of American Research, Santa Fe, New Mexico, until 1952.

In 1915 Professor Cummings accepted an invitation from the University of Arizona to establish a department of archeology and to develop a state museum from the nucleus of zoologic and geologic specimens then on hand. He continued as head of the department and as director of the museum until he retired in 1938 with the title of director emeritus. During his 23 years on the university faculty he was also dean of the College of Letters, Arts, and Sciences, 1918–21; dean of men, 1918–21; and acting president in 1921 and in 1927–28. His tireless service in the crowded university hospital, day and night throughout the influenza epidemic of 1918, is still remembered by students of the period.

In Arizona and in Utah Professor Cummings was a leader in archeological exploration and in organization of local archeological societies. He led the Utah party that discovered Rainbow Natural Bridge on 14 August 1909 and those that discovered Betatakin, Inscription House, and other famous Arizona ruins now administered by the National Park Service. He was leader of the National Geographic Society expedition that laid bare the lava-covered pyramid of Cuicuilco, in the Valley of Mexico, 1924–25. His last major archeological contribution was at Kinishba, a great ruin on the Apache reservation, Arizona, excavation of which he began in 1931 and continued until June 1939. He restored part of the ruin and built a local museum, which he cared for until 1946 when, at the age of 86, he withdrew to give full attention to his writings. A partial bibliography appeared in *For the Dean,* a volume of essays by 22 former students then professionally engaged in anthropology, published in 1950 in recognition of his 90th anniversary. His latest book, *First Inhabitants of Arizona and the Southwest,* appeared 19 September, 1953 on the eve of his 93rd birthday.

A man of unusual warmth and understanding throughout his long career, Dr. Cummings drew people to him from all walks of life. Neighbors and faculty members, as well as university students, went to him for counsel. In a little volume, *Indians I Have Known* (1952), he reviewed a few of the friendships he had made among the Navajo and Apache. He was a fellow of the American Association for the Advancement of Science and a fellow or member of numerous other professional societies. In 1896 he married Isabel McLaury, who died in 1929. He is survived by his second wife, Ann Chatham, whom he married in 1947, and by a son of the first marriage, Malcolm B. Cummings.

NEIL M. JUDD
U.S. National Museum, Washington, D.C.

News and Notes

Some New Scientific Trends in Meteorology

A conference on the significance and possibilities of high-speed computing in meteorology and oceanography was held at the University of California in Los Angeles, 13–15 May. The conference, sponsored by the National Science Foundation was attended by about 40 scientists, including meteorologists, oceanographers, mathematicians, and fluid dynamicists. Most of the discussion of meteorological problems was concerned with the motions of the atmosphere. The fundamental laws of these motions are based on theoretical and experimental information available from fluid-dynamics studies, and they are applied with much success whenever the flow conditions are relatively simple, as is mostly the case in physics and engineering. However, in most meteorological problems, the fluid motions are extremely complicated and involve energies of relatively great magnitudes. The meteorologists have, therefore, of necessity been forced to build a new discipline, based partly on existing physical laws and partly on insight into atmospheric phenomena gained from long experience.

While the art of meteorology was thus being continually improved, important advances were being made in fluid dynamics and in pertinent mathematical techniques. Moreover, high-speed computing techniques came into being. With this newly acquired knowledge and facilities, a fundamental approach to problems of atmospheric motions has become possible. Electronic computing machines can now, within a reasonable time and without requiring thousands of human operators, apply such laws to many complicated meteorological problems. High-speed computing techniques can also be of assistance in testing those fundamental laws of physics that are not yet well established, and they can help in handling and analyzing the enormous amount of numerical data needed to describe atmospheric motions.

Numerical weather forecast, using high-speed computing equipment, is already an object of extensive studies, particularly in the United States and the United Kingdom. From known meteorological conditions over the United States, the general flow pattern can already be determined, 1 or 2 days ahead, for a large part of the country. Comparisons between the numerically determined charts and those observed 1 or 2 days later appear to be encouraging. With further scientific development, predictions of large-scale flow patterns, located correctly within, say, 200 mi will be made on a routine basis. The next step will be to connect with each flow pattern smaller scale motions combined with humidity and temperature fields and to

predict the weather on a scale at which it affects living conditions. The trajectories and development of tropical cyclones are being investigated in Japan. Some basic work has been done on tornadoes and hurricanes. Numerical forecast of the meteorological conditions leading to disastrous floods has been proved to be possible. These and other purely meteorological problems are of major importance in certain areas, and their further studies await the scientific development now made possible.

The study of the relationship between large-scale patterns and the smaller-scale phenomena, which is our local weather, must be based on a better knowledge of the atmospheric processes. Such knowledge can be acquired from extensive atmospheric data obtained under various meteorological and geographic conditions. However, the enormous amount of available data and their extreme complexity make it practically impossible for a meteorologist to digest them and to grasp fully their significance. A great many already available measurements therefore, remain unexploited; other significant meteorological data are not even collected, because of the time and labor required to analyze them. High-speed computing techniques now make possible the analysis of these data and their availability to the scientist in a usable form.

In most fields of science the use of electronic computors speeds up our knowledge and its technologic application. There is, however, an even more significant contribution of these machines, which is of particular importance to the future of meteorology. In such problems as weather prediction, the meteorologist does not even find time to apply all the laws that are already known. He, therefore, makes a general diagnosis of the meteorological situation and determines his forecast on its basis. There is, in such a prediction, some guessing in which experience is necessary and where some luck is helpful. No two human forecasters will reach precisely the same conclusions. A computing machine has the objectivity of an unimaginative mathematician; it will not guess, but it will give numerical solutions of the problem by applying the laws of physics. An incorrect forecast will indicate to the meteorologist how his instructions to the machine should be improved. The meteorologist will be able to determine his weather predictions on the basis of much more objective information.

Oceanography is expected to be advanced by high-speed computing techniques, although for the moment only some problems should be studied by these methods. Electronic computors can be also used with profit to study the interaction of the wind and sea motion and to extend the present calculations of the dynamics and energy dissipation of tides.

Atmospheric pollution of an industrial area has now become a major problem in many communities. Such areas face the problem of reducing the degree of contamination without detriment to many of those human activities that produce it and are necessary to the well-being of the population. Here again high-speed computing methods will make possible the application of the laws of physics to the solution of a large part of the problem. Using meteorological data, one will be able to determine the distribution of contaminants originating at each of the sources of pollution in the area. The relative contribution of each of the pollution sources to a possibly dangerous contamination, under various meteorological conditions, can then be determined. It may then be possible to use electronic machines to predict the contamination patterns and to protect the population when the meteorological conditions may become particularly dangerous. Atmospheric pollution studies become even more important with the development of nuclear energy, which is responsible for radioactive contamination.

The conference steering committee had the following membership: J. von Neumann, chairman (The Institute for Advanced Study); F. N. Frenkiel, secretary (The Johns Hopkins University); J. Kaplan, local member (University of California, Los Angeles); C. Eckart (Scripps Institution of Oceanography); B. Haurwitz (New York University); G. P. Kuiper (Yerkes Observatory); H. K. Stephenson (National Science Foundation); and H. Wexler (U.S. Weather Bureau). The local conference committee from the University of California, Los Angeles, was composed of L. M. K. Boelter, M. R. Hestenes, J. Holmboe, V. O. Knudsen, and R. R. Revelle.

FRANCOIS N. FRENKIEL
Applied Physics Laboratory,
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Acoustics and the Structure of Liquids

A conference on acoustics and the structure of liquids was held 20–21 June in the Ultrasonics Laboratory of Brown University under the sponsorship of the National Science Foundation. The meeting was attended by 35 experts from the United States, Belgium, Germany, Great Britain, India, and Italy. The participants were accommodated on the campus, and the arrangements thus included not only the presentation of scheduled papers but, more important, free and informal discussion of all points raised. For convenience, the regular sessions were assigned to four broad areas: compressional and shear waves in liquids; acoustics and chemical reactions; sound waves and theories of liquids; and gas nuclei and cavitation.

