SCIENCE NEWS

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THE COMPOSITION OF THE SUN

NEW knowledge of the composition of the sun should be secured from observations which will be made during the "ring eclipse" of the sun that will occur on April 7, according to Dr. Otto Struve, professor of astrophysics at the University of Chicago and director of both the new McDonald Observatory on Mount Locke, Texas, which is conducted jointly by the University of Texas, the University of Chicago and the Yerkes Observatory.

Usually a "ring eclipse," in which the moon's diameter is not of apparent sufficient size to obscure completely the sun's disk and produce a total eclipse, is of little scientific worth and is regarded more as a pleasing spectacle.

Now being constructed at McDonald Observatory, however, is a new instrument for observing the invisible "infra-red" radiation emitted by the rim of the sun during the ring eclipse. During such an eclipse the much stronger radiation from the center of the sun's disk is blocked out and permits scientists to measure the radiation coming from the rim, or "limb," as it is called. Dr. Struve reports that it is only during a partial or annular (ring) eclipse that this rim radiation can be measured.

McDonald Observatory will be in the zone where the ring eclipse can be seen, but is about 50 miles from best observing position. A special expedition will be sent out to make the infra-red measurements. At the observatory itself will be mounted the television apparatus invented by Dr. A. M. Skellett, of the Bell Telephone Laboratories, for observing the corona of the sun during the eclipse.

THE WEATHER PATROL

FIRST to return from duty as a floating weather observatory at sea, the U. S. Coast Guard Cutter *Bibb* has returned, and investigators of the U. S. Weather Bureau are evaluating results and preparing for another tour to begin on March 18.

The *Bibb* and her sister ships of the "weather patrol" go to a certain spot in the Atlantic and stay there for three weeks, obtaining all possible weather information and relaying it back to the Weather Bureau, where it is made available for the use of the mail-carrying Atlantic clippers and for surface shipping of all nationalities.

The principal instrument used is the radiosonde, a featherweight robot radio sending station that goes up on a small unmanned balloon and automatically sends back information about the weather from altitudes as great as ten or fifteen miles. Once every 24 hours a radiosonde is sent up, at 10:45 P.M. Also, at six-hour intervals, smaller balloons are sent up, which are watched through theodolites as long as they can be seen, to give further information on wind direction and velocity. Finally, constant records are made of weather conditions at the surface, and of ocean temperatures.

The two cutters that have been at sea, the *Bibb* and the *Duane,* were stationed along the course of the Atlantic clippers, respectively one third and two thirds the distance to Europe. The great flying boats passed over them at night, taking their bearings from the brilliantly lighted ships as if they were land beacons. Constant radio communication is of course maintained between aircraft and surface craft, so that the precise location of the latter is known in the clippers' navigation cabins.

The *Bibb* and the *Duane* have been relieved by two other Coast Guard cutters carrying U. S. Weather Bureau men and equipment, the *Hamilton* and the *Ingham.* These will stay at sea until it is time for the first pair to take their place.

HIGH-SPEED CENTRIFUGES AND THE DIAGNOSIS OF DISEASE

FORCES equal to 8,000,000 times gravity that can be created in modern centrifuges have promise of being a new medical tool for the diagnosis of disease, according to a statement made by Professor J. W. Beams, of the University of Virginia, in a lecture given before the Sigma Xi chapter of the College of Medicine, University of Illinois.

Professor Beams stated that under the terrific centrifugal forces created in the whirling rotors of modern centrifuges, it has been found that the viruses of tobacco mosaic virus (a plant disease) and the vaccina virus (cowpox used for immunization against smallpox) can readily be separated and purified. Interesting differences in the number of sedimenting boundaries, as well as the relative concentration in each, between normal and pathological sera have been found. It is not impossible that the centrifuge may be very useful as a means of determining the correct diagnosis of disease.

Professor Beams, who is an authority on the construction of ultra high-speed centrifuges, explained that these devices are highly successful in separating out fractions of complex body proteins. These proteins appear to be composed of homogeneous species of molecules which seem to be definite multiples of a fundamental protein mass unit of 17,600.

The extremely large protein molecules which occur in the bodies of living things represent stable collections of lesser molecules held together in a fragile bond that can easily be changed by many factors including the pH, or acidity, of the medium in which they exist.

An example Professor Beams discussed was the coloring pigment of the blood of the common, edible European snail. This pigment, haemocyanin, has the enormous molecular weight of 6,740,000. When its acidity is changed slightly, Professor Beams said, "it dissociates by steps into halves, eighths and sixteenths, each dissociation product being a homogeneous molecular species. When the pH (acidity) is changed back to the original value, the components recombine to form the original compound of molecular weight 6,740,000." The ultra high-speed centrifuge is invaluable in determining accurately these large molecular weights.

