

SCIENCE NEWS

THE ZODIACAL LIGHT

Science Service

THIS is the time of year to be on the lookout for the zodiacal light which is a faint, luminous wedge of light extending from the northwestern horizon up along the zodiac, that belt of the heavens, which includes the ecliptic, or path of the sun, and also the paths of the moon and planets. It is at this time of year, in the evening, that the ecliptic rises most sharply from the western horizon and objects lying in this portion of its path can then be seen to the best advantage in the northern hemisphere.

The zodiacal light can not be seen in bright moonlight and even the brilliancy of the magnificent Venus now lying in its path may interfere somewhat with its visibility. It should be looked for shortly after sunset on a clear evening when the moon is absent. Starting near the horizon in the northwest with the constellation of Taurus, where we shall now find Venus to the east of the Hyades and ruddy Aldebaran, follow the course of the ecliptic in a southeasterly direction through Gemini with its twin stars Castor and Pollux, onward through the inconspicuous constellation of Cancer, The Crab, to the Sickle in Leo and the first-magnitude star Regulus now a little to the east of the meridian. We shall scarcely be able to trace the zodiacal light as far as this in our latitudes, even under excellent seeing conditions.

At its base, where it rests on the horizon, the zodiacal light is between twenty and thirty degrees wide, which is about the extent of the Big Dipper. From here it tapers gradually to a width of three or four degrees near the meridian. Under very favorable conditions, particularly in the tropics where the ecliptic runs up high toward the zenith, the zodiacal light has been traced as a very faint band entirely across the heavens. In its brighter portions it is a little more luminous than the Milky Way, but it gradually fades away into the dark sky. Exactly opposite to the sun there is a widening of this zodiacal band to form an oval patch ten or twenty degrees long and half as wide which is known as the *Gegenschein*, or counter-glow. This is so excessively faint, however, that very few have ever seen it in our latitudes. First discovered by Brorsen in 1854, it has been seen by a few keen-eyed observers, including the late Professor E. E. Barnard.

The zodiacal light is caused by the reflection of sunlight from numberless small particles of matter circling around the sun in the ecliptic, or plane of the earth's orbit, and chiefly between the orbit of the earth and the sun, though also to some extent beyond it. These particles may be mere meteoric dust. There is evidence that there is a large quantity of this dust in the solar system, left over possibly after the larger members of the solar system had been fashioned from the primitive solar nebula. More than likely, though, these particles are true star-dust that is continually being expelled from

the surface of the sun itself under the action of light or radiation pressure, similar to the particles of which the solar corona consists.

The *Gegenschein*, or counter-glow, is believed to be due to light reflected from clouds of such particles lying at a distance of nearly one million miles from the earth and beyond the apex of its shadow where there is a tendency for matter to circulate in a sort of whirlpool under the action of the rival attractions of earth the sun, which are nearly equal at this distance. Though it is very unlikely that any one in our latitudes will be able to discover this counter-glow, there may be a number of persons who will be successful in their efforts to make out the faint, hazy glow of the zodiacal light.—*Isabel M. Lewis.*

THE RAINFALL IN NORTH DAKOTA

Science Service

A DEFINITE forecast of normal or more than normal rainfall in the state of North Dakota this spring and during the springs of the succeeding four years, was made by F. G. Tingley, meteorologist, of the U. S. Weather Bureau, in an address before the American Meteorological Society in Washington on April 29. The forecast incidentally means a probability of more than an average yield of wheat during the same period, for it has been shown that adequate rain during April, May and June is the leading factor in the yield of wheat.

The forecast is based upon a series of observations of temperatures in Indiana during the month of March which, taken in groups of five years, have a definite relation to rainfall in North Dakota, four years later. When there is an increase of temperature in Indiana there is a corresponding increase in rainfall in North Dakota. If it is cool in Indiana in March, North Dakota goes dry. Mr. Tingley states this similarity has now existed for many years and is believed to be dependable as a basis of long-range precipitation forecasts for North Dakota and probably for adjacent states. It has not yet been determined just how large a region is affected by the relationship.

In the group of five years ending with 1920, the March temperature in Indiana was higher than in the group ending with 1919. It is therefore expected that the precipitation in North Dakota in the months of April, May and June for the five-year period ending with 1924 will be greater than for the one ending with 1923. Interpreted numerically this means normal precipitation in North Dakota this year.

The relationship has more than ordinary significance on account of the fact that there is a very close connection between the amount of precipitation in North Dakota in the months named and the yield of wheat in that state. Thus a forecast of precipitation is in a measure a forecast of wheat production, acreage considered. In the present difficult agricultural situation,

when control of production is being seriously considered, long-range weather forecasting becomes increasingly important. It offers the only clue to production far enough in advance to enable the acreage to be determined.

