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'Right to Die' Symposium Page 2

Student Visits USSR Page 3

Senate Meeting Page 3

Concerts, Lectures, Exhibit Page 5

Big Red Basketball Page 7

Cornell Research

Magnetic Trains 'Float' Above Rail

High speed vehicles suspended above a guideway by a magnetic field could offer a feasible alternative to air transportation, according to Francis C. Moon, associate professor of theoretical and applied mechanics at Cornell.

These magnetic levitation vehicles, often called mag-levs for short, could run at speeds of 300 miles per hour or more, making the trip between many major U.S. cities in about an hour. What's more they could pick up and discharge passengers at the city center — eliminating traffic jams and expensive cab rides often involved in getting from the airport to the downtown area.

Much of the technology for high-speed mag-lev vehicles is already developed, Moon said, but before the vehicles could be employed commercially crucial aspects of their dynamics need to be understood.

As a mechanical engineer, Moon is working to understand how the vehicles would vibrate at different speeds and with different weight distributions. "Before the mag-lev vehicles will be acceptable to the federal government, they must be able to provide as safe and smooth a ride as a jet traveling through calm air," he said.

"The development of mag-lev vehicles is in some ways analogous to the development of the airplane," Moon explained. "Before the Wright brothers, others had figured out the principles for heavier than air flight, but problems of dynamics — control of motion — literally kept them from getting off the ground. Mag-lev is not my invention, but like the Wright brothers, I'm trying to work out the dynamics of mag-lev systems using its principles."

Moon is most interested in vehicles which hover over an aluminum guideway by "repulsive levitation," induced by a magnet traveling above a conducting surface. While electromagnets and even permanent magnets are capable of creating this form of levitation on a small scale, magnetic

fields of the size and intensity needed for high speed vehicle travel will require "superconducting magnets," where electrical resistance is all but eliminated by cooling the magnets to almost absolute zero.

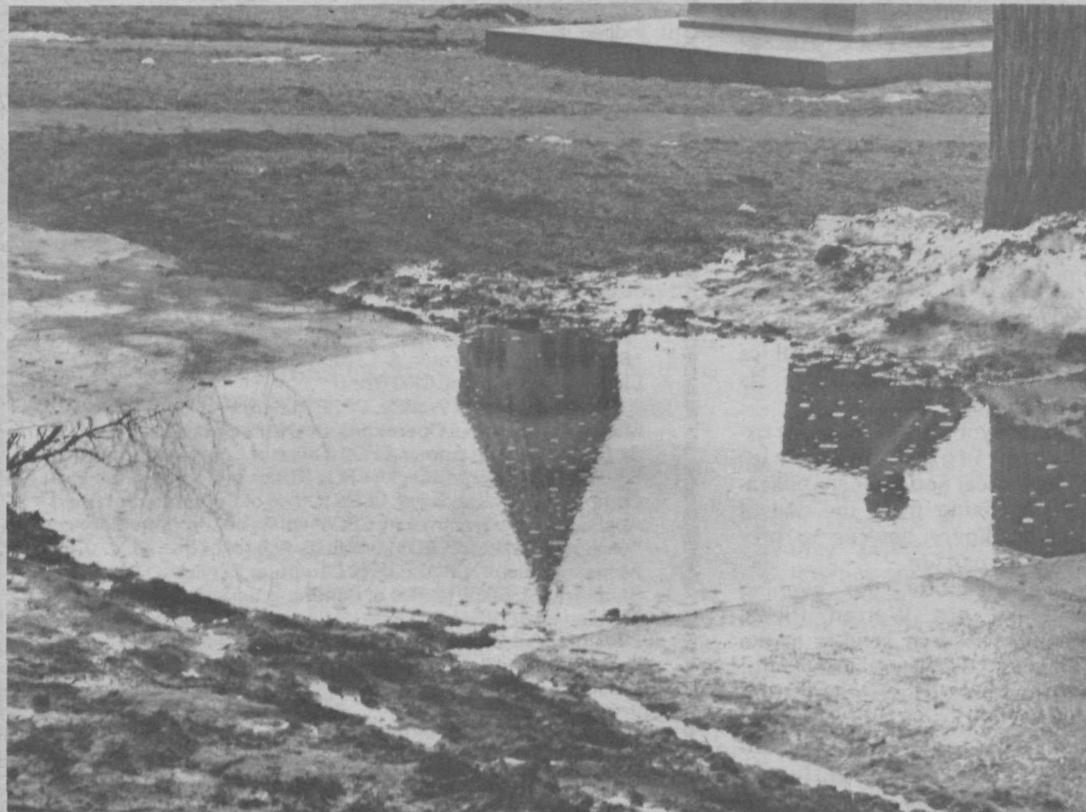
While at Princeton University, Moon developed a rotating guideway and a model mag-lev vehicle to ride along it. The system will be brought to Cornell next semester where it will be outfitted with superconducting magnets and used in dynamics tests.

