SCIENCE NEWS

THE ECLIPSE OF JUNE 29

PARTIAL success of the observations of the total eclipse of the sun of June 29 in England and the failure of expeditions to Norway because of clouds have again proved the fallibility of advance weather prospects. The English chances of clear weather were estimated months ago as only one in three, while in Norway they were said to be even. Yet the eclipse was seen in England, partly through light clouds, while in Norway thick clouds completely obscured the view. Dr. S. A. Mitchell, director of the McCormick-Chaloner expedition to Norway, the only scientific party from the United States, was unable to make any observations. This was his seventh eclipse, yet the magic number failed to bring him luck.

Dr. L. J. Comrie, of the British Nautical Almanac Office, who made the official advance calculations of the path of the eclipse over Britain, was at Southport, near Liverpool. He reports that the eclipse was seen from there through thin clouds, which concealed the faint outer extensions of the corona that were so noticeable at the eclipse of January, 1925, visible in New York. The corona is the outermost part of the sun, consisting at least partly of fine "dust" particles, and can only be seen at the time of a total eclipse. However, the bright inner corona, and the ring of the chromosphere, the sun's outer layer or "atmosphere," could be seen behind the black disc of the moon. A large prominence, or red flame of hydrogen, was observed from the upper part of the sun.

With Dr. Comrie was Dr. D. W. Morehouse, president of Drake University, at Des Moines, Iowa. Dr. Morehouse is a prominent American astronomer, and is known as the discoverer of Morehouse's comet. Dr. Caroline Furness, professor of astronomy at Vassar College, was also at Southport.

Gerald Merton, British astronomer and former war aviator, observed the eclipse from his own airplane, and succeeded in rising above two layers of clouds, at 4,000 and 9,000 feet altitude. He flew at 10,000 feet and while another layer of clouds was 5,000 feet above him, he had a fair view of the phenomenon. He also observed the shadow of the moon creeping across the clouds beneath him.

At Giggleswick, where Sir Frank Dyson, astronomer royal, set up his instruments, a rift in the clouds appeared opportunely a few minutes before the total eclipse commenced. It was observed with a clear sky from that point. Even this was not as narrow an escape as that of a party from the Lick Observatory to Goldendale, Washington, to observe the eclipse in June, 1918. Then a small rift appeared in the clouds at precisely the proper place a minute before totality, and closed a few seconds afterwards. It could hardly have been better timed to suit the astronomer.

AERONAUTIC LABORATORY OF THE CALIFORNIA INSTITUTE

IF it isn't handy to do scientific experiments on an airplane rushing through the air at 100 miles per hour, then rush the air 100 miles per hour past the stationary plane. Such in brief is one plan of the new aeronautical department of the California Institute of Technology. Thanks to the munificence of the Guggenheim Foundation, its elaborate aeronautic laboratory, now rapidly approaching completion, promises to aid in bringing aeronautic design into the domain of exact science.

The new plant includes a large wind-tunnel, wide enough to admit a small airplane. Powerful motor-driven blowers deliver a blast of air into one end of the tunnel, and withdraw the same air from the opposite end. The blast thus makes a continuous circuit within the building like a well-regulated tornado. The airplane, however, as far as the experimenters are concerned is traveling at high speed—admitting that motion is purely a relative matter.

In the wind-tunnel a variety of problems on shape, size and thickness of planes, wings, rudders, etc., will be tested, both in the interest of stability as well as lifting power and speed. Preliminary calculations on the form and directions of curved lines and surfaces are running into the most abstruse mathematics, some of which lead to conclusions not readily tested in common flying practice. Whence comes the aid of the laboratory.

In the earlier days of aircraft it was thought that the frontal exposed parts of an airship should be sharp or slim tapered. A pointed prow, fine piano-wire supports and extra-thin planes were favored. Actual practice on the contrary has shown that a properly-shaped strut of considerable width may actually offer less resistance to the air than a knife-edge or a wire. Apparently the old-fashioned billy-owl is not so badly designed after all.

The new air laboratory of the institute will include equipment for motor research and general engineering design, and will enjoy the cooperation of some of the best builders of mail and passenger planes now in service. Both American and German experts will direct research operations.

THE EARTH COMPASS

THE flight from California to the Hawaiian Islands involves a most difficult piece of navigation.

Flights to Europe are relatively easy, compared with those to Hawaii. All the aviator has to do is to fly eastwards, and he will be sure to hit some part of Europe. If Ireland is missed there is always France farther on.

