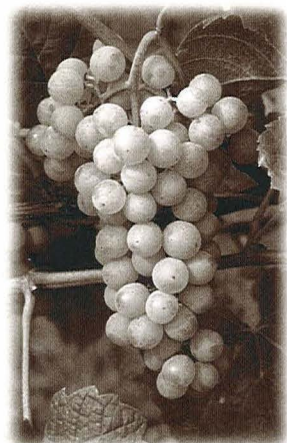

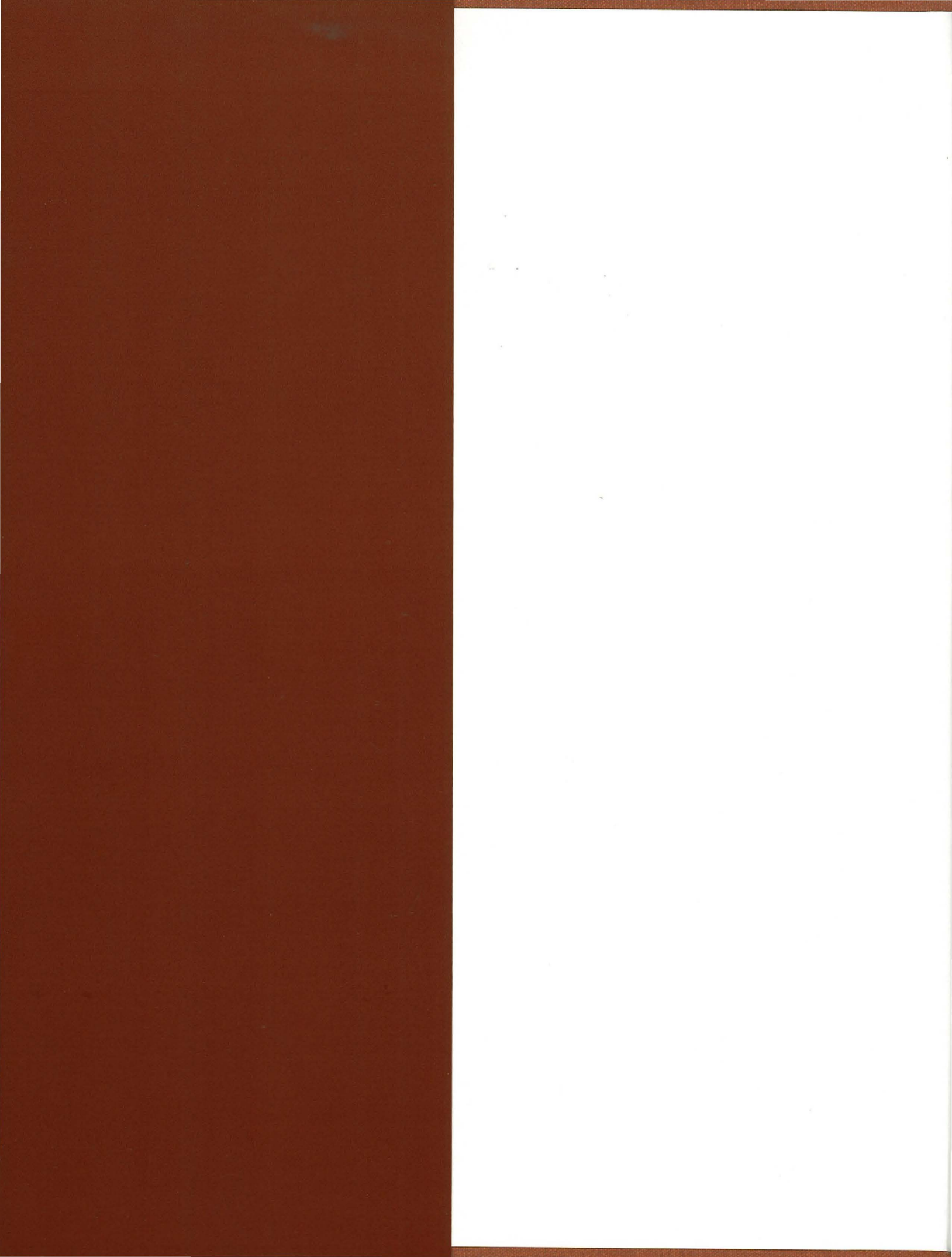


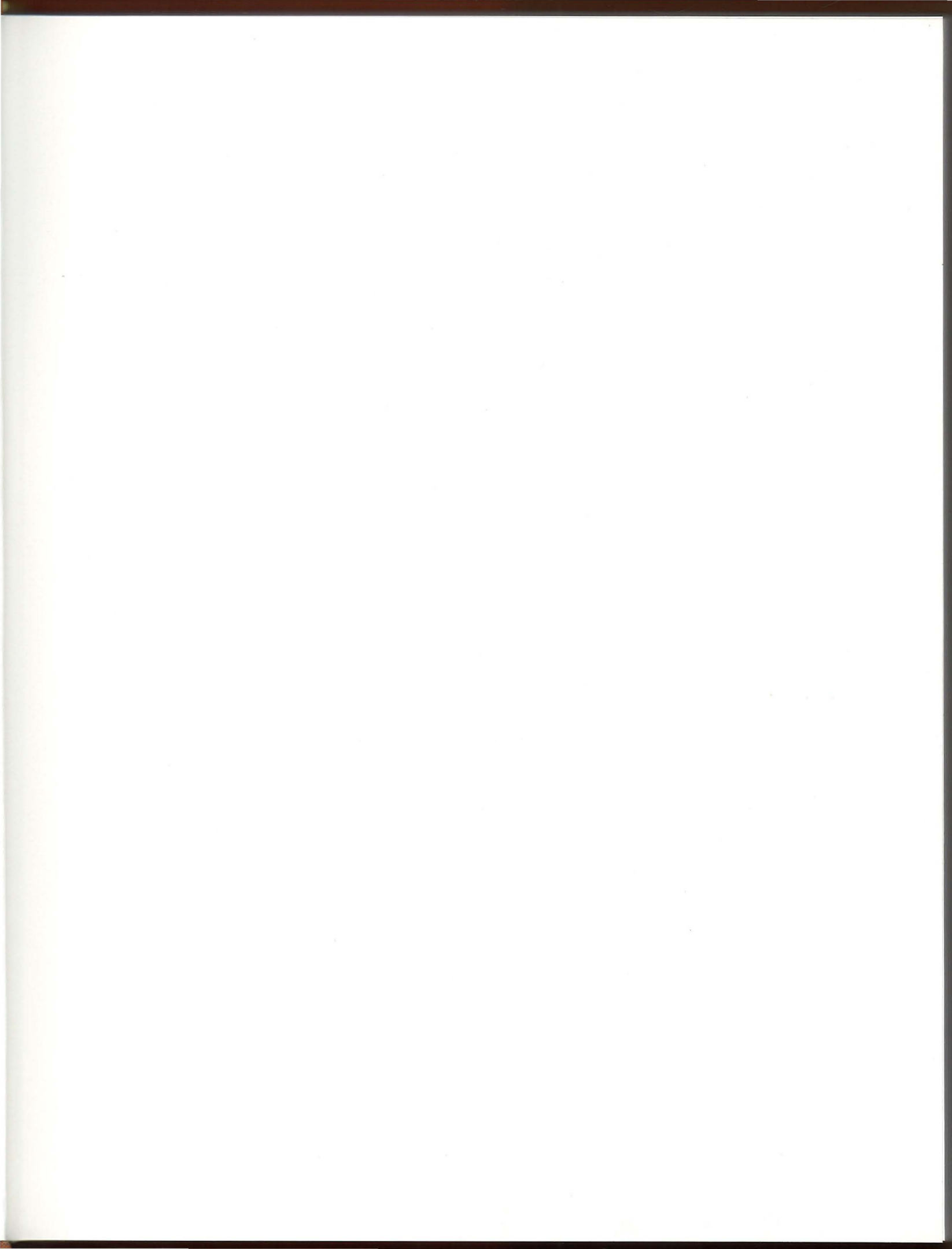
*The First 100 Years*  
*of the*  
**New York State**  
**Agricultural**  
**Experiment Station**  
*at Geneva, NY*

≈ 1882-1982 ≈



  
*Written by*  
*P.J. Chapman*  
*and E.H. Glass*







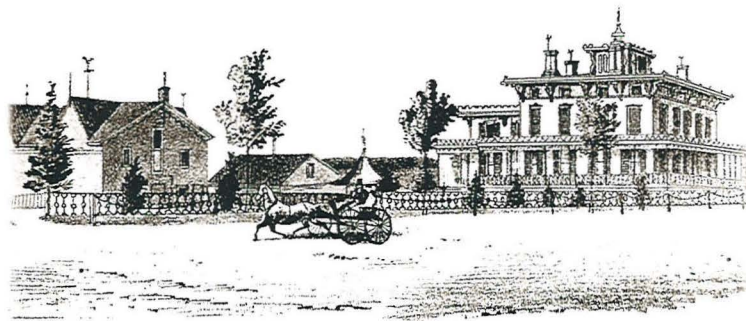
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**The First 100 Years**  
*of the*  
**New York State**  
**Agricultural Experiment Station**  
*at Geneva, NY*



*Written By P. J. Chapman and E. H. Glass*  
*Edited by R. E. Krauss*

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*New York State Agricultural Experiment Station*  
*Cornell University*  
*Geneva, NY*



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## Preface

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One of the founders of our Nation and a very wise man, Benjamin Franklin, wrote: "Agriculture will {in the future} diminish its labor and double its productivity." This story, *The First 100 Years of the New York State Agricultural Experiment Station*, provides the reader with an example of how one of the first agricultural experiment stations in the United States (and the first to conduct agricultural research) was established, evolved into a first-class research institute, and provided farmers with the information and technology to enable them to produce food and fibre with "diminished" labor and "doubled productivity."

It also provides an account of the evolution and coordination of relations between the 1882 fledgling New York State Agricultural Experiment Station at Geneva and the Cornell University's Experiment Station at Ithaca from competing and non-cooperating units to the integrated and collaborating institutions of 1982. The book also highlights some of the significant contributions of the Geneva Station staff to science, agriculture, and human health and welfare.

*P.J.C. and E.H.G.*





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 **Editor's Note**

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This history of the first 100 years of the Geneva Station was written by two of the institution's most distinguished professors—Paul J. Chapman and Edward H. Glass. Chapman was actually asked to write this history in 1980 by the Director at the time, Donald W. Barton. It was to have been ready for distribution at the time of the centennial celebration of the Station in 1982.

However, being the scientist that he was, Chapman quickly found that writing a history of the Experiment Station was quite similar to conducting a scientific experiment. The deeper he got into the subject, the more facts he uncovered, had to confirm, and then put in some kind of logical sequence for presenting to the reader. Consequently, it was impossible for the history of the first 100 years of the Station to be finished by the time of the centennial celebration.

Before his death in 1993, "Chappie," as he was known to his colleagues and friends, asked a fellow entomologist and long-time member of the Station faculty, Edward H. Glass, to help him complete the history. Glass spent the next five years, before and after Chappie's death at the age of 93, completing the book. Glass approached his assignment in much the same way as did Chapman, carefully checking every fact that appears in the final text, including the chapters that had already been written in draft form.

Readers will enjoy this history, for it contains many humorous and sometimes even poignant stories about various individuals who were part of the Station family. Such stories were possible only because Chapman was associated with the Station for more than 60 years and Glass for 50 years. They have woven many of these vignettes about various individuals into the different chapters, again carefully checking their authenticity. Also of interest to the reader will be the writing style of both authors. It is very distinctive and, in editing, has been carefully preserved because it represents the style so prevalent during the period that this history covers.

The New York State Agricultural Experiment Station is recognized as one of the premiere horticultural research institutes in the world. This history reflects both the good and bad times that have occurred over the years. We are sure the reader will enjoy learning about not only the scientific accomplishments of the Station, but about the people who made the Station what it is today. Enjoy!

*R. E. Krauss, Editor*



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## About the Authors

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*In 1992, Paul and Mrs. Chapman made a contribution to Cornell University establishing a graduate Student Fellowship in the Department of Entomology. Paul (right) is pictured here with former department head and co-author, Edward H. Glass (left), and the plaque commemorating the fellowship.*

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**Senior author Paul Chapman** was born in California in 1900. He earned his bachelor of science degree from Oregon State University in 1922 and then headed east to be an assistant in entomology and plant pathology for Cornell University in Genesee and Wyoming counties of New York State. He also enrolled in a doctorate program at Cornell and was awarded his Ph.D. degree in entomology in 1928. He left Cornell briefly to work as an entomologist at the Virginia Truck Crop Experiment Station, but returned to Cornell University's New York State Agricultural Experiment Station at Geneva in 1930. He was hired as a full professor. He was just 29 years of age and probably is still the youngest full professor ever to be hired by Cornell. He remained at Geneva for the rest of his distinguished career conducting research on fruit pests and their interaction with their hosts. He and a Station chemist developed a

new class of horticultural spray oils in the late 1930s that was effective against mites and which is still being used by the industry today. Chapman also served as chairman of the Station's department of entomology for 17 years, from 1948 until 1968. Noteworthy here is that he brought an interdisciplinary look to the Geneva entomology department by hiring a non-entomologist (biochemist) to conduct research on insect pheromones. Although he officially retired in 1968, he remained actively involved in continuing his research program, in writing, and in serving as a mentor for young members of the entomology faculty. He was commissioned to write this history of the Station in 1980. He was still working on it when he died at the age of 93 in 1993.

**Edward H. Glass** is the co-author of this outstanding monograph on the history of the first 100 years of the Geneva

Experiment Station. Like Chapman, he was also an entomologist in his professional career, working in the areas of integrated pest management, biology and control of fruit insects, insect diapause, use of sex pheromones for orchard insect monitoring and control, and later in life in the area of international crop protection. Born in 1917 in Lexington, Massachusetts, Glass was raised on a family farm. He obtained his bachelor of science degree in entomology from the University of Massachusetts, his master's degree from Virginia Polytechnic Institute, and his doctorate degree in entomology in 1943 from Ohio State University. Before joining the New York State Agricultural Experiment Station as an associate professor in 1948, he spent five years in industry working with the American Cyanamid Company, where he set up cooperative research programs with universities. At the Station, he was promoted to full professor in 1955. In addition to his outstanding research program that was recognized locally, nationally, and internationally, Glass succeeded Paul Chapman as chairman of the Station's department of entomology in 1969 and remained in that position until his retirement in 1982. Like Chapman, Glass remained extremely active following retirement, especially in the field of international pest protection programs. He was asked by Chapman to finish writing the history of the Geneva Station not too long before Chapman's death in 1993.





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## Authors Acknowledgements

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**B**ecause of Paul Chapman's death in 1993 before he could complete the work, the following is my attempt to acknowledge the appreciation of both authors for the contributions and help of the many people who have aided us in the preparation and publication of this book. We are indebted, firstly, to former Director of the Station, Donald W. Barton, for initiating the project and to the current Director, James Hunter, for his continuing support, both verbally and financially.

The following is only a partial list of who has contributed to and supported the project in different ways:

In the photography unit of Communications Services at the Geneva Station, Joe Ogrodnick and Rob Way were tremendously helpful in finding and preparing appropriate illustrations for the final manuscript. Special thanks are given to Elaine Gotham for her skill and efforts in designing and preparing the final digital copy for the printer. And, we are indebted to retired long-term directors' assistant, Mary Lou Dumbleton, for her able assistance in helping to select photographs for the publication and in proofreading the final publication. Faculty and other Station personnel have also been very generous in reviewing draft copies related to their specialties for accuracy and comments.

Very special credit and thanks are given to R. E. (Pat) Krauss, former Station Editor. He has assisted both authors in many ways during the writing and, especially, in the final editing and related activities associated with the preparation of the manuscript. It is doubtful that the project would have reached fruition without his editorial skills, enthusiasm, drive, and organizational abilities.

Finally, special credit must be given to the entire faculty and staff of the Experiment Station. Their many valuable contributions of new ideas, methods, and excellent research have made this station what it is, one of the leading horticultural research institutes in the world. They, in fact, wrote this history of a great institution.

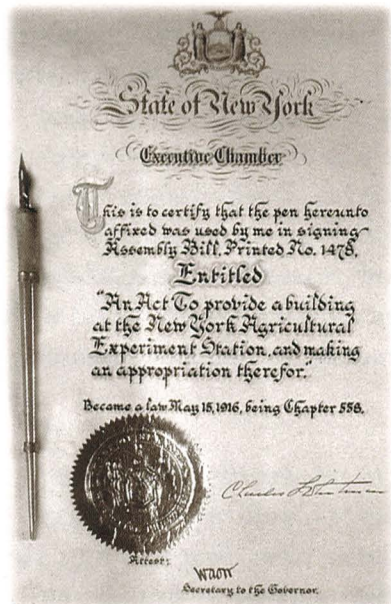
*Paul J. Chapman*  
*Edward H. Glass*  
*October 1999*







## Beginnings



*Act of Legislation authorizing the New York State Agricultural Experiment Station.*

Agricultural research institutions had their origin in Europe in the 1840s and 1850s. The first of these somewhat comparable to the American publicly-supported state agricultural experiment stations was one established in Edinburgh, Scotland, in 1843. The Rothamsted Experimental Station of Harpenden, England, was also established in 1843. Today, it is generally recognized as being the oldest Station in continuous operation in the world. It did not serve as the organizational model for the American state stations, however, for it was wholly supported by private funds over its first 69 years. Today, the research work conducted here is largely financed by annual grants from the Food Research Council.<sup>1</sup> The Edinburgh station and one founded in 1852 at Moeckern in the Province of Saxony, Germany, served as the principal models for the eventual establishment of the state stations in America.

The Edinburgh station was founded through the collaborative efforts of the directors of the Highland Agricultural Society and J. F. W. Johnston, a professor of chemistry at Durham University. Johnston was well known to Society members from the fertilizer tests he conducted and his lectures on agricultural chemistry. For some time the Society had encouraged its members to conduct experiments on their farms. By 1830 many were so engaged. Then, in 1840, the famed German chemist, Justus von Liebig, published a 387-page book entitled *Organic Chemistry and its Application to Agriculture and Physiology*. The message found here and in other publications at this time had a marked effect on Society directors. They decided future tests conducted by its members must meet “scientific” standards. It was at this juncture that Professor Johnston elected to speak out. He maintained experimentation having any lasting value to agriculture could only come from those professionally trained to conduct it. Finally, he said Scottish agriculture would be best served by establishing a research institution staffed by scientists. About two years elapsed before Society directors decided to try out his recommendations.

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To this end the "Agricultural Chemistry Association of Scotland" was formed. From membership dues paid by farmers and others, sufficient funds were raised to acquire a laboratory and a scientist to conduct the work. Not surprisingly, the scientist selected was Professor Johnston. The work done here consisted mostly of the analysis of fertilizer samples supplied by Association members. Other activities included determinations of the chemical composition of fertilizers, soils, waters, and plant products.

News of the laboratory's founding and successful operation soon reached America. It greatly interested English- and Scottish-trained Benjamin Silliman, a distinguished professor of chemistry at Yale University. It led him, in fact, to place one of his students, J. P. Norton, in Johnston's laboratory in 1844. Norton remained there 18 months. Upon his return he was appointed a professor of agricultural chemistry at Yale. Norton had reached some rather definite conclusions about what he believed was needed for agriculture in America in the fields of both research and education. He favored the establishment of agricultural colleges staffed with professors having either full-time teaching or full-time research duties.

Norton accepted every opportunity to present his ideas before farm and other audiences. The results of his efforts, in Connecticut and in the other New England states, were disappointing. He found farmers opposed to sending their sons away from home for schooling and, generally, rejected the idea that book farming, as they called it, had anything useful to offer. Turning to New York, which he hoped would be more receptive to his offerings, Norton fared little better. However, he at least found better appreciation here of his rather exceptional speaking and writing abilities. Unfortunately, Norton's brilliant career came to an abrupt end with his death in 1852 at age 30. <sup>2</sup>

The cause Norton promoted so actively, however, lived on in some of his students at Yale. Samuel W. Johnson was one of these. In 1853, he decided to go to Germany for further training, and hopefully to work in von Liebig's laboratory. Awaiting an opening there he, by chance, visited the Agricultural Experiment Station at Moeckern in the province of Saxony. He was greatly impressed by what he saw. In fact, he appears to have decided then and there to dedicate himself to the founding of a comparable institution in Connecticut. Upon returning home in 1855, Johnson acquired a staff position at Yale University. From this operational base he then launched what proved to be a long campaign before he achieved his objective. This was: the founding in Connecticut

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of an independent state-funded institution devoted exclusively to the conduct of agricultural research.

Success finally came to Johnson in Connecticut; partially, in 1875; fully so, in 1877. On the former date, the Connecticut Legislature appropriated \$2,800, for two years, to the Wesleyan University at Middletown, "to be used...to carry on appropriate work of an agricultural experiment station." After the two years had passed, the legislature decided it would be better to give the station independent status. This was done in 1877 when it became the Connecticut Agricultural Experiment Station. Quite appropriately Johnson was named its first director. The station became permanently located at its present site, New Haven, in 1882.<sup>3</sup>

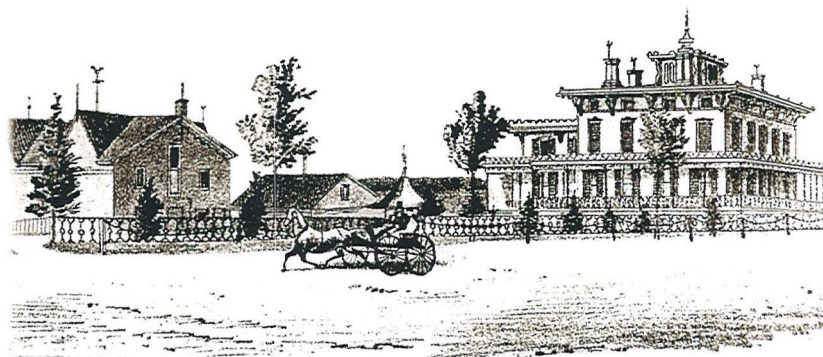
In the foregoing reports, we have seen the dominant role that chemists played in the founding of both the first European and the first American station. The professional staffs of these two institutions were limited to chemists. In fact, a good case can be made for the claim that the Experiment Station movement had its origin out of the emergence of agricultural chemistry as a sub-discipline of chemistry. Pioneers in this development were: J. F. W. Johnston of Scotland; J. B. Lewis and Joseph Gilbert of the privately funded Rothamsted Experimental Station in England; Justin von Liebig and Adolph Stockhardt (the first director of the Moeckern Station) in Germany; Benjamin Silliman of Yale University; and J. F. Norton, S. W. Johnson and Wilbur Atwater, who received their training at Yale. (While E. Lewis Sturtevant, the Geneva Station's first director, was a botanist, the next five directors, including an Acting Director, all were chemists.)

Another individual who was a pioneer in the American Experiment Station movement was E. Lewis Sturtevant. In 1867, he and his two brothers, Joseph and Thomas, purchased a farm at South Framingham, Massachusetts. It was called the Waushakum Farm. All of the brothers were interested in developing the property into a combination model dairy farm and an agricultural research center. The talents of the brothers differed. Just what Thomas did, apparently, has not been recorded. Joseph became active in the affairs of the Massachusetts State Agricultural Board, chairing some of their committees. One committee investigated the operation of the Massachusetts Agricultural College; another, the agricultural research accomplishments.

E. Lewis was interested, primarily, in conducting research. He undertook studies in two areas: the Ayrshire breed of dairy cattle; and vegetable and field crops. In 1875, E. Lewis and Joseph pub-

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*Denton Farm home and barns  
purchased for new Agricultural  
Experiment Station.*



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lished a 252-page monograph on the Ayrshires. E. Lewis became much interested in breeding maize (corn). He eventually introduced the Waushakum variety of corn which became a very popular variety in the Northeast.<sup>4</sup>

While he left most agricultural politics to his brother, E. Lewis became well known from his writings and speaking engagements. In 1878 he took over a farm journal, the *Scientific Farmer*. This provided him with a place to publish the results of his research and to express his views on a variety of agricultural subjects.

In the June 1879 issue of *Scientific Farmer*, he proposed the establishment of a national agricultural scientists' association. Actually, this idea did not originate with him. It was first proposed by his brother, Joseph, in 1873. Joseph offered his plan that year for consideration by the Massachusetts State Agricultural Board. The Board, however, took no action on his proposal, and it received little public attention thereafter.

Unlike his brother, however, E. Lewis discussed the needs of an association from the standpoint of a scientist. The plan he proposed was well received, generally, by his colleagues. One of the more enthusiastic supporters was William J. Beal, a professor of botany and horticulture at Michigan Agricultural College. He had been promoting a plan similar to Sturtevant's with a small group of prominent agricultural scientists. Beal and Sturtevant soon developed a close working relationship. They decided later to invite the scientists on Beal's list to attend an association organizational meeting at the annual meeting of the American Pomological Society.

At their meeting, the Sturtevant-Beal group established a provisional Agricultural Scientists' Association. A selected list of agricultural scientists was then sent a pamphlet setting forth the objectives of the Association. (It was similar in content to the *Scien-*

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*tific Farmer* statement Sturtevant had published earlier.) Along with the pamphlet, an invitation was extended to attend the first meeting of the new society in Boston, a day before the 1880 meeting of the American Association for the Advancement of Science. The AAAS meeting was well attended, and the new agricultural society was officially established. It became named the "Society for the Promotion of Agricultural Science." For the part he had played in the founding of the Society, Sturtevant became well known and highly respected by his peers.<sup>5</sup>

The success achieved by Samuel Johnson in founding the Connecticut Station inspired farm leaders and agricultural scientists in other states to take similar action. A bill to establish a Station in New York was introduced in the Legislature of 1877. It failed passage as did a similar one in 1878. Following these setbacks, members of the Department of Agriculture at Cornell, under the leadership of G. C. Caldwell, a professor of agricultural chemistry, decided, in February 1879, to try to establish a Cornell University Experiment Station. To achieve this end, the department asked each of eight agricultural organizations to send a representative to Ithaca to develop plans for the Station. These individuals then became a Board of Control for the new Station. Caldwell was named Director. The University, however, neither provided operational funds for the Station nor officially recognized its existence. Nevertheless, thanks to a private gift, the Station was able to publish a 133-page annual report in May of 1880.<sup>6</sup>

On June 26, 1880 the State Legislature enacted legislation: "For the purpose of promoting agriculture in its various branches by scientific investigation and experimentation, an institution is hereby established to be called and known as The New York Agricultural Experiment Station. The management of this institution shall be committed to a board of control, whose members shall be selected and appointed as follows: One member from each of the following agricultural organizations of the State: The State Agricultural Society, the State Grange, the American Institute Farmers' Club, the Central New York Farmers Club, the Western New York Farmers' Club, the Elmira Farmers' Club, and the Western New York Horticultural Society. These same organizations, plus the Ithaca Farmers' Club, were represented on the Cornell Station's Board. Two members shall be appointed by the board itself. The governor, and also the person appointed to be director of the Station, shall be ex officio members. Said board of control shall locate and have the general management of the station, and shall appoint a director. The sum of twenty thousand dollars annually is hereby appropriated."<sup>7</sup> As noted, this legislation did not

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*Guests arriving by Rochester and Eastern Rapid Railways for the 1882 Dedication Ceremonies of the Agricultural Experiment Station. The trolley tracks were located on North Street.*



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state where this new institution would be located. It was generally assumed it would be located at Cornell and would replace the recently established Cornell University Station. But, as we shall see, this was not to be.

The first meeting of the Board was held in Albany. Various proposals were made as to what kind of an institution should be developed and where it would be located. Three proposals received the most serious consideration: that the Station be made an independent institution with a farm attached; that it become the research division of Cornell University's Department of Agriculture; or that it consist of an agency located at Albany which would supervise farmer-conducted experiments over the state. The first plan won majority approval. The Board then, through a public notice, invited localities to submit bids for the location of the station in their midst. A site inspection committee was then appointed. It consisted of the following Board members: Patrick Barry (Chairman) of Rochester, James McCann of Elmira and J. S. Woodward of Lockport. The Committee received over one hundred site proposals.<sup>8</sup> Curiously, one of the later bids received came from Cornell. Why the delay occurred has been reported by Colman<sup>9</sup> as follows:

“On February 22, 1881, P. B. Crandall, a prominent member of the Ithaca Farmers' Club, wrote to (Henry W.) Sage (Chairman of Cornell's Board of Trustees) urging him to make a 'definite proposition' to the Board of Control of the state experiment station so that it would be located at Ithaca. Nearly two weeks later Crandall wrote Patrick Barry, Chairman of the Committee on Location,



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urging the selection of Cornell. Barry replied immediately: 'I am not aware that the Board of Control has received any proposition from the Trustees of Cornell University. I expected they would and I have regretted they did not'. Before Barry's reply was received, Sage had made a proposition to the Board of Control. Sage's letter however, was perfunctory. There was no mention of what Cornell had done or hoped to accomplish with its Agricultural Experiment Station. Rather, in the briefest way, he offered Cornell's facilities 'for one, at least, of the Stations you propose to establish,' provided that this can be accomplished 'without interfering with the regular duties of our Professors'. Sage was a prolific writer and successful business man who knew how to get what he wanted, so no other conclusion seems possible than that he did not want the State Agricultural Experiment Station at Cornell."

The reaction of the Board of Control to Sage's (Cornell's) non-bid was predictable. It was passed over.

About this same time the Cornell situation was being resolved, the search committee had finally narrowed the choice of a location to three, viz. Geneva, Palmyra and Spencerport. Geneva was selected as the site of the new institution.<sup>10</sup> Interestingly, the 125 acre farm at Geneva adjoined the property of Robert W. Swan, president of the Board.<sup>11</sup>

Later, in 1881, a complication arose. The State Comptroller issued a statement claiming that the Station bill of 1880 was unconstitutional on the grounds the Board of Control created by the Act was self constituted and self-perpetuating. The Attorney General filed a contrary opinion. However, it was decided that the Act should be amended to meet the comptroller's objections. The Legislature passed this amended legislation August 15, 1881. Its principal provision was the naming of eight specific individuals to the Board with the governor serving as an additional ex officio member. Thereafter Board members would serve three year terms, on a staggered basis, or so that only three new members would be selected annually. The governor would appoint these new members and fill any interim vacancies.<sup>12</sup>

Back to Sturtevant. After he had gained the respect of agricultural scientists, nationally, for the part he played in founding the Society for the Promotion of Agricultural Science, he was much in demand as a speaker. The timing and importance of two addresses he gave may well have assured him appointment to the director-

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ship of the Geneva Station. The first of these was given to the New York State Agricultural Society in September 1881; the second, in January 1882, to the Connecticut State Board of Agriculture.<sup>13</sup> Some of the points he made in his Connecticut address were: that farmer-conducted tests were of little value; that meaningful research could only be performed by trained scientists; that since the analysis of fertilizers to detect fraudulent products did not involve experimentation, such work should not form a part of an Experiment Station's program. He believed an Experiment Station should be a research institution, which had a staff of scientists representing various disciplines and often having them conducting interdisciplinary research.<sup>14</sup>

A much-interested listener at Sturtevant's Connecticut address was Samuel Johnson, director of the Connecticut Station. He is reported<sup>15</sup> to have said: "(Sturtevant) has made us ashamed that we do not have such an Experiment Station. I have always felt that we did not have a station in the true sense of the word. (Connecticut possessed only) the beginning of a station (carrying on) such work in the chemical laboratory as applies to the fertilizer trade (and making) some rather miscellaneous researches in other directions. What is needed to become a true experiment station was a diverse crew of specialists, an adjacent field, and a place in which to conduct successful pot experiments."

While in 1880 and the first half of 1881, Sturtevant probably was one of several considered for appointment to the directorship of the Station, it apparently was not until late 1881 or early 1882 that he was offered the position. Whenever it was made, he quickly accepted it and reported for duty at Geneva on March 1, 1882. Title to the Station's property, according to the Board's president, "passed to the State in February 1882."<sup>16</sup> It should be noted, however, that funds to purchase the property (\$25,000) were not appropriated by the State until March 31, 1882.<sup>17</sup> The Geneva Station, as it became commonly called, was the fourth State Station to be authorized and the sixth to become operative.<sup>18</sup>

Marcus summarized his chapter on the Form and Function of the early agricultural research efforts in the United States in the last paragraph as follows: "The New York station managed to avoid the chemistry-station nexus. It was conceived from a different idea. Although it did employ a chemist, his responsibilities did not include the regulation of the state fertilizer trade. In fact he had no extraordinary duties. The choice of the station director also indicated the subordination of chemistry. New York selected neither a professional nor commercial chemist but instead a pro-

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fessional botanist with administrative experience. He stood as America's first station director not linked to chemistry in some intimate way. Indeed, the New York Station might well claim to be the first real experiment station in the United States, as distinct from a state chemistry shop, and a model for later stations."<sup>19</sup>

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- <sup>8</sup> Jordan, W. H. Geneva Sta. Rpt. 1907, Part III, p. 54.
- <sup>9</sup> Colman, pp. 82-83.
- <sup>10</sup> Jordan, p. 54.
- <sup>11</sup> Marcus, p. 92.
- <sup>12</sup> Laws of N. Y., 1881 (Chap. 702, pp. 937-938).
- <sup>13</sup> Marcus, p. 97.
- <sup>14</sup> Marcus, pp. 98-99.
- <sup>15</sup> Marcus, p. 99.
- <sup>16</sup> Swan, R. J. Geneva Sta. Rpt. 1882, p. 3.
- <sup>17</sup> Laws of N. Y., 1882 (Chap. 257, p. 311).
- <sup>18</sup> Jordan, W. H. Geneva Sta. Rpt. 1907, Part III, p. 53.
- <sup>19</sup> Marcus, p. 86.



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## E. Lewis Sturtevant 1882-1887



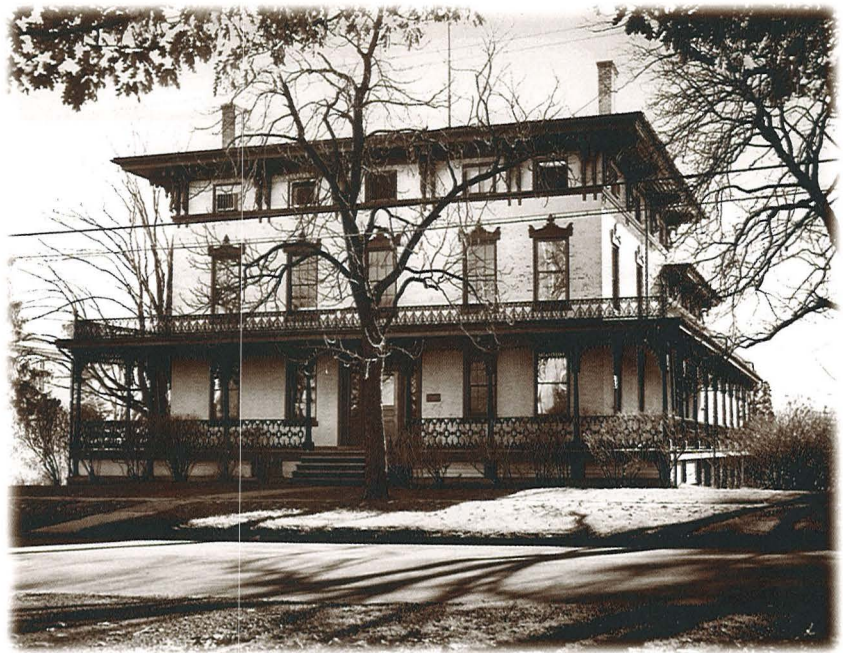
*E. Lewis Sturtevant.*

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**E** Lewis Sturtevant, M. D., of South Framingham, Massachusetts, was selected to serve as the Station's first director. He assumed office March 1, 1882. Although holder of a medical degree from Harvard, he never practiced medicine. Sturtevant was exceptionally well qualified, however, to direct the affairs of an agricultural research institution. He was a successful farmer, a scientist with an impressive record of accomplishments in the fields of both animal and plant agriculture, and he was fully informed on the records the earlier European and American experiment stations had made. His views on agricultural research and on a wide range of other agricultural subjects were well known from his writings and speaking performances. Sturtevant had spent a number of years prior to coming to Geneva engaged in research on a model farm at Framingham, Massachusetts, which he shared with two brothers. The property was called the Waushakum Farm, a name which became well known in agricultural circles in the Northeast. Sturtevant was especially interested in the Ayrshire breed of dairy cattle, and, on a worldwide basis, the botany, history, and use of edible plants.<sup>1</sup>

In 1882, Sturtevant defined the Station's mission as follows: "The field for agricultural (research) is very extensive. There is room in it for pure science; and there is also abundant room for the science that applies to practical affairs. This Station, however, was organized in the interests of the latter rather than of the former, and our duty compels us to leave to others that agreeable and fascinating work of seeking for knowledge for its own sake, so long as the equally good knowledge which relates to practical problems is pressing and is pressed upon us for acceptance."<sup>2</sup>

The Station's property in 1882 consisted of 130 acres of land and a large brick residential building,<sup>3</sup> the usual complement of farm buildings, and an orchard composed of 695 apple trees. Sturtevant's immediate concern was the modification of the residential building to provide laboratory and office space for the



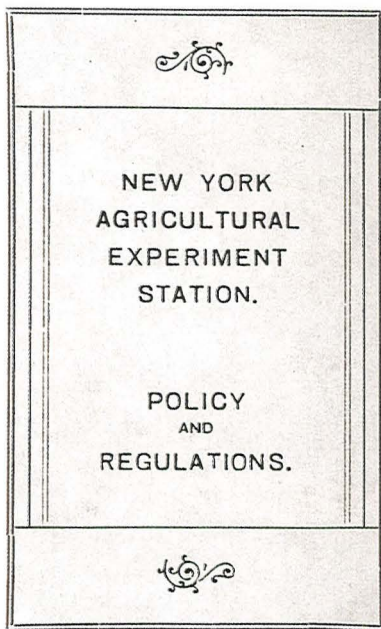
*Parrott Hall (former Denton home) which provided laboratory and office space and even living quarters initially.*

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staff, and living quarters for his family and for some of the staff. This work started March 2. The staff in 1882 consisted of: Sturtevant; his assistant, H. H. Wing, B. Agr.; E. S. Goff, horticulturist; S. M. Babcock, A.M. and Ph.D., chemist; and Robert Watson, stenographer.<sup>4</sup> An entomologist, Professor J. H. Comstock of Cornell University, was paid the sum of \$100 plus traveling expenses in 1882 “to do some entomological work for the Station.” Apparently he was expected to serve only as an advisor or consultant. The arrangement lasted only one year.<sup>5</sup>

From the Work Rules that Sturtevant published, one sees he intended to conduct a tightly controlled and orderly operation. The duties of the janitor, for example, not only required him to attend to the furnace fires and perform all janitorial work, but serve as yardman, stable boy for the Director’s horse, and act as the Station’s receptionist. The horticulturist was charged with keeping a notebook in which he would record daily developments of various crops, weather conditions, and the presence of insects and plant diseases. The notebook was to be left with the Director every night. The workday for all hands started at 6:30 AM—with an hour off for lunch—and ended at 6 PM.<sup>6</sup>

Most farmers in the 1880’s assumed the new Station would be developed into a model farm—become a place where the best agricultural practices would be demonstrated. Sturtevant rejected this idea for he knew that lands properly used for field experimentation would bear little resemblance to a model farm. In his



*Station Policy and Regulations*  
(cover).

Annual Reports, he attempted to explain the scientific principles and practices that must be followed to obtain valid field results. He probably made few converts. Nevertheless, the Station's program was developed along the lines he described in his writings. According to Sturtevant, the objectives of the Station were "to discover, verify, and disseminate." He underlined the importance of verification, saying it was not enough to discover a possible new principle. It had to be tested under varying conditions before it could be considered an established practice. He emphasized too that the Station had an obligation to make its findings available to those who would use them. A reading of Sturtevant's views today reveals how generally sound they were. He was ahead of his time.<sup>7</sup>

In many ways the Station's research program under Sturtevant resembled the one he had conducted at the Waushakum Farm. It was largely limited to studies on vegetable and field crops, and to dairy cattle.

From the first year, a long list of varieties of vegetable and field crops were field evaluated. These totaled over a thousand for each of the years 1883, 1884, and 1885. Corn was featured in these studies, but more than usual attention was also given to varieties of bean, pea, lettuce, wheat, and potato. Of special interest were the evaluations made of the seeds of these crops. This effort consisted of a determination of their purity, weight, and germination rate. (In 1912, a Seeds Research program was formally organized at the Station. But, as we see, studies in this field had their beginning here 30 years earlier.)<sup>8</sup>

Much less critical attention was given by the horticulturist to varietal studies of the tree fruits because of the time lag between their planting and fruiting. Some time was saved in the present situation for apples by top-working some of the trees in the existing Station orchard. In 1883, 90 varieties of apples were top-grafted onto some of these trees. It was not until 1888, however, that appreciable fruit was produced on these grafts. Still, almost every year, starting in 1882, some plantings were made of varieties of strawberry, bush fruits, grape, and all of the tree fruits.

The studies conducted on dairy cattle occupied the attention of both the director and chemist. The director's part of the effort was largely concerned with feeding tests. Babcock provided chemical analyses of the foods used in this program and of the milk produced. He observed an anomaly between chemical analyses of diets and responses in the animals. Many years later

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at Wisconsin, Babcock persuaded his colleagues to follow up on his early work which led to the first discovery of vitamins.<sup>9</sup> In 1885 he acquired an assistant. This enabled him to pursue an interest he had developed in determining the true nature of the components of milk, particularly of butterfat. In light of the butterfat test he finally introduced in 1890, a close reading of the findings he made in this area appearing in the Station's Annual Reports for 1885, 1886, and 1887, are of interest.

Babcock resigned in December 1887 to accept a professorship at the University of Wisconsin. In reporting his departure, Sturtevant made this prophetic observation: "His work with butterfat problems...will doubtless be...of permanent value."<sup>10</sup> And, indeed it was. For, as noted above, in 1890 Babcock introduced the famous test that bears his name for determining the butterfat content of milk and cream. Application of this test had a profound stabilizing influence on the marketing of these products from this time forward. Discoveries are often the end result of a gestation period of research and thought of variable duration. Geneva Station partisans can be forgiven in believing, in the case of Babcock's discovery, that a substantial part of such a period took place while he was at Geneva. When Dahlburg arrived at the Station in 1921, he found a Babcock butterfat tester in the attic of the chemistry building.<sup>11</sup>

Although studies were made on insect pests and plant diseases from the Station's first year, the earlier work was conducted by horticulturists. This is how Goff, the Station's first horticulturist, viewed the subject: "The work of the fruit grower and gardener is becoming more and more a warfare with insects and diseases. To discover the cause of these evils and to devise practicable remedies for them is a broad field for the Experimental Horticulturist."<sup>12</sup>

If today it seems strange that the initial staff did not include either an entomologist or plant pathologist, one should appreciate the status of applied research in these two fields at this time. Professor J. H. Comstock of Cornell University summed up the situation existing in entomology in 1888 as follows: "Although there are many entomologists engaged in research...comparatively little is done in the study of the habits of insects or in making practical applications of entomology. With the exception of a few government entomologists, the energies of the workers in the field were almost entirely devoted to the description of species."<sup>13</sup> A similar situation existed in the field of botany. And so it fell, more or less by default, to others to provide growers with means of coping

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with problems in these fields. Horticulturists placed research on the disease and insect problems of fruit trees on about the same footing as studies on pruning, pollination, fertilization, cultivation, fruit storage, and others.

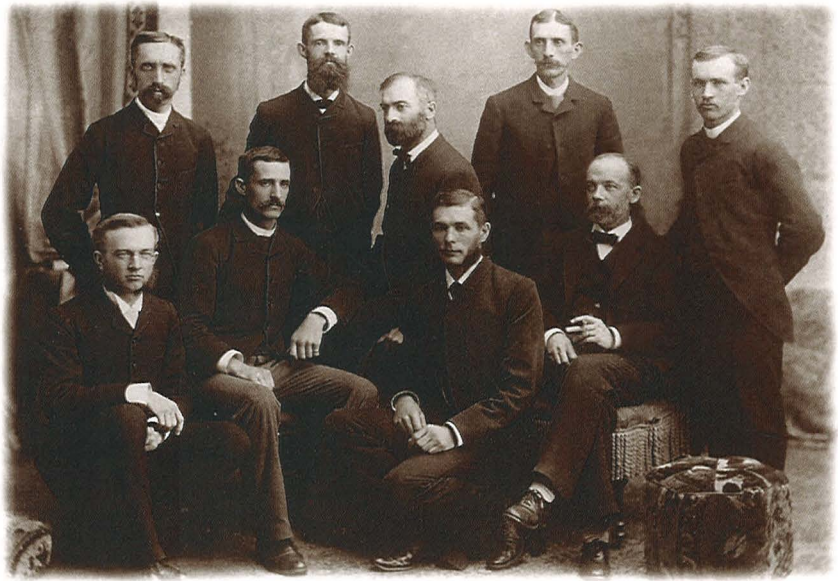
With one exception, no effective means were available in 1880 to combat insect pests and plant diseases in commercial agriculture. Losses caused by these agents were often severe, but farmers and the public apparently had become conditioned to accept them as inevitable and made do with what was spared. Moreover, unlike modern consumers, our forebearers were willing to accept moderately damaged produce. For they knew that when the tattered outer leaves of cabbage, or the rotten or wormy portions of a fruit or vegetable were removed, what was left was quite usable. The exception referred to above was when the insecticide Paris Green was pressed into emergency use to contain the Colorado potato beetle after it became established in 1872 in western New York potato fields.<sup>14</sup> Effective though it was, the product did not come into use in commercial agriculture, along with other pesticides, until about two decades later. Lack of suitable application equipment was one limiting factor here. But a more important reason was the usual slowness of early farmers to adopt any distinctly new practice.

In 1878, E. P. Haynes of Newfane, NY sprayed a portion of his apple orchard with Paris Green, "about two weeks after the blossoms fell," to prevent defoliation of the trees by cankerworms. This action was taken on the advice of J. S. Woodward, Corresponding Secretary of the New York State Agricultural Society. At harvest, Woodward found the treated trees "entirely free of codling moth (wormy) fruit", while the "trees not (treated) were badly infested." He reported these findings at the 1879 meeting of the Western New York Horticultural Society.<sup>15</sup> Many growers present did not believe him. In fact, he said later, "I was jumped upon as a crank."<sup>16</sup> However, Woodward's report has been cited by Slingerland<sup>17</sup> as being "the first published account of the successful use of poisons against the codling moth." Knowing of the foregoing experience, Goff treated some trees on the Station's grounds with Paris Green in 1882. He confirmed the Niagara County grower's findings, and also, in more elaborate tests conducted in later years.

Farmers of this period were only too familiar with the insects that damaged their crops. What caused plant diseases, however, largely remained a mystery to them. In view of the importance of these disease problems, Sturtevant decided it would be desir-



Despite the beards, fashionable then, most of these men were relatively young and were just embarking on their scientific careers. Mr. Babcock was later to achieve worldwide fame for his butterfat test which he perfected after leaving Geneva for the University of Wisconsin. Mr. Plumb became noted for his work in animal husbandry at Ohio State University. Dr. Arthur was renowned as botanist and plant pathologist at Purdue University. Dr. Ladd went from Geneva to the North Dakota Experiment Station and later to the U. S. Senate where he had a distinguished career as a “farm senator.” Mr. Beckman was to become a cranberry expert at the New Jersey Experiment Station. F. E. Newton was the last survivor of the original experiment station staff. He began work at the station in 1833 and retired in 1928, a span of 45 years. In 1957, Mr. Newton, 94, helped celebrate the Station’s 75th anniversary.



*The Station staff of 1886. Seated left to right: F. E. Newton, stenographer; C. S. Plumb, first assistant; S. M. Babcock, chemist; M. H. Beckwith, assistant horticulturist; and E. Lewis Sturtevant, director. Standing, left to right, J. C. Arthur, botanist; E. S. Goff, horticulturist; C. W. Churchill, farmer; and E. F. Ladd, chemist.*

able to acquire a scientist who could not only identify the organisms involved but could develop means of controlling them. In 1884, therefore, he employed J. C. Arthur, M. S., a botanist who, by interest and training, was qualified to meet the foregoing conditions. While Arthur and other early plant disease specialists were classified as botanists, they eventually became called plant pathologists. In fact, a Department of Plant Pathology was established at Cornell University in 1907. The dominant part of Arthur’s program, over the four years he spent at Geneva, was concerned with diseases of plants, but he also conducted some work on weeds and even on a fungus disease that had provided excellent control of the clover leaf weevil. In the first sector, he investigated the nature of one or more diseases of tree fruits, strawberry, gooseberry, potato, tomato, cucumber, lettuce, oats, and clematis. Field tests also were conducted on the control of certain diseases of the foregoing plants with fungicidal sprays. The product most used was potassium sulphide. Perhaps the most important research Arthur conducted while in Geneva was the pioneering studies he made on fire blight, a major disease of pear.

In his weed studies, Arthur used a 1/20th acre plot of land, which was plowed and harrowed in May and then left undis-

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turbed over the remainder of the growing season. A record was taken each year not only of the species of weeds present but the number of specimens of each present. Forty-two species of weeds were found present while the number of specimens of each in a given year ranged from one up to 11,790. Arthur observed that: "The statistics which are given...are presented with the hope of adding a little to the knowledge of the subject and to the elucidation of the problem."<sup>18</sup>

In 1887, Arthur resigned to accept a professorship at Purdue University where he was to have a most distinguished career. Arthur was the first plant pathologist to be appointed to the staff of an American state agricultural experiment station. The Geneva Station is proud of Director Sturtevant in this connection, not only for his early recognition of the necessity of having a plant disease scientist on an experiment station staff, but to have acted ahead of his peers to acquire one.

After the Station had been in existence five or six years, and apparently had not made any earth-shaking discoveries, it became fair game for the uninformed, and certain politicians and segments of the press who sought to use its vulnerability to further their own ends. One of the best known of these attacks appeared in the *New York Sun* in March 1887. It read, in part: "It is enough to make an earnest American despair of the future of democracy in America to see the ease with which a few men, hating to work for their own living and determined to live on the Government, succeeded in putting a law through our Legislature to set them up, with \$22,000 a year income, in the fraudulent business of conducting agricultural experiments to improve New York farming. From top to bottom, the bill, the Station, and the operatives have been a fraud on our farmers and taxpayers.... In the name of New York's insulted farmers and in the name of good government, we demand of the Legislature to abolish the Geneva Agricultural Experiment Station. It is a humbug."<sup>19</sup> Humbug or not, the Geneva Station survived, grew, and became world famous for the quality and importance of its research accomplishments. As for the *Sun*—alas, it disappeared long ago from the journalistic scene.

In the fall of 1887, Sturtevant, along with Arthur, Plumb, and Babcock, resigned. Sturtevant, never strong physically, is perceived to have sought a return to the lesser pressures of private life. It also would give him an opportunity to devote as much time as he desired to study and to writing on a variety of subjects, especially on the botany, world distribution, and economic importance of edible plants.<sup>20</sup>

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*One of the laboratories in the Botany Laboratory—1884. This was the Denton House, which was later named Parrott Hall.*



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The three staff members who resigned advanced, as noted earlier, to more prestigious and lucrative posts elsewhere. While Sturtevant's departure may have influenced their decisions to leave, at least at this time, this probably was only a secondary consideration.

If the Station reached a low point in 1887 with the departure of half its staff, the institution was in no danger of being discontinued. State agricultural leaders remained strong in its support. And Sturtevant in his final report strongly reaffirmed his belief in the value of experiment stations and the certainty of their future. Anyway, to have considered the Station's termination a possibility would have run counter to a nationwide upsurge of support for the experiment station idea. For it also was in 1887 (March 2) that the Federal Hatch Act became law. This legislation provided funds for the establishment of state operated agricultural experiment stations in all of the states.

A close reading of Sturtevant's final report reveals he was not wholly satisfied with the Station's accomplishments under his leadership. He accepted some of the blame, writing: "I have yielded to public pressure...to a certain extent, and have practiced less boldly than I have believed." On the other hand, he rightly did not accept full responsibility for the operational difficulties he had experienced. He maintained the organizational conditions occurring in the founding legislation were faulty in that they did not give the director sole management responsibilities. He held

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that the function of the Board of Control should be limited to the control of the Station's financial interests and to the appointment or displacement of a director. The director in turn should be empowered to appoint all employees and be allowed to carry out the program he had envisioned for the Station. He declared that continuity of effort could not be attained otherwise. If at any time the Board should become dissatisfied with a director's management, the remedy for this situation was to displace him and appoint another.<sup>21</sup> But too much can be read into these and similar comments he made here. With some exceptions, Sturtevant had nothing to apologize for. He had selected an excellent staff, had successfully resisted all attempts to make the Station something other than a research institution, and if the Station's research program was limited because of the small financial support it received, it was sound and well executed.<sup>22</sup>

Sturtevant, along with the Board of Control, can be faulted, however, for their failure to obtain growth funds for the Station. Thus, appropriations for its operation remained at \$20,000 annually over the six years he was director. However, no permanent harm was done. For, as we shall see, Collier, Sturtevant's successor, quickly remedied this situation.

Before leaving Sturtevant, a correction should be made of a charge that he was guilty of introducing the English sparrow into America. This accusation was made by the Station's sixth director, U. P. Hedrick, in 1933. Hedrick correctly observed that many Americans in the 19th century believed birds offered the best means of controlling insect pests in their fields and orchards. But then he wrote: "It was under this delusion that E. Lewis Sturtevant, first Director of the New York State Agricultural Experiment Station, happily some years before he became Director of that institution, introduced the English sparrow into the United States, which proved of no use whatsoever in keeping down insects, but became, as everyone knows, a pest of agriculture surpassed only by the robin, crow, and now the starling." Fortunately, the facts are at variance with this charge. O. S. Pettingill, then (1973) Director of the Laboratory of Ornithology at Cornell University, advised the writer that the English sparrow (now called house sparrow) was first introduced in the United States in 1850. He stated that "Eight pairs (of this species) were imported from England in 1850 to the Brooklyn Institute. They were released in the spring of 1851, but did not thrive. Other birds were imported in 1852...and still others...in 1853, all (being) released in the New York City area. Those released in 1853 thrived." Thus we may conclude: the house sparrow was first in-

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roduced to the United States in the New York City area in 1850, but it did not become established here (and in the United States) until 1853.<sup>23</sup> Sturtevant was 11 years old in 1853.



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## References

- <sup>1</sup> Hedrick, U. P. Geneva Sta. Rpt. 1919, Part II, Sturtevant's Notes on Edible Plants, pp. 1-11.
- <sup>2</sup> NYSAES Ann. Rpt. 1882, p. 12.
- <sup>3</sup> This building was believed to have been constructed shortly after Mr. and Mrs. Nehemiah Denton purchased this property (in Mrs. Denton's name) on September 19, 1852. Incidentally, both of the Dentons were deaf mutes. Evidence obtained in 1987, however, has revealed that extensive additions were made to an existing structure in 1853. This discovery was made by the architectural firm of Crawford and Sterns of Syracuse, NY. They had been commissioned to develop plans for remodeling the interior of the building to meet a projected new use of it. Earlier, this vacated building had been officially designated a State Historic Site and later was scheduled to become the Parrott Hall of Science.  
Crawford and Sterns provided the writer with the ground level line drawings showing what Parrott Hall consisted of before and after 1853. There is a family linkage between Parrott Hall and another dwelling built in 1853. Reference is made to the Octagon House at the corner of Castle and North Streets. Its builder, Harry G. Moore, was a brother of Mrs. Denton. The most prominent structural linkage between the two houses is the use of the same iron railings over their exteriors. Both the Octagon and Denton houses became local show places.
- <sup>4</sup> NYSAES Ann. Rpt. 1882, p. 8.
- <sup>5</sup> Comstock, A. B. 1953. *The Comstocks of Cornell*, p. 146, Cornell Univ. Press.
- <sup>6</sup> NYSAES Ann. Rpt. 1882, pp. 26-28.
- <sup>7</sup> NYSAES Ann. Rpt. 1882-1887, Introductory statements.
- <sup>8</sup> NYSAES Ann. Rpt. 1882, pp. 12-13, 82.
- <sup>9</sup> de Kruif, P. 1928. *Hunger Fighters, Finder of the Hidden Hunger*, pp. 267-297.
- <sup>10</sup> NYSAES Ann. Rpt. 1887, p. 48.
- <sup>11</sup> Dahlberg Oral History, 1962, p. 3.
- <sup>12</sup> NYSAES Ann. Rpt. 1882, p. 121.
- <sup>13</sup> Cornell Sta. Rpt. 1888, p. 19.
- <sup>14</sup> U.S. Bur. Entom. Circ. 87, p. 4, 1907.
- <sup>15</sup> Woodward, J. C. W. NY Hort. Soc. Proceed. 1879, pp. 20-21.
- <sup>16</sup> Lodeman, E. J. 1896. *The spraying of plants*, pp. 62-63.
- <sup>17</sup> Slingerland, M. V. 1898. *Cornell Exp. Sta. Bul.* 142: 50, 66.
- <sup>18</sup> NYSAES Ann. Rpt. 1887, pp. 363-371.
- <sup>19</sup> NYSAES Ann. Rpt. 1907, Part III, p. 6-7.
- <sup>20</sup> The Station published as Part 2 of its 1919 Annual Report a 686-page volume entitled "Sturtevant's Notes on Edible Plants." Expertly compiled and edited by U. P. Hedrick, it was based on a number of published contributions by Sturtevant and a 1,600-page hand-written manuscript which he left with the Station when he resigned in 1887.
- <sup>21</sup> NYSAES Ann. Rpt. 1887, pp. 36-37, 44-47; and *Ibid.*, 1907, Part III, pp. 56-57.
- <sup>22</sup> Hedrick, U. P. 1933. *A History of Agriculture in the State of New York*, p. 401.
- <sup>23</sup> In support of this statement, Pettingill cited: Barrows, W. B. 1889. *USDA, Div. of Econ. Ornithology and Mammalogy Farmers Bul.* 1, 405 pp; and Bent, A. C. 1958. *U.S. Nat. Museum Bul.* 211.

## Peter Collier 1887-1895



*Peter Collier.*

The Station's second director, Peter Collier, MD, Ph.D., was born in Madison County, NY. His father, grandfather, and great grandfather were practical farmers. He was an 1861 graduate of Yale University. In 1867, he became professor of chemistry, University of Vermont, and became secretary of the newly created Board of Agriculture and Mining in 1872 where he established the first series of Farmer Institutes ever held in the United States. President Grant appointed him one of six scientific commissioners to represent the United States at the World's Exposition in Vienna in 1873. Prior to coming to Geneva, Collier served as head of the Chemistry Division of the U.S. Department of Agriculture from 1877 until he came to Geneva as Station Director in 1887. Collier had an excellent background to succeed Director Sturtevant in that he had experience at the farm, state, national, and international levels. He had strengths where Sturtevant was weak.<sup>1</sup>

An immediate concern of Collier's was the condition of the Station's buildings and grounds. He found them to be in a sorry state. Important though the correction of this situation was, it comprised only a small part of the new plans he had for the Station. Collier had inherited a program in 1887 largely limited to studies involving fruits, vegetables, field crops, and dairy cattle. He realized that because of the Station's small staff and operational budget, a program larger than this could hardly have been undertaken. But mindful of the charge given in the founding legislation that the Station was expected to serve agriculture in "its various branches," he apparently decided to make the fulfillment of this mandate a primary objective.

Being a man of action, Collier decided to inform the State Legislature as early as possible about the new plans he had for the Station. So, on April 16, 1888 he appeared before the Senate Finance Committee in Albany. In the first sentence of a prepared

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statement he said, "there appears to exist in certain quarters, grave misconceptions as to the work of the Station in the past, the practical and scientific value of the work done, the economy of its management, and the necessity of additional aid in order that it may enlarge its sphere of usefulness." He then went on to say: "If the...statements upon which such adverse criticisms are based were true, or even approximately so, then there can be no doubt of the...duty of the Legislature to abolish the Station at Geneva, and at once." But, he said, he proposed "to show that the gravest error(s) had been made in such criticisms."

Collier prefaced the next part of his thesis by saying he was not appearing before the committee as director of the Geneva Station, a post he had only recently assumed, but as a person who had had 25 years experience in agricultural research and administration. First, he said, he had no thought of abandoning the program that had been carried out at the Geneva Station over the past six years. Rather, he intended to "supplement the work which, in my best judgment, has been wisely planned and faithfully and economically carried forward."

Collier told the Committee the Geneva Station had provided most valuable service to the producers of fruit and vegetable crops and of dairy products. But it had not been possible to provide assistance to other branches of the State's agriculture. He then bluntly posed this rhetorical question: "What, then, is the matter?" As he rightly saw it, the "matter" was that the Legislature had established the Station six years earlier but then had provided no additional funds for its growth. (He was, of course, referring to the fact that operational funds had remained at \$20,000, annually, over the six preceding years.) Institutions like this, he said, could not succeed if they could not grow. And they could not grow unless they were provided with additional funds.

Collier next reminded the committee, the law establishing the Station in 1880 was for "the purpose of promoting agriculture in its various branches." This being the case, he proposed starting to provide research assistance to those branches not previously served. Collier also advised he was proposing other new ventures that would add to the interest and value of the Station, not only to the State's farmers but to the general public as well. After citing immediate need of funds to provide for a new barn and to carry out the badly needed repair of the buildings and the upgrading of the grounds, he then listed as follows the new areas he proposed entering.



*Drawing fertilizer samples to be sent to the Station for analysis.*

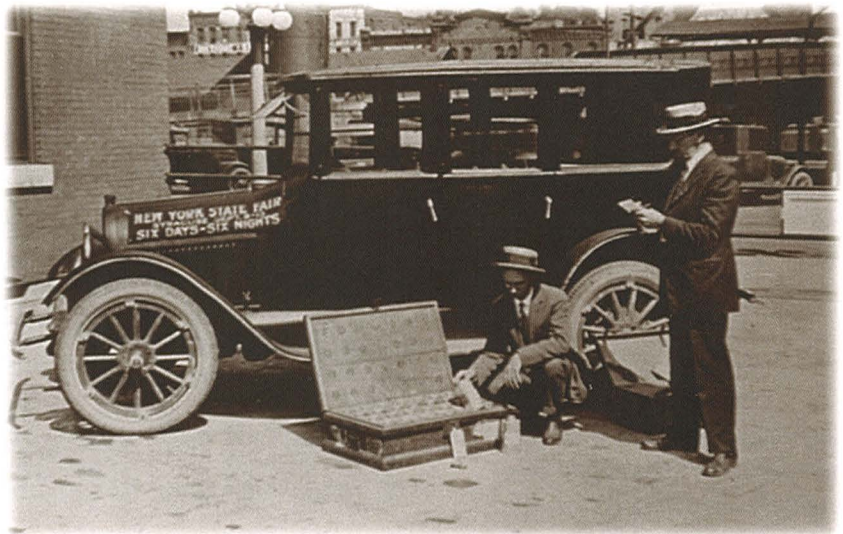
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“It is proposed to enter into an exhaustive investigation for the purpose of determining the relative value of the various breeds of cattle for the purpose of the dairy or for beef; the relative cost of production of milk, butter, cheese, and beef, and the food rations which, with greatest economy, secure the best results. It is proposed to have upon the ground of the Station a permanent exhibit of every kind of agricultural implement used upon the farm. It is proposed to have an arboretum, in which, in time, there shall be a permanent exhibit of every kind of tree and shrub which in this latitude may be successfully grown; it is proposed to have upon the grounds, for the purpose of comparison, all the new varieties of small fruits, and berries, and vegetables, in order that their relative value, under the same cultivation, may be determined; it is proposed to make a careful investigation of the many practical problems connected with one of our greatest industries—poultry.” (Later extended to include swine.)

“In regard to the above, I am able to testify that so far as I know, the farmers, the various stock-breeders, the manufacturers of agricultural implements, the nurserymen and fruit-growers, and the poultrymen are unanimous in their desire to have this work entered upon and (that many) are ready...to supply the Station with choice animals and implements, and trees and fruits, and the material necessary with which to carry on this work.”<sup>2</sup>

Later on in his statement, Collier rather casually referred to two other fields he hoped the Station could be involved in. One was the founding of a fertilizer inspection service; the other, the establishment of about 10 sub-stations over the State. The words used in the former instance were: “It is hoped that there will be pro-





*Preparing samples of fertilizer for shipment to the Station.*

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vided at the Station the means of securing protection to the farmers of the State in the purchase of fertilizer.”<sup>3</sup> He must have known, however, that a bill designed to achieve this end had been introduced in the Legislature a month before he appeared before the Finance Committee.<sup>4</sup>

The Senate Finance Committee appears to have been most favorably impressed with Collier’s presentation. And even though his requests for immediate additional funds came near the end of the legislative session, the Station was granted a special appropriation of \$8,000, available immediately.<sup>5</sup>

During 1888, the Station issued a series of five bulletins and several circulars. The latter were concerned, as Collier put it, “with setting forth the needs of the Station.” The direct mailing list for these publications was necessarily small, because funds for printing and mailing costs were very limited. But private Agricultural papers commonly reproduced some of them in full. The result was that a goodly percentage of New York farmers had an opportunity to read them. The Station received a large number of inquiries from farmers establishing their interest in the work being done here and the new fields the Station hoped to enter. Subjects of greatest interest were: the inspection of commercial fertilizers, branch stations, tests of dairy cattle, the poultry industry, and in having a permanent exhibit of tools and agricultural implements.

Following the introduction of the fertilizer inspection bill March 15, 1888, a circular letter, dated April 5, was signed by nearly every manufacturer and dealer in fertilizers doing business in New York protesting enactment of this bill. It was claimed to be “a tax

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*Chemistry Laboratory designed for analysis of fertilizers and other products used in agriculture.*



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which is unjust and a direct blow against the farming industry of this State." The latter ended by saying they hoped the bill would be "consigned to oblivion." (Interestingly not a single farmer signed this petition.) The original bill failed to pass, as did an amended one that was scheduled to go into effect February 1, 1889.<sup>6</sup> Success finally was achieved, however, May 24, 1890 when a grant of \$20,000 was received for the new program.

While Collier was occupied with the foregoing activities, he also became involved in another major development. This was the disposition of the \$15,000 that would come to New York for agricultural research purposes under provisions of the federal Hatch Act. This legislation was enacted March 1, 1887. How these new funds were to be used was delegated to the state legislatures. It was commonly assumed New York's share would go to the Cornell University Station. Some or all of the funds, however, could have been assigned to the Geneva Station. Aware of this possibility, Cornell officials, early in 1889, are said to have obtained a promise from Collier not to seek any of the money. Later that year, however, a bill was introduced in the Legislature proposing an equal division of the funds between the Geneva and Cornell stations. Collier assured Cornell the bill came as a surprise to him and did not represent an act of bad faith on his part. Later, all of the Hatch funds were assigned temporarily to Cornell. Their disposition was reopened in 1890, however, when Geneva Station supporters sought to obtain some of the funds to qualify for the use of the franking privilege. This award would enable the Station to mail out its publications free of charge.<sup>7</sup> More on this issue later.

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Most of the \$8,000 appropriation obtained in 1888 was used to construct a cattle barn. It was not necessary to reserve much of this money for the purchase of livestock and equipment since most of these items were provided, free of charge, by interested cattle breeders and equipment manufacturers.

Collier was unhappy about the run-down condition of most of the acreage comprising the Station's farm. Only a small portion of it lying between North Street and Castle Creek had been used during Sturtevant's years. In the 1888 Report, the Board of Control reported that all visiting farmers believed the property "should be made in all respects a model farm." Whether Collier shared this view is uncertain. However, he did decide to make use of all of the Station's 130 acres. He set aside 17 acres of it along Castle Creek for an arboretum; expanded the varietal planting of fruits and vegetables for "comparison" purposes, and proposed founding a farm equipment exhibit center. While a model farm probably would not emerge out of the fulfillment of the foregoing plans, something approaching a showplace would. In any event, Collier is to be credited with improving the appearance and condition of the entire Station property.

The fertilizer inspection act of 1890 included a \$20,000 appropriation. Since laboratory space was not available for the large amount of additional analytical work projected, the Board of Control decided to use much of this money, the first year, to construct a new laboratory. One of its members, Daniel Batchelor, was commissioned to visit some stations having such facilities. He reported back that the building used at the Amherst, Massachusetts Station would be a good model. Collier was then authorized to construct a comparable laboratory at Geneva. The building, with some undeveloped sections, was completed in 1891. It became the first building on the Station's grounds specifically designed for office and laboratory purposes. Until it was available, the fertilizer samples had been analyzed in a makeshift laboratory at 129 Exchange Street in downtown Geneva.<sup>8</sup> In 1892, the Legislature provided an additional appropriation of \$6,000 so that the undeveloped space in the building could be utilized. The building not only provided office and laboratory space for all of the chemists but for some non-chemical staff as well.

Studies conducted in the field of horticulture have always occupied a major part of the Station's program. As noted earlier, in the years Sturtevant was director, the horticultural program was largely concerned with studies involving vegetable and field crops. Later, it included some work on the fruits, and also on the

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control, of plant diseases and insect pests. As bearing plantings of the tree fruits became available on the Station's grounds, however, there was a gradual shift of emphasis from vegetable and field crops to the fruits. By 1896 the varietal plantings of the various fruits had reached impressive numbers. As of July 1 that year, they included 16 kinds of fruits and 2,823 varieties of them. It perhaps can be said that by 1896 research on fruit crops had become the dominant interest of the Department of Horticulture.

The studies made by horticulturists on insects and plant diseases from 1882 to about 1890 were small scale and essentially limited to field tests. Plant diseases received more attention than did insect pests in these years. In 1891, the director asked the Division of Vegetable Pathology of the U.S. Department of Agriculture for some assistance in coping with several foliar diseases of fruit nursery stocks. The Division sent their D. G. Fairchild to Geneva. He was on this assignment only two years, but was able to provide nurserymen with some quite effective means of containing their disease problems.

In 1891 (November 1), S. A. Beach began his distinguished career as head horticulturist of the Station. He exhibited an early interest in plant diseases. In his first year (1892) he carried out some relatively comprehensive field tests on the control of diseases of bean, potato, celery, and chrysanthemum. His findings are given in 54 pages of the 1892 Annual Report. In subsequent years, he conducted some important experiments on the control of plum leaf spot, cherry leaf spot, apple scab, and pear scab. It should be noted that Beach apparently elected to do this research, first, because of the demand for it, and second, because after J. C. Arthur left in 1887 the Station's staff did not include a Geneva-based plant disease specialist until 1898.

While the research undertaken by the Station in animal agriculture was limited to dairy cattle during the years Sturtevant was director, it was expanded under Collier to include beef cattle, poultry, and swine. The work on dairy cattle, milk, and cheese was a major part of the Station's program from the first year. And this position was maintained until 1943 when all dairy research became centered in the Cornell University Station.

In 1888, William P. Wheeler was added to the staff to conduct studies, primarily, on poultry and swine. He was given the title of First Assistant. Presumably this meant he was to serve as the director's principal assistant. Collectively, Wheeler devoted more time to studies on poultry and swine than on other assignments

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from 1888 through 1892. But other duties given him thereafter appreciably reduced the work done in these fields. Thus as he observed in 1893: "Considerable time has been spent attending to...incidental and routine work connected with the general Station management. During the first few months of this year (for example) a great deal of time was given to the preparation...of exhibits intended for the Chicago Exhibition." Other duties included handling much of the Station's correspondence. Over the Collier years, Wheeler's research on poultry appeared in five Station bulletins (Nos. 29, 38, 39, 53, and 57) and in two on swine (Nos. 22 and 28). These publications are duplicated along with reports on studies in all fields in the Annual Reports for 1888-1894. Concerning the poultry research program, Wheeler claimed in 1907: "This Station was one of the first to conduct any experiments with poultry."<sup>9</sup>

From the Station's first year, chemistry occupied a key position in the Station's program. In the early years, a great variety of products were subjected to chemical analysis, ranging from milk, fertilizers, soil, water, and many kinds of plants and plant products. Soon, however, major attention was given to milk and cheese, and to the composition and significance of the foods fed dairy cattle. Reference has already been made to the important studies conducted at this Station by S. M. Babcock from 1885-1887 on milk and its butterfat content. The work load of the chemistry department was greatly expanded in 1890, however, when the Station was selected to manage the fertilizer inspection program. By 1892, of the 12 members of the Station's professional staff, seven were chemists. In 1891, L. L. Van Slyke initiated some very extensive and varied studies on the production of cheese. In 1892, for example, 106 experiments were conducted which extended over a period from May to October. About half of these tests were carried out in cooperation with commercial cheese producers.<sup>10</sup>

Curiously, except for the first five bulletins published by the Station in the years Collier was director, none of the remaining 76 identified their author(s). Only the director's name appeared on the title page. While not so instructed, anyone having questions about the bulletins' contents or seeking additional information, presumably, was expected to write the director.

The years 1893 and 1894 were critical ones in the life of the Geneva Station. On January 3, 1893, Governor Roswell P. Flower in his annual address to the Legislature said: "I would urge the concentration at Cornell University of the various agencies for promoting scientific agriculture." Obviously, had his proposal

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*Governor Roswell P. Flower and dignitaries making their “on-site” inspection—September 26, 1893.*



been implemented, the Geneva Station would have been eliminated.<sup>11</sup> Friends of the Station quickly organized plans to forstall such an outcome. A key part of this plan involved the use of a member of the Board of Control, former Senator S. H. Hammond. He was a prominent member of the State’s Democratic Party and a close personal friend of the Governor. Hammond was able to persuade Flower to delay action on the foregoing proposal until after he had made an on-site inspection of the Geneva Station.

The Governor came to Geneva September 26, 1893, arriving at the New York Central Railroad Station at 7:50 AM. After he and his party had breakfast at Senator Hammond’s home, the group went directly to the Geneva Station. Here they first met with Director Collier and the Board of Control. The remainder of the morning was spent inspecting the Station’s field and laboratory operations. The Governor was particularly impressed with: the chemical analyses being made, for regulatory purposes, of samples of commercial fertilizer being sold in the State; the varietal plantings of fruit under testing consisting of 11 kinds of fruits and over 1,200 varieties; the performance of the Station’s dairy herd consisting of seven well-known breeds; and a display of recent Station bulletins which, he was informed, were being mailed out almost daily to the State’s farmers.

After leaving the Station, the Governor’s party was driven by carriage to the inner village for a public reception held at the Armory. He was greeted here by several thousand Genevans including a military unit and a band, school children, and others. A welcoming speech was given by a local orator and this was followed by a response from the Governor. Next the party moved on to make a courtesy call on members of the Geneva Club, and then to

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Hobart College. Here he was graciously received by the president, the faculty and many of their wives, and a number of students. The final event of this day was an elaborate dinner party hosted by Senator Hammond and his family. Guests present were the Governor, Secretary of State Rice, Collier, W. C. Barry and several other Board members, and eight other distinguished persons. Following dinner, several hours were spent in an informal discussion of State affairs including, of course, the possibilities for increased usefulness of the Geneva Station. Board member Barry made a very effective case for that last subject. Flower was an overnight guest of the Hammonds.<sup>12</sup>

The Governor was reported to have become a strong supporter of the Geneva Station following this visit. The first tangible evidence of such support is found in his annual message to the Legislature in January 1894. He recommended here that the Station receive ample appropriations. This recommendation was followed by the introduction of a bill allocating 10 per cent of the federal Hatch funds to Geneva. The purpose of this legislation was to qualify the Station for use of the franking or free mailing privilege. While some in the Cornell administration decided not to object to this bill, Director Roberts strongly opposed it not only for the \$1,500 the Cornell Station would lose, but on principle. Liberty Hyde Bailey called it the "Geneva Steal Bill." And President Jacob Gould Schurman even went so far as to claim that, with an additional \$6,000, the Cornell Station could do all of the work currently being done at Geneva at an annual cost to the State of \$66,000. In spite of these objections, the Legislature assigned 10 per cent of the Hatch Fund to Geneva and later appropriated \$8,000 for the establishment of a Geneva sub-station in the Second Judicial District. This district included several lower Hudson Valley counties, and Nassau and Suffolk Counties on Long Island.<sup>13</sup>

The principal support for this new appropriation came from the vegetable growers on Long Island. They sought means of coping with insect and plant disease problems primarily. This situation clearly called for the appointment of both a botanist (plant pathologist) and an entomologist. Director Collier more than met these conditions. He appointed not only one but two entomologists, and a botanist as well. All three were stationed, initially, at Jamaica on Long Island. But why two entomologists? Apparently this was done with the intention of moving one of them one day to Geneva. An entomologist, Victor Lowe, was so transferred in 1895; the botanist, F. C. Stewart, did not make Geneva his base of operation, however, until 1898.

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The funds the Cornell Station received from the Hatch Act in 1889 greatly strengthened its program. And, from this year forward, both stations entered a period of significant growth. It was perhaps inevitable, however, that the two stations became somewhat competitive. Thus, each sought to acquire a maximum degree of recognition and support from the state's farmers, their organizations, and the State Legislature. Both sometimes followed rather aggressive policies and tactics to achieve these ends. Relations between the two stations had badly deteriorated by 1895.

At a special meeting of the Station's Board of Control on June 7, 1895, Collier "was given a vacation of three months on account of long continued ill health."<sup>14</sup> L. L. Van Slyke, the Station's chemist, was named Acting Director. Collier's health did not improve, so in October 1895 he decided to resign as director, and to move to Ann Arbor, Michigan, where he could receive care from an eminent physician located there. At first his health did improve. But, thereafter, it steadily declined, resulting in his death June 29, 1896. He was only 61. He was survived by his wife and a daughter. On July 1, 1896, the Station's Board of Control met to prepare a resolution memorializing Collier's death. In it they wrote of his "genial courtesy and unvarying hospitality (which) characterized (his) relations to this Board...and his untiring interest, while director, in the matters pertaining to this station."<sup>15</sup>

Regarding Collier's accomplishments as director, it can be said: he increased operational funds from \$20,000 annually in 1888 to \$68,000 by 1895; expanded the Station's program to include studies on beef cattle, poultry, and swine; added an inspection regulatory service to the Station's program; added a botanist (plant pathologist) and two entomologists to the staff; added a large cattle barn, a chemical laboratory, several forcing houses, a fruit cold storage building, and a triple residential house on North Street.

Collier had some wide-ranging plans for the Geneva Station when he became director December 1, 1887. Not all of these projections materialized. But perhaps most of the better ones did. The gains made in the Station's physical plant, staff, and program were impressive. The seven-and-a-half years he was in office, however, were challenging and demanding ones for him, particularly in dealings with the Cornell University Station and its supporters. Much was at stake here. But the fact that he and his Board of Control were able to defeat a plan to abolish the Geneva Station, and then gain additional funding from the State, attests to his dedication to the Station's interests, to his tenacity, and resourcefulness. Unfortunately, the duties of the directorship over



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this period were so demanding that his health finally seriously declined and he was obliged to resign in 1895. The Station Collier left that year unquestionably was a much stronger institution than the one he took over in 1887.

The kind of an institution Collier and Sturtevant sought to establish at Geneva differed greatly. Each largely showed what they had been doing prior to coming here. Whatever their intentions were, what Sturtevant created, it appears, was an enlarged Waushakum Farm operation. As for Collier, he produced what could be called a minute U.S. Department of Agriculture. Both Directors, however, made valuable contributions to the Geneva Station in its formative years, thus producing a well balanced agricultural research institution.

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- <sup>2</sup> NYSAES Ann. Rpt. 1888, pp. 4-16.
- <sup>3</sup> NYSAES Ann. Rpt. 1888, p. 15.
- <sup>4</sup> NYSAES Ann. Rpt. 1888, p. 27-29.
- <sup>5</sup> NYSAES Ann. Rpt. 1888, p. 4.
- <sup>6</sup> NYSAES Ann. Rpt. 1888, pp. 22-32.
- <sup>7</sup> Colman, G. P. 1963. Education and Agriculture: A History of the NYS College of Agriculture at Cornell University, pp. 96, 102.
- <sup>8</sup> NYSAES Ann. Rpt. 1890, pp. 2-3, 242.
- <sup>9</sup> NYSAES Ann. Rpts 1888-1890; 1907, Part III, p. 72.
- <sup>10</sup> NYSAES Ann. Rpts. 1891-1895.
- <sup>11</sup> Colman, 1963. Education and Agriculture: A History of the NYS College of Agriculture at Cornell University, pp. 115, 118-9.
- <sup>12</sup> Geneva Gazette, Sept. 29, 1893.
- <sup>13</sup> Colman, 1963. Education and Agriculture: A History of the NYS College of Agriculture at Cornell University, p. 121.
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- <sup>15</sup> Geneva Gazette, July 3, 1896.

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## Whitman H. Jordan 1896-1921



*Whitman B. Jordan.*

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Whitman H. Jordan, Sc.D., LL.D., became the Geneva Station's third director July 1, 1896. His experience prior to coming to Geneva was as follows: He received B.S. and M.S. degrees from the University of Maine. Jordan then spent the year 1877-1878 at Cornell University engaged in graduate studies. Next he joined the staff of the Connecticut Experiment Station as an assistant chemist. In the year he spent there, site of America's first state experiment station, his thinking about what role these institutions should properly play was much influenced by his exposure to the views held by Director S. W. Johnson and W. O. Atwater. Both of these individuals had visited and studied at the highly successful agricultural experiment stations of Germany. After spending one year back at Maine, he accepted, in 1881, a professorship of agricultural chemistry at The Pennsylvania State University. Then, in 1885, Jordan became the first director of the Maine Agricultural Experiment Station. He remained there until 1896 when he became Director of the Geneva Station. Trained as a chemist, Jordan's area of specialization was animal nutrition. In addition to the solid records he had made in both research and administration, he was a gifted speaker. And, as we shall see, he was to use this skill to advantage on both the New York and national scenes.

In his first annual report, Jordan gives a rather full assessment of the Station as he found it in 1896. Much of what he saw he found good. One of the earlier changes he decided to make, however, was to organize the staff into departments. Created, initially, were departments of Chemistry, Horticulture, Vegetable Pathology, Entomology, and Animal Husbandry.

