The Month at Caltech

No More Frosh Camp

Caltech's class of 1974, in addition to including 31 women in its ranks, will have the added distinction of being the first since 1926 to have no New Student Camp. Instead, there's going to be New Student Orientation, and it's going to be right on campus.

Since January a committee of faculty and students has been meeting to evaluate the Institute's approach to orientation, and switching sites back to the campus was one of the early suggestions. It grew out of the thought that the new students would benefit from learning their way around the Institute and the Los Angeles area as soon as possible.

"When we came up with the possibility of shifting the locale, a whole lot of other new ideas opened up," says David Wood, associate dean of students and the man in charge of freshman orientation. "We're going to see how some of them work."

The orientation program originated back in 1919 when the Caltech YMCA sponsored an evening reception in honor of the freshmen. Eventually that expanded into a day-long, on-campus briefing that still later became an overnight camp-out. The Institute took over freshman camp in 1946 under the direction of Dean of Freshmen Foster Strong. For the next 23 years all new students went to the mountains for two and a half days. There they were offered a melange of speeches, athletics, and entertainment to facilitate their getting to know some of Caltech's traditions and expectations, each other, and some of the people they were likely to run into—or at least hear about—after they got back to campus.

The long weekend wound up with a formal reception at the president's house after everyone was back in Pasadena. But in the fall of 1969 President and Mrs. Brown replaced that part of the program with a Sunday morning swimming and pizza party.

This year campus tours are on the agenda early on the first day of orientation, Thursday, September 24. The program will still include talks about academic and personal life at Caltech and the Honor System, but most of the usual formal speeches are being eliminated to give the students more time to get acquainted with each other.

To demonstrate the broad spectrum of research on campus, a dozen faculty members will offer 30-minute seminars over a two-hour period on Thursday afternoon. Each will describe his particular research activities and answer questions, and each freshman will be urged to sample two or three of these presentations.

Each faculty counselor will be encouraged to invite his group of students to his home for dinner on Thursday evening. Since, as far as possible, these counselors will be the regular freshman advisers, many of the new students will be dealing from the beginning with the advisers they will have throughout the year.

The president's party will again center on swimming and pizza, but this year it will be on Friday afternoon and will be an integral part of the orientation program.

A theater party is planned for Friday night, with a repertory company from Los Angeles to present a play on campus. Plans are being made for inviting girls from other schools who are also in the midst of orientation activities to attend. There will be a bus tour of the Los Angeles area on Saturday, and topping it all off—at least for those who choose to buy their own tickets—will be the baseball game at Dodger Stadium on Saturday night.

New Chairman

Robert B. Leighton, professor of physics and staff member of the Hale Observatories, has been named chairman of the division of physics, mathematics and astronomy at the Institute. On September 15, Leighton, an alumnus ('41, PhD '47) and a member of the Caltech faculty for 23 years, will succeed Nobel laureate Carl D. Anderson, who has been chairman since 1962. Anderson, with whom Leighton collaborated years ago in using cosmic rays for studying atomic particles, will resume research.

A physicist who has also made many contributions in astronomy, Leighton was principal investigator of the Mariner spacecraft television experiments that returned the historic closeup photographs of Mars. With Caltech planetary scientist

Bruce Murray he suggested that the martian polar caps are composed of dry ice, not water ice.

Working with Caltech physicist Gerry Neugebauer, Leighton launched an infrared survey of the sky and discovered stars with surfaces as cool as that of the planet Venus. He also found oscillating waves and giant convection cells on the sun's surface. In earlier research in atomic physics, he collaborated in discovering new subatomic particles and their decay products.

Many of Leighton's discoveries were made with instruments that he designed and built; these include the first cloud chamber to operate from a balloon at high altitude; a 62-inch infrared telescope; and a unique Doppler shift and Zeeman effect camera. He has also built a large telescope at his home, and he ground its 16-inch mirror himself.

Leighton is a member of the National Academy of Sciences and the American Academy of Arts and Sciences. In 1967 he won the American Institute of Aeronautics and Astronautics space science award for his work with the Mariner television experiments. He is author of the textbook *Principles of Modern Physics* and co-author of *The Feynman Lectures* physics textbooks.

