonian's New Zoo*, ed. Jake Page (Washington, D.C.: Smithsonian Institution Press, 1990), pp. 198-205.

[60]Personal communication, 9 July 1993.

[61]Ed Bronikowski, "Amazonia Scope of Work," 15 October 1987, NZP, Ric Hider Amazonia Project Files.

[62]Carr, "Kick off Meeting," p. 1.

[63]The connection between conservation, realistic exhibits, and educational content transcending the spectacle of the animal in isolation is widespread in the zoo world (West, "Rain Forest Exhibits—Educational Opportunity Knocks," p. 2;

Horsley stressed this idea to the NZP staff when recruiting for Amazonia began in 1991:

> The purpose of Amazonia is to inspire and inform the public.. . .Amazonia is an exhibit that integrates a variety of living organisms into a single department. Plants and animals will have equal emphasis. Distinctions that have traditionally separated plants from animals are abandoned in Amazonia. This distinction has never been fostered by biologists, who are equally interested in all life forms. As a result plants will not be seen merely as backdrops for animal exhibition. Instead they will be presented as living organisms and interpretive materials will highlight their complex and highly evolved survival strategies. This point can not be overemphasized if the nature of Amazonia is to be clearly understood.[64]

Horsley's statement does important boundary work to separate the Amazonia enterprise from the previous zoo approach.[65] On an institutional level, Amazonia was its own department on the organizational chart, whereas the rest of the zoo remained divided into bird, mammal, reptile, and invertebrate departments. That organizational structure reflected Amazonia's holistic, ecological approach, which, according to Horsley, was the biologist's proper outlook. This was an implied contrast to the traditional compartmentalization of zoo keepers, the analog of the "green eye shade boys" in Farb's Hall of Living Things. Finally, in stating that "plants will not be seen merely as backdrops for animal exhibition," Horsley echoed the Smithsonian botanists, implying that previous attempts at realistic habitats in zoos were not truly ecological, but merely served to create a generic ambiance for visitors viewing the animals.

Craig, "Changing the Way People Think"; Richard Wise, personal communication, 18 January 1995).

[64]Jaren Horsley to NZP Staff, 24 August 1991, NZP, Ric Hider Amazonia Project Files.

[65]Thomas F. Gieryn, "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists," *American Sociological Review*, 1983, *48*:781-795.

Because of the existing trend toward realism in zoo exhibit design, Robinson and Horsley's claim that Amazonia arose entirely from the biologist's perspective and owed nothing to the zookeeper's experience or interests is problematic. However, it is true that their arguments do strongly resonate with the museum naturalists' earlier desires for ecological realism in habitat groups. Whether completely radical or not in terms of zoo or aquarium design, at least some of the living rain forests, such as Amazonia and the Montreal Biodome, owe much of their genre and argument interests injected by conservation biology into the zoo setting. The Biodome completely replaced the ailing Montreal Zoo and Aquarium, which had lost their scientific programs and suffered from decaying infrastructure.[66] The Biodome's founders also stressed its difference from older zoos, similarly focusing on the novelty of the ecological approach and its value in raising environmental awareness.[67]

Even though most of the new exhibits aspire to create realistic habitats, the standards of realism built into them vary from institution to institution. A member of the Amazonia team who visited the brand-new Indianapolis Zoo (according to him, developed as "an entertainment park with zoo exhibits") in 1987 found the quality of the rock-work and background murals there to be lower than what the NZP wanted for Amazonia.[68] It remains as an interesting exercise to correlate more thoroughly the level of involvement of field biologists in the institutional matrix with the realism of the completed exhibits. The preceding chapters suggest the hypothesis that greater realism follows from closer involvement by field naturalists. An early entrant in the genre, the

---

[66]Pierre Bourque, "A 21st Century Garden," *Quatre Temps (The Friends of the Montréal Botanical Garden)*, Summer 1992, pp. 25-29.

[67]Johanne Landry, "A Love Story," *Quatre Temps (The Friends of the Montréal Botanical Garden)*, Summer 1992, pp. 30-33, on p. 31.

[68]Robert Mulcahy, "Report by Robert Mulcahy on Visit to Indianapolis Zoo," 17 November 1987, NZP, Ric Hider Amazonia Project Files.

Amazon gallery at the Vancouver, B.C., Public Aquarium, opened in 1983. The gallery did not include artificial rock work, but did feature casts of buttressed Kapok trees from a botanical garden in Florida. Following the traditional natural history museum paradigm, the content was designed on the basis of visits by Aquarium staff and research associates to the Amazon.[69]

New Mediations, New Realism

The natural history museum habitat group created place-specificity by translating nature into the exhibit hall with inscription devices that both captured and abstracted reality. Although the new rain forest exhibits include living plants and animals, they are but two components in a space that is as heavily constructed and full of technical mediations to create verisimilitude as the museum habitat group. Because of the larger scale and increased demand for the new exhibits, the technologies of inscription developed for the living rain forests are considerably more industrialized than the craftsman-based habitat group processes, but the combination of formalized scientific expertise and tacit knowledge of the field continues. Finally, translation involves making the inside of the exhibit gallery resemble the outside of the field site.

Current Rain Forests in Museums

The Smithsonian's "Disappearing Treasures" and the Milwaukee Public Museum's rain forest exhibit show how central the "you are there" experience is in promoting conservation. The fact that there have only been two major museum exhibitions about rain forests in the last seven years, compared to around a dozen new living rain forests, suggests that the industry sees living rain

---

[69]Murray A. Newman and Stefani I. Hewlett, "The Graham Amazon Gallery at the Vancouver Public Aquarium," *International Zoo Yearbook*, 1987, *26*:81-90.

forests as being more effective in communicating the wonder of the natural world to urban dwellers.

After opening in Washington, D.C., in May 1988, the Smithsonian exhibit, “Tropical Rainforests: A Disappearing Treasure,” visited thirteen U.S. cities before its tour closed in the fall of 1993.[70] Co-organized by the World Wildlife Fund, “Disappearing Treasure” included exhibits about rain forest natural history, but largely emphasized human activity in rain forests. “Disappearing Treasure” focused on social, political, and economic dimensions of tropical deforestation often unmentioned by the more biologically-oriented living rain forest exhibits. Because the show de-emphasized the biological nature of the rain forest, it therefore did not need to recreate it exactly. In these ways, “Disappearing Treasure” was most similar in intent and presentation to the “South America: Continent and Culture” hall at the National Museum of Natural History (Chapter Five).

The exhibit did include models of tropical forest plants constructed from material collected on a special expedition to Panama. The ubiquitous buttress tree in Figure 7.7 signals that the subject is the rain forest. But, even making allowances for the limitations of a traveling exhibition, the buttress tree functions as a stage prop just as the buttress tree in the South America Hall (Figure 5.17) did. In this case, the video monitor embedded in its side played a program about the ecology of leaf-cutter ants. This video, rather than the tree model, did the real work of explaining the rain forest.

The bulk of the exhibition detailed human activities in the rain forest, from sustainable extraction such as rubber tapping (depicted in the diorama in the background of Figure 7.7), to massive deforestation for timber and cattle grazing

---

[70]Fact Sheet: “Tropical Rainforests: A Disappearing Treasure,” 20 June 1988, Smithsonian Institution Traveling Exhibition Service Public Relations Office.

Figure 7.7. "Tropical Rainforests: A Disappearing Treasure" opened at the S. Dillon Ripley Center, Smithsonian Institution, May 1988. Foreground: rain forest ecology exhibit. The video monitor in the buttress tree shows a program about leaf-cutter ants. Background: rubber tapping diorama with economic uses of rain forest plants at left. Tony Heiderer photo courtesy Smithsonian Institution Traveling Exhibition Service.

(Figure 7.8). As Figure 7.8 shows, these exhibits included artifacts that illustrated the issues, but did not take the visitor to the place. Precisely because this emphasis on human activity in the rain forest cut against the dominant definition of rain forests as wilderness, and because the exhibition did not attempt to lavishly recreate a primordial jungle, the exhibition did not fulfill the expectations of all the visitors when it was at the Western Forestry Center in Portland, Oregon. Even though visitors responding to a survey thought it was a "good exhibition" rather than being "disappointed," by a margin of twenty to one, the negative comments are quite telling: "Too much focus on humans and their interest." "Not quite the visual impact I had hoped." "Thought I was going to see a real rainforest."[71] The last statement in particular indicates that the museum-going public still expects to experience "you are there" settings of "real" places in museums.

The Milwaukee Public Museum recognized this expectation and addressed it with an exhibition approach that combined realism with multi-media abstraction. Milwaukee's replacement for its twenty-year-old biology hall opened in 1988 and was called "Rain Forest: Exploring Life on Earth."[72] Of the new rain forest exhibits reviewed, it is the only permanent museum-style exhibit that utilizes plant models and habitat groups instead of living material.[73] This is not because Milwaukee is any less committed to realism: the museum cherishes "its walk-through exhibit environments that establish an effective 'you are there' ambiance."[74] Rather, it was able to accomplish what the Smithsonian tried with its rain forest group in the Hall of Living Things project, but failed to do because

---

[71]"TR: ADT Survey Summary," after June 1989, SITES Public Relations Office. Over 1100 people completed questionnaires. Other visitors surveyed lauded the message, but wanted to see the exhibition go farther in its activism.

[72]Young, "The Rain Forest In Milwaukee."

[73]West, "Rain Forest Exhibits—Educational Opportunity Knocks."

[74]Young "The Rain Forest In Milwaukee," p. 229.

Figure 7.8. Rain forest deforestation exhibit from "Tropical Rainforests: A Disappearing Treasure," opened at the S. Dillon Ripley Center, Smithsonian Institution, May 1988. Tony Heiderer photo courtesy Smithsonian Institution Traveling Exhibition Service.

of lack of high-level institutional support and battles between the curatorial and exhibit staff (Chapters Four and Five).

The Milwaukee Public Museum succeeded precisely because it maintained the close institutional and cognitive relationship between research and exhibition that the Smithsonian abandoned in the late 1960s. The Milwaukee project's director wrote, "Our philosophy in planning permanent displays is that subject matter should arise from the scholarly expertise of the curators, linking scientific research and museum exhibits."[75] The exhibit was located in Costa Rica, where museum curators had previously conducted research and built collegial ties.[76] In an operation reminiscent of the 1962 Smithsonian trip to British Guiana, museum scientists and artists worked together "closely" in the Costa Rican rain forest collecting insects, reptiles, more than 100 bird specimens, and making over 300 plant molds.[77] Because the practice of collecting animals from the field for exhibition has declined, the museum's continued willingness to do so indicates its commitment to a definition of realism based on authentic objects and inscriptions derived from primary sources. For instance, large mammal skins came from zoos and earlier collections.[78] Furthermore, tacit knowledge of the field retained its value as an important part of creating the exhibition: by going to Costa Rica, the "project artists actually saw the tropical rain forest and became familiar—first hand—with the scientific information that they were to present."[79]

What sets the Milwaukee hall apart from its contemporary brethren is also what gives it a strong resemblance to the earlier Smithsonian plans: a

---

[75]*Ibid*., p. 231.
[76]*Ibid*., p. 231 & p. 235.
[77]*Ibid*., p. 235.
[78]*Ibid*., p. 236.
[79]*Ibid*., p. 235.

combination of abstract didactic exhibits and realistic immersion experiences allows the Milwaukee exhibition to aspire to teach much more about the ecology and evolutionary adaptations found in the rain forest than do the living exhibits, which emphasize an intuitive grasp of biodiversity. Along with the reproductions of rain forest trees and plants, videos and computer interactives convey the biological concepts, including basic genetics and cell biology, drawn from the rain forest context.[80] Milwaukee's rain forest reflects its clear identity as a natural history museum with a consciously-maintained history of a unified research and exhibition program. Summative evaluation conducted in 1989 showed that visitors responded favorably to the "you are there experience," with 18% specifically reporting that what they best liked was "It made me feel like I was there." However, a full 10% reported that "Exhibit was not as real as I expected," and specifically complained about the glass cases, the lack of real plant life, and the fact that the animals did not move.[81] Even high-quality museum habitat recreations are in fact struggling to compete with the living habitats, suggesting that as the living exhibits have proliferated, visitors have been further conditioned to expect living, moving displays. On the other hand, the Milwaukee rain forest also scored well on its interpretive materials, and this is frequently the weakness of the living installations.[82]

Sense of Space vs. Sense of Place

There is a difference between how the museum habitat groups and the living rain forests construe sense of place. Because of their small size compared to the new rain forest habitats, the museum exhibits could locate the scene at an exact physical location by means of the background painting. This was

[80] *Ibid*., pp. 237-239.

[81] Mary S. Korenic and Allen M. Young, "The Rain Forest in Milwaukee: An Evaluation," *Curator*, 1991, *34*:144-160, pp. 151-152.

[82] *Ibid*., p. 151.

important to the naturalists, who valued accurate portraits of the distribution of plants and animals. Since they are large and allow the visitor to walk through them, the living rain forests do not have backgrounds and do not try to locate the exhibit on one geographical spot. As "immersion experiences" aimed at imparting wonder and a love for biodiversity, they try to give the visitor the impression of being *in* a rain forest as a *space*, rather than looking *at* a rain forest as a *place*. They are created landscapes based on the geology and plant life of a general area, and maintain local specificity to varying degrees. As more generalized yet still plausible physical spaces, these rain forests combine the physical inscription devices of the sort used to build habitat groups with more formalized, abstracted inscriptions of the laboratory.

Even though the living rain forests such as Amazonia do not purport to reproduce a specific patch of ground from the field, the details they replicate aim to create a level of authenticity that goes beyond the merely evocative settings of the earlier generation of murals or generic mixed plantings. Amazonia, obviously, locates itself in the Amazon River basin, though a label in the exhibit indicates the technical difficulty of defining the region precisely. Richard Wise, the project manager for the Larson Company, which was contracted to design the environmental elements, emphasized that the exhibit was in fact *Amazonia* (the name given to the region) rather than a specific place on the Amazon River. Because of that inherent generality, the environmental elements, such as the limestone geology of the rocks, were, according to Wise, "plausible," but not subject to the same "scientific precision" as a museum habitat group might be. Larson considers its "product" to be the visitor's experience of immersion in the habitat (sense of space). To do this, Larson believes that "following natural laws creates a seamless feeling for the visitor.. . .We're designers and artists using Nature as our palette." Wise also suggested that putting the visitor in the exotic space was necessary to compete with the "frenetic, intense media" such as television and video games to which children especially are now accustomed.[83]

Because Amazonia originated as the Zoo's aquatics exhibit, it features both terra firme forest and flooded forest. The project's chief horticulturist, Ric Hider, considers Amazonia to be the best region-specific immersion exhibit constructed. In order to ensure that the plants exhibited were appropriate, he cleared the species list with the Smithsonian botanists expert in the flora of western Brazil and engaged a specialty plant dealer who could supply the proper native specimens.[84] Hider wrote to the MNH botanists placing the "target area as the upper Amazon River Basin, the area where Brazil, Ecuador, and Peru come together," and requested their help identifying "species which should be included because of their obvious association with the target area or because they are readily available."[85] The acting chair of the botany department circulated Hider's request with the comment, "We should do what we can to make the exhibit as authentic as possible."[86] One botanist annotated the list and stated, "Perhaps the most critical decision for Mr. Hider to make will be that of which TYPE of Amazonian wet forest he would like to feature in the exhibit. Many of the plants listed are from forests which are periodically inundated, and within that category, several forest types exist."[87] The botanists' concern for specificity of place comes through here as it did during the 1960s.

---

[83]Richard Wise, personal communication, 18 January 1995.

[84]Personal communication, March 1994.

[85]Ric Hider to Dr. Laurence E. Skog, 2 November 1987, NZP, Ric Hider Amazonia Project Files.

[86]Laurence Skog to Lyman Smith, 17 November 1987, NZP, Ric Hider Amazonia Project Files.

[87]John Pipoly to Laurence Skog, 21 November 1987, NZP, Ric Hider Amazonia Project Files.

Hybrids Proliferate

While fabricating the artificial rocks and buttress trees in the habitat was as much an engineering and heavy construction task as a scientific and artistic endeavor, building the environment in Amazonia to contain the living specimens involved a process of inscription similar to the collecting methods of the habitat group makers. The contract between the NZP and the Larson Company specified that both the rocks and artificial tree trunks were to be designed using reference photographs, molds, and material samples provided by the NZP.[88]

Figure 7.9 shows the artificial limestone rocks Larson designed being installed in the Amazonia habitat. In a December 1990 letter to the architects, Wise commented on the reference photographs submitted for the artificial rock work and trees. The level of accuracy he wanted built into the rocks combined aesthetics with an identifiable natural history:

> Limestone Geology is correct. However, rock surface does not show weathering, erosion and staining one would expect in a region of intense rainfall.. . .
>
> Artificial Rock. Limestone geology is correct choice, but parallel, sea-bottom-level stratification is unclear. Staining is insufficient.. . .
>
> Mud bank texture. Drawings are very specific that the mudbanks express the horizontal strata of rising and falling river water's actions of depositing and eroding. This is lacking from this Photo Reference.[89]

The second example shows that the rocks had to reflect geological knowledge about how they were originally formed in that locale. The first and third examples indicate that it was important to the exhibit-builders to portray the on-going processes shaping the land as well. Just as the Smithsonian botanists wanted plant models that went beyond mere credibility and reflected

[88]The Larson Company, "Section 13176—Artificial Rockwork and Exhibit Accessories and Section 13177—Artificial Tree Fabrication Specifications," 15 December 1989, NZP, Ric Hider Amazonia Project Files.

[89]Amazonia's curator concurred with these comments (Richard J. Wise to May Carr, 18 December 1990, NZP, Ric Hider Amazonia Project Files).

Figure 7.9. Artificial limestone rock panels designed by The Larson Company in Amazonia habitat, National Zoological Park, 1991. Jessie Cohen photo courtesy National Zoological Park, Smithsonian Institution.

characteristics that could be discerned by a botanist (Chapter Three), these rocks were to be technically accurate enough to satisfy a geologist. These features were important narrative elements in encoding the Amazon's physical and biological conditions in the Amazonia habitat.

In order to collect the molds needed for the contractor to fabricate the trees, the contractor and Ric Hider made a trip to the Smithsonian Tropical Research Institute on Barro Colorado Island in Panama in the spring of 1991 "for the purpose of making actual molds of desired tree bark textures, getting color patterns via photographs and obtaining firsthand information about the forest litter and composition of the rainforest."[90] As with the exhibits staff visit to STRI in the final stages of building the "It All Depends" rain forest, this trip was necessary because even though constructing artificial rain forests had become almost a standardized manufacturing process, "firsthand" tacit knowledge of the field could still not be omitted entirely. Even though first-hand field observation was still a necessary step in creating the immersion experience, the emphasis on *space* instead of *place* meant that the exhibit-makers could substitute a second-growth forest in Panama for the pristine jungle of the Amazon.

In the pursuit of verisimilitude, Amazonia's designers sought to create a hybrid of living and non-living elements extending far beyond the large-scale and fairly obvious level of building artificial rocks to contain living plants and animals. Amazonia is a "hybrid of nature and culture" through and through. Bruno Latour uses the term in a very specific way to mean an object that includes both natural and man-made parts.[91] Latour argues that modern western society sees clear categories of "natural" and "man-made" only because we insist on

---

[90]Ric Hider to Michael Robinson, 15 February 1991, NZP, Ric Hider Amazonia Project Files.

[91]Bruno Latour, *We Have Never Been Modern* (Cambridge, Massachusetts: Harvard University Press, 1993), p. 10.

"purification." We deny that hybrids exist in order to let them do their work. In fact, Latour claims, the objects we make rely on "natural" principles and materials, but those things are created by multiple layers of social mediation.[92]

Amazonia is a hybrid because not only are some of the trees in the exhibit artificial and some living, but plans existed for a time to create individual trees out of both living and constructed components. This scheme echoes the traditional museum practice of attaching molded wax or plastic leaves to the original shrub of the plant collected from the field. In Amazonia, the idea was reversed, and the "branch stake" technology proposed attaching living branches to an artificial trunk. Amazonia's planners intended this scheme to create the necessary realism. The October 1987 scope of work document describes the "branch stake" method illustrated by the sketch in Figure 7.10:

> Trunks and branches of large trees can be reproduced very realistically but the believability fails if leaves are needed to complete the scene. An innovative approach to exhibiting animals in artificial trees with real leaves will be attempted in an experiment prior to the Amazonian opening. If the National Zoological Park can develop a technique to take large size cuttings (6'- to 8' long) of canopy and emergent species of rain forest trees and root them in 24" by 2" tubes and maintain them in good health for a year or more, then a totally plastic tree [trunk] could be created. . .[and] the overall appearance would be very realistic.[93]

As with museum modeling methods, the branch stake (never actually implemented) was to create a hybrid representation in which the natural and constructed components would perfectly blend together.

