# SCIENCE NEWS

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## SOME PAPERS READ AT THE INDIANAPOLIS MEETING OF THE AMERICAN ASSOCIATION AND ASSOCIATED SOCIETIES

THE retiring presidential address before the American Association for the Advancement of Science, delivered on December 27 by Dr. Edwin Grant Conklin, professor emeritus of biology at Princeton, executive vice-president of the American Philosophical Society and president of Science Service, was printed in SCIENCE on December 31. Terming "dull and fruitless" attempts to make science the handmaiden of religion, Dr. Conklin emphasized that science was vitally concerned with ethics, "the religion of science." The words expressing the ethics of the great scientists, among them Pavlov, Pasteur and Tyndall, were shown by Dr. Conklin to contain ideals of conduct and character similar to that taught by great religious leaders. Often the substitution of the word "Truth" for "God" will bring them into agreement. Militarists and dictators have no right to seize upon Darwin's principle of natural selection as justification of their philosophy that might makes right. "Darwin himself repudiated this extension of his principle to the struggle between races and nations of men. Those who attempt to extend it into the field of intellectual, social and moral qualities should remember that the standards of fitness are wholly different in these fields. Physically the fittest is the most viable and most capable of leaving offspring; intellectually the fittest is the most rational; socially the fittest is the most ethical. To attempt to measure intellectual or social fitness by standards of physical fitness is hopelessly to confuse the whole question, for human evolution has progressed in these three distinct paths. Man owes his unique position in nature to this threefold evolution, and although the factors of physical, intellectual and social progress are always balanced one against another, they are not mutually exclusive." Intelligence has become a prime factor in evolution. Human selection, as practiced either by the hit or miss process of "trial and error" or the vastly more rapid and less wasteful method of remembered experience, is just as natural as the "natural" variety to which Darwin devoted most attention. We are continually improving on nature, as shown in agriculture, industry, medicine and education. To the recent statement by Dr. Robert Maynard Hutchins, president of the University of Chicago, that science is a failure in the educational process, Dr. Conklin replied: "Those who have never experienced the discipline and ennobling effects of scientific studies fear that science will destroy our civilization and are calling upon educators to repent and to return to the good old subjects of classical learning. It was not science that caused the decay of former civilizations, nor was it in the power of classic art, literature and philosophy to save those civilizations. Certainly there are no other studies than science that distinguish so sharply truth from error, evidence from opinion, reason from emotion; none that teach a greater reverence for truth or inspire more laborious and persistent search for it. Great is philosophy, for it is an attempt at a synthesis of all knowledge, but if it is true philosophy it must be built upon science which is tested knowledge." "In its practical aspects," said Dr. Conklin, "the ethics of science includes everything that concerns human welfare and social relations; it includes eugenics and all possible means of improving human heredity through the discovery and application of the principles of genetics; it is concerned with the best means of attaining and maintaining an optimum population; it includes all those agencies such as experimental biology and medicine, endocrinology, nutrition and child study, which promise to improve bodies and minds. It includes the many scientific aspects of economics, politics and government; it is concerned especially with education of a kind that establishes habits of rational thinking, generous feeling and courageous doing."

PROFESSOR H. M. RANDALL, of the University of Michigan, from a lifetime study of the far infra-red region of the spectrum, assembled for an exhibit shown at the Annual Science Exhibition strange and little-seen equipment used to generate and detect the rays. This radiation is neither heat rays nor radio waves but a cross between the two. It will pierce layers of black paper and appreciable thicknesses of hard rubber. Ordinary receivers like photoelectric cells and common thermopiles will not detect its presence. Radio receivers are also useless. Crystals of rock salt, rather than glass, must be used to bend the far infra-red rays in studies of its properties. Grating lines scratched on crystals are also used. One feature of Professor Randall's exhibit was a ruling machine, in operation, that cuts grating lines in spacings varying from 25 lines to 1,200 lines to an inch. The source of the radiation which comprises "No Man's Land" is the energy released by molecules as their atoms vibrate like two or more balls at ends of a spring. In the remote region of the far infra-red even the minute amount of energy released as the atoms in the molecule rotate, one about the other like a spinning dumbbell, is responsible for radiation.

THE instruments for detecting and studying cosmic rays were also exhibited. Professor Arthur H. Compton, of the University of Chicago, and Professor Robert A. Millikan, both Nobel prize winners and both authorities on the cosmic ray, showed operating exhibits of their equipment.

