News and Notes

Meeting of the Society of General Physiologists: Symposium on Photoperiodism

THE Annual Meeting of the Society of General Physiologists was held at the Marine Biological Laboratory, Woods Hole, Sept. 11–12. The 75 registrants devoted the first day to short research papers and the second to a stimulating symposium on Photoperiodism, arranged by Sterling Hendricks in cooperation with the Committee on Photobiology, National Research Council.

At the business meeting it was voted to affiliate with the AAAS. It was also decided to meet at Woods Hole in 1955 in conjunction with the meeting of the American Physiological Society at Tufts Medical School. The results of the mail balloting for officers and council were announced (see p. 3 of this issue of SCIENCE), and it was reported that Woods Hole had won narrowly over Gainesville as the meeting place for 1954; that the Society had been invited to nominate two members to the editorial board of *Physiological Reviews* (F. A. Brown, Jr. and Folke Skoog were selected); and that the members of the Society are ex officio members of the International Union of Physiological Sciences, and entitled to participate in the next Congress. After the meeting the Society enjoyed a social hour at the home of Dr. and Mrs. A. Szent-Györgyi.

The contributed papers consisted of the following: "Electrical measurement of oxygen exchange in respiration and the photosynthetic energy cycle" (D. Burk, K. Damaschke, F. Toedt, and O. Warburg); "Participation of photosynthesis in the physiology of *Ochromonas*" (J. Myers); "The effect of the illumination conditions on behavior in a gradient of temperature" (C. M. Sullivan and K. C. Fisher); "The nature and kinetics of the respiratory pigments of the luminous bacterium, *Achromobacter fischeri*" (B. Chance and V. Sidel); "A quantitative study of the distribution of sulfhydryl groups during embryonic development" (J. H. Bodine and C. Norman); "Discontinuous respiration in diapausing *Agapema* pupae" (J. B. Buck, M. L. Keister, and H. Specht); "Structure and function of the nuclear membrane" (W. R. Duryee); "Facilitated transfer of sugar across the erythrocyte membrane" (W. F. Widdas); "The asymmetrical penetration of water through insect cuticle" (A. G. Richards); "The Q_{10} of the maximum developed tetanic tension of isolated single muscle fibers of the frog" (R. W. Ramsey, M. A. Washington, M. F. Arrighi, and S. F. Street); "Ca, Na and K concentrations in the cathodal and anodal portions of *Physarum polycephalum* during galvanotaxis" (J. D. Anderson, J. V. Butkiewicz, and E. C. Roter); "Rabbit blastocyst alkalinity and implantation" (B. G. Böving); "Kinetics of the thermal inactivation of isolated chloroplast fragments" (J. D. Spikes, N. I. Bishop, and R. Lumry).

The Symposium on Photoperiodism demonstrated the fundamental kinship between plants and animals in the mechanisms of certain responses to light and in the operation of various adaptive endogenous rhythms. The contributions also illustrated well the fruitfulness of three levels of attack: measuring carefully the responses and rhythms and relating them to environmental cycles; tracing the overt phenomena to underlying physiological changes, notably in hormone level; deducing, from quantitative spectrophotomery, the nature of the active pigment and the molecular changes involved in the basic photochemical reaction.

In a variety of plant material, H. A. Borthwick reported that the same action spectrum, with maximum effect at 6500 A, was obtained for induction of seed germination, for seedling growth, and for both the induction of flowering in long-day plants and its inhibition in short-day plants. The effect of 6500 A light was completely and repeatedly reversible by infrared light of wavelength 7350 A.

This photoreversible reaction was further studied by S. B. Hendricks and shown to be temperature-independent and obedient to the reciprocity relation. Hendricks regards the pigment, which is present in exceedingly low concentration, as probably a tetrapyrrol related to phycocyanin, and the photoreaction as probably a cis-trans isomerization, with the biologically active molecule being the excited intermediate form rather than either the more stable (6500 A) or less stable (7350 A) isomer.

One link in the complex chain of reactions between photosensitive molecule and biological end-phenomenon may involve hormone action, judging from the work of A. W. Galston. It was found, for example, that light produces a rise in the growth-promoting auxin indoleacetic acid (IAA) and that the experimental application of IAA is equivalent to the action of light in inducing and in inhibiting, respectively, the flowering of long-day and short-day plants. A further step in biological complexity, the origin of endogenous rhythms, is suggested by Galston's finding that rhythmic responses originally induced by photoalternation may persist in uniform conditions, apparently via alternating rises in concentration of IAA and its adaptively-induced enzymatic inhibitor, IAA-oxidase.

From a review, by C. E. Jenner, of animal responses to seasonal changes in length of day or night, it appears that knowledge of the basic reactions lags behind what is known in plants, although the biological variety and complexity may be even greater in animals. The only two action spectra adequately investigated—those for induction of spawning in a freshwater snail and a marine hydrozoan—show absorption maxima at 4200, 5000, and 6250 A, suggesting porphyrin involvement. Animal photoperiodism thus

seems to depend on a different photochemical reaction from that in plants.