The structure of the liquid state has long been a challenge to both theorists and experimentalists. With the advent of precision ultrasonic equipment, it has become possible in recent times to make measurements of sound velocity and absorption coefficients over wide ranges of frequency and intensity and, through the medium of relaxation theories, to learn by acoustic means a good deal about liquids of all kinds at all temperatures and pressures. Many fascinating properties of liquids are associated with cavitation, and here again acoustics provides the most adaptable tool for their study. These and numerous other matters were taken up in detail in the conference.

At the first session, presided over by A. van Itterbeek of the University of Louvain, Belgium, John

Lamb of the Imperial College of Science and Technology, London, reported on an ingenious use of acoustic streaming produced by ultrasonic radiation to measure the sound absorption coefficient for frequencies in the neighborhood of 1 Mcy/sec of certain organic liquids like nitrobenzene, alcohol, and cyclohexane. He employs Poiseuille's law to measure the streaming velocity in a small-diameter side tube in parallel with the main ultrasonic radiation tube. The evaluation of the absorption coefficient is then carried out by assuming that it is proportional to the streaming velocity and using a standard liquid for calibration purposes. Lamb estimates the precision of this method as 5 percent or better. The method may have an important influence on future absorption-measurement techniques at relatively low frequencies.

At a subsequent session there was a great deal of discussion of the relationship between streaming and absorption. Carl Eckart of the Scripps Institution of Oceanography described his recent thinking on this problem and expressed the opinion that the well-known theoretical result that makes the streaming velocity proportional to the *total* absorption regardless of its origin (viscosity, thermal or structural relaxation, and so forth) is really only an approximation and would not hold, for example, in the case of chemical reactions taking place in a liquid near a solid obstacle. This conclusion was seriously questioned by several present, notably A. W. Nolle of the University of Texas and P. J. Westervelt of Brown. This important problem is clearly one that demands further careful study.

Other absorption studies by Karpovich at the Imperial College in London were reported by Lamb. These related to cyclohexane derivatives, the molecules of which show two-state configurational relaxation processes at relatively low relaxation frequencies. For example, methylcyclohexane has a relaxation frequency of 100 kcy/sec. The reverberation-time technique was used in these measurements, which clearly show an interesting use of acoustics as a tool in the study of the structure of organic molecules in the liquid state.

D. Sette of the Istituto Nazionale di Ultracustica in Rome presented a summary of the latest results obtained in his laboratory on absorption in binary mixtures of organic liquids. The results appear to confirm the presumption that, unlike the situation in associated liquids (for example, water and the alcohols) for which structural relaxation accounts rather well for the excess absorption over the classical (shear viscosity) value, for unassociated liquids the relaxation is largely thermal in origin, although in mixtures some molecular association may well be involved.

No discussion of the acoustics of liquids would be complete without a consideration of liquid helium. A. van Itterbeek, in reviewing recent work on the absorption in liquid helium II, indicated that the two relaxation frequencies detected at 1.4°K support to a certain extent the Landau theory of phonons and rotons.

Continuing the discussion of velocity and absorption in liquids, T. A. Litovitz of Catholic University of America thought that more attention should be paid to liquids like glycerol, which manifest both shear and compressional relaxation but do not possess a single relaxation time. He has considered it useful to compare dielectric and acoustic relaxation for such substances, taking as an example propyl alcohol whose dielectric properties have been examined by R. H. Cole of Brown. There are some suggestive agreements in relaxation times but still enough disagreements to provide interesting puzzles, particularly with respect to the relationship between molecular behavior and shear and compressional viscous flow. Further measurements of velocity and absorption for such substances over a wide range of frequencies, temperature, and pressure are contemplated. Since a glass can be treated as a supercooled liquid, some measurements of attenuation and velocity in fused silica at very low temperatures reported by W. P. Mason of Bell Telephone Laboratories were of great interest and relevance. An absorption peak has been located at about 45°K that is attributed to a relaxation in sidewise vibrations of the oxygen molecules in the Si—O—Si bonds.

In a panel discussion on *acoustics and chemical reactions* for which S. Parthasarathy of the National Physical Laboratory of India served as chairman, L. Liebermann of the Scripps Institution of Oceanography developed a theory of ionization reaction in electrolytes to explain the well-known anomalous sound absorption of solutions like magnesium sulfate. The theory assumes the coordination of water molecules with the metallic ions. Although the picture appears qualitatively attractive, it leads to much larger values of the activation energy than can be accounted for by the observed attenuation coefficients. The presentation aroused much discussion among the chemists present.

Turning aside from the chemical reaction theory of acoustic absorption, V. Griffing of Catholic University of America considered the question of how chemical reactions are produced by ultrasonics. She gave a detailed account of experiments on the ultrasonic production of free chlorine in the reaction between water and carbon tetrachloride in the presence of dissolved gases like argon, oxygen, and nitrogen. The conclusion is that such chemical effects always need the presence of cavitation and are indeed gas-phase thermal reactions taking place in the cavitation bubbles. It was pointed out that although the actual temperature rise associated with sound intensity of 5 to 10 w/cm^2 in a homogeneous medium is only a few degrees Celsius, the adiabatic compression of small bubbles by the sound can lead to temperature increases of several hundred degrees. For gas bubbles of higher specific heat ratio, one would then expect greater yields and this is found to be the case. The viewpoint was also expressed that the luminescence associated with cavitation is chemiluminescence. The paper led to much discussion, primarily of experimental details.

The conference turned next to a consideration of *acoustics and the theories of liquids,* with H. Eyring of the University of Utah acting as chairman. J. Meixner of the Technische Hochschule in Aachen presented a survey of theories of acoustic relaxation. He divided these into three fundamental categories: (i) phenomenological, employing the usual hydrodynamic equations together with a dynamic equation of state of rather arbitrary character; (ii) thermodynamic, involving a set of equations for the rates of change of internal variables of the system expressed in terms of thermodynamic affinity functions; (iii) aftereffect, or hereditary, implying the assumption that the pressure of the fluid at time t depends on the density at all previous times (integral equation approach). Meixner held the opinion that the hereditary mode of description is the most general of the three, although K. F. Herzfeld of Catholic University disagreed with this view.

M. S. Green of the University of Maryland described a new statistical mechanical theory of irreversible processes in liquids with which, in principle, the fundamental transport quantities for liquids can be calculated. The work has not yet progressed as far as the detailed evaluation. There seems to be some question whether or not the theory can lead to a frequency dependent viscosity.

An attempt was made by S. J. Lukasik of Massachusetts Institute of Technology to account for the temperature dependence of sound velocity in liquids by a hole theory. The work is tentative, but it was shown that the required hole size and activation energy of formation are reasonable. Lukasik also discussed the effect on acoustic propagation of heterophase fluctuations near the freezing point of liquids. The hole theory was also invoked by A. W. Nolle to account for the effect of large hydrostatic pressure on ultrasonic absorption. He builds a structural relaxation theory something like Hall's but with the presence of holes forming one state of the liquid. The sults appear promising, although the theory was criticized by Lamb, who thought the experimental results could readily be attributed to thermal relaxation.

H. F. Eyring interjected a brief review of some recent attempts to describe the flow of complicated liquids like rubber and the polystyrenes by means of model networks made up of non-Hookian springs.

