SCIENCE NEWS

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BIOLOGICAL ENGINEERING

BIOLOGICAL ENGINEERING was the subject of a symposium heard during the one hundred and seventy-fifth anniversary celebration of Rutgers University. Applied biology may become a major profession in the coming years and the science of living things will produce results that may even outdistance the fruitful benefits of chemistry, physics and the older branches of engineering.

That the primary needs of man are for food, clothing and shelter was pointed out by Dr. Vannevar Bush, president of the Carnegie Institution of Washington and director of the Office of Scientific Research and Development. Into the first two of these the application of biological science enters very definitely, and it enters somewhat into the third. The ultimate field for the biological engineer is correspondingly wide, and his ultimate position in society will be correspondingly important. It is to be expected, in fact, that he will become more completely integrated into the operation of the social organization than the engineer who deals with secondary or subsidiary needs, such as transportation or communication. The direct applications of biological science to practical affairs become daily more numerous. It is the job of the biological engineer to understand and influence the process by which this is occurring, in order that it may occur more completely and more effectively, to the end that life on this planet may be more secure and less harassed by ills, with more of leisure and comfort, and less of poverty and distress.

The accelerating pace of discovery in the biological sciences through the impact of molecular chemistry was cited by Dr. Hugh Stott Taylor, of Princeton. "We need only call to mind," Dr. Taylor said, "the synthetic vitamins with structures elucidated, and activities ever better defined, the hormones of sex and of the pituitary gland, the new agents of chemotherapy, sulfanilamide and its successors, the carcinogenic agents so closely related chemically to the sterols, vitamins and pigments, the determination of constitution in the case of haemoglobins and chlorophylls. Techniques have advanced that permit an approach, with confidence, to the problems of high-molecular weight substances, starches, proteins, viruses, enzymes, with weights ranging from 17,000 to many millions, that take us into the domains of the most complex biological systems. The development of the ultra-centrifuge by Svedberg has shown us that these biological systems retain the molecular characteristic, and, with the Tiselius electrophoresis apparatus, demonstrates in many systems the essential homogeneity of the material. Successively, the microscope, the ultra-microscope and, most recently, the electron microscope have increased the resolution of our observations on material objects, so that now it is possible to 'see' molecules, if they are as large as the viruses studied by Stanley, and trace the interaction, one molecule with another. The x-ray analysis of fibers and of the simpler globular proteins is now under way and will supplement the analytic and synthetic efforts that characterize this field at the present time."

The need of cooperation in solving practical problems in agriculture was emphasized by Dr. R. W. Trullinger, assistant chief of the Office of Experiment Stations, of the U. S. Department of Agriculture. Before hay could be cured artificially with success a plant physiologist had to place the hay plant under the microscope and determine just what had to be done to bring about the internal changes in the plant to cause the curing. Once this was known the agricultural engineer could proceed with his mechanical manipulation of environment to cure the hay successfully even when the sun wasn't shining.

A discovery that promises to prove useful to biologists of the future was reported by Dr. Irving Langmuir, of the General Electric Research Laboratories. He has found that when very, very thin layers, only one molecule thick, are highly impermeable they have internal stresses, in which some part of the film is in the state of tension which is opposed by another part under compression. Permeability, or what lets things get through, is a property which gives a kind of fine structure of the monolayer.

Patients hopelessly sick with cancer which has spread to the bones from its original location in the breast or prostate gland are now being treated with radio-strontium, made by the atom-smashing cyclotron, was announced by the inventor, Professor E. O. Lawrence, of the University of California. It is too early to know what the results of this treatment will be, although favorable signs, including control of pain, have been observed. The cyclotron attack on cancer and other serious diseases now includes use of neutron rays, made by bombarding a beryllium target with high-speed deuterons, to treat cancer; use of radio-phosphorus for treatment of the blood diseases leukemia and polycythemia vera; and use of radio-iodine for treatment of tumors and enlargement of the thyroid gland. The idea of using radio-strontium for treating bone cancer arose from studies of the late Dr. Charles Pecher, of the University of California, who found through harmless tracer doses of radio-calcium and radio-strontium that strontium, like calcium, after it is taken into the body goes immediately to the bones, particularly to new-forming bone tissue and cancerous growths in bones, practically none of it being deposited elsewhere. Either strontium or calcium, therefore, could be used to carry cancer-killing radiation straight to cancerous bones. Radio-strontium is being used, because it can be made more easily in the cyclotron than radio-calcium. The small, harmless tracer doses of radio-calcium and radio-strontium also are giving information about the action of vitamin D in rickets. Vitamin D, these studies have shown, both promotes the absorption of calcium and in other ways promotes mineralization of bone.