PROFESSOR HAROLD C. UREY, of Columbia University, showed the equipment used to concentrate and detect the presence of those rare chemical forms of matter, the isotopes. For detecting heavy hydrogen, Professor Urey won the Nobel prize. More lately he has been working on the concentrations of the isotopes of nitrogen and of oxygen. Hydrogen, nitrogen and oxygen are chemical elements having the greatest importance to the world

and life on it; all are found in the human body. Dr. Urey's exhibit shows samples of water which have an increased concentration of the mass 18 isotope of oxygen approximately 4.5 times that in normal water.

FLOWERS that ordinarily would fade overnight can be made to keep their living beauty unfaded for a whole year under treatment reported by Professor Carl D. LaRue, of the University of Michigan. First the flowers had to be sterilized, a task very difficult to accomplish without injury to their delicate beauty. Bromine water, quarter strength, used for from two to ten minutes did the trick. Then the flowers were placed in agar containing sugar and essential mineral salts. They not only lived, but actually grew roots and formed new plants.

PROFESSOR A. C. KINSEY, of Indiana University, exhibited an insect collection which numbers over 5,000,000 specimens. Professor Kinsey showed special mountings of galls and gall wasps which have been collected for more than 20 years in the United States, Mexico and Guatemala. This collection is of outstanding use to entomologists, because through it can be traced the process of evolution in insects, the alteration of generations, and the production of offspring by unmated females.

PROFESSOR ROBERT CHAMBERS, of New York University, pointed out that microdissection, the science and art of dissecting minute tissues under high-power microscopes, has pointed the way toward solution of one of the oldest and most important riddles of modern science. Does the tiny darkish spot in each cell, the nucleus, traditionally referred to as the "soul" or "brain" of each individual cell, exert a continuous influence on the cell? Or is its activity limited to the time when each cell is reproducing itself by dividing into two cells? An experiment in which it is indicated that the cell's "brain" plays a vital part in the cell's activity was reported by Dr. Chambers in the course of his review of protoplasm, the material of which cells are fashioned. Fibrocyte cells, which are found commonly in connective tissue, frequently have two nuclei apiece instead of the more usual single nucleus. Destruction of the second nucleus by means of microdissection results in the shriveling of the punctured nucleus and the disintegration of the surrounding cell material. But after several minutes the disintegration ceases and in an hour the cell, now with only one nucleus, is again healthy. This experiment, with the visible disintegration of cell material, is taken by Professor Chambers to indicate that the cell's "brain" is acting continuously on the cell.

FURTHER advance in the knowledge of cancer and its eventual subjugation, a potent aid in the treatment of severe burns, and better understanding of the nature of life and cell growth, are all bound up in the discovery of substances produced by injured cells which cause the rapid multiplication of healthy cells. These substances, provisionally named intercellular hormones, were demonstrated by John R. Loofbourow, of the Institutum Divi Thomae, Cincinnati. The steps in the demonstration were simple, direct and complete. Under one microscope were cells of yeast, with other cells of yeast, uninjured, separated from them by a layer of jelly-like material, agar-agar. Nothing especial was happening in this culture. Under the next microscope was a similar mounting of yeast cells, with the important exception that the lower cells had been injured by prolonged exposure to strong ultra-violet radiation. Here, something emanated from the injured cells, passed through the separating layer and stimulated the healthy cells into exceedingly rapid multiplication. A third microscope showed yeast cells in a similar state of rapid proliferation. These, however, had not been treated directly with injured cells, but with an extract taken from such cells. In a tiny tube near-by were a few yellowish crystals, purified out of injured-cell extract. Mr. Loofbourow stated that these crystals have not yet been analyzed. Preliminary steps in analysis indicate that they consist of the higher chemical fractions of proteins. But that does not tell much as yet. Many kinds of injured cells, both plant and animal, have been shown to be capable of yielding the new intercellular hormones. They cause rapid growth or proliferation of a wide variety of uninjured cells. Of especial interest, from the practical point of view, is the stimulation of two kinds, fibroblasts and epithelial cells. Fibroblasts are cells typical of one kind of cancer. Epithelial cells constitute an important part of the complex we know as the skin, as well as the covering of other, internal body surfaces. The ability of the newfound substances to make these grow and spread rapidly has already been turned to account. For the past year, they have been used at St. Mary's Hospital, Cincinnati, in the treatment of third-degree burns. Burns thus treated heal up in a minimum of time and without the wide areas of disfiguring scar tissue that usually follow such injuries.