The final topic considered by the conference was *nuclei and cavitation.* Here perhaps the fundamental question was the nature of the nuclei on which gassy cavitation starts. E. Meyer of the University of Göttingen described experiments that appear to show that air adhering to fine solid particles is responsible for the onset of cavitation, which is here measured by the change in attenuation it causes; animated discussion and questioning followed this paper. A different point of view was presented by K. F. Herzfeld, who described the theory of the late F. E. Fox that the cavitation nuclei are genuine air bubbles whose persistence, despite surface tension, is attributed to the protection of a monomolecular organic layer or skin; from this view the cavitation threshold is the sound intensity just sufficient to break the skin, so that air or other gases can diffuse into the bubble and cause it to grow. This theory has not yet been thoroughly tested experimentally.

G. W. Willard described some recent experiments at Bell Telephone Laboratories that may have a bearing on the cavitation threshold. These concern the interesting ripples or crispations formed on the surface of a small water droplet set in vigorous vibration by a barium titanate cylinder. When the intensity reaches a sufficient magnitude, the crests of these waves pop off in the form of smaller droplets with the concomitant production of air bubbles inside the vibrating drop. The possible multiplication of bubbles by this process was stressed, with presumptive application to ultrasonic emulsification, fog production, biological cell destruction, and so forth. E. G. Richardson of Kings College, Newcastle-upon-Tyne (the chairman of the panel) commented on similar crispation phenomena associated with the large cavity formed when an object is dropped into water. M. Harrison of the David Taylor Model Basin reported on water tunnel experiments leading to ripple phenomena of similar character.

M. S. Plesset of California Institute of Technology gave an engineering slant to the discussion by describing experiments in his laboratory on the growth of bubbles in superheated water. He also showed high-speed pictures of the collapse of cavitation bubbles in investigations directed toward a study of cavitation damage. I. Rudnick presented a summary of the recent studies by W. J. Galloway of the University of California at Los Angeles on cavitation threshold as a function of air content, hydrostatic pressure, temperature, and surface tension. This material is scheduled to appear in the *Journal of the Acoustical Society of America* for September.

I wish to express my grateful thanks to my colleagues W. L. Nyborg and R. W. Morse for helpful assistance in connection with the arrangements for the conference.

R. B. LINDSAY
Department of Physics, Brown University

Brazilian Congress of Chemistry

The 11th national meeting sponsored by the Brazilian Association of Chemistry was held in São Paulo, 4–10 July. The meeting was officially included in the 4th centennial celebrations of the city, and it was presided over by O. Bergstrom Lourenço of the University of São Paulo. More than 250 members attended, and their number was considerably increased by guests and visitors.

At the opening session Carlos Chagas, Jr., addressed the audience in the name of the National Research Council of Rio de Janeiro. He discussed the evolution and present status of science in Brazil, emphasizing the work of several pioneers and pointing out the difficulties that still have to be removed in order to

promote the more rapid and steady development of scientific research in the country.

About 100 papers were given before eight divisions: general inorganic and physical chemistry; analytic chemistry; organic and biological chemistry; agricultural chemistry; industrial and engineering chemistry; food, toxicological, and legal chemistry; history and chemical education; and industrial organizations and economics.

The meeting also included three symposiums. The first one dealt with special methods of analytic chemistry, and the topics discussed were spectrographic methods, microanalysis with special reference to the work of Fritz Feigl, use of organic solvents in inorganic analysis, and applications of polarography. The second symposium on basic materials for the chemical industry was devoted to a discussion of the needs and problems of the Brazilian fundamental chemical industry with respect to basic materials, such as nitrogen, caustic soda, sulfur, and cellulose. Finally, in the third symposium, attention was given to the role of petroleum in the organic chemical industry, to the preparation of azo dyes from gammexane residues, and to the chemical classification of proteins.

The highlight of the meeting was the presence of three distinguished foreign guests. Richard Klar of the University of Frankfurt, Germany, spoke on "Fundamentals of international planning of the chemical industry"; G. H. Dieke of The Johns Hopkins University talked on "Spectroscopic methods on isotope analysis"; and I. M. Kolthoff of the University of Minnesota discussed the "Fundamentals of emulsion polymerization." A fourth lecture was given by a local professor, P. Krumholz, on "The impact of molecular science on chemistry."

The Argentine Chemical Society was represented by a special delegate. The foreign scientists attended several sessions, and Kolthoff presided not only at the symposium on analytic methods, making interesting and valuable comments, but also at a 2-hr informal gathering that met to discuss problems of mutual interest, especially the recent progress in amperometric titrations and questions on the aging of precipitates.

A selected program of plant trips gave many an opportunity to visit a number of factories, laboratories, and institutions in the city and the surrounding area.

PASCHOAL SENISE
Universidade de São Paulo, São Paulo, Brazil

International Astronomical Union

The executive committee of the International Astronomical Union decided at its meeting in Liége, Belgium, in July that the general assembly in Dublin is to take place between 29 Aug. and 5 Sept. 1955. There will be two general symposiums at Dublin, one on a comparison of the large-scale structure of our galaxy with that of other galaxies and the other on nonstable stars. The former will be organized by a committee under J. H. Oort, and the latter by a committee under V. A. Ambartsumian, P. Swings, and G. H. Herbig. There will also be four joint discussions, each involving several standing commissions: (i) turbulence in stellar atmospheres, (ii) fundamental stars, (iii) solar flares, and (iv) image converters.

The executive committee discussed invitations for the 1958 general assembly from Belgium, the Soviet Union, and Poland, together with tentative invitations previously received from Argentina, South Africa, and Australia. The committee unanimously decided that it viewed with favor the invitation to Moscow in 1958 and instructed the general secretary to investigate, with the vice president, the possibility of making all necessary arrangements. The final decision will be made at the Dublin meeting. The president of the Union read a letter from the Assistant Secretary of State and then requested that the executive committee place on its books a tentative invitation to meet in the United States in 1961. He underlined the fact that this invitation would be made formal only if the United States Government could see its way to meet the essential requirement that all competent astronomers who are members of the Union would be welcome. This invitation was supported by the U.S.A. National Committee on Astronomy, by the National Research Council, and by the American Astronomical Society. The executive committee "unanimously decided to record that it is grateful for and interested in the invitation from the U.S.A. for a meeting in 1961."

Two new countries, Venezuela and Israel, were admitted to the Union, and several other countries are in the process of forming suitable organizations for affiliation with the Union in 1955.

OTTO STRUVE
Berkeley Astronomical Department, University of California, Berkeley 4

Science News

Fission bomb particles that fell to earth in New York State caused a 1000-yr **mistake in dating** the earliest inhabitants of the San Francisco Bay area. The confusion began in 1953 when Bert A. Gerow, Stanford University anthropologist, excavated some ancient Indian burials on the San Francisco Peninsula. He sent samples of wood charcoal from the prehistoric graves to Columbia University's Lamont Geological Observatory at Palisades, N.Y., for carbon-dating.

While the charcoal samples lay waiting in the Observatory's laboratory, bomb tests were taking place in the Nevada desert. Microscopic specks of radioactive debris that were blown into the air floated clear across the continent and landed on the charcoal samples in New York. The samples were duly processed, and the laboratory reported to Gerow that his find was approximately 2000 yr old.

Since artifacts and certain other characteristics of the burials indicated greater age, Gerow sent along another and larger sample that proved to be 1000 yr

older. The Columbia research workers explained that many samples that had been awaiting test at the laboratory in March 1953 had been contaminated by the "fall out" of atomic debris from the explosions in Nevada.

J. J. Ghosh and J. H. Quastel report in the 3 July issue of *Nature* that **narcotics,** at pharmacologically active concentrations, exercise large inhibitive effects on the total respiration of the stimulated nerve cell by suppressing that aspect of respiration which is potassium-sensitive and which is concerned with carbohydrate (or pyruvate) oxidation. Working with rat brain cortex *in vitro,* they found that the inhibitory effect of narcotics did not occur with resting, unstimulated nerve tissue, and they support the conclusion that narcotics act on the nerve cell by suppression of oxidative events, particularly those involved in glucose or pyruvate oxidation.—E. M. L.