F. A. Brown, Jr., described a number of remarkable rhythms in marine invertebrates that, for weeks or months, persist in accurate synchrony with environmental cycles even though the animal is in uniform conditions. In the eyes of certain shrimp, for example, the retinal pigment migration shows clear cycling not only according to diurnal light-dark alternation, but with the daily and fortnightly tidal cycles as well. A basic endogenous rhythm is postulated, which controls both the sensitivity of the eye and the hormonal cycle that in turn controls pigment migration. Similar rhythms of oxygen uptake have been found in crabs and snails.

A three-component cycle involving interaction of diurnal and endocrine components is illustrated in the egg-laying activity of the hen, described by R. M. Fraps. Here the neural component stimulating the pituitary to release the ovulation-inducing hormone has a diurnal rhythm of threshold for excitation by hormones from the ovarian follicle. Due to lag in the production of the follicular hormones after ovulation, each successive neural-pituitary-ovary chain of stimulation occurs later than the preceding, and eventually the chain is broken for a day—that is, the hen skips a day in egg-laying—because the neural element is in the refractory part of its diurnal cycle at the time of day the follicle hormones arrive.

In the eclosion of *Drosophila* at the end of pupal life there appear to be two inherited and persistent "clocks" involved. One measures time in 24-hr periods, normally with respect to dawn, but subject to experimental resetting; the other measures time between dawn and a time at which a favorable humidity would normally be attained. In describing these clocks, C. S. Pittendrigh showed that the 24-hr clock is temperature-independent between 5° and 29°, and the other clock temperature-dependent; and that these facts have adaptive significance.

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Science in 1953 as Presented to the Public

This summary of progress in science and technology in 1953 consists of items selected and adapted from a 355-item list prepared by Science Service for distribution to its newspaper clients. More information about any item can be obtained by sending two 3-cent stamps for each item to Science Service, 1719 N St., N.W., Washington 6, D. C.

Aeronautics

Work progressed on an automatic radio transmitter beacon that goes into action when a plane crashes; combined with automatic ground-based direction-finding stations, the beacon will serve to pinpoint the scene of future airplane crashes, permitting rescues in record time. ¶ A plastic-treated material of glass fibers was found to be successful for airplane construction, saving on construction cost, permitting faster flight and making airplanes "invisible" to radar. ¶ Tests were successful on models of a new type of airplane wing, resembling Venetian blinds, that will enable a fast transport plane to make a vertical take-off from a small airport. ¶ A prototype of the F-100 Super Sabre, now in production for the Air Force, attained supersonic speed in performance; it set a new official record of 754.98 mi/hr. ¶ The experimental Douglas D-588-II Skyrocket set a new unofficial record of 1327 mi/hr by flying twice the speed of sound. A new altitude record was set at 83,235 ft in an experimental plane. ¶ A swept-winged guided missile was developed capable of striking at supersonic speeds from submarines, surface ships and shore bases. ¶ Devices were developed for guided missiles which automatically correct navigation errors due to faulty construction, winds, changes in air density and other factors that might throw the missile off course. ¶ Two Navy guns were paired into a team automatically loaded, controlled electronically by the ship's radar and fire-control system, and capable of spitting heavy flak at guided missiles. ¶ A new synthetic lubricant was developed for jet engines that will enable designers to create fighter planes that can fly higher and faster and operate in Arctic as well as the tropics. ¶ Synthetic lubricants from pine gum were found useful in the extreme cold of the Arctic. ¶ Zirconium dioxide powder was stabilized to withstand the extreme heat of jet engines and rockets. ¶ An electronic "brain" was invented that will compute the arrival time of airplanes at an airport and, in event that two planes arrive simultaneously, will figure out a slight detour for one. ¶ A robot pilot was developed to control the flight of a heavy plane from take-off to landing using flight data coded on a punched paper tape. ¶ A new kind of radar that responds to airplanes but not to stationary objects such as buildings went into operation as a landing aid. ¶ A sled that can travel at twice the speed of sound was created to test the design of new parachutes for jet planes.

Anthropology and Archaeology

A fragment of bone of the most ancient true man so far known, some millions of year old and found in South Africa, was cleaned and readied for scientific study. ¶ Fresh evidence that the "Taungs Baby" was more human than ape was provided by a mathematical study of the dimensions of the milk canine teeth. ¶ A complete rib of 12,000-year-old Folsom Man was found in New Mexico with the skeletons of three dire wolves which had probably killed him. ¶ Bones of the Old Stone Age infant were found in a cave in Iraq; the cave is now inhabited and has been continuously for some 100,000 yrs. ¶ Human weapons and tools found in the frozen soil of Alaska were dated by geologic methods as being from 3000 to 7000 yrs old, belonging to a period when the climate was much