A general criticism he had of the existing program was that for the Station's small staff too much was attempted; in consequence, the total effort was spread too thinly. While he hoped to enlarge the staff, he believed it still would be too small, over the foresee-

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able future, to provide assistance of a meaningful order to all segments of New York's agriculture. This being the case, he decided to adopt the following policy: "The most profitable field for (our) research should be determined by the relative importance of the various agricultural industries in the state. It is certain that at the present time, and there are no indications of a change of conditions, dairying and horticulture occupy a commanding position in New York agriculture. Both are greatly aided by our proximity to the largest home markets in this country. The former can scarcely become less important because of the great increase in the consumption of dairy products, especially of raw milk, and the latter must always be fostered in this state in view of the unexcelled natural advantages for the production of small and large fruits. Everything points, therefore, to the conclusion that the experiment stations of this state should give prominent consideration to whatever will promote these two lines of practice."<sup>1</sup> Thus, Jordan said, in effect, he intended to direct most of the Station's future efforts into serving the state's dairy and horticultural interests.

In 1896, Jordan proposed the addition of three staff positions: a dairy bacteriologist, a botanist, and an editor-librarian. He also asked the Legislature to provide funds for the building of five new structures. By far the most important of these was a Biological and Dairy Building. This building would provide badly needed housing for the Vegetable Pathology, Horticulture, Entomology, and Dairy Departments.<sup>2</sup> Jordan was able to fill the post of Editor and Librarian in 1897. Selected was Frank H. Hall, a staff member of the Office of Experiment Stations in the U. S. Department of Agriculture at Washington, DC. Jordan also named the future occupants of the two other positions in 1897: H. A. Harding as Bacteriologist and G. A. Smith as Dairy Expert. Smith's appointment became effective in 1898, but Harding's not until January 1, 1899. A botanist was added to the Geneva-based staff in 1898 by transferring F. C. Stewart to Geneva from the Long Island substation.

As a graduate of the Johnson-Atwater school of thought, Jordan had acquired some strongly held views about what should and what should not engage the attention of an experiment station staff. He believed such institutions would best serve agriculture by conducting research on the principles underlying agricultural practices. He also maintained that research should be made the near full-time occupation of a Station's staff. He was referring here to a practice commonly followed where stations were located on the campuses of colleges of agriculture. Station staff

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*In grower tests, five sprays, which cost a total of \$4.85, produced an increase of 132 bushels per acre of potatoes for a profit of \$20.51 per acre.*



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members here usually were obliged to divide their time between classroom instruction and research.

At the 1897 Annual Meeting of the Association of American Agricultural Colleges and Experiment Stations, Jordan had an opportunity to present his views on the foregoing subjects. He started off by saying: "This combination of the teacher and investigator has been supported by the somewhat widespread declaration that a man must be a teacher in order to reach his highest mark as an investigator, a declaration that under the conditions which prevail in our state colleges I regard as an unmitigated, though perhaps comfortable fallacy. It is, perhaps, true that a specialist may derive benefit from preparing a brief course of lectures relating to his special subjects of investigation, for in this way he is forced to clarify disputed points; but to say that the constant grind of teaching three, two, or even one hour a day, generally in elementary work, as do nearly all American college professors, is a help and inspiration, I regard as an absurd proposition." He then went on the offensive. He declared the type of investigation actually attempted by those required to divide their time between teaching and research did not aim in many instances to discover new truth, but to illustrate the application of old truths and is really an instructional effort rather than one of real inquiry and should be so classified. "Let us not confuse our aims or misuse our funds (he said). Research of the most severe kind is demanded, and the experiment station (Hatch) fund is a research fund."

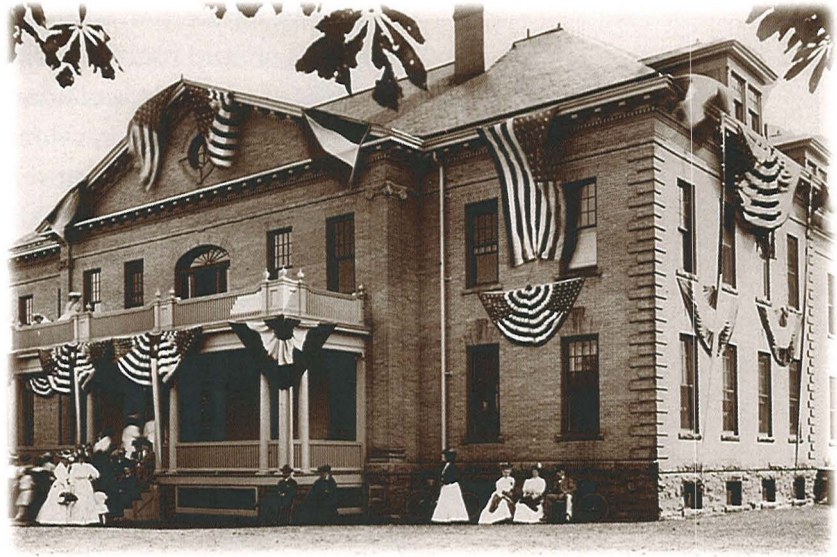
Reactions to Jordan's powerfully delivered address were mixed. The comments made by Director I. P. Roberts of the Cornell Sta-

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tion in this connection were especially interesting. He maintained a "station should function primarily as a diffuser of improved methods — and only secondarily as an investigating agency. It should concentrate on rural instruction until the farming community, at a time far in the future, had fully exploited the technological capabilities of the information already known, had been fully exploited. Not until that time, Roberts contended, "should the stations direct the main part of (their) effort...toward original research." The views of the two New York directors could hardly have differed more. Jordan won the respect of all who heard him that day. But most College of Agriculture administrators were more comfortable with the views presented by Roberts. Jordan won the near unanimous support of station directors, notably, those of William A. Henry of the Wisconsin Station. Henry was important not only because he had served as President of the Association, but in his presidential address of 1892 he had voiced much the same objections Jordan did in 1897, to station staff members being obliged to both teach and do research.

As a featured speaker at the 1900 convention of the Association, Jordan had another opportunity to win acceptance of his thesis. His address was reported to have been most effective with him "deftly displaying the scholarly incisiveness which had become his trademark." In effect, he appealed for an interpretation of the Hatch Act that would have refuted the Roberts' thesis. But most of all, Jordan deplored the small quantity of truly original research that had been realized since passage of the Hatch Act in 1887. This situation, he naturally charged, was a result of the station teacher-investigator having had too little time to pursue research in depth.

Meanwhile, Director Henry waited patiently for the close of Jordan's address. When this occurred, he quickly presented a resolution for reducing the teaching load of Hatch paid staff members. Unfortunately, the rules of order prevented the Association from acting on his resolution. Undaunted, Henry introduced the same resolution at the 1901 convention. In so doing, he bluntly accused the college presidents and trustees of forcing heavy teaching duties on Hatch paid investigators. His charges produced the same storm of protests that his 1900 proposal had created and his resolution was tabled. Unable to gain his goal through direct action, Henry decided to follow a different course. A movement was under way at this time to revise the constitution of the Association, and Henry sought and gained membership on the Revision Committee. Largely through his leadership, a new plan was adopted by the Association in 1903 to not only



*New Biology and Dairy Building,  
Sturtevant Hall—1898.*

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point up the professional differences between station directors and college presidents, but it enabled the director division of the Association to place Jordan on its potent executive committee. And, they kept him there as their principal spokesman over the following 15 years.<sup>3</sup>

The big local news of 1897 was the granting of funds for the construction of the Biological and Dairy Building. The Legislature appropriated \$41,000 for this purpose. Work on the building started in September 1897, and the structure was completed a year later. An additional greenhouse and a poultry house were also added. The Biological and Dairy Building was dedicated September 21, 1898. Some 3,000 persons attended the occasion. The speaking part of the program was held in a tent with a seating capacity of some 2,000 persons! The keynote speaker was James Wilson, U. S. Secretary of Agriculture. Those who followed him were: W. D. Hoard, former governor of Wisconsin; I. P. Roberts, Dean of the College of Agriculture at Cornell; and R. E. Jones, President of Hobart College. In the evening, the Station's Board of Control hosted a reception for all comers. The report is that the rooms of the new building remained crowded until a late hour.<sup>4</sup>

As reported in the preceding chapter, the Station was made responsible, in 1891, for inspecting, by chemical analysis, samples of the commercial fertilizers being sold in the State. No additional regulatory work was assigned to the Station until 1898. The product to be inspected then was the insecticide Paris Green. The first year samples of Paris Green were received from 23 New York suppliers. Unofficial inspections were also made of seven propri-

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etary insecticidal products under the trade names of: Paragrene, Black Death, Slug Shot, London Purple, Laurel Green, Smiths Electric Vermin Exterminator, and Bug Death.<sup>5</sup> On May 3, 1899, the Legislature passed a bill providing for the inspection of concentrated feeding stuffs by the Geneva Station. This was a major new assignment, comparable in work volume to the fertilizer project.<sup>6</sup> In 1900, the Station received a fourth regulatory responsibility. This time the glassware used in conducting the Babcock test for the butterfat content of milk and cream was to be tested for accuracy.<sup>7</sup>

Considering Jordan's strongly held view that an experiment station's primary mission was research, how could he accept the inclusion of so many essentially non-research activities in the Station's program? He probably had no choice. He had inherited the highly successful fertilizer inspection program. And, he recognized that major material gains had come to the Station from this program, including, of course, the much needed chemical laboratory. But he insisted in making a clear distinction between the research and regulatory parts of the Station's program. He put it this way: "This (inspection) work is provided for by special funds and is not allowed to interfere with the fundamental purpose of the Station, because it is assigned to a special force of men who are not in any way related to investigational functions." Lest he be misunderstood, he went on to say: "The value of this inspection is unquestioned. Probably no experiment station effort has been of more direct financial benefit (to the growers)."<sup>8</sup>

The Legislature of 1904 enacted some legislation that materially affected the status of the Station and its administration. Redefined were the responsibilities of both the Board of Control and Director. The Commissioner of Agriculture became an ex officio member of the Board of Control. Closer relations also were established, thereafter, between the Station and the State Department of Agriculture. The most important change made, however, was the transfer of the administration and enforcement of the inspection laws from the Station's director to the Commission of Agriculture. This change apparently did not mean the Department had become dissatisfied with the Director's handling of this responsibility. Rather, the Legislature apparently believed the administration of all agricultural laws properly should be placed under one authority, namely, that of the Commissioner of Agriculture. The analytical part of the Station's four regulatory programs, however, would continue to be conducted at Geneva. The Director also was given the authority to publish the results of these analyses and to use this information in bulletins reporting research work.<sup>9</sup>



*View of Parrott Hall south lawn in 1880.*

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As established earlier, up to 1904, Jordan was best known in the Association of American Agricultural Colleges and Experiment Station circles as the leader of those who maintained Hatch funds were to be used primarily for the conduct of original research. However, in 1904 he, and all members of the Association, became alarmed about a provision included in a pending appropriation bill for the U. S. Department of Agriculture. It would have made the state stations subordinate to the federal Department of Agriculture. This legislation was proposed in spite of the fact that Congressman H. C. Adams had introduced a bill that would not only continue the independent status of the state station but would provide additional funding for them.

The Executive Committee realized the Association was confronted by a situation requiring both immediate and forceful action. So, first it asked the chairmen of the House and Senate Agricultural Committees to delete the offending subordination section in the Department's pending bill. This request was granted. Next, they decided to make passage of the Adams bill the Association's next order of business. However, they realized a more basic issue was involved here. While the federal government had established both the federal Department of Agriculture and the state stations, it had favored only the former in granting growth funds. Did the federal government intend to continue this one-sided policy? The Executive Committee decided it must seek an answer to this question from the Congress.



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The Executive Committee was granted an opportunity to present its case before the House Committee on Agriculture in mid-January 1905. Jordan was selected to be the Association's principal spokesman.<sup>10</sup> In his opening remarks, Jordan commended Congress for its foresight in providing a needed service to agriculture by creating the state stations through the Hatch Act in 1887. This action was much appreciated, he said, by the farmers of America. Their worth to them, he continued, is evident from the fact that they obtained additional research funds from their state legislatures. Collectively these funds now equaled those provided, nationwide, by the Hatch Act. Jordan then said the record the stations have made "proved beyond question the success of the Hatch system. (And this being the case) Congress should encourage not discourage or impede a movement firmly approved by popular judgment."

At this juncture Jordan posed this vital question: What can be made of the fact that while the federal government created both the Department of Agriculture and state stations, no additional funding had been given to the latter institutions, whereas, over the same period Department funds had increased four-fold? Moreover, the operational budget for only one bureau, Plant Industry, was larger in 1904 than the total Hatch appropriations. Did this mean, he asked, that Congress intended to continue and expand this funding imbalance with the object of creating a centralized federal research system and, at the same time, "reduce (the state stations) to a minor and subordinate position?" Thus, Jordan squarely placed on Congress the responsibility of determining the future status of the state stations. All attending the hearing agreed Jordan had presented the Association's case in a most dramatic and effective way.

While, as noted earlier, passage of the Adams Bill was a prime objective of the Association, this was not mentioned directly by those speaking that day for the Association. They knew that Adams was present and would know best how to exploit what was said here to obtain action on his bill. Months went by, however, before he had gained sufficient support for passage of the bill. This took place early in 1906 with President Theodore Roosevelt signing it March 11. (Considering what Jordan did to help gain passage of the Adams Bill, it is ironic to observe what he got for his own institution out of the legislation. It was 10 per cent of the \$15,000 to be assigned annually to New York.) The state stations movement reached an important milestone with the passage of the Adams Act. It went a long way towards achieving a new policy in which the federal and state governments recognized they had a joint responsibility to provide adequate funding

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of the state stations. The Geneva Station is proud of the part Jordan played in achieving the foregoing ends.<sup>11</sup>

On August 29, 1907, the Geneva Station celebrated its 25th anniversary. It was a big day—not only for the Station but also for the city of Geneva. Many distinguished persons visited Geneva that day. Included were Governor Charles Evans Hughes; W. O. Thompson, president of Ohio State University; Dean Liberty Hyde Bailey of the College of Agriculture at Cornell; A. C. True, director of the federal office of experiment stations; and others. Here are some excerpts from the account of the occasion that appeared that day in the Geneva Daily Times: “Ideal weather marked the day....The city of Geneva united with the Station in welcoming the Governor who arrived on the 9:01 A.M. train of the New York Central railroad. Waiting (his) coming were the mayor and other officials and dignitaries...the Geneva city band and Company B of the New York National Guard. Under this escort the Governor was conducted to the Armory where a short informal reception was held. (Ten automobiles then) were provided for the leading members of the party (for a tour of the city and environs). The line of machines decorated with flags made an interesting and picturesque sight which was enjoyed (by all)...along the route.... Upon arriving at the Experiment Station the (touring) visitors found the large tent (there) filled to its utmost capacity, probably 3,000 being assembled.”

This was a memorable occasion. Jordan, the Board of Control, and the Station’s staff must have received a great deal of satisfaction with the outcome. A special 362-page 25th Anniversary Report was issued for the occasion. It not only included an account of what transpired anniversary day, but also provided summary reports of the accomplishments of the several departments over the Station’s first 25 years. It was published as Part III of the Annual Report of 1907. Part II (published in 1908) was the second of the Geneva Station Fruit Books, entitled *Grapes of New York*. The latter is a beautifully illustrated (often in color) 564-page volume on folio-sized pages.

In 1907, Dean Bailey and Jordan found themselves in serious disagreement with the federal Bureau of Plant Industry over some studies the Bureau elected to conduct at Romulus, NY, on a grape problem. The issue was complicated from the fact that the grower involved had sought help from the Department of Agriculture at Albany. This agency, in turn, passed the request along to Washington. Neither New York Station had been informed of the Bureau’s decision to conduct some tests at Romulus. This deci-

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sion raised this question: Did a federal research agency have the right to undertake independent studies on local problems where state research agencies were available for this purpose? Bailey and Jordan thought not. And both made strong public statements to this effect. A heated letter exchange also took place between Bailey and B. T. Galloway, head of the Bureau of Plant Industry. Given time, "problems" like this have a way of solving themselves. For as the two Stations grew stronger and demonstrated their competence to solve most local problems, it apparently rarely occurred to growers to seek out-of-state help.<sup>12</sup>

As we have seen, Jordan became highly regarded for the part he played over the formative years of the State Agricultural Experiment Station Movement and the kind of Station he produced at Geneva. Did he make an equally good record in his personal relationships with members of the Station's staff? Initially, in 1907, he prepared a pocket-sized 12-page pamphlet entitled: *New York Agricultural Experiment Station: Policy and Regulations*. With regard to his personal relations with the staff and their families, here are some comments made by Professor Richard Wellington taken from his oral history as recorded by interviewer G. P. Colman during the summer of 1962. "When I came to the Station I expected to stay one year and then return to my father's farm in Massachusetts. After working one year under Jordan, I was so pleased with the work and with his administration that I continued to serve under him. Jordan was a dynamic individual. He would have made a good army officer. He had full command but was very considerate of everyone who worked under him regardless of whether he was a workman or a member of the staff. He had a personal interest in everyone—even with the families of the Station workers. For instance, he took a special interest in every child that was born. I can remember when he said 'This is the 80th child that has been born under my administration.' . . . He always welcomed the young folks to his house and at Thanksgiving he always invited all the unmarried people. . . . In 1908, he had five houses built for the staff in order to promote a better sociability and to aid in holding them at the station. . . . He was a man that worked largely through the heads of departments. He did not hold staff meetings, . . . He was absolutely honest and sincere. . . . Everything was straight forward. He was quite proud of his Indian blood. He always said he was more American than anyone at the station. I believe he attributed his interest in hunting and fishing to his Indian blood."<sup>13</sup> These 1962 reflections by Professor Wellington provide us with an excel-

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lent insight to Jordan the man and his interactions with professional staff and the workers.

Strained relations existed between the two New York stations in 1896 when Jordan became director. Both were still in their formative years and had become somewhat competitive. Jordan quickly sought to correct this situation and found Cornell officials readily receptive to his overtures. A most satisfactory understanding was soon established, and this cordial working relationship continued over the remainder of the years Jordan served as director. This outcome can be largely attributed to the relationship developed between Jordan and Liberty Hyde Bailey both before and after the latter became Dean of the College of Agriculture. It was based on mutual admiration and respect. The high regard Cornell officials had for Jordan is further illustrated in what took place shortly before the Geneva Station became a unit of the College of Agriculture. Colman informs us that "by 1920 preparations were well under way to unify the administration of the (two stations) pending the retirement of Director Jordan."<sup>14</sup> It was thoughtful of those planning such action to delay effecting it until after Jordan's period of service had run its natural course.

In 1909, the Legislature appropriated \$10,000 to the Geneva Station for the establishment of a grape sub-station in Chautauqua County. Thirty acres of land were leased for this purpose at Fredonia. Located here was a horticulturist (F. E. Gladwin), a plant pathologist (Donald Reddick), and an entomologist (F. Z. Hartzell).<sup>15</sup> During the next 73 years, the period covered in this history, a great deal of valuable research has been conducted at this sub-station. New York grape growers, particularly those in the lands bordering Lake Erie, have greatly appreciated the guidance the research conducted here has provided.

The Geneva Station became a unit of the College of Agriculture two years after Jordan had retired. Had this relationship been sought by Jordan and the Station's Board of Control? Not in this form. However, Jordan appears to have sensed the two New York stations could not go their separate ways indefinitely. So finally, in 1915, he formally proposed an "affiliation" between the Geneva Station and the College of Agriculture. In his plan, the Station would continue its autonomy. But, some staff members of the two stations would serve as "affiliated" members of the other station. (This part of his plan was adopted in 1920 when eight Cornell faculty members were designated as affiliate members of the Geneva Station's staff.) In those areas where the two stations had a common interest, future studies would be conducted on a



*Station Staff, 1921.*

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cooperative basis. All publications reporting research conducted under these arrangements would carry a statement attesting to that fact. Jordan also pointed out that there were some rather unusual opportunities for graduate study at Geneva. He suggested the desirability of entering into a reciprocal arrangement whereby some Cornell graduate students could conduct their thesis research at Geneva, while junior members of the Station's staff seeking an advanced degree could fulfill their laboratory-classroom requirements at Ithaca. The specifics of what Jordan proposed here are less important than the fact an affiliation proposal was made.<sup>16</sup>

Following his successes in obtaining funds from the Legislature to construct the Biological and Dairy Building in 1897 and a residence for the director in 1900, Jordan next sought funding for an administration building. It would provide: an auditorium, house administration operations, the library, a repository for Station publications, a mailing room, and provide office space for some of the staff. This time, the response from Albany was neither immediate nor encouraging. Three times the Legislature appropriated funds for the building only to have them disallowed by the governor. Jordan, however, did not give up, and finally his perseverance was rewarded. Funds in the amount of \$100,000 were appropriated for the building in 1916.<sup>17</sup> It was completed in 1918.

The building was dedicated August 31, 1918. The day-time program was a speaking affair featuring an address by Governor Charles S. Whitman. Other speakers included the U. S. Assistant

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Secretary of Agriculture, Clarence Onsley; L. H. Bailey; and Jordan. In introducing Jordan, who was the final speaker that day, Commissioner of Agriculture Charles S. Wilson revealed that the Station's Board of Control had met in special session the evening before and had decided to name the new building Jordan Hall. This action appears to have come as a complete surprise to Jordan. So Jordan Hall it became.

As reported by *The Geneva Daily Times*, the evening program was: "A beautiful spectacle.... The production was unusually elaborate and the numerous stage settings were most realistic." The program consisted of a series of tableaux and episodes. Participating in the production was a cast of some 140 persons drawn from the Station's staff, their families, and some non-station Genevans. The program opened with a Dance of the Seasons and involved 30 young women. Episode I depicted "The Agriculture of a Primitive People," and had Indians gathering their winter's food. The theme of Episode II was "The Dependence of the Colonists on the Abundance of Nature." Illustrated was work and pleasure at a corn-husking party. The scene for Episode III was a country store and brought out the skepticism that prevailed in 1875 over the value of agricultural research. The latter half of the program was devoted to the history of the Geneva Station up to 1918. The final tableau illustrated the seven Station departments through costumes. Gnomes represented Agronomy; culture tubes, Bacteriology; mushrooms, Botany; flasks, Chemistry; milkmaids, Dairy; butterflies, Entomology; and fruits, Horticulture.<sup>18</sup> Obviously, August 31, 1918, was a big day in the life of the Geneva Station.

In 1896, Jordan assigned each staff member to one of five newly created Departments. These units were renamed Divisions in 1914. This designation remained in effect until 1952 when again they were called Departments. They have been so called from 1953 to date. The number of Departments/Divisions expanded during Jordan's administration to nine as follows: agronomy, animal husbandry, bacteriology, biochemistry, botany, chemistry, dairying, entomology, and horticulture. See Chapter XI for further information of the organization of Station research activities through 1982.

The nation's involvement in World War I in 1917 affected the lives of all Americans and their institutions. A sizable number of Station personnel entered military or other war-related services. The war's effect on the Station's program consisted mostly of a general slowing of its research output. This situation was evident

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*Meeting on the lawn east of Parrott Hall.*



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not only during 1917 and 1918 but for several years thereafter. Americans learned in 1917 that they were expected to not only produce enough food for themselves but be an important food source for their European allies. Jordan saw a role here for the Geneva Station. And, he took an active part in involving the Station in all state and national programs designed to achieve greater food production and conservation. He himself served as chairman of the Federal Milk Commission for the Middle States.

In 1917, Jordan was given a little known but highly important war-time assignment. He was asked to serve as chairman of a committee to resolve a jurisdictional dispute that had arisen between Herbert Hoover, as U. S. Food Administrator, and the U. S. Department of Agriculture. But first, what led up to Jordan's involvement in this affair? After the United States had entered World War I in 1917, President Woodrow Wilson appointed Hoover U. S. Food Administrator under the Lever Act. Hoover had made a remarkable record in providing food and clothing for war-torn Belgium from 1914 to 1917. With this record, he was the obvious choice to administer the food part of America's contribution to the allied war effort. Upon appointment, Hoover immediately launched a wide-ranging program for stimulating food production, checking hoarding and speculation, and promoting food conservation. It was not long, however, before the Department of Agriculture challenged his right to develop such a massive independent program, at least some of which, they maintained, legally fell within their domain. Apparently President Wilson had

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sensed such a problem might arise, for in appointing Hoover Food Administrator May 19, 1917, he wrote: "It is proposed to draw a sharp line of distinction between the normal activities of the government represented in the Department of Agriculture in reference to food production, conservation, and marketing, on the one hand, and the emergency activities necessitated by the war in reference to the regulation of food distribution and consumption on the other."<sup>19</sup> Obviously the "sharp line" the President drew was an insufficient barrier to avert a collision of interests between the two parties.

So, it was at this time that Jordan's committee was appointed. What followed was a series of committee meetings and exchanges of letters and other documents between Jordan and the two agencies.<sup>20</sup> Eventually the dispute was settled. If there was a winner it was Hoover. For there is no evidence he altered any part of the course he undertook initially. It is a matter of record, too, that Hoover won the wholehearted cooperation of the American people in his efforts. And, it is also generally recognized that what he did to manage our food production so that much of it was sent to help feed our allies was a masterful achievement.

Back to internal affairs. At war's end, the Station found its staff salary scale non-competitive, generally, with comparable industrial and publicly supported agricultural research institutions. While this deficiency was gradually corrected, it did not occur until after some of the Station's more promising young staff had left for more lucrative posts. There were some senior staff members, including Jordan, who were not wholly unhappy with this situation. They believed the Geneva Station had acquired a reputation of being an excellent training or proving center for fledgling scientists.

In another area, Jordan, in his final year in office, elected to assign new titles to the staff. Using the horticulturists as the example, here is how the several grades were named: a former Horticulturist became a Chief in Research (Horticulture); an Associate Horticulturist became an Associate in Research (Horticulture); and an Assistant Horticulturist became an Assistant in Research (Horticulture). Even though the Station became a unit of Cornell University in 1923, the first two titles given above were not given academic titles until 1943. Chiefs in Research were then assigned the title of Professor, Associates in Research became Assistant Professors, while Assistants in Research became Investigators.



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Of the staff appointments Jordan made in 1920, three merit special mention. The first of these was James D. Lockett who, on March 1, became Editor and Librarian. He succeeded Frank H. Hall who had served in that capacity over the preceding 22 years. Lockett proved an excellent choice. On July 1, Richard Wellington was appointed Associate in Research (Horticulture). This was his second appointment to the Geneva Station's staff for he had served here from 1906 to 1913 as an Assistant Horticulturist. In 1913, he was appointed Pomologist of the Minnesota Experiment Station and then, in 1919, Professor of Vegetable Gardening at the University of Maryland. The third 1920 noteworthy appointee was James S. Lawson. He became the Geneva Station's first Museum Preparator. Lawson was skilled in the preparation of wax models of a variety of subjects. These included varieties of fruits and vegetables, and insect and disease injuries to these plants. Perhaps the best models he prepared, however, were those of a series of fleshy fungi - mushrooms, toadstools, puffballs, etc. A few of those are on display today in the foyer of Barton Laboratory and Jordan Hall. Lawson was only in residence at Geneva during the summer months of his service period. He resigned in 1935.<sup>21</sup> Miss Clara L. Barnes was appointed Museum Preparator May 23, 1936. She served in this capacity until 1939 when the position was abandoned due to lack of funding.<sup>22</sup>

After 25 years of most distinguished service, Jordan retired June 30, 1921. The Geneva Station is greatly in his debt. It can be said the Station truly "came of age" under his leadership. In 1896, he undertook the direction of a small struggling institution with an uncertain future and built it into one of the more highly respected research centers of its kind in the world.

As we have seen, Jordan's accomplishments on the national scene were equally impressive. He was a pioneer and leader in the American agricultural experiment station movement. The Association of American Agricultural Colleges and Experiment Stations provided him with a forum for presenting his views on what he so strongly believed should and should not constitute the duties of an experiment station staff. He held that the primary mission of an experiment station staff was the conduct of original research. Classroom teaching and extension responsibilities, if any, should constitute only a minor part of their programs. These were not popular views around the turn of the century. But how, in retrospect, did Jordan's peers judge him? That question is well answered in a four-page



*Director and Mrs. Jordan prepared to leave for retirement in Maine.*

editorial appearing in the federal Experiment Station Record on the occasion of his retirement. Here is an excerpt from that statement: "The influence of such a vigorous, clear-visioned (person) in the councils of the experiment stations for a period of thirty-six years can hardly be overestimated. It is apparent only after a review of the things he contended for and the course which development has taken. He has been a leader in the march of progress. He will be greatly missed in the meetings of the Association and in his personal relations with those engaged in agricultural research."<sup>23</sup>

On June 6, 1921, Director and Mrs. Jordan departed the Station for his retirement home in Maine in a car driven by his chauffeur. A copy of his poignant letter to his secretary, Miss Jessie Sperry, gives insight to his loyalty to the Station and his relations with staff:

**HOTEL UTICA**  
—MANAGEMENT—

T. W. & D. M. JOHNSON  
UTICA. N.Y.

*June 6 1921*

*You dear Girl*

*Here we are at Utica, one hundred miles away from Geneva. When I registered tonight - I felt like a man without a Country. We had a very pleasant journey so far and could have gone farther but we are both tired & we shall seek our downy(?) couch very soon. Tomorrow we go as far as Schenectady, where we are to stay until morning.*

*For lunch, or dinner, we had clams & strawberry short cake. The lunch on the way was taken beside the road and consisted of sandwiches, cup cakes, fried cakes (fresh) coffee & pickles. I ate too much.*

*The picture of you people watching us off has followed me all day. Give my (our) best regards to the good folks we have left behind.*

Very sincerely,  
*This Old Director*

*McLeod is a fine chauffeur.*

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“He has left to the members of this Staff a legacy of work well done, a life well spent, and a record of great accomplishment as scientist, administrator, and citizen. For all this we make heartfelt acknowledgment. We are grateful that he could live to the fullness of years and witness the consummation of many of his most treasured ambitions for this Station. Let us record here our enduring regard for him as man and Director, and pass on to those who are to succeed us the heritage of his achievements.”<sup>24</sup>

Jordan died at Orono, Maine, May 8, 1931 at age 79. To commemorate his passing the Geneva Station staff met May 21, 1931 and adopted a formal resolution which expressed the high regard it had for him. The resolution follows:

“Jordan was born at Raymond, Maine, October 27, 1851, and died at Orono, Maine, May 8, 1931. He began his life work as an assistant in the Connecticut Agricultural Experiment Station in 1878; next he served four years at the Pennsylvania Experiment Station; then eleven years as director of the Maine Experiment Station; and finally twenty-five years as director of this Station. Thus, his career was coincident with the development of experiment stations in the United States.

“He served agriculture efficiently in this State and in the Nation. He believed that the most useful work an experiment station can do is to conduct rigidly scientific investigations of agricultural problems. To his insistence upon this fundamental principle and to his exceptional ability in expounding it to his colleagues and to the public, is due in large measure, to the present high standing of the United States in the field of agricultural science and practice.

“This institution and its Staff were his chief concern for thirty-five years. Altho exacting in his standards of workmanship, he directed those associated with him sympathetically, kindly, and justly. He was, besides, to each member of his Staff a guardian and counselor.

“Jordan was, first of all, a man of unflinching integrity—a vigorous, high-minded advocate of truth. In a busy life he found time to take an active part in the affairs of his church, community, and State. Invariably, he stood for righteousness. He was in every respect a good citizen.


“He has left to the members of this Staff a legacy of work well done, a life well spent, and a record of great accomplishment as scientist, administrator, and citizen. For all this we make heartfelt acknowledgment. We are grateful that he could live to the fullness of years and witness the consummation of many of his most treasured ambitions for this Station. Let us record here our enduring regard for him as man and Director, and pass on to those who are to succeed us the heritage of his achievements.”<sup>24</sup>

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## References

- <sup>1</sup> NYSAES Ann. Rpt. 1886, pp. 17-18.
- <sup>2</sup> NYSAES Ann. Rpt. 1896, p. 7-24.
- <sup>3</sup> USDA Misc. Publ. 904 (1962), pp. 75-6, 86-8.

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- <sup>4</sup> NYSAES Ann. Rpt. 1898, pp. 7-21.
- <sup>5</sup> NYSAES Ann. Rpt. 1899, pp. 237-248, (Bul. 165).
- <sup>6</sup> NYSAES Ann. Rpt. 1899, pp. 35-74, (Bul. 166).
- <sup>7</sup> NYSAES Ann. Rpt. 1900, pp. 444-448. (Bul. 178).
- <sup>8</sup> NYSAES Ann. Rpt. 1907, Part III, p. 64.
- <sup>9</sup> NYSAES Ann. Rpt. 1904, 10. Laws of New York, Chapters 439, 567, and 570.
- <sup>10</sup> USDA Misc. Publ. 904 (1962), p. 103.
- <sup>11</sup> USDA Misc. Publ. 904 (1962), pp. 97-107.
- <sup>12</sup> Colman, G. P. 1963. A History of the New York State College of Agriculture at Cornell University, pp. 195-7.
- <sup>13</sup> Wellington, R., 1962 Oral History, pp. 32, 33, 44.
- <sup>14</sup> Colman, G. P., 1963. A History of the New York State College of Agriculture at Cornell University: p. 288.
- <sup>15</sup> NYSAES Ann. Rpt. 1909, pp. 443-4.
- <sup>16</sup> NYSAES Ann. Rpt. 1915, pp. 624-5.
- <sup>17</sup> NYSAES Ann. Rpt. 1916, p. 536.
- <sup>18</sup> Geneva Daily Times, Aug. 31 and Sept. 2, 1918. Also a printed copy of the program.
- <sup>19</sup> The Memoirs of Herbert Hoover. U. S. Food Administration 1917-19, p. 251.
- <sup>20</sup> The account given here is based on recollections provided P. J. Chapman in 1982 by Emeritus Professor G. J. Hucker of the Geneva Station's staff. He and his wife visited Jordan in the late 1920s at his retirement home in Orono, Maine. When they were about to leave Jordan told Hucker he had something he would like to give him on condition it would not be made public until after his death. The item was the record of this committee's activities in 1917. Hucker accepted the packet and brought it back to Geneva, placing it in a safe. Following Jordan's death in 1931, Hucker, along with several colleagues, examined the packet's contents in some detail. He then decided to send it to the Cornell University Archives for filing. In 1982 the writer asked the archivist there for the packet. She, unfortunately, was unable to find it. She and others at Cornell suggested it might have been given either to the Herbert Hoover Library at West Branch, Iowa, or to the Hoover Institution at Stanford University. Both of these institutions were contacted but with negative results.
- <sup>21</sup> NYSAES Ann. Rpt. 1936, p. 11.
- <sup>22</sup> NYSAES Ann. Rpt. 1939, p. 11.
- <sup>23</sup> Geneva Exp. Sta. Record 45, pp. 305-9; NYSAES Ann. Rpt. 1921, pp. 9-11.
- <sup>24</sup> NYSAES Ann. Rpt. 1931, pp. 18-19.
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## Roscoe W. Thatcher 1921-1927



*Roscoe W. Thatcher.*

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Roscoe W. Thatcher became the Geneva Station's fourth director on July 1, 1921. After graduating from the University of Nebraska in 1898 with a B. S. degree, he served for two years as an assistant chemist in the Nebraska Agricultural Experiment Station. In 1901, he accepted a similar post at the Washington Agricultural Experiment Station. Here, he advanced through the ranks to become Director of the Station in 1907, and, in 1910, acquired the additional duties of Head of the Department of Agriculture. In 1913, he joined the staff of the University of Minnesota as a professor of plant chemistry and as plant chemist of the Minnesota Agricultural Experiment Station. After serving one year (1916-1917) as Assistant Director of the Station, he was named Director of the Station and Dean of the Department of Agriculture. He occupied these posts until 1921 when he came to Geneva.<sup>1</sup>

Thatcher arrived at Geneva at a time critical in the life of the Station. All signs pointed to the probability the Station would soon lose its independent status and become a unit of the College of Agriculture at Cornell University. For, as reported in the previous chapter, by 1920, preparations were well under way to effect this change.<sup>2</sup> Undoubtedly, Thatcher had been informed of this probable outcome prior to coming to Geneva. However, since unification had not taken place when he assumed office, he appears to have decided to go ahead with plans he had for the Station in the belief they would be acceptable whether he would be answerable to the Station's Board of Control or to the Cornell administration.

Shortly after Thatcher became Director, U. P. Hedrick, Chief in Research (Horticulture), was assigned the additional duties of Vice Director of the Station. Several operational changes also were made. One was the holding of regular monthly staff meetings—a Geneva Station first. Other changes involved the organization of the Station's program. First, each separate study would

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become a project; and upon initiation would require the preparation of a formal statement setting forth the objectives of the study, the procedures that would be followed, and other relevant information. A progress report would then be prepared annually on each project. One result of these changes was the publication of seven complete and very informative Annual Reports over the Thatcher years. If the staff was unhappy about the additional "paperwork" these new practices entailed, no such reaction has been reported. As will be noted later, Thatcher received considerable opposition to these practices from the faculty of the College of Agriculture when, after he became Director of the Cornell Station in 1923, he proposed the adoption of the Geneva procedures by the Cornell Station.

When Thatcher became director, he found the Legislature had appropriated a budget of \$203,400 for fiscal year 1921-1922. This was \$4,400 smaller than for 1920-1921. He naturally was disappointed with this loss but was more concerned with the general inadequacy of the budget. He realized that both State and Federal governments still felt obliged to live within the tight fiscal constraints created by World War I. He believed, however, the time had come for the State to start providing the Station with additional funds so that certain long-neglected segments of New York agriculture could be properly served. To inform the legislature of these needs, he decided to provide a specific plan for the development of the Station over the next decade. Significant progress was made in preparing this document by year's end, and a tentative draft of it was prepared early in 1922. This was then reviewed with the Station's Staff, the administrative official of the College of Agriculture, with farm leaders, and with others. After making some changes, as a result of these conferences, a final draft was submitted to the Board of Control for their consideration. At their May 23, 1922, meeting, the plan won its unanimous approval.

In the introduction of this document, Thatcher advised, "It will be understood that the presentation of this program does not mean that we propose to ask for funds to carry out all of its details into effect at any one time; but rather that it will serve as a guide by means of which both the administration of the Station and the Legislature may determine whether the plans and budgetary requests of any given year are in harmony with and a part of a well worked-out and publicly approved plan."

Of the new lines of research proposed, two very salable requests were made in the horticultural field. One was to provide a research program for the State's vegetable growers that would be

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comparable to the one currently being supplied the fruit growers. (It will be recalled that after Jordan became director, he elected, because of the small size of the horticultural staff, to essentially limit the Division's efforts to serving the State's fruit growers.) The second proposal was to provide methods for preserving fruits and vegetables and of making food and beverage products out of them. This appears to be the first official proposal to conduct food science research at Geneva, even though earlier work had been in progress. The possibilities for providing research service in this latter area were most extensive.

To improve the production of field crops, Thatcher asked for the establishment of studies in the fields of soil physics, plant physiology, meteorology, and phenology. He next requested support for widening the existing pest control program to include studies on birds and small mammal pests. For new research on foods he proposed the establishment of a Division of Nutrition Investigations. Its mission would be to investigate "animal and human foods both from the standpoint of better economy in the use of food by man and animals and that of better utilization of farm products." In the field of dairy management, Thatcher maintained the Station would be of greatest assistance to the industry by improving methods of producing and distributing milk and in providing better techniques of manufacturing butter, cheese, and other dairy products. He commended the Divisions of Dairying, Bacteriology, and Chemistry "for their splendid cooperative relations" in the work that had been done in the foregoing area to date. To assure its continuation, Thatcher said, "our laboratory facilities and staff of trained scientific workers need to be materially strengthened."

In another section, he made a strong plea for additional laboratory and other work space. He pointed out that the present Station buildings were crowded to their limit—far beyond what they had been designed for originally. First of all, a major new building was urgently needed. It would house the Divisions of Horticulture, Botany, Entomology, Agronomy, and the new research proposed in plant physiology and phenology. A need also was expressed for an additional greenhouse and a cold storage building. Thatcher finally suggested it would be wise, both in the interest of economy and efficiency, to provide the Station with a central heating plant.

To conduct the new research proposed and to strengthen the existing program, Thatcher said a considerably larger professional and labor force would be needed. He sought three new Chief in

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Research positions, seven Associates in Research, a statistician, an expert illustrator, and "certain technical and laboratory assistants and assistants in research." He again pointed out he was not asking for the immediate fulfillment of these requests. Rather, it was to project a goal for the gradual fulfillment of them over the next decade or even longer.<sup>3</sup>

If what Thatcher proposed was overly ambitious, it was sound and readily defensible. All of the important elements of it and more are represented in the Station's 1982 program.

A plan was adopted by Thatcher in 1922 to provide brief weekly news items to the state's newspapers and to farm newspapers in New York and in nearby states. These releases provided: information of seasonal interest to farmers, served to announce the availability of new Station publications, and to report developments on research in progress. In 1922, the News Service supplied news items to about 120 daily and 263 weekly newspapers, 82 farm newspapers, and all of New York's County Farm Bureaus. Through these means, the results of the Station's accomplishments were brought to the attention of a much larger audience than had been the case in the past.<sup>4</sup>

The Station was the sole or partial beneficiary of two special State appropriations in 1922. One was for work on "Methods of suppressing or controlling insect pests and diseases affecting raspberry plants." The grant was for \$4,000 and W. H. Rankin, a plant pathologist, was placed in charge of the new project. The other appropriation<sup>5</sup> in which the Station was a partial beneficiary, was one made to the Cornell Station for the establishment of the Long Island Vegetable Research Substation. Of the \$46,050 appropriated, \$38,000 was assigned to the Cornell Station; the balance, or \$8,050, to the Geneva Station. The latter funds were designated "for the study of vegetable diseases and insect control by members of the staff of the New York State Experiment Station." The funds assigned to Cornell were used for the purchase of land, the erection of a greenhouse, remodeling an existing building, operating expenses of the physical plant, and to employ "a specialist in vegetable gardening." Thus, the management of this new substation and the conduct of horticultural research were made the responsibility of the Cornell Station. A site near Riverhead was selected for this substation. Additions to the Geneva Station's staff from this appropriation were a plant pathologist (E. E. Clayton) and an entomologist (H. C. Hockett).<sup>6</sup>



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The Proposed Program of Development was reproduced in full in the 1922 Annual Report. Since it covered the calendar year 1922, letters of transmittal show it was not sent to the Commissioner of Farms and Markets and to the Governor until January 2, 1923.<sup>7</sup> To Thatcher's surprise and probable great disappointment, little consideration, apparently, was given his new development plan. Rather, the plan served to activate interest in an older problem. And this was, as Thatcher described it, "the proposed Program of Development...led to very active discussion at Albany of the question as to the future relations between this Station and the research work at the State College of Agriculture." The idea that some kind of coordination of the work of the two New York Stations should be achieved had long been considered. Thus, Jordan, in his 1915 Annual Report, formally proposed an "affiliation" between the Cornell and Geneva Stations.<sup>8</sup> In his plan, however, the Geneva Station would retain its autonomy. Thatcher also pointed out that all of the State Stations, founded with funds provided by the federal Hatch Act of 1887, were made integral parts of their respective Colleges of Agriculture. The six founded prior to 1887, of which the Geneva Station, of course, was one, were more or less independent. By 1922, however, the Geneva Station was the only totally independent State station in the nation.

In view of the foregoing facts, it was not surprising that the Governor decided the best solution of this problem would be to place the two Stations under one authority, namely, the College of Agriculture at Cornell. This, in fact, is what he recommended in his annual message to the Legislature in January 1923. Later, a bill was introduced in the Legislature providing for the transfer of the Station's administration from the Board of Control to Cornell University. After public hearings were held before committees in both Houses of the Legislature, the bill was passed and signed by the Governor May 29, 1923. The new law became effective July 1, 1923.<sup>9</sup>

The Board of Trustees of Cornell University met June 18, 1923 "to accomplish coordination of the work" of the Geneva and Ithaca Stations. The first action taken was to assign the administration of the Geneva Station to the Dean of the College of Agriculture. Next, it was resolved (a) "that the President be empowered, effective July 1, 1923: to appoint Thatcher, at present Director of the (Geneva) Station, as Director of Experiment Stations and to vest him with authority, under the Dean, to direct the staff research of the College of Agriculture, and the Cornell University Agricultural Experiment Station" and (b) "make staff appointments for the (Geneva) Station . . . as per a list submitted by Director Thatcher." Finally, it was resolved "that the foregoing appointments carry eligibility for mem-

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*Buggies near Station barns for a Grange meeting in the early 1900s. This was a frequent method used by staff to communicate results of research to growers.*



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bership in the Faculty of the Graduate School under the established regulations of the University governing such membership; and that membership in the Faculty of Agriculture shall be by Special Election.”<sup>10</sup>

In 1923, the Station received a special appropriation of \$16,800 to initiate some horticultural (fruit) research work in the Hudson Valley district. (Interestingly, it became law May 22, 1923, or just a week *before* the bill was passed which made the Geneva Station a unit of the College of Agriculture). The bill stipulated that the studies conducted here were to be carried out on rented, not purchased, property. Underlining this point, Thatcher maintained this new grant should “not be regarded as establishing a *permanently* located substation in the Hudson Valley area.” While he would have preferred to have had all funding increases simply added to the Station’s basic budget, he still was glad, with some reservations, to receive these special appropriations. But he still observed “such . . . appropriations have the disadvantages that they may suddenly be discontinued at any time by some inadvertence or by political manipulation . . . and are particularly susceptible to local conceptions of research needs (rather than to find lasting solutions of problems).” He was particularly concerned about the use of special appropriations to establish substations. He believed, “it would be most unfortunate if the State of New York were to embark upon a plan of establishing definitely located state-owned substations (over the state).”<sup>11</sup> All of the directors to 1982, (with the exception of Collier), have agreed with the position Thatcher took here.

Currently (1999), the Geneva Station operates substations at Highland and Fredonia. These have fully proved their worth, and their future appears assured. But, from Thatcher’s time forward, it be-

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T H E S T A T I O N N E W S

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July 2, 1923

Geneva, N.Y.

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THE STATION NEWS hereby makes its bow. With seven members of our staff located away from Geneva, the time seems opportune to inaugurate some sort of a house organ to keep these men in touch with the goings and comings of their associates, and incidentally, to keep all of us informed of matters of more or less general interest to the staff.

came increasingly clear that research at all levels could be better and more economically conducted at a single, adequately equipped and staffed research center. Such an institution eventually emerged at Geneva. One should not assume, however, that research has been limited to the laboratories and experimental farms available at Geneva, Fredonia, and Highland. Field studies have been and continue to be conducted by the Geneva Station throughout the state to solve regional problems.

That the Legislature of 1923 was much more interested in placing the two New York Stations under the management of the College of Agriculture than in providing the growth funds Thatcher requested, is evident from the budget he requested for fiscal 1923-1924 and what was granted. He sought the sum of \$464,555; he received only \$250,035. The latter sum, however, was \$31,585 larger than the 1922-1923 budget. But \$16,800 of this increase came from the special appropriation that created the Hudson Valley fruit investigations' substation. This item was not included in Thatcher's master plan. The Station's budget was gradually increased every year over the Thatcher years, but more of its growth came from special appropriations than from additions to the basic budget.

On July 2, 1923, the Station's editor, J. D. Luckett, issued a mimeographed sheet with the comment: "The *Station News* hereby makes its bow." Subsequently, this in-house newsletter has been published regularly down to the present time (1999). In the October 3, 1923, issue of the *Station News*, an item is included dealing with the annual meeting of the "Experiment Station Club." The writers have not been able to pinpoint just when this social organization was founded, but it is believed to have been in either 1921 or 1922. This club has held two or more meetings, annually, ever since.

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In 1923, John Street, secretary of the New York State Cannery Association, selected a committee of growers and canners to seek state funds for research on canning crops. After two years of planning, a Canning Crops Bill carrying an appropriation of \$20,500 was introduced in the Legislature. In its original wording the funds requested could be used by either the Cornell or Geneva Station, or by both. While the bill was under review, however, a publication appeared that greatly disturbed the committee. Issued by the Department of Agricultural Economics at Cornell, it showed, in effect, that canning crops could not be grown profitably in New York. The committee is reported to have believed this to be an erroneous finding. Consequently, through a canner member of the Legislature, the wording of the pending bill was changed to assign all of the funds to the Geneva Station. The Canning Crops Bill became law April 1, 1925, and effective, July 1. Assigned to the new program were a new horticulturist (C. B. Sayre), a plant pathologist (L. K. Jones), and an existing staff entomologist (Hugh Glasgow). Bacteriology also became directly involved in the canning crop program through the creation of a new staff position July 1, 1925. Appointed to this post was C. S. Peterson.<sup>12</sup>

Two special appropriations were obtained by the Station in 1927. One was provided by the State Legislature, the other by the Empire Gas and Electric Association of New York. The former grant was supplied to conduct studies on the problems of production, storage, and distribution of nursery shrubs and plants. So that this work could be started at the beginning of the growing season of 1927, the sum of \$5,400 was made available for use from April 15 through June 30. Support was increased to \$13,450, annually, for the fiscal year starting July 1, 1927. On April 15, H. B. Tukey was placed in charge of this new project with the title of Acting Chief in Research (Horticulture). For the preceding three years he had been located at Hudson, N. Y., serving as horticulturist of the Hudson Valley Fruit Investigations program. L. C. Anderson was selected to fill the post vacated by Tukey.<sup>13</sup> The grant from the Gas and Electric Association (amount not recorded) was made to determine the effectiveness of light-trapping of the adults of certain insect pests of orchard crops, as a possible control measure.<sup>14, 15</sup> Thatcher was pleased to receive the additional funds even though they worsened the work-space problem, for a part of each grant was used to employ additional staff members.

The summary reports on the accomplishments of the nine Divisions over the Thatcher years are found in the Division chapters, XII to XX.

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In 1927, effective September 30, Thatcher resigned to accept the presidency of the Massachusetts Agricultural College (now the University of Massachusetts). He had developed a fine rapport with the Geneva staff at all levels, and all were sorry to see him leave. Not only was he popular, personally, but he was respected and admired for the program he had developed for the Station. It was based, primarily, on studying the principals underlying agricultural practices. The six years of Thatcher's tenure were productive and eventful ones. The most eventful happening, of course, was the transfer of the administration of the Station from its Board of Control to Cornell University. This change-over was effected smoothly, attributably both to Thatcher's skillful handling of the problems involved and the fact that he became Director of both the Cornell and Geneva Stations.

In his final report covering fiscal year 1926-1927, Thatcher included a five-page "Review of the Station's work for the past six years."<sup>16</sup> He pointed out here that when he became Director, in 1921, the administration of the station was in the hands of a Board of Control appointed by the Governor. The Station was wholly independent of all other state agencies except for a nominal responsibility to the Commissioner of Farms and Markets who was made an ex officio member of the Board of Control. A major administration problem confronting Thatcher initially was: What should be the relationship of the Station to other state agencies engaged in agricultural research or other activities, which more or less paralleled or even duplicated those of the Geneva Station? He decided, therefore, to develop a program for the Station that would fit properly into the State's general program of assistance to agriculture. As reported earlier, a "Program of Development" for the Station was prepared, and it was published in full in the 1922 Annual Report.

A highly important item in this program was the request for additional laboratory and other work space. This need would be fulfilled through the construction of the horticultural building, long requested. Most of the new research proposed in the Program, in fact, could only be undertaken when the building was made available. Although funds for this structure were requested annually by Thatcher, none were appropriated. He and the staff, naturally, were deeply disappointed in this outcome. He commended the Legislatures of 1924 and 1925 for having included funds for the building in the general appropriation bill only to have the Governor veto the item both years. While in his veto message of 1925 the Governor did advise that "this necessary addition to the State's building equipment should be provided

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from the bond issue now pending," no funds were realized. Nor were they in the 1926 and 1927 budgets. This lack of results led Thatcher to write in his 1927 Annual Report, as follows: "he (the Governor) apparently had not been **able** or **willing** to include this item in his (budgets)."<sup>17</sup>

Finally, in his "Review," Thatcher said this statement would not be complete without referring to two administrative changes made by the Legislature.<sup>18</sup> The first of these was "the abolition of the separate Board of Control and the transfer to Cornell University as the Agent of the State of the responsibility for the administration of the State Agricultural Experiment Station in the same way that the University is responsible for the State Colleges of Agriculture and Home Economics and the State Veterinary College."<sup>19</sup> The second administrative change made by the State was to transfer the State's fiscal relation of the Geneva Station from the former Department of Farms and Markets to the Department of Education. This action became effective January 1, 1927.

In assessing Thatcher's administrative record we should keep in mind that from July 1, 1921, to June 30, 1923, his duties were limited to directing the affairs of the Geneva Station. After that latter date, he served as Director of both the Geneva and Cornell Stations. His accomplishments as Director of each Station will be assessed separately.

Thatcher's attempts to serve as Director of the Cornell Station were a frustrating experience for him. He tried to use the methods at Ithaca he had used so successfully in Washington, Minnesota, and Geneva, but to little avail. The Cornell Station at this time has been described as being "an organization in name only, having neither a budget nor a director who could exercise authority. The majority of the faculty thoroughly opposed any sharp line (being drawn) between the research and teaching function of the college."<sup>20</sup> Furthermore, the faculty "offered considerable resistance to his (Thatcher's) attempts to evaluate research and his efforts to secure annual research reports from each department, several departments (even) dismissing his request for these (reports) in 1927 with a condemnation of administrative interference."<sup>21</sup>

Interestingly, G. F. Warren, Cornell's distinguished Professor of Agricultural Economics, must have been one of those holding the foregoing views. For, in 1937, in offering some advice to Dean Ladd, he recommended that in seeking a department

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head or someone for a higher post he would be wise to select a Cornellian. He then recalled Thatcher's performance as Director of the Cornell Station (this, he thought) "rather typical of a USDA or a corporation manager's point of view, which ignored the Cornell tradition of professorial independence."<sup>22</sup> It was reported, too, in 1927, that "many of the faculty were unquestionably relieved" when Thatcher resigned.

In his last Annual Report for 1927,<sup>23</sup> Director Thatcher reviewed his six years of accomplishments and failures. There was a three-fold increase in total annual Station funding and an increase from 57 to 76 research staff members. Further, he was largely responsible for establishing the role of the Station as a unit of Cornell University and its role in agricultural research in New York State. He regretted his failure to obtain funding for the needed facilities to conduct the Station's ever increasing activities. This failure was not for lack of trying. The State legislature approved funding several times only to be vetoed by the Governor. As we shall see in the next chapter, his successor had no difficulties with the next governor. It is evident that Thatcher laid a firm foundation for the future success of the Station.

Did Thatcher's record, as director of the Cornell Station, reflect unfavorably on his overall administrative competence? Obviously, the presidential search committee of the Massachusetts Agricultural College reached no such conclusion. But, perhaps the best answer to the foregoing question is found in the assessment Dean A. R. Mann made of his competence, which follows: "The retirement of R. W. Thatcher from the Directorship of the Station in order to accept the Presidency of the Massachusetts Agricultural College can be counted only as a severe loss to the Station and to this State. Director Thatcher brought to his present post a rich and successful experience both in scientific research and in its administration. His keen and discriminating judgment, his broad outlook, and his unusual clarity of mind respecting state policies affecting research, have made his work constructive to a high degree. The resources of the Station have increased by half during his administration, and the activities have grown correspondingly. He has served the State well. He holds the confidence and respect of the people among whom he has worked. While deeply regretting that New York is no longer to have his services, we must congratulate our sister state on her good fortune. Thatcher is admirably qualified for the presidential duties he is now to assume."<sup>24</sup>



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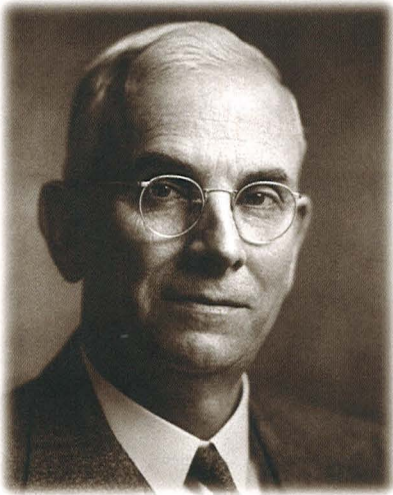
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- <sup>1</sup> NYSAES Ann. Rpt. 1921, p 11.
- <sup>2</sup> Colman, G. P., 1963, A History of the New York State College of Agriculture at Cornell University, p. 288.
- <sup>3</sup> NYSAES Ann. Rpt. 1921, pp. 12-14.
- <sup>4</sup> NYSAES Ann. Rpt. 1922, pp. 19-20.
- <sup>5</sup> NYSAES Ann. Rpt. 1923, pp. 16-18.
- <sup>6</sup> Besides these new staff members five vacant positions were filled in 1922. New occupants of these were: S. W. Harman (Entomology); H. G. Beattie (Chemistry); G. L. Slate (Horticulture); D. C. Carpenter (Dairy Chemistry); and F. H. Hall (formerly Editor and Librarian, reassigned to Horticulture).
- <sup>7</sup> After July 1, 1923 when the Geneva Station became a unit of the College of Agriculture, future Annual Reports covered a year starting July 1 and ending June 30 of the following year. To adjust to this new schedule the Station's forty-second Annual Report covered only the first six months of 1923.
- <sup>8</sup> NYSAES Ann. Rpt. 1915, pp. 624-5.
- <sup>9</sup> Laws of New York, 1923, Chapter 852.
- <sup>10</sup> A complete set of the Station News is available in the Geneva Station's library.
- <sup>11</sup> NYSAES Ann. Rpt. 1925, pp. 13-14. Also, Sayre, C. B. History of the Department of Vegetable Crops transcript of talk, March 10, 1965.
- <sup>12</sup> Laws of New York, 1925, Chapter 232.
- <sup>13</sup> Laws of New York, 1920, Chapter 895.
- <sup>14</sup> Laws of New York, 1922, Chapter 106.
- <sup>15</sup> M. W. Nixon represented the Association on this project assisted by Donald Collins, then a Hobart College student. Collins, much later, obtained a Ph.D. degree in Entomology at Cornell and became the State Entomologist of New York.
- <sup>16</sup> NYSAES Ann. Rpt. 1927, pp. 8-13.
- <sup>17</sup> NYSAES Ann. Rpt. 1927, pp. 9-10.
- <sup>18</sup> Laws of New York, 1925, Chapter 232.
- <sup>19</sup> What Thatcher referred to here was, that while the President of Cornell University delegated the Administration of the Geneva Station to the Dean of the College of Agriculture, the Station still retained the same status as the three State Colleges. In other words, it was not merely another unit of the College of Agriculture.
- <sup>20</sup> NYSAES Ann. Rpt. 1927, pp. 10-12.
- <sup>21</sup> NYSAES Ann. Rpt. 1921, p. 18.
- <sup>22</sup> NYSAES Ann. Rpt. 1921, p. 19; NYSAES Ann. Rpt. 1922, pp 25-26.
- <sup>23</sup> NYSAES Ann. Rpt. 1927, pp. 8-13.
- <sup>24</sup> NYSAES Ann. Rpt. 1927, pp. 7-8.





## Frank B. Morrison 1927-1928



*Frank B. Morrison.*

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To succeed Thatcher, Dean Mann selected Professor Frank B. Morrison, of the Animal Husbandry Department at the University of Wisconsin. A chemist by training, Morrison had achieved international recognition as an authority on animal nutrition. In large measure, this reputation was based on a book he authored, in collaboration with W. A. Henry, Dean of the Wisconsin College of Agriculture, entitled *Feeds and Feeding*. The book became the preeminent guide and reference on the feeding of livestock in this country and in Canada. In addition to his departmental duties, Morrison served from 1915 to 1927 as assistant director of the Wisconsin station, and later, when Dean Henry was on leave for a year and a half, as acting dean of the College of Agriculture.<sup>1</sup>

Of interest here, is a comparison of Dean Mann's approach to selecting Morrison in 1927 with that of Dean Ladd's selection of Heinicke in 1942. Dean Mann was interested in finding a new director to serve as director of both the Station and the College of Agriculture at Ithaca. He sought the advice and support of both a Station and a College committee for the appointment of Professor Morrison in 1927.<sup>2</sup> Morrison's appointment became effective October 1, 1927. He lived at Geneva, commuting several days a week to Ithaca.

Dean Mann and the College expected much from Director Morrison. During his first year, he was appointed head of a New York State Commission to appraise the field of animal husbandry, which recommended significant expansion of facilities and staff at the College. Resources were obtained, and Director Morrison was offered much to come to Ithaca to carry out the recommendations of the Commission. He resigned from the Geneva Station in 1928 to accept the headship of the Department of Animal Husbandry at Cornell. He apparently was given the choice of possibly devoting the remainder of his career to administrative pursuits, full time, or



*Grange Picnic—c. 1900.*

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of directing affairs in the area of his professional specialization. He obviously opted for the latter course.<sup>3</sup>

Since Morrison's stay at Geneva was so short, he had little opportunity to contribute much of a permanent nature to the Station's program. However, as U. P. Hedrick, his successor, observed, "Director Morrison did much to reorganize the business affairs of the Station and made notable changes in the scientific work as well."<sup>4</sup> It is appropriate to include here, some summaries of several divisions up to and including 1928.

In the 1920s, the division of bacteriology was actively engaged in the identification and classification of bacteria found in the soil, milk, and other dairy products, and in processed plant food products. Thus, R. S. Breed served as chairman of the Bacteriology Section of the International Botanical Congress held in Ithaca in 1925. At that time, he was asked to form an international committee on bacteriological nomenclature and was charged with presenting recommendations in this field at the next meeting of the Congress scheduled for 1930 in London. This assignment became Breed's central interest. The identification and classification studies conducted by other members of the division were as follows: H. J. Conn was concerned with the bacteria occurring in soil; G. J. Hucker with the organisms associated with dairy cattle, milk, cheese, and dairy utensils; and C. S. Peterson with those forms found in processed plant foods, especially tomato products and sauerkraut.

The fruit varietal testing and breeding programs of the horticultural division had reached an impressive level by 1928. Thus, 2,470 vari-

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eties of 21 fruits and nuts were then on trial on the Station grounds. In the fruit-breeding program, over the past 23 years, 80,000 seedlings of 15 fruits had been grown, of which 41,469 had fruited. Ninety of these latter seedlings were judged good enough to have been named. These named varieties were made available to the public through the nonprofit New York State Fruit Testing Association. Organized in 1918, this venture had grown in 10 years to have 1,200 members, with every part of the world being represented. (Additional information on later years is found in Chapter XI.)

The inspection of samples of fertilizers, feeding-stuffs, and pesticides had long occupied a high percentage of time of the chemistry division. However, increasing attention was given in the 1920s to research projects in a number of fields, of which those carried out on insecticides and fungicides are especially noteworthy. Funding for work in this area was made in a special appropriation starting in 1920.<sup>5</sup> Of special interest here are the studies made from about 1927 forward on the toxic residues that may occur on sprayed fruit and how to remove them. This work was to become a major program of the chemistry division in cooperation with entomologists and plant pathologists in the years immediately ahead.

Like preceding directors, Morrison deplored the State's failure to provide adequately for staff salaries and for the Station's many physical needs. He made a special plea for the construction of the Horticultural Research Laboratory. This structure was first proposed in 1922. Twice, funding for this proposal had been obtained from the State Legislature only to have lost out by having the governor veto the enabling bills. In his proposed budget for the Station in fiscal year 1928-1929, Morrison asked for funds that would have more than doubled the amount available in the 1927-1928 budget. The State granted a \$3,070 increase, or less than 1 per cent of what he had requested.<sup>6</sup>

Morrison's experience in seeking a general increase in the Station's budget was not unlike that of Thatcher's first year in office. As noted earlier, most of the budgetary gains achieved in the 1920s came from special grants made by the Legislature to meet the demands of special interest groups.

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#### References

- <sup>1</sup> NYSAES Ann. Rpt. 1928, pp. 7-8.
- <sup>2</sup> NYSAES Ann. Rpt. 1928, p. 8.
- <sup>3</sup> Colman, G. F., 1963, History of the New York State College of Agriculture at Cornell University, p. 397.
- <sup>4</sup> NYSAES Ann. Rpt. 1929, p. 10.
- <sup>5</sup> Laws of New York, 1920, Chapter 895.
- <sup>6</sup> NYSAES Ann. Rpt. 1928, pp. 17-18.

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## Ulysses P. Hedrick 1928-1937



*Ulysses P. Hedrick.*

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On October 1, 1928, Ulysses P. Hedrick became the Geneva Station's sixth Director. He was the first local staff member to serve in this capacity. Hedrick had joined the staff here in 1905 as Head of the Division of Horticulture, and from 1921 to 1928 he acquired the additional duties of the Vice-Directorship. He obviously was the best qualified Genevan to become Director. The Cornell Administration, however, probably had some reservations about appointing him to this post because of his well-known belief that the Station's interests would be better served by regaining its former independent status. However, initially anyway, all went well under Hedrick's management.

P. J. Parrott, Head of the Division of Entomology since 1904, was appointed Vice Director effective January 1, 1929. He continued, however, to serve as Head of the Entomology Division and did not play an active role as Vice Director.

In the Station's Annual Report for fiscal year 1928-1929, Hedrick leads off by announcing the discontinuance of the Divisions of Agronomy and of Poultry Husbandry. R. C. Collison and J. D. Harlan of Agronomy were transferred to the Division of Horticulture. W. P. Wheeler, who had served 38 years in the Division of Poultry Husbandry, decided to retire.<sup>1</sup> Not content with these changes, Hedrick, in 1930, obtained the approval of the Board of Trustees of Cornell University to divide the Division of Horticulture into the Divisions of Pomology and Vegetable Crops. Richard Wellington was then named Head of the Division of Pomology and Charles B. Sayre became Head of the Division of Vegetable Crops.<sup>2</sup>

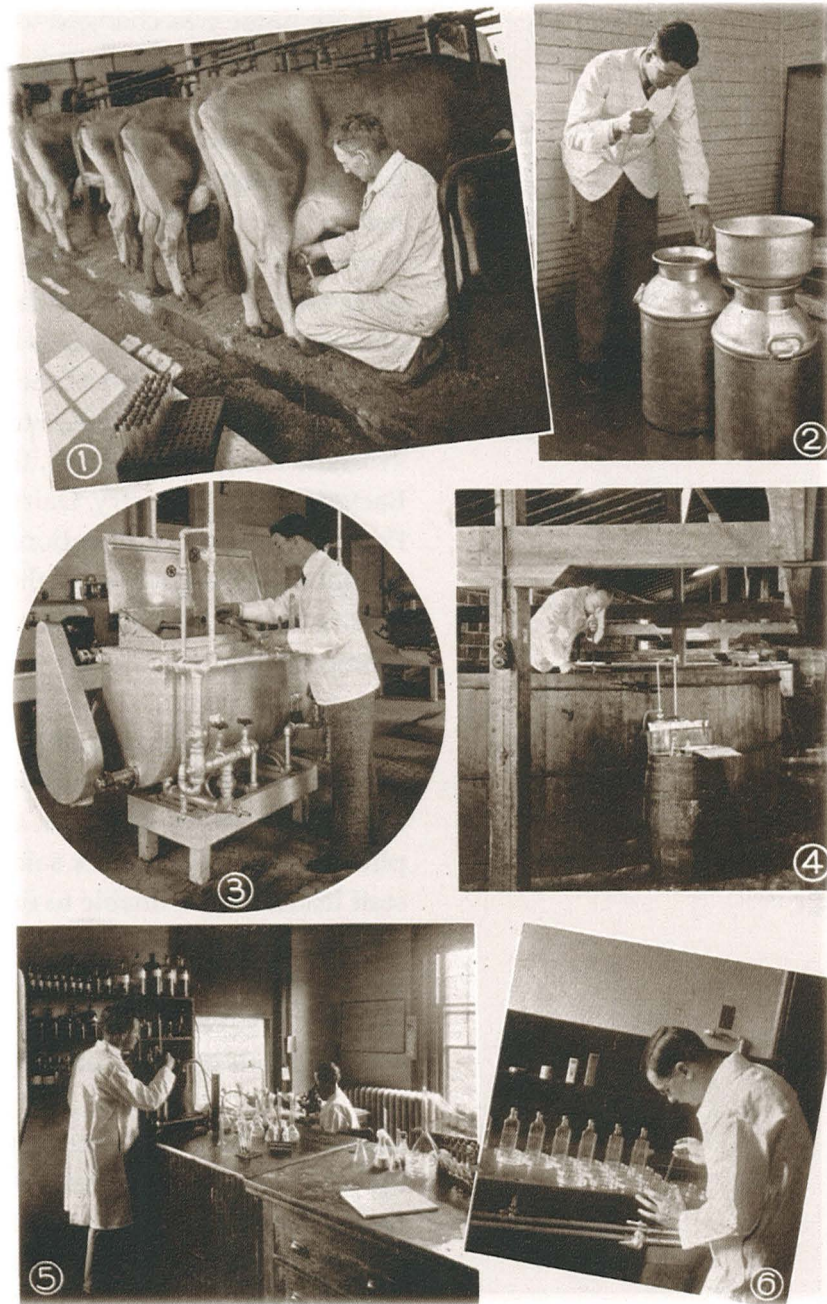
Hedrick made further revisions of the Station Divisions late in his term as director. He noted that the term Botany was no longer an accurate designation for the research being conducted

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and the name was changed to Division of Plant Pathology in 1936. At the same time, a new Division of Seed Investigations was established. Hedrick reported that, although the major part of the work of this new Division would be the testing of seeds, most important investigations would be conducted on the fundamental factors covering the germination of seeds; improvement in seed testing techniques; the role of seeds as carriers of disease organisms; and other problems relating to flower, vegetable, lawn grasses, and farm crop seeds in general. Professor M. T. Munn, who had been the head of the Seed Testing Laboratory as a part of the old Division of Botany, was named head of the new division.<sup>3</sup> With the foregoing changes, the Station's Divisions, in 1930, were: Bacteriology, Chemistry, Dairying, Entomology, Plant Pathology, Pomology, Seed Investigations, and Vegetable Crops. These changes were approved by the Board of Trustees of Cornell University. Dean Ladd may not have been enthusiastic about the changes as described later.

In 1928-1929, Hedrick asked each Division Head to compare their projects with those of their counterpart Departments in the College of Agriculture at Ithaca, to determine if any instances of duplication existed. Hedrick said he was pleased to report that his staff leaders were unable to find any instances of unreasonable duplication. Then, in regard to reasonable and unreasonable duplication, Hedrick rather defiantly said: "I say 'unreasonable,' because, as you well know, with some projects a certain amount of duplication is essential and to be sought rather than thwarted."<sup>4</sup>

Under the heading, "Changes in Station Staff," Hedrick reported the staff members who retired, accepted positions elsewhere, were advanced in rank, or were new appointees. Those in the last category included J. G. Horsfall, (a plant pathologist) who became Research Associate in the Botany Division; Z. I. Kertesz, who was made an Assistant in Research in Chemistry; B. R. Nebel, who had been a post graduate student at the Station the previous year, became an Associate in Research, Horticulture; and G. E. R. Hervey, who was named an Associate in Research in Entomology. Bernard Nebel, a fellow of the International Education Board working on chromosome studies in cultivated fruit varieties, had completed his work at the Station during the fall months of 1928. Director Hedrick stated: "Bernard R. Nebel, a graduate student of the University of Halle, Germany, who did notable work as a post-graduate student at this institution last year, becomes Associate in Research (Horticulture), September 1, 1929."<sup>5</sup> Thus, Director Hedrick can be credited with the recognition of the potential role of cytology and cytogenetics in the Station's plant



*Illustration from Facts about the Geneva Station, 1882-1932 showing the breadth of investigations from milking procedures to detailed laboratory testing of milk quality and safety.*

breeding programs. Nebel was followed by Einset, Pratt, and others in cytological studies of fruit and vegetable crops as reported in Chapter XV.

Hedrick then devoted nearly a page in the Annual Report to the retirement of Lucius L. Van Slyke, who had long been recognized as a leader in the field of Dairy Chemistry. He was well known to farmers of New York for his organization and supervision of the chemical inspection of commercial fertilizers and feeding stuff. Hedrick observed: "Perhaps it is not too much to say that, at a time when research in agriculture received scant support from the farm-

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ers of this State, Van Slyke's work in the inspection of fertilizers and feeding stuffs, better than any other effort of the Station, brought this institution to the notice of New York farmers and won their hearty support."<sup>6</sup>

But the event that gave Hedrick most satisfaction was the passage of a bill by the State Legislature, April 24, 1930, providing \$285,000 for the long-sought Horticultural Building. How was it possible for him to "sell" the Legislature and the governor on this action only a few months after he became Director, when his two predecessors, Thatcher and Morrison, were turned down annually for six years? It was probably because of his political connections, for he was an active Democrat and had some important political friends at Albany, including the Governor, Franklin Delano Roosevelt.<sup>7</sup> In support of that latter claim is the fact that Roosevelt's daughter, Anna Eleanor Roosevelt, came to Geneva in 1930 and 1931, serving as an unpaid summer assistant in the Division of Pomology to learn about flowers and horticulture. Roosevelt came to the Station and was entertained at a reception in the Director's house. There was much preparation, including a ramp to the front door.<sup>8</sup> No doubt, Hedrick's connections served the Station well with regard to other appropriations and may well have led to some of his problems with Dean Ladd, which are described later.

While Hedrick was confident the Legislature of 1929-1930 would provide funds for the construction of the horticultural building, he realized that even if this took place, the new building would still not be ready for occupancy until late 1931, or even early 1932. He decided, therefore, to start relieving the space needs of all Divisions other than Chemistry. All of the other Divisions were tightly quartered together in the Biological and Dairy Building (now Sturtevant Hall). The action he took was to move the Division of Entomology into the original Station building, later named Parrott Hall. After Jordan Hall was built in 1918, Parrott Hall was used as a residence for some of the staff. Eventually, it acquired the amusing and strictly in-house name of the "Pogey." The Entomology Division moved into the "Pogey" early in 1930 and remained there until the "Department" moved into the newly completed Barton Laboratory in January 1969.

In 1931, Hedrick justifiably announced with great satisfaction: "It is most gratifying to report that the new horticultural building which the Station has so long needed, provided by the Legislature of 1930, is now nearly completed and will be ready for use in the autumn of 1931. The new building dominates all other structures on the Station grounds in size, position, and architecture. It

provides ample facilities for three divisions of the Station's organization, viz., Pomology, Botany, and Vegetable Crops. The purchase of equipment is now under way at a cost of \$65,000." In the same report, Hedrick announced that the Legislature of 1931 appropriated \$80,000 for new greenhouses and plans were being made with the expectation that they would be completed before the winter of 1931. Because he was a writer and philosopher, it seems appropriate that Hedrick would add the following comment: "It is said that 'it is better to travel hopefully than it is to arrive,' but after traveling with more or less hope for 17 years, it is, all at the Station agree, a great source of satisfaction to 'arrive.'"<sup>9</sup>

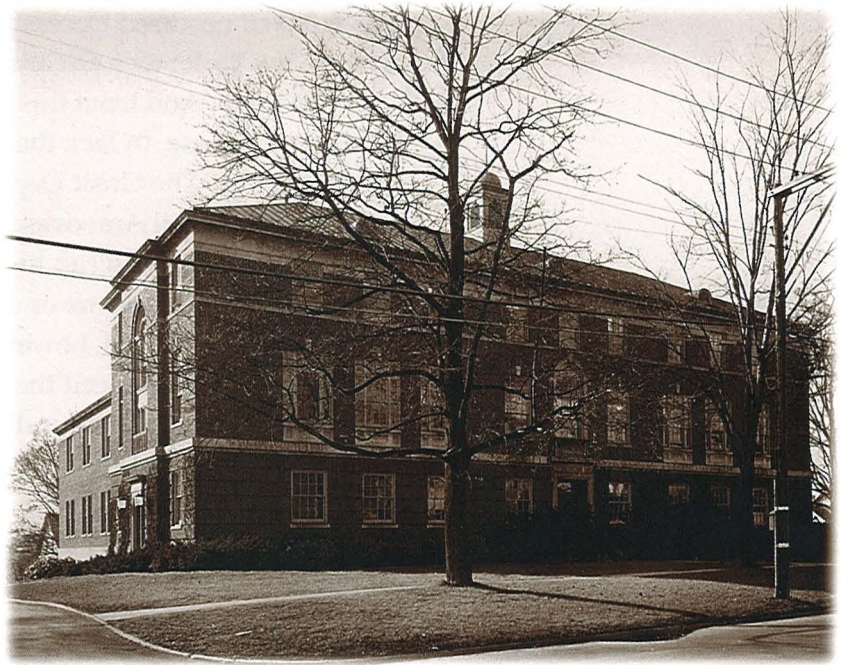
Hedrick was very gratified with the new building, the greenhouses, and the special appropriations, which every Legislature had made during the previous 10 years to do special work asked for by farmers. In 1931 there were 11 of these special funds:

Long Island Vegetable Research Farm	\$11,300
Hudson Valley Horticultural Investigations	15,250
Problems of Production, Storage, and Distribution of Nursery Shrubs and Plants	13,450
Insect Pests and Diseases Affecting Raspberry Plants	4,500
Corn Borer Investigations	7,250
Investigations of Moths and Insects	50,000
Grape Work at Fredonia	2,750
Utilization of Fruit and Vegetable By-products	10,000
Seed Investigations	9,000
Legume Inoculants	5,000
Small Fruits in Western New York	5,000
<b>TOTAL</b>	<b>\$133,500</b>

He noted that the Director and the "men"<sup>10</sup> in the several Divisions were gladly undertaking the projects called for by the farmers, but he was concerned that during this period there had been few increases for general maintenance, salaries, and services of the Station.<sup>11</sup>

The next year, Hedrick reported: "That at the last budget hearing, the Director volunteered to have this amount cut to \$100,000, provided the money could be given in a lump sum so there might be greater fluidity in its use. The recommendation of the Director





*Hedrick Hall housed those working on horticultural projects.*

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was accepted by the Budget Committee of the Legislature. This means that there must be considerable give and take in the matter of money by the men using the funds---."12 The authors are not aware of any discontent among the staff but it seems likely that Hedrick must have taken his cut (or overhead as it is referred to today), from the lump sum for critical Station needs. This was a wise move. The likelihood of losing support funds hidden in the general budget was far less than for special items, which no longer had strong farmer support. Substantiation for this is the fact that the special funds total anticipated for 1932 had dropped \$23,050 from the previous year. Hedrick was shrewd with dollars as will be noted later.

It was also during the early years of his administration that Director Hedrick turned his attention to the landscaping of the Station grounds. Under his direction, numerous ornamental trees and shrubs were established. He also directed that chrysanthemums and other flowering plants should be maintained in the greenhouses. The result was that many visitors came to see these as well as to visit experimental plots. Even though Hedrick received some criticism for using greenhouse space for non-research purposes, the overall effort was judged to be beneficial, and some of his landscaping is still in evidence and enjoyed in the 1990s.

The year 1929 was a good one for the Geneva Station; 1930 and 1931 proved to be even better. In 1929, however, the nation's economy reached a worrisome state. The first clear signal that all

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was not well occurred December 29, 1929, when securities sold on the New York Stock Exchange were subjected to precipitous losses in value. And from this point forward the economy went from bad to worse. In fact, the nation became involved in what became called "The Great Depression," which lasted about 10 years. It affected all Americans adversely. Its effects ranged from one being unemployed (up to about 25 per cent of the population) to living on the same or a reduced income. There was a time lag of varying duration, however, before the Geneva Station and its employees experienced the full effects of the depression. Thus, as stated before, support funding increased steadily over the years 1929, 1930, and 1931.

The Legislature of 1929 provided funds for two new entomological projects. Both involved introduced species. One of \$13,000 was for: "Investigations on Certain Moths and Insects." It was used, initially, for research on the oriental fruit moth, a pest, primarily, of peach. The other grant concerned the European corn borer. The State's Department of Agriculture and Markets started studies on this species in 1927. In 1929, however, the Legislature decided to transfer the operational funds for this project (\$7,200) and the scientist involved (G. E. R. Hervey) to the Geneva Station.

The Legislature of 1930 increased the "Moths and Insects" fund from \$13,000 to \$50,000. The additional \$37,000 was for research on fruit pests in Eastern New York (the Hudson Valley and Lake Champlain fruit districts). The pest receiving primary attention, initially, was the apple maggot. Worldwide, this species, in 1930, occurred only in our northeastern states and in the adjoining Provinces of Canada. Several apple growers here, for some years, had sold some of their fruit in European markets, especially in Great Britain. A chance existed that the apple maggot might become established in their orchards. Officials in Great Britain finally recognized this possibility and served notice on our officials, that unless means were found to supply apples free of living eggs and larvae of the apple maggot, their markets would be closed to our fruit. Additionally, other British officials became concerned about the occurrence of too much lead arsenate spray residues on our harvested fruit. So, an allowable tolerance was established. It was 0.01 of a grain of arsenic per pound of fruit. On June 1, 1930, the senior author was added to the staff and placed in charge of the research needed to solve the foregoing problems.