New chairman Leighton

Retiring chairman Anderson

JPL and the Campus

A faculty-Jet Propulsion Laboratory committee has recommended that closer ties be developed between JPL and the campus. The study committee, appointed by Harold Brown in June 1969, was composed of seven Caltech faculty—with biologist Norman Horowitz as chairman—three senior staff members from JPL, and two observers, one an undergraduate and the other a graduate student.

Caltech founded JPL in the late 1930's for rocket research and has managed JPL for NASA since 1958. The committee advocated continuation of the relationship as long as JPL's scope and style are appropriate to a university-affiliated laboratory, and as long as meaningful interactions with the campus exist. It also said that JPL must enrich the educational and research activities of Caltech, primarily through involvement of students as well as faculty in JPL projects.

During the past two years, about 20 percent of Caltech's faculty have been directly involved with JPL in a variety of ways—as principal investigators on spaceflight experiments, on joint research projects at JPL, in JPL-sponsored campus research, on student thesis research at JPL, and as consultants on special problems.

In 1968 Caltech and NASA reached an agreement that provided JPL with increased flexibility to work with the Caltech campus and with other universities. At that time Caltech was called upon to regard its stewardship of JPL "not only as a contract but as a public trust and that NASA, for its part, exercise restraint in those administrative matters which is consistent with the recognition of Caltech's function as a trustee for the university community." At present JPL has research contracts with 27 other universities and research institutions.

The committee's report urged that JPL be as open and unrestricted as possible and that no classified work be conducted there except in special cases for which an urgent national need exists and for which approval is given by Caltech's president after consultation with the faculty board. JPL has reduced its classified work from essentially 100 percent 15 years ago, when it was operated by Caltech for the Army, to less than 1 percent now.

The 1968 agreement also authorized JPL to seek sponsorship for work at JPL from federal agencies other than NASA. About 2 percent of JPL's work now is in non-space areas—such as medical engineering, transportation, and ecology—with funding primarily from NASA. However, support for some tasks is now coming from the National Institutes of Health, Department of Transportation, and the National Science Foundation.

Among the committee's proposals was one urging that the Caltech faculty committee on graduate study develop policies and procedures for graduate students who wish to do thesis work at JPL and for JPL employees who wish to do part-time graduate study toward a degree at Caltech.

Bing Professorship

The Bing family has endowed a professorship in behavioral biology at Caltech. Peter Bing, MD, and his mother, Mrs. Anna Bing Arnold—who is a life member of The Associates of the California Institute of Technology—made the gift through the Bing Foundation.

Robert Sinsheimer, chairman of the biology division, says about the gift that "We in biology believe we have a vital role to play—to bring to bear the power of natural science upon the essential problems of human health and behavior. We now have confidence that the time is at hand for major developments in these subjects."

The Bing endowment brings to eight the number of named professorships at the Institute: two in theoretical physics, and one each in aeronautics, biology, behavioral biology, chemistry, jet propulsion, and psychobiology.

Awards

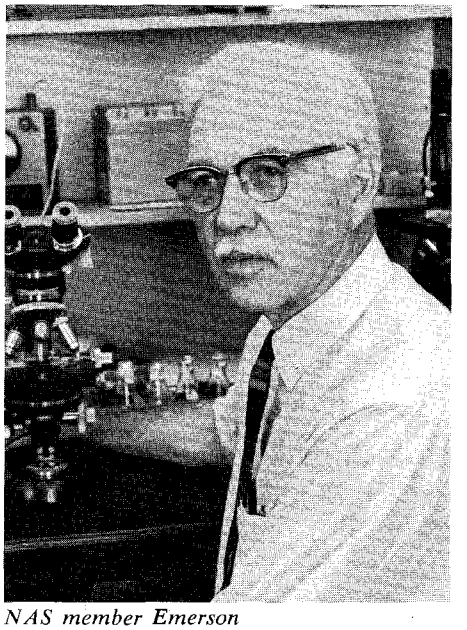
Two faculty members are among 50 scientists who were elected to the National Academy of Sciences in April. Robert B. Corey, professor emeritus of structural chemistry, and Sterling H. Emerson, professor of genetics, bring to 35 the number of Caltech faculty in the academy.