milder than it is today. ¶ Further evidence of a pole-girdling migration of early man from Europe through Siberia, Alaska and Canada to Greenland was seen in delicately made burins found near the west coast of Hudson Bay. ¶ The jaw of Piltdown Man, the "Dawn Man" of Sussex, was definitely proved to be a hoax; the other skull fragments are authentic but not more than 50,000 yrs old. ¶Fluted weapon points of the type known as eastern Folsom, relics of people who lived some 7000 yrs ago, were found near the Roanoke River in southern Virginia. ¶ Evidence in the form of associated extinct animal bones showing that the ancient men who were makers of the "Clovis" points were hunting in America more than 15,000 yrs ago was reported; similar evidence showed that Folsom man, although more recent than the Clovis people, lived in America long before Yuma Man. ¶ The first known Indian-carved nude figure of a woman found on the face of a canyon wall showed the marks of smallpox eruption and commemorated the recovery of the woman. ¶ The practically unknown people of the upper Xingu River, in Brazil's Mato Grosso were visited by a party of anthropologists and found to be dying out. ¶ Technical experts recommended the new use of 2000-year-old cisterns to store water to reclaim the Negev desert area in Israel. ¶ A cooperative x-ray study by medical and anthropological experts of Indian bones in the Smithsonian Institution was undertaken; it is expected to show whether tuberculosis and syphilis are native in America.

Astronomy [See H. Shapley's "Astronomical Highlights," SCIENCE, **118**, 738 (Dec. 18, 1953).]

Biological Sciences

The manner of duplication of chemicals that carry on heredity within the germ cells was suggested by the proposed structure for desoxyribonucleic acid (DNA) as two intertwined complementary molecular chains which uncoil and become templates for genetic replication. ¶ An answer to the key question of photosynthesis was proposed in a theory that energy packets released by chlorophyll strike the protogen molecule, breaking a bond tying the two sulfur atoms together; the energy is retained in the two resulting molecular fragments which then combine with other molecules to build proteins. ¶ Tests duplicating conditions that probably existed before life appeared on earth showed that chlorophyll could have been spontaneously created when two common gases and water were passed over heated silica. ¶ Chlorophyll was found to promote the release of water vapor from leaves in addition to its function in capturing energy from sunlight in the manufacture of food out of carbon dioxide and water. ¶ Debris of chromosomes left after the smashing of a virus have been photographed with the electron microscope. ¶ Algae can provide food high in protein and other necessary food elements suitable for human diet, it was found, giving promise of saving future populations from starvation. ¶ By labeling two bacterial viruses with radioactive phosphorus, it was found that the virus attacks its cell victim through chemical groups of atoms on the cell's surface. ¶ Chick embryos survived freezing in liquid nitrogen at $-320°$ F and thawing in tyrode solution. ¶ A new method was found for keeping cells alive inside a plastic incubator under a microscope while motion pictures were made. ¶ A coelacanth, survivor of a long-gone geologic age, and the third ever found, was caught off Madagascar. ¶ The San Benedicto Island wren was rendered extinct by the birth of a new volcano on the island. ¶ New birds, including babbler, lark, and warbler, were discovered in the Arabian Sultanate of Muscat and Oman. ¶Genes are changed by mutation-causing agents but only indirectly through changes in the cell metabolism, it was found. ¶ Better varieties of many vegetables and flowers become possible through development of a sterile pollen method of producing hybrid seed. ¶ Brood X, biggest and widest-spread group of the periodical 17-yr cicadas, emerged for 6 wks of life spent in singing and in laying eggs that will hatch in 1970. ¶ Tiny black beetles of the family Nitidulidae were found to spread the fungus disease oak wilt from infected to healthy trees. ¶ A new antibiotic, oligomycin, was isolated and showed promise in the control of plant fungus diseases. ¶ A hydrocarbon insecticide 100 times as deadly as DDT yet nonpoisonous to man and domestic animals was developed. ¶ Study was begun on the long-neglected horseshoe crab, which has resisted evolutionary change for millions of years. ¶ Psittacosis, parrot fever, was found for the first time in turkeys. ¶ New rules were adopted to govern the scientific naming of animals; it is hoped that they will end the confusion between European and American practice. ¶ Australia's marsupials have been getting smaller since the Pleistocene age and the process is still going on, it was found.

Chemistry and Physics

A revision of Einstein's generalized theory of gravitation was published, a forward step toward finding a single theory to describe both gravitation and electromagnetism. ¶ Experimental proof was obtained for the Nernst-Einstein relation of the mobility of electrons and holes, important in transistor research. ¶ The spinor was suggested as the first arch of a possible bridge between Einstein's unified field theory and quantum concepts. ¶ A theromometer sensitive to the electrical noise generated by heat in a fine platinum wire was investigated for measuring high temperatures. ¶ Hard-to-detect strains in metals were spotted by measuring minute changes in spacing between their atoms as revealed by x-ray diffraction. ¶ Prediction was made of a new acousto-electric effect by which electrons are carried by sound when an acoustic wave passes a semiconductor. ¶ New information about the meson was promised by the discovery that this fundamental particle can originate in atomic collisions on only a few billion electron volt energies. ¶ Beams of mesons were used to measure the size of the atomic nucleus which was found to