On March 1, 1932, the Station had been in existence for 50 years. Plans were developed in 1931 to give proper recognition of this

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important occasion. Unfortunately, the Legislature, because of the depression, disallowed a request for celebration funds. Disappointed, but not dissuaded, the Station adopted its own low-budget plan. A major part of it was to invite New York and National agricultural organizations to hold their 1932 meetings in Geneva. An attractive brochure, entitled *Facts About the Geneva Station* was issued for distribution at these meetings.<sup>13</sup> A total of eight State and four National organizations elected to come to Geneva. In reporting on the outcome of the 50-year celebration, Hedrick wrote: "The plan worked admirably, and no doubt more people have been apprised of what the Station is and what it had done by this means than if there had been a formal celebration of the event."<sup>14</sup>

The Legislature of 1931 provided funds for the preparation of a *History of Agriculture in the State of New York*. This publication was to be prepared as part of the observance of the 100th anniversary of the New York Agricultural Society. It also was an important event in Hedrick's career for he was asked by the Society to write the history. This he did, and it appeared in print in 1933. It consisted of a 462-page well-written and beautifully illustrated volume. In its Preface he discusses the kind of a history he produced, as follows:

*"This is not a history of agriculture as an economic activity. The economist may close the book at once. Nor is it a textbook. The student will find matter much better worth study in cyclopedias. Nor, again, is the book written for scientists. Truth is, the author has studiously avoided all the jargon of science. It is not a source-book of statistics; it is not a treatise of agricultural philosophy; it does not tell how to farm; nor draw lessons from how our ancestors farmed.*

*The changing social scene in rural New York, people, not things, have lured the author. He has tried to give an account, in the first chapters at least, of communities of farmers shaping the destinies of their common life as they took possession of a new land. He has written of changes and movements which have multiplied the conveniences and pleasures of farm people. The table of contents shows chapters on farm organizations and their effect; transportation and communication; the printing press and the farmer; New York's share in the invention of farm machinery; the introduction of foreign plants and the domes-*

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*tication of native esculents; something about the derivation of the State's livestock; advancement in agriculture and science. All has been written for the farmer's fireside, not the study, classroom, or office.*

*The history begins with the early settlements and ends with the nineteenth century. The account has not been brought down to the present time for the twentieth century ushered in an almost new set of agricultural problems—organization, cooperation, farm economics, rural sociology, and industrialism. These new forces are making changes so profound and they are so far from finished that a history of them needs the perspective of time.*

*This history was written at the request, almost at the express command, of the State Agricultural Society.”*

The fact that Hedrick could write a book of this length and scholarship while carrying on his responsibilities as director of the Station is a remarkable tribute to his abilities and energy. In his preface, he acknowledges help from two people in planning the book and gives special tribute to Station editor James D. Lockett “who has read the manuscript and proofs and helped in many ways in seeing the book through the press.”

Several years prior to assuming the directorship, Hedrick edited and published a 686-page volume *Sturtevant's Notes on Edible Plants* in 1919, State of New York, Department of Agriculture, Twenty-seventh Annual Report, Vol. 2, Part II. This was also a monumental task and gives further evidence of Director Hedrick's skills as a writer and editor. It also provides much historical information about the Station's first director, E. Lewis Sturtevant, M. A., M. D. Also of interest is that Hedrick was assisted in this effort by Joseph W. Wellington, younger brother of Richard Wellington.<sup>16</sup> Joseph Wellington was employed here for five of the seven years Richard was employed at Minnesota and Virginia.

Two former Directors died in 1931, another in 1933. The first of these was the Station's third Director, Whitman H. Jordan, who died May 3, 1931, at his retirement home in Orono, Maine, at age 87. Lucius Van Slyke, who had served one year (1895) as acting Director, died in Geneva on September 30, 1931. He was 72. The Station's fourth Director, Roscoe W. Thatcher, died December 6, 1933, at Amherst, Massachusetts. He was only 61.



Volume I, No. I.

OCTOBER I, 1934.

Geneva, N. Y.

## Introducing "Farm Research"



**N**OTHING gives the Station greater concern than getting results of work in the hands of farmers. We distribute annually bulletins and circulars to the

number of 50 or more; publish books from time to time; send out about 300 news letters each year to newspapers; radio talks about the work of the Station reach the ears of thousands; groups of farmers come to the Station almost weekly; exhibits are made at fairs and agricultural meet-

ings; and thousands of letters are written during the course of the year to farmers who ask for advice. What more can we do?

The happy thought has come to the Station Editor that a journal giving current results of research at the Station and timely agricultural information prepared by members of the Station staff would help to carry news from us to farmers. Here, then, is FARM RESEARCH, a quarterly for the present, a new medium to tell the farmers of the State what the Station is doing.

—U. P. HEDRICK, *Director.*

*Introducing Farm Research from Volume 1, No. 1. This periodical was published for 33 years, until 1967 when it became a college-wide publication under a new name.*

On October 3, 1934, the first edition of *Farm Research* was issued. Planned to appear quarterly, its purpose was to provide accounts of research in progress. Brainchild of the Station's Editor, J. D. Lockett, it was published on schedule from 1934 to 1967. It was a very successful venture.

The Station's financial situation was not wholly bleak over the latter half of the 1930s. Thus, in 1935, an appropriation of \$3,500 was provided for studies on the corn earworm and \$5,000 for work on the problems of concern to the hop industry. Then, in 1936, came a \$10,000 appropriation for research on tree fruit diseases. In 1937, the State provided \$6,000 for studies on maple syrup and other maple products. Over this same period, grants were received from industry, the U. S. Department of Agriculture, and other granting agencies. In 1936, industrial companies, for example, provided \$7,495 to establish some graduate fellowships. While this foregoing financial assistance was helpful, the State-supported part of the budget remained at near the 1933-1934 level for the next six or seven years.

From the foregoing report on the Station's financial situation, the reader might conclude its research output must have been reduced. Quite the contrary. Viewed today, the advances made by the Station's staff over the depression years were most impressive. This claim is supported from the reports of accom-

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plishments given later in the division/department chapters, XII - XIX.

In 1923, when the Station became a unit of the College of Agriculture, the College Administration acquired the problem of effecting a satisfactory division and coordination of the programs of its two Experiment Stations. As noted earlier, the first plan adopted was to place the management of the two Stations under one Director. Thatcher and Morrison served in this capacity over the years 1923-1928.<sup>17</sup> As noted earlier, this plan was less than successful, largely because some of the College faculty ignored Thatcher's management efforts. In 1929, the college decided to provide a Director for each Station.

What followed thereafter, under Hedrick at Geneva, as perceived by Dean Ladd, was reported by Colman as follows: "Since the resignation of Director Morrison, the inclination towards independence on the part of the Geneva Station had again become predominant. There was little that Dean Ladd could do to secure greater coordination. As Director, Hedrick noted in his last report to the President of the University in 1937, almost all of the increases in the Station's budget during his administration had come from special appropriations by the Legislature. Much to Ladd's dismay, these appropriations were written in a way which required their direct assignment to Geneva. Temporary fellowships and grants in aid from commercial companies and from the USDA for cooperative research projects were additional sources of support. Although the receipt of funds in these cases were based on Memoranda of Understanding which Ladd had to approve, his approval was almost a formality; failure to do so would have affected the morale of the staff who had worked to secure agreements and would have prevented research of benefit to New York agriculture."<sup>18</sup>

However, the Cornell Administration doubtless was relieved when Hedrick retired. Hedrick's parting comment was, "On January 15, 1938, the present Director reaches the age at which Cornell University requires members of the staff to retire."<sup>19</sup> This inferred retirement was not his decision.

The very considerable scientific and practical advances achieved in the divisions during Director Hedrick's administration are reported in the Division/Department chapters XII to XIX. We call attention here to Hedrick's promotion and encouragement of research in the field of food science with a quotation from his 1932 Annual Report:

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*“The workers at this Station have been doing some work with the by-products of the farm for several years past, but renewed efforts are to be made for the utilization of fruit, vegetable, and dairy by-products. In particular, research work is being undertaken, either in new or a continuation of old projects, in the making of ice cream, cheese and casein, sauerkraut, bottled cider, grape juice, pectin, jams, jellies, and preserves. One of the most interesting of the new projects is the quick freezing of fruits and vegetables, work which the Station is doing co-operatively with the Birdseye Laboratories of the General Foods Cooperation of Gloucester, Mass., who during the summer of 1931 kept three of their workers at the Station and during the present summer will have a larger force. From the Station’s standpoint, the several projects have in view the determination of what varieties of fruits and vegetables are best suited for freezing; what the chemical and bacteriological changes are in the frozen product; and in general the adaptability of this process to keeping food. Much is expected of this work in the years to come.”<sup>20</sup>*

Director Hedrick followed up on the above concepts in 1933 with specific action. Early in that summer, Hedrick and his son were driven by his chauffeur in a state car to Gloucester, MA, to visit with Clarence Birdseye and Donald Tressler. He stayed for two days to learn about frozen food and the frozen food industry. According to Tressler, Hedrick was “very much enamored. He thought that it was wonderful.”<sup>21</sup> Back at the Station, Hedrick called George Hucker to his office to discuss his ideas about establishing a research program on food processing at Geneva. Hucker believed that this was the first administrative proposal for food science at the Station.<sup>22</sup> He was in error, however, because Director Thatcher had similar ideas for the Station. As noted in Chapter V, Thatcher’s second proposal to the Board of Control in 1921 was to provide new methods for preserving fruits and vegetables and making foods and beverages from them.<sup>23</sup> Additionally he strengthened the dairy program by hiring Arthur Dahlberg in November, 1921, to implement similar research on dairy products. Dahlberg and associates made several significant contributions to the pasteurization of milk and milk products and the production of no-free water cream cheese. The latter process was patented and resulted in more than doubling of cream cheese manufacture in New York State within three years.<sup>24</sup> Thus, it is evident that a viable and productive food science program was under way several years prior to the establishment of the Food Science and Technology Department in 1943.

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Director Hedrick brought further attention to his emphasis on food processing and preservation in the Station's research program in his last annual report in 1937. "While every effort has been made as in the past to help the farmers of the State produce crops, the work of the present Director in the nine years of his incumbency has been chiefly directed to converting farm products into foods."<sup>25</sup>

Thus, the reader should not be left with the impression that Director Hedrick's promotion of a food science program at Geneva had any significant negative impact on programs directed to helping farmers produce their crops. In fact, this was a very productive period in research accomplishments on fruit, vegetable and dairy production, as is recorded in the department chapters.

Obviously, the nine years of Hedrick's administration were very productive. A major new building and greenhouses were erected, new programs were initiated, income increased in spite of the Great Depression, the staff increased in numbers, the grounds were much improved in appearance and, more importantly, good progress was made in several fields of endeavor. On the negative side, relations between Ithaca and Geneva deteriorated during this period, some administrative problems were not addressed, and the Station did not have the influence on the national scene that it had under some previous directors. How then, shall we judge Hedrick as an administrator. Shall we do as Ladd did in his congratulatory retirement letter to Hedrick, i.e., praise his writings and politely ignore completely the subject of his administration? We think not, it would be unfair to Hedrick.

Hedrick's administration may be conveniently divided into the early and late years. His early years were extremely productive. He made several organizational changes in the Station divisions in recognition of the changing scientific developments and staff working relationships. He managed to obtain funding for the long sought horticultural building and the much needed new greenhouses. He used the then available funds for the unemployed to improve the appearance of the Station grounds. Further, the Station professional staff increased by 20 per cent during his administration. On the other hand, during the latter years of his administration, he became more and more involved with writing and editing books and suffered illnesses that reduced his effectiveness. He even considered early retirement at one time before his health problems were identified and corrected. His lack of attention to some aspects of Station internal and external affairs led to some farmer discontent. This was expressed by Mr.



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Skeffington, a highly respected farm reporter for the *Rochester Democrat and Chronicle*, in a letter addressed to Dean Ladd, November 4, 1938. Writing about Hedrick, Skeffington made the following statement: "There is considerable feeling among the more thoughtful growers that the station has gone through the severe handicap of having a sick man at its head for years. Farmers would fight to protect Hedrick from attack, but many of them realized the lack of leadership."<sup>26</sup>

There were also indications of discontent and morale problems at Geneva during the last few year's of Hedrick's directorship. Hedrick was recognized as a person who sought opportunities for self promotion. He consorted with the gentry of Geneva. He placed his name as the sole author on all the Fruit Books except the one written earlier by Beach. He did the same thing with the first monograph of the *Vegetables of New York* with recognition of the real authors only as "assistants." After complaints were made, he recognized the fact that most of the second vegetable monograph was written by others, but his name was listed in a manner that all citations would be for Hedrick alone.<sup>27</sup> The affected persons resented not being recognized for their contributions. In other ways, he failed to give praise or recognition to his colleagues.<sup>28</sup> When Nelson Shaulis, a world renown expert on grapes, first came to Geneva as an assistant professor, he went to retired Hedrick's house to obtain a copy the *Grapes of New York* because Hedrick was the only one in Geneva with copies. Shaulis agreed to buy a copy for \$4.00 and asked Hedrick to autograph the book. He did so and then told Shaulis: "That will be \$4 for the book and \$1 for the autograph."<sup>29</sup>

Problems of another nature existed in the Division of Horticulture. Richard Wellington, the head of the Division, was an excellent horticulturist and world recognized fruit breeder. However, he was a reserved person who did not seek or create much excitement among growers and the public. Also in the Division, was Harold Tukey who was leading the research effort on the then exciting new field of dwarfing clonal rootstocks. He was an extrovert who captured the imagination of growers, the public and, to an extent, Cornell administrators. He chafed under Wellington's quiet administration and sought ways to create a greater role for himself. He finally attempted to create a new Division for Rootstocks. Hedrick apparently elected to ignore the problem. His successor, Director Parrott, also took no action to solve this problem. Finally Wellington went to and complained to Dean Ladd. The latter's response was: "There are already too many divisions at Geneva."<sup>30</sup> Tukey was offered positions at Illinois and

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Michigan in 1937 but elected to stay at Geneva.<sup>31</sup> These letters suggest that Ladd encouraged Tukey to remain in Geneva but made no promises for future advancement. Tukey's lengthy letter to Ladd giving his reasons for staying in Geneva suggest that he had aspirations for an administrative position. When Heinicke came to Geneva as Director, he made it clear to Tukey that he should work through and not around Wellington's office.<sup>32</sup> Also, the Station directorship was no longer an early option for Tukey. He resigned on September 15, 1945 to return to his alma mater, Michigan State, as head of the horticulture department.

Regarding Director Hedrick's relations with Ithaca and Dean Ladd, there is no doubt that his priorities and loyalty resided in the Geneva Station. He had succeeded in getting funding for the new horticultural building, for which his two immediate predecessors had been unsuccessful. Further, some of the special appropriations for new projects originated by farmers and industry were directed to Geneva, often without the blessings of Dean Ladd. In 1937, the Dean accused Geneva (Hedrick) of playing politics: "Although you repeatedly assured me that you were not keen about it (melon breeding bill), and knew little of its origins, still it has for some time been apparent that someone at Geneva was pushing the bill but attempting to keep their activities from being known in this office. I do not yet know what has taken place but I am thoroughly disgusted with this sort of manipulation. Similar tactics were followed in the passage of the apple scab bill last year. The time has come to eliminate competition and to work energetically for coordination of program. I propose to do so."<sup>33</sup> The day before Ladd wrote his letter, Hedrick wrote Ladd about a memorandum he had received regarding the Governor's action as follows: "As you will see in the memorandum I enclose, Governor Lehman vetoed the bill because, as he says 'after consultation with the College of Agriculture at Cornell University he had learned that money was available from other appropriations to carry on the research work proposed by this appropriation'. This, of course, is not the case. We are hard pressed for money, especially in the Division of Vegetable Crops. That, however, is not the worst of the matter. The statement to Governor Lehman that there was money available must lead him to feel that there are funds available here for any new research work, which is far from the case. Moreover, if the statement attributed to Cornell was made to the Governor, I feel that I should have been consulted about it."<sup>34</sup> On June 12, Hedrick responded to Ladd's June 10, 1937, letter about the melon bill stating that a man named McNeal had proposed the melon bill at the fall budget hearing in Albany last autumn when Provost Mann rather

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than Ladd had been present. He denied further interaction on the matter until after the bill had been passed by both houses and was asked by McNeal to write the Governor, telling how the money could be used to advantage. He then went on to reiterate his displeasure as follows: "However, it is not disappointment in the Governor's vetoing the bill that displeases me. It is, as I wrote you before, the fact that someone at Cornell told the Governor that there was money at the Station to carry on this work. This statement appeared in the Sunday papers of a week ago and gives a wrong impression."<sup>35, 36</sup>

It is interesting to note that the only mention of Hedrick's ten years as Director of the Station in his obituary in the *Cornell Necrology of the Faculty 1951* is: "In 1921 he was named Vice Director of the Station and in 1928 Director. He served in that capacity until his retirement in 1938, when he took up residence in Geneva and devoted his time to writing." Following his retirement, the Board of Trustees of Cornell University authorized the naming of the horticultural building<sup>37</sup> "Hedrick Hall." He was a known member of the Station staff in the Geneva community and at Hobart and William Smith Colleges—if not the best known. He purchased a home in the prestigious section of South Main Street. Robert Doran, MD, was a neighbor and good friend of Hedrick and spoke very highly of the latter in his Oral History.<sup>38</sup> Doran seemed to be little aware of most other Station staff and noted: "Most of them, I think, are in their own particular little world up there." Thus, while Hedrick was well known and liked on Main Street, he did little to bring the rest of the staff and their work to the attention of the local people.

On the lighter side and to illustrate one of Hedrick's positive qualities is the delightful account by Hucker of how Hedrick turned what seemed to be an embarrassing situation into a positive outcome. The then Secretary of Agriculture was scheduled to come to speak at one of the Dairy Days. Hucker was in charge of planning a dinner at the country club where the Secretary could speak and meet the Station staff. In the forenoon a phone call brought the news that the Secretary was unable to come. Hedrick, who at first instructed Hucker to cancel the dinner, a little later told Hucker that Liberty Hyde Bailey had agreed to come and to proceed with the dinner plans. Bailey and Hedrick were very good friends and liked to reminisce together. Bailey and Station staff were seated at two long tables with Bailey and Hedrick at one end. As they were completing dinner, Bailey pushed back his chair and began talking to Hedrick. Gradually all became quiet and listened. Hucker recalled the occasion as follows: "There was

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no introduction, standing up nor subject. He was talking to Hedrick and indirectly to the Station staff. They discussed Cornell, earlier directors, Bailey's studies of palm trees, etc., etc. ..it was one of the most delightful and charming evenings I ever spent. ... This was the type of thing which Hedrick enjoyed and this was the type of administration he brought to the Station."<sup>39</sup>

On balance, Hedrick must be judged as a very successful director who contributed very significantly to the physical facilities, organizational structure, and scientific stature of the Station. It was well for the Station, however, that he reached retirement age when he did due to his health problems and diverted interests.



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### References

- <sup>1</sup> NYSAES Ann. Rpt. 1929, pp. 9-10.
- <sup>2</sup> NYSAES Ann. Rpt. 1930, pp. 11-12.
- <sup>3</sup> NYSAES Ann. Rpt. 1936, p.17.
- <sup>4</sup> NYSAES Ann. Rpt. 1929, p. 10.
- <sup>5</sup> NYSAES Ann. Rpt. 1929, p. 11
- <sup>6</sup> NYSAES Ann. Rpt. 1929, pp. 14-15.
- <sup>7</sup> Some of the credit, however, should be given to Directors Morrison and Thatcher who had laid the ground work and already had had the support of the legislature in previous years.
- <sup>8</sup> Sperry Oral History p.47-48.
- <sup>9</sup> NYSAES Ann. Rpt. 1931, pp. 14-15.
- <sup>10</sup> The use of the word "men" to refer to Station and University professionals was common in verbal, printed documents, and correspondence in Hedrick's time. The fact that such use now appears strange and inappropriate indicates the progress women have made in the scientific and academic professions during the last few decades. Charlotte Pratt was the first woman employed as a professional at the Station and enjoyed a highly successful career working in the field of cytology.
- <sup>11</sup> NYSAES Ann. Rpt. 1931, p. 15.
- <sup>12</sup> NYSAES Ann. Rpt. 1932, p. 15.
- <sup>13</sup> NYSAES Ann. Circ. 136, 34 pp., 8 plates, 1932.
- <sup>14</sup> NYSAES Ann. Rpt. 1932, pp. 16-17.
- <sup>15</sup> NYSAES Ann. Rpt. 1937, p. 13.
- <sup>16</sup> Hedrick acknowledged especially J. W. Wellington: "Who has had charge of standardizing botanical names, verifying references and preparing the bibliography." (Preface, p. vii)
- <sup>17</sup> Colman, G. P. 1963, A History of the New York State College of Agriculture at Cornell University, pp. 382-3.
- <sup>18</sup> Colman G. P. 1963, A History of the New York State College of Agriculture at Cornell University, pp. 446-447.
- <sup>19</sup> NYSAES Ann. Rpt. 1937, p. 12.
- <sup>20</sup> NYSAES Ann. Rpt. 1932, pp. 15-16.
- <sup>21</sup> Tressler, D. K., Oral History, 1964, p 12.
- <sup>22</sup> Hucker G. J., Oral History, 1962, pp. 119-120.
- <sup>23</sup> NYSAES Ann. Rpt. 1922, pp. 12-13.
- <sup>24</sup> Dahlberg, A. C., 1962, Oral History, pp. 14-15. NYSAES Tech. Bul. 180, 1931.
- <sup>25</sup> NYSAES Ann. Rpt. 1937, p. 14.
- <sup>26</sup> Letter, Skeffington to Laird, Nov. 4, 1938.
- <sup>27</sup> Sayre Oral History, 1962, p. 18.
- <sup>28</sup> Wellington Oral History, 1962, pp 78-79.
- <sup>29</sup> Personal communication, Shaulis-Glass, May 1994.
- <sup>30</sup> Wellington Oral History, 1962, pp. 67-68.
- <sup>31</sup> Letters, Ladd to Tukey 7/19/37 and Tukey to Ladd 7/16/37.

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<sup>32</sup> Wellington Oral History, 1962, p. 67.

<sup>33</sup> Letter, Ladd to Hedrick, 6/10/37.

<sup>34</sup> Letter, Hedrick to Ladd, 6/9/37.

<sup>35</sup> Letter, Hedrick to Ladd, 6/12/37.

<sup>36</sup> Even though relations between Geneva and Ithaca had improved by the 1950s, the Junior author (E. Glass) inadvertently stumbled into an awkward situation that he would have avoided had he known the background related here. During the mid 1950s, the redbanded leaf roller was causing heavy losses in apple orchards and no effective controls were available. I was responsible for the research on this pest. A fruit grower asked me if there was anything I needed that would assist in finding a solution. I said I needed another technician to carry on laboratory research on a year around basis. It never crossed my mind that this conversation would be followed up for action. The next spring, however, a bill was introduced and passed by both houses providing funds for a technician for me. When Governor Rockefeller asked Dean Palm about the matter, he replied that he knew nothing about it and the bill was vetoed. The final result, however, was not all bad because the next year, by going through channels, funds were provided not only for my technician but also one for a colleague working on vegetable insect pests.

<sup>37</sup> Built during Hedrick's first year as Station Director.

<sup>38</sup> Doran, Oral History, 1963, pp. 3-7.

<sup>39</sup> Hucker Oral History, Vol. I, 1962, pp. 122-3.

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## Percival J. Parrott 1938-1942



*Percival J. Parrott.*

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**P**. J. Parrott was appointed the seventh director of the New York State Agricultural Experiment Station on January 15, 1938 by Dean Ladd. Parrott had been Vice Director since 1929. The appointment was very well received by Station and Ithaca Staffs and by New York farmers.

By 1938, the concept of the Geneva Director having responsibility for Ithaca agricultural research had long been discarded. In fact, Dean Ladd was considering ways and means of eliminating competition and duplication by making drastic administrative changes. In 1937, Ladd circulated a plan to develop: "A closer and better defined relationship between the two institutions...to insure the most efficient use of funds, the greatest possible coordination of effort and to prevent undesirable duplication or appearance of duplication." Ladd's plan called for a single head for each pair of corresponding departments: plant pathology, entomology, pomology, vegetable crops, dairy (Ithaca) and bacteriology (Geneva), animal husbandry (Ithaca) and dairy (Geneva), and seed testing at Geneva would be joined with plant breeding at Ithaca. The department of chemistry at Geneva, having no counterpart at Ithaca, would remain unchanged. No mention was made about where the department head should be located. Under Ladd's proposal, "The dean is also Director of Experiment Stations. The local officer in charge at Geneva should be designated as Assistant Director of the Experiment Station." Further, "authority should be given for the transfer of men, equipment, supplies, units of work or funds from one institution to the other by the Dean with the approval of the President and the State College Council when it seems that the best interests of the state will be served by such a transfer."

What response did Ladd receive from the persons to whom he circulated the proposal? The only direct evidence we have is found in Director of Resident Instruction Cornelius Betten's November 12, 1937, letter to Ladd.

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*“Dear Dean Ladd:*

*I return herewith your statement regarding our relations with the station at Geneva. I agree with what you propose. In the long run the men and the services at the Geneva station must merge their interests into those of the University. I do not believe that a real unification can be accomplished so long as there are ambitions to promote the Station as such. I do not know whether we can give these men satisfactions in their University relations that will bring about this changed attitude. I do not know that we can take the steps you propose all at once but I think it is the direction which we should head.*

*Yours sincerely,*

*Cornelius Betten*

*Director of Resident Instruction”*

We can speculate that the mood in Ithaca favored the proposal but recognition of the problems and obstacles to implementation delayed immediate action. The imposition of the proposal on Geneva would have been met with hostility and resentment (authors' assessment). Even though Ladd elected to proceed with the appointment of Parrott to follow Hedrick, he did not give up the concept completely as shown in the next chapter.

Ladd chose Parrott after much deliberation because he was keenly aware of the strained relations with Director Hedrick over funding and other matters and the need for closer relations between Geneva and Ithaca. He sought advice from the highly knowledgeable and respected Mr. Skeffington, farm reporter for the *Rochester Democrat and Chronicle*, on what the reaction would be to a Parrott appointment. “...Confidentially, I think now that I shall recommend that Parrott be made Director following Hedrick's retirement in January. Do you think that this would be well received by the fruit growers in western New York? Parrott will have only a few years to serve and after his term of service, I should be anxious to secure a relatively young man who might reasonably be expected to serve twenty years or more years...”<sup>1</sup> Also, Ladd was searching for someone who would work collaboratively with Cornell administration and faculty. Parrott fulfilled these requirements and was only four years from retirement.

Professor Parrott was born in England and came with his family to the United States as a small child. The family settled in rural Kansas where he experienced the pioneer conditions of the time and place. These were the source of many lively anecdotes which he

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used in later life. The junior author recalls clearly the impromptu remarks that Parrott gave at the New York State Horticultural Society annual meeting in 1949. He compared the rudimentary dental equipment and techniques he was exposed to as a child with those of 1949. He likened that comparison to the new spectacularly effective insecticides and fungicides available in the late 1940s to the primitive materials available to him in 1900 when he first came to the Experiment Station. In spite of having been retired for seven years, the growers gave him an extraordinarily warm reception.<sup>2</sup> Parrott attended the University of Kansas, receiving the A. B. degree in 1897 and the A. M. degree in 1898. Kansas State College of Agriculture conferred upon him the honorary degree of Doctor of Science in 1943.<sup>2</sup>

Parrott was very effective in finding practical solutions to a number of difficult insect pest problems. He also built a very strong Division of Entomology (later termed Department) at Geneva. He was recognized nationally and internationally. The U. S. Department of Agriculture made him a special agent for an assignment to travel the entire length of Africa to investigate the potential for introducing new pests into the United States. He was called upon as a consultant by the Department at the time of the threatened invasion of the Florida Citrus industry by the dreaded Mediterranean fruit fly in 1929 and 1930. He served many years on the executive committee of the Division of Biology and Agriculture of the National Research Council. He was elected president of the American Association of Economic Entomologists. He was a member of the American Association for the Advancement of Science and a Fellow of the Entomological Society of America. Parrott was one of the most outstanding economic entomologists in the world when he assumed the directorship of the Station.

Professor Parrott had a pleasing personality. By his sense of humor, witticisms, and fairness, he was a pacifier among co-workers and at farmer meetings. Dean Ladd correctly judged Parrott to be the best choice for Hedrick's successor. Ladd, however, also realized Parrott's potential limitations as an administrator and recommended that Hedrick give Parrott more administrative responsibilities to prepare him for the assignment. "As a matter of fact, although Parrott has been Vice-director in name, he really doesn't know much about the administrative work of the Station. Unless we give him an opportunity to break in soon, he will not be in condition to take over the responsibilities next January if it is finally decided to ask him to do so."<sup>3</sup> Hedrick seldom if ever consulted with Parrott on administrative matters.



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Director Parrott appears to have been relaxed regarding many of the financial aspects of Station activities. As late as 1948 when Glass came to the Station, many recalled Parrott's familiar response to requests for funds or equipment, "See Bowen." Mr. Bowen was the financial clerk in the Director's office at that time. In 1962, Miss Jesse Sperry, who was hired by Director Jordan in 1914 as his administrative secretary and had worked for Jordan, Thatcher, Morrison, Hedrick, Parrott, and later for Heinicke, said that, "(Parrott) was very gracious and kind to everybody. He liked everybody, and he wanted everybody to like him." She recalled that Parrott left many duties to her, including the drafting of budgets and pay raises. Parrott only gave advice and final approval.<sup>4</sup>

Parrott's basic nature as a pacifier made it difficult for him to make certain administrative decisions. He delayed the appointment of his successor as head of the Entomology Division for seven months trying to decide between two strong internal candidates: long-term friend and respected entomologist (Hugh Glasgow) and a younger colleague (Paul Chapman) with an outstanding research record and forward looking approach to the future of the department. He finally chose Glasgow, who served until his death in 1948.<sup>5</sup> In retrospect, Parrott made the right decision. Glasgow was an able manager of department affairs during the difficult final depression and World War II years, and Chapman was given the time to pursue the outstanding research on horticultural spray oils that he and his colleagues in Chemistry initiated in 1939.

During the Parrott years, there was considerable tension in the Pomology Division between Wellington and Tukey. As noted earlier, the latter was very outgoing, aggressive, and ambitious. Wellington by contrast was mild mannered, conservative but tenacious, and well respected. Tukey attempted to establish a separate division for his nursery rootstock program, which at that time was receiving much attention from nurseries and growers. Wellington, while mild mannered, did not approve the concept and took steps to prevent the new division. As noted in Chapter VII, neither Hedrick nor Parrott took a stand in the matter and permitted Tukey to bypass Wellington. To prevent a new nursery division, Wellington went directly to Dean Ladd for help. Ladd's response was that there were already too many divisions at Geneva and did not need another. Still Parrott did not prevent Tukey from bypassing Wellington in other matters and left it up to his successor to correct the problem.<sup>6</sup>

Unlike Hedrick, who started out with a whirlwind of administrative directives and decisions, Parrott was concerned with the larger



*Experiment Station Staff, 1938.*

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problems associated with relations with farmers, Cornell Administrators, Albany, and adjustments to the changing demands and limitations of the early World War II years. It was not possible to build new buildings or make major alterations; however, he did manage to obtain a \$4,500 appropriation in 1939 for the much needed reconditioning and improvement of the Station's electrical facilities. In the new spirit of cooperation between Ithaca and Geneva, H. E. Weatherlow, Superintendent of the Department of Grounds and Buildings, Cornell University, planned and supervised the new installation.<sup>7</sup>

Also, unlike Hedrick, Parrott obviously had a good working relationship with Dean Ladd. They worked closely in efforts to obtain funding for research on biological control of the oriental fruit moth and the Japanese beetle and support to diversify the fruit industry in the Hudson Valley and add funding for the Valley Laboratory. This involved letters back and forth regarding strategies for obtaining funds from Albany. Parrott wrote lengthy letters briefing Ladd on his perception of the feelings and wishes of the farmers and the public in both the Valley and Western New York.<sup>8</sup> Parrott's approach to new funding for special needs appears to have been effective. New appropriations were made as follows: 1940—Grape berry moth control—\$2,500,<sup>9</sup> 1942—European corn borer and corn earworm—\$5,000, oriental fruit moth and fruit diversification—\$10,000, and new uses for milk and dairy products—\$5,000.<sup>10</sup> These arrived with the blessings and support of the Dean's office.

In spite of these special appropriations, there were cuts in State appropriations, which impacted Station operations and personnel.

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Every effort was made to maintain professional staff, but finally in 1940 it was necessary to reduce staff by not filling vacancies or eliminating positions. One of the latter was an associate in research (Pomology), held by Olav Einset since 1923.<sup>11</sup> He was on leave in his home country, Norway, at the time and was notified by letter that his position had been eliminated and that he should not return. This action raised some ethical questions, but no action was taken. Had the Station been more closely integrated with Cornell at that time, there would have been greater concern regarding the rights of a member of the professional staff.<sup>12</sup> The following year, it became necessary to shut down the greenhouses from November 1 to March 1 in order to avoid a deficit. This action resulted in the loss of one year in plant breeding activities and limited the work of the Vegetable Crops Division.<sup>13</sup>

It was during Parrott's administration that the Geneva staff was given professorial titles. We have not been able to determine who first initiated the action, but we assume that there was favorable sentiment in Geneva. In a letter to Parrott, Dean Ladd asked Parrott what he would think of giving Geneva staff with Chiefs in Research and Associates in Research the titles of Professor and Assistant Professor respectively. The Station did not have the intermediate equivalent title of Associate Professor and Ladd suggested that it could be established.<sup>14</sup> Ladd must have explored the sentiment of the Ithaca staff prior to this letter because Director Guterman discussed the matter and how it could be accomplished in a letter to Ladd.<sup>15</sup> Ladd received approval from the President's office on January 2, 1941 to implement the change and Ladd notified Parrott of the decision on February 8, 1941. The change took effect on July 1, 1941. The use of the Associate Professor title was authorized, but recipients would have to attain it by promotion from Assistant Professor or Associate in Research ranks. This was a positive step in the effort to coordinate and amalgamate the Geneva and Ithaca staffs.

Reflecting on the above arrangement some 40 years later, it is surprising that there was no recorded dissatisfaction among the more senior Associates in Research holding Ph.D. degrees plus five or more years of productive research for not being classified as Associate Professors. D. M. Daniel's refusal to return to Geneva after World War II as Assistant Professor is the only known record of such dissatisfaction.<sup>16</sup> We can speculate that Director Hedrick would have objected strenuously to the arrangement if he had been director at that time. Daniel had all the qualifications for the promotion with his outstanding research on the oriental fruit moth control with parasites.

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World War II started on September 1, 1939, with Germany's invasion of Poland. It seems unlikely that Cornell administrators and Station personnel could have known or suspected the impact this war would soon have on the Station shortly after Parrott's appointment. The senior staff members, with the exception of Daniel, were not called into military service. Daniel was called up for active duty on December 6, 1940.<sup>17</sup> While his tour of duty was to have been for one year, the United States became involved in the War and Daniel remained in service for the War's duration. Daniel came to Geneva in 1925 with a BS in agriculture from Clemson, earned his Ph.D. in entomology in 1933 from Cornell, and was an Associate in Research in 1940. While at Geneva, he developed a highly organized and successful biological control program using a parasite (*Macrocentrus ancyliivorus*) to control the oriental fruit moth, a major pest of peach introduced to Western New York in the 1920s. At that time, there was no other effective control method. More details on his work are in the Entomology Department, Chapter XII. His military record was brilliant. In addition, 16 non-professional members of the Station staff were in the armed services in 1942.<sup>18</sup>

The War created a demand for increased food production to feed the armed forces and civilians of the United States and its Allies. It also called for new processing, packaging, and storage methods to make food available to military personnel in the field. There was pressure on Station staff to extend the latest technologies for increased production to the farmers and processors. The Entomology Division issued a new bulletin bearing the title, *Current Contribution on Insect Control* (Bul. 698) in December 1941. A second issue (Bul. 703) was distributed in January 1943. The series was designed to achieve several purposes: to provide New York farmers and professional workers with a report of the more pertinent new findings of the year, to provide prompt dissemination of information (a time lag of seven to 17 months from manuscript submission to appearance in print was normal for professional journals), and to serve as an outlet for useful findings not extensive enough to qualify for publication through normal channels. *Current Contributions* were well received by its intended customers, but the College Administration became concerned that similar publications would arise in many other departments at Geneva and Ithaca creating an impossible publication crunch. Further *Current Contributions* were disallowed.

Research efforts in other protection and production divisions were modified to obtain needed information for immediate use

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for increased production while continuing long-term research on basic scientific investigations. The Divisions of Bacteriology, Chemistry, and Dairying emphasized the solutions to the problems of preserving, processing, and packaging foods needed for the War effort.

The Geneva Station had an exceptionally talented, forward thinking, and widely recognized staff during the late 1930s to early 1950s period. Among these were: Drs. Breed, Conn, Hucker and Peterson in Bacteriology; Tressler and Kertesz in Chemistry; Parrott and Chapman in Entomology; Horsfall and McNew in Plant Pathology; Hedrick and Wellington in Horticulture; Dahlberg in Dairying; and Munn in Seed Investigations. Information on the contributions of these scientists and others are found in the departmental chapters XII to XIX. We mention here a few who left the Station during this period.

Among those who left was J. G. Horsfall, who was conducting pioneering work with organic fungicides prior to his departure to the Connecticut Station. There, he continued his research, which was the basis for his election to the National Academy of Science. He later was appointed director of the Connecticut Station. His successor, George McNew, was very productive before leaving to eventually become director of the Boyce Thompson Institute. The leadership by D. K. Tressler with cooperation from G. J. Hucker and C. S. Pederson and cooperation with food scientists from the Massachusetts Institute of Technology and other universities founded the Institute of Food Technologists (IFT) in the early 1940s. An early planning meeting was held at the Geneva Station on August 5, 1938. IFT developed into the principal food science organization in the United States with a 1990 membership in excess of 20,000.

In Bacteriology, R. S. Breed was world famous for his contributions and leadership in the preparation of the *Bergey's Manuals*. H. J. Conn was the national leader in developing and testing biological stains during and between World Wars I and II. As mentioned earlier, Parrott was one of the foremost economic entomologists of his time and had assembled a very capable staff. M. T. Munn became a national and international figure in seed technology. R. Wellington was one of the foremost fruit breeders of his time. H. B. Tukey was a leader in the development and use of vegetatively propagated rootstocks. And, in Dairying, A. C. Dahlberg, was an outstanding scientist in dairy chemistry. Most of the other members of the staff were also productive, even if not as well known at that time.

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Four years is too short a time to provide a well rounded assessment of Parrott's time as Director. However, the nature of the times with the uneasy relations of the Station with the Cornell Administration, the continuing financial constraints of the Great Depression, and the problems and challenges of the beginning of World War II were a critical test of his abilities as Director.

Parrott articulated the role of the Station in the introductory section of the 61st Annual Report of the Station about the adaptation of research to agricultural trends over its first 60 years.<sup>19</sup> After covering the earlier years, he turned to the war needs as follows: "Such considerations have never been more cogent than just now. In view of national war needs and the desirability of some thought on problems of post-war settlement, as a part of the war program, much attention has been given by the staff to the role that the Station should play in this emergency in the light of its dual responsibilities—contributions to the national effort and maintenance of the work normally requested by farmers. The list of research projects has been carefully studied from the standpoint of the kind and extent of the most useful service that could be rendered. Also, a balanced program providing for the national demands and the preservation of essential research and correlative activities sought by the agriculture of the State was formulated."<sup>20</sup> Parrott also made another revealing statement of his view of the Station's role and its impact, "These examples (adaptation of research to agricultural trends) of changing emphasis suggest two thoughts—first, the Station should be concerned with the times in which it lives; and second, that what it does today marks the future."<sup>21</sup>

Another insight to Parrott's basic philosophy regarding the Station follows: "A distinguishing characteristic of present work of the Experiment Station is its emphasis on the necessity of precise knowledge of the principles relating to farm practices, which knowledge in turn should serve as the foundation for a sound and profitable agriculture. More than any other thing, research extends the horizon of economic insight and imparts a forward thrust. This is recognized by rural folk educated in agricultural science for which reason research is a major feature of the program of this institution."<sup>22</sup> Thus, Parrott continued to articulate the basic philosophy first stated by Sturtevant 60 years earlier that the Station has a mandate to conduct both basic and applied research, and the latter must rest on the foundation of the former.

Parrott's lifetime record of interest and collaboration with farmers and agricultural interests continued into his administrative years.

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*The Director's Residence was built in 1902. It housed Directors Jordan through Barton and later housed the Integrated Pest Management (IPM) program.*



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He noted that each year, it had been customary for a few State agricultural organizations and farmers groups to meet at the Station for the purpose of observing experimental activities or for conferences on matters of interest to the organizations. Parrott observed in the 60th Annual Report that there was an unusually large number of such meetings in 1940. In addition to the usual small groups, summer meetings of the following were held at Geneva: New York State Horticultural Society, New York State Jersey Breeders Association, State Vegetable Growers Society, State Canners Association, New York Fruit Testing Cooperative Association, Inc., New York State Seed Testing Association, and horticulturists from the northeastern states engaged in rootstock investigations. Additionally, two committees representing respectively the State's fruit and vegetable interests came to review the research programs in these two fields. Parrott included the following comment about these activities: "It may be accounted a hopeful sign that there are so many who find so much satisfaction in securing new knowledge first hand. More significant, perhaps, in view of the revelation of intellectual appreciation and dominating motives, are the efforts of the joint committees, which show that research has become an important interest to farmers. Their concern is not simply one of securing the latest information and advice, but also embraces independent action by organized farmer groups to review critically the research programs and facilities to secure effective prosecution of the work."<sup>23</sup>

Parrott was effective in obtaining some additional funding and, unlike Hedrick, did it in collaboration with Dean Ladd. A total of \$8,900 was appropriated for special repairs and modernization of

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facilities and \$30,000 for new research. As with many of such special research appropriations, these were continued and eventually became part of the Station budget. These gains were made in spite of shrinking budgets due to the depression.

No account of Parrott would be complete without relating the hunting expedition he had with Hedrick. Parrott had borrowed Mrs. Parrott's new car for the venture. On the way home, a shot gun accidentally fired and made a round hole through the center of the roof. They took the car to a garage and had a dome light installed in the hole. When Mrs. Parrott returned home a few days later, Parrott showed her the new dome light. She was quite pleased and did not learn until sometime later the true reason for the light. This incident speaks well for the resourcefulness and diplomacy of directors.<sup>24</sup>

When the junior author came to Geneva in 1948, housing was scarce and he decided to have a new home framed in by a contractor and he would finish it himself. Local banks were reluctant to loan the needed funds. Parrott's son, John, was in the insurance business and said he knew someone who would make the loan. All arrangements and payments were made through a local bank. When Glass went to the bank to sign the papers, he passed the loaner, P. J. Parrott, coming out of the bank after signing the papers. He just nodded and said a polite hello. There was never any mention of the loan by Parrott or Glass during subsequent meetings on social occasions. He was a caring person and did things in a quiet dignified manner.

Parrott's major contribution to the welfare and future of the Station is thought to be the quiet effective manner in which he brought the Station and Cornell closer together, not by edict but by example. He set the stage for his successor even though he did not prepare the staff for the shock of A. J. Heinicke's administrative style. Perhaps long-term administrative secretary, Jesse Sperry, may have summed up P. J. Parrott's administration best when she said: "People did mostly as they pleased. We were not supervised very strongly at that time. We could do or not do but I think we got along all right. Sometimes I think we get along just as well with easy people as with Drivers."<sup>25</sup>



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## References

- <sup>1</sup> Letter, Ladd to Skeffington, 6/9/37.
- <sup>2</sup> For many years, Parrott had held unscheduled and informal discussions with growers at Horticultural Society meetings, which were very popular and well attended.
- <sup>3</sup> Necrology of the Faculty, Cornell University, 1953-1954, pp. 4-5.
- <sup>4</sup> Sperry Oral History, 1962, p. 55.
- <sup>5</sup> Chapman Oral History, 1965, pp. 29-31.
- <sup>6</sup> Wellington Oral History, 1962, pp. 67-68.
- <sup>7</sup> NYSAES Ann. Rpt. 1941, p. 10.
- <sup>8</sup> Ladd to Parrott 10/17/40, Parrot to Ladd 10/29/40 and 12/27/40.
- <sup>9</sup> NYSAES Ann. Rpt. 1940, p. 8.
- <sup>10</sup> NYSAES Ann. Rpt. 1942, p. 13.
- <sup>11</sup> NYSAES Ann. Rpt. 1939, p. 11.
- <sup>12</sup> Chapman Oral History, 1964, pp. 147-8,155.
- <sup>13</sup> NYSAES Ann. Rpt. 1940, p. 7.
- <sup>14</sup> Letter, Ladd to Parrott, 7/9/40.
- <sup>15</sup> Letter, Guterman to Ladd, 5/17/40.
- <sup>16</sup> Chapman Oral History, 1964, pp. 55-56.
- <sup>17</sup> NYSAES Ann. Rpt. 1941, p. 11.
- <sup>18</sup> NYSAES Ann. Rpt. 1942, pp. 15-16.
- <sup>19</sup> NYSAES Ann. Rpt. 1942, p. 9.
- <sup>20</sup> NYSAES Ann. Rpt. 1942, pp. 9-10.
- <sup>21</sup> NYSAES Ann. Rpt. 1942, p. 9.
- <sup>22</sup> NYSAES Ann. Rpt. 1940, p. 7.
- <sup>23</sup> NYSAES Ann. Rpt. 1941, p. 9.
- <sup>24</sup> Hucker Oral History, Vol. 1, pp. 95-96.
- <sup>25</sup> Sperry Oral History, 1962, pp. 56-57.

## Arthur J. Heinicke 1942-1960



*Arthur J. Heinicke.*

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**O**n September 1, 1942, Arthur J. Heinicke became the eighth Director of the New York Agricultural Experiment Station. He was the first Station director appointed from the Cornell University faculty at Ithaca. Like his two immediate predecessors, he was well known and respected by New York fruit growers and had their support and confidence.

Heinicke's account of his youth and early professional career gives insight to his administration of the Station.<sup>1</sup> He was brought up in the outskirts of St. Louis, Missouri, where German was frequently spoken and was the language of the church he and his family attended. He spent most of his summer school vacations on farms near the city. He was proud that he was able to handle a team of horses and plow a straight furrow at an early age. During his last summer in high school, he worked for a small meat packing company in St. Louis owned by an elderly man who was looking for a young person to take over the business. Among other duties, Heinicke was given the task of collecting, sorting, and providing the bookkeeper with the delivery slips for the day. In spite of advice from the meat packer that he should stay and take over the business, he decided to enroll at the University of Missouri in the College of Agriculture in the fall of 1910.

Heinicke had saved money from his summer employments and from producing and selling eggs during the school terms but it was necessary for him to work during his undergraduate years. He worked for his veterinarian professor, he milked cows, and finally he worked in Professor William Chandler's laboratory where studies on freezing injuries to plant tissues were being conducted. After Chandler left in 1913 to accept a professorship in the Pomology Department at Cornell, Heinicke conducted experiments to determine the freezing points of "many" crops. Heinicke's background in German was put to use when he agreed to translate an early genetics text by a German scientist in

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return for a modest stipend and credit for a three hour genetics course. He received the BSA in June 1913 (three years) and the MS in the spring of 1914. These accomplishments are early evidence of his characteristic single-minded determination and concentration he displayed as director to complete immediate tasks and reach his objectives. Even as a student, he avoided distracting activities.

Heinicke followed Chandler to Cornell University in the spring of 1914 as an instructor in the Department of Pomology and registered in the graduate school with a major in pomology and minors in botany and physical chemistry. He received his Ph.D. in 1916, the first doctoral degree granted in Pomology at Cornell University. Chandler had been brought to Cornell to develop a strong research program with emphasis on basic studies relating to fruit production. Heinicke thrived in this environment and, in 1920, was appointed head of the department when Chandler left. Heinicke established a reputation as an excellent teacher and as an effective researcher and administrator. He was well respected by fruit growers. A number of these were former students.

It is not surprising that Cornell administrators turned to Heinicke to be director of the Station in 1942 upon Professor Parrott's retirement. After the rather difficult experience with Director Hedrick, who resented and resisted Cornell University's control and supervision, followed by Director Parrott's cooperative but relaxed administration, Dean Ladd of the College of Agriculture sought a strong administrator with credentials in horticultural research and one who would be acceptable to New York farmers and processors. Heinicke was an obvious choice. In fact, he was being considered in 1938 as a prime candidate to succeed Parrott whenever the latter might decide to retire, or at the latest in 1942 upon mandatory retirement.<sup>2</sup>

It is surprising, however, that no one at Geneva, except Parrott, appears to have been consulted regarding Heinicke's appointment. Dean Ladd brought Heinicke to Geneva and introduced him to the then Department Heads assembled at Jordan Hall with the perfunctory statement, "Here is your new Director."<sup>3</sup> The department heads and other staff felt that they had no voice in the selection of the new director. This was hardly a very helpful beginning for Heinicke who was facing several very sensitive and challenging situations.

There is little recorded information as to how the Station Staff reacted to Heinicke's appointment. He was not well known to most

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of the staff except those in pomology.<sup>4</sup> Professor Wellington respected Heinicke for his research and teaching.<sup>5</sup> Professors Chapman and Hamilton knew Heinicke from contacts at fruit grower meetings where he was a colleague with whom they carried on vigorous but reasonable discussions on scientific problems. They considered “that this was a fine choice.”<sup>6</sup> There was, however, a conviction, or at least a strong suspicion, that Heinicke’s appointment confirmed the perceived hostile attitude of Ithaca toward Geneva. Whatever favorable acceptance Heinicke’s appointment had with the staff was tempered after his arrival because of the way in which he questioned everything that was being done at the Station.

Miss Jessie Sperry’s oral account of her early experiences with Heinicke is quite revealing. Miss Sperry was a strong minded person who started work at the Station under Director Jordan and had considerable authority and control under Directors Hedrick and Parrott. When asked if Heinicke was a fighter, she replied as follows: “Yes. It is queer how anyone’s ideas and opinions of people change. A few of the men in pomology had known him in Ithaca, but he was a stranger to most of us. I don’t know as he had been to our Station more than once or twice. Nothing, absolutely nothing, we did was right. We didn’t do anything right—our forms were not right—nothing was right in the whole business. He was the most difficult person to get along with. I was next door to him all the time and was right in all of it. I took quite a beating at that time. I made up my mind that was my job. He was doing his job and I was doing my job. There was no use fighting all the time. After a while I think he gave in and I gave in and we got along beautifully ever since. I liked him very much and I thought a lot of him. I could look back and see where he had really done things. He tried to do things and he insisted on doing it no matter what effect it had on other people. He didn’t care about that. If he said do it, we did it. I guess he had the right idea.”<sup>7</sup>

Jessie Sperry’s successor, Lucile Holtby, also found Heinicke to be an effective and agreeable supervisor and became a strong champion of Heinicke.<sup>8</sup> The abrupt change from the courteous and deferential Parrott administration to Heinicke’s style was not easy to accept by a number of the professional and non-professional staff as we shall see later.

The negative feeling toward Heinicke’s appointment was further exacerbated when he assumed headship of the Pomology Division, thus demoting Wellington to Associate Head. He also continued as head of the Ithaca Department of Pomology. It was not generally

Whatever favorable acceptance Heinicke's appointment had with the staff was tempered after his arrival because of the way in which he questioned everything that was being done at the Station.

known or understood that Heinicke was directed by Cornell administration to take over these duties in order to improve integration without duplication of the efforts of the two pomology units.<sup>9</sup> We have been unable to find information concerning what Heinicke thought about the triple responsibility. It was not characteristic of him to seriously question the decisions of his superiors. He further aggravated Geneva Department heads by telling them that a headship was only a part-time job because he managed two departments as well as being Director of the Station.

The transfer of the dairying program to Ithaca and combining the administration of the two pomology departments raised further concerns that Cornell would eventually transfer all Station functions to Ithaca. This concern was especially prevalent in the Vegetable Crops and Pomology Departments.<sup>10</sup> Barton believed that the lack of extension at Geneva exacerbated the situation because Ithaca extension frequently failed to recognize Geneva research results in their publications. Later, as Director, Barton sought to develop an extension presence on campus as we shall see in the next chapter.

Director Heinicke rarely, if ever, praised Station staff. It was the general impression at the Station that he had a very poor regard for the Geneva staff and its research effort. It would come as a surprise when word would come from Ithaca, Albany, or farmers of praises and favorable comments he had made about Station contributions. Needless to say, this approach did not improve morale at Geneva. Toward the end of his administration, however, most of the staff began to realize that much of his approach was his way of managing. In this regard, it is interesting to note that the persons who worked most closely with the director (Jessie Sperry, Lucile Holtby, James Luckett) were the ones who spoke most highly about him and his administration.

Upon his arrival in Geneva, Director Heinicke immediately became embroiled with the Geneva Community and the Geneva Chamber of Commerce relative to their concerns about moving Dairying and Dahlberg to Ithaca. When news of the transfer came to the Geneva Chamber of Commerce, its members became very concerned that this was the first move towards the elimination of the Station in Geneva. Heinicke described the subsequent events as "The first crisis (and the only one I recall) that the new administration of the Station had to deal with ..."<sup>11</sup> His account of a meeting in his office with the head of the Chamber of Commerce and Dean Ladd is quoted here for the insight it provides to his approach to people and problems. "Soon after I became director,

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the head of the Geneva Chamber of Commerce, who was a prominent insurance man, met with Dean Ladd in my office at the Station, and tried to intimidate him. But Ladd remained calm, and as much as told the Chamber of Commerce president to mind his own business. Somehow or other, I was asked how I felt about the matter. I had had little experience dealing with local politicians and indicated that I had the impression that the station was under the administrative authority of Cornell and not of the local Chamber of Commerce, and that I was working under the direction of the dean of the College who I felt knew considerably more about the best interests of the station than did the local business representative. On this note the conference ended and, as previously mentioned, the matter was taken up with President Day and Trustee Babcock. After this initial contact we had no further indication that the Chamber of Commerce would try to influence the work of the Station. The individual members, including the president of the Chamber of Commerce became and remained good friends of the Director throughout his administration.<sup>12</sup> He was blunt, almost to the point of being rude, in following the official Cornell policy with zeal. More details on the move of dairying to Ithaca are discussed later in this chapter.

As was customary in the Geneva Rotary Club, Heinicke, as director, was elected an honorary member, and attended as his schedule permitted. The Heinickes attended church in Geneva but retained their membership in their Ithaca church. Unlike Parrott, he was not active in civic affairs.

On one of Heinicke's visits to the Station in 1942, he took a taxi from the railway station and asked the driver to take him to the Station. The driver replied, "You mean the Naval Training Station?" When told he wanted to go to Jordan Hall, the driver said: "Oh, you mean the 'State Farm.'" Heinicke learned that many visitors had similar experiences and made efforts to change the image from a "farm" to a "research" institution. The "state farm" phrase gradually faded and was used only in jest by a few residents by the end of Heinicke's administration.

During the early and mid years of the Heinicke administration, relatively little or no attention was directed toward public relations. The usual contacts with farmers and the scientific organizations were maintained, but it was not until the 75th anniversary of the founding of the Station and the groundbreaking ceremonies for the new food science building that he encouraged and sponsored significant public relations activities. The New York State Horticultural Society and the New York State Vegetable Growers joined

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*Governor Harriman's successful ground breaking for the new Food Research Laboratory in 1957.*



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forces in holding their annual summer meetings at the Station in August 1957, with Governor Averell Harriman and Dean William Myers present as principal speakers. Other groups that met at the Station were the Council of Rural Women, the New York Regional Men's Garden Clubs of America, the Empire State Gladiolus Society, the New York State Association of Fertilizer and Feed Inspectors, the Western New York Section of the Institute of Food Technologists, the Western New York Section of the Society of American Bacteriologists, and the Cornell Chapter of Sigma Xi.

On October 4, 1957, a symposium was held in connection with the groundbreaking ceremony for the new Food Research Laboratory. Outstanding scientists in research fields related to the work of the Station discussed the topic "The Role of Agriculture in Future Society." The Honorable Averell Harriman, Governor of New York, addressed the symposium group and successfully participated in the groundbreaking ceremonies (as noted elsewhere in this chapter). The symposium papers were published as Station Bulletin No. 780.

The Station staff also was host to several events arranged for residents of Geneva and nearby areas. There were tours for organizations with special interests and exhibits for high school students. It was estimated that over 5,000 people visited the Station during the anniversary year. In addition, many others learned of the Station and its work through the cooperation of radio, newspapers, and other publications.

Unlike the files of communication between Director Hedrick and Dean Ladd containing evidence of conflicts and very blunt accu-

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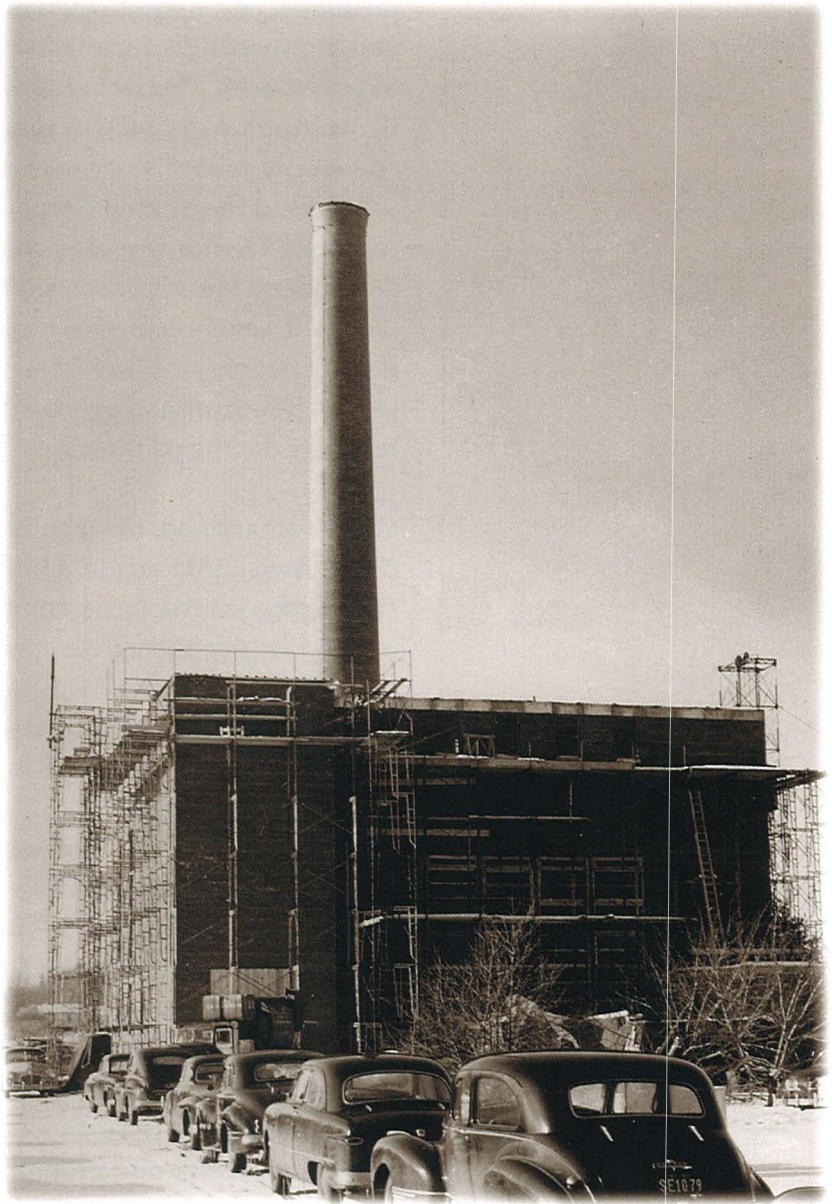
sations, there was no suggestion of any disagreements between Heinicke and Dean Myers or other Cornell administrators during his 17 years as director of the Station. Heinicke had much respect for his superiors, perhaps even awe. Hucker described an incident illustrating this trait. Heinicke was scheduled to be in the car that was to greet Governor Averell Harriman at the airport at Sampson and take him to the Station. A half hour before the car was to leave, Heinicke called Hucker and asked him to substitute for him. When Hucker got in the car with Treasurer Arthur Peterson and Provost Sanford Atwood, he remarked, "I don't know what I am doing here." Provost Atwood answered, "Art (Heinicke) panicked." Most of the Geneva staff had no opportunity to see this trait in his personality.<sup>13</sup>

The matter of the possible role of Geneva staff in extension activities came up several times during the Heinicke years. Up to that time, Station workers had been unofficially conducting extension each year by participating in grower meetings and occasional farm visits. In each of the 18 annual Station reports made during Heinicke's administration, these activities were acknowledged by a reference such as that in the 75th report: "As in past years the staff of the Station participated to a considerable extent in the extension and teaching program of the College of Agriculture." There was some agitation to officially recognize this activity, but Heinicke was opposed to it and Ithaca was happy to receive "free" help. It was in the vegetable area that problems arose when Geneva Staff found that Ithaca extension staff was not recognizing and following the Geneva findings in their recommendations.<sup>14</sup>

As indicated earlier, Heinicke was highly respected by New York fruit growers, and this had been a factor in Dean Ladd's decision to appoint him director in 1942. In fact, a number of growers had been his students at Cornell University. There is no indication that he lost any of this respect or support during his administration. His manner with growers at meetings and on the farms was direct without the challenging and irritating approach he habitually used for Station staff.

Professionally, Heinicke was a highly respected horticulturist as indicated by the fact that he was in demand for speaking engagements in his field of expertise, not only in New York State, but also out of state, including California. According to editor Luckett, he wrote his own speeches.<sup>15</sup> He was also well regarded by his fellow directors in other states and was active in the four annual Northeastern directors meetings. At the time of his retire-





*Central Heating Plant, under construction in 1952.*

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ment, he was responsible for three regional committees. He took his committee responsibilities seriously and played a strong role in the germplasm program. By clever maneuvering, he was able to bring the Northeast Regional Germplasm Center to Geneva along with the funds to support it.<sup>16</sup>

Heinicke's administrative style has been noted in Jessie Sperry's oral history. Unlike Parrott, Heinicke was quite ready to make quick decisions without visible concerns for the consequences to individuals, whether they were secretaries, laborers, professors, or department heads. He did this in terms of research policies, finances, or other matters. His approach was to challenge a person

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on almost any subject whether it was a matter of why certain research procedures were being used or even whether a tire needed to be replaced. He treated professors as if they might be his students. Apparently, he was tough on his graduate students. A commonly related story was about one of his former students who joined the Marine Corps. When asked about boot camp, he responded that it was easy compared to being Heinicke's graduate student. His approach led to some very strong arguments and words. It never seemed to bother Heinicke, and he appeared to respect people who would stand up to him with sound arguments. If he ever had grudges resulting from such verbal battles, he never displayed them.

On the other hand, the faculty resented being treated like students. A well told incident illustrates the situation. Soon after coming to Geneva, he assembled the pomology staff in a peach orchard to give them a demonstration on how to prune a peach tree. Many on the staff had had as much or more experience than Heinicke. At the end of the demonstration, Associate in Research George Oberle walked over to the pruned tree, kicked it, breaking it, and stated: "Heinicke, in Geneva we do not prune dead trees."<sup>17</sup> According to Professor Wellington: "He (Oberly) couldn't take all of Heinicke's suggestions." Oberly resigned in 1948 to accept a position at Virginia Polytechnic Institute. Wellington states that Heinicke predicted that Oberly would not last long in his new position. He made the same prediction for Chief in Research, Reginal C. Collison and Associate in Research, Thais A. Merrill when they resigned. All three did well in their new positions.<sup>18</sup> Professor Harold B. Tukey, who had done outstanding research and promotion on apple rootstocks and was considered by a number of people as a top candidate to succeed Parrott, left in 1944 to become head of the large Horticultural Department at Michigan State University. Tukey later established a food research unit in his Michigan department.<sup>19</sup>

The exodus of staff was not confined to the Division of Pomology. George L. McNew, Division of Plant Pathology, an outstanding researcher and administrator, resigned in 1944 because he could not tolerate the way Heinicke interacted with his staff. McNew became manager for research and development for U. S Rubber Company, then chairman of the Department of Plant Pathology at Iowa State University, and lastly, Managing Director and Distinguished Scientist, Boyce Thompson Institute 1949 to 1974. Tressler also resigned in part because of Heinicke's appointment and administrative style.<sup>20</sup> Another outstanding member of the Staff, James G. Horsfall, resigned in 1939 for a position at the

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Connecticut Agricultural Experiment Station. He later became Director, 1948 to 1971. He was elected to the National Academy of Sciences and received many national and international awards. Tressler surmises that Horsfall left because he felt that his progress at the Station was limited due to the Ithaca-Geneva problems.<sup>21</sup> Heinicke stated that Tressler was very disappointed not to be chosen director and resigned shortly after Heinicke was appointed to the position.<sup>22</sup>

When World War II ended, Lieutenant Colonel Darrill Daniel expected to be reinstated on the staff at Geneva. As noted elsewhere, he had had a brilliant military career, was much decorated, and had been recognized twice on the front pages of the New York Times. In spite of Daniel's excellent work in biological control, Director Heinicke made it clear to him that he would be reinstated as an Assistant Professor and that his military record had not added to his ability to do entomological research. Daniel was an Associate in Research when he was called for military service which, by the end of the War, had been rated the equivalent of Associate Professor with tenure. Daniel resented this negative approach and decided not to return.<sup>23</sup>

The mid- and senior- staff members in the other divisions were not directly involved in World War II, so there was less direct impact on them. All divisions and administration had problems maintaining junior staff and particularly non-professional personnel. As indicated earlier, however, the Station managed to cope with the special needs and still maintain most of its long-range basic research.

Heinicke's relations with the non-professional staff were sometimes equally turbulent as with the professional staff. At that time there were two persons in the carpenter shop who had learned their trade in Europe, were very skilled, and proud of their abilities and work. They were Robert Larsen and William Petersen. They resented being told how to do their work, especially when Heinicke was in error, as when he directed that a new greenhouse being constructed by Station personnel would not need a foundation below frost line. The writers recall the next spring seeing the laborers digging the trench for the foundation under the greenhouse because of broken glass caused by frost heaving.

During Heinicke's administration, there was considerable labor unrest throughout the country, and it had spread to the Station. Hucker, in his oral history,<sup>24</sup> relates a most interesting episode that is informative about Heinicke's relations with non-profes-

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sionals and with Cornell administrators. Arthur Peterson, then treasurer of the College of Agriculture who wielded considerable influence at the College, called Hucker on the phone inviting him to dinner at the Lafayette Inn in Geneva and admonished him to say nothing about it to anyone. Hucker did learn that James D. Luckett had also been invited with the same secrecy request. When they met at the Inn they found that P. J. Chapman had also been invited. Just prior to this time, a labor leader had come to the Station and tried to organize the non-professional staff into a labor union. He had bitterly attacked Heinicke in an open meeting. There was a general anti-union feeling at the Station, but there was also a good deal of unrest among the non-professionals.

Peterson explained that he wanted to talk to the three, who represented 100 years service at the Station, about problems and concerns of the staff, but that he did not want or intend to hurt anyone. He also related that he had recently had a call from Larsen submitting his resignation, and that he immediately came to Geneva after calling Heinicke. The problem was that Heinicke had mandated that the carpenters construct some bins in a manner they judged to be wrong. Heinicke told them that he was director and they had to do it his way. Larsen then said, "O.K. You build it," and walked off the job. Peterson spent the rest of the day straightening out the situation. He explained to Hucker, Chapman, and Luckett that he wanted to talk about this and other concerns at the Station. Among the topics discussed were: recognition for long years of service, voting privileges for the professional staff, daily courier service between Geneva and Ithaca, and a telephone tie line. (All of these were put in place in later years.) Hucker recalled that Peterson made a statement to the effect that the staff should realize that Heinicke means well and is trying to do his job and this is his operational style. At the end of the meeting, Peterson asked again that nothing should be said to anybody about their meeting. About three months later, Heinicke asked Hucker if he had had dinner with Mr. Peterson at the Lafayette Inn. He said he had but would not tell who else was there.<sup>25</sup>

It is not clear what impact the Peterson meeting had on subsequent events. All four of the above mentioned suggestions for improved relations between Geneva and Ithaca have subsequently been put in place in later years. No doubt the three Geneva staff members were made aware of the concern at Ithaca for the welfare of the Station. All three were strong supporters of the Cornell connection. The episode also seems to have impressed Peterson.



*Interior of the heating plant.*

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The junior author distinctly recalls Peterson's opening remark at Heinicke's retirement dinner: "Heinicke is recognized for running a tight ship," which brought a quick chuckle from the audience.

These accounts illustrate Heinicke's hands-on-style of management. A long list of examples are available but only a couple will suffice. It was not unusual to see a professor crossing the street with a used tire to get the Director's approval for a new tire from the locked new tire room in Jordan Hall. And, it was customary to see the Director leaving Jordan Hall during mid-morning on his way to check on activities around the Station grounds. On these excursions, he would confront professors or laborers and ask what they were doing and why. Most often he had specific suggestions for changes. Some feared these interviews; others were unruffled and almost insolent. It appeared to have made no difference to Heinicke. Such excursions kept him abreast of Station activities.

How was the Director able to carry on all the many duties of the Director regarding relations with Cornell, Albany, be active in regional director committee meetings, head Pomology Departments at Geneva and Ithaca, perform his regular duties as Director, and still have time for his hands-on activities? And, he did all this without the help of an assistant or associate director! Donald W. Barton, his immediate successor, has suggested that Heinicke's absolute control over all these operations enabled him to make decisions quickly and without consulting others. For example, he controlled all expenditures. Every requisition passed over his desk and required his signature. Monies were allocated

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to departments but could not be spent without his approval. Even so, he was a man with an unusual ability to handle much detail quickly and efficiently.

Regardless of his administrative style with employees, the Station continued to move forward. Director Parrott's last Station report<sup>26</sup> dated June 30, 1942, begins with a comment that the character of the subjects discussed in these reports have changed over the years. The research and reports have dealt with agricultural matters of interest at the time. Thus, the overall research program of the Station has responded to the agricultural needs as these have changed over the past 60 years. The report continued with the statement: "Such considerations have never been more cogent than just now." Several Staff members were in military service or away on part-time assignments for the state or federal governments. Support staff members were also in the military and others were being lured away to higher paying jobs for construction of the nearby Seneca Ordnance Depot in 1941 and the huge Sampson Naval Training Station in 1942. Replacements were not readily available. At the same time the Station was under pressure by the great demand for assistance in finding ways to produce and preserve more food for the armed forces.

Director Heinicke was compelled to give immediate high priority to obligations of the Station to focus on the War related problems. In fact, the first section of his first report dealt with this subject. The following quotation is of considerable interest as an expression of Heinicke's response to these challenges and his emphasis on basic research. "I am glad to record that even tho the staff has concentrated its research on immediate pressing problems concerned with the war effort, it has nevertheless found it possible to give some attention to the long-term projects of basic importance."<sup>27</sup> Thus, both Parrott and Heinicke recognized the need for immediate answers to food related problems caused by the war effort but encouraged continuation of long-term basic studies.

Early, mention was made of the move of the program in dairy research at Geneva to Ithaca. (A more detailed accounting of that historic event follows.) At a budget hearing in Albany in the fall of 1942, Dean Ladd and President Day informed the Board of Regents that the matter of duplication in dairy research had been carefully considered and that the program in this area at Geneva would soon be moved to Ithaca. Further, it was the intention of the Trustees to strengthen horticultural and food processing research at Geneva. As noted previously, Heinicke's first crisis as

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director was the controversy with Geneva citizens over the transfer of the dairy program from Geneva to Ithaca.

The Geneva Chamber of Commerce also continued to be concerned that the transfer of the dairy program was the beginning of a trend to reduce or eliminate the Station. They retained Mr. Lapham, a retired judge of the New York State Supreme Court who lived in Geneva to plead their case before Chairman of the Cornell Board of Trustees, Howard E. Babcock, President Day, Dean Ladd, Director Heinicke, and several guests. Babcock and Day informed the group of the necessity for moving the dairy program to Ithaca in order to provide for the strengthening of horticultural and food processing research. During the meeting Babcock called Governor Dewey on the telephone, explained the nature of local concern, and received a promise of a \$25,000 token appropriation to get the food processing program under way at Geneva. Apparently, the local Geneva citizens were convinced that a strong Station program would be continued.<sup>28</sup>

However, when the printed budget was received from Albany in February 1943, the promised \$25,000 was not included. After waiting a week and still no word from Ithaca, Heinicke called Dean Ladd about the omission. Ladd called Babcock who in turn called Governor Dewey at his home on a Sunday morning to remind him of the oversight. Later, a member of the Governor's staff visited the Station with instructions to persuade Heinicke to get along with the amount in the Governor's budget. "...but after going over our situation, he confessed that he felt we were 'pickers' for asking for such a small increase to get the food processing work under way." The \$25,000 was provided in the supplemental budget, and Ladd and Babcock were greatly relieved that their promise to the Chamber of Commerce was kept.<sup>29</sup>

There also were concerns among Station staff about the long-term consequences of moving dairying to Ithaca. President Day met with members of the Geneva Staff on June 9, 1943, and assured them that even though the Dairy program would be eliminated, the chemistry and bacteriology research pertaining to the production and preservation of horticultural crops would be strengthened in the new Food Science and Technology Department and other departments.

The records dealing with the Dahlberg's transfer to Ithaca are notable for their contradictions and involved Dean Ladd as well as Director Heinicke. In Ladd's letter to Dahlberg informing him of the transfer, he wrote: "I had hoped to talk with you before you left

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for Central America but some way or other missed out on this.” Then in the next paragraph he wrote: “In accordance with our many previous discussions<sup>30</sup> and the formal request that was made in both budgets last fall, your position has been transferred from the Geneva budget to the Ithaca budget and established at the annual rate of \$5,600. This becomes effective on April 1943. I hope that you can make the transfer of your family and your work to Ithaca without undue inconvenience or hardship.”<sup>31</sup> Dahlberg describes a completely opposite perspective.<sup>32</sup> He stated that in 1923 when Thatcher was Director, there was a rumor that the dairy program might be moved to Ithaca. Dahlberg was so opposed to the move that he sought a position with the U. S. Department of Agriculture and had made a temporary commitment. When he approached Thatcher, the latter talked to Dean Mann who made a promise that no shift would be made in the dairy work unless it had been discussed with Dahlberg personally and that the rumors had no foundation. In the fall of 1942, Ladd had called Dahlberg asking if he would be interested in a six-month study of the dairy industries of Central American Countries sponsored by the U.S. Department of State. Ladd told him about the advantages to Cornell and to his professional career and urged him to accept, which he did. He applied for a sabbatical but was turned down by Director Heinicke because he lacked a few months of the required time for a sabbatical leave.<sup>33</sup> He had to take leave without pay.

Dahlberg received Ladd’s letter advising him of the decision to transfer him to Ithaca when he was in Panama City preparing a report with his colleague, Hodgson. The decision caught him by surprise and he was temporarily in a state of shock. In Dahlberg’s words: “A messenger came to the door with a special delivery letter for me. I opened the letter and scarcely finished the letter when Hodgson spoke up and said in effect ‘What’s the matter, Art? Are you sick? What happened?’ I never said a word but passed the letter over to him. ... This letter written by Dean Ladd about the middle of 1943 advised me that as of the first of the month I had been transferred to the staff in Ithaca. This was the first notice that I had received and the first information of any kind that had come to my attention that the dairy work at Geneva was to be moved to Ithaca.”<sup>34</sup> After his return, Ladd made an appointment with Dahlberg to outline plans for him in his new role at Ithaca. Unfortunately, according to Dahlberg, Ladd died suddenly before the meeting could be held, and he never learned what Ladd was going to propose, nor did he learn anything from Ladd’s successor. Dahlberg apparently was politically astute enough to accept the transfer gracefully in writing,<sup>35</sup> but he obviously continued to be unhappy with the impact on him and his program as late as 1962.<sup>36</sup>



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Heinicke had the full support of Dean Ladd and President Day for the task of transferring the dairy program to Ithaca. The easiest part of the operation was with the dairy herd. The Ithaca Dairy staff decided not to bring the Geneva animals to Ithaca because some were infected with mastitis. The herd was sold to the highest bidder.<sup>37</sup> All the Geneva staff involved in the dairy program, except Dahlberg, remained in Geneva. They continued some of their research on dairy products but eventually converted to non-dairy problems in the emerging food science program at Geneva. Some had years of research in the dairy program and were not pleased with the change.

In spite of the apprehensions of local Geneva residents, it appears that Cornell never seriously considered closing the Station. No doubt the strong support of New York's agricultural organizations and farmers, plus Geneva's keen interest in keeping the Station intact may have deterred any incipient moves in this direction. The strong support from Geneva encouraged the vigorous support by the Cornell Administration for developing a strong food science program for fruits and vegetables. It was considered a trade-off for the loss of the dairy program.<sup>38</sup> It also no doubt encouraged the policy of discouraging Ithaca staff from developing overlapping research activities in fruit and vegetable processing and preservation at Ithaca.

George Hucker<sup>39</sup> believed the first administrative discussion and tentative action in promoting food science research at the Station was by Director Hedrick in 1933. He had met Clarence Birdseye and heard about frozen fish and knew about Tressler's work in Birdseye's laboratory in Gloucester, MA. Hedrick called Hucker to his office and proposed that the Station should perform research in food processing. Certainly, Hedrick followed up on this concept by bringing Tressler to the Station in 1933 as head of the Chemistry Division.

Apparently Hucker was unaware that Director Thatcher included in his 1921 long-range strategic plan for the Station to provide improved methods for producing and distributing milk, and better methods for manufacturing butter cheese and other dairy products as well as preserving and making food and beverages from horticultural crops. He hired a former student, Dahlberg, in 1921, to lead research in the newly established Dairying Division.<sup>40</sup>

Twenty-three years later, in the spring of 1945, President Day called a meeting of key Station professors of Bacteriology and Chemistry at Martha Van Rensselaer Hall in Ithaca to discuss the

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problem of combining the departments of Dairy-Bacteriology and Chemistry into a new department. Also present were Dean Myers and Director Heinicke. After listening to the discussion for an hour or so, President Day summed up what had been said and proposed that the new department be named Food Science and Technology. The name was judged appropriate by all present.<sup>41</sup> The new department was officially approved by the Cornell Board of directors on August 1, 1945. This action was, in reality, a recognition and organization of the strong food science research program that had developed gradually over the past 45 years in the divisions of chemistry, bacteriology, and dairying, often in collaboration with the other divisions.

By 1945, Tressler, head of Chemistry, had resigned and Breed, long-time head of Bacteriology was soon to retire in 1947. Elmer H. Stotz was hired as head of the Chemistry Division and became head of the new Division of Food Science and Technology in 1945. According to Willard B. Robinson and Mary Mann Moyer, hiring Stotz was a typical arbitrary decision by Heinicke, ignoring the fact that Stotz was a chemist trained in human physiology with little knowledge and interest in plants and the food science field.<sup>42</sup> He was, however, considered a good administrator and made some good decisions prior to moving to the University of Rochester Medical School as head of the Department of Physiology in 1947.

David B. Hand was appointed Professor of Biochemistry and head of the Division of Food Science and Technology June 15, 1947. Hand, a Cornell trained physical chemist, had been a member of the Ithaca faculty in the Division of Nutrition from 1936 to 1942. Prior to coming to Geneva, he had served from 1942 to 1947 as technical director for Sheffield Farms Inc., a large New York dairy company. The planning and construction of a new food processing building will be discussed in the next section.

Very little physical and program development took place during World War II, but soon afterward the State asked for proposals for new buildings. This was the beginning of 40 years of physical and personnel expansion at the Station.

When Heinicke came to Geneva as director, each building had its own coal-fired furnace. Not only was it an inefficient and time-consuming operation for the Station employees, it also created some very uncomfortable times for the staff. The junior author remembers distinctly coming to work at 8 A.M. on cold

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winter Monday mornings when the temperature in his office in the back wing of Parrott Hall was in the high 40s or low 50s. By 4 P.M., when the custodian would bank the furnace for the night, the thermometer might have reached the low 60s and then start to plummet again. A more critical problem was to maintain desired greenhouse temperatures. Thus, a modern central heating system was badly needed. It is interesting to note that Director Thatcher included such an item in his 1922 master plan for the Station for the interest of both efficiency and economy.<sup>43</sup>

Prior to Heinicke's appointment as director, Governor Dewey had requested all State agencies to submit plans for post war building projects. The Geneva requests had been submitted in August 1942 and had been approved by the Cornell University trustees. A new centralized heating system was to be the first project.<sup>44</sup> An appropriation of \$430,000 was included in the 1945-1946 budget for this new facility. By then, the plans for the heating plant and the proposed food science and technology facility were nearly completed. Also, an architect had been assigned by the State Planning Commission to develop plans for a new entomology and plant pathology building. However, it was not until 1948 that bids for the heating plant were received. Construction began in April 1950. Another \$350,000 was appropriated in 1951 for heating tunnels and connections to the Station buildings.

While excavating for the heating tunnels, there was a serious problem of water seepage and a special drainage system had to be installed. Later it was discovered that a pond on a farm about two miles northwest of the Station, which had been the source of the water supply for the original farm buildings, was no longer holding water and was the source of the problem. The supply lines had been cut by the excavation for the tunnels.<sup>45</sup>

The heating plant project was complete and in operation on October 1, 1952, servicing the greenhouses and all buildings except Chemistry and Entomology (Parrott Hall). The latter structures were scheduled for demolition.<sup>46</sup> Demolition of Parrott Hall was postponed because of the long delayed construction of the Food Science and the Entomology/Plant Pathology buildings. An underground insulated steam line was connected to the Parrott Hall heating systems when it became clear that the new Food Science laboratory would be delayed several years. A problem developed because the steam radiators had air escape valves. A certain amount of steam escaped into the offices and laborato-

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ries. At that time an anti-rust chemical, which was added to the steam, caused headaches for several members of the Entomology staff. Director Heinicke ignored all complaints. The problem was solved by drilling a hole through the window casing in the nearest window and connecting a rubber hose to the steam valve and running it to the outside through the hole. Soon, there were plumes of steam issuing from several window casings and the headaches disappeared.

Another problem developed with the new heating systems when neighborhood residents complained about the soot issuing from the smoke stack, especially on wash days. This problem was solved later by changing from coal to gas in 1960.<sup>47</sup>

The planning for a new food processing facility was under way prior to Director Heinicke's arrival in Geneva in 1942. Tressler and Hucker had taken the leadership in drafting plans. When Heinicke reviewed the plans with them, they were surprised to learn that he was concerned with every minute detail and challenged them frequently on the sizes and locations of laboratories and offices.<sup>48</sup> However, he was diligent in ensuring its final completion.