A group of investigators at Yale University, working with laboratory animals, have discovered the sections of the brain that play an important role in feelings of pain and fear. By applying electrical stimulation to the hippocampal gyrus or the lateral nucleus of the thalamus, they have succeeded in motivating cats to learn things they normally would not do, such as turning wheels, and refraining from food even though hungry. The research was conducted by José M. R. Delgado, assistant professor of physiology and psychiatry; Neal E. Miller, James Rowland Angell professor of psychology; and Warren W. Roberts, assistant in psychology.

The cats learned their new habits as the result of special emotions created originally by electrical stimulation, stimulation that could be delivered to special areas by means of electrodes implanted by Delgado. These habits could be conditioned to external signals, like the tone of a buzzer or the flickering of a light. This is believed to be the first time that animals have been motivated to **learn habits by electrical stimulation of the brain.**

The week of 3–9 Oct. has been designated for the annual observance of **National Pharmacy Week.**

Starting salaries for inexperienced chemists and chemical engineers are approximately 5 percent higher today than a year ago, although the cost of living has gone up only 1 percent, reports a recent issue of *Chemical and Engineering News.* The median salary for chemists who received the bachelor's degree this year is $364 a month, as compared with $351 in 1953 and $325 in 1952. For chemical engineers with the bachelor's degree, the median starting salary has risen from $360 to $375 since last year; those completing a 5-yr curriculum for a bachelor's degree are now receiving a median salary of $395, whereas the median for 4-yr graduates is $374.

Starting chemists with the master's degree report a median figure of $416 as compared with $404 last year. Those with the Ph.D. degree show an increase to $550 from $525. Starting salaries for chemical engineers with the master's degree are up 5 percent from last year to $425; those with the doctor's degree have made the greatest gain—6.5 percent to a median of $575. The median starting salaries offered to women graduates is lower than that for men in all groups except chemists with the Ph.D. degree.

Lloyd V. Berkner, operating head of Brookhaven National Laboratory and author of the State Department publication, *Science and Foreign Relations,* has written an appraisal of the general problems brought into focus by the Oppenheimer case. His article (*New Republic,* 12 July) is taken from a speech to the American Society of Chemical Engineers. In it he analyzes exhaustively and soberly the pros and cons of our present extremely tight security lid on technologic information. He also raises the question of whether our present **personnel security clearance system** may not be conditioning scientists to

> . . . avoid contact with any idea that may lead to military application. . . . Scientists are no different from anyone else in desiring to protect their reputations. Once they are involved in secret matters, their reputations may be destroyed by any person who makes irresponsible charges. . . . Clearance is not a permanent status, and a scientist's reputation is constantly susceptible to multiple jeopardy. . . . During each clearance review his entire life comes under scrutiny, and any act of indiscretion that may have had no relevance to security at the time, may arise to damn him.

Berkner underlines the dangers of seeking 100 percent security 'by exclusion' in the following words:

> An important concept in science is no less important to our national security because it is produced by one who cannot be 'cleared' by the arbitrary application of security procedures. We must not forget that Hitler and Mussolini abrogated their right to the atomic bomb when they drove a few leading scientists from their shores because they couldn't be cleared according to Nazi lights. Scientific greatness always arises from diversity of thought, never from conformity. Since the security procedures that support technological secrecy inevitably put a premium on conformity, they tend to prevent our nation's realization of the very greatness that we seek.

William McFarland of the University of California at Los Angeles has reported that when **fish are drugged** with sodium amytal they can be transported more easily. Because drugged fish require less oxygen, 3 times as many can be carried in containers without increasing the death rate.

Fort Belvoir, Va., has been chosen as the site for an experimental, full-scale but small **nuclear power plant** to be designed and built jointly by the Army Corps of Engineers and the Atomic Energy Commission. The plant is the prototype of a "package" or transportable power reactor that is being developed

for use at remote bases, eliminating the need to transport bulky conventional fuels. The reactor, a pressurized-water type with a capacity of approximately 1700 kw, will be built of components transportable by air. Succeeding plants for remote bases are expected to produce heat for space heating in addition to electricity. The model will provide construction, operation, and maintenance data and will demonstrate capabilities and limitations of such a plant. In this project, competitive proposals are being sought for the first time on the development, engineering design and building of a power reactor.

The National Research Council's Committee on Cancer Diagnosis and Therapy has issued a necessarily inconclusive report on the controversial **Lincoln bacteriophage treatment for cancer** that drew national attention in 1951–53. The treatment was developed by Robert E. Lincoln and championed in the Congress by Senator Charles W. Tobey of New Hampshire, both of whom are now dead. The investigating committee arrived at no conclusions because Lincoln abruptly withdrew his cooperation and the planned clinical trials were never conducted. Lincoln died a few weeks afterward.

The report traces developments between 12 Oct. 1951, when the Veterans Administration asked the NRC what it knew about Lincoln and the treatment he was using in his Medford, Mass., office, and the physician's sudden death on 30 Jan. 1954. The statement describes conferences and correspondence on protocol to be followed in clinical trials, steps taken to gain the cooperation of participating institutions, and finally, the sudden and mysterious reluctance of Lincoln to continue with the program. The report states that

> During the inquiry, no attempt was made by the committee to assemble records of cancer cases treated with bacteriophages by Dr. Lincoln or others, or to duplicate investigations reported by the Massachusetts Medical Society. . . . Because the committee did not receive any supply of therapeutic agents or any scientific data on objective benefits following the treatment of cancer with these agents, it has not been possible to undertake clinical trials or to evaluate scientific evidence on the response of cancer patients to the bacteriophage therapy proposed by Dr. Lincoln.

A **scientific expedition** left recently to make studies in Iraq, Mesopotamian Turkey, Syria, Lebanon, and Jordan. There will be a major investigation of the site of Jarmo, the oldest known village. Data will be sought on the world of 7000 yr ago, when the first great revolution in human history took place. This is the period when man turned from food-gathering and cave-dwelling to agriculture and the settled village.

Robert J. Braidwood, professor of Old World archeology at the University of Chicago's Oriental Institute, is director of the expedition. Associates include Bruce Howe of the Harvard Peabody Museum; H. E. Wright, Jr., a University of Minnesota geologist; Frederick R. Matson of Pennsylvania State University; and Charles A. Reed of the University of Illinois. Other specialists in many branches of natural science will join the project during the winter.

Further information on the **whooping crane** [*Science* **120**, 205 (6 Aug. 1954)], as given by the *Canadian Weekly Bulletin* of 9 July, is that the cranes' summer nesting grounds are thought to be somewhere in northern Canada. However, even when wildlife officials have attempted to follow the birds north from Texas by airplane, the birds have disappeared in the vicinity of the 60th parallel. It is known that a small number of whooping cranes winter in Texas but, according to Max W. deLaubenfels in the *Wilson Bulletin* **66**, 149 (June 1954), another group is thought to winter in Mexico.

July 6 was the **centenary of the death of George Simon Ohm,** after whom Ohm's law in electricity is named, and the July issues of *Discovery* (**15**, 279) and *Naturwissenschaftliche Rundschau* (**7**, 283) carry essays commemorating this date. Ohm also discovered in 1843 the fundamental law of physiological acoustics. The ear hears a pure sound only if produced by a pure sinusoidal vibration without any harmonics; if a vibration is more complex, it can always be resolved into sinusoidal harmonics. It was Helmholtz who brought Ohm's work to the proper attention of physiologists, musicians, and physicists.—K. L. H.

Scientists in the News

George Nelson Aagaard, dean of Southwestern Medical School at the University of Texas since 1952, has been appointed dean of the University of Washington School of Medicine, Seattle. The post has been open since last fall when Edward L. Turner, first dean of the school, resigned to become secretary of the Council on Medical Education and Hospitals of the American Medical Association.

