SCIENCE NEWS

Science Service, Washington, D. C.

SOCIAL SCIENCE

(Copyright, 1939, by Science Service)

DR. JULIAN HUXLEY, secretary of the Zoological Society of London, grandson of Charles Darwin's famous friend and champion, gave an address at a dinner at the Hotel Willard, Washington, D. C., on December 2.

Dr. Huxley, who will deliver one of the principal addresses before the Christmas meeting of the American Association for the Advancement of Science in Columbus, Ohio, spoke under the joint auspices of the Association, the Smithsonian Institution and *The Scientific Monthly*.

Some thinkers claim for Herbert Spencer, contemporary of Darwin and the elder Huxley, the distinction of being the first to point toward an eventual application of the findings and methods of objective science in the problems of human society, but Dr. Huxley relegated Spencer to a position analogous to that of one of the Hebrew prophets, rather than that of a direct precursor. "He demonstrated that social science was an inevitable development," Dr. Huxley stated, "but his notions of what form it would actually take and what methods it should employ were vague and essentially erroneous. Marx, on the other hand, developed a system directly based on social facts and directly applicable to them. He did not prophesy a Messiah, he indicated the Messiah. As natural scientists tend to undervalue Bacon because he himself did not make discoveries or work out experimental techniques, so social scientists tend to underrate Marx because his system is a dialectical one, ready-made and complete with answer to any problem, not sufficiently empirical and inductive for their scientific taste. It is doubtless true that, as occurred in the case of natural science, the social scientists must go their own way to work, regardless of doctrine or theoretical system; a precursor can not take the place of the Messiah or the gospel he indicates. But at least Marx, like Bacon, gave expression to a new outlook and a new method of attack, and helped materially to alter the intellectual climate so as to make it propitious for the scientific workers in his field."

To the question why social science has taken so long to emerge into large-scale operation, Dr. Huxley returned two answers. First, the method of the controlled experiment, beloved tool of natural science, is impossible when working with human society. There are no societies among lower organisms sufficiently similar to human societies to serve as experimental material; man must be his own guinea pig in social experimentation. Moreover, nothing less than the whole of society will serve: results of experiments on limited groups of people, even in the most completely regimented state, would not yield dependable answers.

The second reason for the laggard state of social science offered by Dr. Huxley is the natural reluctance of the human mind to accept multiple causes for any phenomenon. No matter how complex the behavior of a human group, we always try to find "the cause" instead of seeking for a number of causes, of a complexity comparable to the results they produce. Also, man is always the victim of his own mental slant or bias; it is practically impossible for him to divest himself of inborn and acquired prejudices.

Methods will have to be worked out, especially by the application of mathematical analysis to the problems of multiple causation, and by the use of properly adapted propaganda for the overcoming of bias.

THE CHEMICAL EXPOSITION

(Copyright, 1939, by Science Service)

"CHEMISTRY catalyzes commerce" headlines the exhibit of twenty new commercial products of chemical industry shown by the American Chemical Society at the Seventeenth Exposition of Chemical Industries in Grand Central Palace, New York, which opened on December 4.

Outstanding in interest are eleven synthetic and crystalline vitamins now available. This is the first time so large a group of these food essentials has been displayed. Included are vitamins A (carotene), B_1, B_2, B_6, C, D_2, E, K, riboflavin, nicotinic acid and ergosterol. Nine manufacturers have supplied these man-made duplications of essential body chemicals.

In the synthetic resin group are shown two new and totally synthetic fibers, Vinyon and Nylon. Hosiery and yarn made from both of these are displayed. Both are competitive with silk. Other products made from these materials include felt, filter cloth, thread, surgical sutures and fishing line.

Paint oil made from castor oil, domestically produced to compete with tung oil, and alkyd resins for making varnish from this source are also shown. Of interest in the paint and varnish industry in the American Chemical Society exhibit is a new hydrogenated rosin, "Stabellite," of superior quality as to color and resistance to light and oxidation.

Other outstanding displays include:

Rubber filter cloth, and an all glass centrifugal pump for handling corrosive liquids.

High octane aviation fuels produced by new methods.

The "threshold treatment" for economically softening hard water for boiler use.

Resins and vanillin made from the waste of sulfite paper mills, now produced commercially.

A new type of rayon from ethyl cellulose in a variety of fabrics.

New chemicals exhibited are sulfamic acid and its derivatives, a collection of seventeen new nitroparaffins and new organic compounds of phosphorus.

Twenty-six companies are cooperating with the society to supply exhibit materials and a nearly equal number of others in supplying photographs for the photo murals forming the background of the exhibit.

A NEW ELECTRICAL MICROMETER MEASURES

A NEW and valuable kind of electrical micrometer, which uses a special radio tube to measure distances as small as five millionths of an inch, has been developed at the U. S. Naval Research Laboratory in Washington.