From the foregoing accounts of all the food science research and related activities that had been going on at Geneva since the early 1900s and the promises made by Cornell administrators, plus the post World War II building program originating in Albany, there was every expectation that the new facility would develop smoothly. Heinicke reported in 1945 that plans for the food science and technology laboratory with a pilot plant attached were well under way and that an architect had been assigned by the State Post War Planning Commission to develop plans for the new entomology/plant pathology building.<sup>49</sup> The next year it was reported that the detailed plans were practically completed, and \$877,100 for the building and \$23,000 for equipment funds had been appropriated from the Postwar Fund.<sup>50</sup> The same amounts were reappropriated the next year in 1947. It was not until 1949 that Heinicke could report that the Heating Plant was under way and that, "The food processing building is next in line."<sup>51</sup>

The junior author first became aware of these developments when he came to Geneva in the spring of 1948 to interview for a position in the Department of Entomology. Drs. Chapman and Carruth displayed architectural plans for the new entomology/plant pathology building stating that construction was imminent. Fortunately, his decision to accept the position was not based on the promised facilities but rather on the opportunities for field and modest labo-

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*“The preceding summer was very dry and hot and the ground was baked hard. Several weeks before the ceremony, we selected an appropriate spot, carefully lifted the sod and removed the bone-dry soil to a depth of 18 inches and refilled the hole with a sandy loam, and then replaced the sod. We provided a spade with a very sharp edge. When the Governor was about to break ground, he remarked that he had some difficulty in obtaining a respectable spade full of earth the last time he took part in such a ceremony a few weeks previously. He proceeded to put his full weight on the sharp spade. He and the audience were surprised to see the spade penetrate without difficulty for more than a foot in depth; everybody seemed delighted with the governor’s fine physical condition and his effective technique!”*

ratory research. As we shall see, it was another 20 years before the new entomology-plant pathology facility was in place.

It was not until 1954 that there was action in response to annual pleas for the new food science building. By this time, the New York State University System was in place and Cornell University, including the Station, became part of it. Finally, \$1,800,000 was appropriated in 1954 from the State University building fund and the old 1946 plans were being revised; however, actual construction was delayed at least another year.<sup>52</sup> As it turned out, construction did not begin until March 18, 1958. Heinicke and the food scientists were particularly frustrated when acting President of Cornell, C. W. De Kiewiet, recommended that the Ithaca Agricultural Engineering Building be constructed before the Geneva project, which originally had first priority. Heinicke notes: “President Day had been in close touch with the Experiment Station but the Acting President never visited the Geneva campus and he was not moved by remonstrations from the director.”<sup>53</sup>

The following account of the ground-breaking ceremony in the fall of 1957 by Governor Averell Harriman as part of the celebration of the Station’s 75th anniversary is interesting and illustrates Heinicke’s attention for details. “The preceding summer was very dry and hot and the ground was baked hard. Several weeks before the ceremony, we selected an appropriate spot, carefully lifted the sod and removed the bone-dry soil to a depth of 18 inches and refilled the hole with a sandy loam, and then replaced the sod. We provided a spade with a very sharp edge. When the Governor was about to break ground, he remarked that he had some difficulty in obtaining a respectable spade full of earth the last time he took part in such a ceremony a few weeks previously. He proceeded to put his full weight on the sharp spade. He and the audience were surprised to see the spade penetrate without difficulty for more than a foot in depth; everybody seemed delighted with the governor’s fine physical condition and his effective technique!”<sup>54</sup>

The new Food Research Laboratory was dedicated by Governor Nelson Rockefeller on May 5, 1960, two months prior to Heinicke’s retirement and after an 18-year gestation. It must have given him great satisfaction. In his last annual report, he notes that this facility was mentioned in each of the last 18 reports since it was first recommended in 1942 by the Trustees of the University as one of the post-war building projects. The building was partially occupied in February 1960.<sup>55</sup> The facility was considered to be the latest and best of its kind and many people came to study it prior to designing similar facilities. The cost of the new food research build-



*New Food Research Laboratory dedicated by Governor Nelson Rockefeller on May 5, 1960.*

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ing including scientific equipment as of June 30, 1960 was \$3,526,775.<sup>56</sup>

Before leaving this discussion of the Food Research Laboratory, mention should be made of the fact that it provided for research in the then newest field of food preservation, ionizing radiation. The Station had pioneered in preservation by microbial sterilization by heat, by dehydration, and by freezing. The new facility contained the equipment and a 6,000 curie cobalt 60 source to conduct pioneering research in this newest field.

The completion of the Food Research Laboratory did not signal the end of efforts to modernize the Station's facilities. In Heinicke's last report, it was stated that plans were in progress to convert the power plant from coal to oil or gas, to modify the Fredonia Grape Field Station nursery storage building to useful laboratory and office space, to expand the Jordan Hall Library by adding space formerly used for the boiler and coal bin, to build the new entomology-plant pathology laboratory, and to rehabilitate Sturtevant Hall for use by the Department of Seed Investigations and the Plant Introduction work. Director Heinicke left a monumental challenge to his successor.<sup>57</sup>

Even though the previously mentioned projects had been initiated prior to his administration, Heinicke diligently saw that they were completed. He also made several contributions to the Station for which he can be given complete credit. When he took office in 1942, Director Parrott told him that he was pleased to leave

Year	Name	Acres
1945	Darrow Farm	145.50
1949	Loomis Farm	77.29
1954	Smith Farm	26.04
1957	Childs Farm	19.66
1958	Robbins Farm	40.17
<b>Total</b>		<b>308.66</b>

him \$700 of “station funds” that he could use any way he wanted. Up to that time, produce such as cabbages and peas from fertilizer and other field experiments were given away or wasted. Heinicke initiated a policy that all such produce should be sold to processors. The annual income from sales and services ranged from \$25,763 in 1942 to \$65,806 in 1960. When he retired in 1960, he turned over more than \$100,000 to his successor, Director Barton.<sup>58</sup>

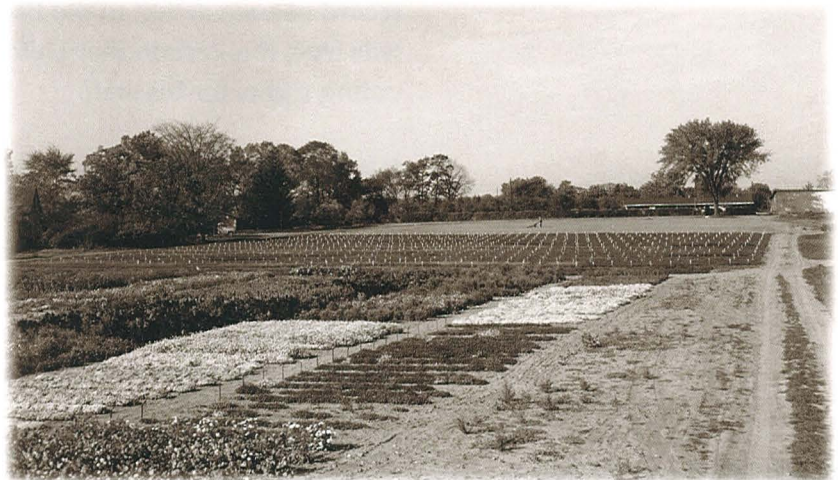
How did Director Heinicke use the Station funds accumulated during his 18-year term? He obtained approval from Cornell to use part of these funds for acquisition of land rather than renting, on the basis that long-term experiments would be jeopardized should rental arrangements be terminated. The table at left shows a list of farms purchased during his tenure as director.

The Darrow and Loomis farms each had a barn. A house, which came with the Darrow farm, was rented to Station employees until sold some years later. Five irrigation ponds were built on these farms.

Heinicke also used Station income funds to build an extension on the head house of the greenhouse range in which a biotron (climate chamber for studying the behavior of plants and other organisms under controlled environmental light, temperature, and humidity) was completed in 1959. Nelson Shaulis made use of the biotron for some of his pioneering studies on grape production.

And finally, Heinicke used these funds to construct two aluminum greenhouses. Most of the construction of the biotron and greenhouses was done by the Station craftsmen. It is evident that

*Field trials were just as important as research conducted in laboratories and greenhouses.*



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Heinicke made excellent use of the funds he acquired with his policy of selling produce.

During Heinicke's term as director, changes were made in title listings for the professional staff. The earliest annual reports listed Station personnel as "Station Officers" and included everyone under that category from the director to the stenographer and the farmer. Professionals were listed as horticulturist or assistant horticulturist of whatever their specialty might be. This terminology was used until 1920 when the terms Chief in Research, Associate in Research and Assistant in Research were introduced.<sup>59</sup> These were used until 1943 when each category was changed from Research to the corresponding rank of Professor, thus making the Station titles comparable to those at Ithaca. The staff officially became members of the College of Agriculture faculty in 1923, but without voting privileges.

Director Heinicke became aware that some members of the staff wanted to have all the privileges of Cornell faculty including voting rights. The matter was brought to the attention of the University Faculty in 1953 and again in 1955. In December 1955, the Geneva staff formally requested full voting privileges. The matter was referred to a Faculty Committee on University Policy and then to a Special Committee on Procedures and Organization. The latter recommended that the professional staff at Geneva be granted full voting privileges, and that Heinicke should present the case to the University Faculty. The latter voted unanimously in favor of the resolution, and the Cornell Trustees soon made it official. Heinicke believed this was an important step in strengthening the relations between Ithaca and Geneva staffs.<sup>60</sup> The senior author learned later that Heinicke's presentation lasted 45 minutes and that the Faculty later passed a resolution limiting allowable floor time to 15 minutes. However, he was unable to find a record of such action in the Faculty minutes. Whether or not this was true, it is certain that Heinicke diligently pursued gaining voting rights for his staff.

It is not generally known that Professor W. W. Wilcox was the first to suggest to the University Faculty that voting rights be granted to Station staff when the Experiment Station became part of Cornell in 1923. He was also present 34 years later at the Faculty meeting in 1957 to vote in favor of the motion, which was similar to his original suggestion.<sup>61</sup>

Director Heinicke held biweekly meetings with the department heads. According to verbal reports from Einset, Sayre, and



**H**einicke gave moral support to the “Station Club.” All members of the Station staff, both professional and non-professional, were eligible to be members of this unofficial social group. At that time, most members were professionals, but this gradually changed over the years. The annual Station Picnics in the summer, the annual fall Dinners, and the Christmas parties were big events and well attended. They provided opportunities for station families to get together in an informal friendly atmosphere.

Chapman, these were frustrating events during which they most frequently failed to accomplish their objectives and received lectures and verbal abuse from the director. He also instituted monthly meetings of the faculty, which he chaired with authority and frequent lectures and admonitions. He used them to discuss general problems of conducting the work of the Station, including general housekeeping that involved staff. Ithaca activities impinging on Geneva were announced. Several standing committees dealt with such matters as Station policy, library, seminars, and lectures as well as special problems such as salaries and voting privileges. Each year there were a series of Station seminars in addition to department seminars. It was also an opportunity for the staff to bring to the Director’s attention such matters that he would have brushed off on a one to one basis. There were occasional confrontations which, to his credit, were not considered as personal matters. This was one of his redeeming qualities. Only later did most of the staff recognize that his challenging manner was his method of finding out whether his “adversary” really knew or believed what he or she was saying or writing.

Director Heinicke believed that attendance of Station staff at scientific meetings was less than it should have been. When he came to Geneva in 1942, few people except department heads and the director attended national meetings. He instituted the policy of paying “most of the travel expenses for out-of-town meetings” to encourage meeting attendance and let it be known that pay raises for those that did not attend would be difficult to justify.<sup>62</sup> Actually, Heinicke may have overstated the situation at Geneva. Many of the staff were active in their respective professional societies. P. J. Parrott had been president of the Society of Economic Entomologists, and bacteriologists had been leaders in their fields. Similarly, staff in other fields was very active. However, the newly introduced policy of “up to \$50 per meeting per year,” while not generous, was quite welcome.

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There was exceptional growth and development at the Station during Heinicke’s 18-year administration. Most of it, however,

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was already blueprinted for him in 1942 when he assumed office. The decision to move dairying to Ithaca and emphasize horticultural research at Geneva had been settled earlier in Albany and Ithaca. The heating plant, the new food science laboratory, and an entomology-plant pathology building were in the planning stages as part of the Governor Dewey post-war program. Heinicke can be credited for keeping all of these projects (except the entomology-plant pathology building) on track and completed prior to his retirement in 1960, for which he deserves much credit. His very nature and track record since his high school days demonstrated his ability and single minded determination to organize and accomplish his goals. We have also recognized his ability to manage Station income funds to add land, ponds, greenhouses, and a biotron.

As important as these were, there is another area that must be considered: What was the impact of his administration on the productivity of the Station staff? Did he improve morale, promote original and creative research, and maintain or improve the credibility of the Station locally and statewide? Did he, like Thatcher bring a Dahlberg to Geneva, or like Hedrick bring a Tressler to Geneva? How did he manage the internal problems related to the merger of the departments of chemistry and bacteriology in the new food science and technology department? The record indicates that his Ithaca background and biases, plus his characteristic confrontational and dogmatic approach to professional and non-professional employees probably had a negative impact.

While talented scientists were hired during his administration, there are no records of innovative developments, except in food science where these were already planned. In fact, there is evidence that he had a negative influence in this regard. Two examples illustrate this conclusion.

When James Horsfall resigned to move to the Connecticut Station, he was replaced, in 1939, by an outstanding young plant pathologist, George McNew. He was exceptionally productive in his first three years. Heinicke approached McNew using his usual confrontational manner, which the latter refused to accept. Their conferences resulted in shouting matches. McNew left in 1943 to accept an administrative position in industry, followed by a department headship at Iowa State, and finally became managing director and Distinguished Scientist at the Boyce Thompson Institute for Plant Research. His departure was a significant loss for the Station.

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The second involved a very talented biochemist, Robert Holley, appointed September 30, 1948, in the Food Science and Technology Department. Holley studied organic constituents of plants, including flavor compounds in grapes. His studies on polypeptides led to his interest in the structure of RNA, which he pursued on a sabbatical leave in California in 1957-1958. He continued these RNA studies when he returned to Geneva using rat livers as a source of RNA. He was informed by administration that all animal work had been moved to Ithaca and that he could not pursue this project.<sup>63</sup> Holley reluctantly resigned July 31, 1957, and accepted a position in the U. S. Department of Agriculture Plant, Soil, and Nutrition Laboratory located on the Cornell Campus. Heinicke's version was that "... R. W. Holley, was ... transferred to the Federal Soils and Nutrition Laboratory and the Department of Biochemistry at Ithaca ..."<sup>64</sup> It was there that he unraveled the structure of RNA for which he was awarded the Nobel Prize in 1968. In correspondence with his widow and collaborator, Mrs. Holley included the following quote from Holley's Nobel Prize Lecture in her letter of June 8, 1994, to the junior author: "... During the three years of work on the structure of the alanine transfer RNA, we used a total of 1 gm of highly purified material. This was isolated in our laboratories from approximately 200 gm of bulk yeast transfer RNA, which in turn was obtained by phenol extraction of approximately 140 kg of a commercial baker's yeast." Mrs. Holley commented that the required number of rat livers to conduct Holley's study was not feasible and required the change to yeast. She concluded, "It all seems quite ironic!"

We have not found records indicating who was responsible for the decision to forbid Holley to continue his research on RNA. Heinicke's bias against non-applied work at Geneva and his blind adherence to any official decision strongly indicates that he supported the decision whether or not he made it originally. The fact that David Hand, head of Food Science and Technology, was away on sabbatical at the time in no way precludes him from being involved. He was known to be antagonistic toward any diversion of his faculty away from his immediate departmental goals.<sup>65</sup>

The Holley affair raises the question of possible implications that the merger of the Departments of Bacteriology and Chemistry may have had on the research programs in other departments. During the 1940s and early 1950s, chemists A. A. Avens and G. W. Pearce were collaborating with P. J. Chapman on a basic study of petroleum oils as horticultural spray oils for control of insects

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and mites. This was a world class research project that elucidated the mode of action and what oils could be used effectively without injury to host plants. It received worldwide acclaim from scientists, farmers, and the petroleum industry. The specifications developed in this study for spray oils are in use on a world-wide basis still in 1998. After his appointment as head of Food Science and Technology, Hand informed Chapman that Pearce was needed for food research and no longer could continue to collaborate with him. Director Heinicke supported Hand's position. To make matters worse for Chapman or others who might need collaboration from a chemist, Director Heinicke informed Chapman that he could not hire a chemist in Entomology and established the rule that all chemists at Geneva would be assigned to the Food Science and Technology department. It was not until after Heinicke retired that Chapman was able to bring a chemist into the Department of Entomology.

Had Whitman Jordan (1896-1921) been director when the Food Science and Technology Department was formed, there undoubtedly would have been a much different policy from the restricted role for chemists adopted by Director Heinicke. In 1896, Jordan wrote "It should be remarked that there is scarcely any line of investigation in which the Station engages where the aid of the chemist is not required."<sup>66</sup>

Fortunately, by the time the Entomology department needed a bacteriologist to study insect pathogens as insecticides, Heinicke had retired. However, the question remains as to the status of the Station bacteriologists in the merger with the chemists. The picture is muddled but does not appear to speak well for administration. Robert S. Breed retired October 10, 1947, after 34 years of outstanding service at the Station. Breed's accomplishments in the field of bacteriology were reviewed earlier, including his work on Bergey's *Manual of Determinative Bacteriology*. He was continuing with his Bergey's Manual and some other activities after retirement. Director Heinicke refused to provide him office space.

Harold J. Conn retired April 30, 1948, after 37 years service at Geneva. His work on the classification of soil bacteria had won him world-wide recognition and resulted in many important papers and bulletins. In 1923, he was named Chairman of the newly formed Biological Stain Commission which was formed after World War I to make the United States independent of outside sources of supply for stains used in medicine and other fields. The Station supported the work as a public service to agriculture and biology until the project became self-supporting. The work was ex-

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*“Feelings got so bitter that we dropped our meetings...he never praised anyone. He never gave credit to the workers...”*

panded during World War II, and the Commission was incorporated under the New York State Board of Regents. Conn was named president. Conn was also active in other organizations, including being Treasurer and Executive Secretary of *Biotech Publications*. He was continuing his connections with the Stain Commission and Biotech Publications after retirement. He also was refused office space by Heinicke.

George Hucker had spent his many years at Geneva working primarily on the bacteriology of milk and milk products and dairy sanitation. He continued some of these studies for only a few years after the dairy work was moved to Ithaca. He never did get seriously involved in vegetable and fruit studies. Hucker had also devised a technology for producing a card that farmers could use to determine whether or not their cows had mastitis. He personally hired a technician to produce the cards at night or on weekends. Hand and Heinicke were generally unhappy with Hucker's performance and, believing that this small business was unethical, threatened to fire him. According to P. J. Chapman,<sup>67</sup> a close confidant of Hucker, Hucker became very concerned. Chapman advised him to go to Ithaca to see Dean Myers, which he did. The Dean advised him that he was well within his rights and told Heinicke and Hand to desist. Dean Myers owned a commercial farm.

Heinicke seems to have come down hard on the bacteriologists, perhaps in part because he believed that they had agitated to keep the dairy work at Geneva and convinced dairy farmers and industry representative to send telegrams to President Day. Heinicke faced perplexing problems in dealing with the bacteriologists and the loss of dairying at Geneva as well as amalgamating them with the chemists in the new Food Science and Technology Department. Unfortunately, it appears that the results were not totally successful.

Heinicke also had problems with the Pomology staff. The reaction by the staff to his assumption of head of the department, his pruning demonstration, and the departure of two pomologists have already been discussed. The department fruit seminars were abandoned because Heinicke took over every session and made it difficult for the speaker to continue. “Feelings got so bitter that we dropped our meetings...he never praised anyone. He never gave credit to the workers...”<sup>68</sup>

There was also discontent with Heinicke in the departments of Plant Pathology, Vegetable Crops and Seed Investigations, but the only direct negative impact here appears to have been McNew's resignation as reported earlier.

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*“We must conclude that Heinicke had a negative impact on our Station’s traditional philosophy followed since Sturtevant’s time that ‘theory and practice march together.’”*

In summary, an overview of Heinicke’s 18 years as director of the Station gives the impression that he was one of the most productive directors. In his final report, there is a brief summary of his 18 years. Whether this was written by Heinicke or by Luckett is not certain, but it surely had Heinicke’s approval and expressed his satisfaction with his accomplishments.<sup>69</sup>

“The administration of the Station since 1942 has been carried on with sympathetic understanding and friendly guidance of three presidents of Cornell: Edmund Ezra Day, 1942-1949; Cornelius W. deKiewiet, 1949-1951; and Dean W. Malott, 1951 to present; and under the immediate jurisdiction of three Deans of the College of Agriculture: C. E. Ladd, 1942-1943; W. L. Myers, 1943-59; C. E. Palm, 1959 to the present. During this period of 18 years, the unification of the research work of the College of Agriculture at Ithaca and of the Experiment Station at Geneva has been completed in accordance with the plan that provided for efficiency and economy of operation while safeguarding the vital interests of the Station as originally contemplated in 1923 by the former Board of Control of the New York Agricultural Experiment Station and by the Trustees of Cornell University.

“Considerable progress has been made toward the realization of the goal restated by the late Dean Carl E. Ladd in 1942 as the policy of Cornell with respect to the Geneva Campus, viz., to develop the Experiment Station as a horticultural institute with horticulture defined in a broad sense to include the production and utilization of fruit and vegetable crops grown for processing. It is now well recognized by the staffs engaged in agricultural research at Ithaca and at the Geneva campus of Cornell, and generally by the farmers throughout the State, that the research programs at the New York State College of Agriculture and the Experiment Station are closely integrated and supplement rather than duplicate the work involved. A feeling of mutual respect and esteem and a spirit of whole hearted cooperation and team work have been gradually developed in the groups of professional specialists at both localities within the framework of academic freedom that permits a wide latitude for individual initiative among coworkers having equal responsibilities and full faculty status.”

With few minor exceptions, the statement accurately reflects the status of the Station and its relationships to the Ithaca campus when Heinicke turned the reins over to D.W. Barton on July 1, 1960. The latter concurred generally with the assessment.<sup>70</sup> Director Heinicke produced the positives in great abundance and must be judged as one of our most productive directors, but with the

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*“I tried to talk with Heinicke once about the value of imagination in research and that one of the roles of a professor was to contemplate on where his particular field might lead—the objectives of his particular field—and that his contribution was mapping out a course of research and trying to stay ahead of the needs rather than emphasis on collection of the detailed data. Frankly, I don’t think Heinicke even caught what I was talking about, because his reply was, ‘Professor, you collect facts. That’s all that is necessary.’ I tried to point out ... that facts, unless they are correlated into a line of reasoning and effort, meant little. He said, ‘Facts always mean something.’ ... The Station lost something during Heinicke’s regime. I think, in many ways, it lost its leadership in research, as it had been known in this state in the field of agriculture, for the very reasons which were mentioned above. That is, we did not contemplate sufficiently and we were left in the details unrelated to a general program.”*

caveat that much of the physical improvements were part of a master plan already in progress. There were, however, unexpressed negatives in the Annual Report account of his administration.

Paul Chapman gave a rather detailed evaluation of Heinicke as director. “Here is an individual who had a lot of the qualities that you need in a good administrator. He was: an efficient office manager, forehanded, made decisions on time and even ahead of time, extremely able in fiscal matters, understood money and budgets, installed business-like ways of carrying out departmental affairs, had no favorites, held no grudges, felt responsibility for ensuring that tax payers got full value for money invested, but still was not a successful director.”<sup>71</sup>

By his statement, which stated that he did not feel Heinicke was “a successful director,” Chapman was probably referring to the nebulous areas of esprit de corps, morale, and achievement of scientific excellence and productivity, which are so difficult to measure. Also, the exodus of recognized outstanding staff was not replaced with comparable talent.

In Chapter I, Chapman related the account of Samuel Johnson’s (first director of the Connecticut Station) reaction to Lewis Sturtevant’s lecture in 1882 on what should and should not be the role of agricultural experiment stations as follows: “...that meaningful research could only be performed by trained scientists; that since the analysis of fertilizers to detect fraudulent products did not involve experimentation, such work should not form a part of an Experiment Station’s program.” Johnson’s reaction was that he was “ashamed not to have such an Experiment Station.” In James G. Horsfall’s recent history of the Connecticut Station, he emphasizes that the Station had followed since early times the practice of studying the basic as well as the practical aspects of agricultural research. In his inimitable style, Horsfall coined the useful phrase “theory and practice march together.” We must conclude that Heinicke had a negative impact on our Station’s traditional philosophy followed since Sturtevant’s time that “theory and practice march together.”

Hucker seems to have said it in the following account of a discussion with Heinicke: “I tried to talk with Heinicke once about the value of imagination in research and that one of the roles of a professor was to contemplate on where his particular field might lead—the objectives of his particular field—and that his contribution was mapping out a course of research and trying to stay

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ahead of the needs rather than emphasis on collection of the detailed data. Frankly, I don't think Heinicke even caught what I was talking about, because his reply was, 'Professor, you collect facts. That's all that is necessary'. I tried to point out...that facts, unless they are correlated into a line of reasoning and effort, meant little. He said, 'Facts always mean something'...The Station lost something during Heinicke's regime. I think, in many ways, it lost its leadership in research, as it had been known in this state in the field of agriculture, for the very reasons which were mentioned above. That is, we did not contemplate sufficiently and we were left in the details unrelated to a general program."<sup>72</sup> Many, if not all the faculty received the same treatment beginning with "Now professor, what are the facts?"


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- <sup>4</sup> Sperry Oral History, 1943, p. 58.
- <sup>5</sup> Hucker Oral History (11), p. 203.
- <sup>6</sup> Chapman Oral History, pp. 173-174.
- <sup>7</sup> Sperry Oral History, 1943, p. 58.
- <sup>8</sup> Chapman Oral History, p. 180.
- <sup>9</sup> Ladd letter to President Edmund E. Day, March 31, 1942.
- <sup>10</sup> D. W. Barton, personal communication, 1996.
- <sup>11</sup> Heinicke Oral History 1967, pp. 101-102.
- <sup>12</sup> Heinicke Oral History 1967, pp. 119-120.
- <sup>13</sup> Hucker Oral History 1962, vol. 2. p. 203.
- <sup>14</sup> D. W. Barton, personal communication, 1995.
- <sup>15</sup> Lockett Oral History 1962, p. 33.
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- <sup>20</sup> Tressler Oral History, pp. 65-66.
- <sup>21</sup> Tressler Oral History, p. 65.
- <sup>22</sup> Heinicke Oral History, 1967, p. 101.
- <sup>23</sup> Chapman Oral History, 1965, pp. 55-56.
- <sup>24</sup> Hucker Oral History, 1962, vol. 2, pp. 207-211.
- <sup>25</sup> Hucker's account of the Lafayette Inn meeting is the only reference to this event that has been found. Chapman and Lockett did not mention it in their oral histories. However, the intense pride of the carpenters in their work and the friction with Heinicke were well known at that time.
- <sup>26</sup> NYSAES Ann. Rpt. 1942, pp. 9-12.
- <sup>27</sup> NYSAES Ann. Rpt. 1943, p. 9.
- <sup>28</sup> Heinicke Oral History, pp. 101-104.
- <sup>29</sup> Heinicke Oral History, 1967, pp. 105-106.
- <sup>30</sup> Underline is authors' emphasis.
- <sup>31</sup> Ladd letter to Dahlberg, 4/1/43.
- <sup>32</sup> Dahlberg Oral History, 1962, pp. 33-40.
- <sup>33</sup> This is an example of Heinicke's very strict application of regulations.
- <sup>34</sup> Dahlberg Oral History, 1962, p. 36.
- <sup>35</sup> Dahlberg letter to Ladd, 1943.
- <sup>36</sup> Dahlberg Oral History, 1962, pp. 36-40.



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- 37 Heinicke Oral History, 1963, p. 101.  
38 Heinicke Oral History, 1963, p. 110.  
39 Hucker Oral History, 1962, pp. 118-120.  
40 NYSAES Ann. Rpt. 1922, p. 15.  
41 Heinicke Oral History, 1967, p. 111.  
42 Personal communications, August 1991 and April 5, 1995 respectively.  
43 NYSAES Ann. Rpt. 1922, p. 16.  
44 Heinicke Oral History, 1967, p. 101.  
45 Heinicke Oral History, 1967, p. 114.  
46 NYSAES Ann. Rpt. 1953, pp. 18-20.  
47 NYSAES Ann. Rpt. 1960, p. 26.  
48 Hucker Oral History, 1962, p. 189.  
49 NYSAES Ann. Rpt. 1945, p. 9.  
50 NYSAES Ann. Rpt. 1946, p. 10.  
51 NYSAES Ann. Rpt. 1949, p. 2.  
52 NYSAES Ann. Rpt. 1954, p. 23.  
53 Heinicke Oral History, 1967, pp. 113-114.  
54 Heinicke Oral History, 1967, pp. 114-115.  
55 NYSAES Ann. Rpt. 1960, p. 1.  
56 NYSAES Ann. Rpt. 1960, p. 22.  
57 NYSAES Ann. Rpt. 1960, pp. 26-27.  
58 Heinicke Oral History, 1967, p. 182.  
59 NYSAES Ann. Rpt. 1920, Bul No 483, p. 2.  
60 Heinicke Oral History, 1967, pp. 136-137.  
61 Heinicke Oral History, 1967, pp. 175-176.  
62 Heinicke Oral History, 1967, p. 155.  
63 David B. Hand, head of Food Science and Technology, insisted that Holley give 50 per cent of his time to projects Hand was interested in pursuing, which annoyed Holley no end. (Personal communication from A. C. Davis, 12/97.)  
64 Heinicke Oral History, 1967, p. 113.  
65 Chapman Oral History, 1965, p. 98.  
66 NYSAES Ann. Rpt. 1896, p. 9.  
67 Personal communication with Chapman.  
68 Wellington Oral History, 1962, p. 77.  
69 NYSAES Ann. Rpt. 1960, p. 31.  
70 D. W. Barton, personal communication, 7/12/95.  
71 Chapman Oral History, 1965, p. 168.  
72 Hucker Oral History, 1962, pp. 194-195.
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## Donald W. Barton 1960-1982



*Donald W. Barton.*

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**O**n July 1, 1960, Donald W. Barton became the ninth Director of the New York State Agricultural Station. He was the third Station faculty member to be selected for this position. Drs. Hedrick and Parrott were selected earlier. But unlike them, he had had limited exposure with New York fruit growers but was well known to vegetable growers and had excellent contacts with canners and freezers. He was well liked by his associates at Geneva and Ithaca.

Director Barton was born June 12, 1921, in Fresno, California. He divided his early years living and working on fruit and vegetable farms where he learned the discipline of hard work and the performance of tasks in a timely manner. He attended the University of California, Berkeley, receiving a Bachelor of Science degree in plant science in February 1947 and Doctor of Philosophy in Genetics in June 1949. The fact that he started his doctoral research while he was still an undergraduate and was awarded his Ph.D. just two years after receiving his B.S. provides insight for the manner in which he would conduct his professional career as an agricultural scientist and administrator.

Barton's college education was interrupted by military service in the Air Force from January 1943 to February 1946. He was bombardier on a night bombing mission over Germany when his plane was hit by anti-aircraft fire. He parachuted from his damaged and burning plane, broke a leg on landing on a mountain, was captured and spent the rest of the War in German hospitals and prisons. The only redeeming result of this experience was the opportunity to learn German.

After completing his graduate studies at Berkeley, he accepted an Atomic Energy Commission post-doctoral fellowship at the University of Missouri from 1949 to 1951. He was appointed

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assistant professor of genetics at Missouri in 1950. Barton left Missouri in 1951 and moved to the New York State Agricultural Experiment Station as Associate Professor in the Department of Vegetable Crops. He was responsible for the pea and sweet corn breeding projects. Interestingly, he had been offered, at the same time, positions at Columbia and Virginia Polytechnic Institute. The Columbia position was primarily in basic genetics, whereas the VPI assignment was mostly applied. He felt that the Geneva position offered the opportunity to do both basic and applied research. Additionally, his major professor advised that Cornell University was a better institution to be *from*, should he wish to make a change later.<sup>3</sup>

Barton's work from 1951 to 1959 was totally involved with research on plant breeding, primarily with peas and sweet corn. He had several publications during this period but was not a prolific writer. He collaborated with William Schroeder of Plant Pathology in developing disease resistant varieties. He developed a strong liaison with the processing industry, which he considered a very important segment of the public that the Station serves.<sup>4</sup> These contacts with industry led to his sabbatical leave at Corvallis, Oregon, working on a three-state (Idaho, Washington, and Oregon) pea research project supported by the processing industry. While he was away, he was appointed head of the Vegetable Crops Department following Professor Sayre's retirement. This was Barton's first administrative experience. He returned to Geneva in March 1960 and was immersed in the task of being Head of a department while continuing with his research programs. Barton's headship lasted for only three months.

Heinicke announced in March 1960 his intention to retire at the end of June 1960, and that Dean Charles Palm was in the process of selecting a new director and was soliciting views from faculty and department heads. Barton did not consider himself a logical candidate.<sup>5</sup> His only involvement with administration had been to serve on a committee in 1958, which had the responsibility for selecting candidates for the vacant position of Dean of the College of Agriculture. This gave him good exposure to college administrators.

One day in mid-June 1960, he was summoned to the Director's office to meet with Dean Palm and Director Heinicke. The Dean stated that he had found strong support from Geneva faculty and department heads for Barton to be the next director and offered him the position. This came as a complete surprise to Barton. After talking to several faculty and department heads and gain-

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ing a sense of support, he accepted the assignment.<sup>6</sup> He became the ninth director of the Station on July 1, 1960.

It may be useful at this point to speculate how it came to pass that a man with essentially no administrative experience and with a good but not spectacular record as a researcher was chosen for this important position as director of the now large and prestigious New York State Agricultural Experiment Station. In the first place, great credit should go to Dean Palm in opening the selection process to guidance from Geneva staff, thus avoiding the problems experienced with Director Heinicke's appointment. Also, Dean Palm chose a personable, well-liked Geneva staff member who had few if any enemies. Barton had managed to get along satisfactorily with Director Heinicke and had gained his support. He also had strong support from New York canners and freezers, as noted earlier, and was liked by the vegetable growers. In addition, his college record indicated a man who knew what he wanted to do and could get it done quickly and on time. Further, his training was in plant science and genetics, disciplines fundamental to many of the Station's programs. His military experience suggested a person of courage and stamina.

A review of correspondence among members of the Vegetable Crops departments at Ithaca and Geneva and Director Palm and Dean Myers is enlightening. A letter from Barton, who was on sabbatical leave in Oregon at that time, addressed to Professor C. Sayre (with copies to Director Heinicke, Director Palm, Dean Myers, Ithaca Vegetable Department Head H. Munger, and Geneva Vegetable Department acting Department Head M. Vittum) must have impressed Dean Myers and Director Palm.<sup>7</sup> At that time there was a bitter controversy raging between the two departments on how a new \$20,000 appropriation for irrigation of vegetable crops was to be divided. It was part of the deliberations in progress to develop a five-year coordinated plan for the two departments. Barton's calm logical analysis of the underlying problems, which were causing the difficulties plus his well thought out solutions were a beacon of light in the clouds of bickering. He stated that the division of responsibilities according to the end use (market or processing) was illogical and, in fact, was not practiced for three vegetable crops grown both for market and processing and that there had been no problems associated with them. The problems arose when responsibility for crops with both end uses were divided. Both departments were obligated to conduct overlapping research as a basis to fulfill their responsibilities. Barton also pointed out that a major source of friction between departments was the lack of an extension

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presence in Geneva and suggested that a vegetable extension person be stationed at Geneva. This concept, opposed by Director Heinicke and Ithaca Extension, will be discussed later in this chapter.

The calm tone and sound logic of Barton's letter compared to correspondence of other participants surely impressed Ithaca administrators. Director Palm expressed his reaction to the vegetable crop affair as follows: "The more I read of copies of letters from Charlie Sayre and Vittum of the Vegetable Crops Department at Geneva, and listen to suggestions from our staff in Vegetable Crops as to what might be done with the Geneva department, the more I am convinced that the Entomology Departments in the two Stations are composed of a group of angels!"<sup>8</sup>

Director Barton assumed his responsibilities at a favorable time. He followed an administration that had repressed some innovative areas of research. It was also a time when the Station was still the beneficiary of the State University of New York expansion program. The reaction of Geneva Station staff to the announcement was one of mild surprise for the same reasons Barton felt when he was first approached. He was young, had only a few years in research, and lacked administrative experience. He also had not shown any evidence that he aspired to an administrative post. If there were any disgruntled persons, there was no evidence of same. One often mentioned candidate, Edward H. Smith, resigned October 31, 1964, to accept the headship of the large Department of Entomology at North Carolina State University; however, this move was not thought to be a reaction to the Barton appointment. Further, Barton's appointment did not preclude Smith's potential to succeed Chapman as head of Entomology when the latter would reach mandatory retirement age. The general response of Station staff, both professional and non-professional, can be summarized in one word: relief.

Chapman was still head of the Department of Entomology when he gave his oral history in 1965. The following quotation seems to express the general response to Director Barton's administration: "I think that he (Barton) is a very different person from Heinicke. He says 'no' as frequently as Heinicke did, but he is endowed with the ability to deal equally with individuals and give them a feeling of discussing the merits of a problem on equal footing... if the phone rings now and I'm told that Barton wants to speak to me, I'm sure that regardless of the complexity of the problem, that it will be discussed freely, in the absence of all tension and

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*“I have great admiration for Director Heinicke as director of the Station, but admit it was a great relief when Don Barton took over.”*

that we would arrive at a solution that would be rather mutually acceptable... (he had the ability) to deal in an effective, friendly manner with people and still retain his position as being boss.”<sup>9</sup> He could have added that Director Barton expected a similar approach to problems from members of his staff and could be firm with those few that did not.

By 1960, relations between the Station and the City and Towns of Geneva were quite satisfactory. Barton did not have to face any crises similar to the one Heinicke faced in his first months in office. In fact, the next 20 years were very calm in this respect, and there were no rumors that the Station might be moved to Ithaca. Barton and his wife, Virginia, and children had been living in the community for nine years. They were active in North Presbyterian Church, public schools, scouts, and other activities, and were respected and well liked. Soon after becoming director, he was made an honorary member of the Geneva Rotary. Any matters involving Station relations with the City or Town of Geneva were handled quietly and apparently satisfactorily.

Even though Director Heinicke had the respect and support of the College of Agriculture administrators, there was some uneasiness about some of his handling of internal Station affairs as noted in Chapter IX. Perhaps the comment by former Research Director, Dean, and University Provost Keith Kennedy best summarizes the situation. He stated, “I have great admiration for Director Heinicke as director of the Station, but admit that it was a relief when Don Barton took over.”

Relations between the Station and Cornell University had evolved over the first 100 years from complete independence to integration as a functioning unit of the University. The unofficial attempts to coordinate overlapping activities during Jordan and Thatcher administrations and the increasing concern in Albany about duplicate research resulted in the official union in 1923 with Station oversight delegated to the dean of the College of Agriculture. This union failed to bring harmony during Director Hedrick’s and Dean Ladd’s administrations. Great improvements were made by Directors Parrott and Heinicke, but there still were unsettled matters as noted above at the department levels as well as at the deans and directors levels in 1960.

Up to this point in this history, we have emphasized only the Station’s administration’s and staff’s acceptance of Cornell’s administrative role. Here, we shall explore Cornell’s acceptance of the Station as a functioning, integral unit of the University

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*Left to right: Willard Robinson  
(food scientist) and John Einset  
(fruit breeder) with new wine  
resulting from collaborative effort.*



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rather than as a problem or a competitor. A review of relations over the years indicates that there had been a wide range of acceptance or non-acceptance depending upon individuals' backgrounds and prejudices. Director Hedrick wanted to maintain independence and continued to bypass Cornell. Dean Ladd was "disgusted" with Director Hedrick's activities and vice versa. Ladd's handling of this difficult situation obviously did not bring the two institutions together. His management of the transfer of Dahlberg to Ithaca was questionable from the latter's point of view. On the other hand, both Dean Myers, Dean Palm, and Director Kennedy made good progress in making the Station a participating unit of the University at the administrative level. The ramifications of the 1960 appointment of Director Barton to Assistant Director of Research of the College of Agriculture and Associate Director in 1967 is discussed later in this chapter.

As for relations at the professorial level, the record was uneven and seems to have varied more on the basis of individuals, their nature, and backgrounds than on the physical separation. In the junior author's experiences from 1948 through 1968 when he was responsible for research on the biology and control of insects attacking apples and pears in Western New York, he had no problems with his extension counterparts in Ithaca. It was clearly understood that each was dependent on the other and worked closely together throughout the year. The only problem he had with Ithaca entomologists was when James Brann was transferred from the Station staff at the Hudson Valley Laboratory to

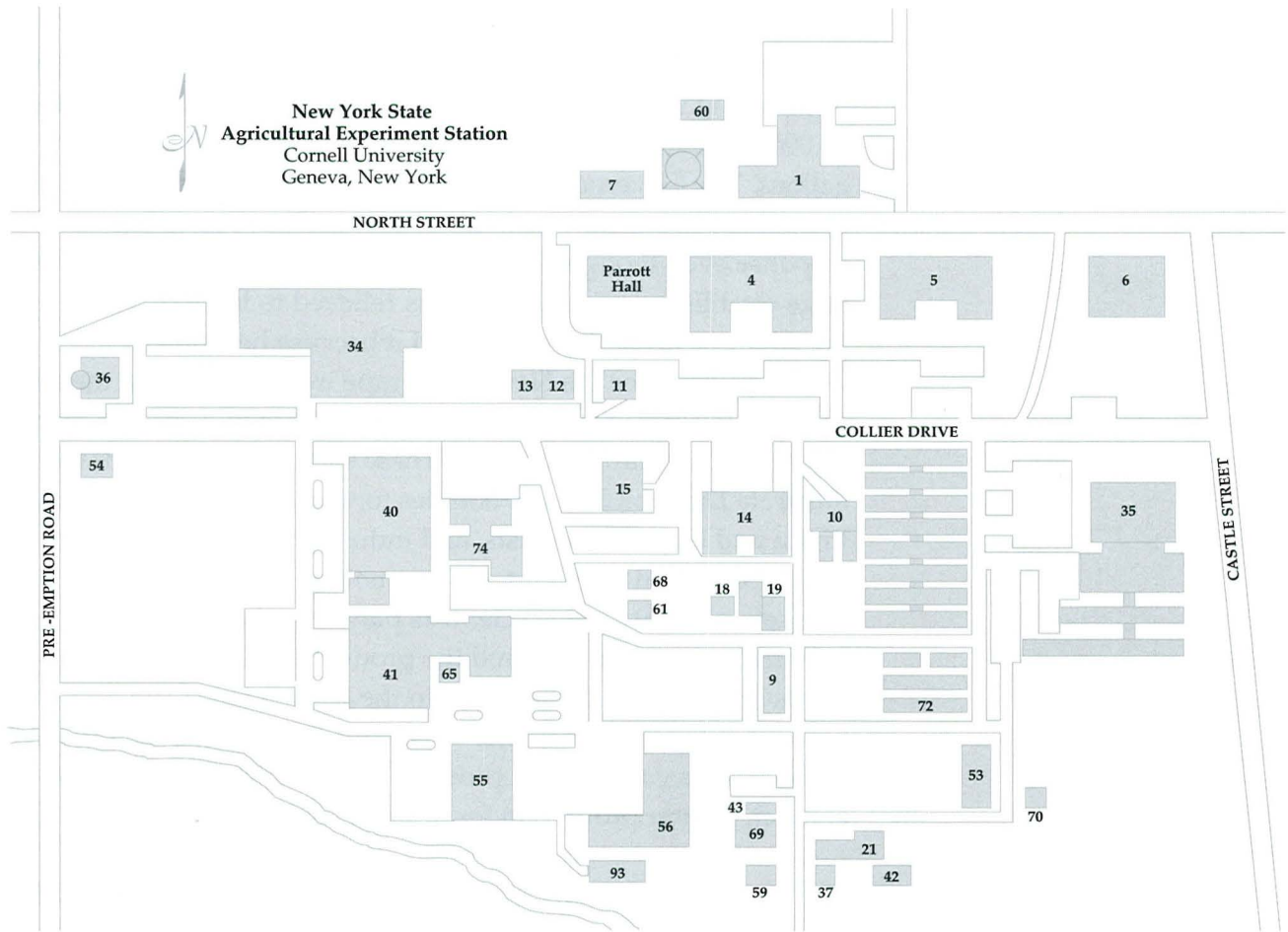
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the Ithaca Entomology staff to work on orchard spray machinery. Drs. Brann and Arthur Burrell were making claims for concentrated sprays, which Geneva entomologists believed were not correct and soon proved it. This created an awkward and embarrassing situation in terms of presentations to fruit growers. This problem was solved when Brann was assigned to the fruit extension position in Ithaca where he worked harmoniously with Geneva staff in developing and presenting control recommendations to fruit growers.

Director Barton had good relations with vegetable growers and the food processing industry prior to being appointed director. During his 20 years as director, he was successful in maintaining and increasing his contacts with industry for the benefit of the Station's programs, the farmers, and the food and beverage industries. His abilities and style in this area are best illustrated in the following account of the development of the wine industry in New York during his administration.

In 1960, the New York grape industry consisted primarily of Concord grapes, with 85 to 90 per cent of the harvested crop being used to make juice. Nelson Shaulis, a viticulturist in the Station Pomology Department, had developed cultural practices that could double the production of grapes per acre. Already, production had reached the saturation point of the then existing market for grape juice. Director Barton was involved in a meeting of processors with Professor Bennett A. Dominick, Jr., an agricultural economist at Ithaca who was studying the grape industry at the time. Upon returning from the meeting, he talked with Station food scientists about developing other by-products from Concord grapes. He noted that "it was interesting that no one at the meeting foresaw the dramatic change that was going to occur in the wine industry of the State."<sup>10</sup> Director Barton tried to establish a relationship with the wine grape processors but had little success after several visits to individual wineries. He was unable to develop their interests in common problems that required research, even after a joint meeting attended by Director (Ithaca) Keith Kennedy. Barton and Kennedy asked Dean Charles Palm for help. After a year and three luncheon meetings, the grape processors became aware that there were industry-wide problems related to New York that might be solved with research. In 1964, the processors stated that they wanted an expanded wine research program at Geneva and supported a \$50,000 appropriation in new money specifically earmarked for an expanded grape and wine research program with the grape component being the development of new varieties for wine.





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|------------------------------|-----------------------------|-----------------------------|---------------------------------|
| 1 Jordan Hall                | 15 Machinery Shed           | 36 Heating Plant            | 60 Recreation Complex           |
| 4 Hedrick Hall               | 18 Spray Shed               | 37 Ent/PP Pole Barn         | 61 Metal Pesticide Building     |
| 5 Sturtevant Hall            | 19 Campus Spray Facility    | 39 Seed Processing          | 65 Industrial Chemical Building |
| 6 Integrated Pest Management | 21 Nursery Cellars          | 40 Raw Products             | 68 Plant Path Pesticide Storage |
| 7 Triplex House              | 23 629 Castle St.           | 41 General Services         | 69 USDA Screenhouse             |
| 8 666 W. North St.           | 24 649 Castle St.           | 42 Pomology Pole Barn       | 70 Pom. & Vit. Screenhouse      |
| 9 Storage Shed               | 25 659 Castle St.           | 43 USDA Entomology Building | 72 USDA Plastic Greenhouse      |
| 10 Old Greenhouse Range      | 26 665 Castle St.           | 44 Soils Building           | 74 Germplasm Repository         |
| 11 Stone Barn                | 27 673 Castle St.           | 45 Power Substation         | 93 Service Pole Barn            |
| 12 Sawdust Cafe              | 28 681 Castle St.           | 55 Farm Services            |                                 |
| 13 Fruit Storage             | 34 Food Research Laboratory | 56 Campus Warehouse         |                                 |
| 14 Utility Storage           | 35 Barton Laboratory        | 59 New Insectary            |                                 |

*Map of the Experiment Station—1988.*

The need for regular meetings with the top winery staff was no longer necessary. Drs. Willard Robinson and David Hand of the Food Science and Technology Department took the leadership in developing a Wine Technical Advisory Panel composed of wine makers and laboratory research staff from a key group of five wineries. Besides reporting on new key developments, the panel reviewed unsolved problems and suggested procedures for solving them. All these efforts resulted in a \$50,000 appropriation from state funds plus annual grants of \$11,000 to \$15,000 from wine and grape industries.<sup>11</sup>

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In 1976, the Farm Winery Legislation was passed in Albany. The bill encouraged the establishment of small wineries in New York by reducing the state license fee for wineries producing less than 25,000 gallons per year. This limit was soon raised to 50,000 gallons. The Governor's office asked Director Barton for an opinion on it. Barton was in favor of it and gave an affirmative response even though he anticipated some opposition from the large established wineries. He was relieved to learn that the president of Taylor Wines favored it because he believed it would be good for the New York grape industry. During the next six years, over 50 new wineries were established.<sup>12</sup> In 1998 there were over 120 "farm" wineries. These events and developments illustrate Director Barton's abilities to work with administrators, Ithaca and Geneva scientists, and industry in identifying and solving common problems and promoting agriculture. The key role that Station scientists played in the remarkable growth of small wineries and the production of world class wines in New York is discussed in the Food Science and Pomology and Viticulture chapters. Their contributions enabled growers to make a value added product, wine, which they could sell at much greater profit than for unprocessed grapes.

The directorship at the Geneva Station had been officially a full-time job with two exceptions. Director Thatcher had been given the added responsibility for the Ithaca Experiment Station. The arrangement was not satisfactory with the Ithaca Staff, and Thatcher elected to move to the presidency of Massachusetts State College after only six years at Geneva. The other exception was Director Heinicke's added responsibilities as head of both the Ithaca and Geneva Departments of Pomology. Director Barton initially had no official responsibilities beyond his directorship, which included some very challenging problems. He neither had the time nor apparently the inclination to keep abreast of and be active in his scientific specialty (plant genetics), nor get involved in added administrative obligations. However, after the major challenges were under control and as he had gained respect as an able administrator, he accepted several assignments related to his primary responsibilities as Director of the Station.

In 1960, he was named Assistant Director of Research at Ithaca while maintaining full responsibilities for the Geneva Station. His Ithaca title was elevated to Associate Director in 1967. The duties of this new office were never defined.<sup>13</sup> In essence he became part of the College of Agriculture administrative team ("Dean's Cabinet"). It was a testimonial to the respect and

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confidence he had earned. It also indicated that the Station had become a truly participating unit of the College in fact as well as in name.

For about 20 years following the establishment of the State University of New York in 1948, the deans and directors, including the director of the Geneva Station, had access to officers, legislators, and the governor's office in Albany regarding fiscal and other matters. As time went on, the State University gained more and more control until the Albany ties were cut off. The Cornell Trustees established a vice presidential position with responsibility for liaison between Cornell and the various offices, agencies, and State University in Albany with a focus on budgetary matters and developing needed renovations and new buildings for the statutory colleges. The position was filled by Constance E. Cook, who had been a legislator in Albany and who had many contacts there; however, she had no experience with the internal management of the University. Director Barton was approached by Dean Keith Kennedy and asked if he would take the assignment to advise Cook on the facilities programs of the statutory colleges. He accepted the responsibility in 1976 in addition to continuing as Director of the Station.

Director Barton was involved with several projects working closely with the Facilities Coordinator of the State University Construction Fund, which resulted in a five-year projection for the renovation of the heating system of the statutory colleges. There were also some other items, but his greatest satisfaction was making the budget plea to the Office of Capital Facilities Group in a personal meeting in Albany, which resulted in the approval of 18 million dollars of funding for Academic I and II in the College of Agriculture at Ithaca. Shortly after this, Director Barton went on administrative leave and the Cornell vice president position was dropped. The concept of and need for a statutory facilities coordinator, which had been recognized earlier, was established. Herbert R. Pallesen, who had been the Physical Plant Manager at Geneva, was hired. He not only had the experience of working with the State University Fund on the Geneva building program but also had a strong engineering background. He did an excellent job in this new assignment.<sup>14</sup>

Director Barton was involved in a non-Station but related activity during the 1970s when Governor Nelson Rockefeller established the New York Pesticide Control Board. Cornell was represented by James Dewey (Department of Entomology at Ithaca) and Barton.<sup>15</sup> There were 13 others representing a broad spectrum of

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interests and perspectives on the issue of the dangers of pesticide use. The Board met quarterly on matters referred to it by the Departments of Health and Agriculture and Markets or directly from the Governor's office or the Legislature. Eventually, these activities led to the passage of the New York State Restricted Pesticide Law. Dewey, Director Barton, and a few others were instrumental in keeping the wording of the bill effective, but reasonable in terms of implementation, administration, and the safe use of pesticides. This was no easy task because of the strong positions taken by anti-pesticide groups. Director Barton related how subjective people's beliefs were on certain issues. Some members were against pesticide use on farms yet favored the use of poisons in New York City to kill nuisance pigeons.<sup>16</sup>

The testimony of a fruit farmer and then president of the New York Farm Bureau, Robert Greig, provided some sanity to the hearings on the bill and also gave Barton a story he told often to his colleagues at the Station. "Senator Smith had brought out in discussion with Bob Greig the fact that if DDT were banned, Bob would find other alternatives for the control of his insects. However, as Bob pointed out 'It would cost me some thousands of dollars more, and we have an old saying around our farm that every thousand dollars counts. And it's not quite like you folks who work in billions of dollars down here in Albany.'" And then Senator Smith asked, "Wouldn't you have a concern about the environmental impact here in your orchard when using DDT?" Bob's response was, "Senator, I want to tell you about my little old dog. Now, this dog lived to an age of 14 years, which is a pretty good age for a dog. Whenever I would get the spray rig going in the summer, that dog would tag along behind because he liked to walk along with the mist coming down on him on a hot day; and there was only one effect that we really noticed about that dog. During the summer he sure didn't have any fleas!" Director Barton pointed out that such folksy testimony was effective, particularly because it presented the true nature of DDT—it was relatively safe for man and animals even though there were some problems in the food chain.<sup>17</sup>

Three years after the State bill was passed, the federal government passed a restricted pesticide law, which was modeled to some extent after the New York law.<sup>18</sup>

Barton was also active in regional research affairs regarding research projects funded by state or federal Hatch funds. At that time, Geneva was involved in about 10 Hatch projects. In collaboration with Director Kennedy and later Director Nyle Brady, they

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worked with other directors in the region to make plans to coordinate the state-funded research of the involved regional stations. Meetings were held and informal agreements reached on how to divide the research. In practice, the concept failed because there was no control of funding across state lines.

The U.S. Department of Agriculture reorganized its research activities into regions in the early 1970s. They were under the direction of the Beltsville Station. Each region coincided with the four State regions, and each had an administrator. Meetings between the state and federal administrators evolved into regional Research Planning Committees, (R.P.C.s). Director Barton was elected as the co-chair of the Northeast R.P.C. Task Forces established for fruits, vegetables, corn, dairy, and environmental quality. They met annually to discuss the total programs and prepare reports defining research priorities for the Northeast and where there were gaps that needed attention. This effort provided some useful information, but only recommended allocations for additional funds rather than ways to reallocate existing funds. This effort, like the previous state-level project, had limited value.<sup>19</sup>

Director Barton had assumed a leadership role in the Northeastern Region affairs, which ensured that the Geneva Station and Cornell University were well represented.

Barton made a quick assessment of the primary tasks facing Director Heinicke's successor during the week he pondered whether or not to accept the directorship. He determined that the key problems were: internal administrative procedures and faculty relations, Ithaca-Geneva relations, and facilities development. Once he made the decision to accept, he spent two weeks with Heinicke learning management procedures and planning needed changes. Heinicke gave special admonition that Cornell should be recognized in any favorable publicity for the Station to escape the wrath of President Deane Mallott. Heinicke had been admonished more than once for breach of this requirement.<sup>20</sup>

Director Barton decentralized power immediately by giving department heads responsibility for managing department finances and personnel matters. He interfered only when problems arose. He did away with paper charges for services rendered to departments by service units, which were funded by state or federal money.<sup>21</sup> His relations with professional and non-professional staff had none of the confrontational manner of his predecessor. Director Barton encouraged the Geneva faculty

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members to organize and form committees to address their problems and concerns such as salary inequities between Geneva and Ithaca. Also, some faculty members had some concerns at that time that Station responsibilities would be moved to Ithaca. Some faculty felt isolated, and there was the problem of poor communications with Extension located at Ithaca. Within six months, the staff had a functional organization with by-laws and committees. Director Barton gave it a participatory role in running the Station. He encouraged faculty to attend Ithaca faculty meetings. The perceived problem of limiting Geneva faculty to co-chairing graduate student committees was studied and determined to be the most satisfactory arrangement after joint meetings and consultations with the dean of the Graduate Faculty. Ithaca co-chairs could attend to matters pertaining to course and other requirements, and the Geneva co-chair could concentrate on the thesis research. Geneva faculty interest waned after these concerns were addressed.<sup>22</sup>

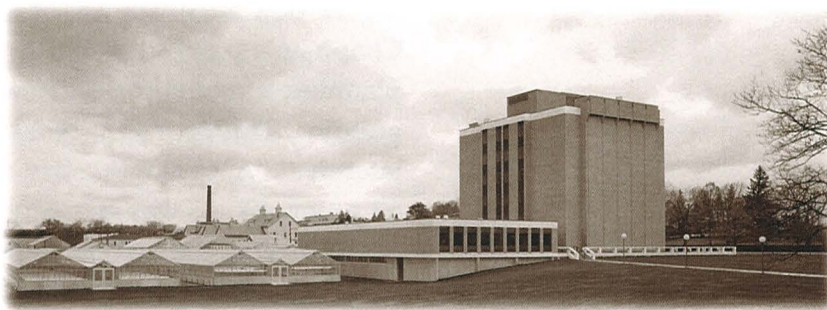
Director Barton's third challenge, to develop Station facilities, required considerable time; in fact, about 11 years. He took office when there were many needs and no clear solutions. The food scientists left Sturtevant Hall, which had been allowed to run down internally, in a cluttered "mess" because they had moved into a fully equipped new building and left much behind. Entomology still occupied Parrott Hall, the original farm house which was inadequate for the expanding staff and new technologies. All the other departments were crowded into Hedrick Hall. A survey study determined that Seeds Investigations and the Plant Introduction group could effectively use the space in Sturtevant Hall and that funds were needed for its rehabilitation. Director Barton requested funds from the State University Construction Fund. At that time, Geneva Station Directors were involved in any discussions in Albany that dealt with Station budget matters. Fortunately, this request was made at a time when the New York State University was embarking on a major construction program to develop many campuses around the state, and the door was open for the Station to prepare and submit a development plan. Director Barton immediately put in motion the required activities to take advantage of this opportunity, and plans for the renovation of Sturtevant Hall were developed and submitted.<sup>23</sup>

The task of developing a master plan was complicated by the limited space available to accommodate programs during renovations. This required careful sequencing of rehabilitation and construction. B. E. Clark was appointed Assistant Director of the Station on October 16, 1968.<sup>24</sup> His primary responsibilities were to

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*Barton Laboratory, constructed in 1968, had extensive new greenhouses for use by plant pathologists and entomologists.*

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work with the State University of New York and architects working on the Station master plan. Earlier, he had worked closely with entomologist E. H. Smith to renovate the then unused third floor of Sturtevant Hall to accommodate new chemically oriented research programs in the Entomology Department. Paul Lippold was the first to use these facilities followed, in 1965, by Wendell Roelofs who carried out his pheromone research there until the completion of Barton Laboratory in 1968. The final plan called for the following sequence of projects: rehabilitation of Sturtevant Hall, construction of the entomology-plant pathology facility (Barton Laboratory), renovation of Hedrick Hall, construction of a new raw products building, construction of a facility for the Buildings and Properties unit, construction of raw products and farm services buildings (two buildings but one project), construction of a campus warehouse and an agricultural chemicals building and, finally a plant nursery building. All projects were put into a schedule and, except the campus warehouse and the agricultural chemical and nursery building, were completed by the end of 1971. According to Barton, "that's when the budget roof fell in."<sup>25</sup> Thus, 1960 to 1971 was a period of major building construction and renovation at the Geneva Station.

In addition to careful sequencing, it was also necessary to anticipate future developments in the various sciences in order to keep abreast of scientific advances and the new positions that were to be made available as part of the master plan. Director Barton appointed a committee for each renovation and construction project. Considerable thought had been given earlier to future needs by the entomologists and plant pathologists because of prior expectations of a new facility for these departments. Drs. P. J. Chapman and A. C. Davis in Entomology and William Schroeder in Plant Pathology had been active in projecting for future needs.

Completely new program plans for the Departments of Plant Pathology and Entomology were made in preparation for design-

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ing the new facility. It was at this point that Barton accepted P. J. Chapman's suggestion that A. C. Davis represent the Station in planning and building the new entomology-plant pathology building. This proved to be a brilliant decision. Barton recorded later that: "A. C. Davis ... had a tremendous aptitude in working on programs. As was subsequently shown, his aptitude is still (1983) serving the College as he works on Academic I and II buildings on Campus (Ithaca)."<sup>26</sup> The Director gave Davis heavy responsibilities and supported him in dealing with the architects and Construction Fund. A chronological account of new buildings and other physical improvements made during the Barton administration follow.

The rapid expansion of Station physical facilities that began during the Heinicke administration continued and even increased during the first 10 of the Barton years. This was due in large part to the impetus and financial largesse of the State University of New York expansion program. Interestingly, the Station at Geneva benefited much more than the Ithaca Station and University. Director Barton suggests that the latter were slow in getting in line.<sup>27</sup> It also can be attributed to the fact that the State and Cornell University were already committed to establishing the Station as a horticultural research unit with strong research programs in the undergirding sciences. The new Food Research Laboratory had just been completed, and plans were being formulated for other new construction.

In 1962, the Station received a special appropriation to convert the heating plant from coal to gas or oil. Major repairs were needed on the coal furnaces, and neighborhood residents, including occupants of the nearby Food Research Laboratory, were complaining about the black soot belching from the chimney. The conversion to gas with an oil backup system was completed by 1964.<sup>28</sup>

With the completion and occupancy of the Food Research Laboratory and the installation of \$473,000 worth of new equipment, the department of Food Science and Technology was "proceeding with new impetus and vigor."<sup>29</sup> The old Chemistry building was torn down in 1960. Sturtevant Hall (Dairy Building), which had housed the Departments of Horticulture, Dairy, Bacteriology, and recently, the Department of Food Science and Technology, was nearly vacant. Plans were being made to renovate the structure for use by the Department of Seed Investigations with space reserved for the Regional Plant Introduction Station, which was closely associated with the work of Seeds Investigation. The third



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*Newly remodeled Fredonia sub-station was dedicated by Dean Palm in September, 1961, and later named in honor of E. Frederick Taschenberg.*



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(top) floor was to be renovated for the temporary use for insect toxicology studies.<sup>30,31</sup> At a cost of nearly \$500,000, Sturtevant Hall was converted “into the most modern and fully equipped facility for seed testing and research to be found anywhere in the United States.”<sup>32</sup> Included in the December 1964 dedication ceremonies was a special symposium entitled “Scientific Seed Improvement.”

The Station also made improvements in buildings and facilities at its sub-stations in Fredonia and the Hudson Valley during Director Barton’s administration. The Fredonia sub-station for grape research had been on rented land. Following purchase of this land in 1957, plans were made to remodel the storage building into offices, laboratory, and storage facilities. In September 1961, there was a dedication and open house attended by 129 interested growers and processors. Dean Palm gave a dedication speech followed by a tour of the renovated facilities and research plots.<sup>33</sup>

In February 1962, the Hudson Valley Fruit Investigations Laboratory was destroyed by fire. This Laboratory was owned by the Hudson Valley Fruit Growers’ Cooperative and leased by the Station. The four scientists stationed there provided information especially adapted for the Hudson Valley fruit and vegetable industries.<sup>34</sup> At this time, the Hudson Valley staff members were not on good terms with each other and were not cooperating in providing information for their needs in the new replacement laboratory. P. J. Chapman convinced Barton to send Davis to work with the scientists and the architect. “This was as difficult a

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*New Hudson Valley Laboratory  
building dedicated July 29, 1964.*



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job as I ever had.”<sup>35</sup> Davis worked out an agreement that he would be in charge of planning and R. Dean would oversee construction. A new laboratory was built by the Hudson Valley Agricultural Research Cooperative, formerly the Hudson Valley Horticultural Research Cooperative, on a new site in Highland purchased by Cornell University in 1963. It was dedicated July 29, 1964.<sup>36</sup> The Hudson Valley fruit and vegetable growers had been the force to establish the original sub-station in the Valley and were very supportive, even to the extent of contributing financial support for this new facility.

The major construction project during Director Barton’s administration was the new entomology-plant pathology facility. As reported in the previous chapter, a building was conceived in the early post WW II years, but it was not built at that time because of the Korean conflict. It was re-conceived after that war and finally completed in late 1968. It had a long, arduous, and sometimes difficult gestation period. Some of the details follow.

After the decision was made to abandon the plans prepared by architect Thomas White (displayed by Chapman and Carruth to Glass in 1948 and Davis in 1950, see Heinicke chapter), efforts were continued to design the new facility separate from the Food Research Laboratory building. P. J. Chapman, then head of the Department of Entomology, asked A. C. Davis, a vegetable entomologist in the department, to represent entomology in this new endeavor. Department head of Plant Pathology, James Hamilton, represented his department. Progress was slow during the remainder of Director Heinicke’s administration as he continued his customary approach of questioning each and every. Further, the plant pathologists did not give the project a high priority at that time.<sup>37</sup>

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In 1964, when the entomology-plant pathology project was transferred to the State University of New York Construction Fund, Barton was director and it became evident that the building would actually be constructed. The Director approved Chapman's suggestion that Davis, working with Plant Pathologist Robert Gilmer, represent both departments and the Station in negotiations with the architects and the Construction fund. This proved to be an exceptionally wise move. Drs. Gilmer and Davis had the scientific background to understand the current and predicted future needs of the departments and effectively translate these to the architects and fund personnel.<sup>38</sup> Davis was far-sighted enough to insist on building in storage and other convertible spaces for future expansions. Davis also performed the same duties in planning the Food Science and Technology pilot plant in Ithaca. He proved to be so effective in handling these assignments that he was asked later by Dean Call to perform similar roles for the new entomology and administrative buildings for the College of Agriculture on the Ithaca campus. It is important to note here that Director Barton recognized Davis's abilities and supported him. Chapman, with inputs from his staff, prepared a plan for the future of his department. R. Gilmer did likewise for his department. The entire effort was an example of what can be accomplished with imaginative teamwork. Further details of these plans are found in the department chapters.

In 1964, the State University Construction Fund received an appropriation of \$3 million for construction of a new entomology-plant pathology building at the Geneva Station. Architectural planning was under way and was "slowly moving ahead." Occupancy was projected by July 1967.<sup>39</sup> The 1965 Station Annual Report noted that plans for the building were moving ahead nearly on schedule and occupancy was scheduled for "sometime in 1968."<sup>40</sup> Construction began in 1967 and was essentially complete in December 1968. The junior author, then Department Head of Entomology, and the Department of Entomology head secretary, Dorothy Lynch, moved into their new offices on January 2, 1969.

The new facility included a single story administrative wing and a six-story research tower with laboratories and offices, plus a basement with facilities for research and storage. The laboratories were equipped with the latest instrumentation. The building encompassed 80,000 square feet of space with an adjoining greenhouse area of 20,000 square feet. At the time of completion, it was considered to be the most up-to-date facility of its kind and was copied, in part, by others. Appropriately, it was named

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“Barton Laboratory” at the time of Director Barton’s retirement in 1983.

Two much needed buildings were constructed under the authority of the State University Construction Fund soon after the completion of Barton Laboratory. For years the carpenters, mechanics, and other service units had been located in old barns and other outdated wooden structures. A similar problem existed for storing, ripening, grading, and preparing fruits and vegetables for canning and freezing experiments in the Station’s pilot plant. The new one-story Raw Products and General Services buildings were completed in 1969. With the completion of these structures and the renovations of Hedrick and Sturtevant Halls, the Station had excellent facilities to conduct its laboratory and greenhouse research programs. It also had adequate land available for field experiments.

Director Heinicke was proud to turn \$100,000 in income funds over to incoming Director Barton.<sup>41</sup> The record shows that the latter wasted no time in using these and other funds, which he managed to accumulate, to acquire additional land and storage barns as shown in the following table.

YEAR	ITEM
1962	Pomology Pole Barn
1962	Robbins Farm Pole Barn
1963	Vegetable Research Farm, 108 acres Highland Research Farm, 19.0 acres
1964	Vegetable Farm Pole Barn
1967	USDA Entomology Research Building
1967	Lucey Farm, 33 acres
1967	Wellington property, 3.5 acres
1969	Smith Farm Pole Barn
1970	Soil Storage Facility
1971	Power Station

Charles Sayre had been critical of Director Heinicke for buying properties and assigning it for pomological and viticultural research rather than for vegetables. Director Barton balanced the account with the 108-acre vegetable research farm. By the 1970s, the Station had adequate farm land (670 acres in and near Geneva, 19.5 acres at Highland and 30 acres at Fredonia) and farm facilities to meet the needs of the Station’s field research

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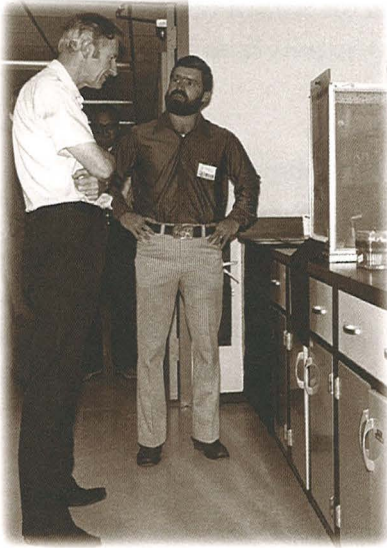
*“Theory and practice must march together. The central theme of the Experiment Station always has been that it do basic research and put it to work for society. The Station serves society by solving problems with plant production, whether in farmers’ fields, parks, or people’s gardens. Society as a whole pays for it because, without agriculture, society would fall to pieces.”*

programs. Like his predecessor, Director Barton was very successful in managing income funds to acquire land and farm facilities needed to conduct field research.

It is obvious from the activities reported above that a significant portion of Director Barton’s efforts and time during the first 10 years in office were involved in improving the physical facilities of the Station. This enabled its research programs to keep pace with the many advances being made in the basic sciences. During the latter half of his administration, he devoted more emphasis to research programs, and he was more involved in Ithaca affairs and regional and national committees.

A review of Director Barton’s 20 annual reports reflects this change. The procedure for preparing these reports at that time was to ask each department to prepare a review of activities and contributions for the year. Editor Roscoe E. Krauss assembled these plus the financial and personnel statistics. The lead-off section was a report from the Director, written by him or drafted by Krauss with careful editing and approval of the Director. Thus, each annual report reflected the Director’s thinking at that date. In the 93rd Annual Report in 1974, Director Barton gave a brief history of the role and contributions of the state and national agricultural experiment stations in bringing about the great increases in food production and processing, which enabled three per cent of the population to feed all our citizens plus an impressive amount of exports to foreign countries. In 1870, before the experiment stations were established, eight out of every 10 persons were required to produce food and fiber products to clothe and feed our citizens.<sup>42</sup>

The following comments from Director Barton’s 96th Annual Report provide an insight into his basic philosophy and pride in the nature and accomplishments of the Geneva Station: “...Agricultural research is a fascinating field and is most rewarding to the scientists involved in the many projects of the New York State Agricultural Experiment Station. As an Experiment Station designed specifically to serve the people of this state, much of our work revolves around solving problems of immediate concern to growers and processors in the very large and economically important fruit and vegetable processing industry. Yet at the same time, we must balance this type of practical research with more basic studies to provide us with adequate background knowledge in a multiplicity of subjects so that we are prepared to solve future problems. It is because the Experiment Station at Geneva stresses the desirability of these two types of research approaches



*Charles Eckenrode explaining to Cornell University President Frank Rhodes how certain insects can locate seeds below the soil surface prior to emergence.*

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that we have been able to build such a strong reputation through the years in both the scientific community and with our growers and processors.”<sup>43</sup> Director Barton always recognized that industry played an important role in the agricultural revolution.

The above quotation describes the same research philosophy that James Horsfall expressed for the “first station” in the United States, the Connecticut Agricultural Experiment Station, in New Haven: “Theory and practice must march together. The central theme of the Experiment Station always has been that it do basic research and put it to work for society. The Station serves society by solving problems with plant production, whether in farmers’ fields, parks, or people’s gardens. Society as a whole pays for it because, without agriculture, society would fall to pieces.”<sup>44</sup> No doubt Horsfall may have developed this philosophy when he was a member of the Geneva Station staff from 1929 to 1939 before moving to Connecticut.

Barton illustrated the wisdom of “theory and practice marching together” with the example of chemist Wendell Roelofs’ pioneering studies on insect communication systems. These resulted in a non-pesticidal control of an important grape insect pest and greatly improved pest monitoring capabilities of several important crop pests. Roelofs’ basic research gained world-wide recognition in the scientific community, including election to the prestigious National Academy of Sciences, and the receipt of several important awards. Further information on these and other contributions are found in the Department chapters.

Another example cited by Barton was the cooperative efforts between Drs. Gary Harman and Charles Eckenrode in Seed and Vegetable Sciences and Entomology departments respectively. They showed that the seed corn maggot adult is attracted and stimulated to lay eggs on the soil above and near the seeds by the emissions from certain microbes growing on nutrients that leak out of the seeds during the process of germination. If microbial growth is controlled, the adult maggots cannot locate the seed. An outgrowth of the study to find a non-chemical means of eliminating the attractant was the discovery of a fungus, *Tricoderma*, that competitively colonizes seed coats and also protects seeds against soil-borne pathogenic fungi. As of 1995, a company has been established and is producing and selling this organism for control of a number of soil-borne plant pathogens of vegetables and turf. It was also during Barton’s



*Professor James D. Luckett*

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administration that a new specialty, seed physiology, was added to the Seeds Department with the addition of Anwar Kahn to the staff.

Barton also had a profound effect on publishing and communication policies and procedures at the Station. Professor James D. Luckett retired July 1, 1960, the same day that Director Heinicke resigned the directorship and retired. Luckett had been given the title of Professor and Professor emeritus in recognition of his many contributions to the Station and Cornell University and his prestige among farmers and publishers. He had served under six directors beginning with Jordan in 1920. Director Barton delayed filling this position for nearly two years. He finally chose Roscoe E. ('Pat') Krauss as Editor, Research Information Specialist, and later as Head of a new Publications Department in 1962.

Krauss was very familiar with a station comparable in many ways to the Geneva Station. Prior to coming to Geneva, Krauss was a technical editor and Executive Secretary of the National Academy of Sciences—National Research Council Agricultural Board. He was also Executive Director of the Agricultural Research Institute. He had had contact with Professor Luckett, who suggested that Krauss might be interested in the Geneva position. In 1961, Director Barton attended the annual meeting of the Agricultural Research Institute in Washington, met with Krauss, and invited him to Geneva for an interview. Later, Director Barton offered him the position as Director of Publications and Public Information for the Geneva Station.<sup>45</sup>

The appointment of "Pat" Krauss proved to be an exceptionally wise choice at a time when major changes were occurring in the printing and communication fields. Krauss had an excellent background for the task of adapting new technologies to the Station printing and communication needs. Further, he found that Director Barton readily supported new sound, innovative publishing, and communication systems.

Luckett had been responsible for the Station library. Krauss was not trained as a librarian and convinced the Director to give that responsibility to someone else. After a review of the publication situation at Geneva and the very limited budget, he recommended that a printing capability should be established on campus to better serve the Station's publishing needs with less money. Director Barton established a study committee and asked for technical help from Ithaca. The latter concluded that the Station should have had such a capability for many years and



*Pat Krauss, Director of Publications, discussing the Station's collaborative role in producing quality New York wines with State Senator Fred Warder.*

should establish its own in-house print shop. In 1965, approval was granted by the Dean and Directors to purchase a printing press. Barton made an agreement with Krauss that he would buy additional items if Krauss could demonstrate that he could pay back the money with the savings generated by the new equipment. Krauss used this arrangement to establish a first class printing facility, which won several awards and was copied by other institutions. Director Barton also approved a graphic arts facility for design and layout. The benefits were: (1) tripled the number of major publications, (2) reduced the length of time for publication from three or more months to two to three weeks, and (3) provided enough savings to pay for all the equipment.<sup>46</sup>

Krauss provides the following about Barton's contribution to the Station's communications capabilities: "Director Barton was receptive to other new developments which had possibilities for improving the Station's productiveness. In 1968, Professor John Bourke showed Director Barton how he was able to use a computer to great advantage in analyzing data in the pesticide residue laboratories. The Director responded by appointing a nine-member faculty committee to investigate and provide recommendations for the future development of computer facilities at the Station. At that time, the only available computer was located at Cornell in Ithaca. Attempts to connect by telephone proved unsatisfactory due to problems of telephone transmission and computer software. In 1970, a surplus IBM 1800 mini-computer



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*(left to right): P. Carp, President of Widmer Wine Cellars; John Einset, Head, Pomology Department; Mary Ann Krupsak, Lt. Governor of New York State; Don Barton, Director of the Experiment Station; and Earnest Reveal, CEO of R.T. French Co. (former President of Widmer's).*



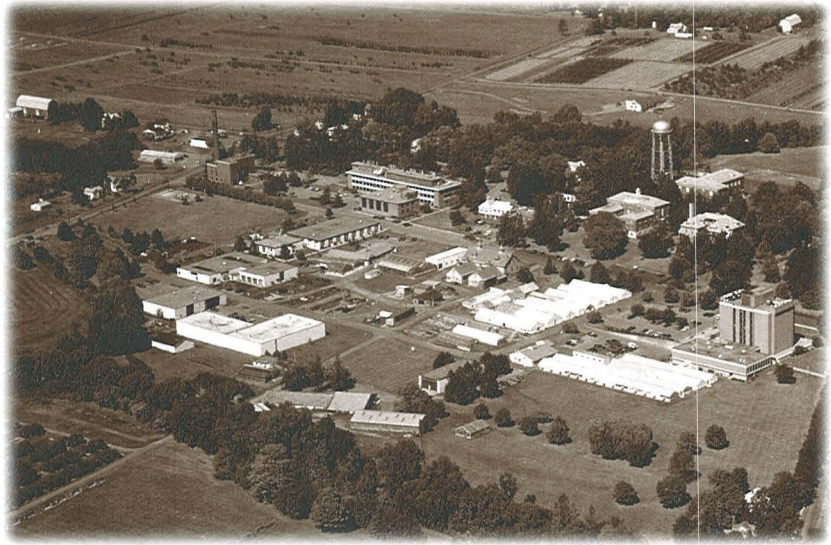
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was purchased from the Cornell Veterinary College, and John Barnard was hired in 1973 as Director of the Computer Center. Thereafter, rapid development of computing occurred leading to purchase of a Prime 300 mini-computer in 1978, wiring of the campus for time-sharing terminals, and upgrades to a Prime 400 (1979) and two Prime 400s in 1982. These advances were followed by further upgrades including statistical packages, word processing and accounting software. Geneva started involvement with personal computing in 1984 with the purchase of the first of many Apple Macintosh computers. The Station was connected to the Internet in 1989. Thus, Director Barton's early support of computer technology at Geneva enabled the Station to keep abreast of and be a leader in the use of this new technology."

Director Barton listened to department chairmen and others with an open-minded, objective and pragmatic attitude. As reported earlier, he pushed for a limited extension presence at Geneva wherever it was logical and would eliminate potential friction. He promoted the concept of Geneva faculty teaching at Ithaca only when there was a definite need because of the inefficiency of the time involved in travel. He favored adding disciplines such as chemistry to departments when it could be shown that they were needed to pursue new potentially productive lines of investigations. He could and did say "No" when he thought it necessary. He was the first Station Director since Thatcher who did not have preconceived ideas and prejudices for or against either the Geneva Station or Cornell University. He was also Director when

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*Aerial photograph of the New York State Agricultural Experiment Station, 1982.*



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Charles Palm and Keith Kennedy were deans and/or directors. Kennedy and Barton had a “symbiotic relationship.”<sup>47</sup> On the other hand, Dean Call’s modus operandi proved to be unacceptable to Director Barton and led in part to his decision to retire in 1982. There were other considerations leading to this decision. Over the years with more and more restricted State budgets, the Geneva director had become further and further removed from the fiscal decision-making process. It had changed from being able to present the Station’s rationale and needs in Albany to being limited to filing budget requests through Cornell University. Barton stated that this change probably would not have been a major factor for a director appointed less than five years previously.<sup>48</sup>

In 1979, the International Rice Research Institute invited Director Barton to come to the Philippines for the calendar year 1980 as Visiting Director of Research. Cornell granted an administrative leave, and Alexander C. Davis was appointed Acting Director at Geneva. After Director Barton’s return in 1981, he developed stress-related health problems. He resigned the directorship on June 30, 1982, and retired on May 30, 1983. Davis served as acting Director again in 1982-1983.

The period from 1960 to 1982, Director Barton’s years as director of the New York State Agricultural Experiment Station, deserve the description “the golden years.” During this period, Hedrick and Sturtevant Halls were completely renovated; the Food Research Laboratory was dedicated; Barton Laboratory, including a new greenhouse range, was completed; and the Raw Products

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Facility and a Farm Services Building were designed and constructed. Also, a Campus Warehouse was on the drawing board awaiting an appropriation before construction a few years later in 1977. During this same period, faculty increased in number from 56 to 65. There was also a significant increase in the number of research associates and technicians. Director Barton declines to take much credit for the above, and attributes much of this growth to the State University of New York and the University Construction Fund.<sup>49</sup> The record, however, demonstrates that Director Barton was responsible for initiating the new building program when he requested funding for the renovation of Sturtevant Hall. This led to the campus-wide plan, which was fully executed. In 1982, the New York State Agricultural Experiment Station had the modern, well-equipped facilities and land needed to pursue all facets of its mission.

