SCIENCE NEWS

Science Service, Washington, D. C.

PHYSIOLOGY AND MEDICINE AT THE WASHINGTON MEETINGS

A METHOD of reviving hearts, that should prove valuable in surgical operations on the heart, was reported by Dr. C. J. Wiggers, Western Reserve University School of Medicine, at the meeting of the American Physiological Society. The method makes use of massage and a weak electric current. Both of these have been used before to revive hearts, but the new and important point reported by Dr. Wiggers is the order in which the two procedures are carried out. Massage first, then use countershock. Passing an electric current of about one ampere strength through a heart that is fibrillating will stop the useless twitching of single muscle fibers known as fibrillation and make all the fibers contract together in a beat strong enough to pump the blood out into the body. This was found by other scientists in previous research. The method, known as countershock, has been used to revive animals shocked by low-voltage electric currents which are one factor that causes fibrillation. Dr. Wiggers and his associates tried the electric shock method of reviving hearts that were fibrillating because of stoppage in the heart arteries. They found that the method worked, provided the stoppage of the artery was removed and the fibrillation had not lasted more than 2 or 3 minutes. After 5 to 8 minutes of fibrillation, the electric current did not stop the fibrillation and revive the failing heart, even when massage of the heart and stimulating drugs were tried. By massaging the heart before rather than after passing the electric current through it, Dr. Wiggers was able to revive 40 out of 47 dogs whose hearts had been fibrillating for as long as 5 to 7 minutes. No drugs or chemicals were needed. Dr. Wiggers believes that the method should prove of value in revival of exposed human hearts that fibrillate accidentally during the course of cardiac operations.

STARTING the life of a baby rabbit outside the body of its mother, and then "planting" the fertilized egg into the body of another female rabbit for development and birth, has given information regarding the necessary physiological-chemical state of the egg cell before it can be fertilized by the sperm cell of the male parent. Experiments throwing new light on the threshold of mammalian life were reported by Dr. Gregory Pincus, of Harvard University, before the meeting of the American Physiological Society. Dr. Pincus obtained the egg-cells, or ova, of female rabbits. In a glass dish, he added the male element, or sperm. Fertilization failed to take place unless the eggs had previously been subjected to certain physiological or chemical treatment, that "activated" or prepared them for further development. This activation could be accomplished within the maternal body, by stimulating certain nerves or by treatment with extracts of the anterior lobe of the pituitary gland. In the glass dish, the eggs could be activated by treatment with sufficiently strong salt solutions or by warming them to a temperature of 113 degrees Fahrenheit. A little over two years ago, Dr. Pincus startled the scientific world with the announcement that he had succeeded in uniting male and female cells of rabbits in glass dishes, and then "planting" them in the bodies of other female rabbits to complete their development. Scientists and romancers alike have for years dreamed of "bottle babies" raised not only on bottles, but actually begotten and born in bottles, thereby making parenthood much easier for half the human race. In a little book called "Daedalus, or Science and the Future," published a dozen years ago, Dr. J. B. S. Haldane predicted the production of the first "ectogenetic" baby in 1951. But even with the success of Dr. Pincus it is hardly expected in so near a future.

SWITCHING a salamander's front legs to opposite sides of its body got the poor little animal "all mixed up" when it tried to crawl. The legs persisted in working backwards, while the rest of the salamander was wriggling forwards. The situation never did get straightened out. An experiment with these curious results, which casts some light on how nerves and locomotor appendages react on each other, was reported before the meeting of the American Physiological Society by Dr. Paul Weiss, of the University of Chicago. Salamanders are animals that look somewhat like lizards, but are more closely related to toads and frogs. The most drastic kinds of surgical procedure do not seem to bother them at all, so that it is possible to cut off legs, tails and other body parts and re-plant them elsewhere, almost as easily as a nurseryman making apple grafts. In the present experiments, Mr. Weiss amputated the animals' front legs, planting right legs where left ones had been, and *vice versa*. The legs took hold and grew fast, but in their new situation persisted in behaving as though they were still in their original positions, resulting in constant effort to crawl backward while the salamanders were trying to move forward. Mr. Weiss sees in this behavior support for a theory that the muscles of a limb determine the pattern of action of the nerves that supply it. The right-leg nerves were thus "specified" into left-leg action because the left leg was attached to them. Similarly, the right leg imposed right-limb action on the left-leg nerves that supplied them after the operation.

A NEW hormone from the pancreas which may greatly improve treatment of diabetes was reported by Drs. Lester R. Dragstedt, John van Prohaska and Herman P. Harms, of the University of Chicago, before the American Physiological Society. The new hormone, called lipocaic, has not yet been used clinically. It will supplement but not replace insulin. Lipocaic apparently controls the utilization of fat in the body as insulin controls the use of sugar. The diabetic patient suffers from a disturbance in the utilization of fat, so that even with insulin treatment he can not be returned to a fully normal state. The

disturbance in fat utilization often causes a premature hardening of the arteries as well as other difficulties. For this reason the fat in his diet must be more or less restricted. The new hormone was discovered in studies on dogs. When the pancreas in these animals is completely removed, they can not live more than two or three months even when given adequate amounts of insulin. At death an extreme infiltration of the liver with fat is found. Giving the new hormone together with insulin, after complete removal of the pancreas, prevented the infiltration of fat into the liver and enables the dog to live probably a normal life span. An attempt is being made to obtain lipocaic in pure form.