Dr. Ross Gunn, physicist and superintendent of the mechanics and electricity division of the laboratory, described the instrument at the meeting in Philadelphia of the American Society of Mechanical Engineers.

The electrical micrometer is a radio tube consisting of an electron-emitting filament and two tiny plates, insulated from one another and jointly supported by a rod which goes into an elastic diaphragm fixed in the bulbous part of the radio tube. Outside the tube, and attached to the diaphragm, is spot welded another small rod whose job it is to detect tiny displacements. Slight displacements of this rod are communicated through the diaphragm into the plates of the tube, which move very slightly from their normal positions. This motion brings one plate nearer to the filament and the other plate farther away, resulting in a decided difference in flow of electrical current within the tube. Normally the current to the two plates balances and zero current is obtained. With the slight shift of plate distance current flows in an amount proportional to the displacement. This current is put through a micrometer and the deflection of the needle of this instrument is a measure of original microscopic displacements.

Dr. Gunn stressed the compactness and stability of the new device as well as its great versatility to a variety of measurements. The electrical micrometer can be used to measure displacements at remote points, and these displacements may be due to tension, compression or torsion.

By attaching a small mass to the external detecting arm of the tube it can be converted into an accelerometer. By the use of elastic bellows fluid pressures can be measured. By using large calibrated proving rings, its range of measurement can be enlarged indefinitely and it has proved useful as an accessory to limit and tolerance gauges. Because it is able to follow vibrations up to 200 cycles a second it can be attached to an oscillograph and thus produce a visual pattern comparable to the motions of the tiny detecting rod.

SOLAR RADIATION AND THE WEATHER

POSSIBILITY of statistical error in the theory that there are significant periodic changes in the sun's radiation which predictably affect the earth's weather has been eliminated by a Harvard mathematician.

The findings, made by Dr. Theodore E. Sterne, lecturer on astrophysics at Harvard University, are believed to eliminate one of the major objections raised against the solar radiation-weather theory advanced by Dr. Charles G. Abbot, secretary of the Smithsonian Institution.

Dr. Abbot's deductions, based on years of solar radiation observations at stations spotted throughout the world, have been questioned as due to either statistical errors in analyzing the data or systematic errors of observation. The Harvard research removes this first objection.

In his findings, Dr. Abbot discovered evidence for changes in solar radiation in periods of 7, 8, 9¾, 11, 21, 25, 34, 39½, 46 and 68 months. Dr. Sterne believes that three of these periods may be due to statistical error—those of 7 months, 8 months and 34 months.

The other seven periods, Dr. Sterne has found, are not attributable to this and he has gone so far as to say that the odds against these seven periods being purely statistical error are about 30,000 to one, or even higher, running in some cases into the millions. He emphasized that his studies were concerned purely with the statistics of Dr. Abbot's researches and not at all with the question of observational technique.

The periods in question were worked out by Dr. Abbot during the fifteen years from 1920 to 1934 and are built on the average of solar radiation in many parts of the world three times each month. Dr. Abbot measured the amount of radiation received in calories per minute per square centimeter at right angles to the sun. The average during this 15-year period, he found, was 1.9410 calories per square centimeter per minute.

THE AUTOGIRO

THE important research finding, that autogiros with their whirling rotor blades have more inherent longitudinal stability (ability to react against a pitching motion in flight) than do normal airplanes, was announced at the concluding meeting in Philadelphia of the Philadelphia chapter of the Institute of Aeronautical Sciences by Professor Alexander Klemin, of New York University, in a scientific report with Lieutenant Victor Haugen, U. S. Army Air Corps, and S. B. Sherwin, first holder of the newly created Cierva Memorial Fellowship at New York University.

The new report contradicts some previous wind tunnel experiments and is in accordance with practical experience. The theoretical investigations show that the rotor with its flapping hinge placed at some distance from the center of rotation is definitely stable. In this the rotor is superior to the airplane wing, which has no inherent stability of its own.

The investigations also show that as the rotor is placed above the center of gravity of the machine with its axis of rotation somewhat behind the center of gravity, the autogiro will be stable without the intervention of the horizontal tail surfaces. Such inherent stability without horizontal tail action is impossible in the airplane. Furthermore, rotors of the direct control type are pivoted about a suitable point so that not only is it possible to secure longitudinal control without use of an elevator, but the rotor tends to change its inclination so as to increase stability. In the airplane, flying with free stick, the stability is less than flying with stick held in a fixed position. In the autogiro with pivoted rotor, on the other hand, there is a dual stabilizing effect. Thus from the point of view of horizontal static stability, the autogiro has distinct points of superiority over the airplane. To re-

move the discrepancy existing between wind tunnel data and theoretical and practical reasoning, Lieutenant Haugen will conduct an investigation into the stability of the rotor with offset hinge, systematically varying the position of the hinge.

