Science in the News

Annual Awards for Outstanding Research Presented at AAAS Meeting in Chicago

The following awards for outstanding work in various fields of science were presented during the annual AAAS meeting, which took place in Chicago 26–31 December.

Rosenthal Award. Wilhelm C. Hueper, chief, Environmental Cancer Section, National Cancer Institute, Bethesda, Md., received the AAAS–Anne Frankel Rosenthal Memorial Award for Cancer Research for his study of the causes of cancer in man. The $1000 award is provided by the Richard and Hinda Rosenthal Foundation and was given for the fifth time.

Since the early 1920's when his scientific career began, Hueper has been engaged in research on exogenous causes of human cancers, such as lung cancers from air pollutants, skin cancers from arsenicals, and cancers of the breast from the cosmetic injection of paraffin. Through a critical evaluation of various morphologic characteristics of cancers of the uterus and breast, which resulted in development of the "histologic malignancy index," he attempted to prognosticate the growth and spread tendencies of cancers and thereby aid the clinician in the selection of proper therapeutic measures.

During the next decade Hueper conducted investigations on immunologic aspects of leukemia and on the experimental production of leukemia in mice by the administration of small doses of x-rays. He was one of the first to call attention to the possibility that such irradiation constituted a cancer hazard.

In 1938, in association with F. H. Wiley and H. D. Wolfe, Hueper succeeded in producing, by feeding β-naphthylamine to dogs, bladder cancers similar to those seen in workers associated with the manufacture of certain dye intermediates (β-naphthylamine, benzidine), rubber antioxidants (4-aminodiphenyl), and synthetic aniline dyes. In subsequent experiments he showed that a urinary metabolite of β-naphthylamine—namely, 2-amino-*l*-naphthol — possesses cancer-producing properties for mice. These observations opened a large new field for experimental study and pointed the way for subsequent investigations on species-specific metabolic mechanisms which seem to control the susceptibility of different species to the carcinogenic action of various aromatic amines and their metabolites.

In 1942 Hueper published *Occupational Tumors and Allied Diseases*, which has become a standard text on this subject. This book provided comprehensive information on the various types and the growing number of occupational carcinogens and on the cancers produced by them in industrial workers and called attention to the spread of these carcinogens in the human environment.

In this period Hueper's previous intermittent work on spontaneous and occupational arteriosclerosis crystallized in a systematic experimental attack on the etiologic factors and causal mechanism responsible for degenerative vascular diseases, culminating in the development of the "anoxemia theory of arteriosclerosis." Of special importance in these investigations were his studies on disturbances of the plasmatic colloidal equilibrium as significant causal mechanisms in atherosclerosis. This concept was developed from observations on experimental atherosclerosis elicited by the injection of a series of synthetic, macromolecular polymers used in medicine and industry as plasma substitutes, resins, plastics, and films.

With his appointment to the National Cancer Institute and the creation of the Environmental Cancer Section in 1948, Hueper returned to studying various problems of environmental and industrial carcinogenesis, particularly the possible cancer hazards of exposure to various metals (arsenic, uranium, chromium, and nickel). Other phases of these investigations covered possible cancer hazards from air pollutants, water pollutants, petroleum derivatives, synthetic hydrogenated coal oils, food additives and contaminants, and plastics. In experimental studies on rats, mice, and dogs conducted, in part, in association with William Payne, Hueper succeeded in demonstrating that chromium is a powerful carcinogen and that the relative carcinogenic potency of various chromium compounds depends on the degree to which they are soluble in water—that is, their degree of biologic availability. As a result of these observations, chromate- and chromium-compound-producing industries are now in a better position to institute rational and effective measures for protecting their workers against the hazards of occupational lung cancer.

Theobald Smith Award. William F. Scherer, professor of bacteriology and immunology, University of Minnesota Medical School, Minneapolis, Minn., received the Association's 15th Theobald Smith Award in Medical Sciences. The award, which is supported by Eli Lilly and Company, consists of $1000, a bronze medal, all travel expenses to and from the meeting, and all expenses at the meeting for its duration. It is given for "demonstrated research in the field of medical sciences, taking into consideration independence of thought and originality." The recipient must be less than 35 years of age as of 1 January of the year in which the award is made, and must be a U.S. citizen.

