

## SCIENCE NEWS

*Science Service, Washington, D. C.*

## THE SOLAR ECLIPSE

THAT the various expeditions of astronomers from the United States to Sumatra to observe the eclipse of January 14 were generally successful is indicated by reports received at Washington from the different institutions represented.

In a special cable to *Science Service*, Dr. John A. Miller, leader of the Swarthmore College Eclipse Expedition at Benkoelen, Sumatra, reported:

"We observed the eclipse of the sun this afternoon through a sky thinly clouded. We believe, however, that our plates are not seriously affected, except possibly those made with the Einstein camera to test the deflection of star light near the sun. The corona was of the type usually associated with maximum sun-spot activity and some very large prominences were visible."

Captain F. B. Littell, in charge of the party from the U. S. Naval Observatory, has sent word that the sky was partly clear at Telbinge-Tinggi. Dr. Harlan T. Stetson, of Harvard University, has reported to the Harvard Observatory that his observations were made through thin clouds but were partially successful. The Harvard party, including also Dr. W. W. Coblentz, of the U. S. Bureau of Standards, made observations on the west coast of Sumatra, not far from the Swarthmore College expedition, at Benkoelen. Months of study of the observations and photographs made will be necessary before definite results of the expeditions can be announced, however.

The regular round shape of the sun's corona as observed at this eclipse is, according to Dr. Louis A. Bauer, director of the department of terrestrial magnetism of the Carnegie Institution of Washington, what was to be expected because of the great number of spots that have appeared recently on the face of the sun. Between eclipses the shape of the corona can not be determined because the filmy pearly radiance haloing the sun can be seen from earth only during the time of total eclipse.

The number of spots visible on the sun at any one time varies in a period of about eleven years and the minimum of the present cycle occurred in 1922. However, the great activity of the sun in the last few months, as shown by the number of spots, indicates, according to Dr. Bauer, that the maximum will occur either this year or next, an unusually short time having elapsed between minimum and maximum. One very large spot which moved across the face of the sun and disappeared at the end of December with the solar rotation would have been on the edge if it had survived. This might well have caused the large prominences or red flames of hydrogen reported by Dr. Miller.

The astronomers will soon start home on their long journey. Dr. Miller and his party will sail from Singapore on January 28.

## PREDICTION OF THE ERUPTION OF MOUNT VESUVIUS

THE recently reported activity of Mount Vesuvius, which may be only the prelude to a really important erup-

tion, was prophesied several months ago by Dr. A. Malladra, noted Italian volcanologist, according to Dr. Henry S. Washington, of the geophysical laboratory of the Carnegie Institution of Washington.

"I was in Rome last summer when a report of a Vesuvius eruption excited the city," said Dr. Washington. "I wired to Dr. Malladra, who said that it was only a rumor, as such reports frequently are, but invited me to come down to Naples and go out for a look at the mountain anyhow."

"He showed me a place on the side of the volcano where, in his opinion, the next outbreak was due to come; and from what I can tell from reports that have reached me the new lava flows seem to be breaking out at this spot."

Vesuvius is no stranger to Dr. Washington. He has visited it every year or two for a long period, and took part in a special study of its last great eruption, which took place in 1906.

"Though this eruption is not to be compared with the cataclysm of 79 A. D., which wiped out Pompeii and Herculaneum," Dr. Washington stated, "it was really very severe. One or two hundred feet of the summit was blown off, and the crater was considerably widened. After the eruption the new crater had a depth of about 1,200 feet, with very steep sides."

"Since that time it has been slowly filling up again, and a small cone, two or three hundred feet high, has been building. Last fall the lava level was up to within one hundred feet of the lowest point in the rim."

"Vesuvius, however, seldom sends lava flows over the rim of the crater; they usually break out on the sides of the mountain, accompanied with the eruption of vast clouds of smoke and ashes. The production of lava from Vesuvius is much smaller, proportionately, than that from Etna. Etna, of course, is a greater mountain, being 12,000 feet high as against the 4,000 feet of Vesuvius; and its lava is much more copious and also more fluid than that of the smaller volcano."

Dr. Washington scouted the idea that the volcanic activities in Alaska had anything to do with those in Italy. "Not only are these two widely separated regions quite independent of each other so far as their volcanoes go," he said, "but even in Italy the earthquakes that have been shaking Tuscany have nothing to do with the eruption of Vesuvius. The earthquakes of northern Italy are normal earthquakes, caused by the slipping of faults, or blocks in the crust of the earth, just as the Montana and Santa Barbara quakes were caused. Volcano tremors are local affairs, and are rarely felt even at moderate distances."

## THE CLIMATE OF SOUTH AFRICA

"RAINFALL over the whole of the central portion of the Union of South Africa is steadily decreasing year by year, and if this goes on at the present rate, the time will come when vast areas now supporting a farming and grazing population will be given over to the wild beasts

of the desert. This process can, however, be checked. Its causes are known; and, being known, can be remedied."