On 1 Oct. **Harold O. Bolz,** head of the general engineering department at Purdue University, will assume his new duties as the new associate dean of the College of Engineering at the Ohio State University.

Arthur B. Cleaves is on leave of absence from Washington University (St. Louis) until Sept. 1955 to serve as chief geologist for Manu-Mine Research and Development Co., Reading, Pa. He will continue as geologist for the Pennsylvania Turnpike Commission and also in his association with the Board of Consultants for the Tennessee Valley Authority.

Alexander D. Langmuir, chief epidemiologist of the Public Health Service's Communicable Disease Center in Atlanta, is head of the 86-man emergency medical force dispatched by President Eisenhower to assist flood-stricken East Pakistan. Reports indicate that 7 million persons have been left homeless or seriously

affected by the unprecedented floods. Chief concern of the Pakistan Government is the threat of major epidemics. Other members of Langmuir's group of experts are **William Clark,** assistant team leader, epidemiologist with the California State Department of Health; **James Coffey,** insect control officer, chief of disaster services at the Communicable Disease Center in Atlanta; **Donald Johnson,** assistant insect control officer, entomologist attached to the Division of International Health; **Kenneth C. Lauster,** general sanitation and water supply officer, sanitary engineer attached to the North Atlantic Drainage Basin office in New York; **Robert Shannon,** administrative officer, attached to the Foreign Operations Administration public health office in Cairo, Egypt.

Joseph V. Michalski, major, U.S. Air Force, has joined the staff of the Aero Medical Field Laboratory, Holloman Air Force Base, N. Mex., as chief, biodynamics branch. A former member of the faculty of Emory University, Dr. Michalski has just completed a 3-yr assignment at the Army Chemical Center, Md., that included two trips to Korea as a wound ballistics investigator.

Allyn C. Miller, former technical operations supervisor of the California Research and Development Co., has joined the staff of Stanford Research Institute as an assistant chairman of the chemistry department. He will supervise project work in the chemical, metallurgical, and ceramic engineering section as well as in air research.

Ronald Neal, former head of the chemistry department of Drury College, has become associate director of research of Hoffman-Taff, Inc., and its subsidiary Hoffman Laboratories, Inc., Springfield, Mo.

P. L. Patel, professor of botany and head of the division of agronomy and plant breeding at the Agricultural Institute and Experiment Station, Anand, Bombay State, India, is in this country for 6 mo under the Point IV program. During August he visited educational institutions in Mississippi.

The U.S. Court of Appeals has upheld the dismissal of **John P. Peters** as a security risk by the National Institutes of Health [*Science* **119,** 500 (16 April 1954)]. A professor of internal medicine at Yale and consultant to the Quartermaster Corps, Peters was cleared of loyalty charges by Federal Security Boards in 1949 and 1952. Then in 1953 he was dismissed as special consultant to NIH after a third hearing initiated and held by the Loyalty Review Board of the Civil Service Commission, on charges supported by unsworn testimony of unidentified witnesses.

Peter's suit for reinstatement was submitted without formal briefs or oral arguments, and the adverse decision was expected, but sought in order to carry the case to the Supreme Court. His case is considered similar to that of Dorothy Bailey, government employee whose dismissal was upheld by the Supreme Court in 1951. That decision was, however, a 4-4 tie, which allowed the adverse decision of the lower court to stand.

Eugene Roberts, formerly on the staff of the division of cancer research in the Washington University School of Medicine (St. Louis), has been appointed chairman of the department of biochemistry in the newly reorganized division of research at the City of Hope Medical Center in Duarte, Calif.

At the 102nd commencement exercises, Purdue University awarded the honorary degree of doctor of science to **N. W. Shock,** chief, section of gerontology, Baltimore City Hospitals, "in recognition of his outstanding contributions in the fields of physiology and psychology and for distinguished work in gerontology and public health."

E. Lester Smith, senior biochemist on the staff of Glaxo Laboratories, Ltd., England, who in 1948 discovered vitamin B_{12}, was presented with the Gold Medal in Therapeutics of the Worshipful Society of Apothecaries at a soirée held in London on 20 July. The citation, which was given by Sir Lionel Whitby, referred to Dr. Smith's "fundamental contribution in connection with vitamin B_{12}."

The University of Pennsylvania has announced that **Frank Bradshaw Wood,** associate professor of astronomy since 1950, has been appointed professor of astronomy and director of observatories. Dr. Wood thus becomes head of the department of astronomy, succeeding **Charles P. Olivier,** who retired on 30 June.

Robert M. Yerkes has been awarded the Gold Medal of the New York Zoological Society. Fairfield Osborn, president of the Society, described Dr. Yerkes as "a true pioneer in comparative psychology and animal behavior whose lifetime work in this field has justified his title as Dean of Comparative Psychology."

Meetings

More than 5000 public health workers from all parts of the world will attend the 82nd annual meeting of the **American Public Health Association** and 38 related organizations in Buffalo, N.Y., 11–15 Oct. Approximately 400 speakers will present papers at 75 scientific sessions.

In a major action to increase the unity of the engineering profession, the **Engineers Joint Council** has adopted two important constitutional amendments permitting, under prescribed conditions, the admission of national and local organizations that do not at present meet all the qualifications for constituent membership. Conditions for admission are being drafted by a special committee. The council is made up of eight major engineering organizations with a total membership of 170,000. A membership of at

least 500 is required of a national organization to qualify and a constituent society, but the first of the new amendments permits the admission as associates of national organizations with less than that number of members. The second amendment permits the admission, as affiliates, of societies "which are regional rather than national in geographical scope." This amendment also permits the admission as affiliates of "federations of engineering societies (or of sections of such societies) broadly representative of the engineering profession in cases in which the majority of the societies who are members of the federation have qualifications for voting members equivalent to those required of constituent societies of the Council."

Eye specialists from all over the world will assemble in New York City 12–17 Sept. for the **17th International Congress of Ophthalmology** at the Waldorf-Astoria. This is the second time that this meeting has been held in the United States; the fifth congress convened in New York in 1876. More than 300 visitors are expected. Bernard Samuels and John H. Dunnington, both of New York, are president and vice president of the congress, and the host societies are the American Ophthalmological Society, the Section on Ophthalmology of the American Medical Association, the Association for Research in Ophthalmology, and the American Academy of Ophthalmology and Otolaryngology. Meeting concurrently for one session on 13 Sept. will be the International Association for the Prevention of Blindness.

The program for the congress will include about 150 papers, which will be presented by representatives of 30 countries. Two official subjects have been chosen, glaucoma and uveitis. Guest speakers on glaucoma will be Derrick Vail, Chicago; Rudolf Thiel, Frankfurt-am-Main, Germany; and G. P. Sourdille, Nantes, France. Those who will discuss uveitis are Allan C. Woods, Baltimore; Norman Ashton, London; and Vittoriano Cavara, Rome.

The Atomic Industrial Forum will hold a meeting 27–28 Sept. at the Plaza Hotel in New York City to explain to American industry the meaning of the new atomic energy law enacted by Congress recently. More than 20 experts on atomic energy from government, industry, labor, and the legal profession will describe to industrialists from companies all over the country how the government plans to implement the new law, what industry plans to accomplish under it, and what investment and insurance opportunities and problems are created by it. The new law for the first time will permit private industry to own atomic facilities, to have rights to atomic patents, to export atomic equipment, and to lease atomic fuels from the government.

The title of the meeting will be, "**The New Atomic Energy Law—What It Means to Industry.**" An address will be delivered by T. Keith Glennan, president of Case Institute of Technology and former U.S. Atomic Energy commissioner. He will describe "The New Industry-Government Partnership." Government spokesmen who will be present include Lawrence R. Hafstad, director of reactor development for the Atomic Energy Commission; William Mitchell, general counsel of the AEC; C. D. Luke, new director of classification for the AEC; and Corbin Allardice, executive director of the Joint Congressional Committee on Atomic Energy.