In 1952, Scherer published a series of papers on the propagation in vitro of poliomyelitis viruses. The series established that poliovirus could be grown in vitro in extraneural tissues (human and monkey testicles). He also characterized the growth of the virus and its accompanying cytopathology.

Subsequently he engaged in research on a pure strain of mammalian cells (Earle, the L strain) for the cultivation of viruses in vitro. Using the principles evolved in this study, Scherer then employed HeLa cell cultures in the assay of poliovirus and of poliovirus antibodies and for rapid isolation and identification of poliovirus from human beings. In reporting the first important application of cell dispersal with trypsin (Rous-Jones), Scherer made quantitative studies in a monolayer on glass possible. The result has been the development since 1953 of cell-culture techniques for virus-plaque counts, cell-plate counts, and mass production of mammalian cells for the production and assay of virus. Morphologically and culturally stable lines of human and other mam-

malian cells in continuous culture are now being employed widely; the complex phenomenon of animal virus infection is reduced to a simpler in vitro system in which chemical and physical factors can be altered at will.

Studies on the ecology of Japanese encephalitis were designed to investigate each of the known natural hosts (mosquitoes, birds, swine, rodents, and human beings) of the encephalitis virus. Only one mosquito species was consistently infected by the virus naturally: the *Culex tritaeniorhynchus*. In this species it was found that the time of infection was independent of the total population, and that the incidence of mosquito infection increased while the total population declined. This emphasized that there is no direct chronological relationship between peak vector populations and epidemics or epizootics, but rather that vertebrate infection is related to the time of maximal density of infected mosquitoes in an area. It was found that the vector mosquito tended to bite certain animals and birds more often than others, and more often than it bit man; however not all mosquitoes behaved like the vector.

The epidemiologic sequence of infections by Japanese encephalitis virus was found to involve a vector (mosquito), amplifying agents (birds and swine), and diseased hosts (men and horses). The natural infection cycle could be divided into periods of preemergence, virus dissemination, and declination to eclipse.

Campbell Award. Charles M. Rick, University of California, Davis, received the AAAS–Campbell Award for Vegetable Research. Established 2 years ago by the Campbell Soup Company, the award consists of $1500 and a bronze medal. (Travel expenses for the recipient to attend the AAAS meetings and to receive the award in person are paid, in addition.) The award is given for an outstanding single research contribution, of either fundamental or practical significance, concerning the production of vegetables, including mushrooms, for processing purposes. Emphasis is on basic research and on applications concerned with vegetable production rather than crop utilization or crop processing. The one or more papers reporting this single research must have been published—or accepted for publication—in a recognized scientific journal not more than 2 years prior to the date of granting the award, which is open to all residents of the United States and Canada. A panel of seven judges representing all areas of plant science determines the winner or winners of the award.

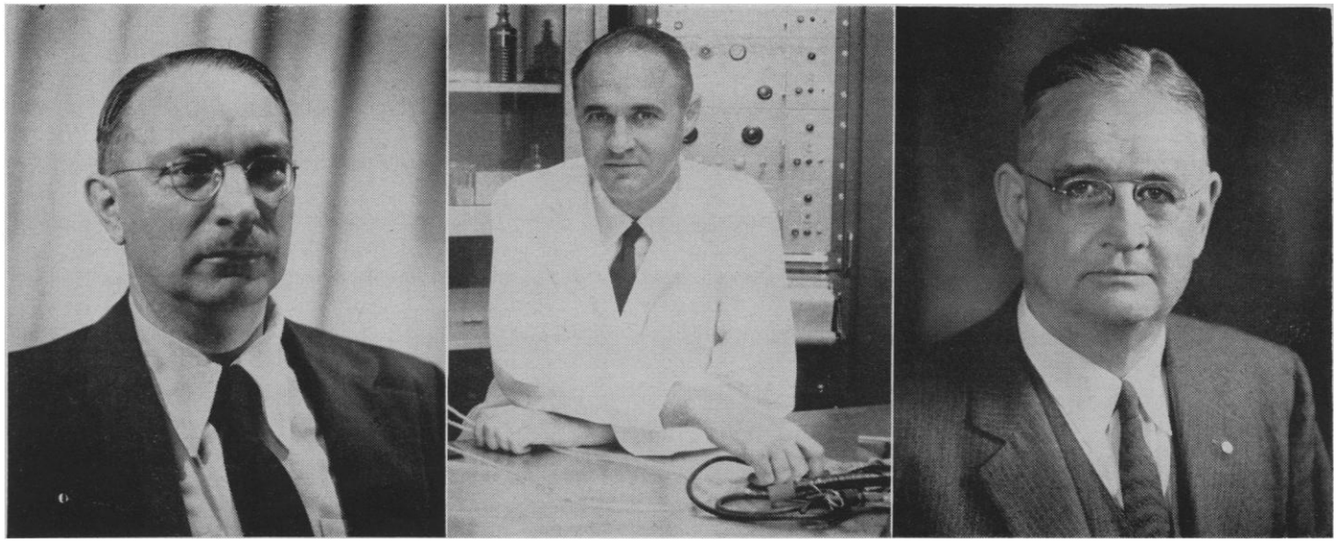
In his work Rick presents new evidence of the frequent hybridization between plants of the cultivated tomato (*Lycopersicon esculentum*) in Ecuador, Peru, and northern Chile.

