SCIENCE NEWS

Science Service, Washington, D. C.

EMBRYOLOGY OF THE MONKEY

THE establishment of a monkey colony in which investigators can study every stage in the development of the animal from the formation of the egg to the birth of the baby monkey has opened a new era in the science of embryology, said Dr. George L. Streeter, of the department of embryology of the Carnegie Institution of Washington, who addressed the opening session of the meeting of the American Association of Physical Anthropologists meeting in Washington on March 19.

From his study of these monkeys, Dr. Streeter found that the maternal body prepares a special place for the fertilized egg to attach itself where the embryo may subsequently obtain nourishment and dispose of its waste products.

This discovery clears up a point which has never been exactly understood before this, either in the case of monkeys or of human beings. It was known that, once the egg was attached to the maternal tissues, the growing embryo was able to get nourishment from them, but no one knew whether the arrangements for the exchange of food and waste products were made entirely by the new little organism or by its parent. Now Dr. Streeter has found that there is preparation on both sides.

He was able to make this discovery as a result of earlier studies on monkeys by Dr. Carl G. Hartman, of the Carnegie Institution. Because monkeys are so small, Dr. Hartman can tell by manual examination just when the egg leaves the monkey's ovary and when it reaches the womb. He knows at just what stage the egg becomes fertilized. By applying this knowledge, Dr. Streeter made his discovery that the maternal tissues begin preparations for the fertilized egg before it attaches itself to them. These preparations consist in forming a marshy place on the interior surface of the uterus or womb. Into this marsh-like tissue, which is kept bathed in blood, the developing embryo shoots little stems called villi, which are filled with blood vessels. The blood in these vessels never mixes with the maternal blood, but nourishment and waste materials are exchanged between them by means of gases and soluble material.

Study of this process of attachment of the fertilized egg to the maternal tissues and the maternal preparations for it may shed light on the causes of sterility, of abnormal developments resulting in monsters and of abortions. The discovery rests not only on Dr. Hartman's work with monkey eggs, but on the skill in handling the tiny eggs and embryos developed by Dr. Chester H. Heuser, of the Carnegie Institution.

DENTAL DECAY

VIVID proof that the modern diet of American civilization causes dental decay was presented before the meeting of the American Association of Physical Anthropologists. Two scientists of the National Museum staff told how they have systematically counted carious teeth in hundreds of jawbones of prehistoric Eskimos and in the mouths of living Eskimos in Alaska.

The ancient Eskimos were meat-eaters, living chiefly on walrus, seal and fish, with only a little vegetable food. In 800 jawbones of these prehistoric people, Mr. M. S. Goldstein found only 6.5 per cent. with defective lower molars. He selected these molars to count because they are the first teeth of the jaw to succumb to decay. Most of the diseased spots were no more than pinhead size, he stated. Mr. Henry B. Collins, Jr., reported that, on examining the teeth of 296 living Eskimos, he found 26 per cent. of them with more or less dental decay.

"The significant fact," Mr. Collins explained, "is that in remote, barren regions of Alaska to-day where the Eskimos are poverty-stricken, they still live in the old-fashioned way as seal hunters and fishermen. And these living Eskimos practically do not know what toothache is like. But Eskimos living in proximity to white settlements show a much higher incidence of dental decay. At Nome, for instance, we find more than half the natives with carious teeth. In the teeth of those Eskimos who supplement their native sea food diet to a greater or less extent with food that the white men eat, dental decay is prevalent and is directly proportionate to the extent that the diet has been altered."

In evidence that food is responsible for dental troubles of the modern Eskimos, Mr. Collins cited the case of two brothers. One, who lived all his life on King Island, where native diet was eaten, had perfect teeth. The other brother, who had been brought up at Nome, had the majority of his teeth in a decaying state, it was found.

"There is evidence that meat-eating races generally have sound teeth, while grain-eating races are much more affected by tooth decay," said Mr. Collins. "Indian tribes who lived along the sea coasts of America left great mounds of shells showing how much sea food they ate. These tribes had almost perfect teeth. The buffalo-hunting Indians of the Plains had fine teeth. On the other hand, the Pueblos of the Southwest, both ancient and modern, and other agricultural tribes of the United States have poor teeth. These Indian farmers lived mainly on grain and vegetable foods."

THE STUDY OF TUMORS IN CHICKENS

SCIENTISTS who have been studying chicken tumors in the hope of throwing light on the problem of cancer in man have for the first time been able to destroy the activity of one of the chicken tumor-producing agents by means of dyes, according to a report by Dr. Margaret Reed Lewis and Mr. Warren Reed Lewis, of the Carnegie Laboratory of Embryology of the Johns Hopkins Medical School, to the *American Journal of Cancer*.