THE body has a special general alarm call by which it mobilizes, within forty-eight hours, its defensive forces against poisons and other damaging influences. Evidence of this hitherto unknown defense reaction was presented by Dr. H. Selye, of McGill University, to the American Physiological Society. It involves three glands and may be due to a new adrenal gland hormone. The regiments of defense called out by the alarm, however, are located in the thymus gland, an organ in the chest which is large in children but grows smaller and may almost diasappear with age. The newly-discovered defense action is like the immune reaction by which the body fights invading disease germs. But it is much faster and operates against poisons and other injuries as well as against germ infections. The routine of general alarm reaction consists of overactivity of the adrenal and thyroid glands, involution or shrinking of the thymus gland as it sends its regiments into the battle, and certain changes in the body's use of water. The reaction fails to occur when the adrenal glands are missing. It is not due to adrenalin, one well-known adrenal gland hormone, nor, apparently, to the other adrenal gland hormone, cortin.

THE idea that alcoholic drinks have a harmful effect on the liver was made less certain by Dr. J. L. Bollman, of the Mayo Clinic. With Dr. F. C. Mann, president this year of the American Physiological Society, Dr. Bollman reported studies showing that alcohol increases the fat content of the liver. The amount of alcohol which produced this effect in the dogs they studied, however, would be equivalent to a ration of one quart of alcohol a day for a man, Dr. Bollman explained. Furthermore, a fatty liver is ordinarily not harmful, although a large fat content in the liver does make it harder for that organ to cope with what Dr. Bollman termed "further insult" in the shape of certain drugs, or surgical operations. In previous studies he and Dr. Mann found that the fat content of the liver can be reduced by feeding a diet high in starch and sugar content. This is important in preparing a patient with a fatty liver for surgical operation. It also seems to put a physiological okay on the custom of eating pretzels with beer or sandwiches with cocktails. When questioned about cirrhosis of the liver, a serious condition quite different from fatty livers, Dr. Bollman said that he knew of no evidence that alcohol caused the condition.

AN extract that may prove valuable in treating hemophilia was obtained from the placenta by Drs. Arda Alden Green, Hope Lowry, R. C. Eley and C. F. McKhann, of Harvard University. Dr. McKhann had previously used an extract from this maternal tissue for treatment of measles. The one now reported is a different extract from the same kind of tissue, and seems to have the property of making the blood of bleeders clot more rapidly.

FROM the cornea of a dog's eyeballs, Dr. John H. Ferguson, of the University of Alabama, has extracted a substance which he found can play a part in the process of blood clotting. This effect of the eyeball tissue indicates, according to Dr. Ferguson, the possibility of preparing a blood-clotting agent from tissues that have no blood in them. The clotting of blood is generally supposed to depend on a substance found in the blood itself. Inability of the blood to clot normally when shed, as in hemophilia, has been thought due to the absence of such substance. He reported other experiments supporting another theory of blood clotting. This is that cephalin from the brain, as well as calcium is an essential factor in directly activating the clotting substance in blood.

A COAGELOMETER was designed at the Mayo Clinic by Drs. E. J. Baldes and K. K. Nygaard to determine the coagulability of blood in such diseases as hemophilia, obstructive jaundice and thrombocytopenic purpura, in which the blood takes a long time to clot, and in certain cases of thrombosis, or stoppage of a blood vessel by a clot, in which the clotting time is shortened. The coagelometer makes use of the photo-electric cell. Studies with this new tool of modern physics show that there are four and possibly five stages in the process of blood clotting. Clinical application of the coagelometer are under way and will be reported on later.

CLOTTING of blood within the blood vessels, which may be extremely dangerous, is due primarily to the action of tissue extract, Drs. Stearley P. Harrison and Edward C. Mason, of the University of Oklahoma Medical School, concluded from experiments made by them. They were able to produce such clots within the veins of an artificial blood-vessel system. Minute amounts of the tissue extract produced the clots when relatively large amounts of blood were circulating through the artificial blood vessels. The clots thus formed were examined under the microscope and found strikingly similar to those occurring in human disease.

THE problem of how fast the plasma protein content of the blood supply of the body can be restored to normal after extensive blood loss was investigated by the apparently drastic but harmless operation of removing all the blood and then replacing it by a salt and blood cell mixture, a sort of modified transfusion. In the case of dogs, the plasma protein is regenerated within 200 hours and in cats within 100 hours, according to experiments made by Drs. William R. Amberson, John Stanbury and Edna Warweg, of the University of Tennessee and the Marine

Biological Laboratory at Woods Hole. The operation is performed under ether and the animal suffers no pain or damage. Blood is withdrawn from the carotid artery in the neck. Into the same artery is then injected a salt solution containing in proper proportion the blood cells of another cat or dog. This is continued until examination shows that all the plasma, or liquid constituent of the blood, has been replaced by the salt solution.