Another hybrid just followed the "branch stake" scheme: "Another tree to the left of the Canopy Observation Deck would be a living 40' tall palm.. . .The crownshaft would be fitted with a large artificial flowering inflorescence or

---

[92]*Ibid*., pp. 30-32.

[93]Ed Bronikowski, "Amazonia Scope of Work," 15 October 1987, NZP, Ric Hider Amazonia Project Files, "Canopy View Level 1, Module 3."

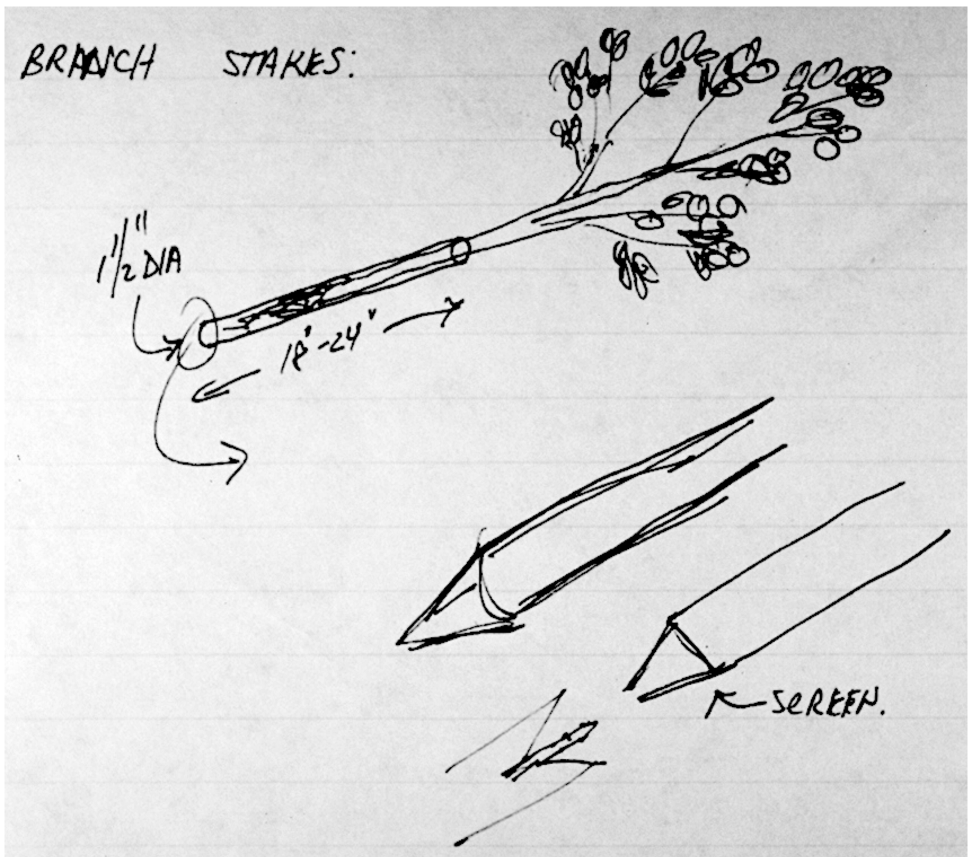


Figure 7.10. Sketch of "branch stake" method proposed to attach living tree limbs to artificial trunks in Amazonia, 1988. Courtesy Rick Hider, National Zoological Park.

fruiting cluster and contain a [live] species of arboreal snake."[94] The palm could be made to appear as if it were perpetually blooming; like the habitat group models, the artificial flower would capture the specific moment of interest desired and hold it constant, subverting the "natural" cycle of organic growth and decay inherent in entirely living systems.

Larson's contract treated both natural and constructed elements as raw materials for creating an idealized but realistic representation: "Paint artificial trees to mimic approved photographs and samples.. . .Paint natural materials to match Artificial Trees."[95] Just as Paul Marchand would add extra leaves to a model to make it look properly real (Chapter Three), Amazonia's creators worked in a dialog between nature and the human imagination.

Early plans for Amazonia also included adding "sound sculptures" that would "heighten an exhibit experience," and "odor dispensers" that would "guide visitor and make experience more real [sic]."[96] There seems to be no irony in these suggestions to use artificial means to increase the realism of the experience. The definition of authenticity for an experience like this was not that it consist only in exposure to "real" items such as plants and animals, but that it successfully transport the visitor to the field site. Authenticity is measured by the exhibition's ability to suspend disbelief. Admittedly, that explanation begs the question as to why the designers did not feel that the smells and sounds generated by the live plants and animals would not have been real enough.

These proposals all bespeak a certain theatricality about the plans, suggesting that hyper-reality was the goal rather than mere verisimilitude. According to Umberto Eco, hyper-reality is the "more real than real" feeling of

---

[94] *Ibid*.

[95] The Larson Company, "Section 13176—Artificial Rockwork and Exhibit Accessories and Section 13177—Artificial Tree Fabrication Specifications."

[96] Carr, "Kick off Meeting," p. 4.

an experience, such as a theme park or wax museum, that distills the most dramatic moments and elements of the real world.[97] The simple addition of music to a movie heightens the emotional impact of the visual action. Nature films and documentaries of all sorts condense hours of tedious observation and events into a coherent, dramatic narrative. Although many of those sorts of schemes proposed for Amazonia were unrealized when the project was reduced under budget constraints, a drive toward hyper-reality actively shaped the exhibit's hybrid nature.

Nature Under Glass

Along with employing living/constructed hybrids to create a hyper-real experience, all of the living rain forest exhibits, including Amazonia, are hybrids on the functional level. At the same time that they strive for the visual appearance of naturalness and contain real tropical plants and animals, these exhibits rely on highly-sophisticated mechanical systems to maintain the conditions necessary to support tropical life in the temperate zone. This is the greatest difference between the living rain forests and the museum habitat groups, and involves an additional body of expertise. In this regard, the new exhibits belong to the technological tradition of the greenhouse or conservatory.

Greenhouses are much older than museum dioramas, arising in their modern form out of the technical, economic, and social context of the early Industrial Revolution, particularly in Great Britain.[98] Recent historians have

---

[97]Umberto Eco, "Travels in Hyperreality," in *Travels in Hyperreality: Essays*, (New York: Harcourt Brace Jovanovich, 1986), pp. 1-58.

[98]Functionally, greenhouses developed from the horticultural tradition of growing exotic fruits, flowers, and palms for the nobility that dated from sixteenth-century voyages of discovery (Stefan Kappelkamm, *Glasshouses and Wintergardens of the Nineteenth Century* (New York: Rizzoli, 1981), pp. 10-16). More importantly, their architecture and construction was shaped by developments in both iron and glass-making technology in the early nineteenth century. Greenhouse construction became the testing ground for engineering

argued that as containers of bits of tropical nature, greenhouses and wintergardens instantiated both the pride of industrial society's ability to domesticate nature and its growing wistfulness over the loss of natural spaces and places.[99] Through the course of the century, these structures and their contents created refuges from nineteenth century urban blight—first for aristocrats, then for the masses. But the nature they brought under glass was most certainly not untrammeled wilderness of the sort imagined by early twentieth-century Americans, but a properly refined, civilized garden defined in absolutely human terms.[100] John Loudon, one of the most influential British greenhouse designers of the early nineteenth century, wrote in *The Greenhouse Companion* in 1824, "It is entirely a work of art: the plants enclosed are in the most artificial situation in which they can be placed."[101] The artifice resonated with Victorian gentility. Even though one left the temperate zone upon passing over the threshold of the glasshouse, one did not strictly go to the Tropics, either. Rather, one entered a construct of an exotic fantasy of a nature without the ugliness of the city but also without the inconvenience of the real out-doors.[102]

Creating the habitat group involved bidirectional movement between the exhibit hall and the field in an analogy to Bruno Latour's concept of translation of

---

experiments in wrought iron that would be directly applied to public buildings such as the Crystal Palace in 1851 and many subsequent railway stations of the Victorian era (Georg Kohlmaier and Barna von Sartory, *Houses of Glass: A Nineteenth-Century Building Type* (Cambridge: MIT Press, 1986), pp. 57-61).

[99]Kohlmaier and von Sartory, *Houses of Glass*, p. 8.

[100]For the American version of wilderness, see Roderick Nash, *Wilderness and the American Mind*, 2nd ed. (New Haven: Yale University Press, 1973). For the Victorian view, see Kohlmaier and von Sartory, *Houses of Glass*, pp. 7-24).

[101]Quoted as epigraph in Kappelkamm, *Glasshouses and Wintergardens of the Nineteenth Century*.

[102]Kohlmaier and von Sartory, *Houses of Glass*, pp. 7-8.

nature through the laboratory (Chapters Two and Three).[103] The practices of the exhibit-makers transformed the field sites in Colorado and British Guiana into laboratories. Then the museum exhibits were transformed into the field site by the inscriptions such as molds and taxidermy that rendered nature tractable to laboratory manipulation. The greenhouse also inscribes the field into the lab. It is a means of making the laboratory enough like the tropical field site to maintain life collected from the field. The parameters being moved (translated) into the laboratory space of the greenhouse were not so much the visual elements of spatial distribution of organisms, as was the case for habitat groups, but physical factors such as light, temperature, and humidity. The great glasshouses of the nineteenth century reproduced field conditions in a contained space.[104] In the reverse direction, glasshouses transformed nature from a wild, frightening place into a domesticated, genteel habitat suitable for civilized beings.

The first glasshouse to employ wrought iron structurally, the Palm House at the Royal Botanic Gardens at Kew, near London (Figure 7.11), provides an iconic example of the genre of domestication not only because of the aesthetics of its architecture, but also because of Kew's scientific function in translating botanical nature throughout the British Empire. In the nineteenth century, Kew became the locus of economic botany in the Empire, the hub to which exotic plants such as rubber and Chinchona were first sent from the wilderness of the politically hostile and therefore uncontrollable South American periphery. Studied, domesticated, and propagated in glasshouses at Kew, these plants were sent out to the colonial plantations, whose locations were carefully matched to the plant's native habitat in terms of soil, climate, altitude, and other physical

---

[103]Bruno Latour, "Give Me a Laboratory and I Will Raise the World," in *Science Observed: Perspectives on the Social Study of Science*, eds. Karin D. Knorr-Cetina and Michael Mulkay (London, Beverly Hills: Sage, 1983), pp. 141-170.

[104]Kohlmaier and von Sartory, *Houses of Glass*, p. 3.

Figure 7.11. Exterior of Palm House, Royal Botanic Gardens at Kew, completed 1848, restored 1988. SWA photo.

parameters.[105] Translated through Kew, the piece of nature originally called Chinchona became a commodity called quinine.

Like the other glasshouses of the period, the Palm House did not so much place the visitor in another place as it celebrated Man's domination of nature with the power of the Industrial Revolution. Kew combines the manmade artifice of graceful white iron arches, balconies, and spiral staircases with the lush greenery of tropical plants (Figure 7.12). Rather than attempting to conceal the structure, the architects aestheticized it and made it into a synthetic context for the plants within, justifying and legitimizing the containment and domestication of nature. In the late 1850s, the first curator of the Palm House complained that Joseph Dalton Hooker's policy to prune specimens ruthlessly had the effect of "leaving the iron work bare as it was left by the architect. . .thus making out that. . .the public was more interested in the iron structure which constitutes the 'Glory of the Garden' than in the beautiful *Passifloras* and *Aristolochias* which had hitherto hung in tassels overhead."[106] Aside from the very real need to keep the collections from crowding each other out, Hooker took obvious pride in the building and had no *a priori* desire to conceal its structure.

This tradition still flourishes literally side by side with the new ultra-naturalistic rain forest representations. Next door to the new Montreal Biodome, the older plantings in the Montreal Botanical Gardens exhibition greenhouses are more evocative than naturalistic, invoking the Victorian iconography of domestication. The tropical plantings form a series of economically important specimens. To enter the desert section, the visitor passes through a mock Spanish

---

[105]Lucile H. Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Gardens* (New York: Academic Press, 1979), pp. 103-139.

[106]Quoted in Sue Minter, *The Greatest Glasshouse* (London: HMSO, 1990), p. 8. Hooker was then Assistant Director of Kew under his father and was later to become one of Darwin's key supporters.

Figure 7.12. Interior detail of iron structure of Palm House, Royal Botanic Gardens at Kew, completed 1848, restored 1988. SWA photo.

Colonial facade. In another area, blooming orchids hang along a *faux* ruined brick wall. Here, cacti are united with mariachi music in a quaint cantina; orchids are linked to a dotty old gentleman in his crumbling back garden. These thematic treatments conjure romantic associations between the plants on display and a sense of place defined in *human* terms, much as turn of the century zoo architecture did. They contrast sharply with the way the Biodome's ultra-naturalism deletes human presence (as required by the logic of wilderness). There, indigenous people are represented in the entryway to the rain forest with quotations celebrating their wisdom of nature, but are absent from the habitat.

Botanical gardens like Kew have been key players in the new conservation movement, motivated by their traditional collection and research activities and using their educational apparatus to promote biodiversity. Since the Palm House restoration in 1988, the plantings simulate tropical rain forest plant assemblages, although no structural elements such as rocks have been added.[107] Some gardens, such as the Missouri Botanical Garden, have also moved to create a stronger sense of place in their more recent exhibits as part of their more explicit conservation message.[108]

More Art to Conceal Art: Systems Ecology Serves Realism

As with the influence of zoos, the contribution of the glasshouse genre to the recent living rain forest exhibits is a combination of historical evolution and new goals and interests. Greenhouses belong to a long-established body of life-support practice continually elaborated by advances in technology. However, even though they rely on the technology of domestication, the new rain forest

---

[107]*Ibid*., p. 24.

[108]Like the Smithsonian, the MBG is another locus of North American tropical biology, and its director, Peter Raven, is one of the founders of the new field of conservation biology ("Climatron Reopens," *Missouri Botanical Garden Bulletin*, 1990, *78*:3-7).

exhibits still seek to construct wilderness. Amazonia's curator, Jaren Horsley, told how unhappy the building's architects were when they learned of his plans to conceal as much of the exterior of the building as possible with tall stands of bamboo (Figure 7.1). Whereas they wanted their building to be visible, Horsley wanted the approach to Amazonia to appear as wild as possible.[109]

While the Victorian genre highlighted the artifice involved in recreating tropical conditions, the new generation of living rain forest exhibits deny their dependence on technology. These immersion experiences require artificial rock cliffs, waterfalls, and soaring tree trunks. They also require precise heat and humidity control both to support the plants and animals and to locate them in the landscape of our imagination. This task requires an equally ambitious technical system of air conditioners and filters and water filters and pumps, all integrated by extensive computerized sensing and control systems. For example, Figures 7.13 and 7.14 show parts of Amazonia's water pumping and purification equipment, located in a windowless, private part of the exhibit complex (the lower extension of the building seen on the model in Figure 7.1).

If greenhouse life support systems were the empirical product of an ideology of man's domination of nature in the nineteenth century, systems ecology was the theoretical legacy of the same ideology in the twentieth. The way systems ecology models nutrient and energy flow in natural systems (something traditional conservatories were not overtly concerned with) derives directly from the command and control principles of cybernetic systems that developed in the military setting of World War Two.[110] In 1960, the Missouri Botanical Garden chose the "Climatron" as the name for its new futuristic

---

[109]Personal communication, 9 July 1993.

[110]Joel B. Hagen, *An Entangled Bank: The Origins of Ecosystems Ecology* (New Brunswick, New Jersey: Rutgers University Press, 1992), pp. 68-74 & pp. 100-121.

Figure 7.13. Amazonia water purification system, 1989. Jessie Cohen photo courtesy National Zoological Park, Smithsonian Institution.

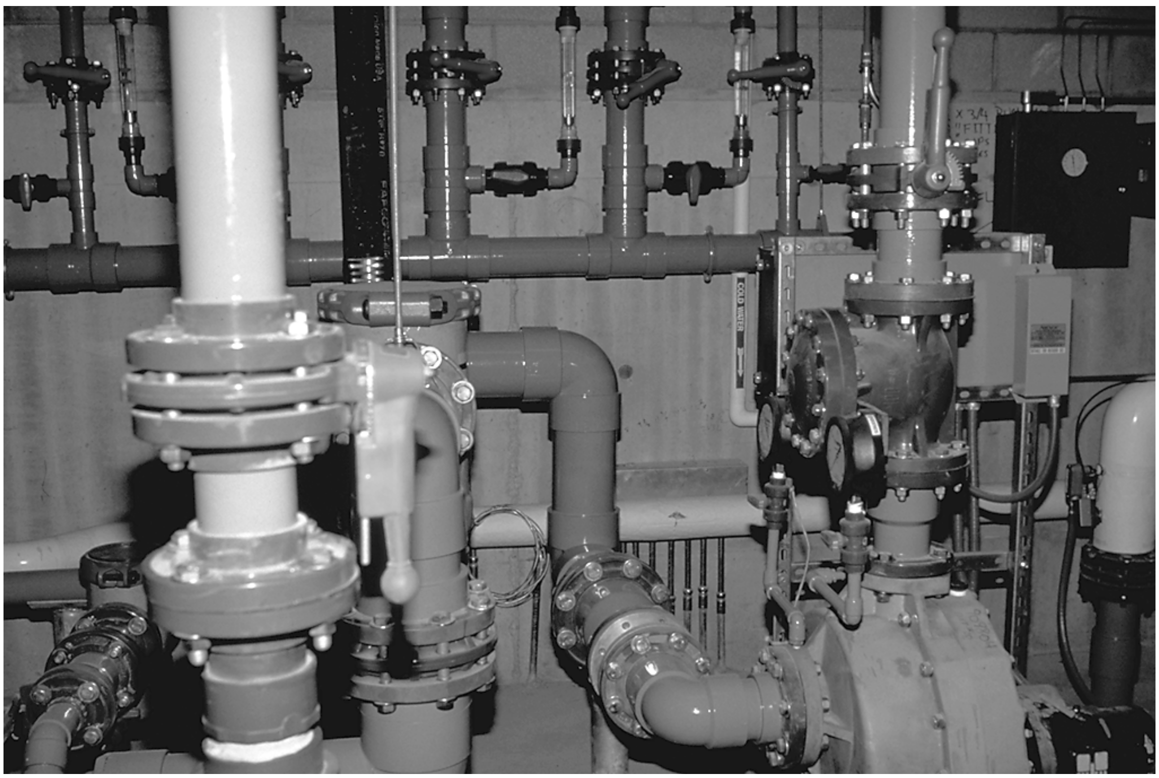


Figure 7.14. Amazonia water pumping equipment, 1989. Jessie Cohen photo courtesy National Zoological Park, Smithsonian Institution.

aluminum and Plexiglas conservatory designed as a Buckminster Fuller geodesic dome (Figure 7.15). Frits Went, the MBG's director, coined the name to suggest the ability to create a scientifically-controlled climate.[111] According to a recent book about the garden, when the Climatron first opened, "people came just to see the dome which had become a prototype for things to come; the very name brought visions of mankind's future to the mind's eye."[112] The same technocratic optimism invoked by Went's neologism, "Climatron," also pervades systems ecology as invented by the Odum brothers in the 1950s and 1960s.[113]

Similarly, by choosing the velodrome built for the 1976 Summer Olympics to house the Montreal Biodome (Figure 7.16), the Biodome's designers gave their project to provide "a direct link to nature" an unmistakably futuristic feel. As negative visitor reactions to "It All Depends" and "Ecology" show, this move to use man-made technology in representations of nature is risky. Because the ideology of domestication is no longer in vogue, a philosopher writing to inaugurate the Biodome's opening acknowledged that the converted velodrome could be interpreted as an image of domination and containment, but maintained that "man is initially cut off from reality and life. To draw closer requires the go-between of art."[114] Just as the Victorians used the greenhouse to tidy the muss and fuss of nature-out-there, the Biodome's creators believe that nature-out-there must be converted into nature-in-here to be known.[115] But we learn more about

---

[111]Charlene Bry, *A World of Plants: The Missouri Botanical Garden* (New York: Harry N. Abrams, 1989). The suffix "-tron" as a name for machinery came from the big physics instruments of the 1940s and 1950s such as the cyclotron (a charged particle accelerator), and in popular parlance, came to denote anything futuristic and high-tech.