The **14th Pan American Sanitary Conference,** governing body of the Pan American Sanitary Organization, will be the guest of the Chilean Government during its 17-day session in Santiago in October. Meeting once every 4 yr, the conference, which also serves as the World Health Organization Regional Committee for the Americas, has the following items on its agenda: reports by the director of the Bureau, Fred L. Soper; the 1955 program and budget; consideration of the malaria eradication program initiated in 1954; health reports of member states; election of a director; executive committee nominations. There will also be a series of technical discussions in the form of seminars held concurrently with the conference session. The subjects chosen this year are (i) methods of improving the reliability of raw statistical data required for health programs; (ii) control of infant diarrheas in the light of recent scientific progress; and (iii) application of health education methods in rural areas in Latin America.

The **6th Southeastern Regional Meeting of the American Chemical Society** will be held at the Thomas Jefferson Hotel in Birmingham, Ala., 21–23 Oct. Divisional sessions are scheduled in analytical chemistry, biochemistry, chemical education, organic chemistry, physical and inorganic chemistry, industrial chemistry, and chemical engineering. Symposiums are planned on "Analysis and role of trace elements in plants and animals"; "Nitrogeneous carbohydrates and animal polysaccharides"; "Organic reaction mechanisms"; "Contributions of chemistry to dentistry and medicine"; "Process equipment"; "Pulp and paper technology"; "High school chemistry at the crossroads"; and "Applications of chromatographic methods of analysis."

The general meeting on 21 Oct. will be addressed by Gerard Piel, publisher of the *Scientific American,* and on 22 Oct. there will be a banquet with ACS President Joel Hildebrand as the featured speaker. Correspondence concerning the meeting should be addressed to the general chairman, Dr. Locke White, Southern Research Institute, Birmingham, Ala.

The **3rd Symposium on Temperature,** an international meeting sponsored by the American Institute of Physics, the National Bureau of Standards, and the Office of Ordnance Research, U.S. Army, will take place in Washington, D.C., 28–30 Oct. Attendance at the sessions, which will be held in the National Bureau of Standards, is open to all interested persons; the registration fee is $1. Advance registration by mail is requested if possible, in order that suitable facilities may be provided for the number attending.

Further information may be obtained from Wallace Waterfall, American Institute of Physics, 57 E. 55 St., New York 22, N.Y.

Publication of the symposium proceedings is being arranged by the American Institute of Physics in order to provide a companion volume to *Temperature, Its Measurement and Control in Science and Industry,* which is the record of the second symposium in 1939. The book is expected to appear by the fall of 1955, under the editorship of Hugh C. Wolfe of Cooper Union.

Allen V. Astin of NBS and Raymond E. Wilson of the Emerson Research Laboratories are chairmen of the general and program committees, respectively. The program is as follows.

General concepts: "General concepts of temperature and their limitations," H. C. Wolfe; "Concept of temperature near 0°K," F. E. Simon; "High gas temperatures," G. H. Dieke; "Astrophysical temperatures," C. H. Payne-Gaposchkin.

Standards and scales: "Gas thermometry," J. A. Beattie; "High temperature gas thermometry," J. A. Hall; "Precision resistance thermometry and fixed points," H. F. Stimson; "The zinc point as a thermometric fixed point," H. Preston-Thomas; "Low temperature scales," R. B. Scott (from 90° to 5°K) and R. P. Hudson (from 5° to 1°K); "Techniques of magnetic thermometry," H. van Dijk.

Transient phenomena: "Irreversible thermodynamics and fluctuations," I. Prigogine; "Relaxation of partial temperatures," K. F. Herzfeld; "Temperature in relation to flow processes," J. G. Kirkwood.

Experimental measurements: "Below one degree K," D. de Klerk; "Flames and hot gases," H. P. Broida; "Temperature measurement in engineering," H. J. Hoge; "Selected new methods," J. G. Daunt (superconductors as thermometers), S. A. Friedberg (semiconductors as thermometers), and D. R. Pardue and A. L. Hedrich (sound velocity as a measure of gas temperature).

Miscellaneous topics: "Temperature in shock waves," A. R. Kantrowitz; "Atomic explosions," F. G. Brickwedde; "Ionization measurement of high temperatures," W. Lochte-Holtgreven; "Temperatures in the upper atmosphere," H. E. Newell, Jr.

Education

A scientific center for **basic research in the field of neurology** is to be built just outside Caracas, Venezuela. The head of the new institute, Humberto Fernández-Morán, is a neurologist and cytologist who for 8 yr has studied and carried on advanced research in Sweden. The Venezuelan Government has already appropriated more than 3 million for the project, which is one of the largest of its kind in the world. The institute is to include 12 central departments and is planned as a training center for young scientists from the whole of Latin America. Leading specialists from all over the world will be invited as lecturers.

For many years **Brooklyn Polytechnic Institute** has offered a graduate course, "Introduction to powder metallurgy," by Henry H. Hausner. This fall the institute will add, for the first time, a second graduate course "**Advanced powder metallurgy,**" in which Hausner will discuss the scientific fundamentals and solid state reactions in powder metallurgy.

The philosophy behind a new approach to public education is described in a booklet, ***The Ear of the Beholder,*** by Margaret M. Farrar, published by the New York State Department of Mental Hygiene. In releasing the booklet Commissioner Newton Bigelow indicated that its purpose is to explain "why this department uses comic books, puppet shows, and similar media to teach the principles of good mental health." The report summarizes 5 yr of activity in a new educational program that attempts to reach the man on the street by speaking his language and using ideas he can grasp and accept.

From a small beginning only 2½ yr ago, a world center has been established at Indiana University for the **growing of algae,** a group of plants that suddenly has risen to a place of scientific and economic importance. Nearly 700 different strains of fresh-water algae are now under cultivation in the Indiana collection. These are distributed at moderate cost to colleges and industries for teaching and research.

The **shortage of technicians** in California medical laboratories is still critical, according to a survey by two staff members of the University of California School of Medicine, San Francisco. Ramona Greefkens, supervisor of field service of curriculum in medical technology in the School of Medicine, and James Hopper, supervisor of the curriculum in medical technology, report in the current issue of *California Medicine* that there is a 12.4-percent shortage of medical technicians in the 432 California laboratories surveyed. This is only a slight improvement over the situation 5 yr ago, when there was a deficit of 14.5 percent. The report suggested the stimulation of more interest in medical technology as a career, the establishment of apprenticeships in the fourth year of training, and more paid apprenticeships.

The **Union University School of Nursing** has announced a substantial reduction in its tuition, and also an administrative reorganization that is aimed at attracting more eligible young women to the nursing profession during this period of nurse shortage.

The **University of Michigan** has announced construction of a two-story building, so simple that it can be quickly erected, altered, or disassembled by workers equipped only with wrenches. To be known as the Research Laboratory of the College of Architecture and Design, the temporary structure requires weeks rather than months to build and is expected to cost less than a conventional building of the same size. It

will be bolted together in an area adjoining the Architecture Building. In the future it can be taken apart, moved to another site in compact bundles, and erected again.

Materials are being donated by the Unistrut Corp. of Wayne, Mich., sponsor of a research project under which the design of the laboratory was developed, and by other manufacturers. The university's Engineering Research Institute and the College of Architecture and Design planned the building, which embodies a new architectural concept—the Unistrut space frame system of construction—a method of introducing a third dimension of reinforcement to support the roof. Conventional roofs rest on beams or trusses running in two directions between walls; the space frame utilizes diagonal struts that permit stresses to be distributed in three directions.

