

## SCIENCE NEWS

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## THE PLANET MERCURY

THE planet Mercury, nearest to the sun of all the members of the solar system, turns once on its axis in eighty-eight days, the same time that it takes to travel once in its orbit around the sun. The result is that it always keeps the same face to the sun, just as the moon always keeps the same part of its surface towards the earth. E. M. Antoniadi, famed planetary observer of the Meudon Observatory, told a Science Service representative of his latest observations, which indicate these facts and confirm the views of Schiaparelli, an Italian astronomer. M. Antoniadi has made his planetary observations with the great 33-inch refracting telescope of the Meudon Observatory. This instrument is the world's third largest, and the largest outside the United States.

In a series of observations during the past summer, most of them made in broad daylight, while Mercury was high in the sky, and not down near the horizon, as it is ordinarily seen with the unaided eye, M. Antoniadi has seen markings on the planet which were previously unnoticed. From these he has detected the period of rotation, or the planet's "day," which turns out to be the same as its "year." As a result of another motion which the astronomer calls libration, however, more than half of the planet's surface is exposed to the sun's rays at one time or another. However, despite the libration, there is a little over three eighths of the surface which is never exposed to the sun's rays, but is perpetually in night. At the sun is on the average only thirty-six million miles from Mercury, as compared with ninety-three million miles from the earth, the part of the opposite side where the sun is almost always directly overhead must be exceedingly hot.

While Mercury is so small that it is generally supposed that it can have no atmosphere, M. Antoniadi thinks it possible that some sort of a veil, perhaps volcanic smoke, may at times cover large areas of the planet. The markings which he has observed, he states, are usually very faint, but sometimes they are remarkably clear, an effect which he attributes to the presence or absence of obscuring matter on Mercury itself. The color of the planet, he says, is yellow orange with a tinge of copper, while the dark areas are gray, like the "seas" or dark areas of the moon.

Somewhat similar is the behavior of the third satellite of Jupiter, one of the four moons of that planet which Galileo discovered in 1610. Last year Professor Joel Stebbins, of the University of Wisconsin, announced results of his studies which showed the brightness of this moon to vary just as often as it revolved around its parent planet. This was attributed to the fact that one side of the moon is brighter than the other and that it always keeps the same face to Jupiter. By means of spots which he has observed on the satellite, M. Antoniadi has confirmed Professor Stebbins's conclusions by direct observation.

As the earth, with its astronomers, is entirely outside the Jupiter system of moons, from our point of vantage all sides of the satellite may be seen. It is especially interesting, says M. Antoniadi, that the principal spot on Moon No. 3 which he has observed is one that Jovian astronomers, if there were any, could never see, just as we can never see the opposite side of our single moon.

## THE VELOCITY OF LIGHT

M. E. J. GHEURY DE BRAY writing in *L'Astronomie*, the official journal of the Astronomical Society of France, ventures the daring speculation that the velocity of light is decreasing at such a rate that each year it darts through space about four kilometers a second slower than it did a twelvemonth earlier. He cites in support of his claim the results of determinations of the velocity of light during a period of over three quarters of a century, of which only one, made in 1855 with apparatus which may have been faulty, is really notably out of step.

The velocity of light is usually stated as 186,000 miles, or 300,000 kilometers, per second, which is fast enough to take it seven times around the earth while the clock ticks once. But for exact work in astronomy, physics and other sciences, determinations to fill out the three blank ciphers usually ignored in ordinary statement are desired, and these have been made a number of times. The most recent research was that of Dr. A. A. Michelson, of the University of Chicago, in 1926, which set the figure at 299,796 kilometers a second. This, according to M. de Bray, is the lowest velocity ever observed, but the new determination, on which Dr. Michelson is working now, should turn out even lower.

The series of determinations, in order to their dates, are given by M. de Bray as follows, the figures indicating velocity in kilometers per second

1849 .....	313,300
1855 .....	298,000
1855 .....	305,650
1871 .....	300,400
1885 .....	299,940
1902 .....	299,895
1906 .....	299,880
1924 .....	299,802
1926 .....	299,796

The differences between these determinations are insignificant from the practical point of view, but if the present claims receive support from subsequent determinations, the accepted ideas in theoretical physics, especially those on which relativity is based, are in for a revolutionary upsetting.

## A COLOR TEST FOR TOXINS

A COLOR test for diphtheria and tetanus toxins has been discovered by Drs. Lucy Mishulow and Charles Krumwiede, of the New York City Health Department.