Director Barton is also credited for recognizing and supporting the need to incorporate in the new facilities space and equipment required to conduct investigations in new areas of developing sciences. Some of these were electron microscopy for basic studies in plant pathology, chemical studies on insect pheromones, plant substances toxic to insects, insect toxicology, physiology of seeds, and plant biochemistry. A number of direct benefits have developed from these new endeavors. They also provided the foundation for the pioneering research carried out later on genetic transformation of plants using molecular genetics and biotechnology. This research led to controls for several important plant diseases. Further, John Sanford, Department of Pomology and Viticulture, in cooperation with engineers in Ithaca, developed and patented the "gene gun," which is now (1999) widely used in public and private research and production to insert genes from one organism into another to provide resistance to pests and to increase productivity.

It was during Director Barton's administration that the Geneva Station truly became a functioning unit of the College of Agriculture and Life Sciences. For the first time, the top administrators were free of bias baggage carried by earlier administrators. Heinicke believed all extension had to be in Ithaca, that all chemistry should be in Food Science and Technology and supported Hand's stand that all chemists in his department must work on food science. Director Parrott worked hard to erase some of the problems between Director Hedrick and Dean Ladd, but Ladd was slow to completely trust him. Dean Myers seems to have had a good approach to Geneva, but Heinicke failed to take advantage of this opportunity. Director Barton was brought up and

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educated in California and had only 10 years at Geneva as a junior scientist before assuming the Directorship. Director and then Dean Palm had done his Ph.D. thesis research at Geneva and was co-author with George Hervey on two journal papers. His undergraduate studies were in Arkansas. Thus, he was familiar with the Station and a number of the staff as well as with the Ithaca campus. Research Director Keith Kennedy and Barton developed an excellent working relationship as noted earlier. Rather than keeping the Station at arm's length, Director Kennedy and Dean Palm appointed Barton to Assistant and later Associate Director of Research of the College of Agriculture, thus making Barton a member of the College of Agriculture's administrative team. It also reflected their recognition of Director Barton's abilities.

Relations between the last four Station directors and Cornell administrators can be succinctly summarized as follows: Hedrick—antagonistic, Parrott—cooperative, Heinicke—obedient, and Barton—participative.

Barton was a very successful director of the New York State Agricultural Experiment Station. While it is impossible to precisely judge which one of the first nine Station directors was the most successful or contributed the most, it is obvious that Director Barton was instrumental in bringing the Station to its peak in terms of its physical facilities; the quality, quantity, and esprit de corps of its professional and non-professional staffs; its partnership with Cornell University; its respect by the farming community and agribusiness; and its prestige in the scientific community. Naming the new plant pathology-entomology building Barton Laboratory was very appropriate recognition of his many contributions.



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#### References

- <sup>1</sup> Barton Oral History, 1983, pp. 1-2.
- <sup>2</sup> Barton Oral History, 1983, p. 2.
- <sup>3</sup> Barton Oral History, 1983, p. 3.
- <sup>4</sup> Barton Oral History, 1983, pp. 3-5.
- <sup>5</sup> Letter, Barton to Sayre, April 13, 1959.
- <sup>6</sup> Letter, Palm to Meyers March 19, 1959.
- <sup>7</sup> Chapman Oral History, 1965, pp. 183-186.
- <sup>8</sup> Barton Oral History, 1983, p. 48.
- <sup>9</sup> Barton Oral History, 1983, pp. 49-50.
- <sup>10</sup> Barton Oral History, 1983, pp. 55-56.
- <sup>11</sup> Barton, personal communication, 1995.
- <sup>12</sup> Barton Oral History, 1983, pp. 92-96.
- <sup>13</sup> Barton Oral History, 1983, pp. 104-105.
- <sup>14</sup> Barton Oral History, 1983, pp. 105-108.

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- <sup>15</sup> Barton Oral History, 1983, pp. 109-111.
- <sup>16</sup> Barton Oral History, 1983, p. 108.
- <sup>17</sup> Barton Oral History, 1983, pp. 126-127.
- <sup>18</sup> Barton Oral History, 1983, p. 4.
- <sup>19</sup> Barton Oral History, 1983, p. 5.
- <sup>20</sup> Barton Oral History, 1983, pp. 19-21.
- <sup>21</sup> Barton Oral History, 1983, pp. 8-11.
- <sup>22</sup> NYSAES, 69th. Ann. Rpt. 1969, p. 72.
- <sup>23</sup> Barton Oral History, 1983, p. 9.
- <sup>24</sup> Barton Oral History, 1983, p.8.
- <sup>25</sup> Barton Oral History, 1983, pp. 10-11.
- <sup>26</sup> NYSAES, 100th. Ann. Rpt. 1981, p. 1, and 102nd Ann. Rpt. 1983: p. 2.
- <sup>27</sup> Geneva Sta. Rpt. 1961, p. 1.
- <sup>28</sup> Geneva Sta. Rpt. 1964, p. 1.
- <sup>29</sup> E. H. Smith prevailed on B. E Clark, then head of the Department of Seed Investigations to assign this space for the use of entomologists to replace the cramped units under the porches of Parrott Hall. A. C. Davis was asked to assist in the redesign of the third floor. Smith resigned July 1964 to accept the headship of Entomology as NC State University. Davis worked with P. Lippold and the newly arrived W. L. Roelofs in planning the renovation. This was a New York Public Works Project. (Personal communication, A. C. Davis, December 19, 1995.)
- <sup>30</sup> Geneva Sta. Rpt. 1965, p. 1.
- <sup>31</sup> Geneva Sta. Rpt. 1962, p. 1.
- <sup>32</sup> Geneva Sta. Rpt. 1962, p. 1-2.
- <sup>33</sup> Davis, personal communication, 12/19/95.
- <sup>34</sup> Geneva Sta. Rpt. 1964, p. 1.
- <sup>35</sup> Davis, personal communication, 9/1/95.
- <sup>36</sup> There was some disagreement between them about Plant Pathology's insistence on greenhouses at the expense of laboratory space. (See chapter XIII).
- <sup>37</sup> Geneva Sta. Rpt. 1964, p. 2.
- <sup>38</sup> Geneva Sta. Rpt. 1965, p. 3.
- <sup>39</sup> Heinicke Oral History, 1963, p. 182.
- <sup>40</sup> Geneva Sta. Rpt. 1974, pp. 1-2.
- <sup>41</sup> Geneva Sta. Rpt. 1977, pp. 1.
- <sup>42</sup> Horsfall, James G. 1992. *The Pioneer Experiment Station, 1875-1975, A History*. Antoca Press, Lexington, KY. 122 pp.
- <sup>43</sup> Krauss Oral History, 1984, pp. 1-3.
- <sup>44</sup> Krauss, personal communication, 9/15/95.
- <sup>45</sup> Krauss, personal communication, 9/15/95.
- <sup>46</sup> Barton Oral History, 1983, pp. 149-152.
- <sup>47</sup> Barton, personal communication, July 1995.
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# Organization of Research Activities

As reported in Chapters II and III, research was conducted in several scientific fields during the Sturtevant and Collier administrations, even though the staff training was limited to medicine, horticulture, botany, and chemistry. The first entomologists were appointed in 1895, and the first plant pathologist in 1898. Prior to these appointments, research on disease and insect problems was conducted by the horticulturists and botanists. It may be interesting to modern researchers that the rather detailed annual reports during the Sturtevant and Collier years were divided according to staff members rather than by discipline. As late as 1940, a few horticulturists continued to include crop protection as part of their duties at stations with limited personnel. This was not the case at Geneva.

It was during Jordan's administration that formal recognition was given to disciplines. In his annual report for the year 1897, research findings were reported under five headings: chemistry, horticulture, vegetable pathology, entomology, and animal husbandry.<sup>1</sup> In his 1916 report, he used the term Division. By 1921, in his last annual report, he had established six divisions: bacteriology, botany, chemistry, dairying, entomology, and horticulture.<sup>2</sup> The term Division was replaced by Department in 1954 during Director Heinicke's administration to conform to Cornell's terminology. From time to time, Divisions/Departments were added, dropped, combined according to new developments and changes in the research programs and, in the case of all animal investigations (Dairying), when the program was moved to Ithaca in 1942.

The changes in the organization of Station's research activities over the first 100 years of the Station are shown in Figure 1.<sup>3</sup> We have elected to use the Station's departmental nomenclature in effect in 1982 at the end of Director Barton's tenure for the purpose of reporting the research activities and contributions of the

Discipline	Sturtevent 1882-1887	Collier 1887-1895	Jordan 1896-1921	Thatcher 1921-1927	Morrison 1927-1928	Hedrick 1929-1937	Parrott 1938-1942	Heinicke 1942-1960	Barton 1960-1982
Entomology			[Bar chart showing duration from 1896 to 1982]						
Bacteriology			[Bar chart showing duration from 1896 to 1942, ending with '1' and a dashed arrow pointing to the transition between Parrott and Heinicke]						
Biochemistry			[Bar chart showing duration from 1896 to 1928, ending with '2' and a dashed arrow pointing to the transition between Morrison and Hedrick]						
Chemistry			[Bar chart showing duration from 1896 to 1942, ending with '3' and a dashed arrow pointing to the transition between Parrott and Heinicke]						
Food Science & Technology			[Bar chart showing duration from 1942 to 1982]						
Agronomy			[Bar chart showing duration from 1896 to 1928, ending with '4' and a dashed arrow pointing to the transition between Morrison and Hedrick, labeled 'To Ithaca']						
Animal Husbandry(Poultry)			[Bar chart showing duration from 1896 to 1928, ending with '4' and a dashed arrow pointing to the transition between Morrison and Hedrick, labeled 'To Ithaca']						
Dairying			[Bar chart showing duration from 1896 to 1942, ending with '5' and a dashed arrow pointing to the transition between Parrott and Heinicke, labeled 'To Ithaca']						
Botany (Plant Pathology)			[Bar chart showing duration from 1896 to 1937, ending with '6']						
Plant Pathology			[Bar chart showing duration from 1938 to 1982]						
Horticulture			[Bar chart showing duration from 1896 to 1928, ending with '7' and a dashed arrow pointing to the transition between Morrison and Hedrick]						
Pomology			[Bar chart showing duration from 1929 to 1942, ending with '8' and a dashed arrow pointing to the transition between Parrott and Heinicke]						
Pomology & Viticulture			[Bar chart showing duration from 1960 to 1982, ending with '9']						
Seeds			[Bar chart showing duration from 1938 to 1960, ending with '10' and a dashed arrow pointing to the transition between Heinicke and Barton]						
Vegetable Crops			[Bar chart showing duration from 1929 to 1982, ending with a dashed arrow pointing to the transition between Barton and 1982]						
Seed & Vegetable Sciences			[Bar chart showing duration from 1960 to 1982, ending with a dashed arrow pointing to the transition between Barton and 1982]						
Integrated Pest Management			[Bar chart showing duration from 1960 to 1982]						
Number of Divisions/Departments*	0	0	9	9	8	8	8	6	5
Number Faculty	5	10	26	43	43	53	59	56	67

**Footnotes**

1. Merged with Chemistry to form new Food Science and Technology Department
2. Merged with Chemistry
3. Merged with newly established Food Science and technology Department
4. Responsibility transferred to Ithaca
5. Responsibility and Dr. Dahlberg transferred to Ithaca
6. Plant pathology united into one department
7. Canning Crops recognized as a separate department
8. Recognition of viticulture research
9. Recognition of increasing importance of viticulture
10. Seed testing and seed research established as a new department

\*Divisions were changed to/became Departments in 1954

*Organization of Station research by divisions/departments.*

Geneva Station to agriculture and science. These were: Entomology, Food Science and Technology, Plant Pathology, Pomology and Viticulture, and Seed and Vegetable Sciences. However, because much of the early work of the bacteriology and chemistry divisions was not related to food science and was not continued after their merger into Food Science and Technology, separate bacteriology and chemistry chapters are included to report the pre-1945 activities in these disciplines. We have included also

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a chapter on Dairying because of its prominence and the major contributions made before this responsibility was moved to Ithaca in 1942. And, finally, there is a short account of the background and formation of the IPM Support Group established in 1980.

It should be noted that Computer Services and Library and Publications made important contributions to the Station's research efforts, even though these are not identified separately in this history.


It has not been possible to include all activities and accomplishments in each of the research units. We have tried to highlight the more significant and interesting developments. This should not be interpreted that those omitted works were not important. This point is best made by quoting from Director Hedrick's comments about Lucius L. Van Slyke's 38 years of service when the latter retired in 1929. In addition to commenting about Van Slyke's very considerable contributions to the chemistry of dairy products, Director Hedrick wrote the following: "Van Slyke should be remembered by the farmers of New York State also for his organization and supervision of the chemical inspection of commercial fertilizers and feed stuffs. This was one of his first tasks upon taking charge of the Chemical Division at this Station, and so well was the work planned in this important field that the organization and the methods Van Slyke employed became at once models for similar work in other institutions, few of which had then undertaken this work. Perhaps it is not too much to say that at a time when research in agriculture received scant support from farmers in this State, Van Slyke's work in the inspection of commercial fertilizers and feeding stuffs, better than any other effort of the Station, brought this institution to the notice of New York farmers and won their hearty support."<sup>4</sup>

Similar direct and indirect benefits to farmers and the public were derived from the Station's seed inspection and pesticide analysis/evaluation programs as related in several chapters.

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### References

- <sup>1</sup> NYSAES Ann. Rpt. for 1897, pp. 13-22.
  - <sup>2</sup> NYSAES Ann. Rpt. for 1920, pp. 9-22.
  - <sup>3</sup> Figure 1 Organization of Station Research by Divisions/Departments.
  - <sup>4</sup> NYSAES Ann. Rpt. 1929, pp. 14-15.
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## Entomology

The lack of an entomologist on the Station staff in the late 1800s was no indication that New York farmers were not plagued by injurious insects and other arthropods as we have noted in Chapter II. There were few economic entomologists and few reliable methods of crop protection during that period. Producers and consumers (mostly the same persons) had learned to cope with pest damage and losses. With the advent of early insecticides, such as calcium and lead arsenates and primitive sprayers, farmers finally were able to protect their crops against the ravages of a few of the most destructive pests, such as the Colorado potato beetle on potato and the codling moth on apples.

The Division's/Department's development, programs, and support were shaped in large measure by a convergence of events during the first six decades of the 20th century. Most important was the succession of introduced pests: San Jose scale (about 1900), Oriental fruit moth (1915), Japanese beetle (1916), European corn borer (1917), and European chafer (1942). The ravages of these, plus some important native pest species created a demand by farmers and home owners for information on control measures, which, in turn, resulted in special appropriations from Albany to enable appropriate research to find solutions. A second development was the evolution from small to larger farms concentrating on fewer crops. The trend towards processed foods led to a demand for insect-free fruits and vegetables. Also, resistance to pesticides (San Jose scale to lime sulfur, codling moth to lead arsenate, and later many insect and mites to most of the new organic pesticides) resulted in demands for alternative controls and, in the case of codling moth, increased applications of insecticides and problems with pesticide residues.

The limited entomological research conducted by horticulturist E. S. Goff in 1882 and succeeding years, which proved the efficacy of Paris Green for the control of the codling moth on apple, has been noted in Chapter II. He conducted tests against pests on other crops in later years. In 1888, he evaluated the then available insecticides for control of current worms and cabbage maggots.

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*Steam powered high platform sprayer used in earlier years to spray the then very tall apple trees.*



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He evaluated “hose” nozzles and kerosene. The latter was phytotoxic on all crops tested.<sup>1</sup> Of interest as an indication of the state of knowledge at that time were the titles of two reports: *Is Scab (potato) Produced by Fertilizers?* and *Is Potato Scab Caused by Insects?*<sup>2</sup> Assistant horticulturist M. H. Beckwith reported the results of tests he conducted with insecticides in 1887 and 1888. These experiments and the materials tested were very crude and primitive, but it must be recognized that these tests were pioneering research in the late 1800s. The Station, faced with new exotic pests as well as the many native species, recognized the need for well trained economic entomologists. When the sub-station on Long Island was established in 1894, two entomologists and one plant pathologist were hired. One of the entomologists, V. Lowe, was transferred to Geneva in 1895. A department of entomology was established in Director Jordan’s first year as Director in 1886.

**(1896-1920):** The San Jose scale, a much feared pest of tree fruits, was first found in New York in 1894 in an area south of Albany and on Long Island.<sup>3</sup> It soon spread to all of the major fruit districts of the state. In 1900, entomologist Lowe, and his newly acquired assistant, P. J. Parrott, at Geneva, and F. A. Serrine of the Long Island sub-station, conducted some coordinated tests using dormant spray applications containing kerosene and crude petroleum oil. These products not only gave variable results in scale control but often were highly injurious to the trees. Much better results were obtained in 1902 with a 10 per cent lime sulfur solution, a product that had been successfully

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used earlier in California. Not only was lime sulfur effective in killing the scale, but proved relatively non-injurious to the trees when applied during the semi-dormant period. The tests conducted in 1902 were located in orchards on Long Island, the Hudson Valley district, Geneva, and Niagara County. Many fruit growers elected to visit the test orchard in their area and were able to see firsthand what lime sulfur was capable of doing.

The Department of Entomology underwent important staff changes in 1902 and 1903. First, the substation at Jamaica on Long Island was closed. Serrine, who had been stationed there since 1894 with the title of entomologist, was relocated to the substation at Riverhead and given the title of Special Agent. Thereafter he was available to assist any Geneva-based staff member who desired to include Long Island conditions in his studies. Next, on August 12, 1902, P. J. Parrott resigned to accept a position in Ohio. Then, Lowe became seriously ill. Early in 1903, he decided to go to Colorado in an attempt to regain his health. This decision was to no avail, however, for on August 27, 1903, at age 34, he died. The cause of death appears to have been tuberculosis. Parrott was asked to return to Geneva to serve as head of the entomology department. This he did October 1, 1903, and he was to hold this post over the next 35 years.

As observed earlier, Station entomologists established in 1902 that a 10 per cent lime sulfur spray was effective in controlling the notorious San Jose scale. In a test conducted in a Geneva orchard that year, lime sulfur applied to trees in early leaf also gave good control of apple scab. Undoubtedly, a key factor affecting this result was the stage of tree development at treatment time. The buds were further advanced than in any orchard previously treated. This may have been the earliest conclusive demonstration of lime sulfur's potential value for scab control. This product was not seriously considered for use for this purpose, however, until 1907 when A. B. Cordley of the Oregon Station established that it could be safely and effectively used at a much more dilute rate than 10 per cent on trees in full foliage.

Over the period 1902-1920, studies were conducted on the biology and control of some 50 species of insect and mite pests. Most of these were pests of the tree fruits. Reports of these studies were offered in 44 Station bulletins. The species given most attention were: San Jose scale (10 bulletins), cabbage maggot (5 bulletins), and the apple aphids (5 bulletins). In 1910, Hartzell published a 93-page bulletin (No. 331) on the biology

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and control of five insect pests of grape.<sup>4</sup> Other noteworthy studies reported in Station bulletins were: the eriophyid mite pests of apple and pear but principally the pear leaf blister mite (Nos. 283, 306); the tussock moth (No. 312); pear thrips (No. 343); the grape leafhopper (No. 359); false tarnished plant bug as a pear pest (No. 368); the cranberry toad-bug on Long Island (No. 377); the pear psylla (No. 387); tree crickets injurious to orchard and garden fruits (No. 388); the cherry leaf beetle (No. 444); leafhoppers injurious to fruit trees (No. 451); control of the grape rootworm (No. 453); and leafhoppers as a potato pest (Tech. Bul. 77).

The Legislature of 1920 provided a special appropriation of \$5,000 for research on insecticides and fungicides. The Division used some of this grant to acquire a new staff member, Guy F. MacLeod. He assisted in studies conducted during the first half of 1921 on the control of apple red bugs with insecticides applied in the form of dusts.<sup>5</sup>

**1921-1928:** The work of this division was greatly expanded with the establishment of the Long Island Vegetable Research Farm in 1922, the Hudson Valley Fruit Research Substation in 1923, and the Canning Crops appropriation of 1925. A new professorial staff member was acquired in each instance, being: H. C. Hockett (Long Island Substation), F. H. Lathrop (Hudson Valley Substation), and Hugh Glasgow<sup>6</sup> (Canning Crops). Lathrop resigned in 1924 and F. G. Munding was appointed to fill this Hudson Valley post.

Over the years 1911-1915, plant pathologists at the Cornell Station (joined by C. R. Crosby, the Extension entomologist in 1914) conducted a series of tests in apple orchards comparing the effectiveness of pesticides applied in the form of dusts and as sprays. They concluded in 1916 that dusts gave "better commercial results in the control of *preventable* apple diseases and apple insects and could be applied much more rapidly and thereby at greatly reduced labor costs." In 1920, Geneva Station entomologists and plant pathologists launched an extensive series of spray-dust comparisons of their own. While apple was the principal commodity involved, tests also were conducted on other fruits, potato, and vegetable crops. By about 1925, New York apple growers were divided into three "camps": those who relied on spray treatments exclusively; those using only dusts; and a third group using schedules combining both dusts and sprays. A big advantage of dusting was rapid rate of application compared to the laborious time-consuming spraying with hand-

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held spray guns. Eventually, research and grower experience established that for controlling the total disease-insect complex, spraying was the more dependable and effective practice. These facts became evident as certain pests, notably the codling moth, became increasingly difficult to control. Then, too, the rapid-application advantage dusting previously had over spraying largely disappeared with the advent of the airblast sprayers.

In 1922, studies were conducted on one or more pests of apple, pear, peach, grape, currant, raspberry, potato, cabbage, carrot, and cucumber. Of the apple pests, special attention was given to the fruit tree leafroller, a species which over-winters in the egg stage in masses of  $\pm 60$  eggs per mass. Attempts were made to control the insect by use of a dormant-applied oil spray to kill the eggs, or by using, later, several lead arsenate sprays to kill the larvae. Neither method proved wholly satisfactory in combating heavy infestations. While Parrott, Glasgow, and S. W. Harman found an eight per cent oil gave good control, this product was not advised for use two years in succession, because of tree-injury hazards. On the other hand, the necessity of having to use one or two extra lead arsenate sprays to kill the larvae appeared impractical to most growers. By 1926, the codling moth became generally serious in apple orchards of Western New York as lead arsenate resistant strains evolved. To assist growers here, S. W. Harman started an adult-trapping service of this species so that treatments for its control could be accurately timed.

In 1925, when Glasgow was placed in charge of studies on Canning Crop pests, he gave special attention, initially, to the control of the two species of cherry fruit flies. Canners required that cherry fruit be free of all larvae (maggots) of these pests. By trapping the adults as they emerged from the soil, Glasgow was able to advise growers when the first and all subsequent pesticidal treatments should be applied. Most growers soon were able to provide canners with maggot-free crops. The other Canning Crop pests investigated in 1926 were: white grubs, wireworms, the spinach leaf-miner, and the carrot-rust fly.

On Long Island, H. C. Hockett conducted studies on the control of pests of cucumber, cabbage and other crucifers, and on potato. Most of his investigations at this time involved comparisons of pesticides used in the form of dusts and as sprays. Some results favored dusting, others, spraying. Hockett finally concluded the performance differences found might be more attributable to efficiency differences in the application equip-



*Derrill Daniel was well known for his successful Oriental Fruit Moth biological control program and for being one of the most decorated American World War II heroes. He stayed in the Army, became a General and Commander of the Paratroopers, and personally made more than 100 jumps.*

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ment employed rather than to the form in which the pesticides were used.

**1928-1938:** By 1928, the Mexican bean beetle was established in home gardens and commercial plantings of beans in about eight counties of western New York. To cope with this problem, the Station entered into a cooperative agreement with the U. S. Bureau of Entomology, whereby a bureau entomologist was stationed at Geneva. The person assigned was Rodney Cecil. His program was concerned with establishing the distribution of the insect in western New York, its life history in this area, and, of course, how best to control it. Since control consisted of the use of one or more pesticidal treatments, a special problem was presented in the case of beans harvested green for canning. He found, however, that objectionable traces of pesticide at harvest could be avoided by proper timing of treatments used.

The Legislature, in its 1929 session, appropriated funds for two new entomological projects. One was research on the European corn borer, the other, in the amount of \$13,000, was "for investigations on certain moths and insects." Specifically named for study in 1929 under this blanket grant was the Oriental fruit moth, which was newly established in the peach and quince orchards of Chatauqua and Niagara counties and the codling moth. An existing staff member, D. M. Daniel, was assigned to the oriental fruit moth project. He learned that workers elsewhere had been unable to find an effective chemical-control measure for this pest. The best hope for control seemed to lie in the use of natural enemies, or, more specifically, in the use of the parasite *Macrocentrus ancyliivorus*. Daniel quickly developed means of rearing large numbers of this species, and by 1937 colonies of it were being established in infested peach orchards over the state. While results varied, the parasite did give, on average, commercial control of the Oriental fruit moth. This was the first successful biological control effort in New York. In 1930, the Legislature added \$37,000 to the Moths and Insects grant bringing its total to \$50,000 annually. (It then represented 13.5 per cent of the Station's total budget.) Most of the additional money was used to initiate a new program designed to cope with the fruit pest problems most troublesome in eastern New York.<sup>7</sup>

The apple maggot was one such problem. It was of major importance in orchards of eastern New York, but only secondarily so in plantings of western New York. In retrospect, the lower incidence of apple maggot in western orchards was due

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to the late summer heavy use of lead arsenate for codling moth control. Apple maggot became a more serious problem there when DDT was substituted for lead arsenate. It acquired even greater importance in both areas around 1930 when European Plant Quarantine officials threatened to reject future shipments of American apples showing any degree of infestation by the insect. The apple maggot did not occur in Europe, but officials recognized it might easily become established there if infested fruit continued to be imported. U. S. Department of Agriculture officials asked the Geneva Division of Entomology to find some practicable way of killing all stages of apple maggot that might occur in the harvested fruit. P. J. Chapman was assigned the problem. After only three years' study, he developed a simple, inexpensive, and practical solution. He found and demonstrated that no eggs or larvae, the only stages present in apples at harvest, could survive in fruit held for a minimum of 35 days at 31-33 F. This treatment became accepted by both foreign and domestic agencies as the official method for disinfecting fruits attacked by apple maggot.<sup>8</sup> Thus, apples were certifiable for shipment to Europe, the west coast of the United States, Japan and any other part of the world where apple maggot was and is not present. This discovery has permitted the export of millions of bushels and apples from the northeastern apple growing regions of North America with a corresponding return flow of dollars from 1933 to the present.

A worsening of the codling moth, due to the development of lead arsenate resistant strains, required the use of lead arsenate sprays so late in the season that lead and arsenic residues often exceeded tolerated amounts. Growers so affected were obliged to reduce these residues to allowable levels either by brushing the fruit or washing it in a weak acid solution. Needed was an insecticide that was both less persistent and more effective than lead arsenate. The first class of products pressed into service for this purpose were nicotine-based insecticides. While their use alleviated the situation somewhat, complete success was not attained until DDT and other synthetic organic insecticides were introduced in the 1940s and later. Because of the lesser severity of the codling moth in eastern New York, most growers here were able to control it and the apple maggot without causing excessive lead and arsenate residues at harvest.

By 1937, the entomological program had become both wide-ranging and diverse. Thus, work was being conducted by staff located at Geneva, Fredonia, Poughkeepsie, Riverhead, and at other points on Long Island, and at Peru and Crown Point in

*“Probably no phase of entomology appeals to the lay mind more than biological control.”* “

the Champlain Valley district. More than 25 species of insects and mites were under active investigation over the 1929-1937 years. These included pests of apple, pear, peach, quince, cherry, currant, cabbage and other crucifers, potato, peas, beans, cucumber and other cucurbits, and various pests of woody plants grown under both nursery and post-nursery conditions. The studies made on the continuing problems posed by cabbage worms, European corn borer, oriental fruit moth, apple maggot, codling moth, cherry fruit flies and others were also important. But so, also, were those conducted on the biology and control of the peach tree borer; the plum curculio as a pest of apple in the Hudson Valley area; the apple curculio in Essex County; and the round headed apple tree borer, the pear midge, Mexican bean beetle, and corn earworm on Long Island-lower Hudson Valley area. Hugh Glasgow succeeded in devising practicable means of controlling the pea aphid in large acreage situations. This was an important contribution and one much appreciated by the growers of this crop.

**1938-1948:** As reported earlier, Parrott was brought to Geneva to work on the San Jose scale problem in 1903. He was successful in developing effective controls and was highly respected by farmers and fellow entomologists. The several special appropriations from Albany enabled Parrott to build a very strong division of entomology during his tenure as head of the Division from 1903 to 1928. Parrott assumed the Station Directorship in 1928 and appointed Hugh Glasgow as his successor. Glasgow was well liked and respected by his colleagues. He provided steady leadership until his death in the summer of 1948.

The need for new insecticides, timing and methods of application, and alternative control methods increased in the late 1930s and early 1940s. The needs were exacerbated by World War II, which resulted in the scarcity of some chemicals and shortages of farm labor. The Station's problems and philosophy on pest control at that time are found in the following quotation from the 1939 annual Station Report.

*“Biological, ecological, and physiological control—Probably no phase of entomology appeals to the lay mind more than biological control. The idea of using predaceous and parasitic insects to destroy other species appears to many as both logical and economical. In reality, with most pests, the problem is not so simple. At present, however, this is the only practical method known for the control of the oriental fruit moth on peaches. The*



*rearing and distribution of the parasitic hymenopteron, Macrocentrus ancyliivorus, requires the entire time of a number of workers in the division. Investigations are in progress to determine the practicality of biological control of other insects, particularly the codling moth.*

*“More and more attention is being given by Station entomologists to the relation of insect pests to their environment. Wild food plants, shelter from wind, favorable places for hibernation, and other ecological factors play important roles in favoring the abundance of certain pests. Important examples of past investigations of this type by members of the Division are grape leafhopper, grape berry moth, cherry leaf beetle, pear midge, and pear psylla. Ecological studies of the plum curculio were completed and published during the past year. Similar studies are being continued on oyster shell scale, red bug, bud moth, Japanese beetle and other insects. The term ‘physiological control’ is used to cover such a miscellaneous list as light traps, bait traps, chemically treated bands, etc., where the response of insects to these various physical and chemical attractants are being studied. The value of banding for codling moth control and of baits for various insects has been receiving attention for a number of years. The light trap investigation of codling moth is being continued in cooperation with the United States Bureau of Entomology. One important use of bait traps and light traps is their service as indicators of the rate of emergence of certain insects, thus being of great assistance in timing spray applications.”<sup>9</sup>*

The philosophy and approaches expressed in these two paragraphs are remarkably similar to those developed in the late 1960s and 1970s after the publication of Rachel Carson’s *Silent Spring* and the severe pest control problems that emerged as a result of extensive resistance that evolved to the available pesticides. This so-called “new” approach was termed “integrated pest management” or “IPM.”<sup>10</sup> Clearly, Parrott and the Division entomologists were in the vanguard of the field of economic entomology.

From an historical perspective, it is evident that Parrott’s philosophy and the later post-*Silent Spring* IPM movement were prompted in large measure by crises. In the early part of the century, when agriculture was changing from small diversified farms to large concentrated operations and there were few effective pesticides, it was necessary to investigate and use every possible approach to obtain satisfactory control methods. With

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the introduction of the very potent organic pesticides following World War II, the emphasis changed to determining how best to use these new tools effectively and safely. Emphasis on the broad based IPM approach resumed later with the crisis brought about by problems, including secondary induced pests, pesticide resistance, and demonstrated environmental problems.

The nature of research in the Station Entomology Division during the World War II years ranged from biological control of the oriental fruit moth to pure chemical control studies; however, wartime demands were changing the emphasis from biological and ecological to chemical control studies. The highlights of four ongoing projects are summarized here to illustrate the nature of the problems and the responses of the Geneva entomologists from 1938 to 1945.

R. W. Dean at the Hudson Valley Station was the first to demonstrate the attractiveness of protein hydrolysates in bait traps to female apple maggot flies. This was important as a tool for detecting the presence of apple maggots in an orchard and timing control measures.<sup>11</sup> It was the beginning of efforts to find a method of predicting when and if control measures are needed to prevent infestation of apples by this dreaded pest, as we shall see later in this chapter.

J. A. Adams worked quietly and without fanfare on the control of sweet corn insect pests during the post-war years. He developed a survey procedure for European corn borer and corn earworm seasonal development and a program to advise growers when to apply control measures. F. L. McEwen observed that this was an excellent example of integrated pest management. In fact, entomologists and plant pathologists at the Station had been using IPM principles for many years.

Pea was an important fresh market and processing crop in New York state. The pea aphid was the most important insect pest and was capable of complete destruction of the crop. Hugh Glasgow had spent eight years searching for suitable insecticides and developing machinery and methods of application. Nicotine and rotenone were the two insecticides found to give the best control. Nicotine sulfate<sup>12</sup> was effectively used as a dilute spray in water at 150 to 200 gallons per acre, as a concentrated water spray at 20 to 25 gallons per acre or an oil-nicotine mixture atomized at four to five gallons per acre. It also was found to be effective as a dust. Rotenone was also used as a dust and as dilute or concentrated water sprays. There were advan-

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tages and disadvantages to each of these options. Thus, pea producers could select the options best suited for their operations with full knowledge of the reasons for the selection.<sup>13</sup> Glasgow was a careful researcher much respected by farmers and his peers.

An interdisciplinary team of Chapman (entomology), G. W. Pearce and A. W. Avens (chemistry), and G. D. Oberle (pomology) initiated studies in 1939 on the use of hydrocarbon oils as insecticide-acaricides. The oils first examined were the so-called dormant oils, which were evaluated for their effectiveness in killing the over wintering eggs of the fruit tree leafroller. It was found that the amount of oil deposited on the small-diameter branches, where the leafroller eggs occur varied widely depending on the kind and amount of emulsifying agent used, even with the same oil concentration. Because of this, evaluations were based principally on the deposits rather than on the oil concentration in the spray. A good correlation was established between these deposits and egg kill. Sensing that the oils may differ in their effectiveness, minimum effective deposit (MED) data were obtained on 39 different dormant oils. MED values were found to range from 0.8 to 3.5 mg per square inch of bark. These differences were found to be related to the basic composition of the oils, or more specifically, to paraffinicity; the more paraffinic the oil, the more effective it was. This correlation had not been established previously. Support for paraffinicity connection was also found in testing a number of foliar or summer oils. Specifications issued for both the dormant and summer oils were widely accepted in the deciduous fruit-growing districts of the world. This work by Chapman, Pearce, and Avens was widely acclaimed. Two papers presented at Entomological Society of America meetings on succeeding years were judged to be the best papers and received Gold Medal Awards. An industry representative told the junior author that this was the most brilliant research done in this field, and an Esso administrator termed Chapman the “father” of modern horticultural spray oils.

Graduate students were involved in the oil project from time to time. E. H. Smith did research on the mode of action (how oil kills insects and mites). In a review of this subject, he reported that the evidence indicates that oils generally are thought to kill by interfering with the exchange of gases through the cuticle rather than by penetration and destruction of internal organs.<sup>14</sup>

The European chafer, a major pest of cultivated turf, was first found established in North America in 1940 at Newark, New

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York. F. L. Gambrell investigated the possible use of natural enemies and available insecticides to contain the pest, but no really effective means of control were found until 1948, when chlordane and other related chlorinated hydrocarbons became available for soil treatments. A single application of these products gave protection for several years. After Gambrell died in 1967, H. Tashiro, a U. S. Department of Agriculture entomologist who had collaborated earlier with Gambrell for 13 years, was hired to take charge of the project. Starting in 1969, resistance to chlordane and related chemicals had developed in limited areas. This eventually led to the use of annual applications of certain organophosphate insecticides.

The codling moth, a native of southeastern Europe that causes the "wormy apple" is found almost everywhere apples are grown throughout the world. It is a serious pest wherever apples are grown in the United States and Canada. Apple maggot larvae also feed internally in apple fruits but occur only in eastern United States and Canada. Lead arsenate has been effective against the apple maggot and also controlled the codling moth until lead arsenate resistant strains developed in the late 1930s and early 1940s. Some orchards in western New York were abandoned because no controls were available then for control of these resistant strains. Extensive research on these problems was underway during this period in Western New York by S. W. Harman and in the Hudson Valley by R. W. Dean. Alternative pesticides available at that time, such as nicotine sulfate and rotenone, were not effective substitutes for the arsenicals. It was not until DDT and other organic insecticides were introduced that the codling moth was brought under control. Members of the Chemistry Division, A. W. Avens and others, were cooperating with entomologists on residue analyses and developing methods to remove excessive residues resulting from late season applications. It should be noted that these major apple insect pests and fruit diseases created the demand for establishing and the continued maintenance of the Hudson Valley Laboratory near Poughkeepsie.

**1948-1965:** This was a period when many new organic pesticides were discovered and introduced, including insecticides, miticides, fungicides, nematicides and herbicides. It also spanned P. J. Chapman's term as head of the Division of Entomology. For the Station entomologists responsible for finding measures to control insect and mite pests on crops, these new chemicals were both a great opportunity and a challenge. They provided unheard of control of several formerly uncontrollable pests, yet they caused previously unknown secondary problems, such as pesticide

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*Edward H. Glass speaking to a New York Horticultural tour group in Station Orchard 12, which was used to evaluate control measures for apple pests.*



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residues, off flavors, creation of secondary pests, and environmental hazards. Further, resistant strains of several insects and mites developed after only a few years of continual use. On balance, however, these new products enabled increased production of quality vegetables, fruits, and other farm products, and were welcomed by farmers.

The organochlorine, DDT, was among the first and most notable of these new synthetic organic insecticides. It became available for the military early in World War II and is credited with saving the lives of millions of soldiers and civilians from the ravages of war associated diseases such as typhus and malaria. By the mid-1950s, samples of DDT were available for testing against agricultural and other pests. Station entomologists soon learned that DDT was remarkably effective against the codling moth and several other pests of apple and other fruits, as well as a number of vegetable pests. Later in the decade, several organophosphate insecticides and miticides, such as parathion and malathion, were available for testing. Parathion and some others were very toxic to man and animals. The challenge to entomologists at Geneva and elsewhere was to evaluate these new products, determine how they could be used effectively and safely for the farmer and the consumer, and not disrupt the environment. The history of a few examples on fruits and a vegetables during this period illustrate the nature of Station department activities during this period.

The Mexican bean beetle had been ravaging dry and snap bean fields for a number of years in spite of the use of rotenone applications. G. E. R. Hervey evaluated available new materials and

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found that methoxychlor and sevin insecticides gave excellent control, were relatively safe to use, and did not create a residue problem. Mexican bean beetles have been difficult to find in commercial New York bean fields since that time.

A. C. Davis was appointed April 1950 to replace L. Carruth, who had resigned to accept a position as head of the Entomology Department at Arizona State University. He initiated extensive studies on potential problems that might arise with the use of the then newly available insecticides. This work was carried out in cooperation with members of the Food Science and Technology Division: J. C. Hening for flavor, W. Robinson for color, and A. Avens for pesticide residues. They determined that some experimental insecticides could not be used because of undesirable effects on flavor, and the use of others had to be limited to prevent harmful residues at harvest. This project illustrated the need for and the value of close inter-divisional collaboration.

Larvae of the seed corn maggot, a major pest of large-seeded crops, reduce yields by destroying or retarding the growth of young germinating plants. Wayne Howe, an entomology graduate student, studying under Dr. Hervey's and plant pathologist W. T. Schroeder's direction in the late 1940s, provided the first effective control of this pest. It consisted of a seed treatment using lindane, dieldrin, or chlordane in combination with a fungicide to control seed pathogens. This original research opened an extended time for planting. Previously, recommendations had designated planting only during a four- to six-day period when flies were not present.

A five-acre apple orchard had been established about 1930 on Station grounds for evaluation of experimental procedures to control apple pests, especially the codling moth. Donald Collins conducted research in this orchard in the 1930s on the use of light traps to attract and destroy moths and to obtain data on moth flight periods as a guide to timing spray applications. The trees were pruned, fertilized and sprayed with fungicides according to standard procedures. Only about 20 per cent of the trees were sprayed with insecticides or miticides in any one year, thus leaving the rest untreated to maintain high populations of insect and mite pests and especially beneficial species. Orchard 12 became a very valuable facility for preliminary screening of the several new insecticides that were available during the post-war decades. There were large populations of pests, the fruit was not consumed, and tree injury was not a problem. Thus, it was possible to conduct preliminary field screening prior to commercial orchard evaluations.

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By 1948, DDT had been used very successfully for two seasons in many Western New York apple orchards for codling moth control. Unexpectedly, the redbanded leafroller emerged as a serious problem causing alarming amounts of fruit damage. DDT, at the dosage and methods of applications used by growers, was ineffective against this new pest and killed natural enemies such as *Trichogramma* egg parasites. A close relative of DDT, named DDD, provided excellent control for several years until resistance developed in the late 1950s. Other available insecticides, including Guthion, were ineffective when applied against the larvae, which feed on the undersides of the leaves under webbing and are well protected from sprays. In 1959, E. H. Glass discovered that Guthion, applied in the normal grower application manner just before moth emergence begins and repeated at two-week intervals during moth emergence, kills moths before they lay eggs. Apple growers obtained remarkable control with this procedure. One hundred percent control was common in grower orchards. Interestingly, Guthion applied against the larvae had been found ineffective by Dean in the Hudson Valley and by Glass in Western New York.

Serious consideration was not given to the use of virus and bacterial diseases for the control of fruit and vegetable pests until 1954. That year, Glass obtained redbanded leafroller larvae diseased with a granulosis virus from Virginia and propagated the virus in a laboratory colony of this insect. It proved to be very contagious and lethal against newly hatched larvae in the laboratory. In a field test, however, it infected all the first generation larvae, but many survived to the pupal stage and emerged to lay second generation eggs. These hatched and, surprisingly, not a single diseased second generation larva or pupa was found. F. L. McEwen and G. E. R. Hervey had better success in 1957 using a virus causing polyhedrosis in the cabbage looper. In 1959, Glass and McEwen joined forces to make further studies on the above and to evaluate the bacterium *Bacillus thuringiensis* for control of the redbanded leafroller, the codling moth, and the cabbage looper. Except for the codling moth, good control was achieved. In spite of these results, the commercially available bacterium saw little use for a number of years owing to competition from more effective chemical control agents and the reluctance of the Food and Drug Administration to authorize its use.

S. E. Lienk was appointed in March 1950 and began investigations in collaboration with Chapman on tree fruit mites and other entomological studies. This remarkably harmonious collabora-



*Sigfried E. Lienk*

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tion lasted until Lienk's death in 1983. Some details of their research are found later in this chapter.

The Geneva Station was the only unit conducting a major research program on insect and mite pests of strawberry, raspberry, and other small fruits in the eastern United States during this period. G. A. Schaefer was in charge of the project from 1958 until he assumed chairmanship of the Department in 1983. Many improvements in pest management and fruit production have resulted from this program, with the work on the tarnished plant bug being the most valuable. For many years, frost damage was considered responsible for deformed "cat-faced" strawberries. Schaefer's research established that plant bug feeding during bloom caused a localized loss of growth hormone production, resulting in undeveloped areas of the berries. The recommended treatments for the control of this important pest proved both highly effective and economical.

The question of restricting the shipment of apples from New York and other states where the apple maggot and plum curculio are present surfaced again in the late 1950s with the development of controlled atmospheric storage (CA). This method, which prolongs storage and shelf life of apples nine or more months, involves storage for 100 days or more at 32 to 38 F. temperatures, with oxygen concentrations of 3 per cent and carbon dioxide levels of 2 per cent to 8 per cent. R. M. Smock, pomologist at Ithaca, was a leader in developing this technology. The question was whether or not CA storage was completely lethal to all stages of apple maggot and plum curculio. Glass, Chapman, and Smock demonstrated that the minimum storage time (90 days required for certified CA apples) is completely lethal to all apple maggot and plum curculio that might be present in the fruit. In April 1960, the California Department of Agriculture amended its quarantine regulations to permit the entry of properly stored eastern CA apples into California.<sup>15</sup>

In 1951, S. E. Lienk, pomologist O. F. Curtis, and Chapman initiated an orchard study to determine whether or not the injury caused to apple leaves by mite feeding had any impact on the growth and productivity of apple trees. They demonstrated that a heavy early season infestation of the European red mite had no effect on the size, color, and quality of Cortland apples that season but reduced yield by 240 bushels per acre. Further, there was a delayed effect. Mites interfered with fruit bud formation in 1951 causing a light bloom and a 261 bushel per-acre loss in 1952. Thus, one mite infestation resulted in a total loss of 501 bushels





*Paul J. Chapman*

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per acre. Fruit growers and researchers had not associated mite infestations with such high fruit losses. This was the first experimental evidence of this nature and preceded a number of similar studies made by others in later years under the rubric of IPM. These results and follow-up studies convinced growers of the importance of early season mite control.

Earlier, we reported on the research and comparisons of spraying versus dusting of insecticides and fungicides, noting that while spraying proved to be generally more reliable than dusting, the latter had distinct advantages. Also, we noted that the new airblast spraying offered the advantages of both types of applications. Dusting ceased to be used by growers as commercial airblast sprayers became available.

During the 1950s, experiments and commercial use of airblast spraying were in progress with "concentrate sprays," i. e., using higher concentrations of pesticides with corresponding less gallons per acre. Most of the applications were made with the popular "Speed Sprayer." A fruit grower in the Hudson Valley in collaboration with James Brann, then located at the Geneva Station's Hudson Valley laboratory, developed a novel sprayer useful only for concentrated low-gallonage spraying of fruit trees. It was called "Mistomatic." Brann was transferred from the Hudson Valley Station to the Entomology Department in Ithaca to work on farm spraying equipment in collaboration with Ithaca agricultural engineers. At first, his primary interest was the

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*E. H. Glass checking the catch of redbanded leafroller moths in a pheromone trap.*



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Mistomatic sprayer. Brann and an Ithaca plant pathologist, Arthur Burrell, working primarily in the Champlain Valley fruit area, were advising growers that they could obtain the same results with concentrated spraying using 80 per cent of the fungicides, insecticides, and miticides per acre normally used in regular dilute sprays. There was no sound experimental evidence presented to justify this advice.

Plant pathologists J. M. Hamilton and M. Szkolnik, in collaboration with entomologists S. E. Lienk and E. H. Glass, undertook a series of evaluations of dilute sprays with 2X, 4X, 6X, and 8X concentrations with insecticides, miticides and fungicides. They also compared the "Mistomatic" with the "Speed Sprayer" at 8X concentration. After three years, it was determined that the most reliable results, especially under adverse spraying conditions, were obtained with dilute sprays. Likewise the Speed Sprayer gave the most consistent results, especially in the tops of large trees. The main advantage of concentrate spraying was in savings of water, time spent at the filling station, and overall time spent in the spraying operation. There was no evidence of saving on pesticides. In fact, the opposite was true for difficult situations.<sup>16</sup> This situation proved to be contentious and caused some awkward situations at grower meetings. The results? Growers ultimately learned to use concentrated spraying to save water and time when it could be done safely and reverted to dilute for mite and other difficult to control problems. Also, the Mistomatic disappeared from the market<sup>17</sup> and Brann was named the extension fruit entomologist where he performed admirably until he retired years later.

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It was during Chapman's term as head of the Entomology Department that the new Barton Laboratory was designed and approved for construction. Chapman turned to Davis for assistance in working with the architects to ensure that all needed facilities were included in the plans to enable the execution of the expanded research programs projected for the Department. Davis proved to have exceptional skills in this area and he soon was asked to work with the plant pathologists in a similar role. He later was appointed associate director of the Station and, additionally, assisted with building projects on the Ithaca campus. More details of his role in administration are found in Chapter X. Both Departments of Plant Pathology and Entomology are indebted to Davis for his contributions.

**1965-1982:** By 1965, there had been only three heads of the Entomology Division/Department: P. J. Parrott, 1903-1938, H. Glasgow, 1938-1948 and P. J. Chapman, 1948 to 1965. Chapman's successor was F. L. McEwen. A Canadian by birth, he elected in 1968 to accept a comparable position at the University of Guelph in Canada, where he later became Dean of the College of Agriculture. Succeeding him at Geneva was E. H. Glass, who served as head for 13 years from 1969 to 1982. Both Glass and McEwen had been closely associated with Chapman and other members of the department for a number of years, and were in full support of the overall plans for the future of the department. McEwen made an excellent choice in bringing H. Tashiro back from a California U. S. Department of Agriculture position to take over Gambrell's programs following the latter's sudden death in 1967. Glass was instrumental in bringing several outstanding new scientists to Geneva to replace retirees or filled new positions. Unlike Chapman, Glass chose to give up active research and turned his attention to national and international affairs. He was active in the Entomological Society of America and served as president in 1978, spent a year in Washington chairing a committee preparing a report on integrated pest management at the Office for Technical Assessment for Congress, was a member of two and chair of one National Academy of Sciences committees and served on its Agricultural Board, and was active in the United States Agency for International Development sponsored Consortium for International Crop Protection as a board member and on several short overseas assignments.

Chapman was head during the critical post World War II period when the Station was expanding both in physical facilities and in numbers of staff. It can be truly said that he led the department into the new 20th century science of entomology. He made three major contributions to the department.

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During his 17-year term, 10 entomology faculty positions were filled. He set very high standards for selecting new staff including being well-rounded persons as well as promising scientists.<sup>18</sup> Of these, five went on to chair departments of entomology at Geneva or elsewhere. Four were appointed to director of research or extension, and one was appointed dean of a college of agriculture. One member was elected to the National Academy of Sciences and, later, named a Cornell Liberty Hyde Bailey professor, the first from the Geneva Station.

The second major contribution by Chapman in the early 1960s was to lead his department in designing a plan for its future, which was used as a guide for designing Barton Laboratory in preparation for new positions and programs. Also, as noted in Chapters IX and X, he took advantage of expertise within his department, especially A. Davis, as well as from his many contacts in the scientific and industrial communities. These efforts ensured that the new facility would accommodate not only existing programs but also projected new research programs.

Chapman's third major contribution was to instill in his faculty a sense of the importance of their missions and provide guidelines and support to achieve their objectives. Much of this he did by example. He maintained an innovative and productive research effort throughout his entire time at Geneva and was still active after his official retirement. He was an excellent collaborator and regularly entered into projects with scientists from other disciplines.

Another example of the benefits of researching new pesticides to solve serious insect pest problems New York crops occurred in the 1970s when a complex of lettuce insect pests was devastating lettuce production in Oswego County. C. Eckenrode found that a safe experimental insecticide was very effective against these pests; however, it was not registered, and the potential market was too small to justify the expense of a national registration by the manufacturer. Eckenrode collaborated with James Dewey, State Pesticide Coordinator at Ithaca, to obtain a New York State registration for the product on lettuce. Oswego Vegetable County Agent, Dale Young, in an informal survey, found the savings to lettuce growers resulting from this action to be more than \$3,000,000 over a five year period.

Apple was introduced to North America from Europe in colonial times. It now occurs widely and, in New York, is found both as a wild and cultivated plant. Many native insects have become

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temporary or permanent pests in commercial orchards. In 1957, Chapman and Lienk, with collaboration from taxonomist J. G. Franclemont of the Department of Entomology at Ithaca, undertook an extended study of insects that breed on wild unsprayed apple trees and are potential threats to commercial orchardists. They limited their study to the lepidopterous family, *Tortricidae*, because the entire range of insects was too great to study and because this group already contained major apple pests such as the codling moth. The study, which involved 49 species, obtained most of the biological information needed to cope with these species should they move into commercial plantings. In 1971, Chapman and Lienk published a 122-page book illustrated with black and white photos of wild apple trees and how they were "planted" by crows, along with color reproductions of paintings of moths and larvae.<sup>19</sup> The project was supported by two National Science Foundation grants and won commendation by this agency. Interestingly, the first application for the grant was returned with suggestions for changes needed to make it acceptable. It was returned again for additional changes before final acceptance. Chapman's comment was "The last proposal is different from the first, but the research will be the same."<sup>20</sup>

Chapman's and Lienk's final collaborative effort was a major study of all *Macrolepidoptera* present in the Geneva area as measured by catches in daily monitored light traps from April through November 15 from 1974 through 1978. Over the five-year period, 670 species were recovered. All initial species identifications were made by J. G. Franclemont. A reference collection of these species was assembled with all specimens confirmed by Franclemont. The collection is estimated to represent 95 per cent of the total *Macrolepidoptera* present in the Geneva area. The flight period information will always be available for use by research and extension workers as well as farmers to time needed control measures. In 1980, Chapman commented that "It is doubtful that anyone has obtained a more complete record on so many species over as long a period anywhere in the world."<sup>21</sup>

Chapman and Dale Webb prepared and published the final report on this study in 1991.<sup>22</sup> The title was, *Flight Period(s) of the Larger Species of Moths (Macrolepidoptera) that Occur in Western New York*. Chapman was 91 years of age. He made his long-time collaborator, Lienk who died in 1988, the senior author.

As noted earlier, the seed corn maggot is a major pest of large-seeded crops and can reduce yields by destroying young plants or retarding their growth. In an effort to find an alternative to chemi-

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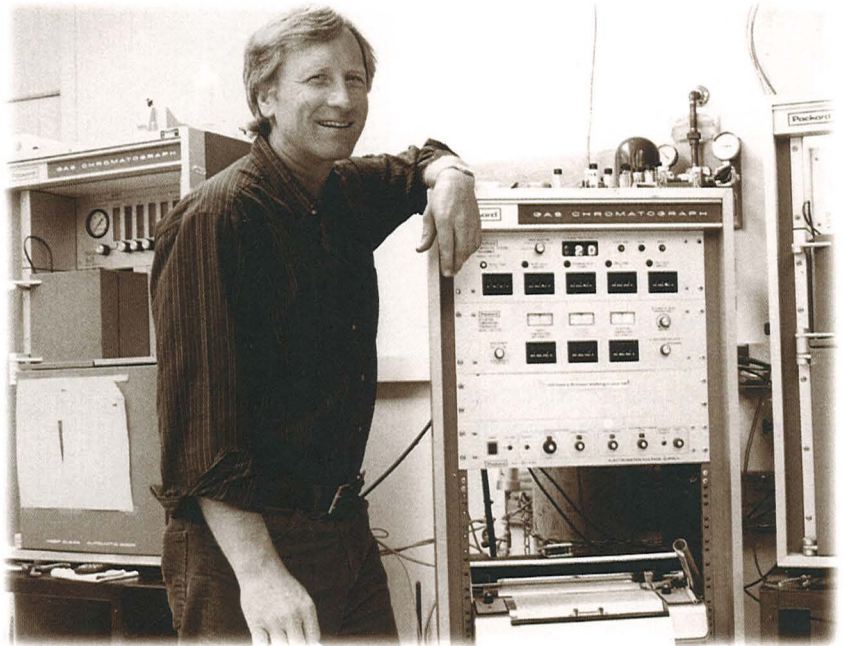
cal seed treatments, C. Eckenrode began a study to learn how the adult females are able to locate where the seeds have been planted below the soil surface. In collaboration with his assistant, D. Webb, and plant pathologist G. Harman of the Department of Seed and Vegetable Sciences, it was discovered, in 1975, that certain microorganisms on and around germinating seeds give off odors that are used by the adult females to locate the seeds. This opened a new window for controlling this pest. Interestingly, it also led to the development of an experimental biological control method, i.e., coating the seed with an innocuous soil fungus that masked the attractant or prevented the development of the naturally occurring seed microorganisms. These studies also led ultimately to the development and use of a microorganism useful for the control of seed and plant pathogens(see Chapter XVI).

When A. C. Davis became Associate Director of the Geneva Station, A. M. Shelton was hired in July 1979 to replace Davis with responsibilities for research on vegetables. Working closely with the Geneva-based IPM Program, Shelton developed programs for managing the insect pests of processing sweet corn and crucifers. Both programs were adopted by the growers and processors and led to a 30 per cent reduction in the use of insecticides in these crops. Annual savings across the state were about \$500,000. For this and his other work on biological control and pesticide resistance, Shelton was presented the Award for Excellence in Pest Management by the Entomological Society of America.

In the early 1960s, the Entomology Department finally had approval from Director Barton and Ithaca administration to employ a chemist to conduct research on insect attractants. W. L. Roelofs was employed in 1965. It turned out to be a remarkably wise decision. Under his leadership, the research on insect pheromones led to the development of microchemical techniques for the isolation and identification in the laboratory of pheromone components of more than 50 insect species. A rapid method of identifying major pheromone components of species from around the world was developed by using the electroantennagram technique developed by Roelofs and associates. This technique is used to test for active fractions with male moth antennae and for producing male moth response profiles from libraries of chemicals. The identified pheromone blends were immediately used to monitor insect populations in insect control programs. Subsequently, techniques were investigated that led to their use in mating disruption. Research on this chemical communication system was carried out on insects' biochemical and physiological mechanisms of production and reception, leading to insights into the genetics and evolution of

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*Wendell Roelofs at the original gas chromatograph he used to identify the pheromones of many insect pest species.*



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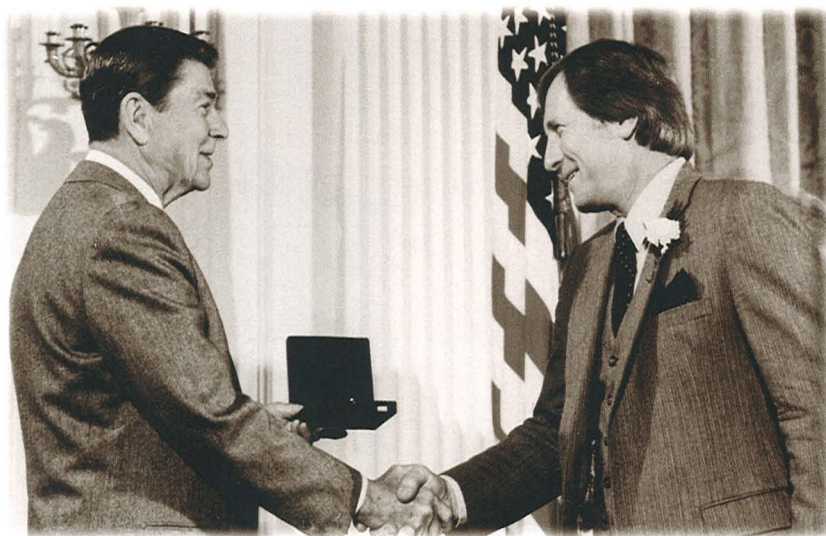
moth pheromone systems. Research also focused on neuromodulators of central nervous system thresholds involved in pheromone perception. Roelofs attracted a remarkably outstanding series of postdoctoral and graduate students who have since gone on to develop fine research programs. Some have moved into administrative positions.

Of the numerous awards received by Roelofs, the most prestigious are the Alexander von Humbolt Award in 1977, the \$100,000 Wolf Foundation Prize in Agriculture in 1983, the National Medal of Science in 1985, and his election to the National Academy of Sciences in 1985, the first recipient from the Station. Cornell recognized him as a Liberty Hyde Bailey Professor in 1978, the first Station professor to receive this honor. He also has been awarded honorary Doctoral Degrees from four universities.

Roelofs' group made extensive use of a laboratory reared colony of the redbanded leafroller that the junior author had established earlier for other purposes. It was a species that had been causing major problems in northeastern apple orchards and could be reared successfully on fava beans in the greenhouse. When Roelofs had identified its pheromone and synthesized it in the laboratory, he wanted to test it in the field. Glass took Roelofs, with a small vial of the synthetic pheromone, to an apple orchard known to have a moderate population of this species. As we drove between the rows of apple trees, we soon saw numerous redbanded leafroller moths following our truck. And Roelofs still

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*President Reagan presenting the National Medal of Science Award to Wendell Roelofs for his pioneering research on the identification and use of insect pheromones in monitoring and management of insect pests (February 27, 1985).*



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had not opened the vial. There was no doubt that the sample was the pheromone of this pest. It was an exciting day.

Following the sudden death of F. L. Gambrell in 1967, H. Tashiro was brought back to Geneva to take over the turf pest research programs. Tashiro expanded the scope of the program before retirement in 1983. After retirement, he completed his 391-page classic book on turfgrass insects including 64 color plates of turf pests and damage they cause.<sup>23</sup> It soon became a standard reference on this subject.

An insect toxicologist, R. J. Kuhr, joined the department October 1, 1968. Besides being an able toxicologist, he was an excellent collaborator with the other members of the department and a fine teacher. He also demonstrated an aptitude for administration and was promoted to associate director of research for the College of Agriculture in Ithaca in 1978 and later moved to North Carolina State University as chairman of the department of Entomology and, eventually, as director of Agricultural Research.

Another dimension was added to the department in 1972 when W. S. Bowers joined the staff to conduct research on plant hormones, which had potential for controlling arthropod pests. During his 12 years at Geneva, he discovered and patented several "juvenile hormones" from plants that delayed development and caused death of insects. He left Geneva in 1984 to assume chairmanship of the Department of Entomology at the University of Arizona. Interestingly, L. A. Carruth left the Station in 1948 to assume the chairmanship of the same department.



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Later, Bowers was elected to the National Academy of Sciences in 1994, based partly on his discoveries made at Geneva.

In 1972, E. H. Glass organized and chaired a multidisciplinary committee to prepare a grant request to the U. S. Department of Agriculture for funding a project, "Pest Management on Apple with Reduced amounts of Pesticides." P. Arneson (extension plant pathologist, Ithaca.), J. Brann (extension entomologist, Ithaca), O. Curtis (pomologist, Geneva), J. Gilpatrick (plant pathologist, Geneva), J. Hunter (plant pathologist, Geneva), S. Lienk (entomologist, Geneva), W. Roelofs (chemist, Geneva), and K. Trammel (entomologist, Geneva) served on the committee. The USDA Agricultural Research Service awarded a grant of \$75,000 for a three-year project from June 1973 to June 1976. J. Tette was hired as project leader. This project and a similar alfalfa project at Ithaca provided the impetus for launching a State-wide IPM effort, which later evolved into the Integrated Pest Management Support Group headed by J. Tette with headquarters at the Geneva Station (See Chapter XVII).

When W. H. Reissig came to the Station in 1973, he assumed responsibility to find new and improved approaches to monitoring and control of the apple maggot, the most dangerous insect pest of this crop. At that time, the standard control program for this major apple pest was to maintain a protective pesticide residue on the foliage and fruit to kill all adult females before they could lay eggs in the fruit, a period extending from late June or early July until the end of August. However, since most commercial orchards do not have indigenous populations of apple maggot, an improved management system would be feasible if a monitoring system could be developed to detect flies immigrating into orchards from outside sources. As reported earlier, Dean had determined that protein hydrolysates attract flies but were not efficient enough to determine accurately the first flies or assess the numbers present. Reissig initiated research on both visible and chemical attractants. In collaboration with W. Roelofs, he found that a blend of six components of apple fruits was very attractive, especially when used in conjunction with red sticky balls. R. Prokopy, at the University of Massachusetts, and others had found that flies are somewhat attracted to red balls hung in apple trees. Reissig, working with a small company selling insect lures, developed kits containing plastic spheres, a sticky substance to coat the spheres, and a small square cardboard impregnated with the volatile attractants. Growers can quickly assemble and hang these in the orchards for periodic inspection. No control operations are recommended until five or more apple maggot flies have been caught. As

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a result of this development, the number of sprays used by growers to control apple maggot has been reduced from an average of three or four to one or two.

A major problem of resistance in insect and mite control followed closely on the introduction and use of the new organic insecticides and miticides that were introduced in the decades following World War II. DDT, DDD, parathion, and many others began to fail after a few years of use against vegetable, fruit, turf, and pests of other crops, animals, and humans as resistant strains evolved. All members of the department from the most applied to the most basic were involved in some aspect of the problem. Some were experimenting with still newer chemicals or attempting to find other approaches such as biological controls, attractants, microbials, resistant varieties, as described earlier in this chapter. The new facility, completed in 1968, and the new basic scientists added to the department in that period enabled a broad approach to the solution of these challenges.

The history of entomology at the Geneva Station would not be complete without recording the development of technologies for rearing pests and beneficial species of insects and mites. Even while housed in the primitive research quarters in Parrott Hall, D. Daniel developed a method for rearing large numbers of Oriental Fruit moths in "thinning apples,"<sup>24</sup> which, in turn, he used to rear the parasites. This was a pioneering effort, especially in view of the lack of knowledge at that time of the photoperiodic influence on diapause. Since then, other pest species and natural enemies have been reared continuously for extended periods of time for laboratory, greenhouse, and field research. Glass and Hervey developed a procedure for continuous rearing of the redbanded leafroller in the greenhouse for toxicological studies in the laboratory and field. Later, Roelofs found this species to be an ideal "guinea pig" for his pioneering pheromone research. During the 1930 to 1982 period, seven vegetable and 11 fruit pests have been successfully reared for experimental use over extended periods of time.

By the centennial year of the Station, 1982, the Department of Entomology had become a broadly based research unit designed to conduct the pioneering basic and practical applied research needed to provide New York farmers and turfgrass managers with effective, safe procedures to prevent losses from arthropod pests. Department faculty members were also active in oversight of graduate student research and taught courses at Ithaca as needed. The department has been a recognized leader in these areas, and most states in the northeastern United States have followed recom-

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mendations originating at the Geneva station. The department has had a significant overall impact on the agriculture of this region.

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## References

- <sup>1</sup> NYSAES Ann. Rpt., 1888, pp. 144-152.
- <sup>2</sup> NYSAES Ann. Rpt., 1888, pp. 224-227.
- <sup>3</sup> NYSAES Bul. No. 87. New Series 1995, pp. 127-128.
- <sup>4</sup> Geneva Sta. Bul. 331. 1910, pp. 98.
- <sup>5</sup> Geneva Sta. Bul. 490. 1921, pp. 30.
- <sup>6</sup> Actually, Glasgow was an existing staff member. The position he vacated was used to employ a new entomological staff member, D. M. Daniel.
- <sup>7</sup> The senior author was added to the staff June 1, 1930 and placed in charge of this new effort. Staff entomologist, F. D. Munding, was already in residence in this area and had headquarters in the basement of the Biology building on the Vassar College campus at Poughkeepsie. This location also became the growing season headquarters for the enlarged entomological and plant disease programs.
- <sup>8</sup> Geneva Sta. Tech. Bul. 206. 1933, p. 19.
- <sup>9</sup> NYSAES Ann. Rpt., 1939, pp. 21-22.
- <sup>10</sup> It is interesting to note that several Geneva entomologists, especially senior author Chapman, espoused the principles of IPM but seldom if ever used the term. He had been using the philosophy all his professional life. The approach was not new to him. In fact, entomologists and plant pathologists at the Station had been developing and using IPM practices for many years but without using the new name.
- <sup>11</sup> Jour. Econ. Ent. 1941, 34(1). p. 123.
- <sup>12</sup> It is of interest that the Station had a project to produce tobacco with a high nicotine content for use by farmers for insect control. See chapter XV for further details.
- <sup>13</sup> NYSAES Ann. Rpt., 1943, p. 26.
- <sup>14</sup> E. H. Smith, *Tree Spray Oils*, in *Advances in Chemistry* series, No. 7, pp. 3-11, 1952.
- <sup>15</sup> Glass, Chapman and Smock, 1961. *Fate of Apple Maggot and Plum Curculio Larvae in Apple Fruits Held in Controlled Atmospheric Storage*. Jour. Econ. Ent. 54, 5 pp. 915-918.
- <sup>16</sup> Farm Research, Vol. 19, No 2, April 1953, pp. 14-15.
- <sup>17</sup> Its demise may have been hastened by Hamilton's remark made at an Ithaca pesticide conference: "The only good thing that it is good for, is to take the motor out, put it in a boat and go fishing."
- <sup>18</sup> The junior author joined the staff three months before Chapman was appointed head in 1948.
- <sup>19</sup> Adult moths were painted by entomologist H. Tashiro and the larvae by plant pathologist J. Keplinger of the Geneva Station.
- <sup>20</sup> Chapman to Glass, personal communication.
- <sup>21</sup> Chapman Curriculum Vitae, 1980.
- <sup>22</sup> New York's Food and Life Sciences Bulletin, No. 137, 1991.
- <sup>23</sup> Tashiro, Haruo. 1987. *Turfgrass Insects of the United States and Canada*. Ithaca, Cornell University Press.
- <sup>24</sup> Apples picked from trees when about one inch in diameter to allow the remaining crop to reach marketable size at harvest. Thinning apples keep in cold storage for at least one year and are suitable for rearing oriental fruit moth and other apple feeders.

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## Plant Pathology

As noted in Chapter II, the initial Station staff did not include a plant pathologist even though the ravages of pathogens were well known. In part, the reason was that there were very few people available with the training and experience needed to research these applied problems. In 1884, Sturtevant demonstrated foresight when he employed a “botanist,” J. C. Arthur, with the interest and training required to identify pathogens and develop control measures. By today’s standards he would have been designated a plant pathologist. Arthur was the first “plant pathologist” to be appointed to the staff of an American State Agricultural Experiment Station.

Arthur resigned in 1887<sup>1</sup> and E. S. Goff and M. H. Beckworth took over the plant disease investigations. However little research was done on plant pathogens until S. A. Beach came to Geneva in 1892. He was a horticulturist but gave emphasis to plant pathology in his first years because of the severe losses caused by fruit diseases at that time.

**Botany (1896-1936):** Most of the plant pathology studies made at the Station before 1936 were made by members of the Botany Division established in 1896 by Director Jordan. F. C. Stewart was appointed as a mycologist in 1894, with headquarters at a newly established substation at Jamaica, Long Island during Director Collier’s administration. The research conducted at the Long Island station was concerned mostly with the disease and nematode problems of potato. Stewart was given the title of botanist and transferred to Geneva in 1898 to take charge of the new Department of Botany, a position he held for 38 years. During this period, he conducted pioneering work on diseases of fruits, vegetables, forest trees, and ornamentals. The reader should be aware that the State Seed Inspection Program mandated in 1912 was also assigned to the Botany Division from 1912 until 1936.

In 1902, Stewart announced his intention to conduct a 10-year study “to determine how much the yield of potatoes may be increased by spraying the plants with Bordeaux mixture.” It

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previously had been established that this fungicide was consistently effective in controlling late blight, the principal disease of potato. But as Stewart observed: "farmers (in New York) are not yet convinced that it pays to spray potatoes (with this product every year)." True to his word, the project was started in 1902 and continued without interruption through the 1911 season. A total of 338 tests were conducted over the 10-year period. These consisted of: 20 experiments conducted by the Station's staff at Geneva and Riverhead; 113 tests conducted by individual farmers under Station supervision; and 205 volunteer farmers' tests having no Station supervision. In summing up what was learned Stewart wrote: "These experiments demonstrate, beyond doubt, that the spraying of potatoes is highly profitable in New York."<sup>2</sup> This monumental study is largely responsible for making the spraying of potatoes, thereafter, a standard practice of New York potato growers.

The Legislature of 1913 appropriated \$5,000 to conduct investigations on hop culture. Studies were initiated in this field at Hartwick in Otsego County by a new botanist, F. M. Blodgett. Principal attention in 1913 and 1914 was given to the development of a means of controlling hop mildew. Blodgett learned that elemental sulfur applied as a dust gave excellent control of this major disease. His findings were reported in February 1915.<sup>3</sup> Blodgett resigned May 1, 1915 to accept an appointment in the College of Agriculture at Ithaca. This hop research effort essentially ended with his departure.

By about 1912, lime sulfur had displaced Bordeaux mixture for the control of apple scab. It was not that the former was the more effective in scab control, but it was much less injurious to the fruit and foliage. To determine whether or not the same situation prevailed for potatoes, the two fungicides were compared in a series of tests conducted over the 1911-1915 period. On this crop, Bordeaux mixture proved superior to lime sulfur in every respect: It increased yields, was non-injurious to the foliage, and was most effective in controlling late blight. M. T. Munn reported that lime sulfur reduced yields, injured the foliage, and apparently was worthless in blight control.<sup>4</sup>

Although weeds are not considered plant pathogens, it seems appropriate to report Station weed control studies in this chapter because the early studies were conducted primarily by the same persons who conducted plant pathology research. Even though weeds are major pests, particularly of row crops, research conducted on weed management was not legitimized as a science or

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a department at Geneva or most other institutions during the first 100 years of the Station's existence. Weed control, however, has always been judged to be a major problem in agriculture. The Station's earliest botanist, J. C. Arthur, spent several years investigating weed problems and their control. It is interesting to learn from the 1919 Geneva Station Annual Report that M. T. Munn in the Botany Division published an eight page bulletin<sup>5</sup> on tests at Geneva over eight years on the control of dandelions in lawns through the use of iron sulfate sprays. It was found that four or five sprays starting in May, just ahead of the first appearance of dandelion blossoms, gave good control. Only four sprays were advised in years having unusually long dry midsummer conditions. Where these sprays were made every three years, lawns were kept virtually free of dandelions. It was only after the Japanese beetle and the European chafer became established in New York in the 1940s that Station staff again became involved with cultivated turf. This new responsibility fell to the Department of Entomology staff.

In 1919, F. C. Stewart started investigations at Geneva to find means of controlling two virus diseases of potatoes, namely, leafroll and mosaic. Similar studies were initiated at Malone in 1921. The control measures used were limited to isolated seed plots and to the removal, or roguing, of diseased plants. Since the variety of potato used at Geneva (one of the Rural class) was highly resistant to mosaic, this was essentially a leafroll-control experiment. The reverse was true at Malone, where the Green Mountain variety was used. While this was susceptible to both leafroll and mosaic, only leafroll disease was a factor at this time. Apparently, this project was terminated in 1924 with the publication of Station Bulletin No. 522.<sup>6</sup> Stewart concluded that "while the isolation and roguing of the seed plot is a practice to be recommended, it cannot be depended upon to keep either leafroll or mosaic under complete control."

In cooperation with members of the Entomology Division, studies were undertaken by Hugh C. Hockett on Long Island to compare the effectiveness of fungicides and insecticides applied as sprays and as dusts to control fungus diseases and insect pests of potatoes. After four years of testing, it was reported in 1926 and 1927 that "in each of the four years, the spray (treatments) gave much better results, as shown both by the appearance of the foliage and the yield of marketable potatoes. Both early and late blight were controlled fairly well by dusting, but considerably better by spraying."<sup>7</sup> An important series of spray-dust comparison tests were also conducted in cooperation with the Entomol-

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ogy Division on the control of insect pests and diseases of apple. (See Entomology Chapter XII)

The State Legislature of 1922 provided a special appropriation of \$4,000 for studies on the control of raspberry diseases and insect pests. W. H. Rankin, a plant pathologist, was added to the Botany staff and placed in charge of this new project. He pioneered the investigation of virus diseases of plants. He determined the nature of several virus diseases of raspberry in New York at a time when very little was known of the role of viruses as causes of plant diseases. He quickly learned that effective means were badly needed to control mosaic, a virus disease transmitted by an aphid. Two possibilities were tested to achieve this end: the annual removal, or roguing, of infected plants; and the use of an insecticide to eliminate the aphid transmitters of the disease. No appreciable control of the disease was achieved through the control of the aphid. In 1927, Rankin published a bulletin summarizing his findings over the 1922-1927 period.<sup>8</sup> He concluded that, while annual roguings gave fair control in western New York plantings, the method proved ineffective under Hudson Valley conditions. He expressed the belief that the only real solution of the problem lay in the breeding of varieties resistant to mosaic.

Investigations in this area were undertaken in cooperation with the Division of Horticulture. By 1937, breeding efforts had resulted in the introduction of two highly virus-resistant red raspberry varieties, Marcy and Indian Summer. Other selections that were in the process of development were as promising of being as resistant as these named ones.<sup>9</sup>

The Legislature of 1925 provided an annual appropriation of \$20,500 to the Station for studies on Canning Crop problems. L. K. Jones was added to the staff of the Botany Division, out of this fund, July 1, 1925. He resigned in 1928 to accept a more lucrative position in Pullman, Washington.<sup>10</sup> Over this brief time span, he was able to do little more than make surveys and appraisals of the diseases of a few key canning crops. Studied were peas, beans, and tomatoes. In 1925, *Ascochyta* blight of peas, anthracnose and bacterial blight of beans and *Septoria* leaf spot of tomatoes were the most important diseases of these crops. The *Ascochyta* blight caused more loss to the canning industry that year than any other disease. The dry summer of 1926, apparently accounted for the fact that disease losses to canning crops, on average, were minimal. An exception was the damage caused by the bacterial canker disease of tomatoes in one canning district. It is interesting to note that Rankin had prepared detailed plans for

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equipment to determine in the greenhouse whether or not weather is responsible for the great variations in losses caused by pea root-rot.<sup>11</sup> As we report elsewhere, Station scientists later found that seed treatments and/or crop rotations were effective controls.

Early in the Hedrick administration, the Station plant pathology program was strengthened through the appointment of J. G. Horsfall, February 1, 1929, and J. M. Hamilton, April 1930. Horsfall filled the post previously occupied by L. K. Jones in Canning Crops research, while Hamilton succeeded E. V. Shear, who was in charge of fruit disease research in the Hudson Valley.

A limiting factor in the profitable production of peas in New York, which was a major canning crop in the state at this time, was a complex of soil organisms causing the so-called root-rot disease. To find a means of controlling it became Horsfall's major concern. Another problem studied was the damping-off disease of vegetables and flowers growing under seedling and transplant flat conditions. In 1932, he found that red copper oxide dust, used as a seed treatment, gave good control. He next tested this product for the control of pea root-rot and with striking success. By 1937, about 90,000 bushels of seed peas were treated in New York alone. In 1936, the average increase in stand due to treatment of a commonly used variety (Surprise) was 21.8 per cent. The division's research on the control of the damping-off disease also proved successful. By 1937, most greenhouse men were using red copper oxide dust to protect susceptible seeds of tomato, pepper, egg plant, cucurbits, and many other plants. In addition to the foregoing, Horsfall's program included studies on: cabbage yellows, tomato and cantaloupe wilts, Stewart's disease of sweet corn, and bean mosaic. Horsfall had a remarkably productive 10 years at Geneva before moving to the Connecticut Agricultural Experiment Station. There, he continued his research, later served as Station Director and was elected to the National Academy of Sciences. The junior author had the privilege of serving on an Academy Committee chaired by Horsfall from 1971-1974.

Hamilton's initial duties from 1930 to 1934 were to conduct research on tree-fruit diseases, under conditions prevailing in the Hudson Valley district. He made Poughkeepsie his headquarters during the growing season, spending the balance of the year at Geneva. His arrival coincided with the enlargement of the entomological program for the Hudson Valley district, provided by an increase, in 1930, in the Moths and Insects Fund. P. J.



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Chapman, entomologist, was assigned to this new project. Hamilton and Chapman (entomologist) soon developed a coordinated fruit protection program for the area. The former conducted research on the control of two major apple diseases, scab and cedar rust. Lime sulfur was the standard fungicide used to control these diseases at that time. Its principal drawback was phytotoxicity, which caused significant yield reductions. Hamilton started a search for products that were both effective in disease control and essentially non-injurious to the fruit and foliage. This goal was not fully gained until years later, or when effective synthetic organic fungicides became available. In 1936, the Legislature appropriated \$10,000 for "research (on) apple scab, cedar rust, and allied diseases of fruit crops." The grant made it possible to establish a statewide research program on tree fruit diseases with Hamilton, the coordinator, located at Geneva, and a new staff pathologist, D. H. Palmiter, stationed at Poughkeepsie.

Professor F. C. Stewart, Chief of the Division of Botany since 1898, retired because of age limit on June 30, 1936 after 42 years of service to the Station. He was best known for work on potato diseases and their control. He was also well known for his research on wild and cultivated mushrooms as well as pioneering work on popcorn. He discovered Stewart's bacterial wilt of corn, a devastating disease that is transmitted by the corn flea beetle. He published over 200 scientific bulletins and articles in scientific journals. He had served on several important national committees concerned with plant pathology and was president of the American Phytopathological Society in 1913. He was appointed Professor Emeritus in Botany on April 24, 1936 by the Cornell University Board of Trustees.<sup>12</sup>

**Plant Pathology (1936-1982):** By 1936, the term "Botany Division" did not identify well with either of its two major activities—plant diseases and seed testing and related research. At its April 1936 meeting, the Cornell Board of trustees changed the name of the Botany Division to the "Division of Plant Pathology" and created a new research unit "Division of Seed Investigations" with responsibility for seed research and the Seed Testing Laboratory. Professor M. T. Munn was named head of the new division. At this time, certain research responsibilities were transferred to the Department of Plant Pathology at Ithaca and the College of Forestry at Syracuse. In Geneva, the major emphasis was on fruits and canning crops. O. A. Reinking was appointed Chief in Research and Head of the new Plant Pathology Division, July 1, 1936, during Director Hedrick's last year.

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Most elements of the new division's programs had their origin in earlier legislative grants made for specific purposes. These funds were then re-appropriated annually. As reported in Chapter VII, in 1937, Director Hedrick convinced Albany to transfer most of these special items to the Station's basic budget. Four of these special grants had been made to establish sub-stations, as follows: the Vineyard Laboratory at Fredonia (1909); the Long Island Vegetable Research Farm at Riverhead (1922); the Hudson Valley Horticultural Investigations Program (1923); and the hop research operation at Waterville (1935). Except for the Hudson Valley program, each of the agricultural interests served by these sub-stations is identified by their names. The horticultural work conducted in the Hudson Valley in the 1930s was limited to fruit crop horticulture. The plant pathologist, entomologist, and their helpers stationed there had their headquarters at Poughkeepsie on the campus of Vassar College. Accounts of the sub-stations are found in Chapter X.

Reinking had an unusual background for a position at the Station. Besides graduate and undergraduate degrees in plant pathology from Wisconsin, he had been employed for 10 years from 1922 to 1932 by the United Fruit Company where he advanced to the position of Director of Tropical Research. From 1932-35, he conducted private research in Europe at the Biologische Reichsanstalt in Berlin. At Geneva, he organized the program of the Plant Pathology Division and conducted research on pea root-rot, cabbage yellows, and other soil-borne diseases. During World War II, he was on special assignments for the United States Department of Agriculture, the State Department, and the Board of Economic Warfare in Central America.<sup>13</sup>

Reinking was given a major challenge in 1936 to form a cohesive and strong plant pathology division. He inherited eight staff members ranging from a young outstanding scientist like Horsfall to one staff member with a Bachelor's degree. Further, they were scattered from Long Island and the Hudson Valley to Geneva. And, one of the Geneva-based plant pathologist's primary work was on the rapidly fading hop project in Waterville. When Reinking retired April 30, 1950, he had only five staff members with two vacant positions recently vacated by two promising young plant pathologists. Thus, Reinking had had limited success in meeting his initial challenge. Even though some of the problems may have been due to Director Heinicke's dictatorial manner, Reinking also was somewhat dictatorial and irritated staff members.<sup>14</sup> He also had devoted major efforts and time to special war-time Government assignments as noted



*James Hamilton, who was Department Head of the Plant Pathology Department for many years and was instrumental in developing laboratory replications of field conditions, provided preliminary evaluations of new experimental fungicides for their potential use in the field.*

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above. In any event, he left for his successor five staff members (Braun, Gilmer, Hamilton, Palmiter, and Schroeder) and two vacant positions, essentially the same number he started with 14 years earlier.