Specialized equipment that will benefit newborn babies and small children will be purchased as a memorial to the late Jacob A. Danciger, assistant professor of pediatrics at the **University of Tennessee College of Medicine.**

West Virginia University expects to break ground this fall for the largest building in its 87-yr history—the 5-story, 1000-room Basic Sciences Building that will be the heart of the new Medical Center.

Available Fellowships and Awards

The **Cigar Manufacturers Association of America** recently announced that in order to expand its research program it will make additional grants available for studies in the genetics, biochemistry, and chemistry of cigar tobaccos. One of the purposes of these studies is to increase knowledge of the substances present in the leaves of cigar tobaccos, and of the chemical conversions that these substances undergo during the various stages of industrial processing and during the smoking of cigars. Applications for research grants should be sent to Mr. Charles H. Horn, Chairman, CMA Research Committee, Room 1321, 350 5th Ave., New York 1.

Entries are being accepted now for the **Oberly Memorial award** of $1200 made every 2 yr by the American Library Association for the best bibliography in the field of agriculture or the natural sciences. The current award, to be made at the ALA annual conference in Philadelphia next July, is for a bibliography issued in 1953 or 1954.

With a letter of submittal, four copies of the bibliography should be sent to J. Richard Blanchard, Librarian, University of California Library, Davis. *Final entry date is 15 March 1955.* Points to be considered in judging the bibliographies are accuracy, scope, usefulness, format, and special features such as explanatory introductions, annotations, and indexes.

Nominations are invited for the **Osborne and Mendel award** of $1000 established by the **Nutrition Foundation, Inc.,** for the recognition of outstanding accomplishments in the general field of exploratory research in the science of nutrition. It is intended for the investigator who has made the most significant published contribution in the year preceding the annual meeting of the American Institute of Nutrition, or who has published a series of contemporary papers of outstanding significance.

Normally preference will be given to workers in the United States and Canada, but investigators in other countries, especially those sojourning in the United States or Canada for a period of time, are not excluded from consideration. Membership in the Institute of Nutrition is not a requirement for eligibility and there is no limitation as to age. Nominations may be made by anyone; those for the 1955 award, accompanied by data relative to the accomplishments of the nominee, must be sent *before 1 Jan.* to Dr. Floyd S. Daft, Institute of Arthritis and Metabolic Disease, National Institutes of Health, Bethesda, Md.

The Future Scientists of America Foundation of the National Science Teachers Association has announced the 1955 program of **Recognition Awards for Science Teachers.** This program, now in its fourth year, is sponsored by the American Society for Metals. It is a cooperative attempt to recognize science teachers in elementary and secondary schools who have developed new ideas and are willing to share them with other teachers. Further information may be obtained from the foundation, 1201 16th St. NW, Washington 6.

Grants and Fellowships Awarded

The **Atomic Energy Commission** has announced the award of 70 unclassified physical research contracts; 7 are new and the remainder are renewals.

University of Chicago. C. A. Hutchison, Jr. Paramagnetic resonance absorption, $27,235.

Cornell University. F. A. Long. Kinetic and equilibrium salt effects, $10,778.

University of North Carolina. K. Knox. Preparation and properties of compounds of technetium and rhenium, $11,450.

University of Notre Dame. B. Waldman. Assistance in remodeling of electrostatic generator, $30,000.

Vanderbilt University. C. D. Curtis. Transfer of ORNL Cockcroft-Walton to Vanderbilt University.

University of Virginia. F. L. Hereford. Interaction of polarized photons with matter and other research with a 1-mev Van de Graaff, $37,500.

University of Wisconsin. J. O. Hirschfelder. Quantum mechanical and semi-empirical determination of intermolecular forces, $19,500.

University of Arkansas. R. R. Edwards. Chemical effects of nuclear transformation, $36,500.

University of Arkansas. R. Edwards. Radioactivity of thermal waters and its relationship to the geology and geochemistry of uranium, $17,152.

Armour Research Foundation. D. J. McPherson. Heat treatment of zirconium base alloys, $24,800.

California Institute of Technology. R. F. Bacher. High energy physics, $375,000.

University of California. E. Parker. Creep of alloys, $58,700.

Catholic University of America. F. O. Rice. Production and identification of free radicals, $8568.

University of Chicago. H. C. Urey. Natural abundance of deuterium and other isotopes, $55,970.

University of Chicago. A. Turkevich and N. Sugarman. Nuclear chemistry research, $47,437; synchrocyclotron operation, $43,454.

University of Chicago. E. Fermi. Theoretical research in elementary particle physics, $40,203.

University of Chicago. S. K. Allison. Reactions of the light nuclei and the penetration of charged particles through matter, $39,839.

University of Chicago. L. Meyer. Structure and properties of graphite, $14,545.

Columbia University. W. W. Havens. Neutron spectroscopy and nuclear physics, $562,000.

Columbia University. H. H. Kellogg. Physical chemical properties of fused electrolytes, $23,500.

Columbia University. T. A. Read. Diffusionless phase changes in metals, $7000.

Duke University. H. W. Newson. Fast neutron cross-sections and shell structure, $89,633.

Emory University. W. H. Jones. Mass distriubtion in proton-induced fission, $5493.

University of Florida. D. C. Swanson. Electrostatic generator program, $8881.

Fordham University. M. Cefola. Formation of complexes by thenoyltrifuloroacetate and other chelating agents, $6640.

General Electric Company. J. H. Hollomon. Fundamental metallurgic research and development of zirconium base alloys, $137,000.

University of Illinois. F. Seitz. Experimental and theoretical investigation of radiation damage in solid materials, $95,284.

University of Illinois. H. G. Drickamer. Mechanism of molecular motion as determined from diffusion and thermal diffusion measurements, $16,140.

Illinois Institute of Technology. H. E. Gunning. Decomposition of molecules by metal-photosensitization, $16,000.

Illinois Institute of Technology. G. Gibson. Fundamental chemistry of uranium, $7000.

State University of Iowa. K. Kammermeyer. Separation of gases by diffusion through permeable membranes, $25,560.

State University of Iowa. N. C. Baenziger. Structures of intermetallic compounds, $7000.

University of Iowa. J. A. Jacobs. Nuclear structure, $34,800.

Johns Hopkins University. G. H. Dieke. Properties of nuclei, $28,019.

Kansas State College. C. M. Fowler. Precision beta ray spectroscopy, $7000.

University of Louisville. R. H. Wiley. Synthesis and properties of ion-exchange resins, $9498.

University of Michigan. E. F. Westrum, Jr. Low-temperature chemical thermodynamics, $12,420.

Michigan State College. M. T. Rogers. Physicochemical investigation of the interhalogen compounds, $15,840.

Michigan State College. H. Brubaker, Jr. Aperiodic oxidation states, $5000.

Michigan State College. J. L. Dye. Thermodynamic investigation of dilute solutions of the alkali metals in liquid ammonia, $4500.

University of Minnesota. J. H. Williams. 60-mev proton linac, $171,587.

University of Nebraska. T. Jorgensen, Jr. Mechanism of energy transfer of slow ions, $12,400.

Research Foundation of the State of New York. O. E. Lanford. Concentration of nitrogen-15 by chemical exchange, $10,138.12.

North Carolina State College. C. Beck (Loan) Use of fuel in operation of reactor.

North Carolina State College. F. P. Pike. Performance of contractors for liquid-liquid extraction, $22,537.80.

Northwestern University. E. N. Strait. Completion of 5-mev electrostatic generator, $52,390.

Northwestern University. F. Basolo and R. Pearson. Mechanism of substitution reactions of inorganic complexes, $6912.

University of Notre Dame. M. Burton. Radiation chemistry studies, $202,000.

Ohio State University Research Foundation. E. C. Mack, Jr. Separative processes, $34,164.

Ohio State University Research Foundation. J. G. Daunt. Nuclear paramagnetism and low-temperature physics, $23,800.

