SCIENCE NEWS

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EXPEDITIONS TO OBSERVE THE SOLAR ECLIPSE OF JUNE 19

ASTRONOMERS will go to Siberia and to the islands of northern Japan to view the total eclipse of the sun which occurs next June 19. Some of them will journey halfway round the world to watch the sun disappear behind the intervening moon for a time which, at its maximum, is 2 minutes, 31½ seconds.

At sunrise on June 19 inhabitants of Tripoli, in northern Africa, will see the sun come up black as the moon blocks out its light. At Athens and in Asia Minor the sun will rise in normal fashion but within a few seconds will be obscured. Thus onward with a speed that covers nearly half the world's circumference in the daylight hours, the shadow cast by the moon on the earth will sweep across the Black Sea, the southern Ural Mountains, across the steppes surrounding Orenburg and into Siberia. There it sweeps across thousands of miles to the islands on the northern tip of Japan until it finally ends far to the east in the vast expanse of the Pacific Ocean.

Starting as a narrow ribbon, the path of totality gradually widens, and the time the sun is obscured lengthens, until at the northern end of Lake Baikal at 12:30 P. M. on June 19 the path is 82 miles wide and the eclipse will last just a little more than 2½ minutes. From Lake Baikal eastward the path of totality narrows again and the time of totality shortens.

As always, astronomers are wondering whether the sky will be clear at their chosen observation points after they have traveled for thousands of miles with bulky and heavy equipment. Professor S. A. Mitchell, of the University of Virginia, who is president of the Eclipse Commission of the International Astronomical Union, estimates that the chances of clear weather throughout the eclipse track are about fifty-fifty. Where American eclipse parties will observe, however, the chances are slightly better—60 per cent. in favor of clear weather. Since 1933 the Soviet Government has collected all the available weather information, old and new, on the climatic conditions of the various possible observation points.

The largest American party will be the joint Harvard University and Massachusetts Institute of Technology expedition headed by Dr. D. H. Menzel and Dr. J. C. Boyce. They will be located at Ak-Bulak which is not far from Orenburg just west of the southern limits of the Ural Mountains. The joint expedition of Georgetown University and the National Geographic Society, headed by Dr. P. A. McNally, S.J., will be stationed at Kustanai, about 500 miles east of Orenburg and just east of the southern tip of the Ural mountain range. Dr. Willi Cohn, of the University of California, will be in northern Japan with Japanese expeditions, as he was in the 1934 eclipse which occurred in the South Seas. Dr. Cohn will cooperate with Science Service in reporting the eclipse conditions from that point.

England will send two expeditions into eclipse areas, under the auspices of the Royal Society and the Royal Astronomical Society. At Omsk will be the party of Professor J. A. Carroll, of the University of Aberdeen. A larger British party will be at Kamishari in Hokkaide, the northern island of Japan where Professor F. J. M. Stratton, of the University of Cambridge, will be in command.

RESULTS OF THE STRATOSPHERE FLIGHT

THE untold story behind the record-breaking stratosphere flight of the balloon *Explorer II* last year was given at a recent meeting of the Philosophical Society of Washington when those taking part in the experiments described their work.

Among the apparatus carried aloft in the 72,395-feet ascent of Captain Orvil Anderson and Captain Albert W. Stevens in the National Geographic Society-U. S. Army Air Corps balloon was the equipment of O. H. Gish on air conductivity from the Department of Terrestrial Magnetism of the Carnegie Institution of Washington.

The ease with which the stratosphere air conducted electrical current, said Mr. Gish, rose steadily from ground level to 60,000 feet, when it was 60 times as great as at the surface of the earth. From 60,000 feet upward, however, the conductivity was surprisingly low. The conductivity not only failed to increase but even decreased slightly. This finding may have importance for cosmic ray studies since above 20,000 feet altitude cosmic radiation is the main contributing cause of air ionization, and hence of air conductivity.

The composition of the stratosphere air was described by G. M. Shepherd, of the National Bureau of Standards. The helium content of the stratosphere air was very much too high, he indicated, to be accounted for by the separation of gases which gravity would bring about. Helium was found in a concentration of 300 parts per million of gas. Contamination of the helium samples from the helium used to inflate the balloon was anticipated and is suspected in the measurements.

The ratio of the amount of oxygen to nitrogen obtained in the stratosphere air samples is slightly different from that expected. The possible origin of these differences is still under study. If the difference turns out to be real, it would indicate that a separation of the two gases due to gravity is occurring at the altitudes reached by the balloon.

W. G. Brombacher, also from the National Bureau of Standards, reported that the automatic instruments carried aloft brought back a complete "life history" of the epochal flight in terms of barometric pressure and time. The use of the vertical camera to measure altitude, Mr. Brombacher stated, yielded results in good accord with the pressure records. The photographs are excellent. A problem which is being investigated is one to determine the effect of camera tilt on the vertical camera photographs. No results on this study are yet reported.