be smaller by 15% than previously thought; a polarized proton beam was also used to study the nucleus. ¶ A 60,000-kw full-scale atomic reactor was designed to produce peace-time atomic energy. ¶ Bombardment of the earth with cosmic rays from outer space has not varied more than 10 to 20% over the last 35,000 yrs, it was concluded. ¶ A new charge exchange accelerator using protons as atomic projectiles was under development at the University of California and was dubbed the "swindletron" because it "cheats" by giving two boosts of energy to the projectile for each electric impulse. ¶ Plans were discussed for a 15-Bev "colossatron," a giant atomic accelerator using the new, strong-focusing principle developed last year. An electron synchrotron, which may later use the new strong-focusing system, started work at Cornell University. ¶ The beam of a 2,000,000-v atom smasher was pin-pointed so that it would strike only one or a very few of the genes in a living cell, contributing information on which parts of the cell would be most affected by radiation from an atom bomb. ¶ The possibility that the hydrogen bomb can be made without using the older fission-type atomic bomb as a trigger was speculated upon; a possible trigger was forecast in exploding wide experiments in the 1920's to duplicate the temperatures of the stars. ¶ The chemical structure of aureomycin, antibiotic drug, was discovered, making practical synthesis possible although highly improbable. ¶ Substances known as lysine polypeptides, which affect some viruses and bacteria in much the same way as the antibodies that create immunity, were synthesized. FAD, or flavin-adenine-dinucleotide, coenzyme essential to the utilization of oxygen, was synthesized. ¶ Catalase, an important plant and animal enzyme, may be a factor in the natural synthesis of both chlorophyll and hemoglobin, plant and animal research indicated. ¶ ACTH, pituitary gland hormone, was isolated as a pure white powder soluble in water and with a molecular weight of about 3500. ¶ An electronic device was developed, operating ultrasonically or in the audible range, to measure liquid flow including blood flow without use of surgery. ¶ A new way to separate small particles such as cells or bacteria which are of equal density but different electrical conductivity was found in their behavior in a magnetic field. ¶ Careful temperature control made possible the manufacture of germanium crystals uniformly enough to make transistors interchangeable. ¶ A sixth series of atomic spectrum lines, as well as the five previously known, was found in light given off by excited hydrogen atoms; the new series is in the infra-red part of the spectrum. ¶ When a cerium compound is dissolved in water and the solution set in sunlight, it was observed, two chemical reactions occurring in seesaw succession split the water into hydrogen and oxygen. ¶ Compounds of aluminum, gallium and indium with arsenic and antimony were found capable of acting as semiconductors and possibly as replacements for hard-to-get germanium. ¶ By separate studies of x-ray diffraction patterns and mathematical theory, new understanding was reached of the structure of protein as a complex twisted form in which spring-shaped molecular chains are intertwined. ¶ Nine semi-living chemical substances known as enzymes were found to work in unison to permit the human digestion of fat. ¶ Radioactive cotton grown on a living cotton plant gave new evidence on how cellulose is formed. ¶ A whole new series of plastics was made possible from compounds of phosphorus, nitrogen, boron, and arsenic with other chemicals. ¶ A new synthetic rubber with resistance to aging due to oxidation and long wearing was made from the antifreeze fluids, propylene glycol and ethylene glycol mixed with adipic acid. ¶ A new food packaging material was made from a special type of saran which shrinks to fit the contents. ¶ Drying of paints, varnishes and inks was hastened by adding amine chemicals and metals to the linseed oil. ¶ A new chemical to protect foods from mold spoilage was announced as were two soy products that give bread a built-in fresh feel.

Earth Sciences

The greatest depth under the sea was reached when a descent was made to 10,339 ft off the island of Ponza, Italy, where complete blackness was found broken only by phosphorescent flickers. ¶ Granite rock from Manitoba was found to be 3.5×10^8 yrs old, the oldest known; lead tetramethyl, made from radioactive lead, yielded the same figure. ¶ A hurricane's eye extends to the top of the storm and then comes back to earth in a second column of calm air 200 to 300 mi away called the "hyperbolic point"; tracking the hyperbolic point, it was reported, may permit better forecasting of the hurricane path. ¶ Cross-polarization of radar transmitting and receiving instruments made it possible to detect the presence of ice crystals in high clouds, thus providing additional clues relating to the occurrence of rain or snow. ¶ The process by which heat and pressure deep under the earth's crust deform rocks and cause them to flow was duplicated in the laboratory. ¶ Great internal waves, reaching a height of 300 ft but not rippling the surface, were found in the heart of ocean depths. ¶ The general level of the world's oceans was found to have risen 5 in. since 1895, due largely to melting polar ice. ¶ Dutch farm land, ruined by salt when floods broke the dykes and rushed over the land, was reclaimed by a process of ion exchange. ¶ A national water shortage was found to be due to greatly increased use and not to a general drop in water resources. ¶ Studies indicated that the earth's core is of solid iron surrounded by the same metal in a molten state, and that the temperature at the boundary between the two is a little greater than 8400° F; jet streams and swirling currents make motion of the core similar to that of the upper atmosphere. ¶ More than 500 tornadoes hit the United States, making 1953 a record year, the increase being attributed in part to improved observing and reporting programs. ¶ The first "mid-ocean" submarine canyon was discovered. ¶ Underwater television was successfully used to study fish life 100 ft below the surface