In the Pacific Ocean it is different. The aviator has to fly for nearly 2,400 miles and hit a line of islands only 317 miles long. If he goes a bit too far north or south, he will not merely reach another part of the coast. Instead he will miss the islands entirely, perhaps without knowing it, and fly on until his gas is exhausted. And by that time he may be far away from steamer lanes.

But the same instrument that guided Lindbergh to the Irish coast, entirely by dead reckoning and without a single observation of a celestial or terrestrial guidepost, helps the Pacific fliers. This is the earth inductor compass, the product of genius in the U. S. Bureau of Standards. It was also the chief navigational instrument of Commander Byrd's *America*.

Like the familiar magnetic compass, the earth inductor compass depends on the fact that the earth is a great magnet. It also depends upon the principle of the electric dynamo. Spinning a coil of wire in a magnetic field produces a current of electricity in the coil.

In the dynamo, there is what is called a field magnet to produce the magnetic field which surrounds the moving coils, or armature. In the earth inductor compass, the earth itself acts as the field magnet. The armature consists of four coils of wire, wound to form a cross. It is spun as the plane goes through the air by means of a four-cupped windmill.

As the coils revolve they touch brushes which pick up the current generated. When the coils touch the brushes while they are in an east and west direction, there is no current. The wires of the coil are then moving in the direction of the lines of force of the earth. In order to have a current, the wires must cross the lines of force. However, if the soils are north and south, or in any other direction than east and west, a current does flow. Then a delicate galvanometer on the plane's instrument board shows the deviation from the course.

To use the compass, the brushes may be set so that they are in an east and west direction, when the plane is flying north, for example. The galvanometer will tell the pilot if he departs from a northerly direction. If he wants to fly in another direction, the pilot can set a controller dial. Then the galvanometer will indicate zero when he is flying in the direction for which the control dial has been set. If he starts in the wrong direction, he merely has to turn the plane slightly, and the galvanometer needle will again indicate zero.

The chief advantage of the earth inductor over the old form of compass is that it can be read at a distance. The inductor mechanism is set in the tail of the machine, far from the electrical coils and steel of the engine and other machinery that would affect the compass needle. Also, the motion of the plane as it banks on one side or the other does not disturb it, as it would a freely swinging needle.

The sun compass which Commander Byrd used on his polar flight is especially adapted for use in the Arctic, because there the magnetic pole is south of the flyer. A magnetic compass, whether earth inductor or not, would indicate any direction but north. Every Boy Scout is familiar with the principle of the sun compass, for he can use it to find the north with a watch.

Point the hour hand of your watch to the sun. Then south is half way between the hour hand and the figure twelve. If the watch were of a kind used in European countries, with a twenty-four hour dial, it would be simpler. Then you would merely need to point the hour hand to the sun, and the figure twenty-four would point to the south. In effect, the sun compass is such a twenty-four hour watch.

CELLULOSE FILMS

CELLULOSE, the principal constituent of wood fiber, may revolutionize photographic methods by its use in photographic films. A new process has just been developed by Philippe David, collaborator of A. Bertillon, the famous criminologist, by means of which it takes the place of gelatin as a support for the sensitive silver salts.

In the ordinary photographic plate of film the base of glass or celluloid is coated with a layer of gelatin in which are suspended the silver bromide particles. The gelatin layer is rather delicate, and great care must be taken with the films or plates before they are dry. Too much heat will melt the coating and spoil the picture.

With the new films gelatin and its disadvantages are eliminated. As the cellulose does not dissolve even in boiling water, the developing chemicals may be used hot to speed up the process. They may be developed in 3 to 4 minutes, fixed in 2 minutes and washed in 30 seconds, instead of the 15 to 30 minutes that the latter process now takes. Then they can be dried over a flame or in a hot oven in 2 or 3 minutes. The entire process, from the start of development to the dry negative ready for printing, is over in ten minutes at the most. This is a far shorter period than can be obtained at present, and it is anticipated that the new films and plates will prove especially valuable, both for still and motion pictures, in portraying news events.

THE FLAX WILT FUNGUS

HAS the parasitic fungus that causes the destructive wilt disease of flax been evolving under our very noses, to meet the handicap imposed by the breeding of resistant strains of its host plant? Or have the special fungus strains been in existence all along, only to be sorted out and detected now that the new flax varieties have been established? These are the riddles now confronting plant pathology experts at the university farm of the University of Minnesota.

From about 1905 until a few years ago, flax wilt threatened to wipe out flax growing in many regions of the United States. Then resistant flax varieties came into wide use, and production increased again with considerable profit to northwestern farmers. But the disturbing fact has developed that resistant flax varieties have in some regions shown themselves more or less susceptible to the disease, and though part of this could be blamed on the weather and other outside factors, not all the trouble could be traced to these causes.

