One example of dissipative structure is the Bénard instability in hydrodynamics. When a pan of liquid is heated from below, regular convection cells appear spontaneously when a sufficiently large value of the temperature gradient is attained. The structure is completely dependent on the heat supply and disappears when it is removed. A second example is a town, which can only survive as long as it receives food, fuel and other supplies and has adequate removal facilities for waste. It is well known in electrical circuits and mechanical problems that oscillations, waves and multistable systems can occur.

In 1952 Alan Turing constructed a chemical model showing instabilities to explain the chemical basis of morphogenesis. Turing found that reaction-diffusion equations can give rise to macroscopic spatial structures.

In the late 1960's Prigogine and Rene Lefever developed a model, generally known as the "Brusselator," of a nonlinear chemical reaction with a feedback mechanism. Using a computer to solve the model, they found a spatial inhomogeneity arising spontaneously, far from chemical equilibrium.

The theory of dissiptative structures has been applied to a wide variety of topics—in chemistry, biology and sociology. Some of the mathematics has used the approach of bifurcation theory, which deals with the appearance of new types of solutions of different equations at critical or bifurcation points.

Prigogine and his collaborators have tried to understand the physicochemical basis of the maintenance of life, how the structures observed in living things arise from an inert, prebiotic mixture of simple molecules, and finally, biological evolution. Stimulated by this work, Manfred Eigen has recently developed an extensive theory of prebiotic evolution.

The work of Prigogine has not been limited to the macroscopic aspects of thermodynamics, as he has devoted a great deal of effort to develop a kinetic theory of matter, which displays the microscopic meaning of irreversible processes. He has also been active in the field of chemical solutions, including polymers and isotopic mixtures. Prigogine's interest in the formulation of structures extends to operations-research problems, such as traffic science.

Prigogine was born in Moscow and educated in Brussels, where he earned his PhD at the Université Libre in 1945. At the university he is professor of physical chemistry and theoretical physics and director of the International Institute of Physics and Chemistry. In addition, he is director of the Center for Statistical Mechanics and Thermodynamics, which he founded in 1967, at the University of Texas in Austin, where he also is professor of physics and chemical engineering.

—GBL

the physics community

AIP publishes annual graduate-student survey

The number of graduate physics students and degree recipients has continued to decline, and employment possibilities for the newly graduated master's recipient have decreased sharply, as reported in the *1975–76 Graduate Student Survey* compiled by the American Institute of Physics Manpower Statistics Division. A statistical breakdown between experimentalists and theoreticians, the first such differentiation attempted in the survey, points to an additional handicap (in employment offers) suffered by theoreticians.

The annual survey supplies basic information on various characteristics of the physics and astronomy graduate-student population: total numbers, sources of support, job offers, minority representation, and so on. The data represented in the report come from 5817 individual graduate students whose names were supplied by the department chairmen.

A sharp increase among those with no job offers, from 20% to 28%, was indicated for the newly graduated master's degree holder and a concurrent drop in multiple job offers, from 24% to 17%, was noted for the same group. Graduates from doctoral programs experienced a leveling-off in the numbers without job offers and an increase, 35% to 39%, among those with multiple job offers.

The survey also found that among graduating PhD's a discontinuity exists in the employment possibilities for theoreticians and experimentalists: on the doctoral level, 10% more theoreticians than experimentalists were unemployed and without job offers. A further finding demonstrates that on average an experimentally oriented dissertation requires 5.2 years of study as compared to 4.9 years for a theoretically oriented dissertation.

Women, after accounting for 10% of the total graduate-student population in 1975, declined in numbers to 8% this year, although among minority-student groups women represent approximately 13%.

Free copies of this survey may be obtained from Susanne D. Ellis, AIP Manpower Statistics Division, 335 East 45th Street, New York, N.Y. 10017.

Fritz London Award nominations sought

Nominations for the Tenth Fritz London Memorial Award are being solicited. The prize is offered in recognition of outstanding contributions to basic research in low-temperature physics. The recipient will be presented with the award at the LT15 conference in Grenoble in August, 1978. Nominations should be sent no later than March 1978 to Ralph P. Hudson, Chairman of the Committee for the Tenth Fritz London Memorial Award, National Bureau of Standards, Washington, D.C. 20234.

in brief

The National Science Foundation has awarded 18 Public Service Science Residencies and 10 Internships under its Science for Citizens program. These awards, the first to be made under the program, are aimed at improving public understanding of science and technology and their societal impact.

David G. Hummer has recently been elected 1977–78 chairman of the Joint Institute for Laboratory Astrophysics, the research facility co-sponsored by the National Bureau of Standards and the University of Colorado, Boulder. Hummer has been a staff member of the Joint Institute since 1966, and has served previously as chairman, 1973–74.

Edward E. David Jr, a consultant to government, industry and universities who served as director of the Office of Science and Technology and also as science adviser to the President, 1970–72, has been chosen president-elect of the American Association for the Advancement of Science.

The American Institute of Physics Center for History of Physics has received a $35 000 grant from the National Science Foundation for a pilot study on the documentation of post-World War II physics and astronomy, particularly at government laboratories. Brookhaven National Laboratory will be the subject of the ten-month pilot study, which is to be the first phase of a proposed three-year project involving further government-contract laboratories.

The mailing list for the AIP Center for the History of Physics *Newsletter* is being updated following the mailing of the November issue. For a free subscription write: Center for History of Physics Newsletter, 335 East 45th Street, New York, NY 10017. □