This startling statement is not that of a sensational journalist in search of a thrilling story, but the considered judgment of a scientist, Professor Schwartz, of the University of Stellenbosch.

Put in a nutshell, the reason for this gradual decrease in rainfall is the drying up of the big tract known as the Kalahari, 400 miles from the Orange River in the south to Lake M'gami in the north.

Up to comparatively recently, this area was traversed by a whole system of rivers dotted with several lakes. This water system connected Lake M'gami with the Orange River. But the lake which acted as feeding reservoir for this system is drying up owing to the silting up of the streams that fed it from the north. What water it still gets and holds has been diverted by some mysterious play of nature and now, instead of flowing towards the south directly, flows eastward into the Zambesi and westward into the Kunene and Okarango rivers.

So far has this process gone that, of recent years, the term "desert" has come to be generally applied to the Kalahari, although the word is a misnomer. The area is not by any means waste land yet; it is a vast undulating plain, partly covered with forest and partly with rich long grass whenever there is the slightest rainfall. It borders on one of the best cattle-raising districts in South Africa, Bechuanaland. The forests are, however, fast dying; there is ample underground water supply which may be tapped by artesian wells, but the water lies too deep to affect the roots of the trees. For mile after mile, one may see wilted and withered remains of what once were luxuriant growths.

To remedy this state of affairs, three schemes have been proposed, and the time is fast approaching when the Union Government will have to make its choice between them.

The first is a vast system of irrigation of the Kalahari, feeding the canals out of artesian wells. This would, however, require the presence in the area of a considerable population of settlers of which there is so far no sign. The initial expense would, moreover, be prohibitive.

The second scheme consists in the building of dams across the Okarango River and one of the tributaries of the Zambesi, the Chobe River. This would retain masses of water in M'gami lake and, while blocking its present ways of outflow, force the surplus water into the old, dried up channels passing through the Kalahari. There is little likelihood of this project being adopted on the score of expense, which would be enormous.

There remains the third scheme, which, in default of the more ambitious ones, stands the best chance of being adopted, and is backed by Professor Schwartz and other South African scientists. It provides for the construction of a dam across the Kunene River, which, it is calculated, would restore a great part of the old scheme of nature for the irrigation of the Kalahari.

Owing to the fact that labor, machinery, and to a certain extent, materials, would have to be brought to the spot from very great distances over difficult country lacking proper means of communication, the expenditure of

money and time is likely to be very considerable, but the importance of the issues at stake is believed to justify it. Not only would the reclaimed area of Kalahari open up a vast stretch of magnificent grazing land, forest and valleys suitable for orange growing, but the process of drying up that is threatening central South Africa with eventual economic and social ruin would be arrested.

## COAL COMPOSITION AS AN INDICATION OF OIL AND GAS ACCUMULATION

THE possibility of striking oil and gas in any locality is indicated by the composition of the coal found in that region, according to studies of Illinois coals by G. F. Moulton, of the Illinois Geological Survey. The ratio of the fixed carbon to the total combustible matter, as determined by analysis of the coal, affords the petroleum prospector a scientific index to the probable presence and the depth of oil and gas accumulations in underlying strata.

The report issued by the survey shows that in areas of high carbon ratios the lowest stratum with possibilities of oil production is shallow and limited to the later Paleozoic rocks, while in areas of low carbon ratios the lowest stratum with such possibilities lies deeper and includes the older Paleozoic formations as well as those of later origin. The coals mined in Illinois were found to have a fixed carbon content varying from 49 to 63 per cent. of the total combustible matter, while most of the oil production is from areas with carbon ratios lying between 54 and 57 per cent.

The explanation of this relationship between the composition of the coal and the presence of petroleum is found in the metamorphic changes brought about by heat and pressure to which the deposits are subjected. Geologists have recognized for some time that the degree to which rocks have been metamorphosed is a factor affecting the accumulation of economically important pools of gas and oil.

Metamorphism causes chemical and physical changes in the material from which the oil is derived and probably brings about the transformation. It enhances the circulation of fluids through the rock strata, thereby promoting the accumulation of deposits of economic importance. It alters the nature of the reservoir-rock, sometimes making it unsuitable for efficient retention of oil. Finally, it changes the character of the oil after its formation and, if carried to the extreme, scatters any accumulation and destroys its value.

The same conditions of heat and pressure which thus affect the accumulation of oil change the composition of the coal, and these changes, as expressed by the carbon ratio, were found to be closely related to the oil possibilities. The study of the petroleum-producing regions of Illinois shows that in areas where the carbon ratios are above 60 per cent., the oil and gas possibilities are poor, while the lower the ratios the greater the probability of large accumulations.

## THE ECONOMIC WASTE OF HARD WATER

THAT hardness of water causes a great economic waste is shown by investigations of Dr. Arthur M. Buswell,

chief of the State Water Survey of Illinois, and his staff of assistants who are trying to find a cheap, harmless, efficient means of softening water.