of a Canadian lake and the ocean bottom at a similar depth. ¶ Congressional action provided for the establishment of a committee to study the feasibility of rain making and other forms of weather modification. ¶ Powerful flashes of lightning were found to be associated with the growth of ice pellets or soft hail of thunderstorms. ¶ Large scale eddies cyclones and anticyclones were duplicated in laboratory models of the atmosphere, using both smoke in air and dyes in water. ¶ Preliminary studies of the formation of fog droplets indicated that the nuclei may be partly made up of tiny crystals of salt evaporated from the ocean. ¶ Measurements of electric charges on cloud droplets and the electric field of natural clouds suggested that the reason certain clouds produce rain and others remain unproductive may be related to electrification. ¶ Theoretical relationships between the vertical ascent of air and the rate of precipitation were developed into practical forecasting procedures. ¶ Numerical weather prediction by means of high-speed electronic computers achieved, for the first time, prediction of the development of an extra-tropical cyclonic storm; because of this success, the government established an operational numerical forecasting unit. ¶ A new seismograph capable of recording strong earthquake waves after they have circled the earth eight times went into operation and recorded Mantle Rayleigh waves, extremely long waves that may penetrate to the core of the earth and reveal its structure. ¶ A new, highly sensitive and speedy optical hygrometer, especially useful in below-freezing temperatures, was developed. ¶ Study of 50-yr records of the intensity of sunlight revealed information about the thickness of the ozone layer surrounding the earth. ¶ The rate with which stars twinkle may indicate where jet streams are and how fast they flow, it was suggested. ¶ Fluctuations in the Florida Current important branch of the Gulf Stream, were measured throughout the year by electromagnetic induction. ¶ Oceanographers found a heat flow from the ocean bottom equal to that from high and dry continents caused by radioactive elements. ¶ A new research tool, in the form of a bibliography of all the literature on the Arctic put out in the last 75 yrs, was made available.

Engineering and Technology

A tape recording system was developed for black and white and color television programs which permits immediate playback, can be wiped clean and reused, and costs much less than film recordings. ¶ "Project Tinkertoy" proved satisfactory; it is a program for putting radios, radars and electronic bombsights into mechanized production through use of standardized parts of printed circuits that can be assembled by machine. ¶ Progress toward entirely push-button factories included an electronic machine controlled by instructions on a magnetic tape, and an automatic eye operating in the infra-red to give a continuous analysis of liquid chemicals. ¶ Electronic machines to handle such clerical work as production scheduling and supply problems were under development. ¶ A mathematical model of an electronic computer that reproduces itself was developed. ¶ A new type of "brain" utilized 10,000 tiny ring-shaped magnets woven into a netting of wires to serve as a memory to store 10,000 bits of information in an instant. ¶ A wrist radio using five transistors instead of vacuum tubes was produced; it picked up broadcasts 40 mi away. ¶ A 400-kv transmission line was successfully used to transmit hydroelectric power over a 600-mi distance in Sweden; this is a record high operational transmission voltage level. ¶ Development continued on unusual ceramic materials needed by the Atomic Energy Commission to withstand the harmful effects of atomic radiation and extraordinary high temperatures. ¶ Some half dozen catalyst beads impregnated with radioactive zirconium were used routinely to indicate the circulation rate of billions (tons) of catalyst beads in several gasoline cracking refineries. ¶ An experimental plant went into operation to extract aluminum metal from common clays; the idea is to make this country independent of imported bauxite as an aluminum source. ¶ A specially built camera making exposures of from 1 to 10 μsec was used to photograph tiny dirt and moisture particles in the air. ¶ Silicone rubber was used successfully for electric wire insulation, standing up under extremes of heat and cold. ¶ A three-dimensional technique was developed for making photomicrographs. ¶ An electric power generator with turbine was designed to be powered by steam above the critical pressure. ¶ Water was pumped into the subsoil of Mexico City by rehydration wells to restore the water supply of the city and stop its sinking into the ground. ¶ Small gobs of air, called "dielectric" eddies, in the atmosphere were found to disrupt television transmission in fringe areas. ¶ Television waves and other very high frequency signals were found to be bent around mountains by diffraction to continue along a long path on the other side of the obstacle. ¶ A wire rope with a plastic core unaffected by acids, caustics and other sub-surface substances was developed for use in drilling oil and gas wells. ¶ Magnesium was used in lightweight automobile bodies and found to be better than plastic. ¶ An electromagnetic "divining rod" was developed to locate underground water sources. ¶ A new method of reproducing maps by line-scribing on an opaque emulsion applied to plastic sheeting was reported. ¶ An aerial estimator, a device resembling a reflector-type gunsight, was developed to help in estimating the size of forest fires, timber stands, lakes, etc. ¶ A fluorescent lamp with quartz inner tube was found to give about 2.5 times more light than an incandescent lamp of equal power and lasts about five times longer. ¶ A method was found for working 16-Alfenol, heretofore an unusable magnetic curiosity. ¶ A new coaxial telephone cable system was installed between New York and Philadelphia to carry simultaneously 1800 separate conversations. ¶ Use of radioactive tracers to label the oil intended for various destinations enabled the operator at any point along the pipe-line to draw off just the batch intended for him. ¶ Two new types of transistors, "tetrodes" and "pentodes," were announced; they have three and four

wires, respectively, instead of two. ¶ Crystals of barium titanate were found capable of "memorizing" answers to 250 questions and producing them on demand in the form of positive or negative electric charges. ¶ A large experimental transistor has been produced that is capable of handling 20 watts of output power. ¶ A telephonic robot device was developed that "listens" to clearly enunciated digits, then matches the sound pattern electronically to standard referents stored in its memory, and responds by flashing an appropriate light.