The physical basis of the relationship, or correlation as it is known meteorologically, is thought by some to lie in the slow movement of warm and cold masses of ocean water, such as the Gulf Stream and Labrador Current, which are held to affect the development of the weather of different regions. Others incline to the theory of weather cycles, or periodicities, due to unknown influentes, or possibly to solar changes of one sort or another.

A correlation similar to the one described is found in the southern hemisphere between the temperature at the South Orkneys and rainfall in Argentina between three and four years later. The South Orkneys are a group of islands lying in the cold water current flowing eastward past Cape Horn and temperature there is affected by ice conditions in the Antarctic. This correlation tends to support the ocean temperature theory.

THE ELIMINATION OF THE UNFIT BY ALCOHOL

Science Service

ALCOHOL probably eliminates the unfit, and races addicted to its use outstrip the teetotalers, declares Dr. Charles R. Stockard, professor of anatomy in the Cornell Medical School of the Cornell University Medical College, in a striking article appearing in the April issue of the *American Journal of Medical Sciences*. His conclusions are based upon experiments in his own laboratory and upon a consideration of available evidence. According to Dr. Stockard alcohol protects the race by killing off many of the weak members before birth.

These experiments were made on guinea-pigs, which were treated with the fumes of alcohol to the point of intoxication six days per week for periods as long as six years. Some of the animals lived to become more than seven years old—the longest life span recorded for a guinea-pig, so far as was known to Dr. Stockard. His conclusion is that the daily inhalation of alcohol fumes does not injure the health or activities, or materially shorten the life of the treated guinea-pigs.

Definite injurious effects were discovered, however, in the offspring and later descendants of these guinea-pigs. They were studied by mating normal mothers alternately with normal and alcoholic males, and by mating normal males alternately with normal and alcoholic females. Normal males were mated 81 times with normal females and 81 times with alcoholic. The 196 young born from the normal combination showed a mortality during the first three months of less than 23 per cent. and none of the offspring was defective. Of the 185 young sired by the same fathers with alcoholic mothers, only 56.6 per cent. lived to reach maturity. The mortality was double that of the young from normal mothers. Almost 6 per cent. of these offspring were structurally defective, while none from the normal combination showed any such defects.

The effects were still more striking in the case of normal females mated alternately with normal males and alcoholic males. The same normal mothers produced all the offspring. Out of 77 normal matings, there were 195 young and only three failures to conceive. Out of 81 matings of the same females with alcoholic males, there were 182 young, but over 12 per cent. of the matings failed to result in conception. There was a mortality of 17.4 per cent. among the offspring of the normal, with 35.1 per cent. mortality among the offspring of the alcoholic. Nine of the offspring from alcoholic fathers were defective as compared with none from the normal.

The mortality among the alcoholic progeny was twice as frequent before birth as after. This means that the alcoholic tendency kills off the weak germ cells before birth. Carrying the interpretation further, it is Dr. Stockard's belief that alcohol acts as a selective agent to bring out a group of unusually strong specimens with superior vitality.

Against the argument which might be made that alcohol would injure not only the weak cells, but also the strong cells, Dr. Stockard says that human blood will not tolerate enough alcohol to injure the strong germ cells as well as the weak. No human beings would lead such alcoholic existences as were led by the guinea-pigs on which he experimented.

He concludes: "It is highly improbable that human beings have ever injured or eliminated their normal resistance germ cells with alcohol. Alcohol probably has eliminated some of the bad. Those nations of men that have used the strongest alcohol beverages through many generations, have now, from a standpoint of performance and modern accomplishments, outstripped the other nations with less alcoholism in their history."

THE PROBLEM OF THE AMERICAN INDIAN

Science Service

SEVENTY to eighty millions of people of the two Americas are still living several centuries in the past and eking out a primitive and defective existence despite the fact that their ancestors, lords of the western hemisphere before the advent of the white man, raised great cities and established cultures of great artistic and architectural accomplishment.

Dr. Manuel Gamio, director of anthropology for the Mexican government, who has just lectured at Washington as a guest of the Carnegie Institution of Washington at a conference of anthropologists, archeologists and ethnologists, pointed out these facts and declared that one of the most urgent problems before American governments was the arousing of the latent energies and possibilities of the Indian and other indigenous inhabitants, particularly in Mexico and other Central American countries. In Mexico alone, he said, there are eight to ten millions of such people, in Guatemala one million, and in this country about 300,000.