[112]*Ibid*., p. 74.

[113]Peter J. Taylor, "Technocratic Optimism, H. T. Odum, and the Partial Transformation of Ecological Metaphor after World War II," *Journal of the History of Biology*, 1988, *21*:213-244.

[114]Jacques Dufresne, "The Meaning of the Biodôme," *Quatre Temps (The Friends of the Montréal Botanical Garden)*, Summer 1992, pp. 8-12, on p. 9.

[115]Kohlmaier and von Sartory, *Houses of Glass*, pp. 7-8.

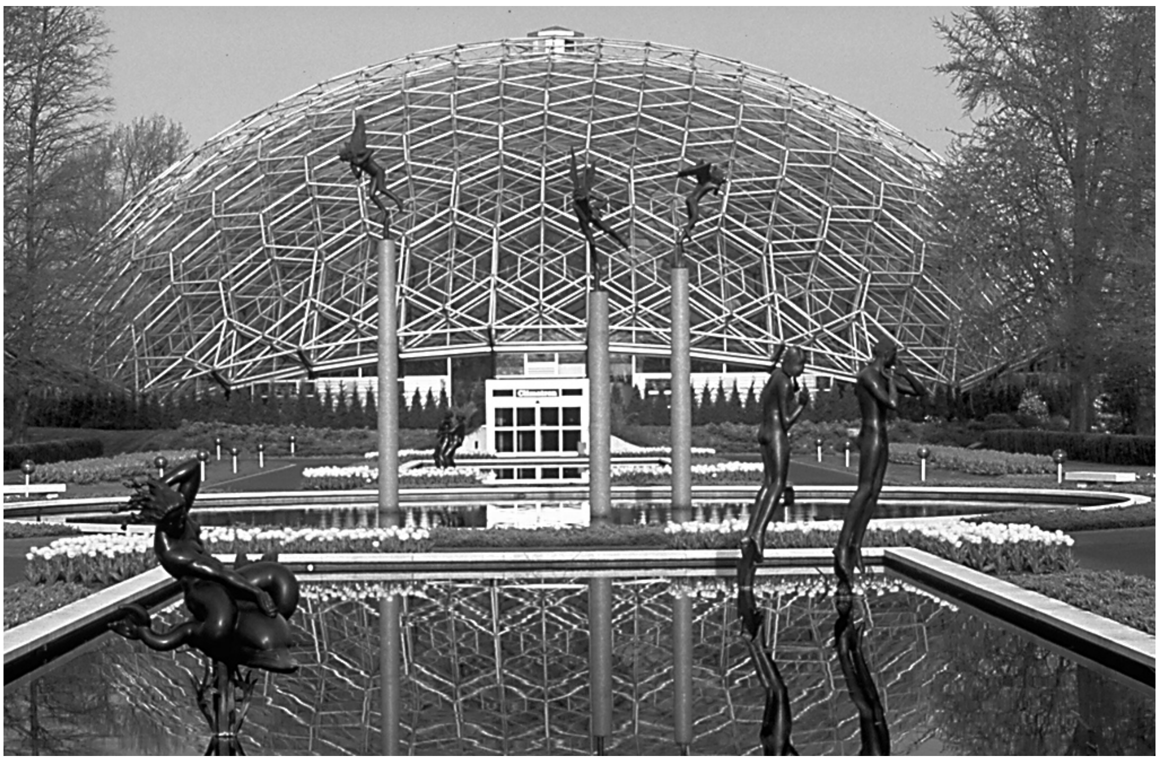


Figure 7.15. Exterior of the Climatron at the Missouri Botanical Garden, completed 1960, renovated 1990. Jack Jennings photo courtesy Missouri Botanical Garden.

Figure 7.16. Exterior of the Biodôme de Montréal (Olympic velodrome built for 1976 Summer games), opened in 1992. SWA photo.

ourselves than nature itself through such an exercise: "Is such a complex not the most beautiful window on nature man has so far created? Technology has been harnessed to serve life, and the Biodôme's ambiguity has been attenuated."[116] Some sort of redemption story as this seems necessary to explain the visitor's view of the Biodome's roof soaring above the rain forest habitat (Figure 7.17). In spite of the painstaking rock work and lush foliage, the artifice remains instead of melting away, as the museum group makers desired. The irony of the habitat group lay in its attempts to hide mediation ("art to conceal art"). The Biodome's attempts to explain its hybrid composition as a necessary cognitive link to pure nature is ironic because it in fact demonstrates its continued allegiance to the technocratic vision it attempts to repudiate.

Yet crucially, even though the greenhouses themselves have been made to read as cozy shelters from mankind's plundering (not just from the physical elements of the temperate zone), the rest of the life-support machinery is assiduously hidden from the visitor. In keeping with Jaren Horsley's conception of the exhibit as theater, Amazonia does not let any of its seams show, since breaking the suspension of disbelief is bad theater.[117] Even the air conditioning ducts are concealed in artificial tree-trunks. Figure 7.18 shows the shell for one of the fake buttress trees prior to installation. The slits for air cycling are readily visible. However, Figure 7.19 shows what the visitor to Amazonia sees: properly dressed, the buttress tree/air duct is a part of the rain forest in all of its illusionistic glory. In the Climatron, falling water masks equipment sounds.[118]

This illusion is occasionally broken by authorized peeks behind the scenes to promote the technical prowess of the exhibit-builders. For example, there is a single window on the infrastructure at the Oregon Coast Aquarium and the

---

[116] Dufresne, "The Meaning of the Biodôme," p. 10.
[117] Personal communication, 9 July 1993.
[118] Bry, *A World of Plants*, p. 76.

Figure 7.17. Rain forest habitat in the Biodôme de Montréal, opened 1992. SWA photo.

Figure 7.18. Artificial buttress tree designed by The Larson Company being installed in the Amazonia habitat, 1991. The arrow indicates slits for air circulation to ducts hidden in the trunk. Jessie Cohen photo courtesy National Zoological Park, Smithsonian Institution.

Figure 7.19. Completed artificial buttress tree in Amazonia habitat, 1993. SWA photo.

New Orleans Aquarium of the Americas, but these glimpses still tend to highlight rather than deconstruct the artifice of hiding the machinery in the rest of the installation. Written accounts portray the measures to hide infrastructure as a clever accomplishment: "From a concealed place in the basement of the [Climatron] dome, modern, computerized controls operate a new climate system."[119] The reader has been let in on a valuable secret kept from the visitor, for above-ground, the waterfalls, palms, and flowers create a new Eden under the dome's curve (Figure 7.20). Articles about the Biodome's life-support systems describing the engineering and systems integration challenges portray the facility as a single giant machine, but all kept out of sight: "Thanks to the Biodôme's hidden but crucially important electromechanical systems, visitors will even be able to see snow fall in July!"[120]

This belongs to a tradition of putting the visitor in the place, distinct from the greenhouse conceit that aestheticized human artistry in containing nature. However, reliance on hidden technical systems to sustain life is also a departure from a purely natural history paradigm. Even though the *visual appearance* derives from the naturalist's aesthetic of a complete picture rich in particulars, the genre physically relies on the practical and theoretical knowledge of cybernetics—energy and chemical flows and cycles, inputs, outputs, and feedback loops. Figure 7.21 strikingly illustrates Amazonia's legacy of the technologies of containment and domestication developed in botanical conservatories. In the photo, a crane lowers a tropical tree through the greenhouse roof, showing the process of inscription to be fundamentally similar,

---

[119]*Ibid*., p. 76.

[120]The penguins in the "Polar World" habitat frolic on machine-made snow (Johanne Falcon, "All Systems Go!," *Quatre Temps (The Friends of the Montréal Botanical Garden)*, Summer 1992, p. 52).

Figure 7.20. Interior of the Climatron after installation of tropical rain forest environmental elements in 1990. Courtesy Missouri Botanical Garden.

Figure 7.21. Installing rain forest tree in Amazonia habitat, 1992. Jessie Cohen photo courtesy National Zoological Park, Smithsonian Institution.

though operating on a larger scale, to the "portable nature" created by the inscription devices used to build museum habitat groups.

Even though the Smithsonian naturalists resisted characterizing their field sites with the totalizing abstractions of interchangeable parts created by systems ecology, the new living rain forests rely on physical mechanisms modeled on systems theory to function. But because this reliance is hidden, except at strategic moments, this alliance is an uneasy one, and ultimately the realistic visual rhetoric of wilderness, rather than the human-made mechanisms of systems theory, dominates public experience of the living rain forests.

Conclusion: Celebrating Hybrids

It is now possible to locate present tropical rain forest recreations in a historical, institutional, and conceptual matrix that helps clarify their form and function. The rise of conservation biology as a political force, its invention of "biodiversity" as a central conceit, and its successful formation of alliances with the informal science education establishment are probably the most significant factors in the proliferation of living rain forest exhibits in the past decade.

Linking the promotion of biodiversity to the preference for realistic rain forest exhibits shows how the history of a scientific concept remains embedded in its representations. Although the rain forest is a stand-in for a putatively generalized concept—biodiversity—the historical and empirical formulation and definition of that concept has been until quite recently situated in the tropical gestalt. The reliance of definitions of biodiversity on the tropics is changing in the scientific community as biologists expand the definition of diversity past sheer numbers to account for the sorts of complexity found in non-tropical ecosystems.[121] The creators of the AMNH's planned biodiversity hall indicate

---

[121] Natalie Angier, "Redefining Diversity: Biologists Urge Look Beyond Rain Forests," *New York Times*, 29 November 1994, p. C1 & p. C6.

that the rain forest will be just one of many habitats the hall will use to define and give importance to biodiversity.[122] It remains to be seen what impact that scientific reorientation will have on public representations of biodiversity, now that rain forest mania has taken on a commercial life of its own.[123]

The fact that the other rain forest replicas must hide their support systems indicates a continued dis-ease of natural history with systems engineering at precisely the same time that they rely on the systems paradigm for sustenance. As the embodiments of the hidden abstractions explaining the workings of visible nature, the air and water pumps and filters are decidedly unnatural! This sounds paradoxical, but as Latour speculates, what he calls the modern discomfort with the appearance of hybrid systems denies their existence and simultaneously allows them to proliferate.[124]

A couple of speculative questions arise from this story. First, given the story of the interests and actors I argue underlie tropical rain forest mania, it is worth imagining (or even finding out) how different groups would represent the rain forest given the resources to do so. What sort of a rain forest would the Kayapo or other Amazonians build to show us and what stories would they build into it? Would verisimilitude be a culturally meaningful genre of representation for their lived experience? Would they even conceive of such a project as plausible or useful, or would they dismiss it as impossible or irrelevant?

---

[122]Joel Cracraft, AMNH, personal communication, 21 November 1995.

[123]Even if museums are broadening their portrayal of biodiversity beyond the Tropics, commercial ventures continue to create realistic or hyper-realistic rain forest experiences with an emphasis on entertainment. For example, the Rain Forest Cafe, recently opened in Minnesota's Mall of America, includes animated animals, live tropical fish, floral aromas, and periodic rain storms as part of its ambiance (Richard Bangs, "Smells Like Rain," *Endless Vacation*, March/April 1995, p. 13).

[124]Latour, *We Have Never Been Modern*, pp. 49-51.

Second, although I have argued that the tension between natural history and systems engineering keeps the pumps in the basement, how might the public respond to an architectural and pedagogical aesthetic that highlights rather than submerges the infrastructure? What if the labels said, “We have to do these things that normally get done in nature. Here’s why it does not happen on its own in this space”? Such an effort might help to make it clear that nature is a construction rather than a found object, and that our relationship to it is always mediated. What new meaning would the rain forest take on if situated in a visual-bio-socio-mechanical system? Would that approach be capable of subverting the vision of technology as domination? Or would it only disappoint visitors looking for pristine wilderness?

Celebrating the hybrid nature of the rain forest inscriptions would mean embracing the “impurity” of the rain forest, as containing humans and wilderness, as embodying both a visual space and an abstract system, and in sum, as creating the real as much as finding it. Applied to a natural entity such as a rain forest, the Latourian notion of hybrids amplifies the original concept of interpretive flexibility to show that purity is neither possible nor even desirable.

CHAPTER EIGHT
CONCLUSION:
"FORWARD TO NATURE"

> Certain people always say we should go back to nature. I notice they never say we should go forward to nature. It seems to me they are more concerned that we should go back, than about nature.. . .The role of the artist has always been image-maker. Different times require different images. Today, when our aspirations have been reduced to a desperate attempt to escape from evil, and times are out of joint, our obsessive, subterranean, and pictographic images are the expression of the neurosis which is reality. To my mind, certain so-called abstraction is not abstraction at all. On the contrary, it is the realism of our time.
>
> Adolph Gottlieb, 1947[1]

Introduction: The Neurosis Which Is Reality

Nearly fifty years after Adolph Gottlieb defended Abstract Expressionism as the authentic response to the reality of its time, our sense of uncertainty about what constitutes the real has only increased. Gottlieb's belief that the genres of realism and abstraction are not fixed measures of the quality of representations of the world, but constructed responses to the psychic needs of a culture and its circumstances, resonates with the constructivist approach to natural history museum exhibits. Throughout the preceding chapters, analysis of the case studies from the United States and Britain has looked beyond instrumental issues of accuracy or educational effectiveness. In doing so, they have yielded a rich picture of the scientific, political, and imaginative resources deployed by various

---

[1] Adolph Gottlieb, statement in *The Tiger's Eye*, December 1947, p. 43. Gottlieb was one of the founders of Abstract Expressionism in the early 1940s, which aimed for "the simple expression of complex thought" (Adolph Gottlieb, letter published in the *New York Times*, 13 June 1943, p. X9). Other inventors of the genre include Mark Rothko, who was one of the artists Peter Farb knew.

constituencies to construct nature and our relation to it in museums, botanical gardens, and zoos in the last half of the twentieth century.

In the spirit of Gottlieb's view that abstraction "is the realism of our time," I have traced the transformation of the "real" at the Smithsonian Institution during the 1960s from an emphasis on objects and realistic representations of nature into a strategy based on communication theory that favored teaching concepts with abstract media. Chapter Two delineated the previous connection between research and exhibition by telling the stories of the making of the Golden Eagle Group at the Denver Museum of Natural History in the 1940s and the Mountain Beaver Group at the American Museum of Natural History in the 1950s. This partnership between naturalists and preparators was the model the Smithsonian botanists used on the 1962 British Guiana expedition to collect material for a rain forest group for their Hall of Plant Life, as detailed in Chapter Three. However, Chapter Four told how new conceptual exhibit aesthetics and ecological research agendas championed by Secretary Ripley in the mid-1960s supplanted the botanists' original plan with an interdisciplinary, ecologically-oriented Hall of Living Things. In Chapter Five, when the ecology hall was finally completed as the multi-media activist exhibition "It All Depends" in 1974, the exhibit-making process had been almost completely taken away from the curatorial staff and was controlled by professional writers and designers with very different conceptions of the "real." This transfer of power and authority and the concomitant change in exhibition genre and argument to favor abstract concepts was highlighted in Chapter Six with the recurrence of similar issues in the contemporary context as seen in history of the "Ecology" exhibition opened at the British Museum (Natural History) in 1991. Finally, Chapter Seven examined the making of "Amazonia" at the National Zoological Park and other living rain forest exhibits during the late 1980s, arguing that these institutions have become the present-day locus of realistic representations of nature for public consumption. These cases articulate the historical context of current realistic and abstract natural history exhibits.

Goals & Propositions Revisited

The goals and propositions asserted in the Introduction can now be re-stated and retrospectively connected to the empirical material presented in the preceding chapters.

One

Goal: to delineate how natural history museum exhibits have attempted to shape our perceptions of Nature, and in doing so, to define what counts as "natural." Chapters Two and Three showed that the habitat groups built from the 1920s through the 1950s defined nature as wilderness. The North American Mammal Hall at the AMNH celebrated famous natural wonders such as Yosemite Valley and Mt. Rainier. Nature was powerful and beautiful, undesecrated by humans, and served as an antidote to the disabling effects of city life. In Denver, habitat groups not only displayed the beauty of Colorado's scenery, but explained the variation between different habitats in terms of Merriam's ecological life zone model. Nature functioned according to an orderly scheme in which the distribution of plants and animals was not accidental, but was dictated by climate and geography.

Proposition: natural history museum habitat groups and their descendants do not copy nature into the exhibit hall in a transparent fashion, but create a *version* of nature informed by the epistemologies, aesthetics, practices, and institutional interests of the exhibit-makers. Background painter James P. Wilson's notion of "art to conceal art" encapsulates this idea. The construction of the field site required to build the Golden Eagle Group in Denver vividly illustrates how the habitat group was never simply a copy of nature, but the product of ongoing dialog with, and manipulation of, the field. As the botanists' trip to Kaieteur Falls showed, the version of nature the habitat group created was ultimately motivated by the field naturalists' desires to convey the wonder and romance of their own field work. The same goal of immersing the visitor in the field required combining "natural" and "artificial" elements in the new living rain forest exhibits during the 1980s.

Two

Goal: to understand changing representations of nature in terms of a change in the scientific definition of nature from the descriptive, particularistic world-view of the naturalist to the abstract systems approach of post-World War Two ecology. Chapters Four and Five discussed how ecosystems ecology owed more to cybernetics and experimental laboratory biology than to the evolutionary concerns of natural history and systematics. Natural history viewed the field site as a specific place with unique qualities that made it intrinsically interesting and distinguished it from other habitats or assemblages of organisms. This contrasts sharply to the ecologists' emphasis on universal energy and nutrient cycles and flows as the defining characteristics of an ecosystem. In the systems paradigm, individual species are less important than the overall functionality of the system. Variation between individuals is minimized or ignored to fit the larger scheme.

Proposition: though conceived as a popular exhibit genre, realistic habitat groups reflected the naturalists' valuation of the specific field site as irreducible to more general terms, whereas later more abstract exhibits drew on an ecological paradigm that saw natural systems in terms of generalized functional units. The naturalists favored realistic means of representation because of their tacit field experience and their interest in the adaptations and life histories of specific organisms. Reginald Sayre's negotiations over the lupines and Paul Marchand's model-making practices exemplify the skills associated with detecting and evaluating variation. The exhibit-makers joined the naturalists in constantly seeking to identify and explain variation. On the other hand, a view of the world as a system of interconnected webs required more abstract representations to explain. This was the rationale given for utilizing multi-media and heavily designed exhibits in "It All Depends" and "Ecology."

Three

Goal: to understand the rise of abstract exhibits in terms of changes in exhibit-making practice from a direct involvement of scientists and artists to the control of the exhibit process by educators and designers. Along with changes in scientific conceptions of nature, the 1960s saw significant changes in exhibit practice. Museum professionals increasingly believed that a distinct set of skills based on communication theory and industrial design were more crucial to the exhibit-making process than the subject expertise of curators or craft skills of the artists. By the time "It All Depends" was built in the early 1970s, the curatorial staff of the NMNH had been relegated to the sideline, and the exhibition contained few real specimens. This approach also dominated new exhibitions other natural history museums during the 1970s and 1980s, as seen from the history of "Ecology" at the Natural History Museum in London. The motives and methods behind "Amazonia" at the National Zoological Park show that realism has not been entirely abandoned as a public genre for representing nature, but it has largely shifted to zoos, botanical gardens, and aquaria.

Proposition: whereas the scientists and artists based habitat groups on their field experience in order to show museum visitors the wonders of their field sites, the designers and educators wanted to repackage existing ecological information to promote environmental awareness in the 1960s and 1970s. I have argued that the naturalists and artists often had to create new knowledge as they gathered materials for exhibits from their field sites. However, the designers saw it as their job to move knowledge already formalized by scientists in the technical sphere out into the public sphere. The ties in epistemology and practice between exhibition and research had been severed. Furthermore, the ecological knowledge deployed in "It All Depends" and to a lesser extent in "Ecology" was selected for its political relevance as a structuring metaphor intended to convey the urgency and necessity of combating environmental degradation. On the other hand, the new living rain forest exhibits once again project the scientific and aesthetic vision of field biologists. They combine political urgency with tacit field experience and the inscription technologies of realism.