Corey's work in the early 1950's is credited with laying the groundwork for current widespread studies of the detailed structures of proteins. Through X-ray crystallography he determined the interatomic distances and group configurations of amino acids and other organic substances related to proteins. Later, collaborative studies with Linus Pauling explored conformations that may be physically possible for polypeptide chains. Corey also designed some of the first accurate, space-filling molecular models of proteins. He was one of the pioneers in the study of biologically important macromolecules, a field that has now become one of the most exciting and rewarding fields of science.

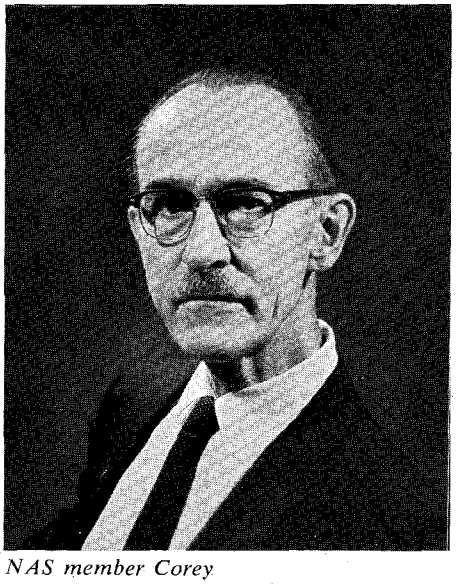
A graduate of the University of Pittsburgh in 1919, Corey received his PhD degree in 1924 from Cornell University, where he taught chemistry until 1928. For the next nine years he was on the staff of the Rockefeller Institute and then came to Caltech in 1937.

Emerson, a former president of the Genetics Society of America, is recognized for significant contributions to the study of genetic recombination and conversion in a number of organisms. He has made notable advances to the development of the translocation interpretation for the cytogenetic behavior of the evening primrose. His derivations and analyses of slime mutants in *Neurospora* have provided a system for investigating genetic transformation in the fungi; through his experiments with the effect of sulfonamides upon the growth of *Neurospora,* he has discovered a biochemical model for a type of hybrid vigor: one-gene heterosis. Emerson's recent experiments with the fungus *Ascobolus* have provided new quantitative data on intragenic recombination.

After graduating from Cornell University in 1922. Emerson did further study at the University of Michigan. He received an AM there in 1924 and a PhD in 1928, after which he came to Caltech as assistant professor of genetics.



NAS member Emerson



NAS member Corey

Francis H. Clauser, chairman of Caltech's division of engineering and applied science, was elected in April to the National Academy of Engineering. He was cited for his "innovations in engineering research and education."

Clauser's research includes work on the design of aircraft and space vehicles, and on compressible fluid flows, turbulence, magnetohydrodynamics, boundary layers, and the behavior of nonlinear systems. In education, he has been an innovator in establishing a more comprehensive base for undergraduate instruction in engineering and science. He feels that engineers today must be more science-based, more broadly educated, and more socially conscious than they used to be.

After taking his BS from Caltech in physics in 1934, Clauser, who is Clark Blanchard Millikan Professor of Aeronautics, received his MS in mechanical engineering in 1935 and his PhD in aeronautics in 1937. He spent nine

AAAS fellow Horowitz

NAE member Clauser

years at Douglas Aircraft Company before going to Johns Hopkins University in 1946 to found its department of aeronautics. Before returning to Caltech last year, Clauser was vice chancellor for academic affairs at the University of California at Santa Cruz, where he went in 1965 to establish the school of engineering.

Norman H. Horowitz, professor of biology and head of the bioscience section at the Jet Propulsion Laboratory, has been elected a fellow of the American Academy of Arts and Sciences. Horowitz is noted for his work in biochemical genetics. Through investigation of the enzyme tyrosinase in *Neurospora*, he has sought to understand the adaptive differentiation represented by the formation of a fruiting body in *Neurospora* in response to certain environmental conditions. As a space biologist he has done analyses of the photographs of Mars taken on JPL's two 1969 Mariner missions, and is working on the design of automatic experiments to be sent to the planets on unmanned probes. Horowitz received his PhD at Caltech in 1939 and has been a member of the Caltech faculty since 1947.