Up to the present time the standardization of toxins, which play such an important part in modern therapeutics, has been based on a system by which the strength of a batch of toxin could only be determined by trying it out on laboratory animals. This procedure involves inoculation of many guinea pigs, endless calculations and observations and the keeping of innumerable records. Animal tests give satisfactory results but chemical tests, when possible, are much more rapid and exact.

In the process of trying out different reagents to detoxify diphtheria toxin Drs. Mishulow and Krumwiede found that the chemical compound gold chloride gave an interesting color reaction when mixed with the toxin. The investigators then proceeded to determine if a quantitative relationship existed between the strength of the toxin and the color produced. Their results indicate that such is the case. By means of the color tests they have been able to estimate the strength of the toxins and have found that this estimation checks approximately with the toxin value obtained by animal tests. If subsequent research bears out these results another great discovery will have been added to the credit of modern medicine.

#### TEMPERATURE IN RELATION TO TOXIC SHOCK

THAT the varying resistance put up by men and animals to toxic shock by bacterial poisons and other foreign substances introduced into the blood may be due to the temperature of their surroundings is indicated by the studies of Professor E. Friedberger, director of the Research Institute for Hygiene and Immunity in Berlin.

Dr. Friedberger made parallel tests of the toxic effect known to scientists as protein anaphylaxis, using in one series animals kept in unheated cages at from 38 to 42 degrees Fahrenheit, while in a second series the temperatures were those of an ordinarily comfortable living room. He found that the animals kept in the cold held out against doses of the poison 150 times as great as the quantity needed to kill their companions that had lived in the warmth.

No difference of any importance was observable in the body temperatures of the two sets of animals, but the outdoors set of course had to keep themselves warm by more rapid internal oxidation processes; and this may have made for more rapid elimination of the poison.

Professor Friedberger calls attention to the practice followed by some physicians, of keeping patients afflicted with infectious diseases, as well as soldiers with dangerous wounds, in unheated booths or stalls exposed to the outer air, rather than in well-warmed hospital wards. This practice has been wholly empirical, but these experiments may be the foundation of a rationale for such a procedure.

#### ARTIFICIALLY RIPENED FRUIT

THE food value of the tomato, ripened by the application of ethylene gas rather than through natural agencies, is under question by the American Medical Association.

During the last three or four years the use of ethylene gas to ripen fruits and vegetables after they have been

picked has increased by leaps and bounds. A single dose of ethylene, according to one investigator, consisting of about two or three cubic feet at a cost of 40 cents to the carload of fruit, is sufficient to produce a remarkable change in the time necessary to ripen bananas and to change their color, flavor and texture. It has become the custom to bring green lemons and oranges to a ripe tint by exposure to ethylene. The ethylene treatment of celery is reported to have increased the sugar content from 20 to 30 per cent., while tomatoes subjected to this method are said to have a fine flavor and color.

The chemistry of this reaction is not at the present time well understood. It has been suggested that the presence of the ethylene acts as a catalyst in the conversion of starch to sugar, but this contention has been disputed by some investigators. The American Medical Association points out that while this development is of vast importance commercially, the health phases of the subject have as yet received little attention.

Certain fruits and vegetables are recommended by physicians largely because of their vitamin content; whether or not this is altered by ethylene has not been determined. Possibly, also, the fruits and vegetables may be picked earlier than has been the practice, thus shortening the period of irradiation by the sun. Physicians may well watch the development of this form of food enterprise; perhaps the time may come when certain every-day foodstuffs will be purchased on the basis of vitamin units. In the meanwhile, the use of vitamin-containing products in as near a "naturally ripened" condition as possible should be encouraged when used for prophylaxis against vitamin deficiency.

#### THE FERTILIZATION OF WHEAT

FORCIBLE feeding methods applied to plants promise to improve the quality of wheat, and incidentally to improve the price the farmer gets from the miller.

An exhibit of the results of applying nitrate fertilizer to wheat fields, not at the conventional time just before sowing but much later in the season when the grains are well into their formative period, were shown at the Chemical Exposition in New York.

The method was worked out by Dr. Jehiel Davidson, of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture. He applied 100 pounds of sodium nitrate per acre to wheat land when the crop was in the early stages of ripening. When the grain was harvested it was found that the protein content had been increased by 27 per cent. or more over that in grain from similar but untreated fields.

Since a large proportion of this protein increase is in the form of gluten, the stuff that makes flour sticky and suitable for bread-making, millers are often willing to pay a premium amounting to about 30 cents on the bushel for this grade of wheat. At twenty bushels to the acre, this premium amounts to \$6 per acre. The cost of the fertilizer averages \$3 per acre, and the net profit to the farmer for adopting this new system of later fertilizer application therefore amounts to about \$3 per acre.