Other valuable uses of centrifuges, outside the field of physics which designs and creates them, are in the purification of hormones, viruses and enzymes, and in the determination of the masses of the artificially radio-active isotopes of the elements which are increasingly being used in chemistry, biology and medicine as "tracer" elements to study complex and hitherto-obscure reactions in plants, animals and chemical compounds.

THE CAUSE OF CANCER

PROBING for the secret of how normal healthy cells in a human body are transformed by a chemical into malignant cancer cells, Drs. Wilton R. Earle and Carl Voegtlin, of the National Cancer Institute, U. S. Public Health Service, have achieved the test-tube transformation of one type of living cell into what appears to be a radically altered type. Whether their cellular alchemy has created cancer cells out of normal cells remains to be proved. The new cells, however, have at least many of the appearances and characteristics of cancer cells. This transformation is important scientifically because it is the first time it has ever been accomplished, outside the body, with mammalian cells.

The new type of cells was produced by growing mouse cells in flasks and treating them with methylcholanthrene. This substance is a powerful coal-tar chemical which causes cancer when injected into or rubbed on the skins of mice or other laboratory animals. It is similar to the substance in coal tar which causes the kind of human cancer known as chimney sweepers' and spinners' cancer.

Since the cells that were transformed by the chemical were outside the animal's body, the experiments show that the chemical probably causes cancer by direct action on the cells, independent of any general systemic action. In other words, the chemical causes cancer by its own contact with the cells and not by indirectly producing changes in general body chemistry which in turn might cause cells to become cancerous.

A significant feature of the transformation of normal mouse cells into this type is the fact that the chief changes so far observed in the cells seem to suggest changes in the cell membrane or envelope. It is suggested that this might be a crucial change in the transformation of a normal cell into a cancerous one by chemical treatment.

THE TREATMENT OF SHOCK IN SURGICAL OPERATIONS

SAFER surgical operations and speedier recovery from them, especially for debilitated patients, seem promised by a new treatment for preventing dangerous shock during and after operations. The treatment, using a synthetic adrenal gland hormone, was developed by Dr. David Perla, of Montefiore Hospital in New York City. "Striking benefits" in fourteen cases at this hospital are reported by Dr. Perla, who said that the treatment will shortly be adopted in two other New York City hospitals.

The patients treated at Montefiore were what would be considered poor surgical risks because serious chronic illnesses such as cancer and tuberculosis had weakened them so that they would have little strength to withstand an operation. Without the new treatment, patients of this type might have had to forego the chance of being helped by surgery because the shock of the operation might cause fatal prostration and collapse.

With the new treatment, patients are prepared for operation by being given quantities of salt solution and carefully prepared doses of desoxycorticosterone acetate. This chemical is the synthetic vital hormone of the adrenal glands. Earlier studies have shown that these glands play a significant rôle in the body's fight against intoxications, poisons, shock and infections. The adrenal cortical hormone, Dr. Perla explained, influences the transfer of water from tissues to cells and the level of salt in tissues and cells. Disturbance of this glandular balance, which frequently occurs in an exhausting operation, leads to collapse.

"In all instances the patients were strikingly benefitted," Dr. Perla said in his report of the new treatment. "There was no objective evidence of shock. The blood pressure was maintained or elevated. The temperature in general returned to normal within 24 to 48 hours. Postoperative exhaustion and toxemia were definitely lessened. Complications did not occur. Operative recovery seemed to the surgeons concerned to be more rapid than in their preceding surgical experience in our hospital."

FEDERAL HOSPITAL CONSTRUCTION

THAT plans for a national health program, supported and coordinated by the Federal Government, should not be abandoned now that a more modest plan for federal hospital construction has been proposed, is the opinion of the Committee of Physicians, according to a statement issued by its secretary, Dr. John J. Peters, of the Yale University School of Medicine.

The plan to have the Federal Government spend $10,000,000 to build hospitals in communities now lacking them was proposed by President Roosevelt and has been embodied in a bill introduced in the Senate by Senator Robert F. Wagner, of New York. Providing that this plan does not mean permanent abandonment of the national health program, the Committee of Physicians approves the hospital construction plan. The hospitals built under this plan should vary in size from 100 to 300 beds. Smaller hospitals probably could not offer comprehensive service. The statement points out that such hospitals should be directed by a lay hospital board representative of those persons in the community. Members of the board should be drawn from welfare organizations, social service and philanthropic agencies, public officials responsible for the care of the indigent and wards of the state or community, business men and industrialists of the locality, and organizataions of farmers or laborers, but no physicians who use the hospital should be on this board. There should, however, be a medical board, consisting of the chiefs of staff of the various services, to maintain and improve standards of medical care, control the use of hospitals by physicians and surgeons of the community and supervise their work. Physicians should be paid, preferably on a salary basis, for their services in these hospitals to the indigent, wards of the government and those

patients for whose medical care the community assumes total or partial responsibility.

Out-patient departments and other measures for integrating these hospitals with the public health services and general health programs of the community are recommended. Effective ambulance service, appropriate to the character of the community, should be provided.