Although the garden tomato is very highly self-pollinated in most regions of cultivation, it cross-pollinates freely in the range of its wild relatives—Ecuador, Peru, and northern Chile. Cohabitation of garden tomatoes and an intercompatible species in this region permits extensive gene exchange between them. These factors lead to a high level of variability and promote rapid evolution of new forms.

Direct genetic tests revealed rates of natural cross-pollination as high as 25 percent—levels vastly higher than those in other regions of cultivation. Frequent hybridization is also reflected in the variation of progenies from single plants collected in various parts of this region. More than half of these progenies segregated for monogenic traits, and a corresponding variability was observed for quantitative traits. The coextensive distribution of the cultivated tomato (*L. esculentum*) and the wild currant tomato (*L. pimpinellifolium*) in this region and the appearance of traits of the latter in cultivated tomatoes render it likely that part of the observed variability results from introgression of traits from the wild-currant forms. Rick found similar evidence for introgression of *L. esculentum* traits into *L. pimpinellifolium*.

Since both species are frequently used as sources of valuable germ plasm for breeding purposes, these results point up the need for coping with high variability, found even within single-plant progenies in contrast to the pure-line uniformity usually found in tomatoes. Rick's studies also have a bearing on the origin of the cultivated common varieties. In keeping with previous conclusions that domestication probably took place in southern Mexico, he points out that the present array of cultivated tomatoes in western South America could have evolved from early post-Columbian introductions in view of the rapid rate of reproduction, prevailing self-pollination, and frequent outcrossing, particularly to the wild-currant form. His findings are also significant in relation to the systematics of the two species.

John A. King of Armour and Company (left) and H. E. Robinson of Swift and Company (right), who accepted the Industrial Science Award for their companies.