Medical Sciences

Plans were announced for a large-scale field trial, starting in Feb. 1954, and involving at least 500,000 second grade children, of a vaccine against all three types of poliomyelitis. ¶ Gamma globulin from blood was given widely to children in many regions in hope of preventing paralysis from poliomyelitis, following reported successful field trials of it in the 1952 season. ¶ Electron microscope pictures and measurements of the poliomyelitis virus were made, showing it to be sphere-shaped and about 10^{-6} in. in diameter. ¶ Discoveries of a new virus, called Mack virus, which can cause a polio-like disease, and of another virus, called Kentucky virus, which may be a fourth type of polio virus, were announced. ¶ The third of the three known strains of polio virus was adapted to growth in laboratory mice. ¶ Synthesis of oxytocin, first pituitary gland hormone to be synthesized, was announced with the hint that synthesis of another pituitary hormone, vasopressin, was almost accomplished. ¶ Growth hormone from the pituitary gland and thyroxin from the thyroid were reported responsible for tooth growth and eruption. ¶ Essential fatty acids from fat in the diet were reported effective in protecting laboratory rats from critical doses of x-rays similar to atomic bomb radiation. ¶ First report of study of first generation of children born to parents who survived atomic bombing in Hiroshima and Nagasaki showed no bad effects of significance with only slight increase in stillbirths and births of malformed babies. ¶ Study of sexual behavior of 5940 white women showed, among other things and for the group studied, though there were wide individual variations, that females become sexually responsive later and remain so to an older age than men, are affected by fewer and different psychological factors than men, are more faithful when married than men, are more successful in marriage when prepared by premarital sexual experience, and are less "frigid" in marriage if born after 1900 than before. ¶ Research suggested patients with multiple sclerosis might be helped by a diet low in fat, particularly if started early in the course of the disease. ¶ Treatment to raise blood pressure and stimulate circulation was advised for multiple sclerosis patients in a report showing two-thirds of all early, microscopically small multiple sclerosis damage spots located close to blood vessels, and that more than half of 250 patients had markedly low blood pressure. ¶ More people have multiple sclerosis and there are more deaths from the disease in Canada and the northern states than the south, a geographic survey showed. ¶ A chick embryo method for cutting time to diagnose tuberculosis from weeks to days was announced. ¶ A new drug promising to help streptomycin in treatment of tuberculosis called HES, or hydroxyethyl sulfone, was synthesized. ¶ A new anti-tuberculosis vaccine was made from urea-killed virulent human tubercle bacilli. ¶ A chemical in the body, lysozyme, was found important in resistance to tuberculosis. ¶ Evidence was found that the growth hormone from the pituitary gland may be the cause of arthritis. ¶ Cortisone, anti-arthritis adrenal gland hormone, was reported effective antidote for yellow phosphorus poisoning. ¶ One form of anti-anemia vitamin B_{12}, hydroxo-cobalamin, was found in mice to act as swift antidote to cyanide poisoning. ¶Formation of disease-fighting antibodies was found to depend in part at least on getting in the diet plenty of these vitamins: pantothenic acid, folic acid and pyridoxine. ¶ Examination of white blood cells for lymphocytes with two-lobed nuclei was reported a practical, sensitive test for exposure to very small amounts of atomic radiation from cyclotrons. ¶ Hemophilia, heretofore thought only a male disease, was found to occur in females also. ¶ Atherosclerosis was produced for the first time in monkeys by a special diet, giving scientists an animal that eats human-type food for further research on the disease. ¶ Cortisone was reported to have saved 75% of babies from Rh blood deaths. ¶ Radioactive cortisone and hydrocortisone were made with carbon 14. ¶ Discovery of a link between anti-anemia vitamin B_{12} and diabetes, particularly diabetic blindness, gave further evidence for the vitamin being involved in the body's handling of fat and carbohydrates. ¶ Plasminogen, newly isolated fraction of human blood, was found capable of dissolving dangerous blood clots in veins. ¶ A blood pressure lowering chemical, andromedotoxin, was discovered in rhododendron leaves. ¶ A parasite called toxoplasma was announced as probable cause of widespread eye infections. ¶ Irradiation of pork with cobalt 60 was reported effective for killing trichina. ¶ A treatment with 22 amino acids and selected vitamins was reported helpful in muscular dystrophy. ¶ Discovery that there are groups and types of blood platelets as well as of red blood cells was announced. ¶ Discovery of the tissue network that connects teeth to gums was announced. ¶ Adrenalin production starts before birth, perhaps helping prevent prebirth or birth asphyxiation, studies of unborn lambs showed. ¶ A new drug for ulcer patients, a quaternary ammonium compound akin to so-called soapless soaps, went on the market. ¶ Methoxamine hydrochloride, a synthetic drug, was found effective for treating excessively rapid heart beating. ¶ Discovery was announced of an abnormal adrenal hormone, 17a-hydroxypregnanolone, in arthritis patients. ¶ A new adrenal gland stimulating hormone from the pituitary, called AGF and distinct from ACTH, was discovered. ¶ A drug to eliminate excess water, sodium and potassium from water-logged tissues of patients with congestive heart