Tests recently made by W. C. Broadfoot, of the Minnesota Experiment Station, show that the flax wilt fungus species is divided up into at least nine separate strains, or so-called physiologic forms. They were determined by the relative amount of injury they caused on four varieties of flax, collected from Minnesota, North Dakota, Saskatchewan and Manitoba. It may be that further examination of other flax varieties will disclose still other physiologic forms of the parasite.

This discovery very considerably complicates the problem of developing flax varieties that will completely defy the disease, and may require the breeding of special strains for cultivation in each region.

MEDICAL EXPERTS

DUELS between psychiatrists disputing the sanity of a prisoner in court will be ended if recommendations by the American Psychiatric Association result in legislation through the country. The association has adopted a report advocating state laws similar to the Briggs law of Massachusetts "which puts the psychiatrist in the position of counselling the legal authorities as to the disposal of social offenders."

The Briggs law, used as a model, provides that if an individual is indicted for a capital offense or if he is indicted a second time for a felony, he is examined by the State's Department of Mental Diseases, which delegates two psychiatrists appointed by the state. If the prisoner is found insane, he is generally committed to a state hospital for mental diseases or for the criminal insane without the delay and expense of a court trial.

This law, which has been in effect in Massachusetts for six years, was formulated through the efforts of Dr. L. Vernon Briggs, the well known psychiatrist.

"Before the law was passed in Massachusetts," said Dr. Briggs in an interview, "there was scarcely a day when psychiatrists, often graduates of the same university, were not pitted against one another, some employed by the prosecution and others by the defense. And this condition still obtains in the other states. In border line cases of mental disease a partisan expert can persuade himself that one side or the other is right. But this has brought disrepute to the profession, and experts have been considered unscientific, willing to sell themselves to either side. Furthermore, when testimony is presented on each side by equally able men, a jury is at a loss which to believe, and as a result they may throw out the expert testimony which should have been useful in guiding them."

Legislation similar to the Briggs law is now being considered for adoption in Belgium and Great Britain, and by New York.

The objection sometimes heard, that if psychiatrists regularly examined prisoners they would find them all psychotic, or mentally defective, or psychopathic, is not borne out by the records of Massachusetts since the law has been in effect.

Dr. Winfred Overholser, director of the division for examination of prisoners, states that out of 295 persons examined, only 21 per cent. were diagnosed as definitely abnormal in mentality.

ITEMS

THE power of fireflies and certain kinds of insects and lower animals to become luminous at will is thought by some biologists to be due to the action of various harmless micro-organisms that live in the animal's body. This theory has recent support from reports received of the claim by Dr. Umberto Pierantoni, of Naples, that ultra-microscopic organisms as well as those visible under the microscope play an important part in such reactions. Dr. Pierantoni believes that the introduction of these ultra-microscopic organisms into the egg of an insect will cause a change in the direction of the development of the embryo leading to the formation of new organs. Investigations on luminous insects, according to a report in *Nature*, have demonstrated that the presence of such micro-organisms is accompanied by the appearance of highly complicated structures such as lenses, reflectors, refractors and analyzers of light, due to stimuli exerted by them in the cells in which they become located.

THE report that a mysterious totem pole carved with a human figure is floating down the flooded Skeena River has been received by Harlan I. Smith, the Canadian government archeologist. Mr. Smith, who is engaged in preserving ancient totem poles and making out-of-door museums of them, has checked up on his collections and finds no exhibits in this region missing. A call was issued immediately to all persons along the Skeena River below Vanarsdol to look out for the traveling pole and if possible to rescue it and notify Mr. Smith. Federal authorities now protect Indian monuments, Mr. Smith points out, so that it is unlawful to take such an object without permission, or to mutilate or destroy it.

THE forests that grew in the widely separated swamps of what are now the states of Rhode Island and Missouri were strikingly alike in the plants that composed them, according to Dr. Eda M. Round, writing in the forthcoming number of *The Botanical Gazette*. Dr. Round has made a close comparison of fossil plant remains from the sandstones and shales of these regions, and states that over 50 per cent. of the plant species of the two localities were identical. None of the species that grew there those many millions of years ago survives into the present time, but the nearest relatives of some of them are now represented by ferns, club-mosses and scouring-rushes or horsetails.

The Berlin Society for Race Hygiene, according to the Berlin correspondent of the American Medical Association, has offered a prize for the best scenario of a eugenical movie. The film story must give a clear idea of the important principles of heredity in man but must exclude all forms of religious and political propaganda. The German society especially desires that measures of eugenics that will tend to preserve valuable physical and mental qualities should be pointed out and the dangers of degeneration duly stressed.