James Hamilton was appointed Head when Reinking retired in 1950 and served until 1967. He was followed by Robert Gilmer from 1967 to 1972, and James Hunter from 1972 to 1983. Herbert Aldwinckle was named Head of the Department in 1983.

As noted in Chapter XV, Pomology and Viticulture, the State appropriated \$5,000 in 1935 to the Station for "hop investigations."<sup>15</sup> A discussion of the background for this new post-prohibition effort is found in chapter XV. Downy mildew was recognized as a major problem for hop production in New York State, and a research project was established in the Botany Division. The center of the fledgling hop industry was in Wellsville where investigations were conducted. R. O. Magie was appointed to the Plant Pathology Division November 1, 1936 and conducted the hop pathology research. He published a Station technical bulletin in 1943.<sup>16</sup> Magie resigned October 15, 1945. Robert E. Foster, appointed Assistant Professor of plant pathology March 16, 1946, worked on the hop disease project until he resigned in 1950. This was the end of active research on diseases of hops at the Station, even though some horticultural studies were continued until 1952. New York hop growers were unable to compete with those in Oregon and Washington due to a more favorable hop growing climate in those states.

Plant pathologists at Geneva and Ithaca made major contributions to a basic understanding of apple scab, a major disease of apples in Northeastern United States and other apple growing areas with similar climates. During the late 1930s and 1940s, Wilbur Mills, extension pathologist for fruit crops located at Ithaca, developed a detailed understanding of the relationships of temperature, length of leaf/fruit wetting, and scab infection. He published this in the form of a graph known as the Mills Chart, which was used widely by growers and scientists as a basis for timing the application of fungicides. It was a major contribution that enabled more efficient and reliable apple scab control.<sup>17</sup>

As we have noted earlier, Geneva scientists had made major contributions to the knowledge of plant diseases prior to 1936 and had developed successful control of diseases of vegetables and fruits with applications of fungicides. James Hamilton, starting in 1930, conducted fruit disease studies first in the

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Hudson Valley and later at Geneva. He helped to refine the Mills Chart and pioneered the development of greenhouse-laboratory facilities and techniques for studying the mode of action of fungicides used in disease control. His investigations established the mode of action of fungicides, i.e., eradication, protection, redistribution, or systemic. Hamilton is also credited with the discovery of ferbam as an effective fungicide for control of apple scab and cedar apple rust.

In 1950, Hamilton was appointed head of the Department of Plant Pathology and Michael Szkolnik was hired to conduct research on tree fruit diseases in western New York. Hamilton continued to be involved in this research until his retirement in 1969. Hamilton's and Szkolnik's investigations provided information vital to the understanding of the proper use and field performance of several groups of fungicides. Hamilton was instrumental in making the early plans for laboratory and greenhouse studies of plant diseases in the new entomology-plant pathology facility (Barton Laboratory) completed in 1968.<sup>18</sup> Later, these were radically modified by Gilmer and his successor, Hunter, in 1972, to enable research in the new areas of the rapidly evolving field of plant pathology.

Palmiter conducted research on diseases of tree fruits in the Hudson and Champlain Valley and Long Island fruit growing regions from 1936 until his retirement in 1969. He conducted field and laboratory research on apple scab, cedar-apple rust, black rot canker of apples, nematodes, virus diseases of apple and peach, bacterial leaf spot of peach, and insect vectors of diseases as they pertained to peaches and cherries.<sup>19</sup>

Szkolnik discovered a novel control of powdery mildew in greenhouses using the vapor activity of certain ergosterol biosynthesis inhibitor fungicides. When cloth or cord impregnated with these products was hung in a greenhouse, the vapors controlled the mildew for two to six months. R. C. Pearson demonstrated that a single application of any one of several ergosterol biosynthesis-inhibitor fungicides gave season-long control of powdery mildew of grapes in the vineyard.<sup>20</sup>

Hamilton and Szkolnik conducted research over many years on pesticide application equipment including dusters, hydraulic sprayers, and fixed outlet air blast machines. During the late 50s and the 60s considerable research was conducted on the use of airplanes for the application of fungicide dusts and sprays for control of apple scab. This led to commercial use of high

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*Aerial application of fungicide dust for control of apple scab.*

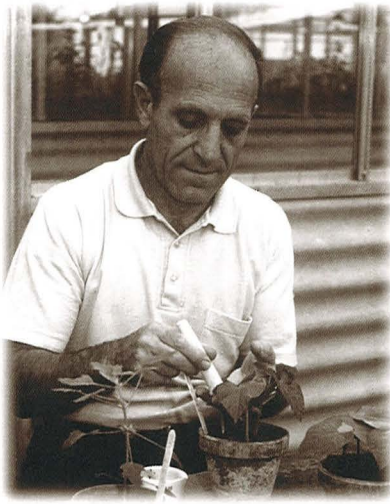


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concentrate sprays applied at very low volume by fixed wing planes and helicopters for control of orchard diseases. Later, with the development and extensive use by orchardists of fixed outlet air blast sprayers, careful comparisons were made of the efficiency of levels of concentration of pesticide from the standard dilute to eight times (8X) concentration. The results showed little difference for disease control, but the higher concentrations were less effective for control of mites and some insects. The “Mistomatic” sprayer, designed only for concentrate spraying, was found to have limitations, especially in large apple trees.<sup>21</sup> As noted in Chapter XII, some of these studies were done cooperatively with members of the Departments of Entomology and Chemistry/Food Science and Technology. The results of these investigations provided fruit growers with accurate guidelines for the best use of their equipment, time, and money.

Hamilton also collaborated with Pomology fruit breeder George Oberle on a research project to breed fireblight resistant pear trees. From crosses made in 1945 with resistant pears from the Tennessee Agricultural Experiment Station, they obtained nine fireblight resistant pear trees for use in this breeding program. Hamilton had limited involvement in this effort.<sup>22</sup>

Hamilton’s and Palmiter’s leadership roles in the field of evaluating the mode of action, effectiveness and best use of new organic fungicides for control of diseases of pome and stone fruits were continued by Szkolnik and Gilpatrick. Braun, Pearson, Schroeder, and others made similar evaluations for small fruits and vegetables.



*Rosario Provvidenti, world famous for his discovery and use of many genes used to make crops resistant to plant diseases. He was elected to a Liberty Hyde Bailey Professorship for his outstanding accomplishments.*

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Wilbur Schroeder joined the staff in 1943 to conduct research on the nature and control of vegetable crop diseases. Over the 29 years he worked at the Station prior to his sudden death in 1972, he made several major contributions to the New York vegetable industry. His discovery of a strain of pea resistant to the pea enation mosaic virus was largely responsible for keeping a sizable segment of the pea industry in New York. He collaborated with entomologists to develop a very effective combination fungicide-insecticide corn seed treatment. It has been used throughout the country as a standard practice and has saved the sweet corn industry millions of dollars.

A. J. Braun was appointed in 1945 to conduct research on small fruit diseases and their control. He demonstrated that the new organic fungicides, ferbam, captan, folpet, and benomyl, were effective against the major fungus diseases of grapes. He also found that the relatively inexpensive wettable sulfur could be used effectively for disease control without phytotoxicity on all varieties except Concord and three minor grape varieties grown only in the northeastern states. Later, he initiated a new project on the control of nematodes on horticultural crops with Palmiter as co-leader. In preparation for this assignment, Braun took a six-month sabbatical leave at the U. S. Department of Agriculture Beltsville Laboratory to learn the latest developments in the field of nematode pests of agricultural crops.<sup>23</sup>

Gilmer, who was appointed assistant professor in 1950, discovered pollen transmission of necrotic ring spot and sour cherry yellows viruses in *Prunus* seeds in 1958 and from tree to tree in the orchard in 1960. Gilmer and J. K. Uyemoto were the first to find tomato ring spot virus on grape in the eastern states. Gilmer instituted a successful program for providing virus-free budwood to nurseries.

John Natti was appointed assistant professor in the Plant Pathology Department in January 1951 to conduct research on the diseases of several vegetables including snap beans, red kidney beans, cabbage, broccoli, cauliflower, beets, and corn. He developed lines of cabbage resistant to fusarium yellows, a previously devastating disease. Where resistant lines of these crops were not available, he evaluated fungicidal control measures. Natti died in 1970 after a brief illness.

Rosario Provvidenti was appointed in 1955 as an Experimentalist to assist Schroeder after the latter's two heart attacks the preceding year. Provvidenti did his undergraduate and graduate studies

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in Italy and had been an assistant professor for three years at the Agricultural & Technical Institute, Siracusa, Italy before accepting a position with Polytron Corporation, White Plains, NY. Apparently, Station and Cornell University were reluctant to accept these credentials for an academic appointment at Geneva. After a few years, his abilities were recognized and he was promoted to Research Associate April 1, 1964, and to Senior Research Associate September 1, 1973.

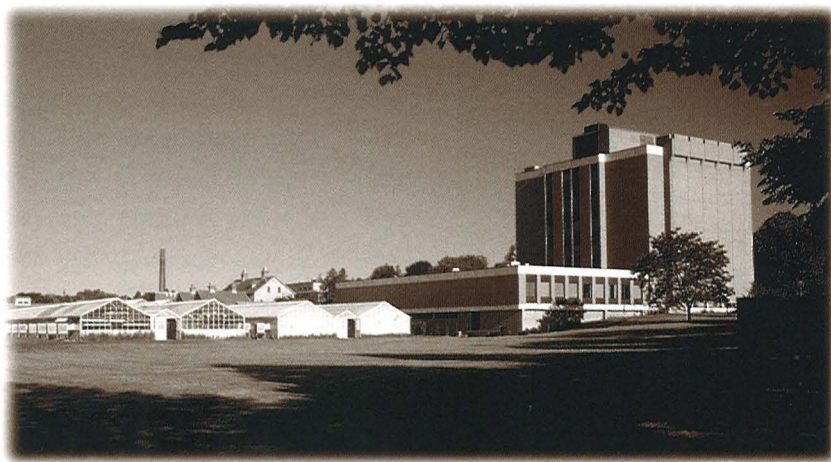
Schroeder and Provvidenti initially collaborated closely on joint projects, but later each began to concentrate on his specialty, fungi and viruses respectively. Following Schroeder's death in 1971, Provvidenti continued his outstanding research and was recognized as a world class plant virologist. He was promoted to full Professorship in 1984 and awarded Cornell's College of Agriculture's highest award, the Liberty Hyde Bailey Professor in 1987. He was only the second Station Scientist to receive this recognition. While some of his many contributions were made after 1982 (the cut-off date for this history), he had already made many major contributions by this date. He had an international reputation as a plant virologist. He has been an AID Consultant to Egypt three times for three or four weeks each, to China as a Technical Advisor for similar periods, as well as to Israel and Cyprus for vegetable disease conferences. He had found and characterized 50 resistance genes for vegetable crop diseases by 1991 when he retired. He is still conducting research and traveling and consulting in foreign countries as of this writing (1999).

Station pathologists were not only leaders in the development of effective uses for the new organic fungicides but were among the first to discover and demonstrate that certain pathogens had evolved resistant strains. In 1969, Schroeder and R. Provvidenti reported resistance to benlate in powdery mildew (*Sphaerotheca fuliginea*).

Because of the anti-pesticide attitudes that evolved following the publication of Rachel Carson's *Silent Spring*, some readers may question or be concerned about the close working relations that Station scientists in the departments of Plant Pathology and Entomology have had with pesticide industries in developing uses for new chemicals. We relate the following incident because it illustrates an exception to the normal open working understanding that has prevailed over the first 100 years and to the present time (1999) and the drastic reaction that was taken when an attempt was made to deviate from it. Among the several new fungicides that were made available and were found useful for

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*Barton Laboratory which had excellent laboratory and greenhouse spaces for use by entomologists and plant pathologists. It was occupied in January 1969.*



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control of diseases on apples during the 1960s and 1970s was an American Cyanamid Company fungicide, Cyprex, with the common name of “dodine.” Szkolnik and others had found it to be particularly effective for the control of apple scab, and it was widely used by New York apple growers. After a few years of use, however, there were reports by a few growers that it was not providing good control. Szkolnik demonstrated in the laboratory that a strain of scab had evolved that was resistant to Cyprex and planned to make this information public. Two Cyanamid representatives came to Geneva to persuade him not to divulge this new information. They also approached the Plant Pathology department head, Robert Gilmer, who quickly ushered them from his office with a definite refusal. They then approached Dean Charles Palm who gave them similar treatment and, further, complained to Cyanamid Administration. The result was that the leader of the Cyanamid delegation to Geneva, a research project leader, was fired.<sup>24</sup>

This event illustrates the open working relationships between Cornell University scientists and pesticide companies in collaborative investigations of their products. In the combined 74 years experience of the authors of this history, this is the only known incident of any company representative attempting to prevent full disclosure of Station research information about a pesticide. This open collaboration has benefited the farmers of New York and neighboring states by providing full disclosure on the limitations as well as the benefits of available pesticides.

As recorded in Chapter IX, a new office laboratory facility for the Departments of Plant Pathology and Entomology was projected for the Station as part of a larger expansion and updating program. It was completed in 1968 and occupied in January 1969.



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The Plant Pathology Department had been quartered in Hedrick Hall for many years prior to the construction of the new entomology-plant pathology facility during the late 1960s. While these facilities had been better than Parrott Hall, where Entomology had been located, the plant pathologists needed room for expansion and to develop new lines of research. Hamilton was Department Head during the planning and building stages and Robert Gilmer was the department's representative to Davis and the architect. The Department's objectives as outlined by Hamilton in 1967 were to:

**A. Expand current research programs:**

- 1. Evaluation of new fungicides by adding rain and mist chambers**
- 2. Establish a strong virology program with new modern equipment**
- 3. Study the dynamics of disease infections in new growth chambers**

**B. Establish new research programs**

- 1. Electron microscopy with an electron microscope, which would serve all departments**
- 2. Radioactive tracer study of fungicide uptake and translocation**
- 3. Fungus-bacterial genetics laboratory for identifying natural races of plant pathogens.<sup>25</sup>**

During the years before construction of the new entomology-plant pathology building and when it was in the planning stage, the typical research program of the pathologists consisted of field experiments during the growing season and greenhouse research during the cold months. Because of this, Gilmer and the majority of the staff chose extensive new greenhouse space at the expense of laboratory space. Davis questioned this decision because additional laboratory space would be needed later and would be very difficult and more expensive to build. This decision did cause problems later when the new field of genetic engineering technology for producing disease resistant cultivars became a major effort of the department and created demands for expanded laboratory space. Later, Hunter blamed Davis for short changing Plant Pathology, which naturally infuriated the latter.<sup>26</sup> Gilmer and faculty had not envisioned how the then new developing scientific technologies would increase the department's future laboratory requirements. In fact, two new faculty positions were created for research in virology and fungal genetics, and a research associate staff position was added for an electron mi-

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croscopist, bringing the staff to nine professorial and three research associate positions.

Jerry Uyemoto was appointed Assistant Professor in 1969 and advanced to Associate Professor in 1974. He and Gilmer found the first soil-borne virus of vinifera grape cultivars, tobacco ringspot virus, in the eastern states in 1968. Later, they also found the same virus in French hybrid grapes. Uyemoto conducted studies of other virus diseases of fruits and vegetables before he resigned in 1977.<sup>27</sup>

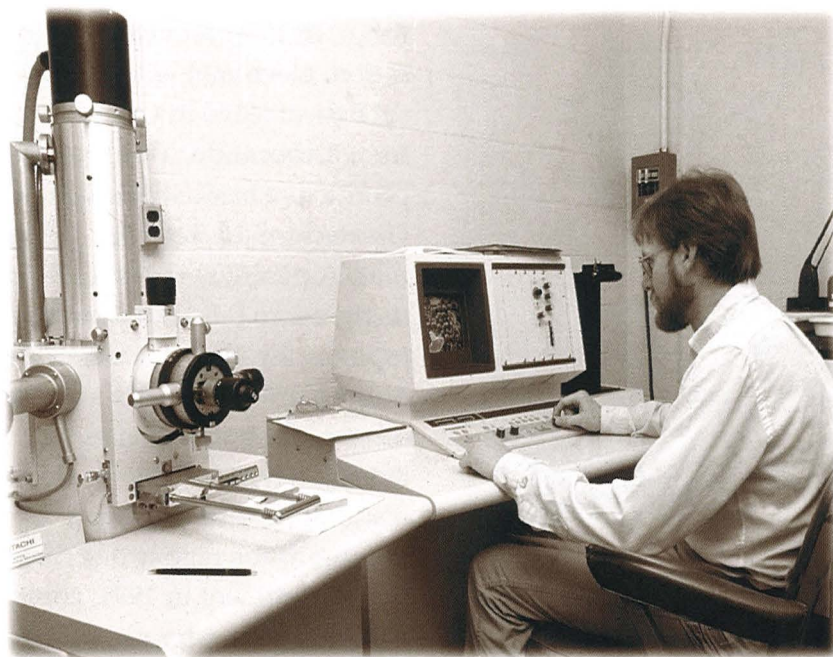
Gilmer resigned from the headship of the Plant Pathology Department September 14, 1972, to accept a temporary assignment at the International Institute of Tropical Agriculture in Nigeria. He retired August 31, 1974. James E. Hunter was appointed Associate Professor and Head of the Department of Plant Pathology on September 14, 1972. This was the beginning of a major restructuring and orientation of the department under Hunter's leadership (1973-1982) and later Aldwinkle's term (1982-1997). These changes were enabled by the new entomology-plant pathology facility and the three new positions that came with it.

Hunter's immediate assignment as department head was to reorganize the Department and build staff and research programs designed to meet the short- and long-term needs of the vegetable and fruit industries. He was successful in carrying out his mandate, but soon learned he had an obligation to conduct research to advance personally from associate to full professor. To accomplish this advancement, he made several contributions to the field of vegetable disease management. He demonstrated that grower failure to control white mold of snap beans was due to improper timing and inadequate coverage with fungicide sprays. He also developed a new and more precise method for determining when control measures are needed for white mold control. In cooperation with plant breeder M. H. Dickson, he identified a source of resistance to black rot of cabbage, a bacterial disease of world wide importance.<sup>28</sup>

Although he made other research discoveries from 1973 to 1982, his major contributions were in the management and development of the Plant Pathology Department into a balanced and cohesive unit covering a broad range of research and extension. He encouraged new technologies, more graduate students, more visiting scientists, and helped younger faculty. During his administration, six good to outstanding faculty members were hired, which greatly strengthened the Department's programs. Later,

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*An electron microscope, one of several new instruments included in the new Barton Laboratory facility.*



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Hunter was appointed Associate Director in 1986 and Director in 1990. Herbert Aldwinkle replaced Hunter as Department Head in 1982.

The decision to include an electron microscope facility and instrument in Barton Laboratory as a Station resource was instigated and promoted by Gilmer. It proved to be of great value over time for a number of programs and especially for plant pathologists in terms of providing an understanding of the nature and growth of plant pathogens. Andrew Grannett was appointed in 1969 as Senior Research Associate to the new microscopist position but stayed only four years.

Harvey Hoch joined the Department as a Research Associate to supervise the electron microscopy program at Geneva in 1974. He was promoted to Assistant Professor in 1977 and later to Associate Professor and Professor. His major research effort involved cell biology studies of fungal-plant interactions. In 1979, Hoch and George Abawi reported that a *Pythium* disease of table beets could be biologically controlled with a fungus. It was later determined that the fungus, *Laetisaria arvalis*, controls the disease by the production of a unique fatty acid, 8-hydroxy linoleic acid.

From 1974 to 1982, Hoch collaborated with several scientists at Geneva and elsewhere. During the 1970s and 1980s, a plant biochemist, Richard Staples, at the Boyce Thompson Institute at Ithaca, was studying gene cloning and expression in obligate rust



*Herb Aldwinckle evaluating apple seedlings for disease resistance in the greenhouse.*

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fungi. In 1980, he visited with Hoch to explore plans for collaboration. Hoch met with Staples later while the latter was on sabbatical leave in Germany where they had made further plans for collaboration. This was the beginning of many years of very productive basic studies on how an obligate rust fungus, *Uromyces appendiculatus*, is able to find and penetrate the stomata (openings) in leaves. In a series of classic experiments, using micro fabricated surfaces duplicating actual leaf surface topography, they characterized the nature of the signals that orient growth towards and into the stomata. They also studied other plant pathogens as well as organisms of medical importance. They were among the first biologists to use the National Nanofabrication Facility at Cornell University. It may be of interest to the reader that Staples, McNew Scientist Emeritus since retirement in 1991, commutes almost daily to Geneva to continue their very productive collaboration as of this writing (1999).

Herbert Aldwinckle joined the faculty in 1971. He began a cooperative program with Robert Lamb of the Department of Pomology and Viticulture to develop disease resistant apples. Their first successes were Liberty (released in 1978) and Freedom (released in 1983). Both are resistant to apple scab, cedar apple rust, powdery mildew, and fireblight. Later, in collaboration with James Cummins of the Department of Horticultural Sciences, they selected and introduced an apple rootstock, Novole, resistant to attacks by orchard voles (mice) and resistant to crown gall and fire blight. Freedom and Novole were awarded United States plant patents.<sup>29</sup> Novole is thought to have greater beneficial impact because it can be used for many varieties, has the needed horticultural characteristics, and has resistance to a wide range of pests.

Roger C. Pearson was appointed Research Associate to succeed Palmiter as Hudson Valley plant pathologist in 1973. Three years later, he was appointed Assistant Professor, and a year later was transferred to Geneva and was replaced by David A. Rosenberger. At Geneva, Pearson conducted research on grape diseases. He discovered a new disease attacking grapes, which he named (*Pseudopezicula tetraspora* Korf, Pearson & Zhuang n. sp.) It was the first report of this organism and the disease in North America.<sup>30</sup>

As a result of earlier work by Hamilton and his successors on the environmental conditions in the orchards and vineyards that must occur to cause disease infections, department researchers

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*Dennis Gonsalves evaluating genetically engineered crops. Later, in 1995, he was awarded a Liberty Hyde Bailey professorship in recognition of his outstanding contributions in creating disease resistant crops before and after he came to Geneva.*



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developed electronic instruments to record environmental conditions in the mid-1970s. Robert Seem, who was appointed in 1976, worked in cooperation with Michigan Agricultural Experiment Station personnel to develop microcomputers to monitor environmental conditions, determine infection periods, and suggest control methods. These devices later became commercially available to growers throughout the United States and elsewhere.

Thomas Burr was appointed Assistant Professor in 1978 to conduct research on apple and grape diseases with a major (70%) extension component. He showed that Mutsu apple fruit become susceptible to blister spot, a bacterial disease, two weeks after petal-fall and are highly susceptible for about six weeks. This led to effective timing of streptomycin sprays. Later, he discovered that the pathogen could rapidly develop resistance to streptomycin and that resistance could be transferred to susceptible strains by conjugation to this and other species of bacteria. In 1980, he discovered that the pathogen, *Agrobacterium vitis*, the primary species infecting grape, could be detected systemically in healthy appearing grape cuttings and that it may be spread in propagation material. This led to methods for indexing cuttings for the pathogen and use of tip culture for producing pathogen-free plants.<sup>31</sup>

Dennis Gonsalves was appointed Associate Professor in 1977 to conduct research on the biochemical and genetical characterization of viruses infecting fruit and vegetable crops, and on the development of control measures for these viruses. He had studied at the University of Hawaii and California, Davis. He

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had five very productive years as Assistant Professor at the University of Florida. At Geneva, Gonsalves found that apple trees in western New York infected with tomato ringspot showed little injury, whereas in the Hudson Valley and the lower Atlantic states there was moderate to severe injury caused by this virus. In the early 1980s, he and Rosenberger<sup>32</sup> established that the tomato ringspot virus caused a graft-union problem on apple trees propagated on MM 106 rootstock. Gonsalves continued in succeeding years to make many new discoveries and introduced resistance genes to a number of fruit and vegetable crops, including yellow mosaic of squash, cucumber mosaic, tomato ringspot, and papaya ringspot virus. He worked closely with Provvidenti in several aspects of his efforts on vegetable viruses. The approval and commercial introduction of genetically engineered Freedom II squash in 1995 was the result of Gonsalves research. He was also responsible for success with the papaya ringspot virus which was destroying this crop in Hawaii and many other locations around the world. The resistant papaya were genetically engineered by producing viral coat protein genes and “shooting” them into cells of papaya using the “gene gun” developed at this Station<sup>33</sup>. Two resistant lines of papaya, Sunup and Rainbow, were the first genetically engineered fruit crops approved for commercial production in the United States. They were introduced in 1996.

In recognition of Gonsalves’s outstanding scientific and practical contributions to agriculture, he was appointed Liberty Hyde Bailey Professor in 1995. He was only the third from Geneva and one of eight so honored by Cornell University at that time.<sup>34</sup>

The Department of Plant Pathology, by 1982, was in the midst of a remarkable transition from a mostly applied research unit to a broadly based department with pioneering research ranging from applied to basic studies of the development and nature of pathogenicity of plant pathogens. Additionally, under Hunter’s and Aldwinkle’s leadership, the department expanded its graduate student, post-doctoral, and visiting scientist programs. Also, several department members became actively involved in international projects.

While much of this expanded effort was initiated prior to the cutoff date for this Station History (1982), major contributions continued after that date. For this reason, we have elected to include in this and other chapters brief summaries of later developments of significant research accomplishments that occurred shortly after 1982. This is done to provide the reader


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with insight into the impact and wide recognition which these recent projects had subsequently generated.

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## References

- <sup>1</sup> To advance to a more prestigious and lucrative position as noted in Chapter II.
  - <sup>2</sup> NYSAES Ann. Rpt. 1912, pp. 560-561.
  - <sup>3</sup> Geneva Sta. Bul. 395.
  - <sup>4</sup> Geneva Sta. Bul. 421, 1916, pp. 311-317.
  - <sup>5</sup> Geneva Sta. Bul. 466, 1919, pp. 1-8.
  - <sup>6</sup> Geneva Sta. Bul. 522, 1924, pp. 1-14.
  - <sup>7</sup> Geneva Sta. Circ. 90, 1926, pp. 1-12. and Circ. 94, 1927, pp. 1-12.
  - <sup>8</sup> Geneva Sta. Bul. 543, 1927, pp. 1-60.
  - <sup>9</sup> NYSAES Ann. Rpt. 1937, p. 57.
  - <sup>10</sup> NYSAES Ann. Rpt. 1929, p. 10.
  - <sup>11</sup> NYSAES Ann. Rpt. 1937, pp. 38-39.
  - <sup>12</sup> NYSAES Ann. Rpt. 1936, pp. 16-17.
  - <sup>13</sup> NYSAES Ann. Rpt. 1950, p. 5.
  - <sup>14</sup> A. Braun, personal communication, October 15, 1996.
  - <sup>15</sup> NYSAES Ann. Rpt. 1935, p. 19.
  - <sup>16</sup> NYSAES Tech. Bul. No. 267, 1943, 48 pp.
  - <sup>17</sup> 100 Years of Agr. Res. at Cornell University, 1887-1987, p. 77.
  - <sup>18</sup> 100 Years of Agr. Res. at Cornell University, 1887-1987, pp. 189-190.
  - <sup>19</sup> Hamilton, Review of Dept. Plant Path. 4/27/67 (CSRS Review document).
  - <sup>20</sup> 100 Years of Agr. Res. at Cornell University, 1887-1987, p. 190.
  - <sup>21</sup> The demise of the Mistomatic was hastened when Hamilton stated at the annual Pesticide Conference in Ithaca: "The only use for the Mistomatic is to put the motor in a boat and go fishing." According to A. C. Davis' recollection, C. E. Palm (who later became Dean and was manning the slide projector) nearly swallowed his cigar and said: "He's a character, isn't he."
  - <sup>22</sup> Robert Lamb, personal communication, Nov. 11, 1996.
  - <sup>23</sup> P. J. Chapman, who did not believe in sabbatical leaves generally, thought that Braun's was the first one that was truly justifiable.
  - <sup>24</sup> Personal recollection, E. H. Glass.
  - <sup>25</sup> Hamilton, CSRS Review of Dept. Plant Path, 4/27/67.
  - <sup>26</sup> A. C. Davis, personal communication, 1996.
  - <sup>27</sup> 100 Years of Agr. Res. at Cornell University, 1887-1987, p. 190-191.
  - <sup>28</sup> 100 Years of Agr. Res. at Cornell University, 1887-1987, p. 191.
  - <sup>29</sup> 100 Years of Agr. Res. at Cornell University, 1887-1987, p. 191.
  - <sup>30</sup> 100 Years of Agr. Res. at Cornell University, 1887-1987, p. 192.
  - <sup>31</sup> 100 Years of Agr. Res. at Cornell University, 1887-1987, p. 192.
  - <sup>32</sup> David Rosenberger was appointed Assistant Professor at the Hudson Valley Laboratory in 1977 when Pearson was transferred to Geneva.
  - <sup>33</sup> The gene gun was developed by J. Sanford in the Department of Pomology and Viticulture and engineering associates (See Chapter XV for more details).
  - <sup>34</sup> Letter from Cornell Univ. President Rawlins to Dennis Gonsalves dated Oct. 16, 1995.
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# Food Science and Technology

**T**he new Department of Food Science and Technology was officially established at the Station on August 1, 1945 by combining the Divisions of Bacteriology and Chemistry. The members of the staffs retained their respective professional titles.<sup>1</sup> E. H. Stotz, who had been appointed head of the Chemistry Division August 1, 1943, was named head of the new division. The former Division of Dairying had been discontinued in 1943 and Dahlberg and his position were transferred to Ithaca. J. C. Henning, J. C. Marquardt and D. C. Carpenter were transferred to the Chemistry Division and then to the new Food Science Division in 1945. Much of the background information on the formation of the new division has been included in Chapters IX (Heinicke), XVIII (Bacteriology), XIX (Chemistry) and XX (Dairy).

**The Heinicke Years: 1945-1960:** The establishment of a food science and technology unit at the Station was, in a larger sense, only a recognition of the very strong programs already under way in sanitation (plant and animal products), food preservation by heat sterilization or freezing, processing methods (fruits, vegetables and dairy products), and the taxonomy of microbes. Even after Dahlberg's transfer to Ithaca, there were 23 members of the new division listed in the 1946 Station Annual Report, nearly twice the size of the next largest unit. The number having major research leadership responsibilities (comparable to later adopted faculty rank) were nine chemists, five bacteriologists, and one dairy technologist, for a total of 15. There was no immediate change in "faculty" numbers but, by the late 1950s, there were 18, by the late 1960s there were 20, the number that continued through to the end of Director Barton's administration in 1982. The increase was needed to conduct the new investigations enabled by the new facilities and equipment.

The projected new food science laboratory was delayed as reported in Chapter IX. In the meantime, the bacteriologists contin-



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*The new Food Research Laboratory, which opened in 1960. Among its outstanding features was a two-story food processing pilot plant.*



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ued to be housed in Sturtevant Hall, and the chemists in the Chemistry Building. The evaluation on feeds, fertilizers, and pesticides was also conducted in the Chemistry building. There were few changes in these physical arrangements until the new food science and technology building was completed 15 years later in 1960.

During the early years of the new department, there was a wide variety of projects with little evidence of change as a result of the joining of bacteriology and chemistry. Breed, in collaboration with Hucker, Pederson, and Conn, was editing the next edition of *Bergey's Manual*. They were studying and classifying microorganisms involved in the decomposition of organic matter in soil; revising related groups of microbes active in sugar fermentation, soft rots of vegetables, and food spoilage as well as bacteria causing serious diseases of man and domestic animals; and finally those that decompose cellulose, chitinous materials, etc. in order to better understand the part they play in agriculture. Conn unsuccessfully attempted to develop a technique for mass production of spores of *Bacillus popilliae*, an important disease of the Japanese beetle. Conn and A. Hofer were conducting official inspections of legume inoculants and related problems. Conn, however, is best known for his earlier work on the microbiology of soils, his nine editions of the *Manual of Methods for Pure Culture Study of Bacteria*, and his work with biological stains as reported in Chapter XVIII.<sup>2</sup> Hucker was continuing his projects on cleaning and sterilizing agents, sanitation of food and dairy plants, and packaging and storage of processed foods. Kertesz reported on his studies on pectin and pectic enzymes and their impact on the quality and preservation of foods. Carpenter was investigating proteins and allied substances and their relation to food processing. Pederson was investigating maple products with F. W. Hayward, but his primary effort at this time was a study of making frozen fruit juice concentrates. F. Lee reported on his investigations on the retention of vitamins and other nutrients during the processing and storage of fruits, berries, and veg-



*David Hand, appointed Head of the Food Science and Technology Department in 1947*

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etables. In addition to the above, Avens, Kokoski, and others were conducting analyses of commercial feed stuffs, fertilizers, and testing Babcock and bacteriological glassware.<sup>3</sup>

It is appropriate to give special recognition to Carl Peterson for his many contribution to food science with the following quotation from his obituary, written by P. J. Chapman, J. R. Stamer, and D. F. Splittstoesser.<sup>4</sup> "Carl was a world leader in food microbiology. His areas of expertise were vegetable fermentations, the preservation of tomato products, sanitation in food processing, and the microbiology of fruit juice beverages. Over 200 publications resulted from his investigations. His book, *Microbiology of Food Fermentations*, was widely acclaimed by food microbiologists."

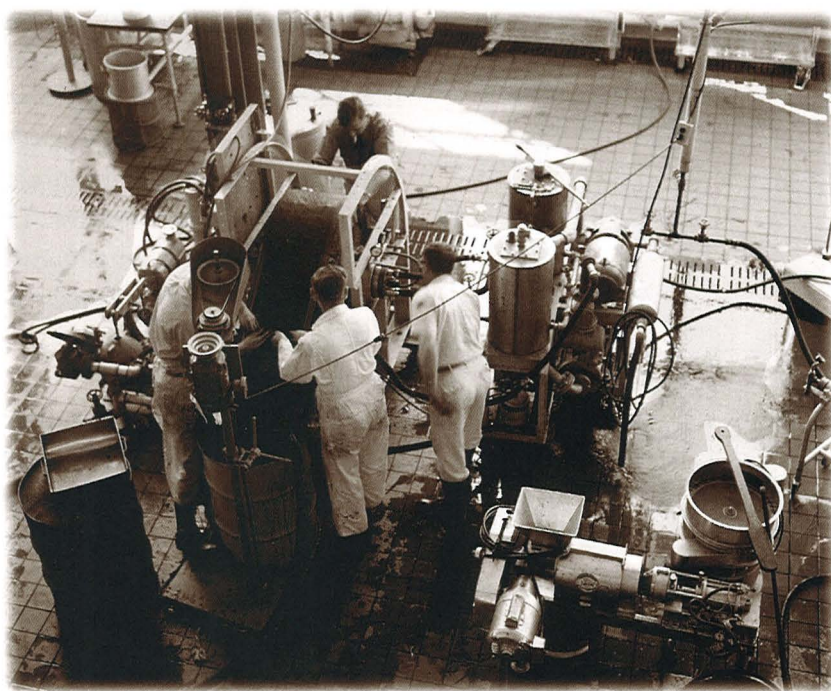
It is of interest that Stotz was listed as junior colleague on three research projects. One was with F. G. Smith on the mechanism of growth hormone action on plant metabolism and the effect of hormone treatments on the composition of economic plants. The second was an effort to determine the action of hormones with special reference to flower bud forming substances. The third was with W. Robinson to select varieties of fruits and vegetables particularly high in nutritive value. It appears that his basic training and interest in human physiology was being transferred to plant physiology in his research interests at the Station. It would be interesting to speculate what his impact might have been had he had elected to remain at the Station.

When Director Heinicke hired Elmer Stotz in 1945 as head of the Chemistry Division, it was assumed he would become the head of the projected food science division. There were some misgivings among the faculty because Stotz's training and experience had been in human physiology. Such misgivings were eliminated when Stotz resigned June 30, 1947, to accept the position as head of the biochemistry department at the University of Rochester.

David B. Hand was appointed Professor of Biochemistry and Head of the Division of Food Science and Technology June 15, 1947. He had trained as a physical chemist at Cornell University and had been a member of the Ithaca faculty from 1936 to 1942 in the Division of Nutrition. From 1942 until coming to Geneva, he had served as technical director for Sheffield Farms Inc., a large New York dairy company. Hand proved to be a very strong department head. He was very protective of the department's "turf" and insisted that his staff confine their efforts to food science matters, as noted in Chapter IX. The faculty was placed in one of three groups: bacteriology, chemistry, and engineering. Each was as-

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*Pilot Plant evaluation of screw press and belt press methods for apple juice production.*

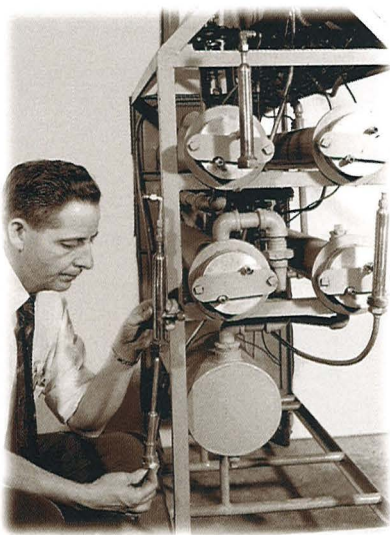


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signed an area of research and then left to develop a research program in that field. Some thrived in this environment, whereas a few did not, but the total department prospered and developed a very impressive national and international reputation.

The completion of the new Food Research Laboratory in 1960 was the fruition of many years of planning, beginning prior to Director Heinicke's appointment in 1942. Hucker and Tressler had been active in drawing the first plans which, later, were judged to be out-of-date and were discarded. New plans were drawn to provide facilities for food preservation by irradiation and other new technologies in chemistry and bacteriology. David Hand and James Moyer played a major role in developing the new plans. They visited facilities on several other campuses throughout the country to learn the latest developments in the field of food science and incorporate them in the new plans. Ground breaking for the new building took place October 4, 1957. It was dedicated May 5, 1960, with Governor Nelson Rockefeller in attendance. This ceremony was followed on May 6 with a symposium on Food and Health chaired by D. B. Hand. Featured speakers were from: the Institute of Nutrition, Vanderbilt University, Council of Food and Nutrition, American Medical Association, Office of the Surgeon General, and Chancellor Emil Mrak from the University of California, Davis.

The new food science facility was considered to be one of the most complete food research laboratories in the United States. It con-



*James Moyer operating the tomato hot break processor that he designed to make tomato juice.*

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tained 60,000 square feet of laboratories and an 8,500 square foot two-story pilot processing plant. It also contained ample equipment for bacteriological and chemical research, taste panel evaluation rooms, and storage spaces for foods at wide ranges of temperatures. Of special interest was a 6,000 curie cobalt source for food irradiation studies. The pilot plant had all the necessary equipment needed for processing of fruits and vegetables. For the first time, the Food Science and Technology faculty was housed in one building.

In 1972, a Raw Products storage building was constructed for use by food scientists and others at the Station with similar needs. This new facility enabled processing research to be conducted over extended periods after harvest. And finally, in 1980, the Station's "Stone Barn" was converted into a facility for housing laboratory animals used in the toxicology studies on foods and beverages.

David Hand resigned as head of the Food Science Department January 1, 1967, and retired exactly one year later. He had been a successful and strong leader of the Department for 20 years. By this time, some of the problems in food science had been solved and there were shifts to other emerging fields. Director Barton chose an internal candidate, Willard Robinson, as acting Head on January 1, 1967. He was named Head one year later. Robinson had developed a strong research program and was an effective collaborator in wine research on problems of the rapidly expanding New York grape and wine production industries. He was well liked and respected by his colleagues in and outside his department. He provided excellent leadership for 15 years until his retirement on June 30, 1982.

A large study involving six professors in Food Science and Vegetable crops was undertaken in the 1950s to improve the quality of tomato products in New York State. The objectives were to measure the effects of cultivar, growing conditions, and methods of processing on the flavor, texture, color, and nutritional value of tomato products. The prevention of spoilage by flat sour bacteria was also studied. Much valuable new information was obtained. Unfortunately, much of the tomato processing industry moved out of New York and adjoining states, mainly to California, to avoid problems related to late ripening of tomatoes in the north-eastern region.

Some of the more basic research in the department was conducted by F. P. Boyle, R. W. Holly, and E. Sondheimer. Boyle, a

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plant physiologist, studied photosynthesis, flower bud formation, and plant growth hormones such as 2-4-D. Sondheimer's projects included studies on the compounds in cabbage that were inhibitory to bacteria. Holly studied various organic constituents of plants including some of the flavor compounds in grapes and the degradation and synthesis of polypeptides. This latter activity is thought to have led to his interest and research on RNA, which ultimately resulted in his move to Ithaca and his award of the Nobel prize.<sup>5</sup>

Numerous studies were conducted to determine the impact of processing procedures on the yield and quality of fruits and vegetables preserved by canning, freezing, and dehydration. J. C. Moyer, R. L. LaBelle, W. B. Robinson, A. C. Wagenknecht, and others studied the canning and freezing of peas, cherries, apples, and other fruits and vegetables. A grant from the U.S. Army Quartermaster supported a study on the dehydration of peas, snap beans, and apples. An eight-member team, including faculty from the Vegetable Crops and Pomology Departments, conducted this study.

Only a modest amount of grape research was conducted in the new department during the Heinicke years (1942-1960). Robinson and Pederson shared a project on the processing of Concord grape in which quality was related to clones and cultural conditions. The work involved fermentation trials. Pederson investigated the use of organic acids to prevent yeast growth in Concord grape juice when stored in refrigerated large tanks. When L. R. Mattick joined the staff in 1957, he and Robinson investigated the chemistry of the Tressler baking process for making sherry from Concord grape wine.

A number of projects dealt with the texture of foods, an important quality of processed vegetables and fruits. During Zoltan I. Kertesz's tenure at Geneva from 1929 until 1962, he investigated problems in processing foods, especially the role of calcium and pectins on the quality of foods. J. P. Van Buren studied the consistency of peach purees. Kertesz and J. P. Van Buren investigated the texture of canned snap beans with special reference to the problem of skin sloughing.

Kertesz was one of the most respected food scientists of his time. He published 160 papers in this field prior to his resignation in 1962. About half of these dealt with the subject of pectin chemistry. He also published a book entitled, *The Pectic Substances*. In addition to his laboratory research, he became involved in the

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practical application of pectin chemistry to the problems of fruit and vegetable processing. He was successful in developing the industrial use of clarifying enzymes for the production of fruit and vegetable juices, and the use of calcium salts to firm canned vegetables, for which he received an award from the National Cannery Association. In his last few years at the Station, Kertesz investigated the use of ionizing radiation as a means of food preservation, a process that he believed could be a significant factor in enhancing the world food supply. He published 12 papers on the effect of atomic radiation on plant and animal components, with emphasis on polysaccharides.<sup>6</sup>

The reader may question why a successful scientist like Kertesz was not selected to lead the new department of Food Science when it was established in 1945. The answer is not clear-cut but seems to revolve about Kertesz's narrow focus on his immediate interests and lack of support from his colleagues and administration. Director Heinicke was still oriented to Ithaca and Hand was well known, liked, and supported by Dean W. I. Myers.<sup>7</sup>

Following retirement from the Station, he held the position as Chief, Food Science and Technology Branch, Nutrition Division, FAO, with headquarters in Rome, Italy for four years prior to transferring to the United Nations New York office. He was awarded the Institute of Food Technologists' coveted International Award in 1967.<sup>8</sup> Kertesz was active in world health and nutrition problems and worked with the United Nations. His monograph, *The Pectic Substances*, published in 1951, is a classic widely cited by pectin chemists. He served on numerous national and international committees and delegations.

During the 1950s, C. S. Pederson continued his studies on lactic acid fermentations. G. J. Hucker had responsibility for studies on sanitation in fruit processing plants. K. H. Steinkraus investigated the Howard mold count procedure as it might be applied to small fruits. Additionally, he initiated a project on the sporulation of *Bacillus popilliae*, a pathogen of the Japanese beetle. D. F. Splittstoesser investigated the relationship of sanitary practices in processing plants to the microflora in frozen vegetables.

The state-mandated inspections and analyses of commercial fertilizers (1896), feedstuffs, economic poisons (including pesticides (1908), and testing Babcock and bacteriological glassware had been the responsibility of the former Chemistry Department. These were continued in the new Department of Food Science and Technology through the Heinicke years under the supervi-

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sion of A. W. Avens (Feed, Fertilizer, and Lime) and G. L. Mack (Economic Poisons) with assistance from a research associate and several technicians.

The establishment of the Station as a horticultural research institution, and the transfer of all dairy and other animal activities to the Ithaca campus without the involved faculty created a lack of teaching expertise for some areas of food science at Ithaca. This proved to be critical in food science related to fruits and vegetables. No doubt, Hand's Cornell background made him sympathetic to such needs. In 1957, Holley organized a course in food science just before he moved to Ithaca to the U. S. Department of Agriculture Plant, Soil, and Nutrition Laboratory. Shallenberger then assumed responsibility for the course. He taught this course and supervised the department's teaching role until his retirement in 1988. Both received their Ph.D. degrees in chemistry from Cornell University and were familiar with the regulations and organization of the graduate school. Other faculty from the Department have taught courses or part of courses from time to time from 1957 to the present (1999).

No one in the new Food Science and Technology Department had any officially recognized extension responsibilities. Just as in other Geneva Station departments however, most food science faculty members were involved in some extension activities with processors and farmers relative to the quality of raw and processed foods. There was much need for assistance because there was no extension presence in Ithaca in the fruit and vegetable processing field. As we shall see in the next section, this deficiency was soon addressed and corrected.

**The Barton Years: 1960-1982:** These were especially good years for the Food Science and Technology Department in terms of facilities, staffing, and financial support. Not only did the department have a new and well-equipped office/laboratory facility, it also was able to add five additional faculty positions over the next two decades. Most of these were enabled by the State University of New York system and the State University of New York Construction fund as noted in Chapter X.

It was also the period when new remarkably efficient chemical analytical equipment was being developed and available for use by chemists. They were very expensive until some years later. Mattick was asked to equip a centralized laboratory with these devices for use by department chemists. This was thought to be the most efficient and economical way to make the best use of

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these new devices. As it turned out at Geneva and other institutions, the concept proved to be inefficient and cumbersome. When Mattick went on sabbatical leave in 1969, Terry E. Acree was placed in charge. He began to decentralize the analytical laboratory by moving the equipment to the laboratories where needed. Also, by that time, prices had dropped and such items as gas chromatographs could be purchased for laboratories where they were needed routinely.

The food processing industry in New York and other states underwent extensive changes during and after the 1942 to 1982 period in response to several developments. In the 1940s, there were many small family owned operations located near sources of their raw products. Capital investments were small, and there were relatively few state and federal regulations. During the following decades, both federal and state regulations and taxes increased with the establishment of the Environmental Protection Agency, stricter Food and Drug requirements, and higher taxes and energy costs. Small processors could not absorb the increased costs and closed operations or sold out to larger operators. Also, with improved transportation facilities, processing plants could be located farther from the raw product sources. The clientele of the Station's food science effort went from many small operators to fewer large firms, which hired the professional experts needed to cope with the new production and marketing requirements. Many of these experts were trained at Geneva. Although the department had no official commitment to extension prior to 1962, many faculty worked closely with companies and food organizations whenever problems arose. Food scientists maintained close contact with the New York State Canners and Freezers Association. One extension-like activity was the annual mold count school for tomato products that was held annually by the department from 1938 through 1960. These were discontinued only when tomato processing ceased to be a significant industry in the State.

It was not until Donald Barton became director of the Station in 1960 and actively sought an officially recognized extension presence at Geneva that such approval was given in 1962 for a position in the Department of Food Science and Technology. This action was instigated by Hand and had the full support of Dean Palm and food industry leaders. D. F. Farkas was appointed Assistant Professor of Food Processing Extension, September 1, 1962. He had earned his Ph.D. at the Massachusetts Institute of Technology in food engineering. His charge was to keep the food industry aware of current processing methods; to alert the industry to major changes likely to affect their competitive positions; to





*Donald Downing, Extension Professor of Food Science, and some of the food products that had been submitted to his laboratory for analysis.*

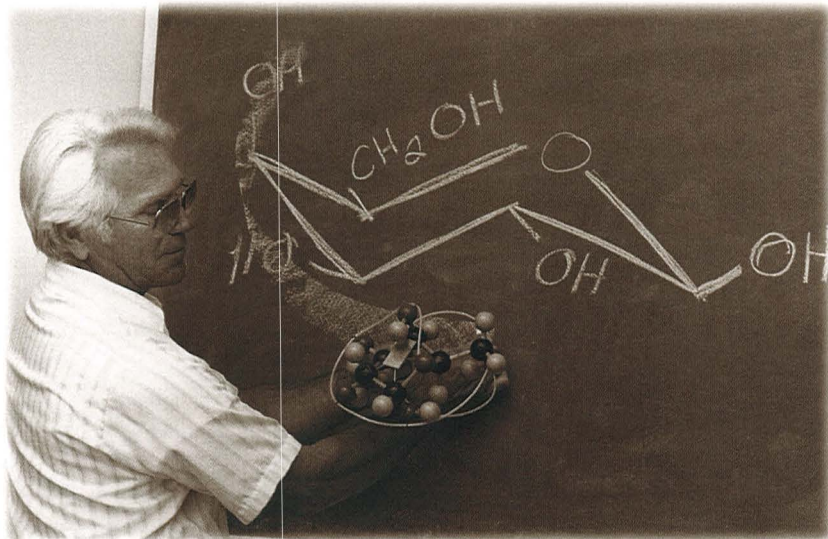
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act as a central contact between industry, Cornell University, USDA laboratories, and other research organizations; to alert Cornell researchers to industry problems; and to conduct pilot plant demonstrations of new technologies and organize conferences on subjects of concern to food processors. Farkas carried out an active extension program including frequent meetings with commodity committees, organized symposia including one on *Clostridium botulinum*, and carried out various applied research projects. He resigned in February 1967 to accept a position with the U. S. Department of Agriculture.

D. L. Downing, who had studied food science at Georgia, was appointed to the extension position in 1967. By then, many of the food company mergers referred to above had taken place with the result that there were fewer but larger food processing companies, and working with commodity committees had become less effective than formerly. Also, new government regulations related to food safety and environmental contamination became important concerns. Additionally, the expanding New York State wine industry was in need of assistance. Downing organized many extension conferences, including annual wine workshops, training programs for FDA food inspectors, microbiology short

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*Robert Shallenberger lecturing on the theory and molecular structure of sugars.*



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courses, training to certify pesticide applicators, and sanitation seminars.

A botulism outbreak involving a commercially canned soup in 1971 resulted in the Food and Drug Administration mandating that retort supervisors be trained in the microbiology and technology of canning. Downing initiated a five-day Better Process Control School in 1974 to meet this new requirement. The school has been held each year until the present (1999).

In earlier flavor chemistry research, R. W. Holley isolated and identified some of the compounds that contribute to the flavor of the Concord grape.<sup>9</sup>

Shallenberger was hired in 1955 and assigned to study the carbohydrate chemistry of raw and processed foods. Among his contributions were a number of practical findings that were put to use by farmers and processors. There had been a problem of knowing the optimum time to pick apples for processing for juice, slices, and sauce. In collaboration with interested parties, Shallenberger established the optimum sugar/acid ratio for picking apples for processing. Another contribution was finding the ingredient in dry beans that causes flatulence. He determined that it was an essential component of the bean that could not be eliminated but could be reduced. He also found the component causing an off-flavor in pureed beets and how to eliminate it.

But perhaps Shallenberger's most creative research was on sugars and other sweeteners. He became interested in the rela-

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*Terry Acree and technician Robert Butts operating the olfactometer (used to identify the chemistry of odors) that Acree developed.*



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tionship between the molecular structure of sugars and their sweet taste. In 1961, he went to the University of California, Berkeley to study this concept. While there, he met a chemistry student, Terry E. Acree, who shared his interest and enthusiasm for this study and was interested in taking graduate studies. After discussion with Hand, Acree was offered and accepted a graduate research assistantship at Geneva to study with Shallenberger. This proved to be a very productive relationship. They published their classic paper that related sweet taste to molecular structure in 1967.<sup>10</sup> It provided a structural template for a functional group and stereo (shape) chemistry for sweet tasting molecules. This was the first successful effort to relate atoms and molecules to sensory perception. At that time chemical industries were investing millions in research to find non-fattening sweeteners as sugar substitutes. Industry was somewhat hostile and attempted to discredit the new structural template, but eventually it was validated and accepted. Their finding greatly aided the synthesis of new sweetening agents. As recently as 1996, a post doctoral student came to Geneva to work with Shallenberger and Acree in the latter's laboratory to synthesize a new sweetener based on their concept. She accomplished the task in two months. Industry had spent years and millions of dollars in random searches for artificial sweeteners. Shallenberger published two books on sugar chemistry prior to retirement and one on taste chemistry after retirement.<sup>11</sup> Acree was offered and accepted an assistant professorship in the department upon completion of his Ph.D. in 1968, an exception to Cornell's policy of not employing its new graduates.

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Acree concentrated his research efforts on the identification and chemistry of flavors and off-flavors of foods and beverages. In 1976, Acree, his technician Robert Butts, a graduate student Richard Nelson, and a colleague C. Y. Lee published a design for a new olfactometer, a device that combined pure humid air with precise doses of odorants. This was connected to a newly available high resolution gas chromatograph and was named a GC/O (gas chromatograph—olfactometer). For the first time, it was possible to identify and isolate chemicals that cause good and bad flavors in foods for the purpose of increasing the quality of foods and beverages. The GC/O can also be used for products other than foods. This new technology was available in the early 1980's and led to the development of a technology transfer company that manufactured and sold GC/O instrumentation world wide.

Mandated inspection and analytical chemistry programs were continued under the supervision of Avens (feed, fertilizer, lime) and Mack (economic poisons, including pesticide formulation registration) until their retirements in 1967 and 1971, respectively. The work was then supervised by John Bourke. The economic poisons program was canceled by the Department of Environmental Conservation in 1973, the fertilizer in 1991, and the feed in 1995 by the Department of Agriculture and Markets.

From the late 1800s until the mid-1930s, state and federal laws concerning pesticide use and risks were developing. By the mid-30s, the Food and Drug Administration (FDA), U. S. Department of Agriculture, and the New York State Department of Agriculture and Markets had developed a system of regulations for the agricultural use of pesticides. Avens and Mack conducted research elucidating the residues of the materials found in food and assisting the crop production departments in developing safe and effective methods for the use of these mostly inorganic materials. With the introduction of organic pesticides in the 1940s, they shifted their emphasis to determining the mode of action, disappearance from crops, and crop residues of these new materials.

In 1956, following the amendment of the Food, Drug, and Cosmetic Act, the FDA was authorized to set tolerances, based on effective use, for pesticide residues on agricultural commodities. It was, therefore, necessary to determine residues and their disappearance following harvest. In response to this need, Avens and Mack, along with D. J. Lisk from the Ithaca Campus developed the Pesticide Residue Laboratory program with both state and federal aid. This program was integrated into a regional

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program, which coordinated the work of the various agricultural colleges in the northeast. In 1963, the regional programs were further integrated into a national federally funded program known as IR-4 (Interregional Research Project # 4). In 1965, J. B. Bourke assumed responsibility for the Geneva Pesticide Residue Laboratory and served as Liaison to the IR-4 project.

With the formation of Environmental Protection Agency, EPA, and the transfer of all pesticide regulatory responsibilities from FDA, the IR-4 program was greatly expanded in 1975 to meet the increased need for residue analyses required by the new agency. Four regional analytical laboratories were established, the northeast being at Geneva with Bourke as Director. Between 1975 and 1982, the program developed data to support pesticide registrations in ornamental crops and the registration of biorational agents. Support was also made available for field research necessary to produce the commodity samples needed for analysis. In 1981, responsibility for developing residue data for minor use animal drugs was added to the IR-4 project.

Mack was interested in the environmental effects that pesticide use might have and developed the early data on levels of DDT and its metabolites in fish and animals, soil, and water. His work led to alterations in the use patterns of the early chlorinated pesticides, which sharply reduced potential risks. At his retirement, Bourke continued this work, emphasizing soil residues, applicator and field worker exposure, pesticide waste management and residues in surface runoff, ground water, and soil residues following various application and cultural techniques.

Several food science investigators made use of the new pilot plant to study a variety of processes. J. C. Moyer investigated vacuum canning of apple slices, drum drying of pea purees, the use of enzymes to increase yields of fruit juice, and the dehydrofreezing of red cherries. G. D. Saravacas conducted basic studies on distillation, concentration, and essence recovery of fruit juices. M. A. Rao initiated projects on energy conservation in commercial canning and freezing, heat transfer, and the deformation and flow of liquid foods.

During the 1960s, efforts were under way to develop machines to mechanically harvest grapes, apples, cherries, snap beans, and other vegetables. As reported in Chapter XV, an interdepartmental team of Geneva and Ithaca scientists successfully developed mechanical harvesting of grapes. From Food Science and Technology, J. C. Moyer and M. C. Bourne evaluated processing and



*Experimental wines bottled at the Geneva Experiment Station under the label of Geneva Cellars.*

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quality, and D. F. Splittstoesser related microbiology of the harvested fruit to shelf life. The total effort was very successful. Soon, the majority of New York grapes were mechanically harvested.

J. L. Stamer continued the research on lactic acid bacteria and the sauerkraut fermentation following C. S. Pederson's retirement in 1967. He also collaborated with M. H. Dickson, breeder in Vegetable Crops Department, in developing a new high solids cabbage variety for use in making sauerkraut. It resulted in increased yields with significant reductions in waste brine. It was a major accomplishment.

K. H. Steinkraus studied a variety of third-world fermented foods. He and his students conducted research on the microbiology of tempeh, fish paste, peanut press cake, idli ontjom, tape ketan, and uji.

The Station has had a major impact on the grape and wine industries of New York State for many years. Horticulturists and engineers have not only determined optimum site and cultural requirements for consistent high yields of quality grapes and methods and equipment for mechanical harvesting, but also have developed new varieties to produce top quality juices and wines. And, as we have reported elsewhere, Tressler developed and patented a new baking procedure to convert surplus Concord grape wine to a very potable sherry. The Department of Food Science and Technology contributed significantly to the industry during the Heinicke and Barton years.

Robinson and Pederson collaborated on a project to determine the relationship of the quality of processed Concord grape products to clones and cultural conditions. Pederson investigated the use of organic acids to prevent yeast growth in Concord grape juice when stored in large refrigerated tanks. As reported earlier, Mattick and Robinson investigated the chemistry of the Tressler baking process for making sherry from Concord grape wine.

A major wine research program was initiated in 1955 in cooperative research projects of W. B. Robinson (food scientist) with John Einset (horticulturist) on the suitability of grape cultivars for wine production. As reported in Chapter X, Director Barton, Hand, and administrators from Ithaca had been successful in enlisting the interest and support of New York wineries in collaborating with and providing financial support for wine

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*Evaluation of experimental wines at one of the many workshops held for New York's rapidly growing wine industry.*



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research. A Technological Advisory Committee was established in 1964.<sup>12</sup> Robinson served as chairman for many years. The purpose of the committee was to provide a forum for the exchange of information and a means to gain funding for wine research. Active members included the following wineries: Brotherhood, Canandaigua, Gold Seal, Mogen David, Monarch, Pleasant Valley, Taylor and Widmer. Semi-annual meetings were held in the Food Research Laboratory conference room and at various wineries. These activities produced inputs of technology, guidance and financial support for research on wine at the Station.

The Farm Winery Legislation, which lowered taxes, was passed in 1976. This, plus research and extension information from the Station, enabled the establishment of 87 new farm wineries in New York State over the next two decades. Total production of all 120 wineries was over 25 million gallons. There were 33,000 acres of vineyards in New York State producing table, juice, and wine grapes in 1996.<sup>13</sup> Robinson and staff and the New York State Department of Agriculture and Markets organized the first commercial wine competition in the eastern part of the United States. Robinson and the Commissioner of Agriculture served as co-chairmen. The size of the competition increased each year as the number of farm wineries proliferated.

During the post World War II decades, claims were being made that wines made from hybrid grapes were toxic to laboratory animals and, thus, potentially dangerous to humans. These claims were based on feeding experiments on poultry conducted in Europe. If true, the New York wine industry would have been

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devastated. Robinson was successful in securing a new position for a toxicologist in 1967 and appointed Gilbert S. Stoewsand September 1, 1967. Stoewsand's research showed clearly that hybrid grape wines had no ill effects on poultry. But, more important, he demonstrated that the European negative results were caused by a nutritional deficiency in the experimental diets rather than by wine toxicity. As a result, the successful Station hybrid grape program was continued and the industry prospered.

Stoewsand also studied the possible activity of natural food constituents on the inhibition or enhancement of carcinogenesis. He demonstrated that diets of cruciferous vegetables inhibit tumor formation in experimental animals.<sup>14</sup> Stoewsand, in collaboration with D. J. Lisk, Toxic Chemical Laboratory at Ithaca, studied the effects of disposing such wastes as fly ash and municipal sludge on crop lands. They found that heavy metals could contaminate plants and cause serious problems.

Some additional significant wine research done by the Station's food scientists from 1960 to 1982 included: cultivar evaluations (W. B. Robinson), methods for reducing acidity (L. R. Mattick), grape pigments (G. Hrazdina), Flor sherry fermentation (H. L. Luthi), wine spoilage microorganisms (D. F. Splittstoesser), browning reactions (C. Y. Lee) and flavor chemistry of grapes and wines (T. E. Acree).

As noted earlier in this chapter, Kertesz had conducted tests in the late 1950s on the effect of ionizing irradiations on pectic substances using the University of Rochester irradiation facility. With the installation of the cobalt-60 source in the new food science laboratory, the studies were transferred to Geneva. After L. M. Massey joined the faculty in 1958, studies were made on the effects of irradiation on the physiology and preservation of fruits and vegetables. This research was funded by the Atomic Energy Commission, National Institutes of Health, and the U. S. Army Quartermaster Corps. A number of post-doctoral scientists participated in this research. The conditions that minimized adverse quality changes were defined, and the effect of ionizing irradiation on pectins and other plant polysaccharides were elucidated.

The early enthusiasm for the potential of irradiation for sterilizing and preserving foods began to fade when its limitations and its real and imagined hazards became known. Outside financial support ceased and irradiation research at Geneva was abandoned. The cobalt source, however, (now at a much reduced potency) still remains in place at the Station as of 1999.



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Steinkraus continued his research on *Bacillus popilliae*, a pathogen of the Japanese beetle. Its use as a control agent is limited because it forms spores only in live beetle grubs, which limits its availability for use in controlling the beetle. Steinkraus, Conn, and others elsewhere have been unable to induce sporulation under fermentation conditions. Stamer investigated the physiology of lactic acid bacteria with the objective of developing improved media for culturing difficult-to-propagate strains. Splittstoesser investigated heat resistant strains of molds that were involved in a number of spoilage incidents in fruit beverages, baby foods, and pie filling products.

Much research on the nutritive value of fruits and vegetables had been done earlier. During this period, L. R. Hackler investigated the protein quality of different foods. C. Y. Lee researched the effects of processing on vitamins A and C. His studies on the methodology for measuring food vitamin A indicated some serious errors in the analytical procedure, and that the vitamin A content of many foods was lower than had been reported.

The increased concern for environmental quality and the new restrictive regulations of waste disposal enacted during the 1960s forced food processors to improve their waste handling procedures. Several projects were initiated to help fruit and vegetable processing companies find solutions. These included: surveys of waste water volumes and waste concentrations generated by different unit operations (Y. D. Hang, D. L. Downing, and D. F. Splittstoesser), yeast fermentation to reduce BOD (biochemical oxygen demand) and acidity of sauerkraut brines (Y. D. Hang), ozone and other non-biological treatment processes (R. H. Walter), dry caustic peeling of root crops to reduce the volume of liquid waste (C. Y. Lee and D. L. Downing), feasibility of feeding apple pomace to dairy cows (R. H. Walter), and solid state fermentation of apple and grape pomace (Y. D. Hang).

With the development of a strong and varied food science and technology program at Geneva, it was not unexpected that some members would become involved in international activities. Dahlberg of the Dairy Division was involved in such activities in the late 1920s when he studied the dairy industries of countries in Central America.<sup>15</sup>

Several members of the Department participated in one or more aspects of international human nutrition programs. The primary support for these studies came from U. S. AID and UNICEF. A major study in the 1960s was concerned with the production of

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soy milk and other high protein foods for infant feeding programs in developing countries, including the Philippines. M. C. Bourne, J. P. Van Buren, R. L. LaBelle, and Y. D. Hang conducted studies on processing. K. L. Steinkraus investigated bacterial and fungal fermentations. L. R. Hackler investigated the nutritional value of these products. Inasmuch as soy beans were not a major crop in New York State, local food processors were not completely sympathetic with this program. Neither was Director Barton who had to justify the activity locally and in Albany.

A number of Station faculty members were involved in government and private foundation funded international agriculture activities, especially in developing countries. Food scientists were in much demand. In the early 1960s, D. B. Hand, K. H. Steinkraus, W. B. Robinson, J. P. Van Buren, and Z. I. Kertesz participated in nutritional surveys of Far Eastern and Latin American Countries. Later, Steinkraus, Pederson, and Bourne participated in one- and two-year assignments at the College of Agriculture at the University of the Philippines supported by the Ford Foundation. Other activities included organization of various conferences in developing countries and the hosting of many foreign graduate students and visiting scientists. Other Station departments participated in similar activities but to a lesser extent.

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- <sup>1</sup> NYSAES Ann. Rpt. 1946, p. 13.
- <sup>2</sup> Personal communication, Donald Splittstoesser.
- <sup>3</sup> NYSAES Ann. Rpt. 1946, pp. 25-35.
- <sup>4</sup> Memorial Statements, Cornell University Faculty, 1987-88, p.72.
- <sup>5</sup> See Chapter IX for more information on Holley and his departure from Geneva.
- <sup>6</sup> NYSAES Ann. Rpts. 1963, p. 29, and 1969, pp. 73-74.
- <sup>7</sup> Much of this assessment is from Willard Robinson, personal communication, September 4, 1997. It is supported also by evidence gained over the years by the junior author in contacts with several food scientists.
- <sup>8</sup> Necrology of the Faculty of Cornell University, pp. 21-22, 1968-1969.
- <sup>9</sup> Holley conducted studies on polypeptides and on the structure of RNA (See Chapter IX for further details).
- <sup>10</sup> Shallenberger, R. S. and T. E. Acree, 1967. Molecular theory of sweet taste. *Nature (London)* 216 (5114): 480-2. abs.
- <sup>11</sup> Shallenberger, R. S. and G. G. Birch, 1975. *Sugar Chemistry*. Avi Publishing Co., Westport, CT, pp. 221, Shallenberger, R. S., 1982, *Advanced Sugar Chemistry*. Avi Publishing Co., Westport, CT, 323 pp.  
Shallenberger, R. S., 1993, *Taste Chemistry*. Blackie Academic and Professional, London, 613 pp.
- <sup>12</sup> Barton Oral History, 1983, pp. 49-50
- <sup>13</sup> NYSAES Station News, Geneva 7/26-8/2/96, p. 3.
- <sup>14</sup> 100 Years of Agr. Res. at Cornell University, 1887-1987, p. 179.
- <sup>15</sup> Dahlberg Oral History, 1962, pp. 35-36.

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## Pomology and Viticulture



*Group of apple pickers in an orchard with very large Baldwin trees in Monroe County, NY, late 1800s.*



*Harvesting apples from dwarf trees developed by Station plant breeders.*

The word horticulture embraces the science of cultivated plants including fruits, vegetables, and ornamentals.

During the first years of the Station's existence when Sturtevant was director, all plant studies were conducted by the horticulturists without distinction or organization according to the kinds of plants. In 1896, when Director Jordan first organized research by divisions, he included both fruits and vegetables in the same unit, i.e., "Division of Horticulture." This terminology was continued until 1930 when Director Hedrick divided Horticulture into two divisions: "Pomology" and "Vegetable Crops," as shown in the research organizational chart in Chapter XI. Beginning with Director Jordan's administration in 1896, the history of the Station's activities on fruits is found in this chapter. Vegetables are included in Chapter XVI, "Seed and Vegetable Crops." Some preliminary notes on activities in both fields are included in several chapters in order to provide perspective on the total horticultural effort at the Station.

Director Sturtevant arrived in Geneva February 28, 1882 and took possession of the Station on March 1. His assistant, H. H. Wing, also arrived on the first day. A study of Wing's activities during his first year<sup>1</sup> indicates he had a good background in horticulture. On March 17, 1882, Emmett S. Goff arrived to serve as horticulturist. While he had no college degree, it is evident from his work that he had a good knowledge of practical and scientific horticulture.<sup>2</sup> He can be rightly considered the first professional employed by Director Sturtevant. The next professional, S. M. Babcock, Ph.D. in chemistry from Cornell and post doctoral studies in Germany, arrived July 1, 1882, and completed the professional staff for the first year.<sup>3</sup>

In spite of this small staff and the March start-up date, a remarkable amount of work was accomplished that first year as attested by the 156-page 1882 annual report. The following *Duties of the*

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*Horticulturist*, established by the Director in 1882, suggest that there was good reason for such productivity:

- “• Keep the garden tool-room in tidiness and the tools clean and in place.
- Have charge of the lawns.
- Have charge of the fruit trees.
- Have charge of the garden and green-house in their multitudinous relations.
- Report every night to the director the work done, its amount and character.
- The horticulturist will also be expected to take full notes of every operation in the garden, observations concerning growth, insect appearances and damage, effect of the weather, temperature of the soil at time of planting, appearance of bloom, edible maturity and of seed maturity, and in general of every matter of near or remote interest.
- The horticulturist will also take charge of such special work as may be assigned to him by the director.
- The horticulturist will do all the important and scientific work with his own hands, or have it done under his immediate supervision.
- The horticulturist will report to the director nightly, leaving his note books and taking them again in the morning.”<sup>4</sup>

Less critical attention was given by the horticulturist to varietal studies of the tree fruits than to vegetables and field crops because of the limited number of fruit plantings on the property (643 apple, 97 peach, 77, pear and 37 cherry trees),<sup>5</sup> and the time lag between their planting and fruiting. Some time was saved for apples by top-working some of the trees in the existing orchard. In 1883, 90 varieties of apples were top-grafted onto some of these trees. It was not until 1888 that appreciable fruit was produced on these grafts. Almost every year, starting in 1882, some plantings were made of varieties of strawberry, bush fruits, grape, and all of the tree fruits.

In the first year, experiments were conducted on field and vegetable crops including: barley, maize (corn), potato, forage crops (16 kinds of sorghum were obtained from Professor Peter Collier,<sup>6</sup> Department of Agriculture, Washington, DC), alfalfa, lucerne, 58 varieties of beans, nine varieties of beets, eight varieties of carrots, 29 varieties of turnips, four varieties of onions, English frame cucumber, eight varieties of musk melon, 12

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varieties of watermelon, 17 varieties of squash, 28 varieties of cabbage, 16 varieties of sweet corn, 10 varieties of lettuce, two varieties of celery, 11 varieties of peppers, seven varieties of tomato, and 31 varieties of peas. Observations were made on days to vegetation, bloom, harvest, and other pertinent developments. Thus, the Station made an impressive beginning in its first year in the field of horticulture on fruit, vegetable, and field crops.

As bearing plantings of the tree fruits became available on the Station's grounds during the late 1880s and early 1890s, there was a gradual shift of emphasis from vegetable and field crops to the fruits. By 1896, the varietal plantings of the various fruits had reached impressive numbers. As of July 1 that year, there were 2,823 varieties of 16 kinds of fruits. It perhaps can be said that by 1896 research on fruit crops had become the dominant interest of the horticulturists.

By 1901, the Station had amassed 19 years of detailed records on several thousand varieties of fruits and vegetables. S. A. Beach and Director Jordan must have pondered over what should be done with this information. The latter observed "such a mass of facts (like this) is too valuable to lie unused."<sup>7</sup> It must have been around 1900 that a decision was made to use this information as the basis for the preparation of one or more publications on the varieties of the several fruits. In the master plan adopted, the first fruit selected for treatment was apple. In preparing this opus, Beach and assistants N. O. Booth and O. M. Taylor drew heavily on the Station's varietal records. But, growers and others provided valuable information together with samples of fruits. *The Apples of New York* was published in 1905 as a supplement to the Annual Report of 1903. It consisted of two hard-cover volumes totaling 769 pages. Treated were 646 varieties of apple of which the fruits of many were illustrated, some in color. This publication represents an important milestone in American pomology and won wide acclaim. It is regarded today as a treasured classic of the pomological literature.

On September 1, 1905, Beach resigned to become Head of the Department of Horticulture at the Iowa Agricultural College. He could hardly have made a more appropriate parting gift to New York orchardists than *The Apples of New York*.

Early Station horticulturists assumed responsibility for disease and insect control. The validity of this concept apparently was not questioned seriously until some time after entomologist Lowe

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and botanist Stewart came to the Geneva Station in 1886. In fact, Director Sturtevant had assigned responsibility for insect pests and diseases to horticulturist E. S. Goff in 1882. Beach, over his entire period of service (1891-1905), maintained an active interest in disease and insect problems. Thus, even as late as 1899, we find him publishing the 65-page bulletin No. 170, entitled *Common Diseases and Insects Injurious to Fruits*. Lowe and Stewart were made junior authors in this instance. Beach's last such publication, appearing in 1903, was the profusely illustrated 56-page bulletin No. 243, entitled *Spray Mixtures and Spray Machinery*. Neither Stewart nor Parrott were among the authors of this one, but Beach does note they had been consulted.

One should not conclude some kind of a power struggle existed here. Beach was merely continuing to follow a long established practice among earlier horticulturists. Actually, entomologists and microbiologists prior to the 1900s were concerned with and studied the taxonomy of insects and microorganisms rather than their control. Eventually, this "problem" solved itself. Beach's successor, U. P. Hedrick, seemed content to leave such work in the capable hands of botanist Stewart and entomologist Parrott.

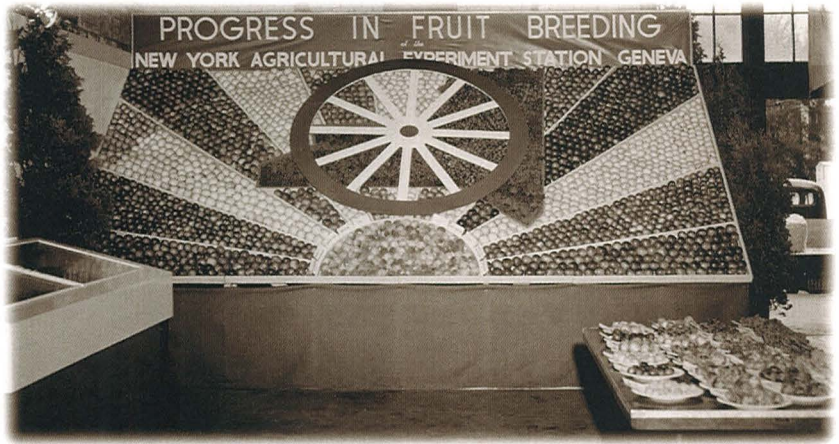
In 1903 and 1904, Beach established three small apple orchards consisting of trees grafted on two kinds of French dwarfing rootstocks. These tests were located in Columbia, Onondaga, and Orleans Counties. After Beach's departure in 1905, Hedrick kept these plantings under observation until 1915. The results obtained were disappointing to him. Mistakenly he saw little future use, commercially, for dwarfing rootstocks.<sup>8</sup>

When U. P. Hedrick<sup>9</sup> was appointed Horticulturist in 1905, he inherited some long-term departmental commitments. The best known of these, and one of great interest to him, was the plan of publishing what was known about the varieties of the various fruits. The model for this publishing venture, *The Apples of New York* had been published in 1905 as noted above. Under Hedrick's leadership, six additional fruit books were realized over the 1908-1925 period. Handsomely printed on folio-sized pages, these hard-cover volumes were (with their date of publication), the following: *The Grapes of New York* (1908), *The Plums of New York* (1911), *The Cherries of New York* (1915), *The Peaches of New York* (1917), *The Pears of New York* (1921), and *The Small Fruits of New York* (1925).

When Sturtevant retired as director in 1887, he left at Geneva an 1,800-page manuscript entitled *Notes on Edible Plants*. Apparently,

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*Station fruit breeding exhibits at  
the New York State Fair, 1951.*



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this manuscript remained untouched until U. P. Hedrick undertook its editing. Precisely when this occurred is not known.

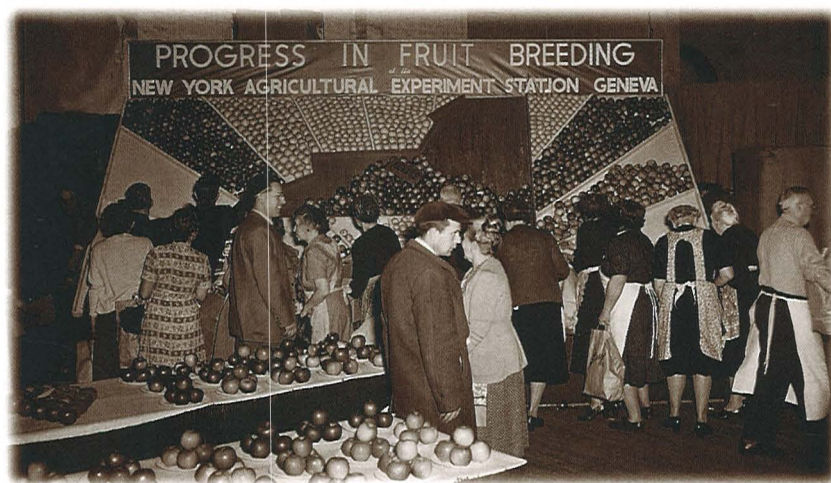
Besides this manuscript, Hedrick made use of information appearing in the first six Geneva Station Annual Reports, a series of Sturtevant articles appearing in the *American Naturalist*, and information written on between 50,000 and 60,000 index cards. In 1919, *Sturtevant's Notes on Edible Plants* was published under the editorship of Hedrick. It is of interest that Hedrick expressed his gratitude to his associates in the Horticultural Division for their assistance, and "especially to J. W. Wellington<sup>10</sup> who had charge of standardizing botanical names, verifying references, and preparing the bibliography."<sup>11</sup> This 686-page book became one of that elegant series of the Geneva Station's Fruit Books of which Hedrick was senior author.

Hedrick also inherited three long-term orchard projects. Answers were sought in these to the following questions: (1) Does an apple tree thrive and perform better under tillage or sod conditions? (2) Does it pay to use a fertilizer, annually, in an apple orchard? (3) Is it commercially feasible and desirable to grow apples on dwarfing rootstocks?

To find an answer to the first of these questions, Beach initiated studies in 1903 in the W. D. Auchter orchard near Rochester and another in 1904 in the Grant Hitching orchard south of Syracuse. Tillage in these experiments involved plowing in the spring followed by cultivation to late July when a cover crop was planted. Sod culture consisted of the maintenance of a grass mulch formed by mowing the grass once or twice each summer, as needed. After Beach resigned, both experiments were continued by his successor, U. P. Hedrick. In 1909, Hedrick published a

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*The Station apple exhibits were always popular, but especially so at dismantling time.*



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preliminary report on the Auchter Experiment. He found the trees under tillage here had given distinctly better results than those in sod. But, he said, "The experiment does not show that apples cannot be grown in sod. There are many orchards in New York which would prove the contrary. It suggests, however, that apples (can) thrive in sod not because of the sod but in spite of it. ... The statement is often made that trees can become 'adapted to grass.' ... (But) trees can hardly become adapted to thirst, starvation, asphyxiation, and poison."<sup>12</sup>

Separate final reports on the two experiments were published in 1914. Hedrick maintained in both of these publications that tillage was the preferred practice to follow in most of New York's commercial apple orchards. Apparently the Hitchings orchard was one of the exceptions. He found here that there was no appreciable difference in crop yields, fruit coloring, etc. between sod and tillage. Part of this experiment, however, was located on relatively flat land; the other part, under hillside conditions. In the latter situation, he decided sod might be preferred owing to the dangers of soil erosion under tillage conditions.<sup>13</sup>

Reported above was the language Hedrick used in 1909 in proclaiming his support for tillage over sod. He made a similar attack in 1914 on the existence of so many unsprayed, untilled "roadside" orchards over the state. He wrote: "Grass makes apple trees sterile and paralyzes their growth—it is the withering palsy of the apple industry in New York. It is the chief cause of the decrepit, somnolent, moribund orchards to be seen by the roadsides — in all parts of the state. Cider mills and evaporators thrive on sod-grown apples. The small, gnarly low-grade apples sent to the market from the orchards in sod have so displeased



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the eye and palled the appetite of consumers that they are bringing discredit to the apple industry of the state. The average orchard in sod is a liability rather than an asset to the owner.”<sup>14</sup>

Despite this spirited display of rhetoric, Hedrick probably won few, if any, new converts to tillage, and for several reasons. Even he conceded many New York sod growers were producing satisfactory crops. And, on the other hand, some tillage growers complained about their inability to produce properly colored fruit. Then, concerning the sad state of the roadside orchards Hedrick referred to above, most of these were the survivors of the orchards that were planted on virtually every New York farm prior to about 1890. Most of their owners produced enough usable fruit for home use and often enough additionally to sell to cider mills or dryers. However, these benefits apparently were considered insufficient to justify the costs of spraying and tillage. Eventually, most of these orchards were cut down, and the land they covered became used for other purposes. Apparently, the question of how best to manage the orchard floor had remained unresolved up to this time.