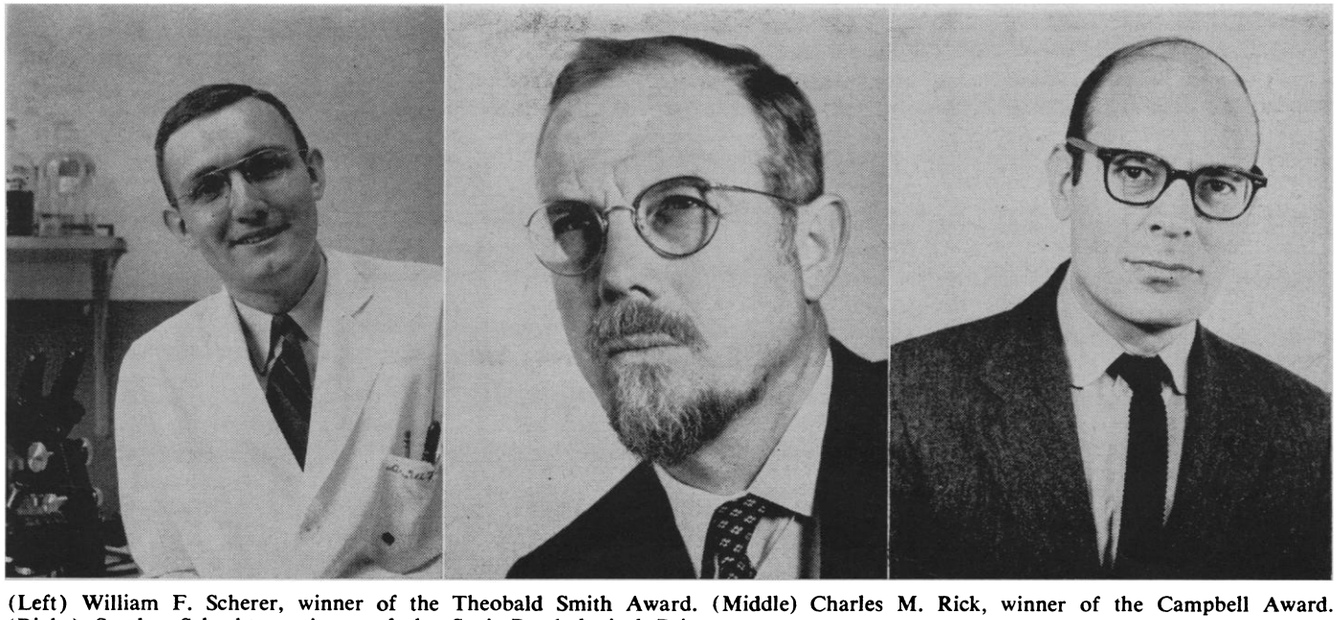
(Left) Wilhelm C. Hueper, winner of Rosenthal Award. [National Institutes of Health] (Middle) Arthur C. Guyton, winner of Gould Award. (Right) Charles S. Draper, winner of the William Procter Prize. [Fabian Bachrach]

The cultivated tomato is almost exclusively self-pollinated. Such intensive inbreeding renders it remarkably uniform; in fact, most modern horticultural varieties are effectively pure lines or populations of several very closely related pure lines. The native region in western South America is therefore of considerable interest because of its much higher rates of natural cross-pollination.

In a random sample of 18 spontaneous seedling mutants, linkages were found by Rick for 15, of which 6 are located on chromosome 2. According to binomial tests, this distribution is nonrandom. Even within chromosomes the distribution appears irregular, as indicated by his finding a cluster of three dominant genes on chromosome 2. Such concentration is unusual in view of the rarity of spontaneous dominant mutations.

These findings correspond with the results of research on the linkages of other gene samples and with the distribution of all known linked genes. For various reasons the deviation probably does not result from the use of favorably located marker genes or from the presence of duplicated segments but reflects greater physical length and, especially, higher genetic activity of chromosome 2. With a net effect of reducing the chromosome number and increasing the probability of linkages, such nonrandom distribution has serious consequences for the use of tomatoes in genetic and breeding investigations. The transfer from one genotype to another of several polygenes without shifting many adjacent genes is rendered more difficult.

Gould Award. Arthur C. Guyton, professor and chairman of the depart-



(Left) William F. Scherer, winner of the Theobald Smith Award. (Middle) Charles M. Rick, winner of the Campbell Award. (Right) Stanley Schachter, winner of the Socio-Psychological Prize.

ment of physiology and biophysics, University of Mississippi, Jackson, received the AAAS–Ida B. Gould Memorial Award for Research on Cardiovascular Problems. The $1000 award is provided by the Richard and Hinda Rosenthal Foundation and was given for the fourth time at this year's meeting.

Guyton invented instruments for making precise measurements in the study of respiratory and circulatory systems. These instruments include electronic devices for determining pressures, volumes, and flows in the heart and lungs and in the peripheral circulation. Out of investigations with these instruments have come new ideas concerning the way in which circulation of the blood is regulated.

Industrial Science Award. Armour and Company and Swift and Company were corecipients of the AAAS Industrial Science Achievement Award, which is administered by Section P (Industrial Science). The award is made annually to a company or companies that develop significant practical applications of basic scientific discoveries.

In accepting the citation for Armour and Company, John A. King, director of research of that organization, said: "Early in Armour's history, the meat packer confined his operations almost entirely to edible products. When the disposal of waste products became more and more of a problem, Armour saw an opportunity to convert millions of pounds of such materials into valuable commercial items and turned to science for the means of doing this."