Table 8.1 summarizes the case studies in terms of the analytical framework of scientific rhetoric, interpretive flexibility, tacit knowledge, inscription, and translation. Moving across the rows shows how each concept changed over time. Moving down the columns shows the relationship between the different concepts during each episode in the period. Grouping Chapter Two with Three and Chapter Four with Five and Six indicates their basic similarity in terms of exhibit genre (realism versus abstract/objects versus concepts). Chapter Seven has its greatest affinity with the earlier period, although the hybrid construction of the living rain forests combines the earlier exhibit practices and outlooks with the later approach.

Rhetorical Strategy & the Interaction of Genre & Argument

Analyzing natural history exhibits for their visual and narrative rhetorical strategies has unpacked the way museums construct meanings for the objects they display. Rather than viewing abstract exhibits as parasitic on realistic

representations, I have treated both realism and abstraction as rhetorical strategies variously suited for different arguments. Throughout, I have tried to distinguish between genre and argument as interlocking elements making up the rhetorical strategies used to represent nature. Each representational style has an identifiable visual vocabulary, or genre. That genre evolved to convey the exhibit-makers' pedagogical goals and scientific ideology, or, using Jeanne Fahnestock's term, the exhibit's argument.[2] The more common alternative to "genre and argument" is "form and content." Renaming form as "genre" highlights the fact that the rhetorical forms of realism and abstraction belong to identifiable categories with established interpretive conventions and trajectories of historical development. Calling content "argument" ensures not only that we understand the persuasive power of representations to influence the viewer's feelings and beliefs, but also that we do not lose track of the exhibit-maker's agency in creating those persuasive representations.

Beginning at the top of Table 8.1 and moving across the rows, habitat groups such as the Coyote Group, the Mountain Beaver Group, and the Golden Eagle Group were, as a genre of realistic representation, highly place-specific and embodied the particularistic view of the field naturalist. The techniques of model-making, taxidermy, and background painting were all developed in order to construct the places the groups depicted in exacting individual detail. The visual and narrative tools of the genre of realism communicate an argument, or point of view, about the beauty, excitement, and intrinsic interest of the field site. Botanist Richard Cowan linked the rain forest group depicting Kaieteur Falls in the Hall of Plant Life to his own desire to explore new places and discover new species. Sharing that excitement with the museum visitor required taking the

---

[2]Jeanne Fahnestock, "Arguing in Different Forums: The Bering Strait Crossover Controversy," *Science, Technology, and Human Values*, 1989, *14*:26-42.

visitor to that place via the realistic habitat group. The highly realistic botanical habitat group (being able to identify plant species from their models) also embodied an argument aimed at raising the status of botany as a subject in the eyes of the public by eliminating the cognitive bias against plant life that existed in exhibits that relied on "mass effect."

Although it is not as place-specific as the old museum groups, the new living rain forest in "Amazonia" similarly relies on the "you are there" genre to compete against recent dynamic representations of nature such as television and OmniMax films, which also offer heightened, condensed experiences of real places. "Amazonia" and the living rain forests argue for a vision of nature seen through the scientists' eyes, and add to the romance of the field the normative message of the urgency in conserving the endangered field site. The argument for biodiversity, with its roots in evolutionary biology and its celebration of species, relies heavily on the particularistic world view realism portrays.

As a genre, abstract exhibits were inspired by the designed spaces of World's Fair exhibitions and Marshall McLuhan's claim that the "medium is the message." McLuhan promoted fast-paced, ephemeral, impressionistic, and multi-sensory communication media. In the Hall of Living Things, Peter Farb and Joe Shannon's exhibit plans self-consciously repudiated the "slice of life" realism advocated by the curators and favored "artier," more theatrical, designs. They meant for the abstract media-oriented approach to bring the museum into parity with contemporary influential media such as television and the aesthetic it stimulated in popular culture.

The genre of abstraction was ideally suited for arguing for the definition of nature as an ecosystem rather than a place. As "It All Depends" illustrates, defining the world in terms of interchangeable parts or functional equivalents (the definition of a biome used in the exhibition) removed detail and ignored individual variation. The tendency of the genre of abstraction to treat a subject in metaphorical terms was also useful in converting the scientific concept of an ecosystem into a politically useful image arguing for the interconnectedness of life and Man's hubris in attempting to step outside of the web.

With "Ecology," the argument defining nature and the environment as cybernetic systems also demanded the genre of abstract, multi-media exhibits. The exhibit-makers intended the architectural design of the gallery itself as a metaphorical statement about humans' place in nature, and they deemed multi-media presentations necessary to convey "active, dynamic" ecological processes. They saw specimens from the museum's collections as too static and anachronistic to compete in the entertainment marketplace. "Ecology" argues for humans' need to reconnect with their environment and for an appreciation of the complexity of the earth's life-support systems. This argument does not have such an activist tone as "It All Depends," but it was motivated by a similar desire to educate the public about ecological principles which should, in the opinion of the museum, form the basis of sound environmental policy decisions.

Interpretive Flexibility Explained

A central narrative thread of this analysis has been the interpretive flexibility of the rain forest as it was transformed from an embodiment of irreducible primary data into a series of icons or signs for generalized theoretical constructs. What was once intrinsically interesting and significant in its own right became a place-holder in an explicitly abstract conceptual scheme. The objects were the same and not the same because their value and use changed as the scientific and educational consensus about what they were and meant changed. That change was explained by following the interests and motivations of the various actors and by detailing how those interests were built into the objects on exhibit.

The definition of interpretive flexibility presented in the Introduction was what Harry Collins called the "first stage" of the Empirical Programme of Relativism: showing that the same body of data or entity has multiple reasonable interpretations.[3] The rain forest has been amply demonstrated to possess considerable interpretive flexibility: it has been given at least five distinct meanings over the course of the episode. The rain forest was successively defined as a wilderness field site, a generalized ecosystem, an icon of the fragile web of nature, a place of indigenous human habitation, and an icon of wondrous biodiversity (Table 8.1). Each of these definitions entailed a slightly different representational form, which is the meaning of the claim that the rain forest was "the same but not the same" (see Figures 5.17-5.20 for the sequence of transformation). There is ultimately a *bona fide* incommensurability between the different forms because each did different work and their creators were frequently talking through on another. The later abstract representations of nature, by their own internal logic, *must*, for example, exclude a sense of place if they are to do the work they are designed to do. Framing the episode in this way is crucial if it is to be seen as anything but a clash of wills or aesthetics, or the subversion of correct information by uneducated popularizers. Those elements may contribute to the story, but they are not the sole force at work.

After establishing the existence of interpretive flexibility, Collins suggested that the next analytical stage of EPOR was to delineate the social mechanisms of closure: given the interpretive flexibility of the natural entity, how was how a more singular definition stabilized?[4] Rather than showing

---

[3]H. M. Collins, "Stages in the Empirical Programme of Relativism," *Social Studies of Science*, 1981, *11*:3-10, p. 4.

[4]*Ibid.*, p. 4.

stable, final closure, this case demonstrates how successive rounds of redefinition can continue in some areas of science almost indefinitely. It would be dangerous to suggest that the possible scientific meanings and public uses of the rain forest have been exhausted by the examples given in this study. In the museum setting, temporary closure was achieved, not surprisingly, by those who were able to control the exhibit-making process.

This study has traced how exhibit-making moved from a partnership with scientific research to a separate profession with an ideology and practices distinct from science. The Hall of Plant Life was planned completely within the traditional paradigm of curatorial control of exhibition form and content, and the definition of the rain forest derived from the botanists' culture and concerns. During the transition period (the Hall of Living Things), there were considerable negotiations between the scientists and research professionals, and in fact Peter Farb hatched the idea of the rain forest as an example of an ecosystem specifically to unite the curators' subject-based approach with the designers' and administrators' conceptual approach. But by the time "It All Depends" opened, reorganizations of exhibit function gave the exhibit professionals sufficient autonomy to pursue their own course with limited input from the curators. Although "Ecology" at the BM(NH) followed a similar trajectory, separating exhibits and research, the emphasis on biodiversity in the living rain forests such as "Amazonia" shows the effects of the renewed involvement of scientists and their ability to promote their interests in the exhibit-making process.

Finally, the third stage Collins promoted for EPOR involved connecting closure (in this study, the creation of a temporarily stable definition of the rain forest) to the wider cultural milieu of the actors (scientists and other exhibit-makers).[5] This study has explicitly related wider cultural influences to scientific

[5] *Ibid.*, p. 7.

and exhibition practices in order to explain the genre and argument of natural history museum exhibits. Because of the museum's identity as an interface between the public and technical spheres, it has been particularly sensitive to wider cultural trends and concerns, and this sensitivity has been a source of instability of the rain forest's definition.

The Smithsonian case has also shown how transferring power from scientists to professional designers and writers injected external interests into the museum. When the botanists responded to the post-Sputnik interest in Big Science by promoting botany and the naturalist's world view with realistic exhibits, their essential goal was to make the knowledge their culture produced available to non-members of that culture. On the other hand, the professional designers and writers were not technically trained and either did not see it as their mandate to propagate or resisted propagating the experts' world view to the public. Instead, they sought to inject into museum exhibitions ecological knowledge not generated by museum scientists. They decoupled museum research and exhibition in order to create "relevant" exhibitions that spoke to social and political issues raised by the environmental movement outside the traditional boundaries of museum science.

Pinch and Bijker's Social Construction of Technology project sought to cash out the stages of Collins' EPOR by choosing a specific artifact, such as the bicycle, identifying the social groups with various relationships to the artifact, such as sporting enthusiasts, women, and recreational cyclists, and then relating changes in the artifact's design to the problems and needs of the social groups, such as a macho image or greater safety.[6] As Table 8.1 shows, those categories

---

[6]Trevor Pinch and Wiebe Bijker, "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, eds. Wiebe Bijker, Thomas

are useful in understanding the overall trends in natural history exhibition outlined in this study. The categories of definition, social group, and problem can be seen as roughly corresponding to the three stages of interpretive flexibility, closure, and wider cultural influence outlined above.

The rain forest replaces the technological artifact as the locus around which the social groups and problems coalesce. Pinch and Bijker's case study of the bicycle shows a fragmentation of bicycleness to the point where various social groups could independently relate to simultaneously-existing bicycles that increasingly bore less and less relationship to each other.[7] In the case of the rain forest at the Smithsonian, there is only one rain forest at a time over the period. The fact that it was repeatedly re-interpreted means that the various social groups were not entirely successful in completely controlling its definition. As the sole surviving component of the earlier exhibit plans, the rain forest did not fit well into the abstract ecological scheme of "It All Depends." At the same time that the rain forest was what had kept the project alive, the designers only kept it at Cowan's insistence, and it was the only realistic exhibit in "It All Depends." Even though Chapter Seven discusses several different rain forest exhibits, their form and purpose is so homogeneous that there has been little fragmentation of meaning even when examining more than one institution.

I have attempted to connect the definition of the rain forest identified in each period to the social groups in control of the exhibit process and the problems each group wanted the rain forest to solve. Connecting curators to internal scientific concerns and designers/writers to external social concerns is an important conclusion of this study. Not only did this relationship characterize

---

Hughes and Trevor Pinch (Cambridge, Massachusetts: MIT Press, 1987), pp. 17-50.

[7] *Ibid*., pp. 17-50.

the exhibit goals the Smithsonian, but it is also found in the examples of the botany gallery and “Ecology” at the BM(NH).

From a science studies perspective, this finding is not surprising: the social construction of knowledge assumes that different actors and different perspectives will produce different outcomes. Furthermore, rhetorical analysis also looks to uncover how varying arguments require varying genres. But the communications perspective held by the public understanding of science movement assumes that communication experts are not adding their own point of view, but expressing scientists’ knowledge in accessible terms that scientists themselves cannot or will not. This study, on the other hand, has shown that the social group comprised of the writers, designers, and educators created its own representation, rather than a representation on behalf of another group (the scientists). For example, in “It All Depends,” the rain forest was both the sole remaining realistic representation of nature in the exhibition and the only part of the exhibition that significantly involved the curatorial staff.

Finally, it is important that the scientist/internal interest and designer/external interest divide should not be seen as an essential feature of the characters of these two groups. Even though some of the botanists were among the most conservative, internally-focused scientists at the Smithsonian up through the 1960s, other scientists both before and since then have used public exhibitions to relate their science to wider cultural concerns. Conservationism was the driving force behind both the habitat groups at the American Museum of Natural History in the 1930s-1950s and the living rain forests in the early 1980s and 1990s. These examples indicate that there is nothing intrinsic to the training or outlook of scientists that precludes their participation in larger social debates.

By now, the rain forest’s interpretive flexibility is so nearly self-evident that to assert its existence is analytically trivial. As the EPOR project specified, interpretive flexibility must not only be uncovered, but *explained*. Tacit knowledge, inscription, and translation help to categorize and structure the resources available to the social groups involved as they tried to force closure on the definition of the rain forest (or, in Pinch and Bijker's terms, as they tried to solve the problem that each group saw from its own vantage point). Each social group valued tacit knowledge differently, utilized different inscriptions, and assumed quite different models of translation.

Tacit Knowledge Replaced by Formal Knowledge

The idea of tacit knowledge has been most useful in distinguishing between the skills and sensibilities of the earlier artist-naturalists and the later designer and writers. The relative weight of tacit knowledge is part of the difference between exhibits-as-science and exhibits-as-communication, which was a key change between the earlier and later periods covered in this study.

During the exhibits-as-science period, replicating the field inside the museum involved two sorts of tacit knowledge. The first was a grasp of the overall gestalt of the field gained from first-hand field experience. This was exemplified by James P. Wilson's account of the Coyote Group at the AMNH and Richard Cowan and Thomas Soderstrom's desire to reproduce the drama of Kaieteur Falls in the Hall of Plant Life at the Smithsonian. Chapter Seven showed that the new living rain forests also seek to recreate the tropical biologist's field experience for the visitor. The realistic representations embodying exhibits-as-science required craft skill in order to create new knowledge from the field. To build the habitat groups, the naturalist-artists could not rely entirely on verbal accounts of the field, but had to go there themselves in order to create inscriptions of nature inside the exhibit hall. The AMNH Coyote Group had to be moved to another location in Yosemite Valley because the first site, chosen by memory from the confines of the museum, did not work. The second kind of tacit knowledge involved in building habitat groups was the culturally-transmitted craft skill that both artists and naturalists developed to distinguish and evaluate variation between specimens. The artists' skill was necessary to reproduce place-specific assemblages of plants and animals, while the taxonomists constantly tried to fit specimens into a phylogenetic classification scheme. In both cases, the representations belonged the scientific enterprise.

On the other hand, the abstract ecological treatments at the Smithsonian and BM(NH) stayed within the confines of formalized knowledge. These exhibits-as-communication were a part of "ready-made science," not "science in the making."[8] As such, they had no use for tacit knowledge because they were not attempting to create a new image of nature or even verify an existing one. Adhering to the pipeline theory of communication, they aimed to move knowledge completed in private out onto public view, effectively black-boxing knowledge and removing its producers, the curators, from the exhibit-making process. The label "green eye-shade boys" and the feeling in London that curators were ill-suited for exhibit-making indicate that the communication professionals did not see the tacit skill of the naturalist as being useful in generating public representations of nature. Furthermore, the systems ecology that the designers wanted to portray to the public was not science created in the museum at all. Although the designers and writers seemed to believe that form and content were linked to the extent that they wanted to create metaphorically evocative spaces and claimed that active media were required to portray active

---

[8]Bruno Latour, *Science In Action: How to Follow Scientists and Engineers Through Society* (Cambridge, Massachusetts: Harvard University Press, 1987), p. 4.

processes, they had no belief that the process of knowledge production had any influence on the final form of a public representation.

I have argued throughout this study that the later representations of nature were more abstract in part because the science they communicated—systems ecology—was more abstract. However, the relationship between tacit knowledge and abstraction is not simply that abstract knowledge has no tacit knowledge backing it up. Many lab ethnographies show tacit knowledge at work in research areas far removed from the naturalist's field site.[9] Rather than being a measure of their distance from reality (the usual definition of abstraction), the absence of scientific tacit knowledge in the production of abstract museum exhibits is a measure of their distance from the site of knowledge production. This conclusion is supported by the fact that the realistic living rain forests fall somewhere between the two poles of the realism/abstraction spectrum. Although "Amazonia" was designed to reproduce the gestalt of the field, because its sense of place is more generalized than the museum groups, it could be produced with less on-the-spot craft skill and could rely more on routinized commercial practices.

Inscriptions in Museums Retain Physicality

Characterizing traditional museum exhibits as the products of inscription devices has helped articulate the historical overlap between research and exhibition. One of the significant distinctions between museum and laboratory science is not that museum collections and exhibits are purely encyclopedic and descriptive while experiment is the only way to go beyond description to mechanism. Rather, museums do in fact retain the physical dimension in their

[9]Karin Knorr Cetina, "Laboratory Studies: The Cultural Approach to the Study of Science," in *Handbook of Science and Technology Studies*, eds. Sheila Jasanoff, *et al*. (Thousand Oaks, California: Sage Publications, 1995), pp. 140-166.

representations that laboratories do not. Interestingly, building a habitat group did involve inscription devices similar to those found in laboratories. Like laboratory inscriptions, the molds and materials collected in the field by Paul Marchand and Reginald Sayre made nature portable enough to carry back to the museum and abstract enough to reassemble using their interpretive framework and vision. However, the lab measured its effectiveness in its ability to leave the physicality of nature behind in creating its representations of nature. The museum is a unique three-dimensional space housing representations that are just as loaded with interpretation and mediation between the found and the made as representations created in the laboratory. But unlike the laboratory, museum representations are powerful because they physically embody concepts.

The key to understanding museum science and the exhibits it generates is not to equate physicality with lack of interpretive skill or conceptual content. This is essentially what later professional designers and writers did in downplaying the value of objects in exhibits. Chapters Four and Five showed how by the end of the 1960s, natural history was struggling to compete with images and definitions of science that did not include the naturalist's particularistic world-view. Because the design professionals lacked appreciation for the conceptual content of museum science, they saw the abstract, laboratory-style inscriptions and representations of systems ecology not only as the sort of science that they wanted to represent in order to promote environmental awareness, but as what counted as doing science at all.

Tacit Knowledge & Inscription in Tension

The cases recounted in Chapters Two and Three suggest a contradiction between the Latourian notion of inscription devices as things that can translate and universalize data and Collins' conception of tacit knowledge as required all along the chain of knowledge production. On one hand, the inscription device such as a chart recorder generating a graph is meant to close the black box of practice, making the final outcome the uncontested, accepted piece of information, eliminating the need to constantly refer to the raw input. It also makes the raw input tractable in the social domain. It can be transferred, interpreted, and acted upon outside of the lab and without the lab's apparatus or the original materials.

The model-maker or the background painter creating materials in the field that translate the field into the exhibit hall, allowing an independent replication of nature inside the museum, seems like a perfect example of this: the mold and the painting are inscriptions that captured an aspect of nature and allowed it to be moved into another domain. For example, Paul Marchand created molds in the field that the preparators later used to mass-produce plants. The British Guiana material waited in storage for over ten years before it was incorporated into the rain forest for "It All Depends." Those inscriptions were sufficiently independent of their referents to function apart from the field.

However, at the same time the field expedition created universal inscriptions, the black box was never quite perfectly closed. Because tacit knowledge was required to use and interpret the inscriptions when the rain forest was finally built, the inscriptions were never quite fully liberated from their origins. To use them to their greatest potential, the user had to maintain some connection to the practice that generated them. To the end, the habitat group builders still heavily relied on their personal field experience. It was not accidental that both Soderstrom and Sayre, two members of the original expedition team, helped resurrect the rain forest, and that other exhibit personnel had to make a final trip to Panama. The rain forest inscriptions had not become a complete kit. This contrasts to the rain forest of "Ecology," which could be built from a kit, since the realism of place specificity was not required. Even the more realistic living rain forests such as "Amazonia" can draw on more routinized or industrialized kits because they are not as place-specific as museum groups.