THE seat of human consciousness and with it the ability to speak is located in the brain's artery in the left front side of the head, Dr. William H. Thompson, of the Municipal University of Omaha, reported to the association, after reviewing operations performed by brain surgeons. Amazingly large amounts of a person's brain can be removed if necessary without seemingly affecting his ability to lead a normal life and carry on his business. The right cerebral hemisphere of the brain, for instance, has been removed with no observable permanent loss of the higher mental processes. Surgeon's knives have whittled away other portions of human gray matter, previously thought essential in the control of mental functions, and the patients hardly knew anything had happened to them. But if the left anterior cerebral artery is injured by any chance the patient can never regain consciousness. This area and the flow of blood seems linked with the problem of conscious existence itself. Investigators are now searching for some practical way of studying these new aspects of the age-old problem of relationship between mind and body.

DR. P. S. SHURRAGER, of the University of Illinois, reported that the origin of the brain waves is shown in the records of the death process. In death the lower creatures such as fish, frog and toad become like the higher animals, the guinea pig, cat and dog, in the electrical responses of their brains. From this fact, Dr. Shurrager

infers that the brain's electrical waves have their origin in the life processes of the cells of the brain. Each single cell in the brain may in the course of its life process create electrical impulses which are added together algebraically to create the complex brain waves broadcast from the brain's surface. The life process of the brain cell consists in the building up of negative electric charges in the brain fluids which surround each cell until these negative ions become numerous enough to disrupt the membrane of the cell. When this happens, a spontaneous nerve impulse bursts from the cell and goes out along the nerve fiber. With this there is a neutralization of the negative charges in the surrounding fluids and the whole process starts again. Thus it repeats over and over. As death approaches, the complex brain wave rhythms become slower and decline in amplitude. Those of different living creatures become more alike and fade to a few millionths of a volt; they lose their distinctive character.

OUR Stone Age ancestors had plenty of dental trouble. This information, contradicting wide-spread ideas that primitives, eating rough and raw foods, always had perfect teeth, was laid before the association by Professor W. M. Krogman, of Western Reserve University. Nor are primitive men to-day at all free from toothaches and the holes and faults that cause them, he added. It is true that dental caries is rarer in the oldest human skulls, and that its incidence increases as one comes down the line toward more recent times. In the Old Stone Age, over a hundred thousand years ago, the frequency of dental caries ranged from 5 to 20 per cent. In the New Stone Age, twenty thousand years ago, the frequency rose to a range of 15 to 45 per cent. "In the next succeeding ages the frequency rose, until in 3500 B.C., just before the dawn of history, an early Iranian (Persian) people showed as high as 75 to 90 per cent. of the entire adult population afflicted with dental caries—a frequency as high as that of any 'civilized' group to-day." The false notion that primitive man always had perfect teeth got its start because archeologists and curators always picked out "pretty" skulls for museum display. Now they keep the imperfect specimens too—and frequently learn more from faults than they do from perfections. Professor Krogman pointed out that not civilization as such, but domestication, is the thing that has played havoc with man's teeth, and domestication started thousands, perhaps millions of years ago.

DR. JAMES VAUGHN, of the University of Cincinnati, gave the Rorschack ink blot test to 43 patients in mental disease hospitals, all of whom had paranoid tendencies and thought people were persecuting them when they were not. He also gave it to 52 college students. He found that many of the apparently normal students showed unusual character in the forms they saw, for seeing such forms has been taken as an indication of mental derangement. Dr. Vaughn said that "One can hardly escape the conclusion that insanity is a difference in degree and not in kind."

AFTER the possible influence of size, shape, color and other features had been eliminated, Dr. Ansbacher, of Columbia University, in an investigation using postage stamps, was able to prove that sheer acceptance of the stamp as a stamp of one's own country gives it an apparent size greater than that of the stamp of some other country. If the trifling matter of postage stamp size is affected in this way, how fundamentally, argues Dr. Ansbacher, is our personality as a whole determined by the people and surroundings in which we live and are reared.

YOUTH has given the world its greatest advances in medicine, surgery and sanitation, according to Dr. Harvey C. Lehman, of Ohio University, at Athens. Most such scientists are under forty when they make their great discoveries. But Dr. Lehman, who is forty-eight, reminded his audience that it is possible for the individual to think creatively and to make highly useful contributions at practically every chronological age beyond early childhood.

