

## SCIENCE NEWS

*Science Service, Washington, D. C.*

## SOME PAPERS ON EXPERIMENTAL BIOLOGY READ AT BALTIMORE

CHICK embryos may be useful in determining the cause, prevention and cure of infectious diseases ranging from influenza and whooping cough to encephalitis and Rocky Mountain spotted fever, according to a report made by Dr. Ernest W. Goodpasture, of Vanderbilt University, to the Federation of American Societies for Experimental Biology, which recently held its meetings in Baltimore. Chick embryo tissue so far has been used chiefly in cancer studies. Its advantages for the study of infectious or germ diseases are that it is cheap, germ-free itself, self-nourishing and uniform. Animals have been generally used for these studies. Some of the worst human ailments, however, can not be induced in animals and with animals there is the further disadvantage that ailments of their own and feeding problems may upset the studies. Viruses like those of encephalitis and other germs, such as those of diphtheria and the staphylococci that cause boils and the streptococci of septic sore throat, can all be grown on chick embryo. They produce the same sort of injury to this tissue that they produce in the body tissue of man. Serums and other remedies used in treating human infections can be studied in the infections in chick embryos. In the case of meningitis, for which there are many serums but none that is universally satisfactory, this chick embryo method should be of particular value. Many problems of resistance and susceptibility to disease might also, Dr. Goodpasture suggested, be solved through chick embryo studies.

EQUINE encephalomyelitis, a kind of encephalitis or "sleeping sickness" of horses, may be spread by wild birds and domestic fowl, it appears from studies reported by Dr. Carl Ten Broeck, of the Rockefeller Institute for Medical Research, at Princeton, N. J. Mosquitoes are carriers of the disease but circumstances surrounding epidemics of it suggested that birds also play a part in its spread. It was found that chickens and turkeys can carry the virus cause of the disease in their blood without showing any signs of illness. It may be that mosquitoes pick up the virus from these healthy carriers and pass it on to horses on the same or neighboring farms.

THE outlook for chemical warfare against virus diseases such as infantile paralysis, influenza and encephalitis is not encouraging in the opinion of Dr. Earl B. McKinley, dean of George Washington University Medical School. Attempts by himself and his associates, Jean Sinclair Meck and Ellen Gray Acree, to destroy or check the growth of 5 disease-causing viruses by 3 chemicals, Prontosil, Prontylin and sodium sulphanilyl sulphanilate, under conditions such as would be met in treating patients, all failed. The viruses were those which cause rabbit myxoma, rabbit fibroma, herpes encephalitis, St. Louis encephalitis and choriomeningitis. Two of these chemicals, Prontosil and Prontylin, have proved spec-

tacular remedies for bacterial diseases such as streptococcus sore throats, childbed fever and gonorrhea. Sodium sulfanilyl sulfanilate, a chemical recently reported, has been described as both a preventive and cure for distemper in dogs, cats and ferrets. Prontylin (sulfanilamide) also failed to destroy or check the growth of the infantile paralysis virus in earlier experiments. The reason why the chemicals are ineffective against virus infections may be, Dr. McKinley suggested, because viruses, unlike bacteria, get inside the cells of the body. The body cells seem to protect the virus from attack by chemicals. Bacteria, such as streptococci, are kept out of the cells and ordinarily occupy the spaces between body cells. Here they are easily attacked by the chemicals which hold the bacteria in check until the germ-fighting cells of the body are able to overcome them.

PROTECTION against cancer, so far only for one type of cancer in mice, is possible by use of a vaccine made of chemicals, it appears from research reported by Drs. W. R. Franks and H. J. Creech, of the University of Toronto, at the meeting. No application of the method to man is yet possible, but discovery of this method for protecting mice against cancers caused by certain chemicals may lead to better knowledge of how to fight cancer in man. Dibenzanthracene, one of the most potent cancer-causing chemicals known, was converted into a protein. This gave it the property, when injected into the mouse's body, of producing an antibody, one of those defenders of the body which go into action against invading disease germs and foreign proteins. So although no germs appeared in the picture, the same defense mechanism was set in motion. Of 12 mice given this sort of chemical vaccination, only 4 developed cancers when the cancer-causing dibenzanthracene was injected. Of 13 mice not protected by the dibenzanthracene-protein combination, 9 developed cancers and 1 developed the malignant disease, leukemia. Application of this method to protecting man against cancer appears to hinge on the possibility of discovering the chemicals that may cause cancer in man as dibenzanthracene can cause cancer in mice. Since this chemical is similar in structure to substances normally found in the human body, such as bile acids and some of the sex hormones, chemists have already been working on the angle that a mistake in body chemistry during the manufacture of the bile acids or the sex hormones may give rise to a cancer-causing chemical.

THE report of the chemical vaccination against cancer in mice followed a report of cancer caused by a chemical which normally plays an important part in the body. This report by Drs. G. E. Hall and W. R. Franks, of the University of Toronto, suggests an important new line of investigation. The chemical is acetylcholine. It is discharged into the body by the nervous system and is thought to be the means by which nerves influence certain types of body activity. This chemical can cause cancer in

mice, rats, dogs, guinea pigs and fowl. Normally this chemical is destroyed as fast as it is set free in the body. It was found that prolonged injections of this chemical, given to learn more of its effects, resulted in the development of cancer. This discovery suggests that one cause of cancer may be the failure of the body in some cases to destroy acetylcholine rapidly enough. Further study of the rate at which this chemical is destroyed apparently is needed.