The apparent disagreement between the ideas of inscription and tacit knowledge can be resolved because even though Latour and Woolgar's original formulation of inscriptions claimed that they operated free from the material conditions of their production, Latour's later discussion of the necessity of the laboratory and its physicality in order to dissent from the assertions made by a scientific text makes room for tacit knowledge without mentioning the concept specifically.[10] Latour's dissenter who challenges the validity of a knowledge claim made by a scientific text is essentially Collins' replicator who sets out to verify or reproduce a reported phenomenon.[11] In either telling, when knowledge must be connected backward from the abstract world of pure representation to the concrete world of practice, tacit knowledge is necessary. Applied to museums, this characterization of the location of craft skill in the cycle of knowledge production further clarifies the distinction I have tried to draw between exhibits-as-science and exhibits-as-communication.

Translation: Transformation or Through the Pipeline?

The final theoretical tool that explains interpretive flexibility by connecting older exhibits such as habitat groups to science-in-the-making and the newer exhibits such as "It All Depends" to ready-made-science is the notion of translation. I have invoked the two meanings of translation as transformation and as relocation in order to argue for the constructedness of both realistic and abstract representations of nature in museums. The story of the Golden Eagle

---

[10]Latour, *Science in Action*, pp. 63-64, pp. 78-79.

[11]H. M. Collins, *Changing Order: Replication and Induction in Scientific Practice* (London: Sage, 1985), pp. 83-89.

Group built in Denver dramatized the cycle of transformation in which the museum's theoretical vision shaped the field in order to bring a realistic representation of the field into the museum. Similarly, the Smithsonian expedition to British Guiana set up an exhibits laboratory in the field in order to capture the rain forest. These activities constituted the cycle of deduction and induction typifying the naturalist's method, which moves between inferring the meaning of particulars from generalities (altering the eagle's nest to suit the naturalists or adding leaves to a model to get it "back to reality") and creating generalities from particulars (using the habitat group to illustrate the life zone scheme). "Amazonia" translated (moved and transformed) the field into the greenhouse via the technology of systems ecology, while also seeking to translate the visitor outside of human civilization and into a wilderness setting.

The later exhibit-making efforts at the Smithsonian and the BM(NH) relied on a completely different meaning of the term translation. The public understanding of science field defines translation solely as the process of moving a piece of information from the esoteric to the public spheres, and seeks to minimize error (as defined by the technical experts) and maximize comprehension (as reported by the public). The way "It All Depends" treated individual habitats such as the rain forest and desert as examples of universal biomes shows that this model relies on one-way deductive logic with particulars (habitats) acting as illustrative examples of pre-established generalities (systems ecology). Once again, there is no indication that how scientists established those generalities had any role to play in shaping the form of the public representation. The science communication model of translation resembles more a pipeline than a cycle of inference, and does not account for the situated nature of representations or the knowledge they embody.

Recovering the Nature of Natural History

In balance, much of this study has taken a critical view of contemporary exhibit practices that dissociate natural history research from exhibition. Chapters Four through Six showed how curators and their perspective were removed from the exhibit-making process. I have argued that this was problematic because moving from exhibits-as-science to exhibits-as-communication has tended to attenuate the unique power of the museum to represent nature in three dimensions with real objects. Such a critique should not be seen, however, as simply joining the curators in their sometimes reactionary rejection of innovations in exhibition technique. There is a real need for the museum to intersect with evolving aesthetics and interests in popular culture. Rather, I have specifically used the distinction of exhibits-as-science and exhibits-as-communication as a means of showing in greater detail the epistemology, methods, and innate fascination with real specimens and organisms that typifies the natural history enterprise. This approach has shown that the arguments that have justified pulling apart exhibits from research and favoring concepts over objects—that scientists are poor communicators, and that naturalists don't really do interesting science any more—should not be taken for granted.

Crossing the Boundary Between Art & Science

One curiosity that emerges from the blurred boundaries between esoteric science and science popularization is the way that the boundary between art and science is manipulated to maintain a strong distinction between those two historically polar categories. Traditionally, art (including literature) and science have been seen from both sides as diametrically opposed: one the realm of creative inner vision which celebrates subjectivity and emotion, the other a methodical enterprise firmly connected to reality and always reined in by reason. This divide has been invoked to the point that the "two cultures" have become an unquestioned cliché.[12] To the art world, the habitat group background painters were too much slaves to copying nature and devoted too much attention to the rules of geometry and perspective for their work to qualify as "fine art." However, their work is often highly dramatic and is never merely photographic.

If the art world would not recognize the background painters as artists, their status as scientists did not last either. In their heyday, the background painter and model-maker's observational powers were highly respected by the scientists they worked with. For a considerable period of time, the scientists relied on the model shops and illustration staffs of their museums for representations of natural objects that they used in their esoteric work. But as natural history lost ground to quantitative ecology and laboratory biology, a new generation of exhibit-makers saw the habitat group as merely aesthetic instead of as a piece of science. The habitat group came to be in the ironic position of being dismissed as mere technique by artists and dismissed as mere art by scientists and science communicators.

Shuttled from one side to another of the great divide between art and science, this hybrid really only makes sense when that divide is blurred and the

---

[12] C.P. Snow's formulation remains the most famous (C. P. Snow, *The Two Cultures and the Scientific Revolution* (New York: Cambridge University Press, 1959)). But David Hollinger argues that Snow's critique has been over-generalized into an all-around portrait of the humanities as anti-science. According to Hollinger, Snow was specifically attacking right-wing elements of certain English faculties for a neo-fascist relativism (David Hollinger, "Science as a Weapon in American *Kulturkampfen* Since World War II," HSS Distinguished Lecture at the annual meeting of the History of Science Society, New Orleans, October 14, 1994)). If Hollinger is right, recent opponents of the disingenuously-labeled "academic left" who hysterically portray science studies as anti-science know-nothingism cannot claim Snow for their own (Paul R. Gross and Norman Levitt, *Higher Superstition: the Academic Left and Its Quarrels with Science* (Baltimore: Johns Hopkins University Press, 1994)).

habitat group is allowed to exist as a boundary object, useful precisely in its ambiguous standing as purely neither and therefore both. As boundary objects, habitat groups have the interpretive flexibility to break down the absolute distinction between art and science, the public and the esoteric, the constructed and the natural. They can be recast by members of different social groups and act as a common locus of discourse, even though their meaning and use is perceived differently from each point of view.[13]

Descriptive Inscription Is Hard Work

An anticipated criticism of this entire project to portray exhibit-making as part of the process of doing natural history, instead of a final product, is that exhibition work did not *really* change the course of research, it was just fitted in around the margins of the technical field. After all, the skeptic might argue, in spite of Star's efforts to show the strength of their claims, the taxidermists *lost* their bid to become true professionals with specialized forms of knowledge instantiated and maintained by practice.[14] This skeptic could take at face value Richard Cowan's assessment that he was only doing botany opportunistically while at Kaieteur Falls. However, this study's most ambitious goal has been to expand the definition of what it means to do science by looking closely at the entire constellation of practices and representations created *at the same time, and often with the same tools of observation*. True enough, no new theories were discovered and no paradigms changed. To require that of the habitat group is to

---

[13]Susan Leigh Star and James R. Griesmer, "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39," *Social Studies of Science*, 1989, *19*:387-420.

[14]Susan Leigh Star, "Craft vs. Commodity, Mess vs. Transcendence: How the Right Tool Became the Wrong One in the Case of Taxidermy and Natural History," in *The Right Tools for the Job: At Work in Twentieth-Century Life Sciences*, eds. Adele E. Clarke and Joan H. Fujimura (Princeton, N.J.: Princeton University Press, 1992), pp. 257-286.

stick to the model of science as knowledge generation and packaging. Calling that model into question doesn't remove esoteric agendas from the picture, but it does remove them from isolation. Esoteric representations were produced at the same time and in the same space as popular representations, and I have argued that the two only successfully coexisted when they shared some of the same tools and ways of seeing the world.

Chapter Four showed how natural history and systematics at the Smithsonian were compelled to justify their existence in the face of the label "mere" description. Secretary Ripley and the promoters of university-style research claimed that the act of describing involved no special questions of interpretation or reasoning, and that its practitioners were the "green eye shade boys" who could not see the forest for the trees. Not only does any taxonomical system, however artificial (that is, non-phylogenetic in organization), require interpretive skill, but science studies from its beginnings has shown that cognition at all levels is profoundly theory-laden and socially mediated.[15] The insights of the sociology of scientific knowledge have been developed using cases from the physical sciences, medicine, and modern biology, but have less frequently examined natural history. After recovering the theory-ladeness and social mediations that go into the practice of natural history, the insinuation of "mere" description is clearly untenable. The natural history museum has been a particularly fruitful place to look at this issue because its exhibits and collections have been repeatedly labeled as "mere description" and "objects without concepts." The irony is that, analytically, it has been precisely the physicality of

---

[15]Ernst Mayr and William B. Provine, eds., *The Evolutionary Synthesis: Perspectives on the Unification of Biology* (Cambridge, Massachusetts: Harvard University Press, 1980); David Bloor, *Knowledge and Social Imagery*, 2nd ed. (Chicago: University of Chicago Press, 1991).

the habitat group that has brought to the fore the mediation, negotiation, and interpretation required to create a description of the natural world.

Another irony emerges from the stories of exhibit-making told here. As public relations tools for promoting the skill of their builders, habitat groups were too successful in submerging the very skill and knowledge that created them. That success has even turned the analysts' heads: near the end of her history celebrating the skill of the habitat group makers, Karen Wonders observes, "In a diorama, the museum visitor can engage in a direct perception of the scene without the interference of technical devices that mediate and translate reality, predetermining both the pace and content of the information that is communicated."[16] But as I have repeatedly emphasized, habitat groups are *nothing but* "technical devices that mediate and translate reality, predetermining both the pace and content of the information that is communicated." Like all good products of technoscience, their mediations and translations are effective precisely because they are submerged from view![17] The pumps are banished to the basement of Amazonia for good reason. "Direct perception" is in principle impossible, either in the exhibit hall or in the field. I have argued that the isomorphic relationship between the habitat group and the field is not between the field as it is found but the field as it is made.

Once the preparator's skill and knowledge rendered themselves transparent in the museum hall, the practitioners of the genre had exposed their work to being labeled as mere description. But the fallacy of that label is that the more realistic (i.e., vulnerable to the charge "mere description") a representation is, the more work has gone into its making. The habitat groups (and to a lesser

---

[16]Karen Wonders, *Habitat Dioramas: Illusions of Wilderness in Museums of Natural History* (Stockholm: University of Uppsala, 1993), p. 223.

[17]Bruno Latour, *We Have Never Been Modern* (Cambridge, Massachusetts: Harvard University Press, 1993), p. 37.

extent the new living rain forests) exemplify this. The exhibit-makers *were* doing science in the sense that each group required starting from scratch with an expedition to the field and developing a detailed local knowledge of that site. Furthermore, although the final uses and forms of the public and esoteric inscriptions gathered in the field were sometimes different, the fundamental skills, practices, and field experiences of the naturalists and preparators were quite similar. Like "purely technical" research, these expeditions combined empirical data available only from observation of the specific site with theoretical commitments concerning spatial composition, aesthetic drama, and how to treat variation between samples and across locales.

The theoretical questions motivating these field expeditions cannot be under-emphasized in light of the attacks on natural history as mere sightseeing and bean-counting by ecologists such as Frederick Clements and administrators like Dillon Ripley's lieutenants. For example, Alfred Bailey and Robert Niedrach chose field sites for Denver's ecological groups not merely for their scenic beauty, but to exemplify Merriam's life zones. The habitat groups such as the Sonoran Desert Group and the Golden Eagle group were representative instances of general principles, but unlike the way that "It All Depends" treated habitats as examples of a general principle, the Denver groups always maintained a commitment to explaining how the general principle was played out at a particular location.

Implications for the Public Communication of Science

Along with recovering a greater appreciation for the science of natural history as seen through habitat groups, the second ulterior motive of this study has been to provide detailed empirical evidence for questioning some of the established assumptions of the public understanding of science project. The implications for science popularization of the story of the separation of research and exhibition merit further investigation: First, the pipeline model of one-way transmission of formalized knowledge from the private to the public spheres fails to take advantage of the natural history museum's special identity as a place that simultaneously creates knowledge about and representations of nature. Second, the shift in the source of authority in popularization from the expertise of the practicing researcher to educational principles and communication media risks undermining the natural history museum's special function as a place where real objects can tell the visitor powerful stories. Finally, discussions of form and content in science communication must go beyond the idea of accuracy in order to understand the work done by specific representational genres in making specific arguments.

Defects in the Pipeline Model of Science Communication

Unlike the habitat group, which required creating new knowledge about the natural world to be built, the "conceptual" exhibits such as "It All Depends" and "Ecology" drew on received knowledge for which closure had already been accomplished. Although they purported to convey higher-order scientific principles, there was nothing of the practice of science involved in communicating them. These exhibits drew their authority from science at a distance rather than being enmeshed in the close kinship of research and representation required for habitat groups.

The multi-media components of the "conceptual" exhibits were not products of inscription devices in the way that term has been developed here. That is, exhibits such as the proposed "Biosphere" in "It All Depends" or the Quadrascope in "Ecology" are translations of existing representations of nature using the pipeline model of communication that this study has resisted. In this scheme, "translation" does not mean the same thing it does in the Latourian sense, which emphasizes that *both* sides of the laboratory/nature equation are *transformed* when inscriptions are produced and used. Latourian translation is a generative process; something new is created out of something that does not stay the same. In the pipeline model, however, translation operates under a correspondence theory of reference which maps information between two separate but already existing public and the esoteric domains. The extent to which the information must be altered to be mapped from one domain to the other is measured as distortion, and there is certainly no belief that the meaning of the source information in the esoteric sphere has been altered.[18]

Not only is the compartmentalization of knowledge production and representation not a fixed essential characteristic of how science operates, but it leads to problems when context-dependent representations are deployed outside of their original context. The efforts of "It All Depends" to convert the ecological idea of a biome into a political statement about interrelationships were not entirely successful. It is interesting to compare this after-the-fact conversion to the way in which biodiversity was simultaneously developed as a scientific and political tool. The success of biodiversity in structuring both scientific and public discourse means that the two domains are not intrinsically mutually exclusive.

One rather radical idea this suggests is that the PUS movement should remove the term Understanding from its moniker and think instead about what

---

[18]This model is discussed and critiqued in Richard Whitley, "Knowledge Producers and Knowledge Acquirers: Popularization as a Relation Between Scientific Fields and Their Publics," in *Expository Science: Forms and Functions of Popularization*, eds. Terry Shinn and Richard Whitley (Boston: D. Reidel, 1985), pp. 3-28. For a critical use of the term "pipeline model," see Thomas H. Gascoigne and Jennifer E. Metcalfe, "Public Communication of Science and Technology in Australia," in *When Science Becomes Culture: World Survey of Scientific Culture*, ed. Bernard Schiele (Boucherville, Quebec: University of Ottawa Press, 1994), pp. 395-433, on p. 426.

it might mean to advocate Public Science. This would mean recovering, or inventing where there were none, isomorphisms in time, space, practice, and practitioners between esoteric research and public representation. This would take the idea of the context-dependence of knowledge seriously instead of treating it as a simple barrier for accuracy.[19] For example, Brian Wynne details how scientists seeking to model the uptake of Chernobyl fallout by grazing sheep at first ignored the local knowledge of British hill farmers about the nature of their particular soils. The scientists assumed that the measurements obtained from different soils were universally applicable to all soils, when in fact they were not. The economically damaging restrictions on lamb from hill farms might have been avoided had the scientists included the hill farmer's own knowledge of the characteristics of their land.[20]

A turn to Public Science would also require abandoning the pipeline theories of communication that separate producers and consumers of information. A hint of the possibilities for new overlap in a contemporary context involve a reactivation of the nineteenth century pursuit of amateur science. This would broaden the category of "doing science" to include information collected by observers such as bird-watchers or amateur astronomers who are not professional scientists but who are sufficiently knowledgeable to gather basic data. An example of this is the recent effort of the U.S. Department of the Interior's National Biological Service to enlist volunteer data-takers to conduct biodiversity censuses across North America.[21]

---

[19]Brian Wynne, "Public Understanding of Science," in *Handbook of Science and Technology Studies*, pp. 361-388.

[20]Brian Wynne, "Sheepfarming After Chernobyl: A Case Study in Communicating Scientific Information," *Environment*, 1989, *31*:10-15, 33-39.

[21]These projects include the annual Breeding Bird Survey and collecting data on introduced species over the Internet (National Biological Survey, U.S. Department of Interior, "The North American Breeding Bird Survey," July 1995,

Convincing the PUS establishment to abandon the pipeline model is, however, unlikely. The pipeline model has not simply helped justify the professionalization of science writing ("you do science, I'll write about it"), but it has been a crucial tool in maintaining the authority of science. The pipeline model has built into it mechanisms of accounting for bias and accuracy in science reporting that actively protect the allegedly hard core of science from being probed or made publicly contentious.[22] Only the quality of the representation or the rate and quality of uptake by the consumer may be questioned. To go from PUS to PS involves a reconfiguration not only of science communication but of science policy. Science communication would become not so much a public relations campaign as a conversation. Amid post-Cold War downsizing and anti-environmental spending cuts, science policy might recognize that not all science must take place in a laboratory.

Do Education & Museums Mix?

The insight that physical representations of nature are just as heavily mediated and constructed as the more abstract inscriptions of nature held up as "real" science has direct bearing on the ongoing, never-ending "objects versus concepts" debate in museums in particular and "interpretation versus education" in informal science education in general. Partisans on both sides have tried to portray the struggle in either-or terms with very little middle ground. On one side, designers and advocates of "dynamic media" have seen objects as too mute, too static, and too specific (all requiring too much explanation to be useful in a fast-paced atmosphere). On the other side, curators and their allies have labeled "concepts" as more glamour than substance, glossing over the delicious details

---

http://www.im.nbs.gov/bbs/bbs.html; "Nonindigenous Aquatic Species Resources," July 1995, http://nfrcg.gov/ans/nas.htm).

[22]Stephen Hilgartner, "The Dominant View of Popularization: Conceptual Problems, Political Uses," *Social Studies of Science*, 1990, *20*:519-541.

and ultimately inauthentic because they lack physical specimens. If one side accuses the other of not seeing the forest for the trees, the other can counter quite reasonably that forests are always made up of trees.

In the general epistemological sense and specifically with regard to natural history museum exhibitions, objects always involve concepts, and concepts without concrete referents lose their meaning (for example, the term "biome" as it was used by the designers of "It All Depends"). That finding can help museums as they struggle to maintain their traditional identities and drawing power as places to go to see things in the face of pressures to conform to evolving popular culture aesthetics and interests. Natural history exhibit-makers must see objects and concepts as mutually constitutive of the representations of nature we call exhibits, not as antagonistic forces.

The concrete value of that perspective is that it helps to resolve the dilemma that museums face in choosing to emphasize "education" over "interpretation." That is, as mentioned in Chapter Six, the educational model of exhibit-making involves communicating a specific subject matter that "people" in general "need to know" in order to cope with "pressing societal issues." Nearly all the terms in that sentence are problematic. Who are people really, what is it that they need to know and why, and what makes this batch of societal issues pressing anyway? Who is defining each of these entities and to what end? It is not that an emphasis on interpretation avoids these questions entirely, but that the educationalist framework even further submerges them by diffusing authorial voice into a vague institutional construct rather than tying it to an identifiable interest group.