failure was made from sulfanilamide. ¶ An artery crushing operation was found to relieve rigidity and involuntary movements of Parkinsonism. ¶ The digestive enzyme, trypsin, was found capable of dissolving life-threatening clots in the heart's arteries and, in aerosol form, of helping asthma patients. ¶ A synthetic drug that stops coughing without addiction or pain-relieving properties was found in the dextro isomer of the synthetic pain-killer, Dromoran. ¶ A new synthetic hormone drug, androstanolone, with weak masculinizing effects, was reported helpful to women with advanced inoperable breast cancer. ¶ Radioactive gold wire encased in nonactive gold tubing was developed as a safer and more advantageous treatment for cancer than the use of radium seeds. ¶ A fatty substance from small intestines of mice and rats was found to destroy cancer cells in test tube leaving normal cells unharmed. ¶ Hormone production of the mother's glands during pregnancy was reported possibly causing predisposition to some kinds of cancers. ¶ Three-dimensional x-ray pictures were made using synchronously moving x-ray tube and subject. ¶ An electric stimulus across the chest was made to act as sole "pacemaker" to keep a stopped heart beating for five days when it started on its own again.

Psychiatry and Psychology

For the first time a research team went into the combat area and obtained measures of the physical and mental consequences of combat stress; important effects were found to be dehydration and a serious reduction in adult white blood cells. ¶ The chemical process involved in night vision was duplicated in the laboratory and one of the chemicals involved for daylight vision, cyanopsin, was produced from an extract of dark-adapted rods and the cones from chicken eye retinas. ¶ Several objective tests were found to be promising for the measurement of temperament, including a color film to test for the dominance of form over color perception or the reverse. ¶ Individuals can learn to recognize at least 10,000 distinct odors and can detect fantastically tenuous odors, it was found, but they are quite poor at distinguishing slight differences in intensity of smells. ¶ Two kinds of pain, pricking and burning, follow the same nerve pathways to the brain, it was determined; a finding important to surgeons performing nerve-blocking operations to relieve intractable pain. ¶ The part of the brain that controls appetite was located in the hypothalamus at the base of the brain. ¶ Individuals with high scores on intelligence tests do even better as they grow older, retesting after an interval of 30 yrs indicated. ¶ Little boys should be six months older when they start school than are little girls, tests of maturity on children indicated; this would save about 2% on the cost of education. ¶ Follow-up study of individuals who as children were placed in "opportunity rooms" for mental deficiency, showed they make a much better adjustment to life than has been supposed and their children, if any, go through school with little or no retardation. ¶ An Institute of Human Variation was established to study what biological and social factors are responsible for producing differences between individuals. ¶ Few people act strictly according to their own prejudices, and many people live in a remarkably strict self-imposed segregation from other groups; these were preliminary findings of an eight-year study of intergroup relations. ¶ Mice defeated repeatedly in fights with other mice developed "combat fatigue," a finding promising that these animals may be used to throw light on the causes of combat breakdown in humans. ¶ A method was devised for recording the brain waves of a patient and a motion picture of his movements on the same film. ¶ Jerky eye movements reveal when a sleeping person is dreaming, it was observed. ¶ Flashing lights in the eyes and semicarbazide, a drug related to isoniazid, new TB drug, were successfully used to produce convulsions for the shock treatment of schizophrenia. ¶ An elixir of metrazol was found to produce improvement in aged mental patients.

Grants and Fellowships

The **AiResearch Manufacturing Company,** a division of the Garrett Corporation, Los Angeles, has established a $56,000 fund for the support of teaching and research in the history of science at the **California Institute of Technology.** The fund will make possible two innovations at the Institute: a general course in the history of science, and a research project in the history of flight under pressurized conditions, such as those which prevail on any flight at high altitude. Rodman W. Paul, professor of history, will direct the three-year program which the new fund will support. Thomas M. Smith, newly-appointed assistant professor of the history of science, will conduct the study and write the history as well as teach the new course when it is introduced next year.

The **American Heart Association,** 44 E. 23rd St., N.Y.C., has announced that entries for the second annual Howard W. Blakeslee Award for outstanding scientific reporting in the field of heart and blood vessel diseases *must be submitted by Jan. 15, 1954.* The award, in the amount of $1000, will be presented at the Association's Annual Dinner early in 1954 to the individual whose creative efforts in any medium of mass communication are judged to have contributed most to public understanding of heart and circulatory diseases.

The **General Electric Educational and Charitable Fund** has announced that *until Jan. 15* it will accept applications from college graduates for research grants to continue their studies next year in the physical sciences, engineering, and industrial management. Under this program, married students receive $2100 and unmarried ones $1400 for living expenses. The educational institutions they will attend will get a grant of $1200 for each fellowship holder to cover tuition and related costs.