Dyes are now used to kill certain disease-causing organisms, such as the streptococci, and recently dyes have been tried in the treatment of cancer, although unsuccessfully. The Baltimore investigators wondered what

the effect of dyes would be on chicken tumors, which are cancer-like growths caused by an agent called a filterable virus because it is so small that it will pass through the pores of the finest filters. Viruses have been the subject of intense investigation in recent years, but so far it has been almost impossible to destroy the activity of any virus by a dye, as can be done for larger, microscopic organisms. It is not known whether the virus is a living organism or a chemical substance.

The Lewises, a mother and son, extracted the virus from one of these chicken tumors so that they could work with it in a test tube. They combined it with 80 different dyes. After being mixed with the dye, the virus was injected into the chicken to see if it could still produce a tumor. Two of the 80 dyes destroyed the tumor-producing activity of the virus. However, the investigators pointed out that the activity was destroyed in the test tube by an amount of dye which would be impractical to inject directly into the animal in the hope of destroying the tumor-virus in its body.

They consider 80 dyes a small number to have investigated. They feel from the results of their study that when a larger number of dyes are investigated, it may be possible to find more than two which can prevent the growth of tumors, even when used in more dilute concentrations. Experiments on injecting the dye directly into the chickens suffering from this type of tumor are now being planned.

The world of science is already familiar with the studies of cell growth and cancer on which Dr. Margaret Reed Lewis has collaborated with her husband, Dr. Warren H. Lewis, and it is interesting to note that in this latest investigation she had the assistance of another member of her family, her son, Warren Reed Lewis, now a medical student.

COSMIC RIDDLES

HOPE that "the solution for the great cosmic riddles of the world" will be found by continued careful study of such seemingly unrelated phenomena as spots on the sun, electrified atmosphere miles above the earth, radio echoes and electricity and magnetism in and around the earth, was expressed by Dr. Arthur E. Kennelly, professor emeritus of electrical engineering of Harvard University and the Massachusetts Institute of Technology, lecturing at the Carnegie Institution of Washington.

Dr. Kennelly's name is linked with that of the English physicist, Oliver Heaviside, in the discovery of one of the phenomena in which he thinks the solution to the great riddles lies. It is the Kennelly-Heaviside layer of ionized, or electrified, atmosphere.

"It is found from numerous records," Dr. Kennelly said, "that the apparent height of the ionized layer is related to the strength of long-distance radio signals, such as those coming over the Atlantic Ocean. Also the strength of received radio signals is found to be related to the earth's magnetic activity, as recorded photographically in a number of terrestrial magnetic observatories. This magnetic activity, in turn, is related to the conditions at the surface of the sun as revealed by sun-spots. Thus, radio reception, ionized-layer height, terrestrial magnetic activity and the 11-year sun-spot cycle are all correlated. Changes in one accompany changes in the others.

"The reasons for the interconnection of these widely different phenomena can be guessed at to some extent," he continued, "but only, as yet, in a tentative way. The spots on the surface of the sun are found to be associated with outpouring of ultra-violet light, and this may change the depth and density of the ionized layer in the atmosphere. This can affect radio signals, and somehow affects the earth's magnetism.

"Why the sun should have acquired the habit of an eruptive cycle of about eleven years is still a mystery. There may be cosmic influences at work more remote than the sun."

EARTH TREMORS CAUSED BY A BLAST

THE biggest shot ever fired intentionally—215 tons of dynamite and other high explosives set off in one enormous blast in a limestone quarry near Manistique, Michigan—registered itself as an earthquake on seismograph instruments at points as remote as Buffalo, N. Y., Madison, Wisconsin, and Washington, D. C. Timed at their starting-point on an accurate chronograph brought into agreement with radio signals from the U. S. Naval Observatory, the waves were picked up as they swayed the sensitive pendulums of seismographs at several observatories. The time at Manistique was clocked by Mr. E. J. Brown, of the U. S. Coast and Geodetic Survey.

The Reverend John P. Delaney, in charge of the seismograph station at Canisius College in Buffalo, wired Science Service that an earthquake train lasting ten seconds recorded itself on his instruments three minutes and fifty-six seconds after the blast was detonated in Manistique, at two minutes after 3 P. M., central standard time. The waves apparently traveled along the surface of the earth's crust. Since Buffalo is approximately 400 miles east of Manistique, this means that the waves moved at a rate of about a hundred miles a minute.

From the seismological station of the University of Wisconsin came the report of a clear record of waves of small amplitude, the first arriving two minutes and three seconds after the firing of the blast. Madison is about 300 miles west of Manistique, so that again the waves are shown to be moving at a high rate, this time approximately two miles a second.

The sensitive vertical Galitzin instrument at Georgetown University, Washington, D. C., recorded the arrival of the first wave five minutes and three seconds after the moment of firing in Manistique. Washington is at a distance of about 600 miles from the scene of the great explosion, so that the waves either traveled faster along the surface, or else took a short cut through the deeper rocks of the earth to make this record. The Georgetown instruments have, so far as is known at present, set a record for distance in perceiving the effects of an explosion.