Whether one approves or disapproves of their goals, it is not particularly difficult to understand how or why the Smithsonian botanists wanted to promote their way of looking at the world based on their skills and experience. But if the means by which the scientists speak for nature can be unpacked, then the means by which the educationalists claim authority for agenda-setting must also be part of the analysis. In general, the museums cast their educational roles as a general public service, neutral in politics, and as the dutiful transmission of information coming out of the end of the popularization pipeline. But at bottom, the act of teaching is extremely value-laden, and the public understanding of science literature is full of indications that scientific ideology is tied closely to the transmission of "raw" information.[23] By casting themselves as explicitly educational and developing what amounts to a curriculum based on need-to-knows rather than what-to-shows, along with the issues of authorial voice and authority I raised in the discussion of "Ecology," museums risk unsuccessfully imitating rather than complementing traditional formal learning.[24]

The interpretive approach begins with the assumption that the natural history museum's historical collections, though collected under obviously different cultures of scientific and popular interest, still have something to say to the visitor when given a contemporary context. Clearly this works well with the classic charismatic specimens such as dinosaur skeletons, big game animals, or meteorites. Most people go to the Smithsonian's NMNH ostensibly to see the Hope Diamond or the world's largest mounted elephant, and end up sampling other exhibits in the process. The BM(NH)'s new dinosaur hall brilliantly uses the features of fossils to discuss how and what we know about dinosaurs as living animals. Habitat groups easily lend themselves to discussions about

---

[23]Jon D. Miller, "Reaching the Attentive and Interested Publics for Science," in *Scientists and Journalists*, eds. Sharon Dunwoody, Sharon M. Friedman and Carol Rogers (New York: Free Press, 1986); W. F. Bodmer, *The Public Understanding of Science* (London: The Royal Society, 1985); Bruce V. Lewenstein, "The Meaning of 'Public Understanding of Science' in the United States After World War II," *Public Understanding of Science*, 1992, *1*:45-68.

[24]Bruce V. Lewenstein, "Why the 'Public Understanding of Science' Field is Beginning to Listen to the Audience," *Journal of Museum Education*, 1993, *18*:3-6.

conservation and the environment. The BM(NH) is at something of a disadvantage in this regard because a large number of its taxidermy specimens are very old and cannot be exhibited any more due to damage or inaccuracies. The Connections Diorama in "Ecology" is an effort to use existing material in this way, and may have a greater impact when the viewing windows are enlarged.

Because my stand on objects might be interpreted as being ultimately neo-conservative—the analyst as crypto-curator—I want to be absolutely clear that modern museum exhibitions must indeed come to terms with modern cultural sensibilities as to what catches the attention, imagination, and intellect of a broad spectrum of museum visitors. This is the crucial insight of exhibit developers and designers. The Denver Museum of Natural History is an institution that has retained its faith in the strength of its lovely, rich habitat groups and sought creative ways to reinvent and reinterpret them. This includes revamping the groups themselves and adding interactive exhibits about wildlife to the diorama halls. These strategies have increased the amount of time spent in the galleries ten-fold.[25] Such an approach adds new educational elements to the galleries while maintaining a firm grasp on the museum's unique qualities. The new dinosaur hall at the BM(NH) also brings a contemporary look to the museum's unique physicality.

The idea of rhetoric as genre and argument structuring one another resists imposing design strategies on subject matter and provides a more explicit framework for articulating the interests involved in various design aesthetics. Considering this, hopefully, could lead to design approaches that are resonant with both the story and the objects. The educationalist approach wants to draw on the subject experts' factual authority but not their form of expressing it.

---

[25]Alan Espenlaub, DMNH Director of Planning, personal communication, August, 1994.

However, translation from one domain to another is not a matter of preserving accuracy but of identifying overlap or divergence in world-views and their constitutive skills and practices.

Another solution to handling the perceived problems with exhibiting old specimens at the Natural History Museum is to actively discuss how and why specimens are as they are and make the exhibits more process-oriented instead of more concept-oriented. This would not only be concrete, but something people might be more interested in, both on an historical and contemporary basis. Since material culture is a key part of our experience, maintaining the chance to interact with the material of the past in order to understand how we got here and where we should go is crucial.[26]

Realism & Simplification in Popular Science

In the Introduction, Gilbert and Mulkay's study of pictorial representation of biochemical processes defined the genre of realism as a set of conventions and strategies instead of an objective standard.[27] Their finding that scientific pictures designed for popular (i.e. less technically-trained) audiences are more realistic in the sense that they are more heavily elaborated as physical entities superficially seems to map directly onto habitat groups. That is, the strategy of literal physical representation in habitat groups was tied by some scientists to their popular appeal. However, there are two aspects of this portrayal of the role of realism in habitat groups that deserve closer attention. The first pertains to the

---

[26]Susan M. Pearce, *Museums, Objects, and Collections: A Cultural Study* (Washington, D.C.: Smithsonian Institution Press, 1992); Ivan Karp and Steven D. Lavine, eds., *Exhibiting Cultures: The Poetics and Politics of Museum Display* (Washington, D.C.: Smithsonian Institution Press, 1990).

[27]Nigel G. Gilbert and Michael Mulkay, *Opening Pandora's Box: A Sociological Analysis of Scientists' Discourse* (Cambridge: Cambridge University Press, 1984).

assumptions of science popularization in general, and the second relates to the role of physicality in habitat groups in particular.

The public understanding of science literature accounts for error in popular science reporting by presuming that popular accounts oversimplify and *strip away* crucial detail from rich technical accounts.[28] To recapitulate Gilbert and Mulkay's conclusions, they dispute that assumption in at least the following way: biochemists worried that the "realistic" pictures were misleading because they were speculative or made a chemical system mechanical. But instead of stripping away detail, these popular images included *more* information rather than less. In fact, they stood at the edge of the envelope of what was known about the system. This suggests that the idea of *simplification* must be more refined, since the case of the biochemistry diagrams, the simpler (more schematic) ones were considered to be more accurate (less misleading).

Creating a popular pictorial representation does not involve simply removing information, but, according to Gilbert and Mulkay, means creating the impression of understanding even when the viewer is not equipped with the expert's interpretive skills. That is, simplification involves both a shift from the conceptual to the literal and a shift of interpretive skill from the viewer to the picture. Like the process of black-boxing an instrument, where less skill of a certain sort is required to operate a black-boxed instrument because more skill has been built into it, more skill is built into a realistic representation. This contrasts to the technical diagram, which, because of its schematic, short-hand nature, requires greater interpretive skill on the viewer's part to understand.[29]

---

[28]Scientists' most frequent complaint about science reporting is that popular stories remove important detail and qualifications of the conclusions and scope of the research (Sharon Dunwoody, "A Question of Accuracy," *IEEE Transactions on Professional Communication PC-25*, December 1982, pp. 196-199).

[29]Joseph O'Connell, "Metrology: The Creation of Universality by the Circulation of Particulars," *Social Studies of Science*, 1993, *23*:129-173.

This study has highlighted the enormous amounts of skill built into the habitat group in order to render interpretation transparent for the viewer.

However, as Chapter Five suggests, the debate between the naturalists and the designers reverses Gilbert and Mulkay's scheme in the following way: The Smithsonian curators were of the opinion that the stripped-down, conceptualized version of nature the designers promoted was in error. Working in a physical system, the curators refused to let its physicality be removed. They were unwilling to do this partly because they saw the need for specific information to be retained for accuracy's sake (the usual PUS line). More importantly, they also resisted losing the physicality of the rain forest exhibit because to have done so would have removed the tacit experience of the rain forest as a field site. That sense of *place* was not constituted by "mass effect," but by the detailed reproduction of the organisms and their relationships (Chapter Three). In their opinion, simplification would not communicate the gestalt.

In Chapter Four, the exhibits chief, James Mahoney, took the other side of the argument, claiming that since the habitat group was indeed idealized, realism was too problematic to undertake. Therefore, to his mind, a conceptual exhibit would not only be less expensive, but more accurate. As a designer accustomed to dealing with information in general, formal terms, it was less apparent to him why or how the specific tacit skills of the naturalist could successfully be encoded in the exhibit hall. However, that encoding process was so successful that Wonders was led to claim that museum visitors could see nature directly through habitat groups. They are a highly complex technology of mediation, but like the pictures of cellular processes in *Scientific American*, they give the *impression* of direct contact and understanding. The background painters and accessory men themselves were happiest when the viewer's awareness of mediation disappeared.

Coda: New Imaginings of Nature in Natural History Museums

Wonders states that dioramas can be used to ask, "What lessons can they teach us about the way we perceive the world surrounding us?"[30] However, her unwillingness to consider the potentially problematic nature of some of those lessons means that she does not really answer the question. She believes that Haraway "condemned" the Akeley African Hall groups in New York because Haraway unpacked how they encode the Rooseveltian struggle to maintain and prove manhood. Rejecting Haraway's analysis, she favors highlighting the habitat group as a beautiful icon of conservation and wilderness preservation.[31] Desirable as such icons are in an era of fast-disappearing wilderness, it remains the case that the donors to the large American museums, though conservationists of their time, were members of urban elites dedicated to preserving nature for their pleasure, not mass consumption. The big game hunting overtones are clear in Figure 2.1, which shows the model for the North American Mammal Hall in the AMNH). Only recently have environmental historians and conservationists have begun to grapple with the problematic aspects of the concept of pristine wilderness.[32] It is likely that this is at least in part because the previous generation of representations, such as habitat groups, were so compelling. It has become increasingly clear that our belief in the purity of pristine wilderness as the ideal state of nature, especially in developing countries, is neither scientifically nor politically tenable.[33] New formulations of our relationship to nature must include human beings throughout the picture.

---

[30]Wonders, *Habitat Dioramas*, p. 225.

[31]*Ibid*., pp. 223-225.

[32]Robert Gottlieb, *Forcing the Spring: The Transformation of the American Environmental Movement* (Washington, D.C.: Island Press, 1994), pp. 6-8.

[33]Smithsonian researchers Robin Foster, Steven Hubbel, and Dolores Piperno have shown that large parts of Central America that we now think of as "virgin" rain forest were under intensive corn cultivation by the Mayas less than

The Latourian hybridization which characterized the living rain forests cuts two ways, and it is clear that its ambiguity is what leads to its denial in the exhibits examined here. On one hand, recognizing hybrids can help break down the dichotomy of wilderness and human-made landscape that allows small patches to be preserved and the remainder developed without concern for the ecological consequences. This approach, which American conservationists favored for most of the century, is now being questioned by a new generation of scientists and activists.[34] Seeing how humans have shaped the landscape since prehistory helps place us back into nature, not as noble savages, but as beings with tremendous power to alter the landscape. That power has yielded results that have been both aesthetically pleasing and ecologically disastrous.

However, the danger is that recognizing hybrids and blurring the boundary between natural and artificial can just as easily lead to the interpretation that because nature-out-there does not "really" exist, it does not matter what humans do to it. Anti-conservation constituencies might also rally around the idea of hybrids. It is notable that a recent traveling exhibit, "Old Growth Forests: Treasures in Transition," was created by the World Forestry Center in Portland, Oregon, which is funded primarily by the timber industry. By framing the exhibition in terms of the putative need to balance economic and conservation concerns, the exhibition's sponsors attempted to shift the discourse away from the primarily biological and ecological rhetoric of environmentalists

---

a thousand years ago (*Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution* (Washington, D.C.: 1988), p. 93).

[34]Secretary of the Interior Bruce Babbitt, keynote address at the annual meeting of the American Association of the Advancement of Science, Atlanta, Georgia, 16 February 1995.

and make room for arguments based on preserving jobs and economic vigor as defined by corporate interests.[35]

I have worked from the premise that examining the way that habitat groups have shaped our visions of nature does not reject them as corrupt. Rather, looking closely and critically at the work they do is precisely what allows us to reinvent them and their descendants when faced with changing scientific and cultural standards. For example, the materially simple addition of numbered ear tags on the Rocky Mountain Sheep in the Denver Museum's Colorado Mammal Hall, refurbished and subtitled "Edge of the Wild" in 1994 (Figure 8.1), shifts the meaning of the group away from a moment of first encounter by the viewer as big game hunter to the socially mediated encounter of the visitor following the trail of the wildlife biologist. The ear tags say, "People have interacted with these animals before. They are important enough, perhaps rare enough, to be identified and studied." This message follows from the hall's new theme, which explores the relationships between people and wildlife as development continues to remove habitat.

This strategy would be useful for the living rain forest exhibits to emulate. An exhibit on biodiversity planned for the American Museum of Natural History explicitly rejects the trope of pristine nature. A key theme of the habitat groups planned for this new hall will be human presence and disturbance.[36] Finally, it is notable that even though Evans and Meggars' hall, "South America: Continent and Culture" completely redefined the rain forest in terms of an anthropological framework, its central assumption that all human cultures shape and are shaped

---

[35]Scott Sonner, "Forest Exhibit Cuts Down Misconceptions," *The Eugene Register Guard*, 30 December 1991, pp. 1C-2C.

[36]Joel Cracraft, head of the AMNH's Center for Biodiversity and Conservation, personal communication, 21 November 1994.

Figure 8.1. Detail from Rocky Mountain Bighorn Sheep Group in the "Boettcher Colorado Hall of Mammals: Edge of the Wild" showing the Tarryall Range in the background, finished 1952, restored 1994, Denver Museum of Natural History. Inset shows ear tag added to specimen for "Edge of the Wild." SWA photo.

by the land comes much closer to putting people back into natural cycles and systems than either "It All Depends" or "Ecology."

Finally, it is quite true that natural history museums at the end of the twentieth century face a radically different audience than they did a hundred years ago. As Adolph Gottlieb stated in the opening quotation of this chapter, there is no going back. But I continue to focus on objects because the nature museums seek to portray in their exhibit halls is vastly different as well. Making the constructedness of seemingly transparent representations of nature visible could well be used to argue that human-made hyperreality is just good or better than out-there reality. This is the slippery slope of hybridization. However, the museum's unique power and paradox confronts us with real objects in a culturally-mediated space and context.

Museums, as institutions with long histories and collections that physically document our changing relationship with nature, are uniquely suited to help us look ahead by making us look back. The Tree Top Group in the Ecology Hall at the Denver Museum, built originally in 1948, features a view of the South Platte River in Colorado as the background to a heron rookery (Figure 8.2). A small label on the case today informs the viewer that the site is presently under a reservoir. These reminders are crucial if we wish to be active participants in inventing conceptions of nature and our place in it that can remind us of the effects we have had on the landscape and chose our future course as carefully as we are willing and able.

Figure 8.2. The Tree Top Group in “Explore Colorado” (formerly Mead Ecology Hall) showing South Platte River in background, finished 1948, restored 1992, Denver Museum of Natural History. SWA photo.

REFERENCES

Manuscripts

American Museum of Natural History Department of Library Services Special Collections, Artist Files.

American Museum of Natural History Department of Library Services Special Collections, Biography Files.

American Museum of Natural History Department of Library Services Special Collections, Department of Mammalogy North American Mammal Hall Memorabilia.

American Museum of Natural History Department of Library Services Special Collections, Preparation Department North American Mammal Hall Original Drawings.

American Museum of Natural History Department of Mammalogy Archives, Correspondence File.

Boston University Mugar Memorial Library Department of Special Collections, Peter Farb Collection.

British Museum (Natural History) Archives, Botanical Gallery.

British Museum (Natural History) Archives, Exhibition Gallery Series DF409.

British Museum (Natural History) Archives, Rowland Ward Memorial Pavilion.

British Museum (Natural History) Department of Exhibitions and Education, Ecology Exhibition Files.

Denver Museum of Natural History Archives, Exhibit Information Notebook.

Denver Museum of Natural History Archives, A. M. Bailey Autobiography.

National Zoological Park, Ric Hider Amazonia Project Files.

Paul Marchand personal papers, Orchard Park, New York.

Smithsonian Institution Archives Accession No. 89-022, Thomas Soderstrom Papers, *ca.* 1954-1985.

Smithsonian Institution Archives Accession No. 91-087, Office of Telecommunications, 1974-1986.

Smithsonian Institution Archives Record Unit 46, Office of the Secretary, 1925-1949.

Smithsonian Institution Archives Record Unit 155, NMNH Office of the Director, Records 1948-1970.

Smithsonian Institution Archives Record Unit 190, Director General of Museums and Director, United States National Museum, 1921-1973.

Smithsonian Institution Archives Record Unit 197, NMNH Office of the Director, 1964-1969, 1971-1972.

Smithsonian Institution Archives Record Unit 257, NMNH Office of the Director, 1973-1975.

Smithsonian Institution Archives Record Unit 272, Department of Botany, 1885-1970.

Smithsonian Institution Archives Record Unit 342, Office of the Assistant Secretary for Museum Programs, 1972-1983.

Smithsonian Institution Archives Record Unit 347, Offics of the Assistant Secretary for Museum Programs, 1968-1979.

Smithsonian Institution Archives Record Unit 363, NMNH Office of Exhibits, *ca*. 1960-1980.

Smithsonian Institution Archives Record Unit 416, NMNH Office of Public Affairs, 1958-1990.

Smithsonian Institution Archives Record Unit 503, Office of Exhibits Central, 1935, 1946-1979.

Smithsonian Institution Archives Record Unit 7331, A. Gilbert Wright Papers, 1936-1981.

Smithsonian Institution Archives Record Unit 7356, Richard Sumner Cowan Papers, *ca.* 1952-1985.

Smithsonian Institution Traveling Exhibition Service Public Relations Office.

Oral Histories

British Museum (Natural History) Archives, John Cannon Interview (conducted by SWA).

Cornell University Archives, Barbara McClintock Interviews.

Smithsonian Institution Archives Record Unit 9501, Richard Cowan Interviews.

Smithsonian Institution Archives Record Unit 9508, Senate of Scientists Project.

Smithsonian Institution Archives Record Unit 9512, Frank Taylor Interviews.

Smithsonian Institution Archives Record Unit 9513, Lucille Quarry Mann Interview.

Smithsonian Institution Archives Record Unit 9516, Watson Perrygo Interviews.

Smithsonian Institution Archives Record Unit 9523, A. Gilbert Wright Interview.

Smithsonian Institution Archives Record Unit 9553, Conservation of Endangered Species Interviews.

Smithsonian Institution Archives Record Unit 9565, Tropical Rain Forest Exhibits (conducted by SWA).

Smithsonian Institution Archives Record Unit 9568, Theodore Reed Interviews.

Unprocessed Interviews & Personal Communications

Robert Bloomfield, exhibition developer, British Museum (Natural History).

Giles Clarke, head, Department of Exhibtions and Education, British Museum (Natural History).

Joel Cracraft, director, Center for Biodiversity and Conservation, American Museum of Natural History.

John Durant, deputy director, The Science Museum, London.

Alan Espenlaub, planning director, Denver Museum of Natural History.

Pamela Henson, director, Institutional History Division, Smithsonian Institution Archives.

Ric Hider, horticulturalist, Amazonia, National Zoological Park.

Jaren Horsley, curator, Amazonia, National Zoological Park.

Lee Kemp, librarian, Rochester Science Center and Museum; Rochester, New York.

David Lellinger, curator of ferns, National Museum of Natural History.

Mark Magidson, ex-designer, British Museum (Natural History).

Ian Ritchie, architect, Ian Ritchie Associates, London.

Wayne Robbins, exhibit preparator, Buffalo Museum of Science; Buffalo, New York.

Alan Ward, ex-designer, British Museum (Natural History).

Richard Wise, project manager, The Larson Company, Tucson, Arizona.

Images

American Museum of Natural History Department of Library Services.

Botanical Museum of Harvard University.

British Museum (Natural History).

Bronx Zoo/Wildlife Conservation Park Photographic Library .

Buffalo Museum of Science; Buffalo, New York.

Denver Museum of Natural History Photo Archives.

Missouri Botanical Garden Public Relations Office.

National Museum of Natural History Department of Botany, Thomas R. Soderstrom collection.

National Zoological Park Photo Archives.

Reginald J. Sayre personal collection, Silver Spring, Maryland.

Smithsonian Institution Archives Accession No. 93-085, Office of Telecommunications, Motion Picture Films, *ca*. 1965-1977.

Smithsonian Institution Archives Record Unit 155, NMNH Office of the Director, 1948-1970.

Smithsonian Institution Archives Record Unit 363, NMNH Office of Exhibits, *ca*. 1960-1980.

Smithsonian Institution Office of Printing and Photographic Services.

Smithsonian Institution Traveling Exhibition Service Public Relations Office.

Steven W. Allison personal collection.

Bibliography

"7 Million to See Kaieteur Fall: Smithsonians Blaze Trail in Interior," Georgetown British Guiana *Evening Post*, 29 March 1962, p. 12.

Achenbach, Joel, "Enola Gay Exhibit: Plane and Simple; Air and Space Museum Focuses on the Hardware, Skirts the Horror," *The Washington Post*, 28 June 1995, p. A1.

Abelson, Philip H., "Editorial: Long-Term Efforts to Clean the Environment," *Science*, 1970, *167*:1081.