THE DANGER OF ACCIDENTS AT HOME

THE most dangerous traffic hazards are encountered when you are on porches and outside stairs, according to Roger W. Sherman, editor of the *Architectural Record*, who reported to the Safety Congress, meeting in Chicago, ways in which home designers can reduce the chances of accident. According to Mr. Sherman, all parts of the house are not equally dangerous. The bathroom, contrary to popular opinion, is only a seventh as dangerous as porches and outer stairs, and, in fact, has the lowest percentage of accidents among the rooms in constant use.

Since most porch and outer stair accidents are falls, house designs should call for guard rails, non-slip treads, adequate lighting and an absolute minimum in changes of grade. Entrance platforms, for example, should be only one step above the grade wherever possible. If this is not possible steps and platforms should have guard rails and be effectively protected in some fashion from rain, sleet and snow.

"Porches and terraces likewise should be very near the finished floor level, and if rough surfacing is used joints ought to be smoothed sufficiently, so that there will be no danger of toe-stubbing or heel-tripping. It goes without saying that second floor porches ought to be protected with toe boards and railings high enough and sturdy enough so that children can not climb over them or push under them."

AUTOMOBILE GEAR-SHIFTING TEST

AUTOMOBILE gear shifting may some day just happen when required under the direction of a "brain" of steel and wire. The autoist will merely have to make the momentous decision as to whether he wants to go forwards or backwards—and then just step on the gas.

That present trends are all in this direction was reported to the Society of Automotive Engineers by Harold E. Churchill, Studebaker engineer. He traces the history of how one function after another that had to be executed by the driver has been taken over by automatic devices, from cranking the engine, advancing and retarding the spark, to the present-day fluid drive. But even this last great improvement still requires the driver to change the gear ratio to what, according to his judgment, it should be under the circumstances. The shift is merely gradual and continuous instead of by sudden jumps.

Mr. Churchill, instead, has in mind a mechanism by which the gear ratio will be automatically changed without the attention of the driver, according as the speed and pull of the engine require it. He has it more than in his mind, for such mechanisms have already been constructed and tested in actual use. His report deals with these tests. He is not altogether satisfied with them. He points out a few defects. For instance, he says that the frequent automatic shifting of the gears in traffic is apt to be disconcerting to the driver. Something must be done about this. He recommends other improvements.

However, the mechanism in the main is here and only needs the removal of kinks, as disclosed by actual use, to become regular equipment of future cars.

ITEMS

SOME equipment developed in the short space of one year's defense research has already seen trial under actual war conditions, according to President Karl T. Compton, of the Massachusetts Institute of Technology, who spoke at the One Hundred and Seventy-fifth Anniversary Celebration of Rutgers University. In a number of other directions the work of the National Defense Research Committee has been reflected in purchase orders for materials and equipment by the Army and Navy. Much equipment developed by the researches of some 5,000 scientific men has undergone field test by the military services. While those engaged in the governmental research on defense approach their work with the enthusiastic conviction that it is well worth doing, Dr. Compton stated that "in many cases there has been some inclination to doubt whether the armed services give adequate recognition to the significance of the results being obtained and show as much enthusiasm as could be wished about putting the results into production and use."

ALL colleges and universities in the United States have been urged to increase their output of technically trained young men to meet the estimated needs of the government during the next two years. An appeal has been sent out by the Civil Service Commission, accompanied by estimates of the number of new men that would be required in each special technique. Thus, in the field of physics, 295 specialists in radio, 304 in meteorology, 110 in ballistics, and 98 other specialists will be needed. In chemistry 233 experts in explosives, 144 in the metallurgy of manganese, magnesium and aluminum and 179 others will be needed. In engineering 916 mechanical, 812 industrial, 514 chemical, 443 electrical, 420 aeronautical and 1,355 other engineers will be required. In addition, 1,591 junior engineers, 3,424 engineering aides, and 4,113 engineering draughtsmen will be wanted. In medicine, 1,228 nurses and 636 physicians are required. Inspectors in all branches to the number of 9,218 will be required and an unestimated number of economists, business analysts and administrative technicians. The estimates do not include the number of men that will be needed by civilian industry to replace those drawn off by defense needs or the draft.

AN enzyme of the body which helps to prevent the squandering of foodstuff reserves is giving clues to some unsolved cancer riddles, it appears from the report to the American Chemical Society, in New York, of Dr. Kurt G. Stern, of Yale University School of Medicine. The enzyme has been christened the Pasteur enzyme by Dr. Stern and his associates, Dr. Joseph L. Melnick and Delafield DuBois, in honor of Louis Pasteur, French bacteriologist and chemist who discovered the power of oxygen to throttle fermentation processes and thus protect food stores of the body from needless destruction. It is the Pasteur enzyme which keeps the oxygen at this task. Otherwise food combustion in the body would be so uneconomical that each adult would have to consume daily more than ten loaves of bread to get enough energy for living.