THE specific gravity of blood is greater during excitement than when one is calm, and the spleen, a red blood cell factory in the body, is partially responsible, experiments by Drs. L. B. Nice and H. L. Katz, of the Ohio State University, show. Specific gravity gives the weight of a unit volume of blood or other fluid compared with the weight of the same unit of water. The effects of excitement on pigeons, rabbits and cats have been studied. In normal animals the increase in specific gravity of the blood after they had been excited was quite marked, but in rabbits whose spleens had been removed this increase was much smaller. The results are ascribed to the removal of water by body tissues from the blood, the addition to the blood of the waste products of the animal's speeded-up life processes, and most important, the actual contraction of the spleen to force red blood cells into the blood stream. Since the red blood corpuscles carry oxygen from the lungs to points where it is needed, this makes more oxygen available to the muscles, nerves and glands, so that it is possible to act more quickly and more forcibly in reponse to whatever it is that is producing the fear, rage or other emotion.

A NEW rôle for vitamin B, helping the body to gain weight by building up fat, was suggested by experiments reported by Drs. Dorothy V. Whipple and Charles F. Church, of the University of Pennsylvania School of Medicine, at the meeting of the American Society of Biological Chemists. Animals given diets that contained no fat but plenty of vitamin B were able to gain more weight than their mates on the same fat-free diet but without the vitamin. Comparing the average body composition of the animals, it was found that fat accounted for half the gain in weight made by the animals on the vitamin diet. Water accounted for the other half of the weight gain. The figures suggest the possibility that vitamin B plays a rôle in the building up of fat in the animal body. Vitamin B is found in moderate amounts in most natural foods, but its chief sources are wholemeal cereals, yeast, peas, beans, egg yolk, nuts, liver, kidney and heart. Lack of this vitamin causes beri-beri, a disease mostly found in the Orient, but which can occur anywhere if this vital food factor is omitted from the diet. Consequently, fat persons can not hope to lose weight by omitting vitamin B from their diet, even if the investigations reported are confirmed and the vitamin is found actually to be important in weight-building. But thin persons wanting to gain weight may in the future be advised to add liberal amounts of the vitamin to their diet.

A WAY to prevent the dental condition known as mottled enamel which has disfigured thousands of children in the Southwest and certain other parts of the country was suggested by Dr. George R. Sharpless, of the Henry Ford Hospital, Detroit, at the meeting of the American Institute of Nutrition. If the human body reacts toward aluminum compounds as the rat's does, a preventive for the disfiguring tooth condition may have been found. All that would then be necessary would be to add the right amount of aluminum chloride, which is a salt, to the diet of infants and children in regions where the water supply is high in fluorine content. Mottled enamel is caused by fluorine in the water used for cooking and drinking. As little as one part per million of fluorine in the water will cause the condition, for which there is no cure. So far, there has been no practical preventive either. A few communities have been able to solve the problem by changing water supplies, but most communities where the water supply is high in fluorine content are located in the arid Southwest where there is no other water available. Working with rats, Dr. Sharpless found that he could prevent the dental condition resulting from fluorine by adding aluminum chloride to the animals' diet. The result is achieved by a chemical reaction in which the aluminum combines with the fluorine to make a compound, aluminum fluoride. Aluminum compounds are not absorbed by the rat, so when the fluorine enters into compound with the aluminum it is eliminated from the body without getting a chance to harm the teeth. Other substances that form insoluble compounds with fluorine were tried but were ineffective.

A LABORATORY-MADE insecticide powder which may turn out to be a valuable remedy for bladder disease was reported at the meeting of the American Society for Pharmacology and Experimental Therapeutics. The report was made jointly by Drs. Floyd DeEds, John O. Thomas, C. W. Eddy and A. B. Stockton, of the U. S. Department of Agriculture and Stanford University Medical School. The powder, which has the name phenthiazine, was made in the Department of Agriculture laboratories for use as an insecticide. Before it was put into practical use for this purpose, it was tested on animals to determine whether it was poisonous. Its effect on these animals indicated a possible use as a urinary antiseptic. Rabbits suffering from cystitis or bladder inflammation due to infection with colon bacilli were cured by the addition of small amounts of the powder to their diet. Encouraging results in about thirty human cases of chronic cystitis were obtained with phenthiazine. In these thirty cases every kind of treatment had failed to relieve the condition. With proper scientific caution, however, the investigators point out that the new antiseptic is still in a very experimental stage and far from being ready for general application in the treatment of human disease. A plentiful supply of the antiseptic will be available as a result of laboratory synthesis made within the last few days.