In accepting the citation for Swift and Company, H. E. Robinson, vice president for research, described some recent company achievements. He said: "The use of our four-point program to control staphylococcus organisms in hospitals will be a major benefit to the medical profession. The utilization of electrical stunning of hogs represents a major contribution toward humane slaughter of livestock. Our continuous chilling technique for poultry is another example of the application of basic scientific principles to our operations."

Socio-Psychological Prize. Stanley Schachter, of the department of psychology and the laboratory for research in social sciences, University of Minnesota, received the AAAS–Socio-Psychological Prize. The basis for the award is Schachter's most recent book, *The Psychology of Affiliation*. Published in 1959 by the Stanford University Press, the work reports experimental studies of the circumstances that drive men to seek each other out and the circumstances that cause men to seek privacy. Schachter considers the ways in which emotion and anxiety affect social needs, and he examines social behavior under such conditions as hunger, isolation, and fear of pain.

Schachter's early research was concerned with problems in communication and social influence, affiliative behavior, cross-cultural research, and sensory psychology. His interests at present are concentrated in the study of the physiological and social determinants of emotional states.

William Procter Prize. Charles S. Draper, head, department of aeronautical engineering, Massachusetts Institute of Technology, received the William Procter Prize for scientific achievement, which is awarded annually by the Scientific Research Society of America.

Criminology Award. Archbishop Bernard J. Sheil of the Chicago Archdiocese received an annual award offered by the American Society of Criminology, which is an affiliate of the AAAS. The award was for Sheil's 50 years of work in the field of criminology. After serving in his youth as a jail chaplain, Sheil founded the Catholic Youth Organization as a major bastion against juvenile delinquency. His leadership in the fight against racial and religious intolerance and prejudice, culminated in his acceptance of the chairmanship of the Illinois Committee to Abolish Capital Punishment.

The winner of the 32nd AAAS–Newcomb Cleveland Prize will not be announced until next March. The $1000 award is for an outstanding paper delivered at the annual meeting. The 1959 winner will be honored at the 1960 AAAS meeting in Philadelphia next December.

Defense Education Act Aids Study of Foreign Languages

Thirty-five modern foreign language institutes for the training of 2000 elementary- and secondary-school language teachers will be established at colleges and universities next summer. Authorized under Title VI of the National Defense Education Act, the language institutes provide professional training to elementary and secondary school teachers of French, German, Italian, Russian, and Spanish.

With three exceptions, none of the institutes will accept teachers who attended one of the 12 institutes conducted last summer. The three institutes which will give preference to those who have already attended an institute include Hollins College for teachers of French, University of Puerto Rico for teachers of Spanish, and Stanford University for teachers of German.

The institute sponsored by Stanford University will be the only one of the 35 to be conducted abroad. About 85 secondary-school teachers of German will spend 9 weeks at the institute to be located at Stuttgart, Germany. It is regarded as a pilot enterprise, and from this experiment the Office of Education will be able to determine whether a limited number of institutes may effectively be established in foreign countries.

Two institutes have been designed for elementary-school language teachers. They will be conducted at the University of Kansas for teachers of German and Spanish and at Tufts University for teachers of French and Spanish. Twenty-five institutes will enroll secondary-school teachers, and the remaining eight institutes will enroll both elementary- and secondary-school teachers.

Teachers from public schools who attend the institutes receive stipends of $75 a week and an allowance of $15 a week for each dependent. Private-school teachers attend the institutes without charge but receive no stipends. School teachers interested in attending an institute should write to the institute director, not to the Office of Education.

Graduate Studies Also Aided

Under Title VI of the National Defense Education Act, the U.S. Office of Education will also award nearly 400 Modern Foreign Language Fellowships. The purpose of these fellowships, for graduate study during the summer of 1960 and the 1960–61 academic year, is to increase the number of teachers of 85 foreign languages seldom taught in the United States—languages spoken by millions of people throughout the world.

First preference in awarding fellowships will be given to students studying Arabic, Chinese, Hindi, Japanese, Portuguese, Russian, and Urdu. Candidates for the language fellowships should apply to universities offering advanced training in any of the 85 languages for which the Commissioner of Education has declared there is a national need. Graduate schools offering these languages have been asked