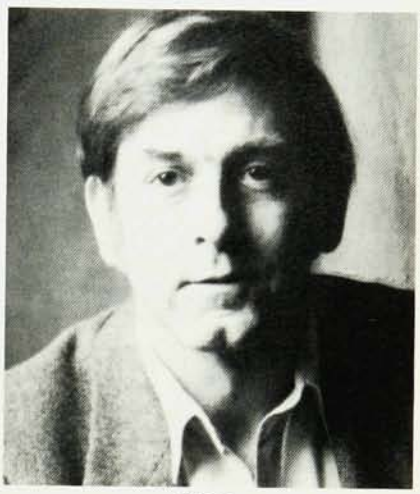
Libchaber and Turco are among new MacArthur Fellows

"I feel free now" is how Albert Joseph Libchaber describes his response to receiving one of the John D. and Catherine T. MacArthur Foundation's "genius" fellowships. The acclaimed expert on turbulence and chaos joins atmospheric scientist Richard Peter Turco, one of the shapers of the "nuclear winter" theory; x-ray crystallographer Jane Richardson, who has designed novel representations of protein structures; and Russian-born physicist and human-rights activist Valery Chalidze among the 1985 and 1986 recipients of the five-year, "no strings attached" awards.

LIBCHABER



AMY ETRA

TURCO

RICHARDSON

A professor in the department of physics, the Enrico Fermi Institute and the James Franck Institute of the University of Chicago, Libchaber received undergraduate degrees in mathematics from the University of Paris (1956) and in engineering from the Ecole Nationale Supérieure des Telecommunications (1958). He obtained his MS from the University of Illinois (1959). In his PhD work, done under Pierre Aigrain at the Ecole Normale Supérieure, Libchaber showed that in a semiconductor in a dc magnetic field, one can propagate electromagnetic "helicon waves" along the magnetic field—the first observation in semiconductor physics of the plasma-physics phenomenon known as "whistlers." After getting his PhD in 1965, Libchaber joined the technical staff at Bell Laboratories for a year, then returned to the Ecole Normale as Maître de Recherche of CNRS. His work from 1965 to 1972 focused on various kinds of mode propagation—the so-called plasma effect—in metals. He then turned to low-temperature physics of liquid and solid helium. In 1979 Libchaber and Jean Maurer (CNRS) made the first experimental observation, in a convective cell containing helium, of the "bifurcation cascade" that Mitchell J. Feigenbaum (then of Los Alamos National Laboratory) had predicted to characterize transitions to turbulence by period doubling (see PHYSICS TODAY, April, page 71).

In 1983 Libchaber moved to his current position at Chicago, where he recently obtained an additional degree of freedom in his turbulence studies by applying an electromagnetic field to mercury in a convective cell (see PHYSICS TODAY, April, page 17). Libchaber intends to use his fellowship money—a total of $248 000—"for scientific work only—part on visiting work at other institutions, part on equipment for my own laboratory and part on I don't know yet." He has developed interests in such organic-chemistry topics as membrane interfaces, and says that now he "can go work in a biology lab for a year if I like"—not a surprising desire, perhaps, for a man who hopes one day to help explain "the shapes of leaves and the development of animals from embryos."

Turco, a researcher in atmospheric physics and chemistry at R&D Associates in Marina Del Rey, California, was praised by the MacArthur people as "an independent thinker within the defense community." Turco holds a BS from Rutgers (1965) and an MS (1967) and PhD in electrical engineering (1971) from the University of Illinois at Urbana. In 1971 he worked at NASA's Space Science Division at the Ames Research Center (Moffett Field, California), then moved to R&D Associates. Under contract to NASA, he has worked there studying planetary atmospheres, climatology and ozone photochemistry. His early investigations of the Earth's stratospheric ozone layer and the layer of sulfate particles found in the same region led into studies of the climatic effects of volcanoes. With Brian Toon, Thomas Ackerman and Jim Pollack (NASA Ames Research Center), Turco did careful simulations of the effect of atmospheric dust clouds on the transmission of solar radiation in connection with Luis Alvarez's hypothesis that a meteor-raised "extinction dust cloud" accounts for the disappearance of the dinosaurs (along with a

host of other creatures) at the end of the Cretaceous period.