The John and Mary R. Markle Foundation has ap-

pointed the following Scholars in Medical Science for 1953:

W. G. Anlyan, Duke University.
M. B. Carpenter, College of Physicians and Surgeons, Columbia University.
B. Childs, The Johns Hopkins University.
J. Davies, State University of Iowa.
H. F. Eichenwald, Cornell University Medical College.
M. M. Figley, University of Michigan.
B. Fisher, University of Pittsburgh.
R. S. Fraser, University of Alberta.
W. L. Henry, Jr., Howard University.
W. S. Jordan, Jr., Western Reserve University.
R. C. Jung, Tulane University.
C. F. Kittle, University of Kansas.
J. C. Laidlaw, University of Toronto.
G. D. Ludwig, University of Pennsylvania.
J. R. McCorriston, McGill University.
T. H. Noehren, University of Buffalo.
R. W. Noyes, Stanford University.
C. N. Peiss, St. Louis University.
G. D. Penick, University of North Carolina.
W. F. Scherer, University of Minnesota.
D. P. Shedd, Yale University.

Meetings and Elections

With the chartering of Arizona's first local section of the **American Chemical Society,** the Society now has sections in every state of the Union. The new group, known as the Southern Arizona Section, will have headquarters at Tucson and will serve chemists and chemical engineers of six counties: Cochise, Gila, Graham, Maricopa, Pima, and Pinal. This section, comprising 84 charter members, becomes the 144th local unit of the Society, which has more than 70,000 members.

The **American Microscopical Society** has elected the following officers for 1954: pres., Oscar W. Richards, American Optical Co., Southbridge, Mass.; 1st v. pres., R. P. Hall, New York University; 2nd v. pres., Robert W. Pennak, University of Colorado; sec., C. J. D. Brown, Montana State College, Bozeman, Mont.; treas., Frank F. Hooper, University of Michigan.

The Pan American Medical Association, a 26-year old organization that brings together leaders in all branches of medicine and public health, has announced its **Ninth Inter-American Medical Congress.** More than 2500 physicians and medical researchers from 22 nations of the Western Hemisphere will exchange information on the latest developments in medicine, surgery, and related fields during a 16-day medical congress to be held in six Latin American cities and aboard ship enroute to these ports. On Jan. 6 more than 700 U.S. physicians and their families and associates will sail from New York to the conference.

The American Psychological Association has announced the formation of a new scientific group, the **Society of Correctional Psychologists,** which is composed of clinical psychologists attached to prisons, reformatories, and other correctional institutions. The society will be a part of the Association's Division 18, a division for psychologists in public service. It is estimated that there are over 150 psychologists working on parole, probation, and prison problems, both civilian and military, who are eligible to join the new organization.

Arnold V. Goulding, clinical psychologist at Auburn Prison, N.Y., has been elected president and the other officers are as follows: 1st v. pres., Capt. William R. Perl, USA, Fort Leavenworth Disciplinary Barracks, Kan.; 2nd v. pres., John Adams, House of Correction, Jessups, Md.; sec.-treas., Sheldon Peizer, Ohio State Reformatory, Mansfield.

The Chicago Section of the Instrument Society of America has arranged a two-day **Symposium on Methods of Instrumental Analysis** for Feb. 1–2, 1954. Papers have been scheduled on the following subjects: measurement of pH; measurement of solution conductivity; amperometric analysis and polarography; colorimetry, nephelometry, and photofluorimetry; infra-red analysis and spectrophotometry; spectrophotometry in the visible and ultraviolet; optical polarimetry and saccharimetry; and electrophoresis (tentative).

The material to be presented is to deal with principles and methods rather than with equipment. Errors, their causes, their prevention, and methods of checking will be emphasized. The symposium is directed at the group-leader level, and should be of interest to research workers, supervisors, and to group leaders in general.

It is planned that complete printed proceedings be available to every registrant at the time of the symposium. To defray the cost of preparing these, a registration fee will be charged. Advance registration is requested whenever possible. Registration may be made either through George R. Kincaid, Beckman Instruments, 7145 W. Belmont Ave., Chicago 34, Ill., or with Prof. H. C. Roberts, 511 W. Washington St., Urbana, Ill.

The University of Texas Medical Branch, Galveston, was host to the **Texas Academy of Science** at its annual meeting, Dec. 4–5, 1953. The meeting included special sessions for the collegiate academy and the Junior Academy. A feature of the meeting was a series of tours and field trips covering bird watching, marine life, beach collecting, and geologic features. The meeting was under the presidency of D. Bailey Calvin of the University of Texas Medical Branch, with John C. Finerty acting as chairman of the local committee on arrangement. J. P. Harris, Jr., of Southern Methodist University, was elected president for next year. Special sections were held in meteorology, physical and earth sciences, oceanography and marinology, chemistry and engineering, zoology, botany, social sciences, earth sciences, and conservation. A feature of the program was a symposium on "Collegiate Training in the Fundamentals of Science," with Charles M. Pomerat, Director of the Tissue Culture Laboratory of the University of Texas Medical Branch, as moderator. The Medical Branch buildings contained a series of exhibits arranged particularly for academy members.