Two new possible substitutes for morphine which may free man from drug addiction, were announced by Dr. Nathan B. Eddy, of the University of Michigan, at the meetings of the federation. The new substances are: (1) methyldihydromorphinone, a substance derived from morphine, and (2) a synthetic chemical made from carbazole, a coal tar product. The promising substance derived from morphine, methyldihydromorphinone, has been given, to relieve pain in place of morphine, to between 800 and 900 patients at hospitals of the Massachusetts State Department of Health, hospitals of the U. S. Public Health Service and at clinics in Ann Arbor. Because the conditions from which these patients suffer vary so greatly, it is difficult to arrive at an exact knowledge of the value of the new drug. Encouraging from the standpoint of the fight on drug addiction is the report that it is not necessary to increase the dose of this new drug. The same amount continues to relieve pain after many doses have been given as was effective in the first dose. The synthetic drug derived from carbazole controls pain as well as codeine does, but it is rather toxic. The chemists think they can remove the part of the synthetic drug that produces these toxic or poison symptoms without reducing its pain-relieving property. It has not yet been tried on man, so no one knows yet whether or not it is habit-forming.

FIRST experiments on the dangerous cumulative effects of lack of oxygen for short periods such as in frequent short flights at high altitudes were reported by Captain H. G. Armstrong, Medical Corps, U. S. Army. Pilots do not get acclimatized to high altitudes as mountaineers do. Lessons learned from mountain climbing expeditions can not, therefore, be applied to high altitude aviation. Captain Armstrong's findings explain why pilots on commercial airplanes complain more and more of chronic fatigue even though they only fly at high altitudes for an average of 3 hours a day. The reason is that the effects of short periods at high altitudes pile up and in time the combined effect may produce dangerous lack of oxygen in the tissues. Rabbits, which can stand altitude one and a half times higher than man, did all right for the first two weeks of daily four-hour "flights" to 18,000 feet, which would correspond to about 12,000 feet for man. After the two weeks, they suddenly began to deteriorate, losing weight, becoming anemic, paralyzed and most of them dying by the fourth week. Even if engineers could find a safe, comfortable way to supply pilots and passengers with oxygen for high-altitude flights, they would not have entirely solved the problem

and removed the danger. Captain Armstrong found that while rabbits could go to an average altitude of 38,000 feet without oxygen, many were dead at an additional 12,000 feet even when breathing essentially pure oxygen.—JANE STAFFORD.

### A STAR GROUP OF A NEW TYPE

THE current issue of the Harvard Observatory *Bulletin* describes a hitherto unknown gigantic star-cluster, unlike any known class of cosmic systems, possibly a member of a whole family of such star clusters previously unsuspected in the universe. Dr. Harlow Shapley, director of the Harvard Observatory, who announced the find, said that the egg-shaped group is located in the southern constellation Sculptor. Because its light is extremely faint, only the most powerful telescopes can detect the individual star members. Discovery of the group was largely a matter of good luck. It was the fact that an unusually sensitive photographic plate happened to be exposed on Sculptor on a very clear night. A plate was exposed at the South African observation station of Harvard University, at Bloemfontein, for three hours through a 24-inch refractor telescope on September 25, 1935. A check through Harvard's library of star photographs showed that the group also appeared on long-exposure plates made in 1908, but only as a very faint patch of light, probably mistaken for general background unevenness or a faint blotch in the photographic emulsion.

Many characteristics of the new cluster are similar to those of three entirely different types of stellar systems, the globular star clusters, the Magellanic clouds and the spheroidal galaxies. The Sculptor group differs markedly from each of these on many points, however, and thus may be representative of a heretofore unknown class. Except for a small elongation in the east-west direction, the cluster appears roughly globe-shaped, and its individual stars can be seen and counted easily on the best photographs. They are arranged fairly compactly at the center of the group with the space between each star increasing fairly regularly toward the cluster's rim. The very brightest stars in the system are only about the eighteenth magnitude, extremely faint, inasmuch as the naked eye can detect stars only up to about the sixth magnitude. In general the brighter stars seem to be bunched more closely in the center, although there is no nucleus to the cluster nor any outstanding nuclear stars. Off-center clusters, cloud-like formations or other irregularities which would spoil the system's marked uniformity are also absent. About 10,000 stars are in the group, with magnitudes between 18 and 19.5, according to preliminary estimates. Astronomers have no idea how many fainter stars it may contain. Despite this tremendous number of stars, the cluster yields surprisingly little total illumination and it is thought that some unusual physical characteristics of the stars, or of the group, cause this low brightness. This conjecture substantiates the suspicion that the cluster may be typical of a large family of such objects scattered throughout the universe whose low luminosity has heretofore concealed them.