Paul J. Crutzen (then of the National Center for Atmospheric Research in Boulder, Colorado; now at the Max Planck Institute for Chemistry) and John Birks (University of Colorado) were studying the problem of ozone depletion after nuclear explosions when, in Turco's words, they "stumbled upon" the important realization that nuclear explosions would generate large fires and copious smoke. Turco recounts that this fortuitous finding by Crutzen and Birks led him and his NASA colleagues, along with Carl Sagan (Cornell University), to "put together dust and smoke and come up with nuclear winter"—the idea that after a nuclear war, land temperatures could drop below freezing over large areas even in summer (see PHYSICS TODAY, September 1985, page 58). The ozone layer has remained one of Turco's interests, and he is currently on a NASA advisory committee planning a mission to Antarctica to study the "ozone hole"—a deep depression in the ozone layer over the South Pole. (See the news story on page 20.) Turco says that for the time being he doesn't intend to let his 1986 MacArthur award divert him from his ongoing work, which includes the guidance of a major research program on nuclear winter involving both theorists and field workers. Over the long term he hopes that the $216 000 fellowship will buy him some time to write about nuclear winter as well as enable him to diversify his research.

Richardson, a medical research associate professor of biochemistry and anatomy at Duke University, thinks that her unusual career path may have appealed to the MacArthur Foundation: She holds no PhD, having turned away from graduate work in philosophy of science to work as a lab technician in x-ray crystallography at MIT. Richardson received BA degrees in philosophy, mathematics and physics from Swarthmore College in 1958, and got an MA in philosophy of science and an MAT in natural sciences from Harvard in 1966. In 1962, however, she had begun collaborating on the protein crystallography of the *Staphylococcus aureus* extracellular nuclease with David C. Richardson, a Swarthmore classmate whom she married a year later. From 1966 to 1969 she joined him at MIT and together they finished working out the nuclease's structure to 2-Å resolution. Next she worked for a year as a general physical scientist at the National Institutes of Health, and in 1970 she and her husband went to Duke. During studies of the enzyme copper, zinc superoxide dismutase, Richardson noticed that it has secondary and tertiary structural features—

particular ways in which its linear amino acid sequence folds—in common with the better-studied immunoglobins. This discovery sparked her interest in comparing and classifying proteins on the basis of their arrangements of such structures as β sheets and β turns. A difficulty in doing such work is that when traditional ways of representing amino acid sequences are used to portray folded proteins, secondary and tertiary features tend to get obscured in a wealth of primary detail. But Richardson overcame this problem by devising a now widely used system for making simplified drawings of protein structures. As Richardson and her coworkers studied structure they began to infer rules about how proteins fold, and since 1983 they have been attempting to design and synthesize simple proteins with "overdetermined" structures to see how well the structure predictions hold up. Richardson is using her 1985 MacArthur award of $220 000 for "things one couldn't do some other way," such as funding her protein-design work, which the Navy used to support. The remainder of the money she may "just hang on to until the right thing comes along."