Alexander, Edward, *Museums in Motion: An Introduction to the History and Functions of Museums* (Nashville, Tennessee: American Association of State and Local History, 1979).

Allen, Garland E., *Life Science in the Twentieth Century* (New York: Wiley, 1975).

Allison, Steven W., "Making Nature 'Real Again'" *Science as Culture*, 1995, *5* (1): 52-79.

_______, "Twice-Domesticated Phenomena: How a Science Center Reconstructs the Laboratory in the Exhibit Hall," paper presented at the annual meeting of the Society for the Social Studies of Science, Purdue University, October 19-21, 1993.

Alloway, Lawrence, "Rauschenberg's Development," in *Robert Rauschenberg*, eds. Clark, Carroll S. and Kathleen A. Preciado (Washington, D.C.: National Collection of Fine Arts, Smithsonian Institution, 1976), pp. 3-22.

Angehr, George R., *Parting the Green Curtain: The Evolution of Tropical Biology in Panama* (STRI, Panama: Smithsonian Institution, 1989).

Angier, Natalie, "Redefining Diversity: Biologists Urge Look Beyond Rain Forests," *New York Times*, 29 November 1994, p. C1 & p. C6.

Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1954).

Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1956).

Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1957).

Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1958).

Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1964).

Ashmore, Malcolm, Greg Myers and Jonathan Potter, "Discourse, Rhetoric, Reflexivity: Seven Days in the Library," in *Handbook of Science and Technology Studies*, eds. Jasanoff, Sheila, *et al*. (Thousand Oaks, California: Sage Publications, 1995), pp. 321-324.

Babbitt, Bruce, "Remarks of Interior Secretary Bruce Babbitt Before the 161st Annual Meeting of the AAAS," keynote address presented at the American Association of the Advancement of Science, Atlanta, Georgia, 16 February 1995.

Bailey, Alfred M. and Robert J. Niedrach, "Filming the Golden Eagle," *American Forests*, 1939, *45*:446-449, 476-477.

______, *Birds of Colorado*, vol. 1 (Denver: Denver Museum of Natural History, 1965).

Bal, Mieke, "Telling, Showing, Showing Off," *Critical Inquiry*, 1992, *18*:556-594.

Bangs, Richard, "Smells Like Rain," *Endless Vacation*, March/April 1995, p. 13.

Barnes, Barry and David Edge, eds., *Science in Context: Readings in the Sociology of Science* (Cambridge, Massachusetts: MIT Press, 1982).

Bates, Marston, *The Nature of Natural History* (Princeton: Princeton University Press, 1950).

Bazerman, Charles, *Shaping Written Knowledge: The Genre and Activity of the Experimental Article in Science* (Madison: University of Wisconsin Press, 1988).

Best, Gerald, ed., *Records of Big Game* (London: Rowland Ward, 1962).

Bierman, John, *Dark Safari: The Life Behind the Legend of Henry Morton Stanley* (New York: Knopf, 1990).

Biodôme de Montréal: Tribute to our Living Planet, Ville de Montréal, 1993.

Bloor, David, *Knowledge and Social Imagery* (Chicago: University of Chicago Press, 1991).

Blum, Ann Shelby, *Picturing Nature: American Nineteenth-Century Zoological Illustration* (Princeton: Princeton University Press, 1993).

Bodmer, W. F., *The Public Understanding of Science* (London: The Royal Society, 1985).

Bourque, Pierre, "A 21st Century Garden," *Quatre Temps (The Friends of the Montréal Botanical Garden)*, Summer 1992, pp. 25-29.

Bowden, Jennifer, "Warming to the Planet," *Environmental Interpretation*, August 1991, p. 29.

Bowman, James S. and Kathryn Hanaford, "Mass Media and the Environment Since Earth Day," *Journalism Quarterly*, 1977, *54*: 160-165.

Brockway, Lucile H., *Science and Colonial Expansion: The Role of the British Royal Botanic Gardens* (New York: Academic Press, 1979).

Bruce, Robert V., *The Launching of Modern American Science*, (Ithaca: Cornell University Press, 1987).

Bry, Charlene, *A World of Plants: The Missouri Botanical Garden* (New York: Harry N. Abrams, 1989).

Bud, Robert, "The Myth and the Machine: Seeing Science Through Museum Eyes," in *Picturing Power: Visual Depiction and Social Relations*, eds. Fyfe, Gordon and John Law (New York and London: Routledge, 1988), pp. 134-159.

Burnham, John, *How Superstition Won and Science Lost: Popularization of Science and Health in America* (New Brunswick, New Jersey: Rutgers University Press, 1987).

Burnham, Sophy, *The Art Crowd* (New York: David McKay Co., 1973).

Cannon, J. F. M., "Some Problems in Botanical Exhibition Work: The New Botanical Gallery at the Natural History Museum," *Museums Journal*, 1962, *62*:167-173.

_______, "The British Museum (Natural History) New Botanical Exhibition Gallery," *Nature*, 1962, *196*:411-413.

_______, "The New Botanical Exhibition Gallery at the British Museum (Natural History)," *Curator*, 1962, *5*:26-35.

_______, "The New Botanical Exhibition Gallery at the British Museum," *Taxon*, 1962, *11*:248-252.

Carr, Archie, III, "Diversity," *Conservation Biology*, 1987, *1*:86.

Carson, Rachel, *Silent Spring* (New York: Houghton Mifflin, 1962).

Cherfas, Jeremy, "B-word or Buzz Word?" *New Scientist*, 6 August 1994, p. 40.

"Climatron Reopens," *Missouri Botanical Garden Bulletin*, 1990, *78*:3-7.

Coles, Alec, "Through the Looking Glass: Alec Coles reviews the Natural History Museum's new Ecology gallery and Giles Clarke explains how the gallery evolved," *Museums Journal*, 1991, *91*:20-21.

Collins, H. M. and T. J. Pinch, *Frames of Meaning: The Social Construction of Extraordinary Science* (Boston: Routledge and Kegan Paul, 1982).

Collins, H. M., “An Empirical Relativist Programme in the Sociology of Scientific Knowledge,” in *Science Observed: Perspectives on the Social Study of Science*, eds. Knorr-Cetina, Karin D. and Michael Mulkay (London, Beverly Hills: Sage, 1983), pp. 85-114.

_______, “Certainty and the Public Understanding of Science: Science on Television,” *Social Studies of Science*, 1987, *17*:689-713.

_______, “Stages in the Empirical Programme of Relativism,” *Social Studies of Science*, 1981, *11*:3-10.

_______, “The Role of the Core-Set in Modern Science: Social Contingency With Methodological Propriety,” *History of Science*, 1981, *19*:6-19.

_______, *Changing Order: Replication and Induction in Scientific Practice* (London: Sage, 1985).

Colorado Museum of Natural History Annual Report (Denver: 1913).

Colorado Museum of Natural History Annual Report (Denver: 1914).

Colorado Museum of Natural History Annual Report (Denver: 1936).

Colorado Museum of Natural History Annual Report (Denver: 1938).

Colorado Museum of Natural History Annual Report (Denver: 1942).

Conrad, Joseph, *Heart of Darkness* (Edinborough: Blackwood, 1899).

Conway, William G., “A Door to the Out-of-Doors,” *Animal Kingdom*, February 1967, pp. 2-11.

Cooper, Bill E., “Ecosystems and Landscapes: Describing and Valuing Whole Ecosystems,” paper presented at the American Association for the Advancement of Science, Atlanta, Georgia, February 18, 1995.

Cowan, Richard S., “Statement by Richard S. Cowan,” *Smithsonian Institution General Hearings before the Subcommittee on Library and Memorials of the Committee on House Administration, House of Representatives, Ninety-first Congress, Second Session* (Washington: U.S. Government Printing Office, 1971), pp. 835-843.

Craig, Tracey Linton, “Changing the Way People Think,” *Museum News*, 1988, *45*:52-54.

Crane, Valerie, "Understanding the Dynamics of Informal Learning," in *Informal Science Learning: What the Research Says About Television, Science Museums, and Community-Based Projects*, ed. Crane, Valerie (Dedham, Massachusetts: Research Communications Ltd., 1994), pp. 177-191.

Crew, Spencer R. and James E. Sims, "Locating Authenticity: Fragments of a Dialog," in *Exhibiting Cultures: The Poetics and Politics of Museum Display*, eds. Karp, Ivan and Steven D. Lavine (Washington, D.C.: Smithsonian Institution Press, 1990), pp. 159-175.

Cummings, Carlos E., "Flowers Reproduced in Wax: Synthetic Nature Then and Now," *Hobbies*, 1941, *21*:68-73.

Davies, Colin, "Green Gimmicks," *Architects Journal*, 10 April 1991, pp. 64- 65.

Davies, Gareth Huw, "Natural Selection: How the Dinosaur Is Surviving in SW7," *London, The Sunday Times Magazine*, 17 February 1991, pp. 12-15.

"Dawn for the Age of Ecology," *Newsweek*, 26 January 1970, pp. 35-36.

Denslow, Julie Sloan and Christine Padoch, eds., *People of the Tropical Rain Forest* (Berkeley: University of California Press, 1988).

Denver Museum of Natural History Annual Report (Denver: 1950).

Denver Museum of Natural History Annual Report (Denver: 1969).

Denver Museum of Natural History Annual Report (Denver: 1970).

Denver Museum of Natural History Annual Report (Denver: 1974).

Dornan, Christopher, "Science and Scientism in the Media," *Science as Culture*, 1989, no. 7: 101-121.

Doyle, Arthur Conan, *The Lost World: Being an Account of the Recent Amazing Adventures of Professor George Summerlee and Mr. E. D. Malone of the Daily Gazette* (London and New York: Hodder and Stoughton, 1912).

Dufresne, Jacques, "The Meaning of the Biodôme," *Quatre Temps (The Friends of the Montréal Botanical Garden)*, Summer 1992, pp. 8-12.

Dunwoody, Sharon, "A Question of Accuracy," *IEEE Transactions on Professional Communication PC-25*, December 1982, pp. 196-199.

Eco, Umberto, *Travels in Hyperreality: Essays* (New York: Harcourt Brace Jovanovich, 1986).

Ehrhardt, George R., "The Creation of Popular Science Writing, 1915-1945," paper presented at the Annual Meeting of the History of Science Society, New Orleans, October 12-16, 1994.

"The Environment: A National Mission of the Seventies," *Fortune*, special issue, February 1970.

Ewing, Heather P., "An Architectural History of the National Zoological Park" (Senior Essay, Yale University, 1990).

Fahnestock, Jeanne, "Arguing in Different Forums: The Bering Strait Crossover Controversy," *Science, Technology, and Human Values*, 1989, *14*:26-42.

Falcon, Johanne, "All Systems Go!," *Quatre Temps (The Friends of the Montréal Botanical Garden)*, Summer 1992, p. 52.

Farb, Peter, *Ecology* (New York: Time, 1963).

____, *Ecology* (New York: Time, 1970).

____, *The Face of North America: The Natural History of a Continent* (New York: Harper and Row, 1963).

____, *The Insects* (New York: Time, 1962).

"From Bison to Biopark: 100 Years of the National Zoo," *Zoogoer*, May-June 1989.

Gascoigne, Thomas H. and Jennifer E. Metcalfe, "Public Communication of Science and Technology in Australia," in *When Science Becomes Culture: World Survey of Scientific Culture*, ed. Schiele, Bernard (Boucherville, Quebec: University of Ottawa Press, 1994), pp. 395-433.

Gieryn, Thomas F., "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists," *American Sociological Review*, 1983, *48*:781-795.

Gilbert, Nigel G. and Michael Mulkay, *Opening Pandora's Box: A Sociological Analysis of Scientists' Discourse* (Cambridge: Cambridge University Press, 1984).

Goodwin, Joe and Judy Harkison, eds., *The Smithsonian Experience: Science-History-The Arts. . .The Treasures of the Nation* (New York: W. W. Norton, 1977).

Gottlieb, Adolph, letter published in the *New York Times*, 13 June 1943, p. X9.

_______, statement in *The Tiger's Eye*, December 1947, p. 43.

Gottlieb, Robert, *Forcing the Spring: The Transformation of the American Environmental Movement* (Washington, D.C.: Island Press, 1994).

Gould, Stephen Jay, "Triumph of a Naturalist," *New York Review of Books*, 29 March 1984, pp. 3-6.

Gross, Paul R., and Norman Levitt, *Higher Superstition: the Academic Left and Its Quarrels with Science* (Baltimore: Johns Hopkins University Press, 1994).

Guide to the Smithsonian Archives (Washington, D.C.: Smithsonian Institution Press, 1983).

Hagen, Joel B., "Ecologists and Taxonomists: Divergent Traditions in Twentieth-Century Plant Geography," *Journal of the History of Biology*, 1986, *19*:197-214.

______, *An Entangled Bank* (New Brunswick, New Jersey: Rutgers University Press, 1992).

______, "Experimentalists and Naturalists in Twentieth-Century Botany: Experimental Taxonomy 1920-1950," *Journal of the History of Biology*, 1984, *17*:249-270.

______, "Problems in the Institutionalization of Tropical Biology: The Case of the Barro Colorado Island Biological Laboratory," *History and Philosophy of the Life Sciences*, 1990, *12*:225-247.

Haglund, Kris, "Denver Museum of Natural History: The First Ninety Years," (Denver: DMNH, 1990).

Hamilton, James, "Pay and Display," *The Spectator*, 1 May 1991, pp. 43-44.

Haraway, Donna, "Teddy Bear Patriarchy: Taxidermy in the Garden of Eden, New York City, 1908-36," in *Primate Visions: Gender, Race, and Nature in the World of Modern Science* (New York: Routledge, Chapman, and Hall, 1989), pp. 26-58.

Harney, Tom, "Ceylon Lures Soderstrom From Green Grass of Home," *Smithsonian Torch*, September-October 1969, p. 3.

Hays, Samuel P., *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985* (New York: Cambridge University Press, 1987).

Henriques, Julian, "The Green Man," *World [BBC magazine]*, November 1990, pp. 24-32.

Hilgartner, Stephen, "The Dominant View of Popularization: Conceptual Problems, Political Uses," *Social Studies of Science*, 1990, *20*:519-541.

Hollinger, David, "Science as a Weapon in American *Kulturkampfen* Since World War II," HSS Distinguished Lecture at the annual meeting of the History of Science Society, New Orleans, October 14, 1994.

Honan, William H., "Say Goodbye to the Stuffed Elephants," *New York Times Magazine*, 14 January 1990, pp. 35-38.

Hooper-Greenhill, Eilean, *Museums and the Shaping of Knowledge* (London: Routledge, 1992).

Hughes, Thomas P., “The Evolution of Large Technological Systems,” in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, eds. Bijker, Wiebe E., Thomas P. Hughes and Trevor J. Pinch (Cambridge, Massachusetts: MIT Press, 1987), pp. 51-82.

Humboldt, Alexander von, *Personal Narrative of Travels to the Equinoctial Regions of America During the Years 1799-1804* (London: Bohn, 1852-1853).

Impey, Oliver and Arthur MacGregor, eds., *The Origins of Museums: the Cabinet of Curiosities in Sixteenth- and Seventeenth-Century Europe* (New York: Oxford University Press, 1985).

Janson-Smith, Deirdre, “On the Relation of Everything,” *New Scientist*, 1991, *129*:42.

Kappelkamm, Stefan, *Glasshouses and Wintergardens of the Nineteenth Century* (New York: Rizzoli, 1981).

Karp, Ivan and Steven D. Lavine, eds., *Exhibiting Cultures: The Poetics and Politics of Museum Display* (Washington, D.C.: Smithsonian Institution Press, 1990).

Keeney, Elizabeth B., *The Botanizers: Amateur Scientists in Nineteenth-Century America* (Chapel Hill, North Carolina: University of North Carolina Press, 1992).

Keller, Evelyn Fox, *A Feeling for the Organism: the Life and Work of Barbara McClintock* (New York: W. H. Freeman, 1983).

Kellogg, Remington, “A Century of Progress in Smithsonian Biology,” *Science*, 1946, *104*:132-141.

Knorr-Cetina, Karin D., *The Manufacture of Knowledge: An Essay on the Constructivist and Contextual Nature of Science* (New York: Pergamon Press, 1981).

Knorr-Cetina, Karin, "Laboratory Studies: The Cultural Approach to the Study of Science," in *Handbook of Science and Technology Studies*, eds. Jasanoff, Sheila, *et al*. (Thousand Oaks, California: Sage Publications, 1995), pp. 140-166.

Kohlmaier, Georg and Barna von Sartory, *Houses of Glass: A Nineteenth-Century Building Type* (Cambridge, Massachusetts: MIT Press, 1986).

Kohlstedt, Sally Gregory, “Henry A. Ward: The Merchant Naturalist and American Museum Development,” *Journal of the Society for the Bibliography of Natural History*, 1980, *9*:647-661.

Korenic, Mary S. and Allen M. Young, “The Rain Forest in Milwaukee: An Evaluation,” *Curator*, 1991, *34*:144-160.

Kriegeskorte, Werner, *Giuseppe Arcimboldo* (Cologne: Benedikt Taschen Verlag, 1988).

Krieghbaum, Hillier, *Science and the Mass Media* (New York: New York University Press, 1967).

Kuhn, Thomas, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1970 [1962]).

Landry, Johanne, "A Love Story," *Quatre Temps (The Friends of the Montréal Botanical Garden)*, Summer 1992, pp. 30-33.

"Last Chance for Mother Earth?" *Time*, 2 February 1970.

Latour, Bruno and Françoise Bastide, "Writing Science—Fact and Fiction: The Analysis of the Process of Reality Construction Through the Application of Socio-Semiotic Methods to Scientific Texts," in *Mapping the Dynamics of Science and Technology*, eds. Callon, Michel and John Law (London: Macmillan Press, 1986), pp. 51-66.

Latour, Bruno and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts*, 2nd ed. (Beverly Hills: Sage, 1986 [1979]).

Latour, Bruno, "Drawing Things Together," in *Representation in Scientific Practice*, eds. Lynch, Michael and Steve Woolgar (Cambridge, Massachusetts: MIT Press, 1990), pp. 19-68.

______, "Give Me a Laboratory and I Will Raise the World," in *Science Observed: Perspectives on the Social Study of Science*, eds. Knorr-Cetina, Karin D. and Michael Mulkay (London, Beverly Hills: Sage, 1983), pp. 141-170.

______, *Science In Action: How to Follow Scientists and Engineers Through Society* (Cambridge, Massachusetts: Harvard University Press, 1987).

______, *We Have Never Been Modern* (Cambridge, Massachusetts: Harvard University Press, 1993).

Law, John, "Technology and Heterogeneous Engineering: The Case of Portugese Expansion," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, eds. Bijker, Wiebe E., Thomas P. Hughes and Trevor J. Pinch (Cambridge, Massachusetts: MIT Press, 1987), pp. 111-134.

Lawless, Benjamin and Marilyn S. Cohen, "The Smithsonian Style," in *The Smithsonian Experience: Science-History-The Arts. . .The Treasures of the Nation*, eds. Goodwin, Joe and Judy Harkison (New York: W. W. Norton, 1977), pp. 52-59.

Lévy-Leblond, Jean-Marc, "About Misunderstandings About Misunderstandings," *Public Understanding of Science*, 1992, *1*:17-21.

Lewenstein, Bruce V., "Science and the Media," in *Handbook of Science and Technology Studies*, eds. Jasanoff, Sheila, *et al*. (Thousand Oaks, California: Sage Publications, 1995), pp. 343-360.

___________, "The Meaning of 'Public Understanding of Science' in the United States After World War II," *Public Understanding of Science*, 1992, *1*:45-68.

___________, "Why the 'Public Understanding of Science' Field is Beginning to Listen to the Audience," *Journal of Museum Education*, 1993, *18*:3-6.

Lewis, Thomas R., "A Glance Backward," *The Journal of Communication*, 1960, *10*:5-9.

Lindsay, G. Carroll, "Museums and Research in History and Technology," *Curator*, 1962, *5*:236-244.

Lutz, Catherine A. and Jane L. Collins, *Reading National Geographic* (Chicago: University of Chicago Press, 1993).

MacArthur, Robert H. and Edward O. Wilson, *The Theory of Island Biogeography* (Princeton, New Jersey: Princeton University Press, 1967).