IMPROVEMENTS IN STEREOTYPING

THE speed and economy of mass production newspaper processes can now be applied to the making of high-

grade printing plates, it became known at the Third Conference of Technical Experts in the Printing Industry held in Washington on March 15 under the auspices of the American Society of Mechanical Engineers.

Using the simple paper matrices of stereotyping, Europeans have for years been making plates of as high quality as those produced in America by more expensive electroplating processes, it was said. A committee investigated the foreign methods and found that they could not be readily applied in this country. Speed, a necessity in the American industry, means nothing to the European, and secret formulae, known only to individual foremen, are largely responsible for success in the distant countries.

But new methods keyed to the tempo and standardization of American industry are now being developed in this country. In one, described by Mr. George A. Kubler, of New York City, the impression of type and engravings is made into a film of metallic and chemical emulsions instead of into the soft surface of an ordinary paper matrix. These emulsions are coated over the surface of an ordinary mat.

"The face of the new coated matrix is smooth to such a degree that the original plate to be reproduced, no matter how fine the screen, is not affected by the grain of the texture of the papier-maché base, as is the case with ordinary and special matrices," Mr. Kubler said. "Type and engraving impressions are made into this surface under pressures of from 25 to 400 tons."

How European secrets were rediscovered in this country was told by Mr. Arnold A. Schwartz, of Dunellen, N. J., who said that a stereotyping plant was brought from Switzerland in 1923 in the hope that it would work as well here as in Europe. Two foreign workers were sent with the machinery. Plates made by this apparatus were of such poor quality, however, that they could not be used, rough matrix paper having been found to be the chief fault. Now, after years of research, the difficulties have been overcome, he said. A satisfactory paper and a properly alloyed metal have been developed, so that the new apparatus is operated at full capacity. Mr. Schwartz believes printing from these stereotype plates equals that produced from high-grade, lead-moulded, nickel-plated electrotypes.

ITEMS

THAT unusually mild weather during the past winter has left insect eggs and hibernating pupae in an unusually favorable position to pursue their trade of trouble-making as soon as the country warms up and gets green again, has been indicated in a survey by the bureau of entomology of the U. S. Department of Agriculture. Grasshoppers especially may be expected to assume pest proportions. From Wisconsin and the Dakotas have come reports of large masses of eggs left by the insects of last year's outbreak. Egg capsules collected in North Dakota and brought into the laboratory gave a 95 per cent. hatch. Another pest that built up a large population in 1931 is the San Jose scale, exceedingly troublesome in orchards. It has survived the winter with very low mortality, and is reported as increasingly abundant from New York south to Georgia, and westward to Illinois, Michigan and Missouri. The codling moth, responsible for "worms" in apples and other fruit, is also highly abundant over the same territory.

MIMICRY in insects, that is, the trick of looking like a dangerous or ill-tasting species or of camouflaging oneself as a leaf or twig, is not the prop of evolution it was once thought to be, according to Mr. W. L. McAtee, of the bureau of biological survey of the U. S. Department of Agriculture. In a report prepared for the Smithsonian Institution he gives the results of a long series of studies he has conducted on the stomachs of birds, determining the numbers and proportions of the supposedly "protected" insects eaten by them. Beetles are taken as one example of the failure of various protective devices. Some of them are mimics. Others have powerful, ill-smelling secretions which are supposed to repel their enemies. Still others have hard shells. Yet, Mr. McAtee says, the birds eat them all.

HOW the elastic and extensible properties of rubber can be gauged by means of an apparatus which has been in use for many years in France by large bakeries has been divulged in a communication to the French Academy of Science. M. Marcel Chopin, in an investigation carried out under the auspices of the French Aircraft Research Division, used a method of testing thin layers of unvulcanized rubber of known thickness. These were securely fixed over a plate with a central hole, and the pressure needed to blow the thin films to different volumes until they break is recorded by a manometer. This simple method gives the tenacity and extensibility of rubber. It has been previously used to determine the baking qualities of various types of flour.

TWO troublesome diseases of potatoes, known respectively as mosaic and "crinkle," have been shown to be of double nature, by the researches of Dr. Kenneth M. Smith, of the School of Agriculture at the University of Cambridge, England. Some time ago it was shown that there was something very queer about the virus diseases of potatoes. When the disease was passed on to the potato in different ways it gave quite different symptoms. This is not at all what one would expect. In human beings, for instance, if a particular kind of malaria is injected, the same symptoms appear, whether the infection was obtained by a bite of a mosquito, or by injection from a syringe. In the potato, however, when the mosaic disease was inoculated, one set of symptoms appeared if it was inoculated with a needle, and another different set of symptoms appeared if the disease was transmitted by means of an aphid, or plant louse. Both inoculations "took," but the symptoms were different. The same sort of thing occurs with another virus disease called "crinkle." Dr. Smith has now found that actually there are two viruses concerned in potato diseases, which he calls "x" and "y." Inoculation by the needle transmits both "x" and "y," but the plant louse transmits only "y."