How far off are mag-lev systems capable of carrying human passengers? Ironically, farther away than they once were, Moon said. In the 1960s mag-lev systems were being intensively investigated in Europe, the United States and Japan as a more feasible alternative to wheeled transportation than air-cushion vehicles. People-carrying models were even built by the Germans, although they traveled at much slower speeds than theoretically possible.

The energy crisis, coupled with inflation, has stalled development of these systems. In fact, Moon said, the United States has stopped funding most applied research on high speed ground transportation. Moon's own work, which is supported by the National Science Foundation, is focused on the basic principles underlying mag-lev systems.

"Perhaps it is good that we are not charging headlong into developing full-scale models at this time," he said. "We now have time to work out some of the basic technical problems, ensuring that mag-lev vehicles, when they are built, will attain not only the safest and smoothest dynamic performance but will also meet new energy and environmental goals."

He predicted that a demonstration model might be in operation in the United States as early as 1990 and that mag-levs could come into more widespread use by the 21st century.



Education Opportunities Explained

Open House for Employees

An open house to explain educational and training opportunities offered to employees will be held from 12 noon to 2 p.m. Monday, Feb. 16, through Friday, Feb. 20, in 247 Day Hall.

Each year several hundred Cornell employees take advantage of educational opportunities offered by the University through the Office of Personnel Services' Training and Development Section, according to Gerald Thomas, director of the section.

Employees are invited to learn about the numerous short job-related training and development courses offered continuously, as well as about academic programs such as the High School Equivalency Program, summer session and extramural programs, the Cornell Employee Degree Candidate Program and the Empire State College Degree Program, according to Penny Greenwood, a graduate assistant in counseling and adult education.

Personnel training and development courses focus on management, communication and technical skills, Greenwood said. Annual enrollments in these courses exceed 800.

Approximately 800 enrollments are made by employees taking regular Cornell courses, at reduced or no tuition, for academic credit or as course auditors through the summer session and extramural program, said Greenwood. Currently, an additional 40 employees are working toward undergraduate or graduate

academic degrees through the part-time employee degree program.

Cornell also offers an off-campus Tuition Aid Program for employees in pursuit of job-related course work at accredited institutions other than Cornell. These courses need not be at the college level.

Employees seeking a college degree may want to take advantage of their experiences

outside a formal classroom setting by enrolling in the Empire State College Degree Program of the State University of New York, which offers college credit for such experiences.

Both Thomas and Greenwood will be present to answer questions about these educational opportunities and to counsel employees considering furthering their training or education.

First-Week Pregnancy Test Developed: CUMC

Clinical experience with 2,000 women who have taken the Saxena blood test for pregnancy indicates that there is an immediate and accurate answer to the question, "Am I pregnant?"

Dr. Brij B. Saxena, professor of Endocrinology and Biochemistry in Obstetrics and Gynecology and in Medicine at Cornell University Medical College, has developed the test which detects pregnancy as early as six to eight days after conception. Furthermore, if the results show pregnancy, the test may define the quality of the pregnancy, signaling imminent spontaneous abortion, ectopic pregnancy and other abnormalities.

If the answer is "No," needless abortion procedures may be ruled out. For rape victims, an early "Yes" allows for early, safe mini-abortion which, if desired, can be performed in five minutes in a doctor's office; an

early "No" relieves at least one of the anxieties associated with rape.

The test, called the radioreceptor assay, measures levels of hCG (human Chorionic Gonadotropin), the specific hormone appearing early in pregnancy. The assay is a basic research method, an outgrowth of ten years of fundamental research by Dr. Saxena in the isolation, chemistry and function of human pituitary hormones.

Since the first public announcement of the assay in May 1974, its sensitivity, accuracy and usefulness have been confirmed not only at Cornell, but also at Harvard, the University of Southern California, and the University of Louisville.

It is expected that the first kit will be available this spring and that the price of a single test will be in the range of that for presently available pregnancy tests.

That's Billion

Yes, the budget has been cut at Cornell, but not nearly as much as the lead headline on page one of last week's Chronicle would indicate. That should have read that the budget for 1976-77 exceeds a quarter billion dollars, not a "quarter million" as written.

Vice Provost Paul McKeegan has pointed out that the last time a quarter-million-dollar Cornell budget was approved was at the January Board of Trustee meetings in 1887. Actually the 1887-1888 budget was for \$251,426.