Macdonald, Sharon and Roger Silverstone, "Rewriting the Museums' Fictions: Taxonomies, Stories and Readers," *Cultural Studies*, 1990, *4*:176-191.

Maier, Franz and Jake Page, *Zoo: The Modern Ark* (Toronto: Key Porter Books, 1990).

Martin, Judith, "Ecology Exhibit," *Washington Post*, 9 April 1974, p. B2.

______, "Tinkering with Mother Nature," *Washington Post*, 14 February 1974, pp. D1, D5.

"Masters of All Trades," *Industrial Design*, 1970, *17*:66-71.

Mayr, Ernst and William B. Provine, eds., *The Evolutionary Synthesis: Perspectives on the Unification of Biology* (Cambridge, Massachusetts: Harvard University Press, 1980).

McKelway, John, "Things to Do When the Rain Forest's Closed," *Washington Star-News*, 25 November 1974, Metro Life (section B).

McLuhan, Marshall, *Understanding Media* (New York: McGraw Hill, 1964).

McLuhan, Marshall and Quentin Fiore, *The Medium Is the Massage* (New York: Touchstone, 1989 [1967]).

McLuhan, Marshall, Harley Parker and Jaques Barzun, *Museum Communication With the Viewing Public: Exploration of the Ways, Means, and Values of Museum Communication with the Viewing Public* (New York: The Museum of the City of New York, 1967).

Meggars, Betty J., "Some Problems of Cultural Adaptation in Amazonia, with Emphasis on the Pre-European Period," in *Tropical Forest Ecosystems in Africa and South America: A Comparative Review*, eds. Meggars, Betty J., Edward S. Ayensu and W. Donald Duckworth (Washington, D.C.: Smithsonian Institution Press, 1973), pp. 311-320.

Melhuish, Clare, "Unnatural History," *Building Design*, 9 March 1990, p. 4.

Miles, R. S., "Museums and the Communication of Science," in *Communicating Science to the Public*, eds. Evered, David and Maeve O'Connor (Chichester: Wiley, 1987), pp. 114-130.

Miles, Roger S., "Too Many Cooks Boil the Wroth—Exhibits, Teams, Evaluation," keynote address presented at the Visitor Studies Conference, St. Louis, Missouri, 1992.

Miller, J. D., "Scientific literacy: a conceptual and empirical review," *Daedalus*, 1983, *112*:29-48.

Miller, Jon D., "Reaching the Attentive and Interested Publics for Science," in *Scientists and Journalists*, eds. Dunwoody, Sharon, Sharon M. Freidman, and Carol Rogers (New York: Free Press, 1986).

Miller, Leon Gordon, "The Industrial Designer: New Member of the Museum Team," *Curator*, 1963, *6*:187-190.

Minter, Sue, *The Greatest Glasshouse* (London: HMSO, 1990).

"The Museum Development Interview: Neil Chalmers," *Museum Development*, March 1991, pp. 35-40.

Myers, Greg, *Writing Biology: Texts in the Construction of Scientific Knowledge* (Madison: University of Wisconsin Press, 1990).

Nash, Roderick, *Wilderness and the American Mind* (New Haven: Yale University Press, 1973).

National Biological Survey, U.S. Department of Interior, "The North American Breeding Bird Survey," July 1995, http://www.im.nbs.gov/bbs/bbs.html.

National Biological Survey, U.S. Department of Interior, Southeastern Biological Science Center, "Nonindigenous Aquatic Species Resources," July 1995, http://nfrcg.gov/ans/nas.htm.

National Museum of Natural History, The Smithsonian Institution, *The Magnificent Foragers: Smithsonian Explorations in the Natural Sciences* (Washington, D.C.: Smithsonian Exposition Books [Norton], 1978).

Nelkin, Dorothy, *Selling Science: How the Press Covers Science and Technology* (New York: W. H. Freeman, 1987).

Neumark, Victoria, "Amusement Arcadia," *The Times Educational Supplement*, 11 March 1991.

Newman, Murray A. and Stefani I. Hewlett, "The Graham Amazon Gallery at the Vancouver Public Aquarium," *International Zoo Yearbook*, 1987, *26*:81-90.

"News and Notices: Rowland Ward Memorial Pavilion," *Museums Journal*, 1960, *60*:80-81.

"Nicky, Crowd, Welcome Giraffe Quartet to Zoo; Cage Background Too Realistic for Newcomers," *Washington Post*, 14 October 1937, p. 3.

O'Connell, Joseph, "Metrology: The Creation of Universality by the Circulation of Particulars," *Social Studies of Science*, 1993, *23*:129-173.

Odum, Eugene P., *Ecology: The Link Between the Natural and the Social Sciences*, 2nd ed. (New York: Holt, Rinehart and Winston, 1975).

Osborn, Henry Fairfield, "The American Museum and Education," in *Fifty-Sixth Annual Report of the President of the American Museum of Natural History* (The City of New York: AMNH, 1925), pp. 3-5.

Parker, Arthur C., "The Wild Flowers of Western New York: Being an Account of Our Floral Diorama," *Museum Service: Bulletin of the Rochester Museum of Arts and Sciences*, 1946, *19*:301-31.

Parr, A. E., "Museums and Museums of Natural History," *Curator*, 1962, *5*:137-144.

____, "The Functions of Museums: Research Center or Show Places," *Curator*, 1963, *6*:20-31.

____, "The Habitat Group," *Curator*, 1959, *2*:107-128.

____, *Mostly About Museums: From the Papers of A. E. Parr* (New York: The American Museum of Natural History, *ca*. 1959).

Pawley, Martin, "Victorian Dinosaur?" *The Guardian*, 5 March 1990, p. 38.

Pearce, Susan M., *Museums, Objects, and Collections: A Cultural Study* (Washington, D.C.: Smithsonian Institution Press, 1992).

Pekkanen, John, "Ecology Becomes a Mass Movement," *Life*, January 1970, pp. 22-30.

Perlman, David, "America the Beautiful?" *Look*, 4 November 1969, pp. 25-27.

Peterson, George E., "Artificial Plants," *Curator*, 1958, *1*:12-35.

Pettingill, Olin Sewall Jr., ed., *The Bird Watcher's America* (New York: McGraw Hill, 1965).

Pickering, Andrew, "From Science as Knowledge to Science as Practice," in *Science as Practice and Culture*, ed. Pickering, Andrew (Chicago: University of Chicago Press, 1992), pp. 1-26.

Pinch, Trevor and Wiebe Bijker, "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, eds. Bijker, Wiebe, Thomas Hughes and Trevor Pinch (Cambridge, Massachussets: MIT Press, 1987), pp. 17-50.

Pinch, Trevor, "The Sociology of the Scientific Community," in *Companion to the History of Modern Science*, eds. Olby, R. C., *et al*. (New York: Routledge, 1990), pp. 87-99.

Polanyi, Michael, *Personal Knowledge: Towards a Post-Critical Philosophy* (New York: Harper and Row, 1964 [1958]).

Porritt, Jonathan, "Politicizing the Planet," *Gloucester Citizen*, 25 March 1991.

Putz, Francis E. and N. Michele Holbrook, "Tropical Rain-Forest Images," in *People of the Tropical Rain Forest*, eds. Denslow, Julie Sloan and Christine Padock (Berkeley: University of California Press, 1988), pp. 37-53.

Rainger, Ronald, *An Agenda for Antiquity: Henry Fairfield Osborn and Vertebrate Paleontology at the American Museum of Natural History, 1890-1935* (Tuscaloosa, Alabama: University of Alabama Press, 1991).

"The Ravaged Environment," *Newsweek*, 26 January 1970, pp. 30-45.

Rawlins, Colin, "West Berlin," in *Great Zoos of the World: Their Origins and Significance*, ed. Zuckerman, Lord (London: George Weidenfeld and Nicolson, 1980), pp. 3-26.

Reingold, Nathan and Ida H. Reingold, eds., *Science in America: A Documentary History 1900-1939* (Chicago: Chicago University Press, 1981).

Ringle, Ken, "At Ground Zero: Two Views of History Collide Over Smithsonian A-Bomb Exhibit," *The Washington Post*, 26 September 1994, p. A1.

Ripley, S. Dillon and Helmut K. Buechner, "Ecosystem Science as a Point of Synthesis," *Daedalus*, 1967, *96*:1192-1199.

Robbins, Michael, "An Exhibit Asks the Question of the Century," *Museum News*, September 1969, pp. 11-13.

Robinson, Michael H., "Afterword: The Once and Future Zoo," in *Smithsonian's New Zoo*, ed. Page, Jake (Washington, D.C.: Smithsonian Institution Press, 1990), pp. 198-205.

_________, "Environmental Problems in the Tropics," in *Environment in Peril*, ed. Wolbarst, Anthony B. (Washington, D.C.: Smithsonian Institution Press, 1991), pp. 140-153.

Rogers, Charles W. Jr. and Stephen R. Wylie, "Use of Tropical Plants in Bird Exhibits at the Philadelphia Zoo," *International Zoo Yearbook*, 1975, *15*:252-255.

Rudwick, Martin J. S., "The Emergence of a Visual Language for Geological Science, 1760-1840," *History of Science*, 1976, *14*:149-195.

________, *Scenes From Deep Time: Early Pictoral Representations of the Prehistoric World* (Chicago: University of Chicago Press, 1992).

________, *The Great Devonian Controversy: The Shaping of Scientific Knowledge Among Gentlemanly Specialists* (Chicago: University of Chicago Press, 1985).

Rydell, Robert W., *World of Fairs: The Century-of-Progress Expositions* (Chicago: University of Chicago Press, 1993).

Scheffer, Victor B., *The Shaping of Environmentalism in America* (Seattle: University of Washington Press, 1991).

Schiele, Bernard, "Creative Interaction of Visitor and Exhibition," in *Visitor Studies: Theory, Research, and Practice*, eds. Thompson, Donald, *et al*. (Jacksonville, Alabama: Visitor Studies Association, 1993), pp. 28-56.

Schmidt, Karl P., "The Nature of the Natural History Museum," *Curator*, 1958, *1*:20-28.

Schramm, Wilbur, "The Challenge to Communication Research," in *Introduction to Mass Communication Research*, eds. Nafziger, Ralph O. and David M. White (Baton Rouge: Louisiana State University Press, 1958), pp. 3-28.

Schultes, Richard Evans and William A. Davis, *The Glass Flowers at Harvard* (Cambridge, Massachusetts: Botanical Museum of Harvard University, 1992 [1982]).

Screven, Chandler, "The Museum as a Responsive Learning Environment," *Museum News*, June 1969, pp. 7-10.

Sears, Cornelia, "Letters to the Smithsonian: Rethinking the Production and Consumption of Scientific Knowledge," paper presented at the Annual Meeting of the History of Science Society, New Orleans, October 12-16 1994.

Sellers, Charles Coleman, *Mr. Peale's Museum: Charles Willson Peale and the First Popular Museum of Natural Science and Art* (New York: W. W. Norton, 1980).

Sellers, Leonard and David W. Jones, Jr., "Environment and the Mass Media," *Journal of Environmental Education*, 1973, *5*:51-57.

Shapin, Steven and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985).

Shapin, Steven, "Why the Public Ought to Understand Science-In-the-Making," *Public Understanding of Science*, 1992, 1:27-30.

Sheets-Pyenson, Susan, *Cathedrals of Science: The Development of Colonial Natural History Museums during the Late Nineteenth Century* (Montreal: McGill-Queen's University Press, 1989).

Shetler, Stanwyn G., *Portraits of Nature: Paintings by Robert Bateman* (Washington, D.C.: Smithsonian Institution Press, 1987).

Shoenfeld, A. Clay, Robert F. Meier and Robert J. Griffin, "Constructing a Social Problem: The Press and the Environment," *Social Problems*, 1979, *27*:38-61.

Smith, Michael L., "Selling the Moon: The U.S. Manned Space Program and the Triumph of Commodity Scientism," in *The Culture of Consumption: Critical Essays in American History, 1880-1980*, eds. Fox, Richard Wightman and T. J. Jackson Lears (New York: Pantheon Books, 1983), pp. 175-209.

"Smithsonian Scuttles Exhibit; Enola Gay Plan Had 'Fundamental Flaw'," *The Washington Post*, 31 January 1995, p. A1.

Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1965).

Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1966).

Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1967).

Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1968).

Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1973).

Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1984).

Smithsonian Year: Annual Report of the Board of Regents of the Smithsonian Institution (Washington, D.C.: 1988).

Snow, C. P., *The Two Cultures and the Scientific Revolution* (New York: Cambridge University Press, 1959).

Soderstrom, Thomas R., "Preparing a Rain Forest Exhibit for Smithsonian's New Hall of Plant Life," *Plant Science Bulletin*, 1965, *11*:1-3.

Sonner, Scott, "Forest Exhibit Cuts Down Misconceptions," *The Eugene Register Guard*, 30 December 1991, pp. 1C-2C.

Soulé, Michael, "History of the Society for Conservation Biology: How and Why We Got Here," *Conservation Biology*, 1987, *1*:4-5.

_____, "What Is Conservation Biology?," *BioScience*, 1985, *35*:727-734.

Star, Susan Leigh and James R. Griesmer, "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39," *Social Studies of Science*, 1989, *19*:387-420.

Star, Susan Leigh, "Craft vs. Commodity, Mess vs. Transcendence: How the Right Tool Became the Wrong One in the Case of Taxidermy and Natural History," in *The Right Tools for the Job: At Work in Twentieth-Century Life Sciences*, eds. Clarke, Adele E. and Joan H. Fujimura (Princeton: Princeton University Press, 1992), pp. 257-286.

Stocking, George, Jr., ed., *Objects and Others: Essays on Museums and Material Culture* (Madison: University of Wisconsin Press, 1985).

Sun, Marjorie, "How Do You Measure the Lovejoy Effect?" *Science*, 1990, *247*:1174-1176.

Takacs, David, "'Biodiversity' and Its Adherents: A Look at Attitudes Towards This Concept by Scientists Working in Costa Rica," 1990, unpublished manuscript, Cornell University Department of Science and Technology Studies.

______, "'Biodiversity': An Idea As Agent for Ecological Change," paper presented at the Conference of the American Society for Environmental History, Pittsburgh, March 6, 1993.

______, "Finding Meaning in Biodiversity" (Ph.D. thesis, Cornell University, 1994).

Talbot, Serge, "The Biodôme and the RIO," *Quatre Temps (The Friends of the Montréal Botanical Garden)*, Summer 1992, p. 34.

Taylor, Peter J. and Ann S. Blum, "Ecosystems as Circuits: Diagrams and the Limits of Physical Analogies," *Biology and Philosophy*, 1991, *6*:275-294.

Taylor, Peter J., "Technocratic Optimism, H. T. Odum, and the Partial Transformation of Ecological Metaphor after World War II," *Journal of the History of Biology*, 1988, *21*:213-244.

Terborgh, John, *Diversity and the Tropical Rain Forest* (New York: Scientific American Library, 1992).

Teslow, Tracey, "Representing Race: Artistic and Scientific Realism at the Field Museum of Natural History," *Science as Culture*, in press.

Trachtman, Leon E., "The Public Understanding of Science Effort: A Critique," *Science, Technology & Human Values*, 1981, *6*:10-15.

Truettner, William H., ed., *The West As America: Reinterpreting Images of the Frontier, 1820-1920* (Washington, D.C.: Smithsonian Institution Press, 1991).

Wallace, Alfred Russel, *A Narrative of Travels on the Amazon and Rio Negro* (London: Reeve, 1853).

Washburn, Wilcomb E., "A National Museum," in *The Smithsonian Experience: Science-History-The Arts . . . The Treasures of the Nation*, eds. Goodwin, Joe and Judy Harkison (New York: W. W. Norton, 1977), pp. 20-27.

West, Robert Mac, "Rain Forest Exhibits—Educational Opportunity Knocks," *The Informal Science Review*, 1993, *1*:1-2, 4.

Whitley, Richard, "Knowledge Producers and Knowledge Acquirers: Popularization as a Relation Between Scientific Fields and Their Publics," in *Expository Science: Forms and Functions of Popularization*, eds. Shinn, Terry and Richard Whitley (Boston: D. Reidel, 1985), pp. 3-28.

Whitman, Howard, "Nature's Wonder Men," *This Week (Cleveland Plain Dealer*, 19 May 1946, p. 12 & p. 17.

Who Was Who in America, vol. 7 (Chicago: Marquis Who's Who, 1981).

Wilson, E. O., "The Biological Diversity Crisis," *BioScience*, 1985, *35*:700-706.

______, "The Current State of Biological Diversity," in *Biodiversity*, ed. Wilson, E. O. (Washington, D.C.: National Academy of Sciences, 1986), pp. 3-18.

______, "Biophilia and the Conservation Ethic," in *The Biophilia Hypothesis*, eds. Kellert, Stephen R. and E. O. Wilson (Washington, D.C.: Island Press, 1993), pp. 31-41.

______, *Naturalist* (Washington, D.C.: Island Press, 1994).

Winsor, Mary P., *Reading the Shape of Nature: Comparative Zoology at the Agassiz Museum* (Chicago: University of Chicago Press, 1991).

Wittlin, Alma S., *Museums: In Search of a Usable Future* (Cambridge, Massachusetts: MIT Press, 1970).

Wonders, Karen E., "Natural History Dioramas: A Popular Art Idiom in the Museum Context" (M. A. thesis, University of Victoria, 1985).

________, "Exhibiting Fauna—From Spectacle to Habitat Group," *Curator*, 1989, *32*:131-156.

________, "The Illusionary Art of Background Painting in Habitat Dioramas," *Curator*, 1990, *33*:90-118.

________, *Habitat Dioramas: Illusions of Wilderness in Museums of Natural History* (Stockholm: University of Uppsala, 1993).

Worster, Donald, *Nature's Economy: A History of Ecological Ideas* (Cambridge: Cambridge University Press, 1977).

Wynne, Brian, "Public Understanding of Science Research: New Horizons or Hall of Mirrors?" *Public Understanding of Science*, 1992, 1:37-43.

______, "Public Understanding of Science," in *Handbook of Science and Technology Studies*, eds. Jasanoff, Sheila, *et al*. (Thousand Oaks, California: Sage Publications, 1995), pp. 361-388.

______, "Sheepfarming After Chernobyl: A Case Study in Communicating Scientific Information," *Environment*, 1989, *31*:10-15, 33-39.

Yochelson, Ellis L., *The National Museum of Natural History: 75 Years in the Natural History Building* (Washington, D.C.: Smithsonian Institution Press, 1985).

Young, Allen M., "The Rain Forest in Milwaukee," *Curator*, 1989, *32*:229-244.

Table 8.1. Summary of analytical framework of natural history exhibit study.

Chapter	**2** **Mountain Beaver & Eagle Groups** **1940s-1950s**	**3** **Hall of Plant Life** **1960-1967**	**4** **Hall of Living Things** **1968-1970**	**5** **"It All Depends"** **1970-1975**	**6** **"Ecology"** **1987-1991**	**7** **"Amazonia"** **1987-1992**
rhetoric	realism as a genre: place-specific particularistic narrative of nature	realism as an argument: romance of the field promote status/ interest of botany	abstraction as a genre: the message is the medium compete w/evolving pop culture	abstraction as an argument: systems ecology metaphor turn science to politics	more abstraction: as a genre: preference for multi-media as an argument: environmental education	return to realism: as a genre: compete with TV as an argument: romance of field politics of conservation
interpretive flexibility: *definition*	habitat group as wilderness	rain forest as field site	rain forest as ecosystem	rain forest as icon of fragile web	rain forest as place of wonder	rain forest as icon of biodiversity wonder
social group	naturalists artists conservationists	botanists artists	writers designers	writers designers environmentalists	educators designers	conservation biologists zoos
problem	urban decadence vanishing wilderness	low status of botany	socially relevant exhibits new ecology	alienation from nature environmental degradation	green politics educational mandate	alienation from nature preserve biodiversity
tacit knowledge	gestalt of the field craft skill in distinguishing variation exhibits-as-science		black-boxing knowledge expertise in packaging supersedes observational skill exhibits-as-communication			gestalt of the field craft skill routinized
inscription	preserve physicality of field		use lab-type inscriptions to remove physicality of the field			create physicality from kit
translation	create lab conditions in the field create nature in the museum (deduction/induction cycle)		translate field through systems theory public understanding of science-type translation one-way deduction (general to particulars)			create field in lab w/systems theory