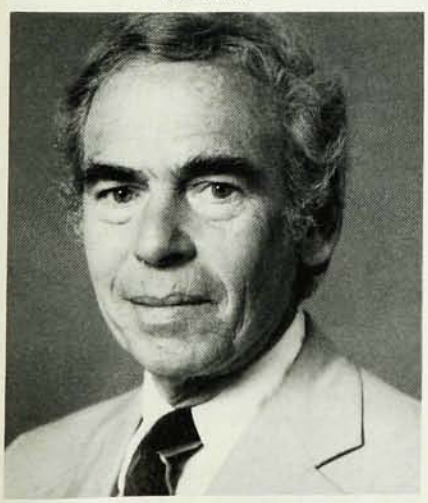
Chalidze, a 1985 MacArthur Fellow, began his human-rights work while still in the USSR. After studying theoretical physics at Moscow University and Tbilisi University (where he received his diploma in 1965), Chalidze went to work at the Institute of Plastics in Moscow. There he headed a unit doing experimental and theoretical research on such topics as high-speed deformation and the reaction of explosive polymers. In 1970 he founded the Moscow Human Rights Committee with Andrei Sakharov and Andrei Tverdokhlebov. An invitation from Georgetown University to lecture on his human-rights work brought Chalidze to the US in 1972, but during the visit the Soviet government stripped him of his citizenship and prohibited his return. Since then he has resided in the US, doing research and writing on Soviet and international law, some of it under contract to the State Department. From 1973 to 1983 he was director of the International League for Human Rights. Chalidze founded the nonprofit Khronika Press, now the major publisher of Russian-language human-rights material from the USSR, in 1973; he continues to serve as its publisher and editor in chief. Throughout, he has continued to do theoretical work in physics, albeit without affiliation with any scientific organization. Since 1984 he has also done independent work on neurolinguistics. Chalidze says that he is using his $220 000 grant to "continue my work as usual, but with more opportunity to work."

—JESSE HOCHSTADT

Frieman replaces Nierenberg at Scripps

Edward A. Frieman, formerly executive vice-president at Science Applications International Corporation, in July replaced William A. Nierenberg as director of the Scripps Institution of Oceanography and vice-chancellor of marine science of the University of California, San Diego. Frieman received his BS (1946) from Columbia and his MS (1948) and PhD in physics (1951) from the Polytechnic Institute of Brooklyn. He was a professor of astrophysical sciences at Princeton and deputy director of the university's plasma-physics laboratory from 1952 to 1979. He served as director of the Office of Energy Research at the US Department of Energy and as DOE's assistant secretary from 1979 to 1981. In 1981 he became executive vice-president at Science Applications. Frieman is a member of the White House Science Council and JASON; he served as chairman of the latter from 1976 to 1978. His research interests include theoretical plasma physics, hydrodynamic stability and astrophysics.

FRIEMAN



NIERENBERG

Nierenberg had been director of Scripps since 1965 and vice-chancellor of marine science at San Diego since 1969. He received his BS (1939) from the City College of New York and his MA (1942) and PhD (1947) in physics from Columbia University. While at Columbia he was a section leader in the Manhattan Project (1942–45) and an instructor (1946–48). He was an assistant professor at the University of Michigan (1948–50) before becoming an associate professor of physics at the University of California, Berkeley, in 1950. He was named a full professor at Berkeley in 1954. Nierenberg established atomic-beams labs at Berkeley and at the Lawrence Radiation Lab in Livermore. He has studied the electronic and nuclear properties of radioactive atoms, gas diffusion theory and the propagation of sound in the ocean. As director at Scripps Nierenberg oversaw programs such as the NSF Deep Sea Drilling project, the North Pacific experiment—a study of the interaction between the upper waters of the North Pacific and the overlying atmosphere—the Sea Grant Program and the Geochemical Ocean Sections Study. He was a member of the US national commission for UNESCO from 1963 to 1970. He has been an adviser-at-large to the Department of State since 1968 and a member of the department's advisory committee for science and technology issues since 1979. Nierenberg served as the first chairman of the National Advisory Committee for Oceans and Atmospheres from 1971 to 1977. He was a member of the National Science Board from 1972 to 1978, and was appointed to the board by President Reagan for a term running from 1982 through 1988. Nierenberg has been a participant in JASON since 1962 and is now its chairman.

Peierls and Woolfson honored by the Royal Society

The Royal Society has honored the following individuals with medals for 1985:

Sir Rudolf Peierls, emeritus professor of theoretical physics, University of Oxford, received the Copley Medal for his "fundamental contributions to a very wide range of theoretical physics, and signal advances in proposing the probable existence of nuclear chain reactions in fissile materials." Peierls studied physics in Berlin, Munich (with Arnold Sommerfeld), Leipzig (with