Ordinary wheat naturally high in protein is generally

shrunk, which detracts from its value, while the wheat obtained by the method described above is just as plump as normal wheat. Baking tests carried out by Dr. Davidson together with J. H. Shollenberger, of the Bureau of Agricultural Economics, have shown that the high protein wheat obtained in the new way yields bread of superior qualities. It is thought not unlikely that the housewife may be willing to pay a premium on flour yielding a better bread.

### THE ORNITHOLOGICAL STATION IN HELIGOLAND

Concentration of bird airways during the spring and fall migration season has turned the island of Heligoland, before the war Germany's strongest fortification, into an important ornithological station.

On the higher part of the island is located a bird house and a small fenced-in area which is planted with bushes, trees and undergrowth. As this spot has practically the only verdure found on the rocky island, the migrating birds are attracted to it and caught by means of two large weirs which are located here and effectually hidden by the undergrowth. Food and decoy birds help attract the migrants. Some of the rarer species are kept in the bird house for the purpose of observation or exhibition.

From time to time during migration an airplane has been used to observe the flights, and, in order to facilitate the recovery of small banded birds, the station has for some time followed the practice of coloring the feathers of these captives with a green, red or blue preparation. This experiment has been successful as many such colored individuals have been recaptured.

The majority of migrating birds pass over the island at night, and as many as twenty or thirty kinds have been frequently noted. On one occasion the director noted fifty kinds in one night. These birds concentrate on the lighthouse on dark nights. Attracted by the brilliant light, they circle around it and settle upon the ground to rest, when they can be captured.

In order to prevent birds from being stunned or killed by dashing against the light a system of external reflectors has been placed on the lighthouse tower, so that most of the birds detect it in time and avoid the danger.

Since May 30, 1909, the bird protection law of the Reich has been in force on the island; by it a number of specified birds were protected, but only during specified months. Since April, 1926, the provisions of the Prussian bird protection law have been made applicable to Heligoland. A number of birds are protected all the year round and many more during the breeding season.

### ITEMS

THE inauguration of autumn was an early evening event this year, according to the U. S. Naval Observatory, which determines and broadcasts the nation's official time. The exact moment at which the sun crossed the equator has been determined at 8:17 P. M., Eastern Standard Time, on Friday, September 23. At this time, day and night were of equal length all over the world; thereafter and until the winter solstice, when the sun reaches its

farthest south and starts northward again, the daylight hours in the northern hemisphere become progressively shorter, while in the southern hemisphere they become correspondingly longer.

EXPERIMENTS in immunization against pneumonia by the feeding of acid-killed pneumonia germs are being watched with interest by the New York City Department of Health, according to Dr. William H. Park, director of the Bureau of Laboratories. Although the health department is taking no part in the experiments it is following carefully the work being done by Dr. Victor Ross, of Bloomfield, N. J. With rats for the subjects the experiments have proved successful. The rats were fed pneumonia germs which had been killed by hydrochloric acid. They reacted by building up a resistance to the dead germs which, it was found, was sufficient to immunize them against injections of living pneumonia germs. Because of the success with the rats the experiments will be carried a step nearer the human race and will next be made on monkeys.

FIVE years ago the Commonwealth Fund undertook to subsidize, in the small city of Fargo, North Dakota, a complete public health demonstration with special attention to the health of mothers and children. Since January, 1923, a staff employed by the fund has assisted local authorities to develop and coordinate the work of the health commissioner, the public schools, the Red Cross, the tuberculosis association, local physicians and dentists, in order to safeguard child health from birth through the school years. Fargo has now decided that health pays, for it has voted to carry on all the essentials of the health program and finance it out of local funds at an estimated cost of \$1.40 per capita instead of the 88 cents per capita expended in 1922. Produce dealers report that the city eats ten times as much spinach as it used to before the schools started to instigate propaganda for the food value of greens.

DURING recent tests made in Berlin by Dr. Victor Mendel, animals and birds showed a rather surprising lack of response to moving pictures. The pictures were especially selected for each animal and animal group, and the experiments were made in an exhibition room especially adapted to the purpose. The response of dogs was practically nil. Only a little mongrel of doubtful origin evinced a momentary interest by sniffing at the human figures on the screen. The experiments with cats were much more favorable. Of five subjects three responded actively, showing fight upon the appearance of a big dog on the screen. Experiments with birds were rather negative. Geese and ducks, chickens and pigeons paid some attention, while owls showed great interest. Small birds and barnyard fowl showed anxiety when a hawk appeared in their line of vision. A squirrel displayed interest when a weasel made its appearance on the screen, but reptiles and fish were, as might have been expected, quite indifferent.