A SYNTHETIC FIBER FROM SOYA BEANS

OUT of the protein in soya beans two Japanese chemists have developed a strong synthetic fiber of high tensile strength which can resemble wool or natural silk, depending on production methods. The process is described in a new patent, No. 2,192,194, granted by the U. S. Patent Office, to Toshiji Kajita and Ryohei Inoue, of Tokyo.

Investigators in the U. S. Department of Agriculture express little surprise that a wool-like fiber can be created from soya beans, for it has been done experimentally, also, in the United States. The claims of a silk-like fiber are novel. While samples of the new Japanese fiber are not available, it is believed that this claim relates to the appearance of one form of the fiber which might be straight, without the kink of wool, and which might possess a sheen resembling that of silk.

Chemists, too, are interested in the new patent because it describes the use of the chemical, lecithin, to stabilize the protein solution prior to its ejection into a hardening bath. American investigators have found that with soya bean protein solutions a critical stage is reached where pectin is present. Pectin is often used by cooks to make jelly. If the pectin in the solution makes it gel prematurely the whole batch must be thrown out. If the Japanese can prevent this gelation with lecithin they have made a real advance in the synthetic fiber art.

Italy was the original home of wool-like fibers made from protein, and Italian scientific men introduced and perfected Lanital—made from milk. The protein of the casein in milk is the basic starting point for this product.

It has been pointed out many times that the protein of soya beans, or fish, or other sources might also be used for fibers, and world-wide research has progressed rapidly to perfect these other possibilities.—ROBERT D. POTTER.

ITEMS

THE possibility that some of the effects now attributed to heredity are due to prenatal environmental influence has arisen from cancer experiments in the Roscoe B. Jackson Memorial Laboratory at Bar Harbor, Me., soon to be reported. Unborn mice that are given foster mothers by transplanting fertilized eggs from one female to another are found to be "pseudo-hybrids" in that they react to transplanted tumors in part as their foster mothers do and in part as their real mothers do. Earlier experiments showed that in the process of nursing, whether the milk is supplied by the real mother or a foster mother, some sort of influence effecting the likelihood of developing breast cancer is transferred. Dr. Arthur M. Cloudman, who conducted the transplantation experiments as a part of a broad investigation of cancer's heredity directed by Dr. C. C. Little, is now planning to conduct experiments to differentiate between the effects transferred during nursing from those acquired during the period before birth. First announcement of the experiments was made through the American Society for the Control of Cancer.

THE old tradition that a human baby dropped into deep water will swim is justified by scientific experiment, provided the infant is young enough. Babies a few days or weeks old were submerged in water in the test conducted by Dr. Myrtle B. McGraw, of the Normal Child Development Clinic at the Babies Hospital in New York City. They made rhythmical coordinated movements of both arms and legs "resembling swimming." The very young infant has a reflex which stops his breathing when he is under water. But after a few months the story is different. The older infant placed in water struggles in disorganized fashion. He tries to turn over on his back. He can not control his breathing. Towards the end of the second year, the baby has still another way of responding to the new experience of deep water. Now he makes deliberate swimming movements especially with his legs. The babies taking part in Dr. McGraw's experiment ranged in age from only eleven days to two and a half years. Animals, including opossum, kitten, rat, rabbit, guinea pig and monkey, made the same rhythmical movements of arms and legs. A complete report of the experiments was made to the *Journal of Pediatrics*.

PROFESSOR K. VON FRISCH, of the University of Munich, in a report published by the Smithsonian Institution, states that when a bee finds nectar she flies back to the hive and does an excited dance amid her fellow workers. These join her for a few steps and then make off for the new source of honey-material. Bees do not usually fly in a literal "bee-line" to the nectar supply after they have been told of it in dance-language. They seem to be guided by a special scent which the discoverer gives off from a controllable gland, in the neighborhood of the source of sweets. The other bees cruise more or less at random until they find this scent, then seek more specifically for the flower. Professor von Frisch has found in his researches that bees are color-blind to red, but that their eyes are sensitive to ultra-violet radiations.

THE U. S. Reclamation Bureau engineers have perfected a new, inexpensive method of hardening concrete surfaces, which compacts the concrete and avoids the forming of "voids" within it. They use "blotting" paper. To improve the surface of the spillways of its giant dams, over which billions of gallons of water glide yearly, government engineers tried a highly absorbent wall fiber board. They found the paper, unrolled on the spillway concrete while it was still soft, drew out excess moisture and allowed air bubbles to escape from the drying mixture. There is a double-action effect. The concrete dries more evenly, the fiber board remaining moist and protecting the surface. The resulting spillway surfaces were satin-smooth. Tests indicated that the concrete was unusually hard and wear-resistant. The new process was reported by C. O. Crane, assistant engineer of the bureau, to the Colorado Society of Engineers.