Most probable of the conjectures offered concerning the nature of the cluster, in the light of evidence so far uncovered, is the theory that the stars may have an absolute magnitude of minus 1.5, about that of the brightest stars in the globular star clusters. Proof of this, of course, must await the discovery of variable stars in the group, but if the assumption is correct, the cluster is about 250,000 light-years away and has a diameter of about 6,500 light-years. Under these conditions, Dr. Shapley stated, the body could be described in one of three ways. (1) As a super-globular cluster more than 10 times the average size for this type. (2) As a Magellanic cloud but without the super-giant stars, clusters, irregular structures and luminous diffuse nebulae which typify these systems. (3) As a nearby sparse spheroidal galaxy of unusually low surface brightness and also unusual in that its members can be distinguished from each other.

Inasmuch as the dimensions of the new cluster are still indefinite, other guesses concerning its nature may be nearly as valid. Other measurements, for example, might identify it as an unusually uniform and stupendous spheroidal galaxy of very low surface brightness, or as a particularly rich cluster composed entirely of dwarf stars, or possibly as a super-galaxy made up of thousands of highly condensed spheroidal galaxies but having some 20 times the population of any such group previously known. Whatever the assumption, however, the cluster is so markedly different from any other known star systems it probably represents a previously undiscovered classification.

### ITEMS

A SIX HUNDRED AND TWENTY-FIVE FOOT vertical antenna is being built at Schenectady to serve as the transmitting antenna for Radio Station WGY, powerful General Electric broadcast center. Resting its weight of 500,000 pounds on a porcelain insulator but 20 inches in diameter, the antenna resembles the 718-foot tower erected for Station KDKA in Pittsburgh several months ago. Instead of tapering at the top like the conventional tower, it tapers at the bottom to rest on the insulator. With the ground system and moorings for the guy wires holding the tower in place, the antenna occupies 20 acres of land. The antennae will be operating in 30 days, it is stated.

RECOMMENDED specifications, tolerances and regulations for all sorts of commercial weighing and measuring devices are listed by the National Bureau of Standards in a new handbook. Designed to eliminate from use weighing devices which are false or do not keep proper adjustment reasonably permanently or will facilitate fraud, the handbook lists recommendations made by the National Conference on Weights and Measures at its conference at the bureau in 1937.

DR. ARNO C. FIELDNER, U. S. Bureau of Mines, reviewing the state of the fuel industry in an address at the University of Maryland, states that nothing now known can be substituted for metallurgical coke, despite the

growing use of fuel oils and natural gas. Coal, once supplying 89 per cent. of the country's fuel energy, and now giving 50 per cent., will in the future again supply most of our fuel energy, for our coal reserves greatly exceed our petroleum reserves. Gasoline from coal, ingenious though the Bergius and Fischer processes are, is thermally inefficient, requiring four tons of coal to make one ton of gasoline. Thus, gasoline should not be made from coal until all natural supplies of petroleum are exhausted.

DEEP, well-like holes in glacial ice, sometimes extending downward ninety feet, are caused by black bodies on the ice surface, says Dr. Fritz Tollner, glaciologist of Vienna, whose studies show that sixty per cent. of the sun's radiation can penetrate to a depth of ninety feet in the ice, when dark minerals are on the surface. Sky-light, as well as direct sunlight, can melt ice under black bodies. Kryokonit structures, as these ice wells are called, can be made at will by placing dark substances on the ice. Ice structure, in addition to black materials on the surface, is a factor in their production, and this structure is prevalent in the Arctic ice, but not in alpine ice.

FLUORINE gas, corrosive vapor that dissolves even glass, given off in quantities by Iceland's subglacial volcano, sickens sheep and men in its vicinity, reports Dr. H. Vigneron, writing in the journal, *La Nature*. Lesions of the membranes of the nose and mouth are caused by the gases. Acting like a giant calorimeter, or device for measuring the heat given off by a fire, Vatnajökull, the crater under the ice, supplies geologists with a rather accurate measure of the energy of a volcanic eruption. From the amount of ice melted away from the Icelandic glacier, they can tell quite closely the amount of heat given out by the volcano. To date, this eruption has melted several cubic miles of ice. Now, it is becoming quiescent, but, judging from the past behavior of the crater, another eruption is expected in about 1945-50.

WEDDELL SEALS, rarest swimming mammals in museum collections, killed in the Antarctic by Admiral Richard E. Byrd's most recent expedition, have been placed on display at the Field Museum of Natural History, Chicago. Reaching a length of nine feet, and weighing up to 900 pounds, the Weddell seal, only mammal except the whale found in the Antarctic, is seldom seen in museums. The Field Museum collection is probably the only habitat group of Weddell seals anywhere. Mounted by staff taxidermist C. J. Albrecht, and displayed in an "environment" prepared by Arthur G. Rueckert, the seals are arranged to appear "at home" in the museum case. Creeping with extreme difficulty and violent wormlike undulations, the Weddell seal goes inland as much as eight miles during the Antarctic summer, when the 65-pound, open-eyed young are born. Nourished by its mother's milk, the young Weddell seal gains as much as seven pounds daily, and after three weeks or so is able to go "on its own," its woolly first coat replaced by a sleek fur of gray or brown with irregularly-placed spots of other colors.