The strength and performance of the stratosphere balloon was described by Dr. L. B. Tuckerman, of the National Bureau of Standards. He explained the new method used in folding the bag of the *Explorer II* to overcome the forces which caused the disastrous mid-air rip in the *Explorer I* and its abrupt descent. Significance in the performance of the balloon was the use of the prepared ballast chart from which Captain Anderson could determine for any conditions of air temperature, outside and inside the balloon, what amount of ballast would be required for a safe landing. Captain Anderson then made his decisions on whether ballast should be released. One disappointment, Dr. Tuckerman pointed out, was that the clockwork mechanism driving the meteorograph inside the balloon stopped about halfway up on the ascent. Its final reading was minus twenty degrees Centigrade.

H. W. Hemple, of the U. S. Coast and Geodetic Survey, described altitude measurements on the balloon from ground stations by trigonometric calculations.

Opening the meeting and introducing the other speakers was Dr. Gilbert Grosvenor, president of the National Geographic Society, who discussed "Stratosphere Flights as Exploration."

USE OF THE HELICOPTER IN AVIATION

MECHANICAL flight by man stands upon the threshold of a new development as revolutionary and progressive as was the development of the automobile in land transportation. Just as the automobile added tremendous flexibility and convenience to land travel—flexibility far above that afforded by railroads confined to rails—so the development of the helicopter along new and scientifically sound principles will add flexibility to present-day air transportation.

This prediction, based upon exhaustive study and research, was made by W. Laurence Le Page, consulting engineer of the firm of Day and Zimmermann, Inc., in a lecture on "Flight on Rotating Wings," given before the Franklin Institute.

Mr. Le Page has designed a helicopter weighing about 3,000 pounds, which, with a 300-horsepower motor, can rise straight up at the rate of 2,000 feet per minute. The "propeller" has 170 revolutions per minute against around 2,000 in the fixed wing type of airplane. This new helicopter, Mr. Le Page estimates, will have a forward motion in the air, once it has risen, of 145 miles per hour.

It must be remembered that in Mr. Le Page's design, there is found only the rotating wing to which the power is applied, there is no vertical propeller. In the autogiro the rotating wing has no power applied to it and there is always a vertical propeller.

In Mr. Le Page's design there is also the advantage of practical silence. At the slower revolutions of the large rotating wings there is a "swish" only, and the terrific roar common to the fast-moving propellers of fixed wing planes is absent. This is an important feature in the safety of air travel when the airways become more congested. At present sight is practically the only sense that a pilot can use to detect other planes in his very near vicinity. With the propeller roar eliminated, he could also use his sense of hearing, for the exhaust can be muffled or deadened.

In the past, the helicopters designed and built were so cumbersome that they were soon regarded as impractical. The sources of power were so heavy that the early builders experienced all sorts of difficulties that invariably ended in "crack-ups." Again, the old designers all worked with rotating wings that were rigid. The rotating wings of the autogiro are not rigid, and in this feature Mr. Le Page largely found the secret of the success of the new helicopter, by the application of old principles in a new way. The rotating wings of the newly designed helicopter, like those of the autogiro, being articulated, and not rigid, there is a tremendous lessening of stress in them.

A large propeller, Mr. Le Page pointed out, moving more slowly, is more efficient than a smaller propeller moving at a greater speed. However, the design of present-day airplanes, with the propeller in a vertical position, limits the size of the propeller, outherwise the landing gear would necessarily have to be on "stilts." However, in the newly designed helicopter, the horizontal position of the rotating wings does not limit their size.

The conception of rotating wing flying dates back to Leonardo da Vinci, and the first serious attempts by man to fly by this method date back to the eighteenth century. Developments for the past thirty years, however, have largely been in the simpler and easier problems of the fixed wing aircraft. The invention of the autogiro, however, pointed to the tremendous potentialities of flying on wings which rotate. Mr. Le Page, in his research, has advanced upon the principle of the autogiro, in that he applies power to the rotating wings.

ETHER AS AN IDEAL ANESTHETIC

ETHER, pioneer anesthetic for surgical operations, can be the ideal anesthetic for both patient and physician, in the opinion of Dr. W. N. Kemp, of Vancouver, B. C. The conditions under which ether may become ideal, surpassing the newer anesthetic agents, are described by Dr. Kemp in the *Journal* of the Canadian Medical Association.

By the method Dr. Kemp outlines the patient is assured of safety, and the twin discomforts he dreads most and remembers longest are banished. There is no uncomfortable struggling to carry out the order to "breathe deeply" of the smelly stuff. The nausea and vomiting on coming out of the anesthetic are also eliminated.