Speaking of the descendants of Aztecs, Maya and other races in Mexico, Dr. Gamio said:

When this mass of automatons recovers the dynamics

which it had in the past and acquires the efficiency which characterizes modern action, then it will develop and make effective use of the almost virgin resources of the country.

Through the use of anthropological methods, steps are being taken by the Mexican government to build up the material and intellectual well-being of its people. Mexico was the first government to create a department of anthropology and it has carried out extensive and successful experiments in establishing the economic independence and education of the inhabitants in the Valley of Teotihuacan, only about twenty-five miles from Mexico City. Workshops for utilizing the resources of the region and schools for developing the intelligence and art of the Indian inhabitants are now located on the site of one of the most ancient civilizations of Mexico. An extension of the practical application of anthropological studies is contemplated by the Mexican government.

Dr. Gamio pointed out that no government can be logical and efficient in its action if it does not take into account anthropological factors. On the American continent and above all in these countries, the larger percentage of whose populations is of the Indian race, the truth of this assertion has been proved by history. The abnormal way in which these countries have evolved is due to the fact that the governments have ignored anthropological problems, such, for instance, as the creation of the mestizo type, the struggles between fusing civilizations, the substitutions of languages and the anthropogeographic conditions.

As to the United States he said that while there has been more anthropological work done than in Mexico, if one compares the bulk of the work of scientific character, nevertheless anthropology has not been applied very generally to procure social betterment. If it had been, he added, the 300,000 Indians of the territories would have been incorporated into modern civilization by a skillful and harmonious blending of both cultures.

AIR-DRIVEN BOATS AND EXPRESS TRAINS

Science Service

A NEW type of water craft drawing practically no water is being developed here for service on tropical streams in the French colonies hitherto unnavigable on account of shallowness, shifting sandbars or underwater vegetation. A boat that floats in six inches of water has also been announced from Lahore, India, where it is in daily use.

Hydroglissia is the name given to flat-bottom boats driven over the surface of the water by an aeroplane engine and propeller. In various races held at Monaco and on the Seine near Paris, the speed of express trains has been consistently equalled. The world's record is held by M. Besson, whose hydroglissia officially made 74 miles an hour. His unofficial record for a later trial is 95 miles an hour.

The hydroglissia on the Sutlej River, India, is used for communication purposes. Its flat-bottom construction enables it to pass over sand-banks only a few inches submerged. In motion it rises to the surface. The keel of

the boat is divided into two halves by a step of nine inches, this being an improvement on the French designs.

When the 90 horse-power engine is started, the boat moves forward compressing the water under its bow causing the first "step" to rise to the surface. The water then swirls under the nine-inch step and another wave is caused lifting the rear. As the speed is increased, the boat rises increasingly out of the water.

It is said that a speed of 35 miles an hour has been obtained with this craft carrying seven persons. The advantage of these boats in India is that at a high speed they can pass over submerged sandbanks which have always been found most difficult to locate by navigators of Indian rivers.

Hydroglissia are being prepared for service in French Africa and Indo-China. One type already built carries 20 tons of freight. Another type with two aeroplane propellers and two motors can run steadily at 45 to 50 miles an hour with a load.

ITEMS

Science Service

NEW studies of rickets and of the convulsive disorders called tetany have shown that benefit follows the giving of calcium with thyroid extract and the use of ultraviolet light. Physicians have treated hay fever and asthma for some years by giving preparations of calcium because good results followed in many instances. In a report to the American Medical Association, Drs. F. J. Novak and A. R. Hollender, of Chicago, report the results of studies made on patients with hay fever and asthma who were treated by a combination of these modern methods. When the blood of such patients was found to be abnormally low in calcium they administered preparations of calcium combined with thyroid extract and found that the patients had the usual temporary relief. These patients were then exposed to the mercury vapor quartz light which appeared to fix permanently the calcium content of the blood. The investigations are recent and further experience will show whether or not they have practical and enduring results.

WORK has begun on the Moffat tunnel through the Continental Divide about 50 miles west of Denver. The tunnel will require nearly four years to complete and will be one of the longest in the world, its total length being 32,150 feet, or 470 feet more than six miles. It will, with its connections, shorten the distance between Denver and Salt Lake by 55 miles, and open up a large area of good agricultural land now many miles from a railroad. A feature of the construction is that intermediate headings are to be driven from a pilot tunnel or parallel heading which may subsequently be used as an aqueduct. The tunnel is being built by public funds, raised by taxation of a Tunnel Improvement District, created by law for that purpose. No grade in the tunnel nor on its approaches will exceed two per cent., and the maximum elevation at the highest point will be 9,242 feet as compared with more than 11,000 feet on a neighboring railway line over the divide.