EXTRA-SENSORY perception and the pros and cons of telepathy and clairvoyance as propelled upon the American scene by the parapsychological researches of Dr. J. B. Rhine, of Duke University, and recent radio programs plugging ESP experiments, were discussed in the scientific sessions and in informal conversation. One paper that from its title dealt with methods used in recent radio telepathy tests was replaced at the last moment by a paper not related to this subject at all. Another paper before the mathematicians titled "A Source of Error in Interpretation of Experiments on Clairvoyance" was not given because of illness of the author, Professor Harold Hotelling, of Columbia University. Instead, a paper by the Harvard mathematician, Dr. E. V. Huntington, was substituted. He finds the mathematical methods used by Dr. Rhine in analyzing his scores, subjected to attack by psychologists, are "good enough for his purposes," although his methods "can not bear close analysis." "I hate to see the prestige of mathematics called into question by psychologists," Dr. Huntington said, as he presented the meeting with a sort of mathematical score card for the use of those playing the ESP game. "This doesn't mean you have demonstrated the reality of telepathy, does it?" Dr. Huntington was asked. And his answer was that it did not. Joining in the same attitude was Professor Burton H. Camp, of Wesleyan University and president of the Institute of Mathematical Statistics, who declared that if the Rhine investigation is to be fairly attacked it must be on other than mathematical grounds. There was evident disappointment among psychologists that more conclusive discussion of ESP did not occur at these meetings. A possible explanation of ESP ability was presented in a discussion at the mathematical session by Professor Henry Schultz, economist of the University of Chicago, who reported that members of the Chicago faculty playing ESP were able to train themselves to make high scores through images appearing on the backs of cards. Dr. John L. Kennedy, psychical research fellow at Stanford University, reported that he had repeated the debated ESP tests of Dr. Rhine, using a hundred subjects. Only one made a record above what would be expected by chance or accident. And that young man, whose scores compared

with Dr. Rhine's best, was found to be using unconsciously some slight differences in the look or feel of the backs of the cards.

A PERSON with migraine headache is on a perpetual emotional drunk, according to Dr. Milton B. Jensen, consulting psychologist of Louisville, Ky. Simple habits of becoming extremely excited over everything or nothing were blamed by Dr. Jensen with this puzzling and painful type of headache without organic cause. In his or her emotional sprees, the individual tenses his muscles so that he produces a partial anemia in the brain by reducing the circulation of the blood. The headache results from a stretching of the blood vessels in the brain. Sex can not be blamed for migraine, Dr. Jensen said. "Sexual maladjustment bears no causal relationship to the onset, duration, frequency or severity of ordinary migraine headaches. Maladjustment to sex does not cause the headaches and the headaches do not cause sexual maladjustment." Too much excitement in the home during childhood, improper rest and acquired habits of incessant nervous excitation were held responsible. Dr. Jensen cited cases where the headaches cleared up when the sufferers learned to control their emotional responses.

SCIENTIFIC men were called upon to assume social responsibility for the consequences of their inventiveness, lest they find themselves in the subservient position of German scientists. Dr. Eduard C. Lindeman, of the New York School of Social Work, pointed out that "a technological age can not afford to have its values set by persons unfamiliar with the foundations of science and technology. Science must become much more forthright in accepting its social responsibilities and especially the responsibility for understanding basic human needs and for releasing the unused energies of men. Education must become more scientific, both with respect to its methods and purposes."

ONE out of six people in the United States could disappear to-morrow without affecting the national income of the nation, according to an inquiry that provides preliminary blue-prints for more effective use of human resources and manpower. Some 15,000,000 to 20,000,000 people live at a subsistence level and take a very meager part in economic life, a paper communicated by Frederick Osborn, of New York City, stated. These people, representing probably some of our finest stocks, are located in the Appalachian Highlands, the Ozarks, the cut-over regions of northern Michigan, Minnesota and Wisconsin, and they include marginal farmers and sharecroppers in the South and the western wheat areas. The unemployed in our cities are also in the class of our population that neither produce nor consume in the sense of any broad exchange of goods. One of the major tasks of society is to change these people into effective producers and consumers. "If all our people could be brought to the level of the twenty-five per cent. who are at present our largest consumers, our total economic activity could be increased manyfold."