In 1896, a small apple orchard of the Rome variety was planted on the Station’s ground for the express purpose of determining whether or not it paid to apply a fertilizer annually in an apple orchard. The soil in this site was a Dunkirk clay loam—heavier than the best New York apple lands. Tillage was the cultural practice followed here. As in the tillage-sod experiments, it consisted of tillage to late July, and then the planting of a non-leguminous cover crop. Four fertilizer compositions were tested against untreated trees, as follows: stable manure; acid phosphate; acid phosphate combined with muriate of potash; and acid phosphate and muriate of potash combined with nitrate of soda and dried blood. The fertilizers were first applied in 1899, and thereafter annually through 1923. Upon the termination of the study that year, Hedrick and H. B. Tukey concluded: “The practical outcome of the fertilizer test is that in the average western New York orchard that is well cultivated, properly drained, and sufficiently supplied with organic matter and humus by means of cover crops, commercial fertilizers are not needed.” The authors did concede that “in sod orchards it has been shown repeatedly that nitrogen carrying fertilizers are beneficial, and that the results are measurable in hundreds of per cent instead of in tenths of one per cent. ... The point is that in this orchard, which is representative of dozens of others in western New York, the application of commercial fertilizers has been a waste of both time and money.”<sup>15</sup> This rather casual observation is noteworthy,

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for except for the use of an herbicide to control vegetation under trees, it essentially fits the apple orchard floor management practice commonly followed today (1980s -1990s).

According to Heinicke, there was “a friendly controversy between the pomology staffs at Cornell and Geneva.” Experiments at Ithaca conducted by Chandler in collaboration with the Department of Soils, demonstrated that the optimum practice was to use sod culture with supplemental nitrogen fertilization. “That research provided the scientific information which was the basis for changing the prevailing practices of orchard soil management in New York and throughout the country.”<sup>16</sup> Apparently and strangely, Hedrick and associates had not evaluated this combination. Nor, did they recognize that the sod/fertilizer practice was more compatible with growers’ overall orchard management systems.

Although varieties of the various fruits had been planted on the Station’s property annually since 1883, it was not until about 1887 that a breeding program was included in this effort. It consisted initially of the planting of open pollinated seeds and then maintaining the resultant seedlings to their fruiting. The first controlled apple crosses were made in 1898. Of particular interest was the cross made that year of the Ben Davis and McIntosh varieties. Out of a population of 11 seedlings, one was selected in 1911 and named by Richard Wellington. The name given it was Cortland. Trees of this cultivar were first made available to fruit growers in 1915. As of 1990, it was the most important cultivar, commercially, of all those introduced by the Geneva Station.<sup>17</sup>

Hedrick was very enthusiastic about the fruit breeding program and encouraged his staff to participate. In fact, he became overly enthusiastic. “He fell into the very tantalizing trap of naming varieties before they had been fully tested. He introduced 12 new varieties of apples in 1914 and in 1915 an additional six new apples. Today, our standards of evaluation before introduction are much more stringent.”<sup>18</sup> None of these 18 introductions became commercial varieties. Hedrick’s naming of new varieties occurred prior to the establishment of the Fruit Testing Association, which provided greater opportunities for evaluations prior to naming and introductions.

In spite of Hedrick’s previously mentioned limitations as a practical scientist, he was a very effective spokesman for the fruit industry and was very popular with fruit growers. He assisted in the unification of the New York State Fruit Growers Association



*Richard Wellington collecting apple buds for making crosses to produce new and improved fruit trees.*

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and the Western New York Horticultural Societies into the New York State Horticultural Society in 1919 and was elected its first president. As reported in Chapter VII, even in later years when Hedrick was director and in very poor health, fruit growers were concerned with his lack of leadership but would not criticize or make any move to have him replaced. In spite of Hedrick's limitations in applied research that we have noted, he deserves the following accolade of his associates: "His colleagues at Geneva and Ithaca and throughout the nation will remember and honor him as a distinguished scientist, scholar, historian, and gracious gentleman."<sup>19</sup>

Richard Wellington was appointed Assistant Horticulturist in 1906 at the age of 22 following receipt of his B.S. degree from Massachusetts Agricultural College. It was the beginning of a long and distinguished career at the Station<sup>20</sup> until his retirement in 1953. He earned his master's degree in genetics at the Bussey Institute of Harvard University in 1911.

At Geneva, Wellington did fruit breeding on all fruits but concentrated on grapes. As noted earlier, he had the distinction of introducing the Cortland apple in 1915, a cross of Ben Davis and McIntosh made in 1898. It increased in importance over the years and by 1965 was the third most important apple in New York State.<sup>21</sup> When Hedrick was appointed director in 1928, Wellington was promoted to Professor and made Head of the Division of Pomology.

In 1918 a non-profit fruit nursery organization was established for the purpose of introducing new fruits deemed worthy of trial by the Geneva Station. The name given it was the New York State Fruit Testing Cooperative Association (FTA).<sup>22</sup> This venture proved highly successful for many years in providing new varieties to its members, to growers, and to nurseries for further evaluations. It continued operation through the 1980s, but was becoming a burden to the Station in the early 1990s and was closed in 1995.

Richard Wellington was a fruit breeder in the old tradition, but he had a good background in genetics and a very detailed knowledge of varieties and a keen sense of the inheritance of good qualities of fruits and vegetables that were useful in breeding quality plants. In his years at Minnesota, he was the first to demonstrate the hybrid vigor and increased yields obtained by crossing tomatoes. He also originated several varieties of hot-house lemons. At Geneva, he was instrumental in the develop-

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ment of 21 apple varieties including Macoun, Lodi, Early McIntosh, and Kendall; Gorham pear; two red and one black raspberries; the Stanley prune; and 13 grape varieties, including Buffalo, Steuben, and Keuka.

Professor Wellington gained wide recognition in his field. He was a fellow of the American Association for the Advancement of Science. He was elected to Sigma Xi and Kappa Sigma. The Massachusetts Horticultural Society honored him in 1937 with the Society's gold medal and again in 1949 with the coveted Jackson Dawson Medal for outstanding fruit hybridization. His most prestigious honors were the Wilder Medals given to individuals and organizations that have rendered outstanding service to pomology. A Wilder Medal was awarded to the Station in 1947, another to Richard Wellington personally in 1954, and to the New York State Fruit Testing Association in 1959. Professor Wellington was considered to be one of the most outstanding of the Station's fruit breeders that brought worldwide recognition to Geneva for its contributions to fruit breeding and culture.<sup>23</sup>

Other new horticulturists who joined the staff for significant periods during Hedrick's term as division head from 1905 to 1929 were: George Howe, 1910-1955; Fred E. Gladwin, 1913-1940 (superintendent Fredonia Vineyard Laboratory); James Harlan, 1918-1954 (high nicotine tobacco for insecticides, hop varieties and culture); Harold B. Tukey, 1920-1940 (rootstocks, president of American Society for Horticultural Science); and George Slate, 1922-1969.

Professor Tukey joined the staff in 1920 in charge of the horticultural research program in the Hudson Valley until 1924 when he was transferred to Geneva with responsibility for the fruit rootstock research program. He was promoted to Chief in Research (later designated Professor). Geneva pomologists were among the first to conduct rootstock research in the United States and were instrumental in convincing apple growers generally to adopt size-controlling rootstocks by the 1980s.<sup>24</sup> As noted in Chapter VII, Tukey promoted unsuccessfully the establishment of a new department of rootstock research. His ambition for an administrative position was satisfied eventually in 1945 when he accepted the position as Head of the Department of Horticulture at Michigan State University.

The sixth of the Geneva Station's famed fruit books, *The Pears of New York*, was available for distribution in 1923. The seventh volume, *The Small Fruits of New York*, was issued in 1926. The

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*The Hudson Valley Laboratory at Highland, NY.*



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Division's fruit-breeding program also continued to grow. From 1905 to 1927, about 75,000 seedlings of various fruits were produced, and out of these, 85 varieties were found good enough to name. These new varieties were made available to commercial and amateur fruit growers through the New York State Fruit Testing Cooperative Association.

A major new research program on problems of canning crops was initiated as a result of the passage of the Canning Crops bill in 1925. It was assigned to the Division of Horticulture. C. B. Sayre was added to the staff and placed in charge of this new program. One of the earlier actions taken was to rent a 60-acre tract of land near Geneva for conducting work on vegetable-canning crops. Two combination fertilizer-rotation experiments were started in 1927. One involved a five-year rotation of tomatoes, stringless beans, beets, wheat, and clover in comparison with the continuous plantings of tomatoes. The second test was a four-year rotation program using sweet corn, cabbage, peas, and clover compared to the continuous planting of peas. Twenty-one different fertilizer treatments were applied to each of these crops. Other studies on tomatoes included variety testing and improvements achieved through selection and breeding. On peas and sweet corn, comparisons were made on the relation of seed size to yield, quality, and uniformity of the crop. Considerable attention was also given to testing of the commercial seed peas being offered to the state's canning industry. About 200 strains of peas were critically examined each year. These efforts produced some very important practical findings that improved vegetable production in New York and other states. Further information is found in chapter XVI (Seeds and Vegetable Sciences).

The State Legislature of 1925 passed a bill authorizing the preparation of a series of monographs on vegetables comparable to those published by the Station on hardy fruits. Inasmuch as the vegetable research was still part of the Horticultural Division, this new obligation fell to that group. Varietal studies with several

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vegetables had been under way for many years. Hedrick was still head of the Division and took the leadership role in this new endeavor until the last book of the fruit series was published several years later after a new vegetable division had been established with Sayre as head. There had been much discontent among the vegetable workers when Hedrick took credit for the vegetable books. Professor Sayre made it clear that this would change for the next series. "After that we had no more appropriations for the *Vegetables of New York*."<sup>25</sup>

Hedrick was appointed Director of the Station in 1928 following Director Morrison's transfer to Ithaca. As noted in Chapter VII, Director Hedrick engineered several changes in the Station's organization. In 1930, the Board of Trustees granted authority to sub-divide the Horticultural Division into the Division of Pomology and the Division of Vegetable Crops. Richard Wellington, Chief in Research (Horticulture) was made Chief in Charge of Pomology and Charles B. Sayre, Chief in Research (Vegetable Crops) was made Chief in Charge of Vegetable Crops.<sup>26</sup> Further activities in vegetable research are found in Chapter XVI.

Fertilizer experiments were conducted on grapes at Fredonia and on grapes, apples, and cherries in the Hudson Valley area. These studies were conducted by local Fredonia and Hudson Valley personnel, often under guidance or collaboration with Geneva Staff. It was quite evident in all of these tests that nitrogen was the primary fertilizer need of these fruits. From 1912 to 1927, pruning experiments had been conducted on tree fruits and grapes. The studies included comparisons of heavy and light pruning, summer and winter pruning, and low and high heading of the trees. For 15 years, comparative studies had been made of budding and grafting of apple trees. As in past years, it was found that both methods gave about equal results. A second propagation experiment was concerned with top-working several standard apple varieties on young Northern Spy trees and on French crabapple. Now in its 15th year, the study showed better results were being obtained with the latter stock. In a third propagation experiment, buds were obtained from the highest- and lowest-producing Rome apple trees. Those derived from the highest yielders gave better yields, but only slightly better. The Station had for many years carried out studies to determine the value of various stocks for grapes, apple, plum, and cherry. It was concluded that of the two stocks used for cherries, Mahaleb and Mazzard, the latter clearly was the preferred one to use, both for sweet and for tart cherries.

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As noted in Chapter VIII, the Station prospered during the 1930s in spite of the Great Depression, due in part to the close relationships Director Hedrick had with the administration in Albany. The research programs in the new Division of Pomology prospered and expanded. The following lines of research evolved: hop investigations, tree fruit breeding<sup>27</sup>, tree fruit nutrition and culture, rootstock breeding and culture, grape breeding and culture, small fruit breeding and culture, cytology/cytogenetics, and the Fruit Testing Association.

During the 1928 to 1982 period, many of the staff were specialists in one area of research but also conducted some research in one or more other specialties. Older staff members, such as Wellington, were involved in several areas.

The State Legislature, in 1935, appropriated \$5,000 to provide research assistance for a renewed agricultural venture—hop culture, which was developing after the repeal of prohibition. In 1932, there were only six hop growers in the state and the collective plantings occupied only 27 acres. But strong demand had developed for New York-grown hops and, by 1937, the foregoing numbers had increased to 65 growers and 220 acres. The very important hop disease problems were assigned to the Botany Division (see Chapter XIII). The responsibility for research on hop varieties and culture fell to the then Division of Pomology, specifically James D. Harlan.

The hops program goals were to: (1) ascertain the extent of hop culture in New York state, (2) establish an experimental hop yard in the Waterville hop-growing area where the more promising and desirable varieties could be propagated, (3) collect, evaluate, and propagate hops from world-wide sources, and (4) devise new methods to propagate native stocks using green wood cuttings to aid in quickly disseminating desirable materials.<sup>28</sup>

The Station established a two-acre experimental hop yard in Waterville, Madison County, where most of the state's hops were being grown. A permanent trellis was installed, which enabled efficient spraying practices and cultural modifications and the propagation of desirable stocks for commercial planting throughout the state. It was used also for both horticultural and disease control investigations.<sup>29</sup>

Even though considerable progress was made in both the cultural and pest control aspects of hop culture in New York, it became evident that there were serious problems in both these areas

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associated with the climate that made production here both erratic and relatively expensive. Production eventually became centered in western states, especially Oregon. Even though the hop investigation project was listed in the Station Annual Reports until 1952, little or no research was done in the preceding five years.<sup>30</sup>

As noted earlier, tree fruit breeding at Geneva was strongly encouraged administratively by Hedrick and Wellington. A series of tree fruit breeders made an impressive record of success from the 1930s through the 1980s. We present here those that did this work along with some examples of their successes.

Associate Professor George H. Howe contributed mainly by describing fruit varieties and seedlings from 1910 to 1955.<sup>31</sup> Olav Einset was an Associate in Research in the Division from 1924 to 1939. He conducted research to determine cross- and self-incompatibilities in fruit varieties. As reported in Chapter VIII, he was on leave in his native Norway when Station funds were scarce, and he was summarily told not to return because his position had been discontinued. He was the father of Professor John Einset who became a member and, later, Head of the Pomology Department.

Associate Professor George D. Oberle was a fruit breeder at Geneva from 1938 to 1948. He resigned to accept a position as horticulturist at Virginia Polytechnic Institute in 1948 Virginia. More appears elsewhere in this book about his accomplishments.

Robert C. Lamb conducted tree fruit breeding research during his tenure at Geneva from 1948 to 1988. He collaborated with plant pathologist Herb Aldwinkle to incorporate plant pathogen resistance into fruit trees.<sup>32</sup> They co-authored 14 scientific publications on their work from 1976 to 1985. This research appears to have been the earliest major effort to incorporate disease resistance into apples. The two resistant varieties that were named and released, Liberty and Freedom, have been accepted for home gardens and commercially for organic and sustainable production. They do not have all the qualities required for the regular fresh fruit and processing markets. No doubt, however, this project was a major step toward eventually finding a successful combination of commercial qualities and disease resistance. Lamb also conducted preliminary research with an entomology graduate student, Marvin Harris, on crosses of an oriental pear (resistant to pear psylla) with susceptible European commercial varieties. Harris' 177 page thesis, *Host Resistance to the Pear Psylla*



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*in New York*.<sup>33</sup> provided the basis for further research to successfully develop horticulturally marketable pears with psylla resistance. In the early 1980s, Lamb collaborated with Fiori (Department of Entomology and ARS., SEA, USDA) to develop histological methods for determining seedling resistance to pear psylla.<sup>34</sup> Lamb's psylla resistant germplasm has subsequently been used by the U. S. Department of Agriculture's pear breeding team at Kearneysville, West Virginia. Lamb retired in 1988. He was well known as a successful and innovative breeder. He served as president of the American Pomological Society, 1981-1982, and was awarded the Wilder Medal from that Society.

Leo Klein was appointed Research Associate in the Department of Pomology in 1949 to take over the apple breeding program following Oberle's resignation. He made "great progress" until 1962 when he died suddenly of a heart attack in his gladiolus garden at home. Klein had earned a Masters degree at Cornell. His thesis, *The Inheritance of Certain Fruit Characters in the Apple*, was published in 1958.<sup>35</sup>

Kenneth W. Hanson was appointed Assistant Professor April 1, 1954 to conduct breeding research on peaches and apples. He resigned in 1960 to accept a position as Director of the Missouri Mountain Grove Fruit Experiment Station.

The appointment of Roger D. Way to the Geneva faculty as Assistant Professor in 1953 in the Department of Pomology was the beginning of a very successful career in fruit breeding. His early work was with cherries. After Klein's death in 1962, he assumed responsibility for the apple breeding program. The Head of the Pomology Department, John Einset, provided funds and labor to expand the program. By 1976, there were more than 25 miles of rows of apple seedlings at three-foot spacing (approximately 40,000 trees) on 100 acres.<sup>36</sup> Way introduced 10 new varieties of apple before his retirement in 1983. These were: Niagara, Wayne, Spigold, Empire, Jonagold, Spijon, Jonamac, Burgundy, Geneva Early, and Early Cortland.<sup>37</sup> Of these, Empire proved to be the most successful. It was planted widely in New York State and was the third most important variety by the 1990s. It has also been planted extensively in other apple growing areas. The Jonagold was well received as a fresh market and processing variety. It has become the major variety in Europe because of its superior quality. Way published a Station bulletin in which he described the 52 apple varieties which the Station had introduced from 1914 to 1968.<sup>38</sup> Way was careful not to "fall in the trap" of being "overly enthusiastic" until all the needed evaluations had

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been completed on new selections. "Today in 1984, our standards of evaluation before introduction are much more stringent."<sup>39</sup> Way was also a historian for his department. The manuscript, *A History of Pomology and Viticulture at Geneva*, by Roger D. Way, has not been published, but a copy can be found in the New York State Agricultural Experiment Station main library in Jordan Hall. The American Pomological Society awarded Way its Wilder Medal in 1982.

Professor Reginald C. Collison joined the staff of the Division of Horticulture when the Division of Agronomy was discontinued in 1929 and became a member of the Division of Pomology when it was established a year later. He had been working at the Station since 1912 as a chemist conducting research on soils. From 1943 until retirement in August 1945, he was Professor of Pomology. He conducted research on several projects including the preparation of artificial manure from straw. His major early projects involved lysimeter research; the fertilization and nutrition of tree and small fruits and grapevines; and soil management of fruit plantings with emphasis on control of erosion by cover crops, sods, and mulches. His research findings were influential in determining soil management and fertilization practices in New York's plantings of tree and small fruits. Professor Collison was recognized for his awareness and use of emerging technologies such as Russian lysimeters beneath apple trees, use of randomized blocks and analysis of variance in 1927, and tree injections to study tree fertilization in 1929.

Following retirement in 1945, Collison and his wife moved to Geyserville, California, where he trained for lay missionary work. They traveled extensively, primarily in Africa, for three decades of missionary work. Professor Collison died June 25, 1983 after a life span of 99 years.<sup>40</sup>

Associate Professor Lester C. Anderson conducted fruit variety testing, orchard fertilizer, and culture experiments during his tenure from 1927-54.<sup>41</sup> He was located at Claverack, NY, and conducted his research in the Hudson Valley. He published three papers in 1953 on the value and use of fertilizers in several methods of soil management of peaches, plums, and small fruits in the Hudson Valley.<sup>42</sup> Indirectly, Professor Anderson was responsible for the original crosses that resulted in the Empire apple.<sup>43</sup> Further information is provided in the account of the Hudson Valley Branch Station.

Associate Professor Otis F. Curtis Jr., Ph.D., was a member of the Department of Pomology from 1946 to 1980. He conducted

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research on the proper use of herbicides in fruit plantings. He also collaborated with P. J. Chapman and S. E. Lienk on a detailed study of the impact of mite feeding on apple foliage on the quantity and quality of the fruit. This collaboration resulted in the first quantitative data on this question.<sup>44</sup> He also collaborated with E. H. Glass, M. Szkolnik, and J. M. Hamilton on a five-year field experiment to determine the possible impact of insecticide-fungicide combinations used to control apple insect and mite pests on apple productivity and quality. The results were reported in three papers from 1955 to 1957.<sup>45</sup> Curtis' research provided a number of significant practical benefits for fruit growers. He retired in 1980 and died in 1988.

Professor John C. Cain, Ph.D. was a member of the Pomology staff from 1946 through 1973. He investigated mechanical pruning and harvesting of fruit trees as well as tree and orchard designs. He also researched fruit plant nutrition. Cain and his graduate student, B. G. Chan, published a seminal paper on the effect of seed formation on the subsequent flowering of apple. They determined that it is the seeds, not the fruits, that inhibit flower initiation on apple spurs.<sup>46</sup> Cain was one of the pioneers in elucidating the role of localized requirements for sunlight exposure in tree canopies. This laid a foundation for later modern orchard systems development. Cain was recognized by his peers when he was elected to a term as president of the Northeast Branch of the American Society for Horticultural Science. He retired in 1973.

Chester G. Forshey was appointed Assistant Professor in 1954 to Professor Anderson's position in the Hudson Valley. Unlike Anderson, he joined the entomology-plant pathology group at Poughkeepsie and conducted most of his field research in commercial fruit growers' orchards. Forshey's emphasis was on pruning, crop control by thinning, and regulation of tree growth by growth regulating chemicals. Over his more than 36 years of service to growers, he made many valuable contributions, especially in solving practical problems, for which growers were very appreciative.

Alan N. Lakso, a plant physiologist from the University of California, Davis, was appointed in 1973 to replace Cain and to research the physiology of tree fruits and the mechanical harvesting of apples. He studied the relationships of tree training systems on water relations, light utilization, and photosynthesis rates in apple leaves. In collaboration with Ithaca agricultural engineers at Cornell, he studied the efficiency of mechanical

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harvesting of apples from various tree training systems. The studies of tree physiology later led to improved understanding of the bases of productivity of apple orchards and to the development of the “palmette leader” tree form that has been useful to the New York fruit farmers.

Professor Lakso has been active in national and international scientific organizations and meetings. The American Society for Horticultural Science awarded him (with F. S. Davies) the J. H. Gourley award in Pomology in 1980. The same year he was given the Senior Research Fellowship, Agricultural University, Wageningen, The Netherlands.

Hedrick published Station Bulletin 406 in 1915 reporting many years of work on rootstocks, which his staff had done. Hedrick was aware of the limitations of the experimental testing and was pessimistic about their practical value in commercial orchards. He wrote “The test has not been such that a safe conclusion can be drawn as to which stock makes the most productive orchard.”<sup>47</sup> In spite of the lack of success in these early experiments, Hedrick encouraged and supported his staff to conduct additional research on dwarfing rootstocks while he was Division head and Director. As a result of these efforts, Professor Way was able to write: “Beginning about 1915, Geneva Pomology was one of the first to do rootstock research in the U. S. and we have been a leader in rootstock research ever since. By 1984, much of the U. S. apple industry had shifted to using size-controlling rootstocks. The techniques for using these stocks were first formulated in our Pomology research.”<sup>48</sup>

Harold B. Tukey was hired in 1920 to conduct fruit research in the Hudson Valley. He was transferred to Geneva in 1927 to take charge of the rootstock research. Tukey was enthusiastic about the potential of dwarfing rootstocks while at Geneva and attempted unsuccessfully to establish a new division for rootstock research. He left the Station in 1945 to be head of the Department of Horticulture at Michigan State. Later, he wrote a book on the subject, *Dwarfed Fruit Trees*, Macmillan Co. 1964. Way describes it as “the definitive work on the subject.”<sup>49</sup>

Karl D. Brase was born and trained in horticulture in Germany. He was employed as assistant manager of a commercial nursery in Switzerland prior to coming to Geneva in 1928 at the age of 25 as Plant Propagator in Tukey’s program. From 1931 to 1937 he earned his B.S. and M.S. degrees from Cornell. He was a part-time assistant to Tukey during this time. When Tukey left in 1945,

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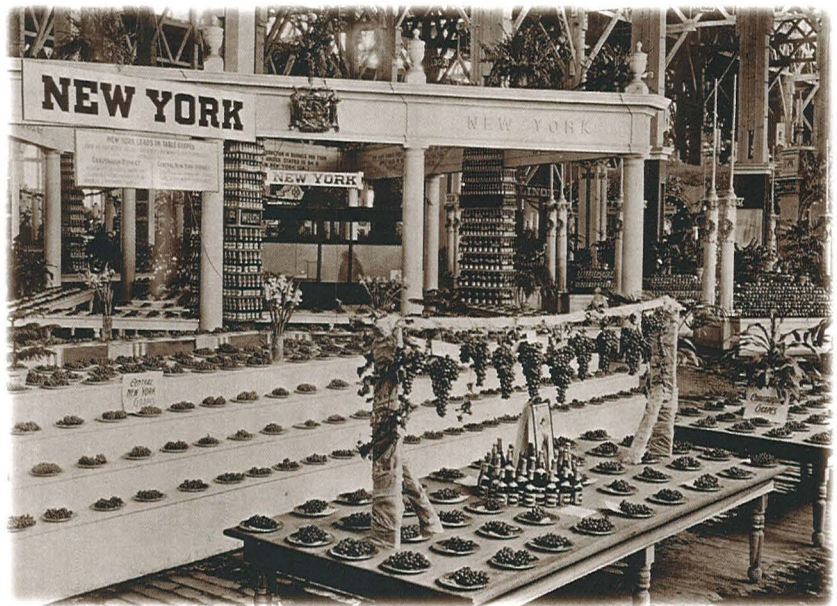
Brase was appointed Research Associate in charge of the rootstock research program. In 1952, he was promoted to Assistant Professor and in 1955 to Associate Professor. He died in 1966 at the age of 63.

Professor Brase's major research was on scion-rootstock relationships in tree fruits. He was one of the first in America to work with the Malling stocks. He also conducted extensive research on the vegetative and seed propagation of rootstocks. He became interested in fruit tree viruses and cooperated for more than a decade with Geneva and Ithaca plant pathologists on research in this field. He was one of the pioneers in his field of interest and lectured frequently at fruit grower meetings throughout the United States. He initiated orchard testing of variety and rootstock combinations and cooperated with grower evaluations.<sup>50</sup>

In 1967, James N. Cummins was appointed Professor of Pomology to replace Professor Brase and continued the long standing Station rootstock research program. He was 42 years old, with training in chemistry, horticulture (including one year at Cornell studying pomology), a Masters from Wisconsin and a Doctorate from Southern Illinois, both in Botany. He elected not to continue a strong rootstock technique program but rather to develop a rootstock development program. He judged that the Malling clonal rootstocks that were being used at that time were not suitable for New York soils and climate. In order to select adapted rootstock material resistant to diseases, pine voles, late freezes, etc., he collaborated with {among others}: plant pathologists Aldwinkle, Gilmer, and Gonsalves; horticulturists Forsline, Brown, and Lamb; wildlife expert R. E. Byers; and others. Later, two patents were issued (1984 and 1994) and three applications were submitted (1995 to 1998). Professor Cummins' research activities at Geneva included: nursery production of fruit trees and tree fruit rootstocks; interactions of fruit trees with viruses; breeding, genetics, and evaluation of fruit tree rootstocks; adaptation of temperate zone fruit crops to subtropical conditions; aseptic culture of *Malus*; evaluation of transgenic apples; and stabilization of chimeras. When Professor Cummins retired in 1993, he was awarded the American Pomological Society Wilder Medal in 1994 and the Outstanding Research Award from the International Dwarf Fruit Tree Association.

A branch station was established in Fredonia in the heart of the western New York grape growing region in 1909 to provide a base for Station research on this crop. Fred E. Gladwin, B. S., was employed as the first viticulturist at Fredonia to conduct research

*Copy of a photo from D. M. Dunnings showing the Grapes of New York Exhibit at the 1951 St. Louis World Fair.*



on grapes. He lived in Fredonia and was Superintendent of the branch station. He made frequent trips to Geneva for consultation with administration and scientific staff.<sup>51</sup> He conducted field experiments/demonstrations on grape culture including pruning, fertilizers and harvesting practices. He bred several new varieties, notably the Fredonia grape. He retired 28 years later in 1940.

Thais A. Merrill was hired as a research associate in 1941 to replace Gladwin. He stayed only two years before leaving for Washington State to work on apples. After that, non-professionals were appointed supervisors of the Station. Frederick Taschenberg, an entomologist, was stationed there from 1940 until his retirement in 1983. He provided assistance in management of the Station but his main thrust was research on grape pest biology and control and was responsible to the Department of Entomology.

John Einset was the son of Olav Einset, who had been summarily notified that his position at Geneva was discontinued in 1939 when he was on leave in Norway. John graduated from Cornell with a bachelor's degree in 1938 and earned his Doctor of Philosophy degree in 1942 in the field of cytogenetics at Cornell. He was appointed Assistant Professor in the Station's Department of Pomology in 1942, where he worked until his retirement as Professor Emeritus of Pomology and Viticulture in 1973. "Professor Einset was one of the outstanding fruit cytogeneticists and fruit breeders of the world."<sup>52</sup> He was a successful breeder of



*John Einset, noted fruit breeder, especially of grapes and apples.*

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new varieties of grapes and apples. In 1972, he and Willard Robinson introduced the successful Cayuga White, the first station grape bred exclusively for the wine market. He also cooperated in introducing six new apple varieties including Empire and Spigon. The Spigold variety, a triploid, resulted from his cytological studies.

In addition to his contributions in cytology and fruit breeding, he was also a very able administrator of the Department of Pomology from 1953 to 1971. His broad background in basic and applied research enabled him to provide strong leadership in all phases of the department's research program. Also, he was a strong supporter of the New York State Fruit Testing Cooperative Association. Further details of his research contributions in cytology are found later in this chapter.

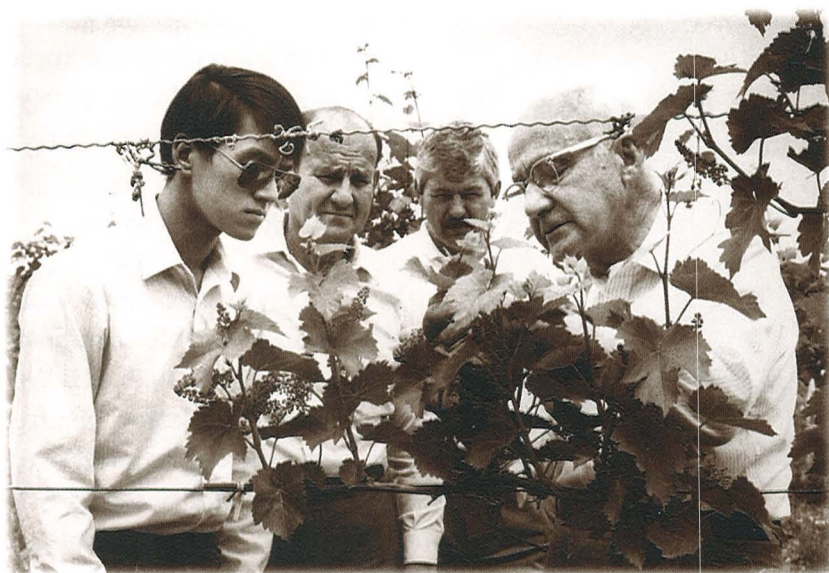
Keith H. Kimball, M. S., was appointed Research Associate in Pomology 1950. He conducted research on grape culture and breeding from 1950 to 1957 and from 1966 to 1982. Also appointed in 1950 as a Research Associate in Pomology was John Watson, M.S. In addition to contributing to the grape breeding program, he conducted the plum breeding program of the Station for many years. This research led to the introduction of two new excellent plum varieties.

Nelson J. Shaulis was appointed Assistant Professor in viticulture in 1944. As reported in Chapter IX, he elected to work out of Geneva rather than Fredonia. He made an agreement with Director Heinicke (who had been on his graduate school faculty committee) that the Director would spend one day each season with Shaulis in Fredonia reviewing his research projects, and that he would wear his "scientist's hat," not his director's. Heinicke lived up to his agreement through the end of his directorship.<sup>53</sup>

The years of Shaulis' research at Geneva from 1944 to 1979 were critical for the New York grape and wine industry. It was a time when competition was expanding rapidly in neighboring states and particularly in California, Washington, and Oregon. Additionally, wines were being imported from Europe and South America. New York wine growers were desperate for increased and less expensive production practices and improved and more productive wine grapes adapted to New York conditions. Shaulis, with his analytical mind and ability to work effectively with others, was a leader in the efforts to find solutions. For the Concord juice grape industry, New York's high production costs were judged to be the major problem. At that time average production

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*Nelson Shaulis (far right) showing grapevine examination techniques to colleagues—student, industry, and faculty.*



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in the State was 1.5 tons per acre. The factors limiting production were identified as: variety, site (soil and low winter temperatures), vine management, pruning and harvesting methods, and soil nutrition.

Shaulis took leadership in addressing these problems. He collaborated with Professor Bernard Dethier and his associates at Ithaca in defining geographical areas where extremely low winter temperatures kill buds and grapes should not be grown. He initiated studies to determine nutritional requirements for increased productivity in various soil types. In collaboration with Professor Alan Lakso, he studied grape physiology. They found that productivity could be increased by raising the height of the trellises from five to six feet to increase the amount of foliage and fruit yield per vine. Shaulis also developed the “double curtain canopy,” which enabled mechanical pruning and harvesting at significant savings of time and money. In collaboration with Ithaca engineers Professors E. S. Shepardson and John Pollock and Geneva food scientist James Moyer, machinery and methods for mechanical grape harvesting were developed.<sup>54</sup> As the result of the application of the new knowledge and improved new technologies, the average yield of grapes in the state increased from 1 1/2 to 4 1/2 tons per acre by 1965.<sup>55</sup> On the occasion of Shaulis’ retirement in 1979, a Nelson J. Shaulis Fund for the Advancement of Viticulture was established in his honor to ensure continuation of his work.<sup>56</sup>

Robert M. Pool was hired to continue John Einset’s research program on grape breeding when Einset retired in 1974. Pool earned both his B.S. in Enology in 1962 and his M.S. in Food



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*The mechanical harvester for grapes developed cooperatively by Geneva scientists and scientists in engineering on the Ithaca campus.*



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Science in 1969 at the University of California. During this time he was Staff Research Associate. He then transferred to Cornell for his Ph.D. studies in Pomology which he completed in 1973. Six years later (1979) when Shaulis retired, Pool relinquished his responsibility for grape breeding and assumed responsibility for the grape cultural program.

Pool's seven years of grape breeding research occurred during a time when there was stagnation in the growth of sales of wines made from traditional native American wine varieties. Through the efforts of Pool and his predecessors, the utility of the French hybrid grape cultivars had been identified, and three out of the top 10 grape varieties grown in New York State by 1977 were French hybrid grapes. These greatly improved the marketing flexibility of the state's wine industry.

The only white wine grape released by the Station prior to 1977 was Cayuga White. It had been planted widely, and in 1977, a commercial varietal Cayuga White wine was made for the first time. It proved to be popular and soon sold out, even though priced higher than other wines.<sup>57</sup> In 1977, the Station introduced two seedless grapes, Candice and Glenora. These were the first cultivars that were winter hardy in all viticultural areas of the state.<sup>58</sup>

As noted earlier, during the 15-year period prior to the cut off date for this history (1982), great progress had been made in grape culture in New York State under Shaulis' leadership. Further refinements and new technologies were made in the years after his retirement by Pool. The latter's primary interests included mecha-

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nization of pruning, crop level related to grape and wine quality, sustainability, vineyard floor management and weed control, cultural practices, and rootstock effects on cold hardiness and vine productivity. He conducted research on the application of similar techniques to French-American varieties during this period.<sup>59</sup> Pool's research was a major factor in maintaining the competitiveness of the New York grape industry.

Bruce I. Reisch was appointed Assistant Professor at the Station in 1980 with responsibilities for research on grape breeding and genetic improvement. Reisch did his undergraduate studies at Cornell University with a major in horticulture and plant breeding. His M.S. and Ph.D. degrees were in plant breeding and genetics at the University of Wisconsin-Madison. While the two years from 1980 to 1982 (end of this history account), are too brief to evaluate his contributions, we can note that Reisch has developed a very successful genetic engineering research program using traditional methods and the novel particle (gene) gun transformation of embryonic tissue cultures and genetic mapping. He has worked with both table and wine grapes.

The Station conducted some small fruit breeding research during its earliest years as part of its overall fruit program. It was not until Professor George Slate came to the Station in 1920 and initiated a program in this field that a major research program was in place. Slate held this position for 48 years until his retirement in 1969. He was the longest tenured professor during the first 100 years of the Station's existence.<sup>60</sup>

Professor Slate, as Richard Wellington had done earlier, graduated from the Massachusetts Agricultural College (1921) and received his master's degree from Harvard University (Bussey Institute) in 1926. Throughout his long career at the Station, he was responsible for the Station's outstanding program of small fruit breeding. Out of the more than a quarter-million small fruit seedlings he raised and evaluated, 41 were named and introduced into commercial production. Some became important varieties in New York and other eastern states.<sup>61</sup> Slate was an active participant in Cornell's extension teaching programs and New York fruit grower meetings. He was involved in evaluations of the techniques and the progeny of fruit breeding. He was articulate and respected for his competence by scientists, farmers and the lay public.

Slate was a prolific writer with over 600 publications. These included many technical articles on plant breeding and genetics

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published in scientific journals and yearbooks of plant societies. He was also well known for his farm and garden articles in such publications as the *Boston Sunday Herald*, *Better Homes and Gardens*, *The New York Times*, and the *Reader's Digest Book of the Garden*.

Slate was a member of a number of professional societies, including the American Society for Horticultural Science, Northern Nut Growers Association (secretary 1943-1945, president 1954-1955), North American Lily Society, honorary member of the Massachusetts Horticultural Society, and corresponding member of the Lily Committee of the Royal Horticultural Society (U.K.) from 1948-1967. His awards included the Mackson Dawson Medal from the Massachusetts Horticultural Society, Johnny Appleseed Gold Medal from the Men's Garden Club of America, American Horticultural Society Citation, E. H. Wilson Award from the North American Lily Society, and the Wilder Medal from the American Pomological Society. He served as president of the latter in 1973-1974. After retirement in 1969, Slate was named a fellow of the American Society for Horticultural Science, received the James R. Jewett Prize for research on native American plants from the Arnold Arboretum of Harvard University, and the Merit Award from the Northern Nut Growers Association.<sup>62</sup>

Donald K. Ourecky was appointed Assistant Professor in 1963 in order to learn small fruit breeding from Professor State prior to the latter's impending retirement. Ourecky received his horticultural training at Oregon State and Washington State Universities. He had been a U. S. Department of Agriculture Research Associate at Tifton Georgia for three years prior to coming to Geneva. In addition to his small fruit breeding projects, he conducted research on the histological, cytological, and genetic problems in the breeding of fruit plants. He also collaborated with entomologists G. G. Kennedy and G. A. Schaefer in efforts to develop red raspberries resistant to two important aphid pests. His major contributions were the development and release of seven small fruit varieties for both home garden and commercial production. One of these was Heritage, which is grown throughout the United States and is the leading fall-bearing red raspberry.<sup>63</sup> Ourecky resigned in 1979 to pursue his interest in and his lucrative business in oriental antiques. He was productive during his relatively short stay at the Station.<sup>64</sup>

John C. Sanford was appointed Assistant Professor in 1980 to take over the breeding program of small fruits including strawberries and raspberries. He had a strong background in plant

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*An early version of John Sanford's gene gun used to transfer genes from one plant to another.*



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breeding and plant genetics. The junior author (E. H. Glass) heard Sanford's lecture given when he was on campus as a candidate for the position. His reaction was that Sanford might do some small fruit breeding, but he would also pursue related basic research areas. In fact, Sanford did some excellent breeding and introduced several good varieties, which are providing royalties that support his research program.<sup>65</sup> But, Sanford also was active and successful in developing innovative technologies to genetically engineer improved varieties. While these activities were initiated during the period covered by this history (1882 to 1982), his major invention, the radically new ballistics method of gene transfer ("gene gun") and its major world-wide impacts occurred after 1982.

We reported in Chapter VII that Director Hedrick initiated a research program in cytology in 1930 when he hired Nebel as a horticulturist to conduct research in fruit cytology. Nebel had been conducting research in this field at Geneva the previous year to complete his requirements for a Ph.D. from the University of Halle, Germany. In this chapter, we summarize the results of this innovative program.

The reader may question the rationale for establishing a cytology research program at the Station. Cytology is defined in the *American Heritage Dictionary* as: "The branch of biology that deals with the formation, structure, and function of cells." Perhaps the term "Cytogenetics," defined as: "The branch of biology that deals with heredity and the cellular components, particularly chromosomes, associated with heredity" provides a more accurate description of the nature and purpose of this Geneva program. Its objectives

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were to apply the science of cytology to the Station's breeding programs to aid in the development of new improved varieties of fruits and vegetables.

Bernard R. Nebel, a graduate of the University of Halle in Germany, was appointed Associate in Research in the Pomology Division September 1, 1929. He had "done notable work as a post-graduate student at this institution last year."<sup>66</sup> Over the next 13 years, he conducted cytological research on apples primarily, but also limited experiments with other crops. His research was directed towards a better understanding of chromosomes, their interaction with closely related varieties and ways to improve or design new methods for the Station's crop breeding programs. He also conducted some testing of colchicine to induce genetic changes to produce crops with new desirable characteristics. He resigned July 31, 1942, studied medicine, and became a practicing physician.

John Einset, as reported earlier in this chapter, was appointed Investigator (Pomology) September 1, 1942, to continue the cytological studies on fruits initiated by Nebel but later turned to fruit breeding.<sup>67</sup> When he retired in 1973, "Professor Einset was one of the outstanding fruit cytogeneticists and fruit breeders of the world. His discoveries of cytochimeras in apples, grapes, and other fruits represent a classic contribution to horticultural science."<sup>68</sup>

Charlotte S. Pratt was appointed a laboratory assistant to Einset in 1951. She was promoted to Research Associate (a professional but not a tenured position) in 1958 and to Senior Research Associate in 1976. This new status gave her the privilege of more independent research and publication opportunities as sole or as senior author. She took a writing leave of absence in 1970 to prepare a review on the reproductive morphology and anatomy of grapevines. The review was submitted to the *American Journal of Enology and Viticulture* and finally was published in 1971 after some delay. She submitted a second paper in 1974 on vegetative anatomy. It was quickly accepted and published in a timely manner. It was named the Society's "Outstanding Paper of 1974." She retired in 1981 but continued some professional activities in her department for many years and still (1998) does work as a volunteer in the Station.



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- <sup>2</sup> NYSAES Ann. Rpt. 1882, pp. 120-154.

- <sup>3</sup> NYSAES Ann. Rpt. 1882, p. 8.
- <sup>4</sup> NYSAES Ann. Rpt. 1882, p. 27.
- <sup>5</sup> NYSAES Ann. Rpt. 1882, p. 9.
- <sup>6</sup> Collier became the second Director of the Station in 1887.
- <sup>7</sup> NYSAES Ann. Rpt. 1897, pp. 7-27, 267-269.
- <sup>8</sup> NYSAES Search Agr. Vol. 1, No. 2. Apple Cultivars, pp. 4-5, 15. March, 1971.
- <sup>9</sup> Hedrick's administrative record as director of the Station is found in Chapter VII.
- <sup>10</sup> Joseph Wellington, a younger brother of Richard Wellington, was a horticulturist on the staff from 1914-1919 during the period when Richard was at Minnesota and Maryland.
- <sup>11</sup> Hedrick, U. P. Geneva Sta. Rpt. 1919: Part II, pp. 1-11. "Sturtevant's Notes on Edible Plants".
- <sup>12</sup> NYSAES Bul. 314. 1909, 56 pp.
- <sup>13</sup> NYSAES Ann. Bul. 375. 1914, p. 79.
- <sup>14</sup> NYSAES Ann. Bul. 383. 1914, p. 249-281.
- <sup>15</sup> NYSAES Ann. Bul. 516. 1924, p. 4.
- <sup>16</sup> Heinicke Oral History, 1967, pp. 48-51.
- <sup>17</sup> Fruit Varieties Jour. 33, 91-94, Hort Sci. 15: 454.
- <sup>18</sup> Way R. D. 1986, A History of Pomology and Viticulture at Geneva, NYSAES, Cornell University, Geneva, NY 1986, p. 32. Unpublished. Copy available in NYSAES Library.
- <sup>19</sup> Necrology of the Faculty, Cornell University, 1951-1952, pp. 15-16.
- <sup>20</sup> Except for the years 1914 to 1919 when he held the positions of pomologist at Minnesota and then of professor of vegetable gardening at Maryland in 1919 to 1920. He returned in 1920 as associate horticulturist. During his absence, his younger brother, Joseph was hired as a member of the Division of Horticulture staff from 1914 to 1919. Joseph spent much of this time assisting Hedrick with the editing of *Sturtevant's Notes on Edible Plants*.
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- <sup>22</sup> NYSAES Ann. Rpt. 1918: p. 25.
- <sup>23</sup> Memorial Statements, Cornell University Faculty, 1975-76, Ithaca, New York, pp 39-41.
- <sup>24</sup> Way, R. D., A History of Pomology and Viticulture at Geneva. 1986. p. 35. Unpublished. Copy available in NYSAES Library.
- <sup>25</sup> Sayre Oral History, 1982, p.18.
- <sup>26</sup> NYSAES Ann. Rpt. 1930, pp. 11-12.
- <sup>27</sup> The major responsibility for storage and marketing research on fresh fruit at that time was with the Ithaca Pomology Department.
- <sup>28</sup> NYSAES, 54th Ann. Rpt. 1935, pp. 79-80.
- <sup>29</sup> NYSAES, 55th Ann. Rpt. 1936, pp. 82-84.
- <sup>30</sup> Personal communication, N. J. Shaulis, 10/11/96.
- <sup>31</sup> Way, R. D., A History of Pomology and Viticulture at Geneva. 1986. p. 52. Unpublished. Copy available in NYSAES Library.
- <sup>32</sup> Also see Chapter XIII for additional information on the disease aspects of this collaboration.
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- <sup>39</sup> Way, R. D., A History of Pomology and Viticulture at Geneva. 1986. pp. 32-33. Unpublished. Copy available in NYSAES Library.
- <sup>40</sup> Memorial Statements, Cornell University Faculty, June 25, 1983, Office of the Dean of Faculty, Ithaca, New York, pp. 9-10.
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- <sup>43</sup> Way, R. D., A History of Pomology and Viticulture at Geneva. 1986. pp. 21-22. Unpublished. Copy available in NYSAES Library.
- <sup>44</sup> See Chapter XII for additional information on Curtis' collaboration with entomologists.
- <sup>45</sup> Curtis, O. F. et. al., 1957. NYS Hort. Soc. Proc. 102, pp. 253-258.
- <sup>46</sup> Chan, B. G. and J. C. Cain, 1967. The effect of seed formation on subsequent flowering of apple. Proc. Amer. Soc. Hort. Sci. 91:63-68.
- <sup>47</sup> NYSAES Bul. 406, 1915. U. P. Hedrick, Dwarf Apples, 28 pp.
- <sup>48</sup> Way, R. D., A History of Pomology and Viticulture at Geneva. 1986. p. 35. Unpublished. Copy available in NYSAES Library.
- <sup>49</sup> Way, R. D., A History of Pomology and Viticulture at Geneva. 1986. p. 36. Unpublished. Copy available in NYSAES Library.
- <sup>50</sup> Necrology of the Faculty of Cornell University, 1966-1967, pp. 7-8.
- <sup>51</sup> Way, R. D., A History of Pomology and Viticulture at Geneva. 1986. pp. 19-20. Unpublished. Copy available in NYSAES Library.
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- <sup>54</sup> For further information, see Chapter XIV.
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## Seed and Vegetable Sciences

*“The director of the New York State Agricultural Experiment Station shall examine, analyze, or test, or cause to be examined, analyzed, or tested such samples of seed taken under the provisions of this article as shall be submitted to him for that purpose by the commissioner, and shall report the results of such analysis, examination, or testing to the commissioner. Any citizen of this state shall have the privilege of submitting to the New York State Agricultural Experiment Station samples of seeds for test and analysis.”*

The departments of Seed Investigations and Vegetable Crops were established early but were not combined until April 1, 1974. During this long incubation period from 1882 to 1974, investigators conducted research on seeds or vegetable sciences under their respective department heads. For this reason, we have elected to record their histories separately as Seed Investigations and Crop Research from 1882 to 1974. (See chapter XI for details). The programs during the 1974 to 1982 period were integrated and are summarized together as one department, Seed and Vegetable Sciences.

**Seed Investigations (1882-1974):** From the first year of the Station’s existence, a long list of varieties of vegetable and field crops were evaluated in the field and later in greenhouses and laboratories. These totaled over a thousand for each of the years 1883, 1884, and 1885. Corn was featured in these studies, but more than usual attention was also given to varieties of bean, pea, lettuce, wheat, and potato. Of special interest were the evaluations made of the seeds of these crops. This effort consisted of a determination of their purity, weight, and germination rate. Sturtevant was very concerned about these qualities, especially in seeds sold in stores. In his first Annual Report, he wrote “...our experience with ‘grocery seeds’...has been so extremely unsatisfactory that we are fain to believe that it is only the ignorance of the purchaser that retains this abominable system of sale.”<sup>1</sup>

In spite of the early recognition of this major problem, little was done about it until 1912 when the New York State legislature passed the seed act, which stated: “The director of the New York State Agricultural Experiment Station shall examine, analyze, or test, or cause to be examined, analyzed, or tested such samples of seed taken under the provisions of this article as shall be submitted to him for that purpose by the commissioner, and shall report the results of such analysis, examination, or testing to the com-





*Seed and Botany laboratory in  
Sturtevant Hall.*

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missioner." Further, "Any citizen of this state shall have the privilege of submitting to the New York State Agricultural Experiment Station samples of seeds for test and analysis."<sup>2</sup> In order to fulfill the requirements of this legislation, a seed testing laboratory was established as part of the former Division of Botany. Mancel T. Munn was appointed as Assistant in Research July 1, 1912, and placed in charge of the new program. He was from Michigan State University and was familiar with seed inspection.<sup>3</sup>

Professor Munn successfully directed the seed laboratory until his retirement in 1952. He devised many procedures and techniques for testing seeds in the laboratory, which became routine operations in seed laboratories everywhere. He also pioneered the practice in the United States of making field performance tests an integral part of official seed testing. In 1927, 5,781 samples of seed were inspected. For the first time, 257 samples of vegetable seeds were tested under both laboratory and field conditions. In the latter situation, plants produced from the seed sample were maintained to maturity, thus enabling the inspector to determine if the variety claimed by the supplier was true. This innovation of trueness-to-type testing was of great significance because it recognized the contribution of superior germplasm in improving crop production. Professor Munn was active in several professional societies, including the Association of Official Seed Analysts. He was President in 1920. He attended International

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Seed Congresses in several countries as an official United States delegate and played an important role in formulating regulations governing the movement of seeds in international trade.<sup>4</sup> The seed inspection program proved highly popular with New York farmers and home owners. Some research work was conducted as part of the Station's seed program, and eventually it dominated the effort.

The Division of Botany was composed of a number of research programs other than seed investigations. It included plant pathology, seeds investigations, and cropping systems. In the 1919 Annual Report and in Station Bulletin 466,<sup>5</sup> we learned that Professor Munn had conducted tests at Geneva over the past eight years on the control of dandelions in lawns through the use of iron sulfate sprays. It was found that four or five sprayings starting in May, just ahead of the first appearance of dandelion blossoms, gave good control. Only four sprayings were advised in years having unusually long dry midsummer conditions. Where these sprayings were made every three years, lawns were kept virtually free of dandelions.

The Cornell University Board of Trustees on April 24, 1936, created a new research unit, "Division of Seed Investigations." Professor Munn was appointed division head. In addition to Munn, the new division consisted of pathologist Willard Crosier, Ph.D.; botanist Arthur Shuck, Ph.D.; Mary Woodbridge, M.S.; and Stewart Patrick, B.S. The new division was unique in its organization compared to other divisions within the Station because of the seed law. The purview of this group was to examine seeds of all kinds and sorts, whereas other divisions focused primarily on animal science and horticulture. Benjamin E. Clark succeeded Munn as head of the Department in 1952 when Professor Munn retired. He served as head of the department until he was appointed Assistant Director of the Station in 1969. Professor LeRoy Nittler became Head of the department and served until the Seed and Vegetable Crops departments were merged in 1974.

The future direction of the new Seed Investigation division was defined in the following announcement: "The major part of the work of this Division will be the testing of seeds, altho most important investigations will be carried on the fundamental factors covering the germination of seeds, improvement in seed testing technic, the role of seeds as carriers of disease organisms, and other problems relating to flower and vegetable seeds, lawn grasses, and farm crop seeds in general."<sup>6</sup> This farsighted statement presumably had the blessing of Director Hedrick as well as Professor Munn. It represented the first effort to establish a verti-



*Seedmen reviewing seed trials.*

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cally (multidisciplinary) structured department at the Station. C. E. Heit captured the philosophy of the group when he wrote: "The testing of seed...is a research study of each individual sample tested and not a sprout-counting game...We must consider each figure a published research result...We must be convinced it is an accurate and true appraisal of the planting value of the seed under test."<sup>7</sup>

The record of achievements of the division over the following decades speaks well for the wisdom of this plan. The new division rapidly became a world leader in the emerging field of seed science and technology.

The activities of the Seed Division during World War II were critically important to ensure adequate food supplies for the nation and the war effort. Seed samples from individuals, from state inspectors, and from seed companies were evaluated. Some lots were tested in field trials for performance and trueness-to-type for the indicated variety. Additionally, some lots were tested for seedborne infection by fungi. In 1944, 15,373 samples were submitted and tested. A substantial percentage (14 per cent of some kinds of field, forage, and grain crop seeds) were unfit for planting. Field planting tests of red kidney beans, field and sweet corn, oats, wheat, and potatoes yielded valuable information. The benefits of new varieties of kidney beans were demonstrated. Some late season sweet corn was found to be of limited value because tuber borne diseases caused substantial losses. Examination of germinating seeds in the laboratory demonstrated the problem of pathogens of sprouting pea, barley, celery, and kidney bean seeds. The results were reported both in publications and in direct reports to growers or to state regulators and contributed substantially to the agricultural productivity.

The activities of the Division continued in this 1944 manner over the next 15 years. The popularity of the seed testing services increased from about 15,000 samples in 1944 to over 20,000 in 1950. Over time the focus on single seed mixtures shifted to lots containing more complex mixtures such as turf seeds.

Plant Pathologist Willard Crosier tested and found that a new fungicide, Arasan, was effective in controlling seed-borne diseases and could replace the use of mercury seed treatments. Mercury was in short supply because of the war. He conducted a series of experiments from 1946 to 1948 to determine possible deleterious effects of an insecticidal fumigant on the germinability of many crop seeds treated and not treated with fungicides.<sup>8</sup>



*Benjamin Clark, director of The Seed Laboratory, and later Associate Director of the Station.*

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Claude E. Heit joined the staff in 1941, and by 1944 was designing methods for testing tree, shrub, flower, and other kinds of seeds. He also developed a method to assess the germination potential of dormant apple seeds using the technique of embryo excision.

Benjamin E. Clark was appointed to the faculty of the Division in 1948 and assumed responsibility for practical stand establishment as well as developing new seed testing procedures. He was instrumental in the development of procedures for predicting seed vigor, which provides an index of the planting value of seeds. He continued the tradition of providing substantial services to the seed trade and seed consumers of the State.

LeRoy W. Nittler was appointed in 1953 with responsibility for the ongoing controlled field plantings to assess trueness-to-type and planting value of seeds. Because such field trials were very time consuming and expensive, he developed, over a period of several years, a series of procedures in controlled chambers to evaluate varieties with results comparable to field trials. These efforts relied upon responses to hormones or other growth factors and responses to different forms and composition of nutritional amendments, temperature, and susceptibility to plant pathogens.

By 1960, the Department of Seed Investigations had been instrumental in developing a number of methods of seed testing for a variety of purposes and in the development and promulgation of official, standard methods known to provide reliable methods for specific crops. These official standard methods were published and governed by the Association of Official Seed Analysts of North America and the International Seed Testing association. Station Seed Department scientists were leaders in these organizations and in seed science in general. They had published hundreds of publications in the *Proceedings of the Association of Official Seed Analysts*. Professor Munn was for many years the editor of this publication and played an important part in establishment of regulations governing seed movement in international trade. Earlier, he had served as president. On the occasion of the Association's 50th anniversary in 1958, Clark was president and Clark, Crosier, and Heit presented invitational papers at the official symposium. Over the last three decades, the Division/Department of Seed Investigations had established its leadership role in seed science and technology, as well as having provided substantial service to the seed industry and to New York growers and gardeners.

The retirement of Director Heinicke and the appointment of Barton as Director in 1960 had no immediate impact on the seed investiga-



*Gary Harman, who researched biological control agents for injurious soilborne diseases.*

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tion program and the philosophy that had guided it since the beginning of the Division in 1936. However, under the leadership of Clark and Nittler, the focus began to change. Nittler succeeded Clark as Department Head after Clark was appointed Associate Director of the Station in 1969. In 1966, Anwar Khan was appointed Assistant Professor and assigned to research seed physiology. Khan received his Ph.D. from the University of Chicago and did two years of post-doctoral studies at Michigan State University researching the isolation and characterization of hormones in seeds. At Geneva, he published a series of papers pertaining primarily to the effects of synthetic and natural plant hormones on seed processes. These included the influence of these substances on basic aspects of seed germination such as synthesis of various classes of RNA. In 1971, he published a paper in *Science*<sup>9</sup> that described a model of the interactions of hormones in seed germination. He also developed a method of infusing chemicals into seeds using solvent permeation into dry seeds, which proved a useful technique in seed physiological studies. He also pioneered a method of enhancing seedling establishment under unfavorable field conditions, such as in cold soils.

Khan edited two books on the physiology and biochemistry of seed development, dormancy, and germination.<sup>10</sup> Each chapter was written by specialists in the chapter subject. These books were a major accomplishment and provided current information on all aspects of seed physiology. Subsequently, Khan became a frequent speaker and panelist on this subject at national and international scientific meetings.

Another major change in the Department occurred in 1970 following Crosier's retirement after 43 years service as the Department's seed pathologist. As discussed earlier, Crosier had emphasized and pioneered the field of seed pathology with his work directed toward the activities of the Seed Testing Laboratory and the Association of Official seed analysts. Crosier's successor, Gary Harman, was appointed in 1970. Like Khan, he had a relatively basic job description, i.e., to investigate the physiology of parasitism as it applied to seeds. While a portion of his studies dealt with seedborne pathogens, the majority dealt with more basic aspects. An early study was seed storage and how seeds may be adversely affected by storage fungi or by the effects of aging. His most significant finding was that loss of seed quality was closely paralleled by lipid peroxidation. Another area of Harman's interest was in the complex ecosystem surrounding planted seeds. A variety of seed pests are influenced by microbial interactions. Charles Eckenrode in Entomology and Gary Harman had deter-

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mined that female seed maggots locate planted seed in the soil and oviposit on the soil above them. The larvae emerge and attack the germinating seeds. They determined that this ability of the female insects to find seeds was a response to the rapid proliferation of non-pathogenic bacteria and yeasts that colonize the germinating seeds. The insect detects the volatile metabolites of the microorganisms rather than the seed itself. They also identified microorganisms that effectively colonize seeds and inhibited growth of the stimulatory microorganisms. Treatment of seeds with the inhibitory organisms reduces damage by the maggots and is an example of biological control. The broad area of the ecology of planted seeds and biological control became Harman's primary research interest in later years. He was appointed Chairman of the Department when Vittum retired in 1983.

Clark continued to contribute much research to the Department of Seed Investigations in spite of his administrative assignments. He published more than 100 scientific papers and made contributions in the area of determining seed vigor. He gained an international reputation for administration of the New York State Seed Testing Laboratory. He was involved in many seed organizations and in developing the State Seed Law. Especially noteworthy was his role in the Association of Official Seed Analysts, where he served as editor of its *Proceedings* and also as president, vice president, and chair of many committees. He received the Association's Award of Merit in 1968.

Nittler served the Station for 27 years. His major research efforts were to determine procedures for testing varietal purity of seeds. His methods for separating and identifying varieties of many crop species were well established and could be performed by commercial and public seed testing laboratories.

The Barton years from 1960 to 1982 were a period of solid achievement in the Seed Investigations Department. It was a time of evolution in the seed science group at the Station that was planned and directed largely by Clark, Nittler, and colleagues with encouragement from Director Barton. And, most certainly, Director Sturtevant would have been amazed and pleased with the advances made by the Station in the seed program he initiated in 1882.

**Crop Research (1882-1974):** During the early years of the Station some research programs related to vegetable and field crops were initiated but later were dropped or were delegated to the Ithaca

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Campus prior to 1974. Only brief mention of agronomy, botany and field crops are included in this section of Chapter XVI.

**Agronomy (1911-1928):** In 1911, J. F. Barker, an agronomist, was added to the staff and placed in charge of a soil investigations program. The work conducted in this field was reported under the title of Soil Investigations until 1915 when it was named the Division of Agronomy. Early attention was given to the sources, composition, and use of ground limestone. At this time, New York farmers were interested in starting the culture of alfalfa on their farms but realized satisfactory crops of alfalfa could not be produced on acid soils. In 1914, samples of lime from 35 quarries were analyzed. These results were published and farmers were advised how each product should be used.

The studies were conducted under laboratory, greenhouse, and field conditions, and through the use of lysimeters. In 1915, the field work included: alfalfa culture tests on 18 hilly landsites; fertilizer, cultivation, and cover crop tests in one or two apple, pear, peach, and cherry orchards; fertilizer and deep plowing tests in two vineyards; two tobacco-culture experiments; and one hop culture test. The program carried out over the following five years (1929 - 1934) was essentially the same.

J. F. Barker resigned in 1917 to accept a position at Ohio State University. He was succeeded by R. C. Collison who had joined the Station's staff in 1914. In regard to the two apple orchard tests that were conducted in cooperation with the Division of Horticulture, it was concluded that "on the better fruit soils of New York—commercial fertilizers will not pay financially." The orchard management practice advised was a clean cultivation and the use of cover crops. In general the findings agree with similar tests carried out by the Division of Horticulture. Studies conducted on the fertilization of orchard and vineyards, along with the use of manures, were continued. In 1919, the Division had found that fresh wheat straw, when incorporated in the soil, was toxic to seedling plants. It was further established that "strawy" manures also were toxic.

Studies on tobacco were started by J. F. Barker in 1911. This project was conducted in cooperation with the U. S. Department of Agriculture. Its principal object was to determine whether tobacco could be produced profitably under upstate New York conditions. In 1922, a new tobacco study was started. It was concerned with finding a tobacco with a high nicotine content. A possible use for such a product was suggested from the findings

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of Station entomologists that a finely ground tobacco dust was quite effective in controlling certain sucking- insect pests (See Entomology section). Analyses made of the tobaccos produced in 1922 in the Division's cultural tests gave disappointing results. The nicotine content ranged from only 1.19 to 1.64 per cent. By 1927, however, the Division found it could produce tobaccos having a nicotine content, in the dried leaves, ranging from four to six per cent (Also see Chapter XIX). By 1927, however, entomologists had found that pesticides applied as sprays gave better results against the total disease-insect complex, at least in the case of the tree fruits, than with dusts. Tobacco dusts were to see little use in commercial agriculture.

**Botany (1896-1920):** F. C. Stewart undertook studies in 1915 to determine the proper spacing of potato plants for best results. At that time the common practice was to provide 15 inches in the row between plants and 36 inches between the rows. In 1920, he concluded: "In the production of seed potatoes . . . New York growers may well consider closer planting than 15 x 30 inches, since, thereby the mat yield is likely to be increased and the quality of the crop improved, particularly in rich soils. . . Potatoes grown in rich garden soil, for table use, may be planted as close as 6 by 30 inches."<sup>11</sup> In 1918, Stewart sought an answer to the question of what loss in yield occurs from the loss of a single plant in a row. He found (see Bulletin 409) that the increased yields of the two plants facing the open space made up 46.4 per cent of the loss caused by the missing plant.<sup>12</sup>

**Field Crops (1897-1899), Crop Production (1900-1901):** From its founding in 1897 to at least 1901, Jordan served, in effect, as head of this new department. Over these years, studies were conducted on the production of sugar beets, potatoes, and onions. Apparently, the primary reason for establishing this department was to determine if sugar beets could be grown profitably under New York conditions. Around the turn of the century, a great deal of interest had developed among farmers in central and western New York about sugar beets. Studies conducted by the Station established that in terms of yields and quality New York was fully competitive with all other beet-producing areas in the United States. Profitability was another matter. Most central and western New York growers soon learned it was more profitable to grow cabbage, potatoes, beans, garden vegetables, and even some specialty crops like broom corn, than sugar beets. Growers in some restricted areas continued to grow sugar beets, but by 1907 only one sugar beet factory was still in operation in New York. The last report of the Field



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Crop-Crop Production Department, as such, is found in the 1901 Annual Report.

The formation, separation, combining, and discontinuation of divisions/departments (see Figure in chapter XI) would almost appear to have been at the whims of the directors (at least it first appeared to be so to the junior author). Further study suggests that there was a reason for most decisions. We find that the Vegetable Crops Division was established in 1930 in response to the enactment of an appropriation for research in this area and the continued demand for increased research. Later, we learn that Vegetable Crops and Seed Investigations were combined because of reduced funding and the need to cut back on administrative overhead.<sup>13</sup> Other changes were made to accommodate administrative changes in responsibilities between Geneva and Ithaca. Still other changes were made to accommodate developing scientific technologies, which opened new research opportunities in several research areas. This was particularly true in chemistry, physiology and genetics with the rapid advances in capabilities to investigate new research avenues.

**Vegetable Crops (1928-1942):** It is appropriate to mention here the background developments that led to the establishment of the processing vegetable crops program at Geneva rather than Ithaca. In 1923, a committee of growers and canners was organized by John Street, secretary of the New York Canners Association, for the purpose of obtaining funding for research on some serious problems in vegetable production. The committee approached Cornell for this research and was advised to prepare a statement of needed research and petition the State legislature for funds. In 1925 a special item was attached to the budget, authorizing \$20,500 for canning crops research. Just prior to that time, the Agricultural Economics Department at Ithaca published a bulletin on the costs of growing tomatoes and other canning crops in New York. The stated costs were “fantastically” high with a number of “wild” estimates, which indicated that New York could not be competitive with other areas. The canners were furious and quietly made sure that when the funds were made available in 1925 they should go to Geneva. The stated reason was that Geneva is centrally located in the heart of the canning crops area, whereas Ithaca is not.<sup>14</sup> In the junior author’s opinion, the right decision was made for the wrong reason. It would have been difficult for Ithaca staff to have conducted field research at considerable distances from Ithaca and may well have found it necessary to establish a field station in the Geneva vegetable growing area to conduct the

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field research programs. This development not only was very important in the expansion of the Station's vegetable field research program but was an important factor later in determining the nature of and the establishment of the Food Science and Technology Department in the 1940s.

The Canning Crops Bill provided for three positions effective July 1, 1925. Leon K. Jones was employed to work on diseases, Hugh Glasgow of the Entomology Division was assigned to insect pests, and C. B. Sayre was hired to research cultural practices. At that time, vegetable activities and personnel were part of the Division of Horticulture. It was not until 1930 that the Cornell Board of Trustees approved dividing the Horticulture Division into the Division of Pomology and the Division of Vegetable Crops. C. B. Sayre, Chief in Research, was made Chief in charge of Vegetable Crops.<sup>15</sup> The only other vegetable crop professionals listed that year were William T. Tapley, M.S., and Leslie R. Hawthorn, M.S..

The seed-borne disease, *Aschochyta* blight, was the principal disease of peas in the mid 1920s. Planting infected seed would inoculate whole fields. Jones demonstrated that disease-free seed was available from the west, particularly Idaho and certain parts of California and Washington. This finding brought quick benefits because the canners furnished the seed to farmers and promptly changed to western sources. *Aschochyta* blight was essentially eliminated in a few years.

Another major contribution to increased pea and tomato production in New York was made by Sayre with his long-term pea and tomato experiments established in 1926 to determine appropriate rotations and fertilizer applications for maximum sustained yields. These were designed to develop "permanent canning crop production systems."<sup>16</sup> Pea production in the non-rotated plots was equal to that in the rotated plots for the first two years. By the third year, however, yields dropped to half in the continuous plots and to non-harvestable levels by the fourth year. Heavy applications of fertilizers were ineffective in countering the reduced yields, which were caused by the build up of pathogenic soil organisms. Similar results were obtained with tomatoes except that the losses occurred about two years later. These long-term experiments also provided growers with guidelines for the optimum amounts and placement of fertilizers. The common practice of drilling the fertilizers into the seed row at the time of planting was found to kill some seedlings and damage root systems resulting in reduced yields. Drilling the fertilizers 2.5 inches on either side of the seeds eliminated the damage.<sup>17</sup>

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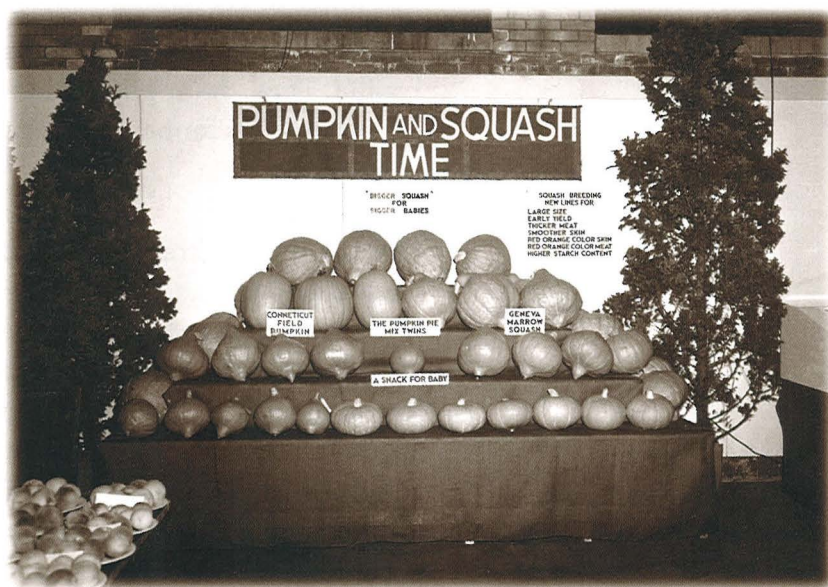
As noted in the Entomology section, Glasgow was successful in developing effective control measures for the very destructive pea aphid. Thus, the appropriation for canning crops research resulted in major gains for both New York State farmers, canners, and consumers.

The Vegetable Crops Division became heavily involved with the new quick-freezing technology for the preservation of vegetables. In collaboration with the Frosted Foods Corporation, a freezer was installed at the Station and was used to evaluate the suitability of the many varieties of canning crops for freezing.<sup>18</sup> This activity coincided with Tressler's appointment in the Chemistry Division in 1933. The impact of his expertise in quick-freezing technology on these programs is discussed in the Chemistry chapter XIX.

Members of the Division were active in developing new varieties of vegetables suitable for New York soils and climates as well as having the qualities demanded by the canners, freezers, and the public. Promising varieties of tomatoes, peas, beans, pumpkins, squash, and cucumbers came from this breeding effort. A new parthenocarpic (fruit production without fertilization) greenhouse cucumber was developed and distributed widely for evaluation under the name "Geneva."<sup>19</sup>

A major project of the Division during the Hedrick years was the preparation and publishing of the series of monographs on *Vegetables of New York*. After the *Fruits of New York* series had been published and widely acclaimed, Hedrick proposed a new series on vegetables. The State legislature approved the project in 1922. Sayre provides an interesting account of the preparation of the first monograph on peas.<sup>20</sup> It should be noted that this activity started six years prior to Hedrick becoming director and while the vegetable researchers were members of his Division of Horticulture. When Hedrick had the appropriation, he searched for a "man" to take on the project. By chance, he ran across Frank Hall picking up drop apples in the entomology orchard. Hall had been the Station Editor in Jordan's time but had been institutionalized following a serious nervous breakdown. The only work he found upon release from the sanitarium was grading apples for the entomologists. Hedrick hired Hall for the vegetable project. He had the library and scientific skills for the assignment but was lacking in knowledge of planting and growing crops. In 1925, Leslie Hawthorn, an Englishman who took a degree at Cornell and was interested in vegetables, was hired as an assistant to Hall. The taxonomic work was done by Alwin Berger whom

Station State Fair exhibit of pumpkin and squash, 1951.



Hedrick had brought earlier from Germany to work on the *Fruits of New York* books. Sayre stated in his oral history of the Department of Vegetable Crops, "*The Peas of New York* was the first publication on that series. It came out in 1928. Director U. P. Hedrick was listed as author and then in smaller type, underneath his name, the title page said 'assisted by F. H. Hall, L. R. Hawthorn, and Alwin Berger.'"<sup>21</sup> Sayre felt that Hedrick failed to give proper recognition to the people that did the work and the writing.

Hall died in 1930 and Hawthorn resigned. They were replaced by William Tapley and Walter Enzie. The second monograph, *Beans of New York*, was published in 1931, again with Hedrick as the author "assisted by" Tapley, Enzie, and Van Eseltine. Even though Hedrick stated in the Preface that the text had been written by the "assistants," they resented not being listed as co-authors.<sup>22</sup>

The Sweet Corn and Curcubits monographs had also been authorized. Sayre stated "When the next publications of the *Vegetables of New York* were to come out, I made it clear with Hedrick that these would not be Hedrick's publications. They would be publications of these men that had done the work. After that we had no more appropriations for the *Vegetables of New York*."<sup>23</sup> The same year in his History of the Department of Vegetable Crops, Sayre provides a slightly different version: "For some reason, a decision was made to eliminate Hedrick's name on future volumes. He wasn't very well pleased. Work was going

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on all the books simultaneously, and the curcurbit and sweet corn books had been authorized and work was proceeding on them so that they were not affected, but no other books were authorized. I don't know whether this had any connection with the fact that Hedrick's name was taken off. Anyhow, the sweet corn (1934) and the curcurbits (1937) books did not have Hedrick's name on them." Lest we be too harsh on Hedrick, it should be recalled that the United States was in the midst of the Great Depression, and the director most likely had a number of items with much higher priorities than more vegetable books. Actually the members of the division continued to plant and evaluate many processing vegetables over the succeeding years. These plots were inspected each year by many farmers and representatives from the vegetable processing companies.

**Vegetable Crops (1942-1974):** When Heinicke moved into the Director's office in 1942, the professional staff members of the Division of Vegetable Crops were: C. B. Sayre, M.S.; W. T. Tapley, M.S.; and W. D. Enzie, Ph.D. Over the next two decades there were a number of staff changes, and two new faculty positions were added. The improvement of vegetable crops was a rapidly expanding research field with numerous opportunities in universities, federal agencies, and industry for young scientists with training in this field. Thus, there were several early resignations of young faculty, and two new faculty positions were added. Also, the department had a few graduate students and non-Ph.D. experimentalists.

In 1941 there was a war-time scarcity of rubber. The U. S. Department of Agriculture asked the Station to experiment with Russian dandelions as a substitute source. Tapley planted over an acre of *Taraxacum Kok-saghyz* at the Canning Crops farm. The average yield of rubber produced in the roots was 60 pounds per acre. This rate was higher than that in other parts of the United States, but it was too low to be practical. Also, during the war, there was a demand for new vegetable varieties suitable for dehydration. Those available at that time were nearly inedible when dehydrated. The Chemistry Department set up a dehydrator in the basement of Sturtevant Hall where varieties of vegetables grown by the Department were tested for their suitability for dehydration. Several varieties were found to be very promising.<sup>24</sup>

The Department responded to a tomato industry's problem of too much or too little acidity in various tomato products. For tomato puree or soup, low acidity was needed and for juice manufacture high acidity was preferred. The Department collaborated with

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industry and determined the factors needed to produce high or low acidity in tomatoes.<sup>25</sup>

In 1947, three new tomato varieties, Gem, Red Jacket, and Long Red, developed by W. T. Tapley were introduced. Gem was early maturing, designed primarily for growers in Orleans County who had extensive orchards and wanted to have work for migrant workers between the snap bean season and the beginning of apple harvest. Gem was right for the purpose except that it was not highly productive. Red Jacket was very distinctive and became a very popular variety, accounting for about half of processing tomatoes in New York State in a few years. Long Red had high quality but matured late in the season.<sup>26</sup>

Tapley crossed Gem with a paste-type tomato from Italy and selected a determinate habit variety with oval shaped fruit. It was named Red Top in 1948. It was the first determinate paste variety ever developed, and was the first tomato variety successfully harvested mechanically. Unfortunately, it was not disease resistant, but Tapley, in cooperation with W. T. Schroeder in Plant Pathology, bred and developed a verticillium resistant variety named Geneva 11. Although Tapley's main interest was tomato breeding, he also did breeding of winter squash with high yields, high dry matter content, and good processing quality. He released one named variety, Red Skin, and gave many of his breeding lines to other plant breeders for their use.

Enzie retired in early 1943 after 13 years at the Station to accept a position with Birdseye, a New York freezing company. He had assisted Tapley with the vegetable monographs and initiated breeding programs with peas, seed corn, muskmelons, and squash. He made the important discovery of cucumber mosaic virus resistance in melons.

Enzie was replaced the same year by John I. Shafer, a Ph.D. botanist from Cornell University specializing in plant physiology. He did much good research during the three years before he resigned in 1946. He began breeding peas for heat tolerance and root rot resistance. This was the beginning of the department's pea breeding program. He collaborated with Professor Sayre in soil deficiency investigations of beets and other vegetables. They determined that tomato yields in the acid soils in Chautauqua County could be increased from 1.5 tons to 12.5 tons per acre by the addition of lime and fertilizer. Beet yields in the Geneva area were dramatically increased by the addition of sodium in the form of salt or other sodium containing product.<sup>27</sup> Shafer resigned September 30, 1946.

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Curtis H. Dearborn, with a Ph.D. in plant breeding from Cornell, was appointed October, 1946 to replace Shafer. During his four years at Geneva, he was involved in several studies, including chemical weed control with 2,4-D in sweet corn; common salt in beets and various chemicals in peas; and breeding early maturing, high yielding, good quality yellow varieties of sweet corn for canning and freezing. He also initiated a breeding program to develop heat-tolerant, root-rot resistant peas. He resigned May 16, 1950 to accept a U. S. Department of Agriculture research position in Alaska where he would have fewer restrictions on his research programs.<sup>28</sup>

The first new professional position in the Department since 1925 was established in the 1944-1945 state budget. John F. Davis, with several years experience in vegetable fertilizer and cultural research at Michigan State College, was appointed to the position December 1, 1944. He worked with Sayre in expanded soil-fertilizer-plant nutrition studies of processing vegetables. He also collaborated with Schroeder in Plant Pathology in a large field experiment to determine the effects of seven five-year canning crop rotations on the incidence of root rot, quality and yield of peas and the structure and fertility of the soil. He also conducted field tests on the nitrogen requirements of nodule forming legume crops suffering from root rots. Unfortunately, sickness in his family forced him to resign and return to Michigan.<sup>29</sup>

After Sayre's experiences with these short-term people, he was justified in recording in his Department history: "I was very fortunate then in getting Morrie Vittum to succeed him (Shafer) and he came here in 1946."<sup>30</sup> Vittum worked with Sayre in fertilizer rate, ratio, and placement experiments. He cooperated with Tapley on the interactions of tomato varieties with fertility levels and continued the cooperative studies with Schroeder in Plant Pathology on the influence of fertilizers on the incidence of root rot and yields of peas. In 1950, he established a long-term experiment on the Darrow Farm where a new farm pond had been constructed to determine the interactions of irrigation, fertility levels, and varieties and spacing of five crops. Vittum was named Department Head in 1960, a position he held until his retirement in 1983.

Donald W. Barton was appointed Associate Professor in 1951 to replace Dearborn. He had had post-doctoral experience with the Atomic Energy Commission at the University of Missouri after his Ph.D. studies at the University of California at Berkeley in genetics. He was the first professionally trained geneticist in the Department. In fact, he was one of the first with specialized training

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to be hired in departments other than Food Science and Technology during Director Heinicke's administration. He was assigned the pea and sweet corn breeding programs. One of his major contributions, in cooperation with Schroeder, was the discovery of pea enation resistance in a plant from the Plant Introduction collection and incorporating it into peas. They bred the resistant Perfection 60 and Perfected Freezer 60, which were commercially successful for many years. Commercial processors and seedsmen incorporated this resistance gene in their new varieties. Barton was appointed Head of the Vegetable Crops Department when Sayre retired June 1, 1959, a position he held for only one year before his appointment as Director of the Station July 1, 1960.

John D. Atkin was appointed in 1953 to a new position that was established in response to pressures from the snap bean industry. He was assigned to the development of snap beans adapted to once-over destructive mechanical machine harvesting, which was rapidly replacing the non-destructive hand harvesting. Atkin solved the bitter carrot storage problem when he discovered that it was caused by exposure to ethylene. The solution was to not store apples, which produce ethylene, with carrots. Later, Atkin initiated breeding programs on lima beans, broccoli, and cauliflower. He incorporated resistance to fusarium yellows in cabbage. He resigned in 1964.

Gerald A. Marx was hired March 1, 1958, as acting Assistant Professor while Barton was on sabbatical leave, and was appointed to this position September 1, 1960 when Barton was selected as the next Director. In a major reorganization of Departmental responsibilities, Marx assumed responsibility for the pea breeding and genetics programs, and the small carrot and beet breeding programs.

Nathan H. Peck was appointed Assistant Professor August 1, 1959, to fill the vacancy when Professor Sayre retired January 1, 1960. He had been a graduate assistant in the department and earned his Ph.D. from Cornell in 1956. He had been an agronomist for the BirdsEye Division of General Food before joining the Geneva faculty. He was assigned the soil/plant nutrition program and conducted research on cultural practices on spacing, irrigation, and planting on raised beds.