Ohio State University Research Foundation. J. N. Cooper, Nuclear spectroscopy and stopping power measurements with 2-mev Van de Graaff, $20,000.

Ohio State University Research Foundation. C. H. Shaw. Soft x-ray spectra of metals and alloys, $6500.

University of Oklahoma Research Institute. J. R. Nielsen. Spectroscopic properties of fluorocarbons and fluorinated hydrocarbons, $9311.

Princeton University. J. Turkevich. Temporary and permanent effects produced by radiation on solids, $8500.

Purdue Research Foundation. T. DeVries. Polarographic studies in nonaqueous solvents, $4000.

Rice Institute. T. W. Bonner. Nuclear physics research, $66,528.

University of South Carolina. O. D. Bonner. Fundamental studies of ion exchange equilibria, $3024.

Stanford University. E. L. Ginzton. Limitations of electron linear accelerators, $168,000.

Syracuse University. B. P. Burtt. Mechanism of gaseous radiation chemical reactions and the chemical reactions of electrons, $10,500.

University of Tennessee. G. K. Schweitzer. Radiocolloids, $4750.

University of Texas. E. L. Hudspeth. Fast neutron interactions, $38,880.

Vanderbilt University. R. T. Lagemann. Precision beta ray spectroscopy, $5378.

Vanderbilt University. C. D. Curtis. Equipment loan contract.

University of Wisconsin. R. G. Herb. Nuclear research with electrostatic generator, $86,400.

University of Wisconsin. F. Daniels. Geochemistry of uranium and the recovery of uranium from low-grade ores, $52,000.

University of Wisconsin. J. E. Willard. Application of radioactive isotopes to chemical problems, $27,172.

University of Wisconsin. R. G. Sachs. Theory of light nuclei, $13,942.

University of Wisconsin. D. A. Lind. Inelastic scattering of fast neutrons, $8543.

Yale University. H. S. Harned. Diffusion coefficients of electrolytes and molecules, $14,904.

In the Laboratories

Arthur D. Little, Inc., industrial consulting and engineering firm of Cambridge, Mass., has signed a contract with the Foreign Operations Administration for a continuation of its industrialization **project in Egypt** under the technical cooperation program. This contract extends until June 1955 the cooperative project for the development of Egyptian industry that has been carried on by the firm since January 1953.

The **Consolidated Uranium Co.** plans to build a 500-ton-a-day uranium mill in the Temple Mountain area near Greenriver, Utah.

A sales development and technical service laboratory for the **Du Pont Co.'s** film department will be built in Wilmington, Del., at an estimated cost of nearly $1 million. The new laboratory will expand Du Pont's program of service to customers in applications and use of cellophane, acetate and polyethylene films, Mylar polyester film, cellulose sponges and sponge yarn, and cellulose bands. The program also includes exploration of markets for all film department products and investigation of industry's need for new types of films.

North American Aviation, Inc., has installed three very **large mufflers** at the International Airport in Los Angeles. They will be used in ground testing of F-100 Super Sabre planes, new craft capable of exceeding the speed of sound in normal level flight. The noise of the 10,000-lb thrust jet engines shatters eardrums, yet with the new silencers engines operating at full power are barely audible 250 ft away.

The U.S. Air Force has awarded the **Perkin-Elmer Corp.,** Norwalk, Conn., two contracts totaling $750,000 to cover the development and construction of three powerful optical tracking devices for guided missile observation. These devices will consist basically of telescopes, similar to those found in astronomical observatories, mounted on massive gun mounts much like the ones used on battleships.

A proposal by the **Vitro Corp. of America** to study chemical and metallurgical processing problems associated with nuclear power systems has been approved by the Atomic Energy Commission.

Miscellaneous

The April 1954 issue of the Indian medical journal ***Antiseptic*** is a greatly enlarged special number commemorating the golden jubilee of that publication. This monthly journal of medicine and surgery was founded in 1904 by U. Rama Rau, and this number pays special tribute to him and to his colleague, and late T. M. Nair. These two are among the most distinguished members of the medical profession that South India has produced.

Hans G. Schlumberger of Ohio State University, who is studying **cancer in parakeets,** has need of live parakeets with tumors and parakeets that have died from tumors.

The New York office of the U.S. Atomic Energy Commission's **division of raw materials** has been transferred to Washington, D.C.

The purpose of a booklet, ***Evaluating Blast Effects on Buildings,*** prepared by the Armour Research Foundation of the Illinois Institute of Technology, Chicago, is to assist architects in the analysis and design of structures. It describes a method of measuring displacement of actual structure by analyzing the behavior of mass and spring of a building represented by a model building. The motion of the model indicates the motion under actual blast of an atomic bomb. Copies may be obtained from the foundation.

The Chemical-Biological Coordination Center of the National Research Council is interested in learning of other organizations who are now using or are planning to use their ***Method of coding chemicals for correlation and classification.*** This extensive code was devised primarily to permit the use of punched cards in the correlation of chemical structure with biological activity. Proof of the adaptability and versatility of the code is some 53,000 compounds now coded by the center. The center would like to know of the experience others have had in adopting the code for their own special needs and also would be glad to answer any questions. Please address all correspondence to Miss Estaleta Dale, Chemical-Biological Coordination Center, National Research Council, 2101 Constitution Ave., Washington 25, D.C. Copies of the code may be obtained from the NRC Publications Office for $1.50.

For the first time this year, the Civil Service Commission is conducting a **procurement campaign for physicians** to serve in all branches of the Federal Government. They are needed for duties which range from adjudication of disability claims to venereal disease control. The Children's Bureau, Civil Aeronautics Administration, and the National Institutes of Health are among the agencies calling for medical personnel. The Air Force and Army want civilian pathologists and specialists in industrial medicine. Elsewhere there are vacancies in research, pharmacology, medical editing, and bacteriology, as well as in clinical medicine and surgery.

A separate drive is under way for doctors to join the Panama Canal Service. Here the age limit is 45, except for applicants with veterans preference. There is no maximum age limit for any of the other positions. Salaries range from $5940 to $10,450. There will be no written examinations for any of the jobs, selection being based on candidates' records. Recent graduates who are at present serving internships are eligible to apply. Forms may be obtained from any post office or Civil Service regional office.

Necrology

Jessie G. Beach, 67, paleontologist for the Smithsonian Institution, Washington, D.C., 16 Aug.; **Joseph H. Bodine,** 58, head of the department of zoology at the State University of Iowa, Iowa City, Iowa, 23 July; **John P. Buwalda,** 67, authority on earthquakes, former president of the Seismological Society of America, professor of geology and retired chairman of the division of geological sciences at California Institute of Technology, Pasadena, 19 Aug.; **A. H. Graham,** 53, leader in gamma globulin inoculation, Montgomery, Ala., 18 Aug.; **Gustaf W. Hammar,** 61, former head of the physics department at the University of Idaho, developer of ektron detectors, and senior supervising physicist of the Navy Ordnance Division of Eastman Kodak Company, Rochester, N.Y., 19 Aug.; **E. C. L. Miller,** 86, bacteriologist, biochemist, and librarian emeritus of the Medical College of Virginia, Richmond, Va., 21 July; **Abram P. Steckel,** 75, electrical engineer, developer of the cold-rolling process in making steel, and president of the Cold Metal Process Company, Youngstown, Ohio, 19 Aug.; **Herbert E. Stein,** 70, author, specialist in surgical gynecology, and former professor at the New York Polyclinic Hospital, New York, N.Y., 22 Aug.; **Enoch F. Story,** 42, analytical chemistry investigator and professor of chemistry at the University of Maryland, University Park, Md., 24 Aug.; **George H. Taber, Jr.,** 64, engineer, developer of improvements in the process of petroleum refining, and retired president of the Sinclair Refining Company, Rye, N.Y., 20 Aug.