According to their investigations, the average town of 40,000 inhabitants in Illinois wastes a ton of soap daily because of the hardness of the water. Besides this waste of soap, the loss of heat because of boiler scale is enormous.

One sixteenth of an inch of boiler scale decreases fuel efficiency ten per cent. This would be great enough, but the boiler scale in Illinois is usually from four to eight times that amount, or from one fourth to one half an inch, thereby decreasing the fuel efficiency forty or eighty per cent.

This efficiency of fuel is comparable to the lowering of the boiling point of water by increasing the altitude. In Mexico City, where the elevation is 7,000 feet, the boiling point is 93.3 degrees Centigrade. This means that water at an elevation of 7,000 feet boils at a temperature that is 6.7 degrees below the normal boiling point of water at sea level, which is 100 degrees, or, in other words, that it is 93.3 per cent. efficient. The per cent. of loss of efficiency is therefore 6.7. This is in noteworthy contrast with the forty to eighty per cent. decrease in fuel efficiency caused by the hardness of the water in Illinois as noted above.

Fortunately, there are few states confronted with the problem of extremely hard water. Comparing Illinois with Massachusetts, we find that 300 to 600 parts per million contain mineral salts in Illinois, while in the latter there are few over 100 parts per million of mineral salts, and none of the water used for municipal supplies have more than 200 parts per million.

### CAMPAIGN AGAINST THE CORN BORER

EVERY known device is being used to head off the advance of the corn borer from its original point of invasion in Canada toward the great corn belt in the middle west. So far, man instead of his foe, the skinny little caterpillar addicted to corn stalk diet, seems to be succeeding.

According to R. C. Walton, of the Bureau of Entomology, the economic damage in this country is not yet serious in spite of the heavy losses in Canada. A strict quarantine making it impossible to ship anything but shelled corn from the infested areas of Maine, Rhode Island, New York, Pennsylvania, Michigan and Ohio is believed to be chiefly responsible for keeping down the spread.

A strenuous campaign is being carried on by state experiment stations to educate the farmers in the best methods of combatting the pest. The borer eats up through the stem and sometimes into the ear causing the whole plant to fall over and die. Through the winter it lives in the dead stalks and cobs. Consequently burning over the fields in the fall is strongly urged. Unfortunately, the labor problem where corn tracts of great acreage are involved is so acute that this method is not always practicable.

Scientists at the Department of Agriculture and at the experiment stations throughout the infested regions are

hard at work on the problem. Two wasp parasites have been introduced which lay their eggs on the borer. One causes paralysis and death at the initial sting while the young larvae of the other actually prey on the host caterpillar until it dies. These pests, artificially introduced to kill pests, Mr. Walton says, have been found in the field a year after their release, indicating their ability to survive in this climate when provided with proper corn borer diet. While it is too soon yet to tell how much they help, the entomologists have hopes that they will prove really effective aids.

### ITEMS

NEW researches by the Carnegie Institution of Washington into the buried records of the ancient Maya civilization of southern Mexico and Central America will begin at Chichen Itza, Yucatan, in about two weeks, and will continue until the rainy season puts an end to excavation operations in June or July. Dr. S. G. Morley, who is in charge of the work, is now in Mexico City, where he will deliver two lectures on the discoveries thus far made. In addition to the further work of Chichen Itza, a new program is to be started at Uaxactun, Guatemala, where Dr. Morley and Dr. Franz Blom made a beginning some years ago. A contract covering the conditions of the research at this place has been concluded with the government of Guatemala.

THE first comet of the year, as yet so faint that it can only be seen with the most powerful telescopes, has been discovered by Dr. Walter Baade, of the Hamburg Observatory at Bergedorf, Germany, according to Dr. Harlow Shapley, director of the Harvard College Observatory, who has just received word of its discovery from Europe. When Dr. Baade saw it on the morning of January 12, it was in the constellation of the Lizard, which can now be seen in the northeastern sky just before sunrise. It is moving in a southeasterly direction into the neighboring constellation of Pegasus. Expressed in the celestial equivalent of latitude and longitude, its position at the time of discovery was 22 hours 27 minutes 52 seconds in Right Ascension and 40 degrees 18 minutes north Declination. At that time it was of the fifteenth magnitude. "This comet was originally discovered by Mechain, of the Paris Observatory, in 1790," said Dr. Shapley. "Then it was lost, and was not rediscovered until 1858 when Horace Tuttle, at the Harvard Observatory, found it again. It returns about every thirteen and a half years, and has been seen at every return since Tuttle."

IMPURITIES in radio detector crystals improve their operation, according to Dr. Edgar T. Wherry, of the Bureau of Chemistry of the U. S. Department of Agriculture. As a result of his studies of 75 minerals, he believes that sensitive spots, which the "cat's whisker" must tickle, are due to peculiar arrangement of the atoms, in which the electrons exert a greater attraction in one direction than another. This permits the current to flow better in one direction, and enables the crystal to do its work.