Professor Sayre had a 35-year scientific career at the Geneva Station beginning as an Associate Horticulturist in 1925. He was promoted to Professor in 1928 and appointed Head of the newly formed Department of Vegetable Crops in 1930, a position he

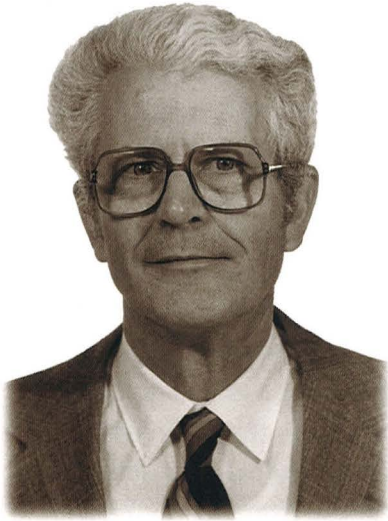


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held until retirement in 1960. He made many contributions. He demonstrated that the soil pathogens proliferate and drastically reduce yields when peas or tomatoes are planted on the same land more than two and four consecutive years respectively. He determined the proper rates, ratios, and placement of fertilizers for maximum yield and quality of processing vegetables. He worked on methods of producing strong healthy transplants of several crops. He developed effective starter solutions for transplanted crops and a heat method for scheduling the planting of peas so that growers could schedule their plantings to avoid a glut at harvest. He led the department from a one to an eight member unit.<sup>31</sup> Sayre had been an officer in the U. S. Army prior to becoming a scientist and ran his department in a military manner. Vittum has provided an example from his own experience. Vittum and a technician were shelling peas on a Saturday afternoon and ended up with about 200 pounds of shelled peas. At that time, shelled peas were sold to a cannery in Monroe County more than 50 miles from the Station. Vittum decided it was not worthwhile to take this small batch to the cannery. Sayre was furious when he learned of the decision and, pointing a finger at Vittum, said: "You countermanded my orders." Sayre suffered from ulcers and was in poor health later in life. He was charming with the ladies, was an excellent dancer, and the ladies hoped he would ask them to dance.<sup>32</sup> Vittum, Barton, and a few others learned to ignore his tirades but some elected to move elsewhere.

**Plant Introduction Station (NE-9):** As reported in Chapter IX, Director Heinicke was a strong supporter of the Station and was instrumental in bringing the Northeastern Regional Plant Introduction (PI) Station to Geneva in 1948. At that time, Heinicke was chairman of the NE-9 Committee that supervised the regional activities of the 12 northeast states and 14 experiment stations (New York and Connecticut had two each).<sup>33</sup> Desmond D. Dolan was selected Coordinator of the new program and arrived October 15, 1953. He was administratively under Director Heinicke for several years until the unit was placed administratively in the Department of Seed Investigations where Dolan was given a courtesy appointment as Associate Professor. Samuel Braverman, Plant Pathologist, joined the PI staff and was given a courtesy appointment as Assistant Professor in 1959 in the same department.

The regional PI Station at Geneva, one of four in the United States, was part of the National Plant Germplasm System. Crops originally assigned to Geneva included peas, cucumbers, squash, tomatoes, and cauliflower. The unit was responsible for the



*Morrill Vittum, vegetable scientist and later Head of the Department of Seed and Vegetable Sciences.*

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evaluation, multiplication, and preservation of germplasm from introductions of these crops obtained from both foreign and domestic explorations. It provided a service to plant breeders and other crop improvement specialists in evaluating and multiplying germplasm of seeds collected throughout the world. The germplasm was carefully preserved and made available to plant breeders and others for crop improvement. Since resistance to diseases and insects is of great importance, plant introductions are screened by special techniques for resistance genes.

**Seed and Vegetable Sciences (1974-1982):** By 1974, the Departments of Seed Investigations and Vegetable Crops had grown but were still relatively small with seven and six professional positions respectively. Faced with fiscal constraints in the early 1970s, Director Barton sought ways to reduce administrative costs. He gained approval from Cornell administration to join the departments and appointed Vittum Head of the new Department of Seed and Vegetable Sciences in 1974.<sup>34</sup> Adding the word “Sciences” to the department name was more than a simple addition of a word. It reflected a change from the Heinicke administration’s policy that all chemistry and related technologies should be in the Food Science and Technology Department to Director Barton’s approach that specialists could and should be located in departments where they are needed. In the new department, there were a few with specialized training: plant pathologist Alconero, microbiologist Harman, and plant physiologist Khan. Comparable additions had been made in Entomology and Plant Pathology with Director Barton’s support as noted in Chapter X.

Stanton Shannon was appointed Assistant Professor of Vegetable Crops in 1962. His primary research efforts were to determine the advantages and problems of old and new processing varieties. He provided valuable information that was greatly appreciated by the food processors over the years until his retirement in 1985.

Richard Robinson was appointed in 1962 as Assistant Professor with specialization in genetics and breeding of processing vegetable crops. Later, when Ithaca discontinued all research on lettuce, he initiated a project on developing lettuce and squash resistant to virus diseases. This was conducted in collaboration with Rosario Providenti of the Department of Plant Pathology. Using wild related species, they developed useful resistant strains by conventional breeding. This was prior to John Sanford’s development of the gene gun. They also were success-

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ful in breeding disease resistant vegetables, especially cucurbit varieties.

Michael H. Dickson had been appointed to the former Vegetable Crops Department as an Assistant Professor in 1964. He developed a productive research program and had been promoted to Associate rank when the departments were joined in 1974. His work during the 1974 to 1982 period was very impressive. It included a study of the genetics of seed defects in beans and the development of screening procedures to improve the quality of green bean seeds. These led to the elimination of poor quality in green beans. He was invited to Australia for a year to help solve a major quality problem in their seed industry.

Dickson also investigated cold tolerance in beans and developed the first cold tolerant beans. Amazingly, these were also heat tolerant. As a result, many bean breeding efforts in the United States and the tropics used this germplasm to breed heat tolerance. As a result of this work, the quality of green beans was no longer a problem. Dickson, in collaboration with microbiologist John Stamer in the Food Science and Technology Department, developed strains of cabbage grown for sauerkraut with increased dry matter content. The pack-out content was increased from seven to nine per cent to 25 per cent and eliminated the problem of excessive brine waste disposal from kraut factories, a major problem up to this time. After the development of the high solids ("HiDri") cabbage, most kraut cabbage has had high solid content. In recognition of their major contribution, Dickson and Stamer were awarded the American Society for Horticultural Sciences "Campbell Soup Award" in 1977.



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- <sup>13</sup> Barton, personal communication, 8/21/96.
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- <sup>15</sup> NYSAES 49th Ann. Rpt. 1930, pp. 11-12.
- <sup>16</sup> 1990 terminology is "sustainable."
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- <sup>33</sup> D. D. Dolan, personal communication, 8/19/96.
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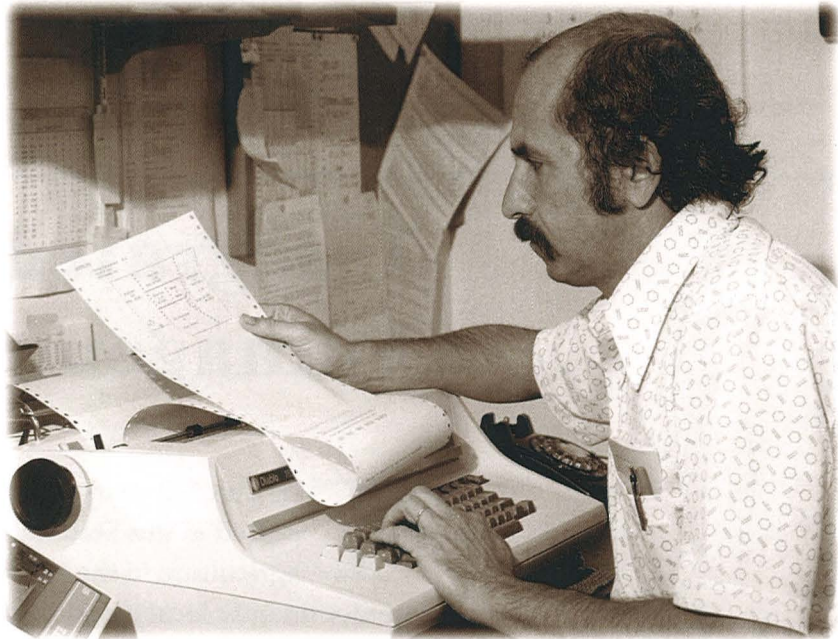
## Integrated Pest Management

The first 100 years of the Station from 1882 to 1982, reported in this Station history, span the great evolution in agriculture in the United States from small farms serving predominantly local markets for most products, especially fruits and vegetables, to larger and larger farms serving markets in many states and even foreign countries. With these changes came the demand for prevention of even modest losses caused by insects, diseases, and other pests. Farmers were also faced with newly introduced pests such as the San Jose scale, Mexican bean beetle, and alfalfa weevil. Prior to World War II, a number of inorganic fungicides and insecticides were used to protect crops from old and new pests. After the War, many new and highly effective organic fungicides and insecticides were introduced. Unfortunately, resistant pathogens, mite and insect pests evolved resulting in the need for increased use of pesticides. By the 1960s and 1970s, there was much concern about the future of pest control among crop protection scientists. Also, the public became alarmed about the impact of pesticides on human health and the

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*Former Directors' home converted to new Integrated Pest Management Unit's quarters.*





*James Tette, Director of IPM Unit.*

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environment. Rachel Carson's *Silent Spring*<sup>1</sup> dramatized the problem to the public and the government. The term "Integrated Pest Management" as opposed to "pest control" became the popular alternative concept in government and private circles. The federal government initiated two national pest management research projects: the Huffaker project in 1972 and the Consortium for Integrated Pest Management (CIPM) project, 1978 to 1982.

In addition to these specially funded efforts, other investigators were studying IPM approaches to pest control.<sup>2</sup> The U. S. Department of Agriculture and a number of state Experiment Station scientists, including a number from Geneva and Ithaca, began to concentrate on research designed to further the IPM approach to pest control to reduce the use of pesticides to the essential minimum.

Plant pathologists and entomologists at Geneva and Ithaca had often followed the principles of IPM many years before the term was "invented." Wilbur Mills, extension fruit pathologist at Ithaca developed the "Mills Apple Scab Chart" in the 1940s, which provided the number of hours of wet apple foliage required to cause scab infection of apples at various temperatures. Geneva plant pathologists James Hamilton and Michael Szkolnik, in careful laboratory, greenhouse, and field tests devised more specific recommendations about when sprays were needed and when they were not. Growers were then able to safely eliminate all the non-essential scab sprays. More details are found in Chapter XIII.



*Examining pheromone trap for red-banded leafroller moths.*

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Entomologists Paul Chapman and Siegfried Lienk and horticulturist Otis Curtis made a study of the need to control mites attacking apples. These mites feed only on the foliage and do not directly attack the fruit. In carefully conducted field experiments, they determined that light to moderate late-season mite damage did not affect the quality and quantity of the fruit. Conversely, early season leaf damage not only reduced the quality and quantity of the crop the same year but also very significantly reduced the bloom and productivity the following season. This information enabled growers to apply miticides only when benefits would result (See Chapter XII for additional information).

Cornell, both at Geneva and Ithaca, was in the vanguard of the development of the “new” integrated pest management (IPM) for pests of agricultural crops and ornamentals. Ithaca entomologists were involved in an IPM project on alfalfa in 1972, funded by the National Research Foundation (NSF) and the Environmental Protection Agency (EPA). This effort was administered by the University of California and was known as the “Huffaker” project. The Huffaker project was followed by another national research project, the Consortium for Integrated Pest Management (CIPM), funded by the USDA and EPA and administered by Texas A&M University. Harvey Reissig, Station fruit entomologist, received CIPM funding for a four-year study of mite predators on apples. CIPM also provided funds for research on alfalfa at Ithaca.

In 1972, Dr. Glass organized an interdisciplinary committee, which included as members: P. Arneson, plant pathologist (extension); J. Brann entomologist (extension); O. Curtis, pomologist; J.

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Gilpatrick, plant pathologist); E. Glass, entomologist (chairman); J. Hunter, plant pathologist; S. Lienk, entomologist; W. Roelofs, chemist; and K. Trammel, entomologist. This group prepared a research/extension proposal: "Pest Management on Apple with Reduced Amounts of Pesticides" for submission to the U. S. Department of Agriculture, Extension Service. In 1973, a \$75,000 grant was awarded to the Geneva Departments of Entomology and Plant Pathology for a combined Geneva-Ithaca interdisciplinary research/extension project to develop and demonstrate IPM practices for apples. It was administered by the Geneva Entomology Department. James Tette, a chemist who had been a post doctoral associate with Roelofs researching sex pheromones for monitoring insect pests and had worked briefly with a chemical firm producing pheromones, was selected to lead the U. S. Department of Agriculture apple IPM project.

Under Tette's able leadership and in cooperation with Cornell Research and extension staffs at Geneva and Ithaca, the program flourished. Significant progress was made in developing sound IPM programs for apples and other commodities. A group of scientists was assembled to support IPM activities on a wider range of commodities, and in 1980, the College of Agriculture and Life Sciences created a separate IPM Support Group, with Tette as group leader. The Group was housed in the vacant Director's Residence<sup>3</sup> on the Geneva Station campus.

The primary focus of the IPM Support Group was on the needs of the commodities as they related to the integration of information from many disciplines. It conducted both applied research and extension work to facilitate the exchange of information and ideas among various disciplines, leading to the development of pest management strategies that are effective and economical for growers. A few of the earlier contributions of the IPM Support Group made prior to 1982 (during the period covered in this History) and the following few years are summarized below to inform the reader of the nature of its activities and successes. These were:

- **Provided an extensive on-farm evaluation of a monitoring system for apple maggot (a major pest of apple) in 3000 acres of commercial plantings and recommend pesticide applications based on a combination of trap catches, weather data, previous pesticide use and nearness to sources of maggot infestations.**




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- Established a statewide weather and biological monitoring network that provides uniform and timely information on weather, pests, and crop development from sites maintained by 18 volunteer cooperators.
  - Pioneered the use of electronic technology to forecast, track, and record pest activity and to document crop and weather parameters. It provided the first on-line information system for the College of Agriculture and Life Sciences. Later, it became the cornerstone for an extension wide system.
  - Assimilated data on the economics of the several IPM programs under evaluation to provide growers with the basis for judging the economic impact of the systems being offered. These data proved valuable to private consultants. Also growers established pest management associations to obtain IPM services.

On the basis of these early successes, the New York state governor's office and state legislature provided funding in 1986 to continue the operation of the Integrated Pest Management Support Group.<sup>4</sup>

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#### References

- <sup>1</sup> Carson, R. 1962. *Silent Spring*. Houghton Mifflin Co. Boston. 368 pp.
  - <sup>2</sup> One Hundred Years of Agricultural Research at Cornell University: A celebration of the centennial of the Hatch Act, 1887-1987, Ithaca, NY: Office of Research, College of Agriculture and Life Sciences, Cornell University, 1987. pp. 184-188.
  - <sup>3</sup> The Director's home was built during Director Jordan's administration and had been occupied by him and each succeeding director until Director Barton elected to move to a private home in Geneva in 1979. It was converted to an office facility for the IPM Support Group.
  - <sup>4</sup> One Hundred Years of Agricultural Research at Cornell University: A celebration of the centennial of the Hatch Act, 1887-1987, Ithaca, NY: Office of Research, College of Agriculture and Life Sciences, Cornell University, 1987. p. 187.
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# Bacteriology

The status of knowledge in the field of bacteriology in 1882 was very limited, especially in relation to food production, preservation, and safety. The Station was established only two decades after Pasteur's discovery of the role of microorganisms in wine and other beverages. Not only their impact was not well known, the taxonomic status and identification capabilities were limited and crude at best. In light of this situation, the contributions to basic and applied bacteriology of Station bacteriologists from 1899 when the first bacteriologist was employed, until 1945 were outstanding and received world-wide recognition.

The major research efforts of Station bacteriologists from 1899 to 1945 were in three applied areas: dairy, fruits and vegetable, and soil inoculants. They found early that the lack of taxonomic information on microscopic organisms was a major obstacle in their work and all members were involved in

PLATE I.—DRAWINGS OF MILK SMEARS AS SEEN UNDER THE MICROSCOPE.  
All prepared in such a way that each bacterium or tissue cell seen is equivalent to 400,000 per cubic centimeter.

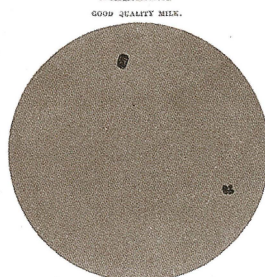


Fig. 1.—No bacteria seen. Two tissue cells. Cell count = 800,000 per c. c.

PLATE I.—DRAWINGS OF MILK SMEARS AS SEEN UNDER THE MICROSCOPE.  
All prepared in such a way that each bacterium or tissue cell seen is equivalent to 400,000 per cubic centimeter.

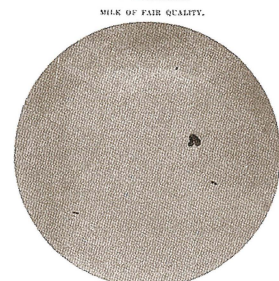


Fig. 2.—Two pairs of lactic acid bacteria and one single bacterium. One tissue cell. Bacterial count = 2,400,000 per c. c. Cell count = 100,000 per c. c.

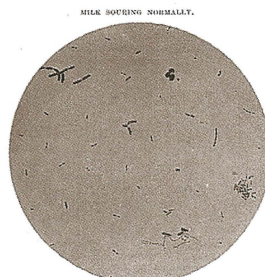


Fig. 3.—Milk which is nearly sour. The majority of the bacteria are lactic acid bacteria. One tissue cell. Bacterial count = 80,000,000 per c. c. Cell count = 100,000 per c. c.

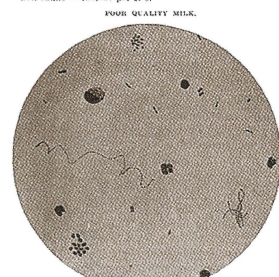
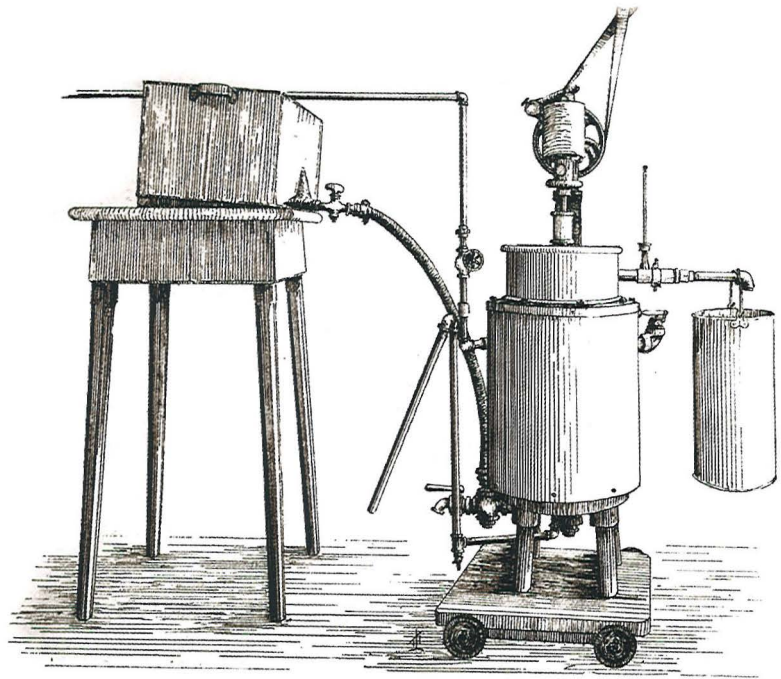


Fig. 4.—Milk which is both nearly sour and suspicious in sanitary quality. Seven tissue cells. Bacterial count = 100,000,000 per c. c. Cell count = 2,800,000 per c. c.

*Drawings of milk smears as seen under the microscope of good quality milk (left) and (right) milk which is nearly sour.*

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*Early milk receiver and pasteurizer.*



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efforts to correct the problem. In fact, two Station bacteriologists became world leaders in the taxonomy and identification of bacteria.

H. A. Harding (M.S.), the Station's first bacteriologist, reported for duty January 1, 1899. He was officially listed as a Dairy Bacteriologist from 1899 to 1905, but thereafter, simply, as Bacteriologist. M. S. Prucha was appointed Assistant Bacteriologist September 9, 1903. Harding's studies the first year were limited to determining the effectiveness of continuous pasteurizing equipment in reducing the bacterial count in milk held at various temperatures. He found a temperature of 176°F highly effective. The next year he extended his program to include studies on the causes of off flavors in milk and cheese and a rusty spotting of cheddar cheese.

In 1902, a commercial cannery of peas sought help in solving a serious can-swelling problem. Harding quickly discovered the trouble was caused by bacteria that had survived the canning temperatures employed in canneries. This finding led him to test the applicability of higher canning temperatures and longer holding periods to achieve total sterilization of the peas without altering their quality. Eventually, he found both goals could be reached by subjecting peas to a temperature of 240°F for 30 minutes. This new procedure was widely adopted by New York pea canners with excellent results.

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Studies were started in Germany in 1883 to determine if it was possible to obtain desired stands of alfalfa and other legumes by inoculating the soil with *Pseudomonas radicola*, the bacterium which produces nitrogen-fixing nodules on the roots of these plants. Transferring soil from a field where this organism was known to be established to a new field gave positive results. But, this was a rather laborious practice. So, interest developed in the possibility of establishing the organism in a new site by inoculating the seed. On March 12, 1904, a member of the Bureau of Plant Industry of the U. S. Department of Agriculture obtained a patent for a seed inoculating method. Users of it were to be supplied with a culture of *P. radicola* on dry cotton and some culture chemicals. After dissolving the latter in water, the cotton culture was added. Then, after a holding period of three to four days, the inoculate, which was presumed to have been produced, was ready for treating the seed. Results were erratic but farmers, nationwide, became very interested in this new development.

The Station soil bacteria program at this time consisted of: (1) attempts to relate the population levels of certain bacteria to soil nutritional deficiencies, (2) the inspection of commercial legume inoculants and studies in an attempt to improve inspection methods, and (3) the identification of certain important soil bacteria.<sup>1</sup>

It was at this juncture that Harding, along with bacteriologists in other state stations, undertook studies to provide answers to the questions growers raised as to the viability, purity, and effectiveness of this method. He quickly learned, by use of an agar-cultural method, that some commercial samples of the inoculate contained either no living *P. radicola* or only insignificant numbers. It was evident the bacterium was unable to survive on dry cotton over the interval between its addition to the cotton and the use of the product by the grower. In 1906, Harding and Prucha finally concluded: "Cultures of legume bacteria dried upon cotton according to the (Bureau's) method have been tested by sixteen Agricultural Experiment Stations in 1904-1905, and all have found such cultures to be of little or no practical value."<sup>2</sup>

Obviously, seed bearing few or no living *P. radicola* could hardly be expected to inoculate soil. Harding, therefore, decided to supply a few grower-cooperators with seed, which was known to carry a living culture of the organism. Results were negative. Harding's final efforts to find the best means of producing good stands of alfalfa involved the cooperation of more than 100 farmers. Compared by them were: no treatment, lime at a rate of

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1,500 pounds per acre, soil from a field supporting an abundance of *P. radicicola* at a rate of 150-300 pounds per acre, and where both lime and the inoculated soil were used. He found that no treatment was needed on about 20 per cent of the fields, that lime used alone gave good results in 60 per cent of the fields, and where both lime and inoculated soil were added the success rate was about 80 per cent.<sup>3</sup>

With the departure of M. J. Prucha in 1911, H. J. Conn was appointed to the staff as an Associate Bacteriologist. Conn's graduate studies at Cornell were conducted in the field of soil bacteriology. At Geneva, he undertook studies on the bacteria occurring in the soil and their relationship to soil fertility.

H. J. Conn found that certain non spore-forming soil bacteria were abundant in good soils and either scarce or absent in poor soils. These studies were continued since they indicated the possibility that a method might be developed to use the bacteria "to determine what sort of fertilization to give a soil." By 1934, he had found a single bacterial species giving quite promising results in relation to the foregoing goal. Studies made in 1935 and 1936 continued promising but, in 1937, problems were encountered. Some "unknown factors appeared to influence the results. (Thus, these factors) often had more influence on the numbers of bacteria (that developed in the tests) than the nutrients added to the soil."<sup>4</sup> The "unknown factor" was determined to be the level of soil moisture. Continued testing confirmed that air-dried soil is not a suitable medium for the growth of certain soil bacteria.<sup>5</sup>

For a number of years, the Division had conducted studies on *Pseudomonas radicicola*, the bacterium which produces nitrogen-fixing nodules on the roots of alfalfa and other legumes. In 1930, H. J. Conn published a Station Circular<sup>6</sup> reporting the status of the inoculants of this organism being sold in New York. Partly as a result of the information provided here, the legislature decided to pass legislation effective January 1, 1931 requiring companies selling the inoculants in New York to register with the state Department of Agriculture and Markets. The Station was "directed" in this law to analyze samples of these products to determine if they met the claims of the manufacturer. The Department was authorized to disallow the sale of all products failing to meet these claims. Locally, this project became the primary responsibility of A. J. Hofer who had joined the staff on July 1, 1931. He found that 47 per cent of the samples examined in 1931 were unsatisfactory. This number dropped to 35 per cent in 1932, to 19 per cent in 1933, and to only 11 per cent in 1934. While these

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results were gratifying, Hofer became confronted by some important technical complications. One was the variable effectiveness of strains of *P. radicola*. Another was the occurrence, in *P. radicola* cultures, of *Bacterium radiobacter* Löhnis which, besides closely resembling *P. radicola* in appearance, is incapable of producing nitrogen-fixing nodules. These and other related problems were not wholly solved through 1937.<sup>7</sup>

While Harding became rather deeply involved in the legume inoculation project, he had not neglected his long standing interest in dairy sanitation problems. In 1907, he became a member of the Geneva Board of Health. This gave him an opportunity to see what could be done to improve the sanitary quality of the city's milk supply. The means he adopted to achieve this end was to conduct a systematic inspection of the conditions under which milk was produced by the farmers supplying milk to the city. Each was graded on a score card and then assigned to one of four classes: poor, medium, good, and excellent. The results of these inspections were published in Geneva's newspaper. When the project was started in 1907, none of the dairies scored "excellent"; only 5.0 per cent "good"; 57.5 per cent, "medium"; and 37.5 per cent, "poor." By March 1911, however, 11.8 per cent of the dairies were found "excellent" and 87.2 per cent, "good." But, this favorable situation did not last. And, the reason it didn't was economic. After the price support for good sanitary milk was removed, dairymen found it did not pay to carry out the clean farm practices they had followed earlier. The scoring in 1912 was: none scored "excellent," only 18 per cent "good," while 82 per cent were scored "medium." Harding's collaboration with Geneva to improve the safety of milk was the beginning of many years of cooperation between the City and Station bacteriologists.

As noted earlier, a major problem limiting bacteriological research at this time was the unsatisfactory status of the taxonomy of these organisms. Harding observed that "the limiting factor in the study of many agricultural problems is our inability to recognize and classify quickly the bacteria encountered...For this reason it has been found necessary to devote much time to the techniques of the laboratory and the study of various types of organisms irrespective of their economic relations."<sup>8</sup> In 1913, Harding resigned to accept a professorship at the University of Illinois. Harding was succeeded by Robert S. Breed, holder of a Ph.D. degree from Harvard University.

Prior to coming to Geneva, Breed had been a Professor of Biology at Allegheny College. In his first year, he initiated studies to

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determine the number and “general character” of the bacteria present in a given sample of milk through a direct microscopic examination. At this time, dairy bacteriologists were using cultural methods to obtain this information. The possibilities of developing a direct microscopic method had long been considered, but no simple, accurate procedure had been realized. In February 1914, however, J. D. Brew of the Geneva Station’s staff published such a method.<sup>9</sup> It had the distinct advantage over all cultural methods in that the bacterial record could be obtained within a matter of minutes; whereas cultural procedures required holding periods ranging from several hours up to five days. Thus, the direct count method could be used to grade milk without interfering with daily marketing procedures.

The next step taken was to compare the sanitary quality of milk produced on individual farms based on barn cleanliness scorings and the actual number of bacteria found in the milk. Breed reported that no relationship “whatsoever” was found between the dairy score cards and the number of bacteria found in the milk. In reporting this finding, he said “the intention is not to encourage dirty and careless stable conditions but to point out the necessity of scoring the milk as it actually is rather than scoring the place from which it came. Filthy barn conditions are (of course, intolerable).”<sup>10</sup>

In 1915, the Division elected to test the practical applicability of the direct count method. To this end it entered into a cooperative agreement with the two milk companies that received most of the milk used in Geneva, the dairy farmers involved, and the local and state boards of health to make a bacterial count of all of the milk as it was received at the milk plants. Each lot was assigned to one of three bacterial count classes, which then constituted the basis for the payment the farmer received for his product. While initially the inspections were conducted by the Bacteriology Division, a bacteriologist eventually was employed by the city to conduct this work. Clearly, this was a unique pioneering effort and one which proved most successful. In 1985, George G. Hucker, a Geneva Station bacteriologist, put it this way: “This project and the contributions the Station made to it put the Geneva Station and Geneva on the map, worldwide, in the public health field.”<sup>11</sup> The Station continued to be associated with the program but only in a supervisory capacity. Don Splittstoesser made the following statement in describing the Station’s contribution: “The Breed procedure provided a rapid method for monitoring the sanitary quality of milk and helped to change milk from one of the most dangerous foods to one of the safest.”<sup>12</sup>

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The accuracy of a bacterial count made by a direct examination of a sample of milk continued to be questioned, at that time, by some bacteriologists. A sizable number of them still favored the agar cultural method. By 1918, however, the direct count method was beginning to come into general use. It was accepted that year as an official analytical method both by the Committee on Standard Methods of Milk Analysis and by the surgeon general of the U. S. Army. The direct count method won acceptance by the American Public Health Association in 1920.

The Division continued to cooperate with the city of Geneva in the supervision of its milk supply. A report on this effort was requested by the state's Mayor's Conference in 1922, and this report was published later by the State Department of Health. The Geneva plan of securing a clean and sanitary supply of milk became the model used by other communities interested in developing a similar program.

Dairy sanitation research and the production of cheeses and ice cream constituted a major part of the Division's program. Active in these fields were G. J. Hucker, R. S. Breed, and M. W. Yale. Some of the work was carried out in close cooperation with the Division of Dairying and the Department of Animal Husbandry at Cornell. For a number of years, the Division continued to take part in the development of *Standard Methods for the Bacteriological Analysis of Dairy Products* issued by the American Public Health Association. A new edition of the *Methods* was in progress in 1937.

The adoption of the use of paper rather than glass containers in the marketing of milk raised some sanitation questions. These were studied in cooperation with the container manufacturers. Much attention was also given to the various problems posed by mastitis. It was found "that it was not yet possible to maintain a herd free of cows which discharged mastitis streptococci in the milk."<sup>13</sup> During the period when the cheese industry was developed in this country, New York became noted for its production of fine quality products. The division was able to conduct studies on the production and quality of cheeses with support of federal Bankhead-Jones funds.<sup>14</sup>

Members of the Division continued studies of milk quality and safety. They continued to assist the City of Geneva in maintaining the quality and safety of its milk and water supplies. Hucker and his associates had developed a new method for cleaning and sterilizing the equipment and pipes used in milk plants that



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eliminated the laborious disassembling of all the pipes. Howard E. Babcock, a very influential person,<sup>15</sup> heard Hucker's speech at Farmers' Week on this subject where he told of work at Geneva that could eliminate this laborious process. The next morning, Babcock called Hucker, offering his dairy equipment to test the new system on a commercial scale. The large scale experimental testing proved successful; in fact bacterial counts on Babcock's milk were lower than they ever had been. With Babcock's influence and collaboration with Corning Glass Company, a demonstration was arranged at the Auburn, NY Dairymen's League plant in Auburn, New York. The glass pipe lines were sealed by the New York City and New York State Departments of Health. After several months operation, the units were taken down, but leaving the sealed joints intact, and trucked to the Pennsylvania Hotel in New York City for inspection by the New York State Health officials. Babcock called Hucker to wish him well before he left for the meeting. Corning Glass representatives also attended and provided transportation for Hucker. Hucker reported that it was a dramatic moment when the sealed joint were opened. He was relieved when all proved to be "perfectly all right." This led to official approval of the new method of sterilizing and cleaning in dairy operations resulting in great savings in labor and expense and cleaner and safer milk.<sup>16</sup>

Breed, like Harding before him, was concerned about the continuing unsatisfactory state of bacteriological taxonomy. In 1919, he made the following observation: "bacteriologists find great difficulty in distinguishing between the types or species of bacteria (encountered)."<sup>17</sup> For some time, the American Bacteriological Society had attempted to establish uniform pure culture methods and to develop standard means of describing species of bacteria. Geneva Station bacteriologists were active contributors in this effort. These developments greatly interested Breed. In fact, it became his central interest over the remainder of his professional career. He is to be credited with having been a leader in the efforts made that eventually placed the taxonomy of all bacteria on a sound and orderly basis.

**Thatcher years (1921-1927):** During the Thatcher years from 1921 through 1927, the Bacteriology Division continued to be active in developing new techniques for conducting studies on the microorganisms occurring in soils, in milk and cheese, on the utensils used in marketing milk, and in processed foods.

By 1921, bacteriologists and other biologists became much concerned about the shortage of suitable aniline dyes used to stain

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microorganisms and plant and animal sections for microscopic examinations. Up to this time, most of these products had come from Germany. This shortage, obviously, was created by Germany's involvement in World War I. At Geneva, the staff members most concerned over this situation were the bacteriologists. When they learned that bacteriologists in other laboratories were experiencing the same difficulties, a collective decision was made to bring the problem to the attention of the Committee in Bacteriological Technic of the Society of American Bacteriologists. This led to the conduct of cooperative studies between Geneva bacteriologists and those in about 30 other laboratories. Eventually, this program was taken over by the National Research Council. It decided to establish an independent Commission on the Standardization of Stains. The Geneva Station made news, in this connection, when one of its staff, H. J. Conn, was named director of this new venture. As a result of the Commission's actions, it was not long before domestically produced stains were available which were as good as, or in some instances, better than those formerly originating from German sources. Management of the commission's affairs and the conduct of research on stains eventually became Conn's central interest. In 1926, the Commission not only published a book, entitled *Biological Stains*, but also started a new journal, *Stain Technology*.

In 1921, all members of the Division were engaged in taxonomic studies. Conn, who had joined the staff in 1911, was occupied initially with the identification and classification of the species of microorganisms occurring in soils. Breed and Hucker studied the species encountered in milk and cheese and on the equipment used in marketing milk. Hucker, shortly after joining the staff, undertook a monographic study of the spherical bacteria of the genus *Micrococcus*. Breed became increasingly involved in a plan proposed by D. H. Bergey, University of Pennsylvania, of preparing an official publication devoted to the classification of all bacteria. In Bergey's plan, he would serve as editor, assisted by a board of four trustees representing the Society of American Bacteriologists. The plan was soon adopted with Breed serving as one of the four trustees. The first edition of this guide appeared in 1923 under the title of *Bergey's Manual of Determinative Bacteriology*. It became the standard reference of the discipline. In succeeding editions, all Geneva Station bacteriologists made contributions in updating the manual. In his later years, this project became Breed's primary interest.

In 1920, the Division was asked by the National Research Council to determine the accuracy of the counts being made of various

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microorganisms occurring in catsup and other processed tomato products. The study was undertaken and reported in Station Technical Bulletin 91.<sup>18</sup> No satisfactory counting method was found. When C. S. Peterson joined the staff in 1925 as the bacteriologist on the Canning Crops "team," he sought a solution of the foregoing tomato problem along with studies on the production of sauerkraut. Both of these projects were actively studied. By 1927, however, the production of sauerkraut and the key role strains of the lactic acid bacteria played in the production of this product had become his dominant interest.

**Hedrick years (1928-1937):** When Pederson joined the staff in 1925, bacteriological studies on plant food products were expanded. By 1937, in addition to his work on sauerkraut, catsup, chili sauce, and tomato juice, he was involved in studies on the preservation of fruit juices, particularly those of grape, apple, and cherry. He also researched the oxidized flavors in grape juices, especially in various wines. Food poisoning studies were made on the micrococci responsible for causing some food poisoning epidemics. Pederson also conducted research on the classification of some important food associated bacteria. Some of the foregoing projects were carried out in close cooperation with the Division of Chemistry, especially after D. K. Tressler became head of the division in 1933.

All members of the Division continued to be interested in the identification of bacteria with which they worked. They also contributed to the compilation of *Bergey's Manual of Determinative Bacteriology* and other taxonomic programs.

Breed soon became deeply involved in studies on the taxonomy of all bacteria. In the Station's 1931 Annual Report, he wrote of the state of knowledge in this field at that time, as follows: "Unlike those biologists who study higher plants and animals, bacteriologists have never generally adopted internationally accepted rules, governing the choice of names for the species of bacteria. Thereby much confusion and waste of effort has resulted. The fact that the organism causing Bang's disease in cattle was originally named *Bacterium abortus*, while the organism in goat's milk causing Malta fever was called *Micrococcus melitenaia*, played its part in delaying for many years the recognition of the close relationship, or even possible identity of these organisms."<sup>19</sup>

At the First International Microbiological Congress held in Paris in July 1930, the body decided to appoint an International Commission whose duty would be to assist in bringing about uniform

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usage of names of the bacteria. Breed was appointed Permanent Secretary of the Commission and, additionally, he would serve the fields of Agriculture and Industry associated with milk and milk products that constituted the dominant concern of this group. Earlier, work in this field had been conducted under the leadership of Breed. Later, as he became increasingly occupied with the identification of and classification of bacteria, his leadership role in milk contamination was transferred to Hucker.

Most of Hucker's work in the Hedrick years would be classified as dairy sanitation studies. In particular, however, Hucker became especially interested in the occurrence of mastitis infections (garget) in the udder tissues of dairy cattle and the discharges of the organism into milk. Over the years 1932 to 1938 he, in collaboration with members of the division of Dairying and the department of Animal Husbandry at Cornell, published a series of nine technical Geneva Station bulletins on various phases of this subject. Progress was made in developing means of coping with the problem.

**Parrott Years (1938-1942):** The Bacteriology Division had 48 research projects under way in 1939: 19 related to dairying, 14 on fruits and vegetable processing, eight on soil and soil fertility, four on basic bacteriology studies, and three on regulatory issues. Thus, research activities of the Division during the last years of the Depression and early years of World War II continued along similar lines to those of the preceding years. There were no major personnel changes. There were, however, some changes in emphasis in response to war related conditions. Bacteriological stains were again in short supply as they had been during World War I. This time, however, mechanisms and personnel were in place to meet the challenge. Conn was still chairman of the Biological Stain Commission. The result was that adequate domestic old and new stains quickly became available to meet the peace and war-time needs of the country.

Breed and the other members of the division continued their basic studies to find methods to identify types of microorganisms found in soils, air, dairy, and other food products. Classification and physiology of toxin producing types of microorganisms found in dairy and other food products were completed, and publications were in preparation in 1942. Hucker stated: "The development of this manual (*Bergey's Manuals of Determinative Bacteriology*) brought great prestige to Breed of the Bacteriology Department at Geneva and to the Experiment Station. It is the only classification of its kind in existence, and wherever bacteriology is studied or taught, *Bergey's Manual* remains almost as a Bible." <sup>20</sup>



*Bacteriologists who attended the World's Dairy Congress. (Left to right), Back row: Dahlberg, Eglinton, Pederson, Herring, Marquardt, Conn, Hucker. Front row: Carpenter, Hedrick, Orla-Jensen (Copenhagen), Sherman (Ithaca), Breed. (circa 1928)*

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During World War II, the importation of cheeses dropped dramatically resulting in a new demand for domestic cheeses. Also, there was a surplus supply of milk. Peterson and Hucker worked closely with cheese manufacturers and determined that it was possible to produce cheese from pasteurized milk equal to or better than foreign cheeses. Pederson and others collaborated with Tressler on the improvement of sauerkraut and other foods production and quality. Pederson's most important contributions, however, were related to his studies of lactic acid bacteria, which enabled him to define the conditions that would consistently produce high quality sauerkraut.<sup>21</sup>

It is obvious that members of the Bacteriology Department from the late 1800s through 1944 were engaged in one or more aspects of the science and technology of dairy and horticultural products. One obvious exception was Alvin Hofer who served in a position established by action of the state legislature in 1930 to test legume inoculants.<sup>22</sup> This matter is discussed in chapter XIV (Food Science and Technology). Hucker was working on food problems but almost exclusively on dairy problems related to dairy products, diseases, or sanitation. Both of these situations led to organizational problems when the dairy work was moved to Ithaca and the Bacteriology and Chemistry divisions were merged into the new Food Science and Technology Department with one head and responsibilities limited only to horticultural crops.

The New York State Agricultural Experiment Station was one of the leading institutions in the country in the field of dairy sanitation

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during the period from the late teens through 1945. This statement is supported by A. C. Dahlberg's account of its role.<sup>23</sup> He relates the close associations in both the Station's dairy and bacteriology work with milk production, processing, and manufacturing. "...the overall effort in the field of milk sanitation was assumed through industry to be centered in the Experiment Station at Geneva...that seldom did any short period of time pass without someone from the Experiment Station at Geneva appearing on programs of local, state, or national organizations to present information based upon recent research on sanitary milk production." During Hedrick's administration, an annual "Dairy Day" was established and continued until the World War II years. The project was an immediate success, and there was not enough room to park cars or take care of the people who came to the first "Dairy Day." State troopers reported up to 1,200 cars and the crowd varied from 1,000 to 5,000 people. Dahlberg noted: "It is my opinion that they did a tremendous amount toward developing an interest in dairy research, in advanced dairy technology, and a general interest in the industry, itself."<sup>24</sup>


In 1945, when the new Department of Food Science and Technology was officially established, the Station bacteriologists were conducting a wide range of projects. C. S. Pederson was continuing his research on sauerkraut and pickle fermentation. A. W. Hofer was testing legume inocula for improved crop productivity. G. J. Hucker was studying sanitation in food processing plants. H. J. Conn was chairing the Biological Stain Commission and writing manuals on identification of bacteria. R. S. Breed was editing the next edition of Bergey's manual. It is of interest to note that Hucker, Conn, and Pederson were still collaborators with Breed on his taxonomic studies of microorganisms, indicating that the subject was still a major concern of bacteriologists in 1945.



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#### References

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- <sup>2</sup> NYSAES Ann. Rpt. 1906, p. 109.
- <sup>3</sup> NYSAES Bul. 313, 1909, Inoculation and lime as factors in growing alfalfa. H. A. Harding and J. K. Wilson, 25 pp.
- <sup>4</sup> NYSAES Ann. Rpt. 1937, p. 17.
- <sup>5</sup> NYSAES Ann. Rpt. 1938, p. 12.
- <sup>6</sup> NYSAES 1930, Circ. No. 114, 6 pages.
- <sup>7</sup> NYSAES Ann. Rpt. 1937, pp. 17-18.
- <sup>8</sup> NYSAES Ann. Rpt. 1910, p. 600, and 1912, p. 535.
- <sup>9</sup> NYSAES Bul. 373. 1914, J. D. Brew. A comparison of the microscopical method and the plate method of counting bacteria in milk. 38 pages.
- <sup>10</sup> NYSAES Bul. 413. Director's Report for 1915. pp. 632-633.

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- <sup>11</sup> Personal communication, G. J. Hucker to P. J. Chapman.
- <sup>12</sup> One Hundred Years of Agricultural Research at Cornell University, 1987. p. 177.
- <sup>13</sup> NYSAES Ann. Rpt. 1937, p. 24.
- <sup>14</sup> NYSAES Ann. Rpt. 1937, p. 25.
- <sup>15</sup> Howard E. Babcock was State Leader of County Agents, 1916-1920, owned and operated a dairy farm, was active in state farming organizations including GLF (predecessor of Agway), and had considerable influence at Cornell, Albany, and with the New York State Health Department.
- <sup>16</sup> Hucker Oral History, 1962, pp. 212-217.
- <sup>17</sup> NYSAES Ann. Rpt. 1919, p. 13.
- <sup>18</sup> NYSAES Bul. Tech. Bul. 91, 1923, C. A. Darling, Methods of determining the number of micro organisms in tomato products. p. 72.
- <sup>19</sup> NYSAES Ann. Rpt. 1931, pp. 25-26.
- <sup>20</sup> Hucker Oral History, 1962, p. 80.
- <sup>21</sup> One Hundred Years of Agricultural Research at Cornell University, 1987, pp. 177-178.
- <sup>22</sup> NYSAES Ann. Rpt. 1930, p. 33.
- <sup>23</sup> Dahlberg Oral History, 1962, pp. 28-30.
- <sup>24</sup> Dahlberg Oral History, 1962, p. 31.
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## Chemistry

Chemistry has been an important component of the Station's program since the first years of its existence. Director Sturtevant, although not a chemist, recognized the need for such expertise and hired Babcock in 1883 and provided him with an assistant chemist in 1885. They investigated the chemical components of various diets being tested on dairy cows by the Director. The second director, Collier, was a chemist and was instrumental in securing the fertilizer inspection program for the Station in 1890, which included funds for a new chemistry building and staff to conduct the work. The next three directors were also chemists and supported chemical research but without reductions of other research programs.

The diverse nature of the several Station activities was first given official recognition in 1896 when Director Jordan reported the results of research activities in five departments: Horticulture, Vegetable Pathology, Chemistry, Entomology and Animal Production.<sup>1</sup> There follows in this chapter the history of the Chemistry Department/Division through 1945 when all chemists were transferred to the new Food Science and Technology Department. Also included in this chapter is an account of the unique and short-lived Division of Biochemistry.

**Biochemistry (1920-1927):** One of the actions taken by Jordan during his final year in office, was the recognition of Biochemistry as a Division. Rudolph J. Anderson, who had been a member of the Chemistry staff since 1911, was placed in charge of the new unit, while W. L. Kulp, who had been a staff member since 1917, became an Assistant in the new Division. The first report of this Division appeared in the 1920 Annual Report<sup>2</sup> and consisted of a 12-line summary of Technical Bulletin 79 entitled, "*A study of the inosite phosphoric acids.*"<sup>3</sup>

Biochemistry investigations at the Station actually began when Director Jordan brought Anderson to Geneva to research poultry metabolism. At that time, the Station had a small respirator, perhaps the first at any Experiment Station in the country.<sup>4</sup>



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Jordan was trained in biochemistry and nutrition and expected Anderson to conduct studies on poultry metabolism. Later, Anderson became involved with studies on pigments in grapes and other plant chemistry.

Anderson and his assistant conducted research on two principal projects in 1921; namely, the analyses and composition of corn pollen, and the metabolism and respiration exchange of poultry during vitamin starvation. In subsequent years, the program was expanded to include studies on: the phytosterols of plant oils, including corn, cottonseed, and linseed oils; the chemistry of the pigments occurring in grape; the phytosterols in the endosperms of corn, wheat, and grapes; the amounts of sugars present in different varieties of grape; and the kinds of carbohydrates that are stored in the grape stems and buds during the dormant period. This last project was undertaken in the hope of accounting for differences in winter hardiness in various grape varieties. The results of most of this research were published in technical journals that are cited in the 1921-1927 Station Annual Reports.

Hucker gave an enlightening account of Anderson as a man and as a scientist. He described him as a gentleman's gentleman who was always polite but somewhat aloof. He always walked with a cane or umbrella and was neatly dressed. He and his wife socialized with "the higher echelons of Geneva society." On the other hand, he was well respected by his peers for his research. He was a pioneer in the micro-chemistry of plant pigments and developed many of the basic techniques widely used by others.<sup>5</sup>

Anderson took a sabbatical leave at Yale University from October 1, 1926, to September 30, 1927. He spent the year studying the chemical composition of the tubercle bacillus. While there, he was offered and accepted a full professorship in chemistry at Yale. On September 30, 1927, he resigned from the Station. Thus, ended the Division of Biochemistry.

Some biochemical studies, however, were continued by members of the Chemistry Division over the next 18 years. These included research on pigments found in grapes. Another was a study designed to produce tobacco with a high nicotine content to be used for the production of nicotine insecticide dusts. Analyses made of tobacco produced in early cultural tests gave disappointing results, for the nicotine content ranged from only 1.19 to 1.64 per cent. By 1927, however, it was found that tobaccos could be produced having a nicotine content in the dried leaves ranging from four to six per cent. This result was achieved by use of

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certain varieties of two species of tobacco, *Nicotiana rustica* and *N. tabacum*, and by removing the flowering tips (“topping”)<sup>6</sup> of the plants.<sup>7</sup> By that time, however, entomologists and plant pathologists had concluded that pesticides applied as sprays gave better results than dusts against the total disease and insect complex. Tobacco dusts were to see little, and eventually, no use in commercial agriculture.

**Chemistry (1896-1945):** The Station was first designated to carry out the provisions of an inspection law in 1890. This required the Division to analyze samples of commercial fertilizers being sold in New York. The scope of work was enlarged later to include the analysis of farm-animal food stuffs. The 1917 Annual Report stated that the inspection work “requires a large share of the attention of six chemists.” Including one scientist on leave, the total chemistry staff numbered nine persons in 1917. Studies were also conducted on the composition of lime sulfur as it was variously prepared by growers and industry for use as a fungicide and insecticide, and what occurs, chemically, when lime sulfur is combined with lead arsenate.

During this same period and in a different project, the Station at this time maintained a small herd of goats which gave the chemists an opportunity to compare the composition of milk derived from goats and cows.

Over the Thatcher years from 1921 to 1927, most of the Chemistry Division’s efforts were spent in the inspection of fertilizers and feeding stuffs. However, by 1927 some research was being conducted on the chemistry of proteins with special attention being given to casein and gelatin, and to the chemistry of various insecticides and fungicides. Of special interest was the brief reference made in the 1927 Annual Report to studies on the “toxic residues on sprayed fruit.” This is an early reference to the spray residue problem that was to become of great concern to the divisions of Entomology, Botany, and Chemistry. An Act to prevent fraud in the sale of Paris Green insecticide and funding for work in this area was made in a special state appropriation starting in 1920.<sup>8</sup> This work was to become a major segment of the Chemistry Division program and was conducted in cooperation with the entomologists and plant pathologists.

L. L. Van Slyke, who had served as head of the Chemistry Division since 1890, retired in February 1929. The division’s program, at the time of his departure, may be described as follows: A majority of the staff was engaged in regulatory work, con-

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*Chemistry Building designed for analyzing fertilizer and pesticide samples collected by inspectors.*



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sisting of the analysis of samples of commercial fertilizers, animal food stuffs, and pesticides for the State Department of Agriculture and Markets. However, a strong research program was being conducted in the field of dairy chemistry. Studies of residue problems that had arisen in connection with the use of pesticides on horticultural crops were also being conducted.

Director Hedrick paid special tribute to Van Slyke in 1929 as follows: "...he has long been one of the leaders in research in dairy chemistry. His colleagues know that it was largely due to his work that this Station early attained and has long held prestige in the dairy world. Van Slyke should be remembered by the farmers of New York State also for his organization and supervision of the chemical inspection of commercial fertilizers and feeding stuffs. This was one of his first tasks upon taking charge of the Chemical Division at this Station, and so well was the work planned that the organization and the methods Van Slyke employed became at once models for similar work in other institutions,... at a time when research in agriculture received scant support from farmers in this State, Van Slyke's work in the inspection of commercial fertilizers and feeding stuffs, better than any other effort of the Station, brought this institution to the notice of New York farmers and won their hearty support."<sup>9</sup>

The division underwent some important changes in both directors and leadership over the following five years. Thus, it was served by three heads. The first of these was J. J. Williman. He was appointed to the staff April 1, 1929, but remained only a year and a half or until October 1, 1930. Williman was succeeded by D. C. Carpenter, who had been a member of the local division since 1922. On June 1, 1933, the director decided to transfer Carpenter to the Dairy Division to head up a dairy chemistry program.

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Then, on October 1, 1933, D. K. Tressler was appointed head of the Chemistry Division. After he became head, work in this field was continued and expanded. Attention was given to determinations of the varieties of fruits and vegetables best suited for freezing, the chemical and bacteriological changes taking place in the frozen product, and the general adaptability of this method for keeping foods. Some of the earlier programs of the division were combined; namely, the analyses of samples of fertilizer, animal food products, and pesticides for regulatory purposes and research on pesticides. However, the dominant part of the division's program soon became concerned with studies on fruits and vegetables and products derived from them. More specifically work was conducted on fruit and vegetable juices, fermented fruit juices (wine-making), and determination of the vitamin C.

The heads and staffs of the Vegetable Crops and Chemistry Divisions first became acquainted with Tressler in 1931 when the Station and the Birdseye Laboratory undertook some cooperative work. The project involved was an exploration of the future use of the quick-freezing method developed by Birdseye for the preservation of fruits and vegetables. Hedrick visited Tressler in Gloucester, Massachusetts at the Birdseye research laboratory in 1933 and soon after offered him the headship of the Chemistry Division.<sup>10</sup>

Tressler's coming appears to have been satisfactory for him and the Station for he stayed here 10 years and developed a strong and diversified divisional program. Also, he had a rather remarkable publication record during his nine years at the Station, particularly in view of his administrative duties as head of the Chemistry Division. It included two Station bulletins (the first year, 15,000 copies of Bul 690 on food preservation by freezing were requested and distributed), one *Farm Research* article, three circulars, 57 journal articles,<sup>11</sup> and one technical bulletin.

At the end of Hedrick's tenure (January 15, 1938), the division was continuing to conduct work in the three areas identified earlier. By this time, however, studies on fruits and vegetables and products derived from them had become the dominant research effort of the division. This included pectin and pectin enzyme studies, and investigations dealing with the various aspects of the preservation of fruits and vegetables by freezing.

No account of the pre-Food Science and Technology Department of Chemistry activities at Geneva would be complete without recording the contributions of one of its most productive scientists, Zoltan I. Kertesz. He came to the Station in 1928 after completing

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his undergraduate and graduate studies in Hungary and Sweden. At Geneva, he conducted basic work on the structure of plant pectins and on the enzymes that degrade them. These studies led to the use of enzymes to facilitate the clarification of fruit juices, a practice now widely used by the food industry. They also resulted in production methods for firmer processed tomato products and a technology for improved juice textures. Kertesz took early retirement in 1962 to become chief of the Food Science and Technology Branch, Nutrition Division, Food and Agriculture Organization (FAO) of the United Nations. He returned to the United States and served as secretary of the Protein Advisory Group of the same organization in 1968, shortly prior to his death that same year.

Much of the division's work on pesticides was done in cooperation with Entomology. Important new problems had been created at this time through the establishment of official tolerance limits for arsenic, lead and fluorine residues occurring on fruits and vegetables at harvest. The Chemistry Division's part in the cooperative studies undertaken consisted of the analysis of samples of produce to determine the levels of these pesticide contaminants. This was done for survey purposes and to determine the effectiveness of various cleaning methods available to reduce these deposits to acceptable levels. Also undertaken were studies on the chemistry of the calcium arsenates. Hopefully, some safe and effective form of this class of pesticide could be identified. If found, it could be used in place of lead arsenate, the standard arsenical then in use, and thereby eliminate lead from spray residues. The results of this research, which were encouraging, were published in 1935.<sup>12</sup> Additional information on later studies on pesticide residues is provided in the Food Science and Technology chapter.

Members of the Chemistry Department made a significant contribution to pest control via an informal collaborative project on petroleum oil spray oils including P. J. Chapman from Entomology, A. W. Avens and G. W. Pearce from Chemistry, and G. Oberle from Pomology. They conducted extensive laboratory and field research studies on the mode of activity and composition of effective and safe horticultural spray oils.<sup>13</sup> This work resulted in specifications for horticultural petroleum spray oils that are still followed in the 1990s.

Even though Tressler would have been a strong candidate for heading the new Food Science and Technology Department, he chose to resign January 31, 1943. He was very unhappy with the way Ladd appointed Heinicke without consulting Geneva staff

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and department heads.<sup>14</sup> As it turned out, there was little or no collaboration between the Food Science and Technology Department chemists and non-food science faculty. The problem was solved when Director Barton (1960-1982) encouraged the employment of chemists or other needed specialists by other departments. The Chemistry Department, as such, was dissolved in 1945 with establishment of the Department of Food Science and Technology.



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### References

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- <sup>2</sup> NYSAES 15th . Ann. Rpt. 1920, p. 16.
- <sup>3</sup> NYSAES Tech. Bul. 79, pp. 22, Concerning inosite phosphoric acids, I. Synthesis of phytic acid. II. Comparison of inosite phosphoric acid of plants. R. J. Anderson, pp. 22.
- <sup>4</sup> Huckler Oral History, 1982, p. 181.
- <sup>5</sup> Huckler Oral History, 1982, pp. 180-184.
- <sup>6</sup> It may be of interest to the reader that at the time this was written (1996), there is much interest in the nicotine content of tobacco regarding its addictive properties. The junior author did his Masters thesis on a study of an insect pest of tobacco in Virginia in 1938-1939 and recalls that "topping" was the accepted practice because it "improved the quality and market value of the tobacco leaves."
- <sup>7</sup> NYSAES Tech. Bul. 562, 1929. R. C. Collison, J. D. Harlan, and L. R. Streeter, High-nicotine Tobacco, 19 pages.
- <sup>8</sup> NYSAES 18th . Ann. Rpt. 1899, pp. 237-248.
- <sup>9</sup> NYSAES 48th . Ann. Rpt. 1929, pp. 14-15.
- <sup>10</sup> Tressler Oral History, 1964, pp. 39-41.
- <sup>11</sup> Tressler had a ready outlet for publications in the then new *Food Research* journal. George Huckler was one of the three editors and reports that the editors frequently went to Tressler when they needed manuscripts of high quality. "Dr. Tressler always had something. People have criticized the early *Food Research* journal as being all Dr. Tressler in the first couple of volumes."
- <sup>12</sup> NYSAES Tech. Bul. 234, 1936, pp. 16.
- <sup>13</sup> Additional information is provided in Chapter XII (Entomology).
- <sup>14</sup> Tressler Oral History, 1964, pp. 65-66.

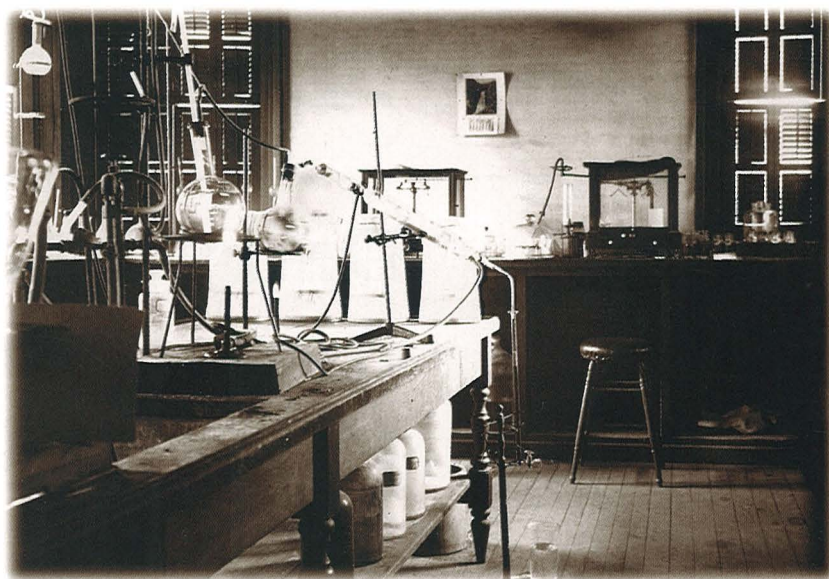
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# Dairying and Related Animal Research (1882-1943)

**A**s reported in Chapter II, dairying research was established in the very first years of the Station's existence when Director Sturtevant began feeding studies on dairy cattle. At the same time, chemist S. M. Babcock conducted chemical analyses of diets used in these studies and also on milk. According to reports on his later activities at Wisconsin, there was an unexpected correlation between some diets and the responses in the test animals.<sup>1</sup> Babcock also worked on and had made considerable progress in developing a method to determine the butterfat content of milk before resigning in 1887 to accept a professorship at the University of Wisconsin. In fact, he developed this work far enough that Dahlberg found an old Babcock tester in the attic of the Chemistry building when he came to Geneva in 1921. Babcock completed his work on his test method for butterfat determination in only one year at Wisconsin and introduced it in 1888. It soon became widely used and famous because it eliminated fraud in buttermilk claims.<sup>2</sup>

Sturtevant's successor, Director Peter Collier, continued to emphasize research on animal agriculture and expanded the work to include studies of swine and poultry. Dairy cattle, milk, and by products, however, continued to be a major part of the division's research efforts until all animal investigations were transferred to Ithaca in 1943. Thus, efforts in the general field of animal agriculture were in two general areas: dairying (milking cows and dairy products) and animal husbandry (other animals and poultry).

When Jordan became director in 1896, he made an appraisal of existing investigations and programs and concluded that the Station's activities were too diverse in terms of available resources. He decided that emphasis should be given to the two major segments of New York agriculture, which he judged could



*An early laboratory in the "Dairy Building" (Sturtevant Hall).*

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profit most from research. These were dairying and horticulture. Some of the other projects, however, were continued for many years. Jordan was successful in obtaining funds in 1896 to build a "dairy" building to house the existing programs including dairying. In fact the building, which was ultimately named "Sturtevant Hall" in honor of the first director, was commonly referred to as the "Dairy" building for many years even though it housed all Station departments for a number of years.

**Animal Husbandry (1896-1929):** In the 1896 Annual Report, the First Assistant, W. P. Wheeler, wrote that the Department's activities in 1896 represented a continuation of the program conducted in 1895.<sup>3</sup> It consisted of feeding studies on the station's dairy herd, on cross-bred swine, and on laying hens, plus a discussion on silos and ensilage. In subsequent years, Wheeler became occupied, primarily, with poultry feeding tests. These involved laying hens, chicks, capons, ducks, and ducklings. Over the years 1896 to 1904, he published seven Station bulletins<sup>4</sup> in this field. Interestingly, he did not publish another Station bulletin until 1919.<sup>5</sup> It was entitled *Some studies relating to calcium metabolism (in poultry)*. A six-line "report" appeared in the 1912 Station Annual Report, 18 lines in 1918, and one page in Jordan's final Annual Report in 1920. No doubt this de-emphasis of animal husbandry was a result of Jordan's belief that the Station should concentrate on dairying and horticulture. Jordan served as project leader in nutritional studies conducted on dairy cows from 1897 to 1901. Increasingly thereafter, administrative responsibilities apparently prevented him from becoming directly involved in the research program of this unit.

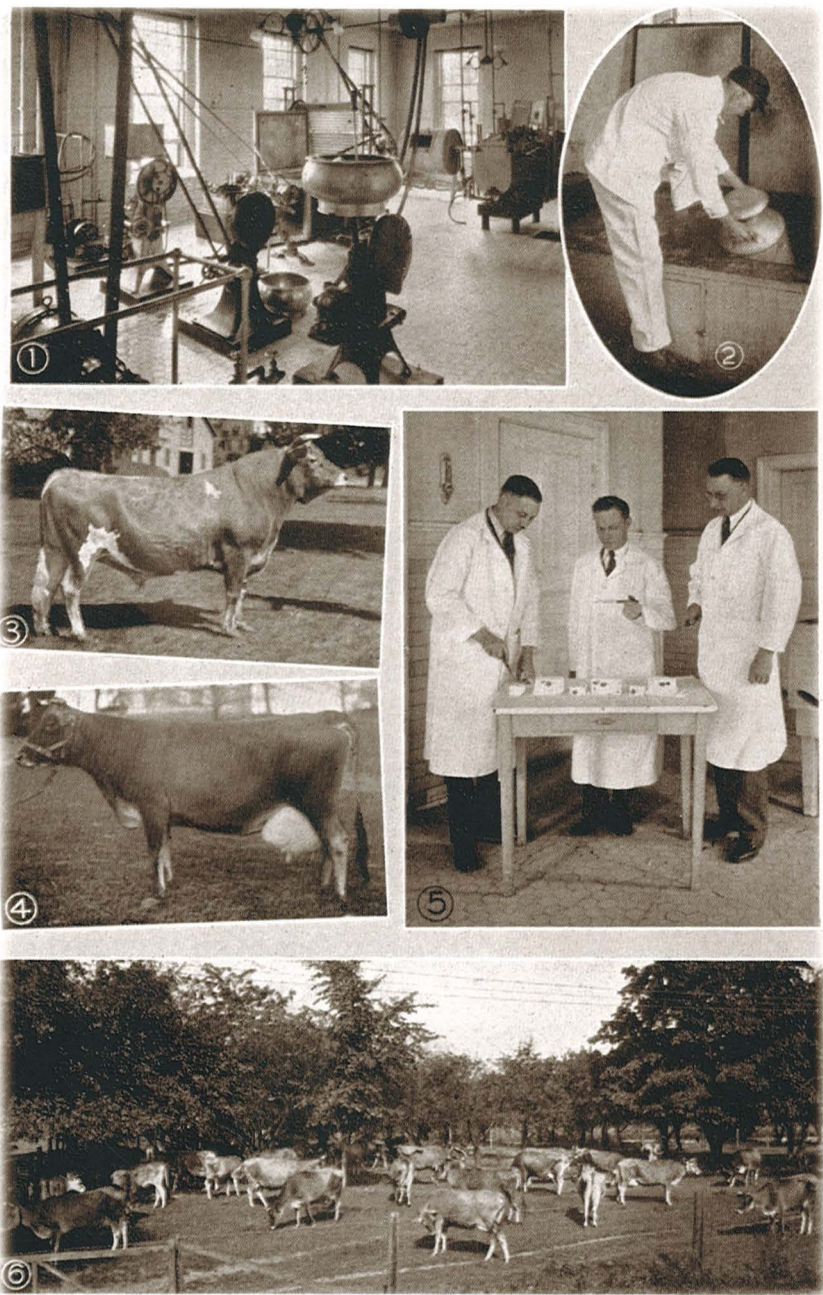


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Wheeler continued the work in this division from 1921 through 1929. He had been a member of the staff since 1888. He pursued his poultry feeding and breeding studies and worked on a project entitled "a study of soil requirements." Only brief summary statements were published on Wheeler's findings and these are found in the Station Annual Reports for 1921-1927.

Director Hedrick, in his first Annual Report (1929), stated that the Division of Animal Husbandry (then known as "Poultry Husbandry") was "discontinued" in 1929, and that W. P. Wheeler retired June 30 1929. He also announced that the Division of Agronomy had been discontinued, and that Collison and Harlan had been transferred to the Division of Horticulture.<sup>6</sup> It may be of interest that Hedrick noted in his next Annual Report that the work of these divisions "has been transferred to the State College of Agriculture."<sup>7</sup> Thus, all animal husbandry at the Station was discontinued in 1929.

**Dairying (1898-1943):** G. A. Smith served from 1898 to 1920 as Dairy Expert, and as Chief in Research (Dairying) from January 1, 1921, until he retired October 30, 1921. According to his successor, A. C. Dahlberg, Smith was not well known among dairy researchers even though "he was a formidable individual who, in his own way, carried on a number of activities of much value to the dairy industry of this state."<sup>8</sup> Smith was trained in the ministry but worked on a dairy farm due to ill health and soon became a promoter of advanced ideas before he came to the Station. Although he was not well qualified to originate and plan research, he was excellent in suggesting problems that needed attention. He also lent support to those who were developing his original ideas even though he seldom received credit. This attribute no doubt led to the remarkable collaboration between Dairying and the Station bacteriologists and chemists. It was also under Smith's supervision that the dairy herd was one of first herds in the United States to become free of bovine tuberculosis while it was being maintained as a diseased herd. During 1898 and 1899, the Station purchased 17 carefully selected mature Jersey cows from several New York dairy farms. One of these showed symptoms of tuberculosis in 1900 and was destroyed. Eight of the remaining tested positive. H. A. Harding, G. A. Smith, and V. A. Moore (New York State Veterinary College) decided to try the new "Bang" method of eliminating the disease by isolating all animals testing positive. These cows bore disease-free calves, which were immediately separated from diseased animals. The milk was made safe for human consumption by pasteurization. By 1905, the Station had 30 healthy cows.<sup>9</sup> The diseased animals had been



1. Section of Dairy Laboratory; 2. Milk Cooler; 3. The Head of the Herd; 4. A Silver Medal Cow; 5. Testing Experimental Ice Cream; 6. The Station Herd.

slowly eliminated and replaced by healthy animals raised in the herd until the herd was disease free.<sup>10</sup> The common practice at that time was to slaughter all infected animals, which was disastrous for many farmers. The Station herd was also noteworthy because milk production per cow in the early 1920s was double that of the average New York cow.

In spite of Mr. Smith's many abilities, it is likely that Director Thatcher recognized Smith's lack of scientific leadership and sought a replacement with a strong academic background. He chose A. C. Dahlberg, a former graduate student of Thatcher's in

*“...there was a special merit in the research set-up as it existed in Geneva from the standpoint of a dairy department and from the viewpoint of the cooperation from scientists. The herd was located just a few hundred feet from the rear of the dairy building... The feed of the cattle, their management, and care could be controlled and held constant over a period of months and years.”*

biochemistry who had majored in dairy and animal husbandry as an undergraduate. Dahlberg also was born on a dairy farm in Wisconsin, had been an instructor in dairy manufacturing at the University of Wisconsin, a creamery extension specialist at North Dakota State University, and for two years was superintendent of a co-operative creamery just before coming to Geneva. Director Thatcher asked Dahlberg to take two or three months to study what had been done in the dairy field at Geneva and Ithaca and gather the available tuberculosis data on the Experiment Station herd. The latter was important because, as indicated earlier, it was one of the first herds in the United States to become free of the disease while it was being maintained as a diseased herd.

When Dahlberg became head of the Division of Dairying in 1921, work was then carried out in three areas: dairy herd management, dairy products and inspection of glassware used in conducting butterfat and bacteriological determinations in milk and cream. During his years at Geneva from 1921 to 1943, Dahlberg compiled an impressive record of personal achievements and energized the department into a highly respected unit. He continued close collaboration with and support for chemists and bacteriologists working on dairy problems. As promised, Thatcher provided two people, J. C. Marquardt and J. C. Hening, to assist him. Dahlberg considered the Station to be an ideal place to conduct dairy research, not equaled anywhere in the United States. “I learned that there was a special merit in the research set-up as it existed in Geneva from the standpoint of a dairy department and from the viewpoint of the cooperation from scientists. The herd was located just a few hundred feet from the rear of the dairy building...The feed of the cattle, their management, and care could be controlled and held constant over a period of months and years. This made it possible to carry on the work with the greatest ease on such topics as the sanitation of milk, the control of its bacterial count, and the source of a milk supply of known history for the use in the manufacture of dairy products or in the processing of milk itself. I think that this arrangement was unique in our educational institutions, and to the best of my knowledge there is nothing that approaches it, even to the present time (1962), when one considers that outstanding men in both chemistry and bacteriology were available for cooperation on problems in the Dairy Department and on whose projects those in the Dairy Department could assist wherever possible or desirable. There was an unusually favorable environment toward the production of successful research.”<sup>11</sup>

Dahlberg’s accomplishments while at Geneva support his very favorable assessment of the Geneva research climate. In addition

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to serving as Head of the Dairy Division, he published approximately four scientific publications a year and was awarded five patents based on his work at Geneva. We mention here several of his important contributions to dairying. They represent the value of combining basic science with practical experience to find solutions to important problems.

An early example of this was Dahlberg's solution to a problem of a greenish black discoloration of much of the chocolate ice cream manufactured and held in storage in New York State. He determined that it was caused by the reaction of the tannins in the chocolate with the rust of unpolished iron in the tin can ice cream containers to form iron tannate, a chemical that had been used to make blue-green ink.<sup>12</sup>

Dahlberg's and Marquardt's discovery of a method for producing cream cheese without free water was patented and widely demonstrated to and adopted by commercial producers. Within three years, the production of this product in New York State doubled, whereas it had been constant in preceding years.<sup>13</sup>

Dahlberg and Marquardt showed that milk could be best clarified at very low temperatures rather than at the 90 F. used on farms and industrially. There were no clarifiers available for cold milk at that time. In cooperation with manufacturers of straining materials, suitable cold milk filters were developed and made available. These were adapted for use on farms.<sup>14</sup>

In 1930, Marquardt and Dahlberg published a bulletin on electric cooling of milk on the farm.<sup>15</sup> They demonstrated that the process was both advantageous and economical. When a cooler was being constructed at Geneva by skilled labor, Dahlberg reported that several engineers from refrigeration companies came to Geneva to watch the construction.<sup>16</sup> The combination of cold milk filters with on-farm refrigeration contributed greatly to the quality of milk.

Dahlberg cut microscopic sections of ice cream and sherbets at -20F. and examined them under these low temperatures to study textures. He believed that this was the first use of this technology to improve ice cream and other dairy product textures. As a result of these studies, the quality of water-ices and sherbets were much improved and soon became substantial products in the ice cream industry.<sup>17</sup>

Following the introduction of milking machines in the early 1900s, there was much interest in the influence of machine milking cows

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on the production of milk and the health of the cows. Earlier work had been reported by Smith and Harding.<sup>18</sup> In 1941, Dahlberg reported on the influence of length of time of milking by machine in relation to total milk production. He determined that cows milked by machine for only four minutes, instead of the usual 10 minutes, maintained production as uniformly throughout the lactation period as by hand milking. These findings were welcomed and quickly adopted by dairy farmers in 1941 when labor was scarce.<sup>19</sup>

Dahlberg made several other discoveries and developments during his Geneva years which proved to have practical value for dairy farmers and the dairy product industries. At Ithaca, he continued to make contributions but became more and more involved in national and international activities. However, it is evident from a close reading of his 1962 Oral History that he considered his years at Geneva very important and that they contributed greatly to his very distinguished career.

The program of the Dairy Division continued much the same through the Morrison, Hedrick, and Parrott administrations under Dahlberg's leadership. By 1937, the program consisted of the following sections: dairy-herd management studies based on the herd maintained at Geneva, goat milk studies, detection of the causes of off-flavors in milk, protein investigations centering on the casein and the possible industrial uses of such products, and the inspection of glassware offered for sale for determining the butterfat content or bacterial count of milk and cream. Major attention, also, was given to the production of various kinds of cheese—cheddar, limburger, and soft types—and to various problems encountered in their production. The goat milk studies were made in cooperation with workers in other states.

Dahlberg's account of Geneva's standing in the dairy field made in 1962, two decades after his transfer to Ithaca, gives further evidence that he still had a strong loyalty to the Station. He made an interesting comment in relation to Morrison's appointment as Director of the Station in 1927. "It seemed to many that when Professor Morrison was brought to Geneva, it was done with the deliberate intent of making certain that the dairy work would remain at Geneva. We made no effort whatever to build a political following or to get other individuals to do so for us from the standpoint of the support of the work at Geneva. I say that from my own personal attitude and I'm not endeavoring to cover the thoughts of others."<sup>20</sup> Earlier,<sup>21</sup> he noted that during the many contacts he and others at Geneva had with dairy farmers and

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industry, "They were not of the type which led us into contact with legislators or individuals who were concerned in the promotion of projects and policies pertaining to the dairy industry. Looking back at the matter at this time, I think that we might be criticized for not having paid sufficient attention to cultivating interests which would have been of tremendous value in departmental preservation and advancement." Obviously, Professor Dahlberg's move to Ithaca was not one of his choosing nor liking at the time nor later.

Dahlberg provides some valuable perspectives on Station scientists and their contributions to dairying during the early and mid years of the Station's existence.<sup>22</sup> He noted that Robert S. Breed was "a particularly active bacteriologist in his several chosen fields of work." One of these was the taxonomy of bacteria (as reported in Chapter XVIII). Breed's contributions in the field of dairy bacteriology, particularly in respect to milk sanitation and cheese ripening, gave him an enviable reputation in both science and industry. Another contributor at that time was Van Slyke, head of the Division of Chemistry, whose interest was primarily in dairy chemistry. He did basic work on the chemistry of casein and on the changes occurring in cheese ripening. He developed a test for protein in milk. One of his associates developed a method for determining the pH of milk to identify infected udders, a procedure still in use in 1962. Dahlberg also commented that Breed and Van Slyke were active church and social workers. They and Thatcher and Mr. Smith taught classes and took leadership roles in church activities. Van Slyke with his full snow-white beard played Santa Claus for children at the annual Station Christmas parties.

Dr. Dahlberg also gave a full account of a colorful member of the non-professional staff—herdsman William Casey. "Casey was a character all of his own. He was enthusiastic about everything that he did and he inherited natural wit and ability to entertain and it was appreciated by everyone. He was an old time fiddler for square dances...He played at many a farm meeting and particularly at sales of the New York State Jersey Cattle Club...Very few jersey breeders in New York State or vicinity did not know William Casey. Often they drove off US Highway 5 or 20 to come around to have a chat with Casey...There is one feature about Mr. Casey which I would like to mention even his closest friends, except for those who visited him in his home, never knew the situation. By the time I came to Geneva his wife was a complete invalid from arthritis and was fixed in a sitting position. He brought a hospital bed into the home and personally cared for her throughout a period of at least fifteen years before she passed away. Possibly he could never have stood up under it except for his ability to see the amusing side of

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things. He bought her a very small lap dog which was her constant companion as she sat in the chair perfectly helpless. ...There was more to Casey than his wit and his friendly spirit.”<sup>23</sup> Apparently Mr. Casey treated Directors the same as any employee. Director Jordan is reported to have delighted in telling how Casey had run him out of the barn with a pitchfork.

The decision to transfer all dairy research to the New York State College in Ithaca in 1943 and make the Geneva Station a horticultural research center has been discussed in the directors’ chapters. It fell to the new Director, Heinicke, to implement the order, which he did with dispatch. Dahlberg was transferred to Cornell at Ithaca as a full professor. D. C. Carpenter, J. C. Hening, and J. C. Marquardt were transferred to the Division of Chemistry. Marquardt resigned in 1944. The new Division of Food Science and Technology was established August 1, 1945, combining the Divisions of Bacteriology and Chemistry. D. C. Carpenter and J. C. Hening continued in the new division until their deaths in 1953 and 1955, respectively.

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## References

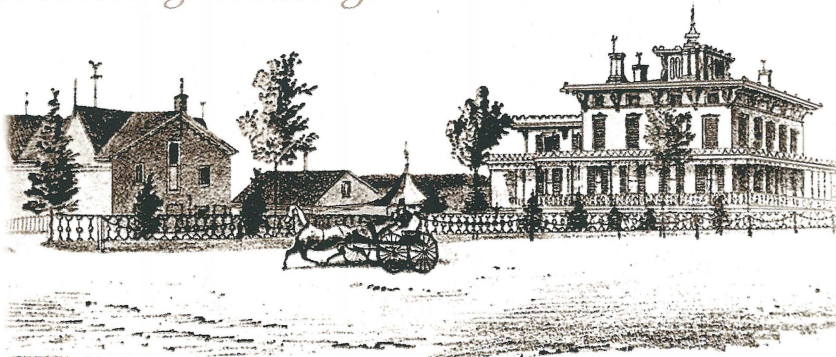
- <sup>1</sup> The authors failed to find any references in Station literature to an anomaly Babcock found between his chemical analyses of Sturtevant’s diets and the responses of the animals. Much later at Wisconsin, Babcock convinced his dean to sponsor an experiment on young calves with three specific food diets and one combination diet. Very interesting results disclosed that there was a lack of unknown substances in one of the diets that caused deaths of calves and eventually their mothers on this diet. The missing substances were found to be vitamins, the first discovery of these chemicals. The story is told in detail in Paul De Kruif’s book, *Hunger Fighters*, in chapter 9, *Finder of the Hidden Hunger*, Babcock. Harcourt, Brace, and Company, 1928.
- <sup>2</sup> Dahlberg Oral History, 1962, pp. 3-4.
- <sup>3</sup> NYSAES 15th Ann. Rpt. 1896, pp. 641-687.
- <sup>4</sup> NYSAES Bulletins Nos. 106, 126, 149, 171, 242, 250, and 271.
- <sup>5</sup> NYSAES 38th Ann. Rpt. 1919, Bul. 468.
- <sup>6</sup> NYSAES 48th Ann. Rpt. 1929, p. 9.
- <sup>7</sup> NYSAES 49th Ann. Rpt. 1930, p. 11.
- <sup>8</sup> Dahlberg Oral History, 1962, p. 4.
- <sup>9</sup> NYSAES Bulletin No. 277, pp. 78-109.
- <sup>10</sup> NYSAES Bulletin No. 496, 1923, and Dahlberg Oral History, 1962: pp. 1-2.
- <sup>11</sup> Dahlberg Oral History, 1962, pp. 7-8.
- <sup>12</sup> Dahlberg Oral History, 1962, p. 7.
- <sup>13</sup> Cheese process, Application Serial 244922, filed 12/10/38, assigned to Cornell University. and NYSAES Tech. Bul. 226.
- <sup>14</sup> Dahlberg Oral History, 1962, p. 10., NYSAES Tech. Bul. 111.
- <sup>15</sup> NYSAES Bulletin No. 581.
- <sup>16</sup> Dahlberg Oral History, 1962, p. 12.
- <sup>17</sup> NYSAES Bulletin No. 111, 1924, and Bulletin No. 536, 1926.
- <sup>18</sup> NYSAES Bulletin No. 353, 1912, and Bulletin No. 654, 1935.
- <sup>19</sup> NYSAES Bulletin No. 697, 1941, Dahlberg Oral History, 1962, pp. 15-16.
- <sup>20</sup> Dahlberg Oral History, 1962, p. 34.
- <sup>21</sup> Dahlberg Oral History, 1962, p. 29.
- <sup>22</sup> Dahlberg Oral History, 1962, p. 16-20.
- <sup>23</sup> Dahlberg Oral History, 1962, p. 18-20.







*“As an Experiment Station designed specifically to serve the people of New York, much of our work revolves around solving problems of immediate concern to growers and processors in the very large and economically important fruit and vegetable processing industry.*



*Yet, at the same time, we must balance this type of practical research with more basic studies to provide us with adequate background knowledge in a multi-*



*plicity of subjects so that we are prepared to solve future problems.”*

—DIRECTOR DONALD W. BARTON, 1977—