Thorough preparation of the patient for the operation and the anesthetic is the first requisite for making ether an ideal anesthetic, Dr. Kemp concludes from animal and clinical studies. "The fact that the majority of patients survive our present customary lack of preparation is no argument for its continuance," he states. For about a week before the operation, Dr. Kemp directs the patient to eat no meat, but to include plenty of starches and sugars and an abundance of vitamins and calcium or lime in his diet. This diet is supplemented with a daily dose of one and a half ounces of lactose, familiarly known as milk sugar. For five days before the operation

the patient is given a daily dose of an iodine-containing medicine known as Lugol's solution. In some cases, Dr. Kemp prescribes daily doses of an extract from the adrenal glands for five days before operation. The patient should spend the last three days before the operation in the hospital "getting into physical and environmental equilibrium." These measures, Dr. Kemp believes, are "powerful factors in preventing or decreasing post-operative nausea and vomiting and in generally improving the surgical patient's subsequent well-being."

Before being taken to the operating room the patient should be made stuporous or even unconscious by one of the modern sleep-inducing medicines such as avertin, or one of the barbiturates, or the "twilight sleep" combination of morphine and scopolamine. This makes the patient oblivious to the preparations in the operating room and he goes under the ether without knowing he has taken it.

Among special instructions to anesthetists on administration of ether, Dr. Kemp advises them immediately after the operation to use suction to remove accumulated mucus from the trachea or windpipe. This, he says, is important for lessening post-operative nausea and vomiting.

Dr. Kemp cites various studies on animals explaining why the measures he advocates are useful and reports his success with them in a series of cases at the Vancouver General Hospital. In conclusion he states: "Undoubtedly the next great advance in surgery will be in the field of pre-operative care. When this ensues and when anesthetists are trained to administer ether according to the technique outlined above, or in even better fashion, then we will have made ether an ideal general anesthetic."

ITEMS

THE epidemic reported to have attacked one fifth of Milwaukee's population is thought by health authorities as possibly being influenza or perhaps being one of a series of epidemics of intestinal disease which have baffled medical scientists for the past several years. The latter disease resembles food-poisoning, is of rather short duration and is not fatal. The symptoms are nausea, vomiting, and diarrhea. Starting five years ago, the U. S. Public Health Service began receiving reports of this mysterious malady from various localities in the Northwest and from some of the National Parks, where severe outbreaks occurred in the summer. Dr. R. R. Spencer, of the Public Health Service, was sent to investigate. Although hesitating to call this a new disease, Dr. Spencer was unable to class it with any previously known ones. Neither could he trace it to the food or water supplies in the communities he investigated.

STUDIES which may explain some of the varying results obtained in the treatment of cancer by x-ray and by radium were reported by Dr. Shields Warren, of Boston, at the meeting of the American Society for Experimental Pathology. Dr. Warren observed the way in which cells of a strain of rat cancer divided following exposure to radium of the same dosage as is used in the treatment of human cancers. He found marked variation in the way the dividing cells of the cancer responded to the irradiation. Body tissue, both cancerous and normal, grows by process of cell division. In the case of cancer, however, the growth continues unchecked, the cancer cells overrunning the normal ones. Irradiation, either with x-rays or radium is of benefit in cancer because it checks the process of division by which the cells grow, finally destroying the cells. In the rat cancer cells Dr. Warren observed that the frequency of division dropped rapidly within an hour and a half after application of the radium, reaching its lowest point during a period from two to ten hours after irradiation. The cancer tissue then recovered partially, the cells dividing at about one-third their previous rate. This level continued for about 72 hours. From ten hours onward, the cell division shows numerous cases of abnormality.

THE anemia which frequently follows infections may be due to a disturbance of internal body processes which puts a check on production of hemoglobin, the oxygen-carrying red coloring matter of blood. Studies indicating that this is the case were reported by Dr. F. S. Robscheit-Robbins, of the University of Rochester School of Medicine, at the meeting of the American Society for Experimental Pathology. Dr. Robscheit-Robbins' studies seem to clear up a long-standing medical puzzle. Heretofore it has been generally believed that lack of absorption of blood-forming substances by the body as well as destruction of blood during infection were responsible for the anemia. An accidental infection in dogs that had been made anemic by being bled gave Dr. Robscheit-Robbins a chance to investigate the problem. He found that infection and intoxication both markedly impaired the formation of new blood. Further studies with other animals showed that actual blood destruction is not part of the picture and that lack of absorption of blood-forming substances can also be definitely ruled out. That leaves failure of blood production as the explanation of the anemia, and the studies suggest, Dr. Robscheit-Robbins said, that the failure is due to some disturbance of internal body processes connected with food utilization. The same factor, he stated, may be important in human disease.

NEW hybrid varieties of cotton, aimed at meeting Russia's peculiar cotton-production problems, have been bred at the central experiment station of the All-Union Cotton Institute at Tashkent, in Turkistan. They mature from eight to ten days earlier than the old standard cotton varieties. Since even the most southerly of Russia's cotton-growing regions in Asia is in about the same latitude as Washington, D. C., St. Louis and San Francisco, this adaptation to a shorter growing season is considered of importance. Some of the new varieties were obtained by crossing Egyptian with Peruvian cotton. They produce much larger bolls—just about double the weight of the choice, but small, bolls of Egyptian cotton.