One of the most interesting problems in the helicopter to-day is whether super-imposed air screws, as in the Breguet helicopter, or air screw placed on either side of the fusilage, as in the Focke helicopter, are more efficient. Mr. Sherwin has devised a special apparatus for investigating this point in the nine-foot wind tunnel of the Daniel Guggenheim School of Aeronautics of New York University.

CHEMICALLY INDUCED PLANT TUMORS

CLUES to the mechanism of cancer production in man and other animals are now being sought in the plant world. Latest efforts to produce cancers in plants by the chemicals in tar which produce cancer in animals or by other chemicals were described by Dr. Michael Levine, Montefiore Hospital Biological Laboratory for Cancer Research, at a meeting of the Torrey Botanical Club in New York on December 5. Montefiore Hospital is the only hospital in the world which has a garden devoted to plant cancer studies.

Crown gall, the form of cancer which plants are known to harbor, is not analogous to human or other animal cancer, Dr. Levine said. Cancer-causing hydrocarbons, which produce cancer in animals, poison plants but fail to produce cancers in them. Certain other irritating chemicals, such as indole acetic acid, indole butyric acid, naphthalene acetic acid and a series of scarlet red dyes, when applied to the injured surface of a plant, produce roots together with small tumors. These tumors, however, are not, in Dr. Levine's opinion, analogous to human or other animal tumors, either. The plant tumor, he believes, is a part of a reparative and protective mechanism of the plant, analogous to inflammation in animals.

Dr. Levine expressed the hope that plants ultimately will be made to form tumors as a response to chemical substances. He implies that the plant cells will be so modified as to proliferate without limit, endowing them with a property now possessed by animal cancer. The production of malignant plant growths will throw light on the mechanism of cancer production in animals. The absence of blood and lymph streams and lack of diversity of tissue types make the plant a suitable subject for the study of this important problem.

ITEMS

DR. KARL T. COMPTON, president of the Massachusetts Institute of Technology, pointed out at the seventy-fifth anniversary dinner of the Columbia University School of Engineering that the applications of scientific knowledge advance much more rapidly than the mere increase of knowledge. "There are two factors which account for the increasing rapidity in the development of new applications of science to human welfare," Dr. Compton said. "One of these is simply the fact that we are learning continually by experience how to make these applications more quickly and effectively. The second is that the possibilities for accomplishing our purposes increase somewhat as the square of the amount of knowledge which we possess." Thus if knowledge can be doubled in extent the applications can be increased four-fold.

How a four-lane highway was "jacked" apart to make a divided roadway and thus reduced fatal accidents over 83 per cent. was described at the meeting at Washington, D. C., of the Highway Research Board of the National Research Council by Arnold H. Vey, traffic engineer of the State of New Jersey. New Jersey took a popular four-lane highway and split it down the middle, jacking up separate concrete slabs and moving them sideways. Two roadways, separated by a dividing center strip, thus resulted. A study of accident figures on this road in 1933–34, before the division, and for 1937–38, after the division, showed that fatal accidents dropped 83.3 per cent. Non-fatal accidents decreased 48.5 per cent., and accidents involving property damage were cut 17.6 per cent. The reduction for accidents of all kinds was 40.4 per cent. Particularly valuable was the new divided highway at night, for accidents were then decreased by 47.2 per cent., while during the day they dropped only 31.4 per cent.

THE giant 608,170-pound locomotive, "American Railroads," which millions saw at the New York World's Fair, was the outstanding development of railroading for 1939, according to a report submitted to the meeting in Philadelphia of the American Society of Mechanical Engineers by its subcommittee. "American Railroads," while it stayed in one place, covered thousands of miles on rollers to thrill World's Fair crowds. Designed to haul 1,200-ton trains at speeds up to 100 miles per hour, it was the cooperative undertaking of the Baldwin, American and Lima locomotive companies.

ROTARY winged aircraft of the autogiro or helicopter type will usher in the third stage of growth in man's conquest of the air, according to Igor I. Sikorsky, pilot and designer, who spoke at the meeting of the Philadelphia chapter of the Institute of Aeronautical Sciences. Mr. Sikorsky forecast a brilliant future for planes with rotary wings, particularly in the field of private flying, to add to lighter-than-air and heavier-than-air transportation, the two earliest stages of man's aerial transport. By rotary wings, Mr. Sikorsky said, private flying can come into its own, for planes of this type overcome the main handicap of private flying to-day, which is lack of ability to take off and land in small spaces. It is this handicap, he feels, rather than lack of speed, lack of safety or even high cost of operation which has limited private aviation.

PLAIN ordinary water is now being used successfully as a lubricant for bearings in giant steel mill rolls and large ship propeller shafts through advances in the plastics industry, L. M. Tichvinsky, of the Westinghouse Research Laboratories, pointed out at the meeting of the American Society of Mechanical Engineers. Woven textile fabrics are impregnated with an organic binder and then treated by temperature and pressure to create these bearings, which require no oil or grease but perform efficiently when lubricated with water, which serves both as a cooling agent and as a lubricant.