Lepton's-Eye View

Physics 10, an elective for freshmen taught by Robert Leighton, is designed to let students get more deeply involved in some of the topics covered in their freshman physics course. This year one of Leighton's students, Elliot Tarabour, penetrated so far into the subject matter that he was able to write this fable from the point of view of the elementary particles themselves.

I, Lenny the Lepton, am serving a 99 nanosecond term in San Quantum prison. I was arrested and convicted of having a strong interaction with a K-meson before she was of the age of consent. But my story is not what I'm writing about now. What is more important is the story of my former cellmate, Eddie the electron. I am writing in the hopes that his story may give you beings of the large world a little insight into our little world, and that you may realize that we, although many orders of magnitude smaller, have emotions and feelings just as real as yours. And so I present to you . . .

THE ILL-FATED LOVE STORY OF EDDIE THE ELECTRON

One day as Eddie was doing his usual job, patrolling as a 2p electron, a photon struck his atom. This was not an unusual occurrence, but it was Eddie's turn to be promoted so up he jumped to a d-orbital. As he was orbiting, he saw something that made his heart leap. There in a nearby anti-atom was the most beautiful positron he had ever seen. The next orbit around he waved to her and she waved back. Oh, this was too much for him! The photon was soon emitted and he dropped back into his usual spot in the p-orbital. But he was a different particle. In those few fleeting pecoseconds that he saw her he felt something strange and wonderful. Eddie was in love.

From that day on he could do nothing right. He just dreamed of the day that he would have the bond energy to break away and be with his beloved positron. He applied for valence liberty but got turned down. His behavior was so erratic that he was finally called before the board of electrons to be reproached for his behavior.

"Eddie," said the head electron, "You've always been a good stable particle, but lately we have reports that you've been acting rather irregular. Do you have any explanation for your actions?"

"Well sir, it's just that the job is so Bohring." He hesitated for a nanosecond and then said, "If you must know the truth, I'm in love with Patsy the positron from that anti-Lithium atom. I know this is a serious violation, and you can do anything to me—annihilate me, make me become a lowly s-electron, even cut off my Schroedinger. I don't care; I'll still love her."

"But she's from the wrong side of the particle tracks."

"I don't care; there's some strange attraction between us."

"We will consider your case now.

We'll call you when we reach a verdict."

Eddie felt dejected. He thought the board of electrons would react negatively to him. He became very depressed and began writing poetry.

6800 A. is red
4000 A. is blue
The strongest force that is
Exists from me to you.

Oh Patsy, I'd climb the highest
energy barriers
I'd swim through the highest waves
Just to be in the positiveness of your
field
But alas, my love,
Fate has decreed us to be
apart, so all we can do is dream.

The more Eddie wrote the more depressed he got. He started drinking. Then one day down at the local H-bar an Omega minus made a crack about him being so stupid as to fall in love with a particle that would annihilate him if they came in contact.

Eddie got riled and made a foolish mistake. He said, "I am going to hit you right in the head with a momentum of 1.8024739424 x10^{-23} gram-meter/second." If he hadn't been so exact, he would have avoided a lot of trouble. But by doing so, he specified his position and momentum more accurately than is allowed by the law.

Eddie was arrested for violating the Heisenberg Uncertainty Principle—a serious offense. As he was brought into court, the crowds were screaming, "Make him walk the Planck."

Well, the court sentenced him to 20 nanoseconds in San Quantum—where I met him.

It was in the prison library that he read about a new theory—that by concentration electrons can develop enough energy to break the bonds that hold them to the nucleus. He suddenly showed a great deal of interest, and tried to get himself excited enough to escape. He worked diligently and finally was ready.

When he left, there was a tear in my eye. I can still hear his last words.

"Remember, Lenny," he said, "love is as fundamental as a quark." And then he disappeared.

That concludes the story of Eddie and his love affair. He did find his beloved Patsy, and they came together and annihilated each other in a blazing white photon. And if you ever see a certain gleam in your special someone's eye, chances are it is the photon that Eddie and Patsy created by their final act of love.