SCIENCE NEWS

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SCIENTIFIC STUDY OF THE NORTH PACIFIC

CANADA and the United States from the east, Japan, China and Russia from the west, will meet in mid-Pacific in less than ten years with a well-rounded preliminary picture of the biology and physical oceanography of the northern section of that great ocean. This is the prophecy of Dr. T. Wayland Vaughan, director of the Scripps Institution of Oceanography, made after a survey of the programs of ocean science now embarked upon or contemplated by the powers bordering upon the North Pacific.

Currents, tides, winds, air and water temperature—all the complex phenomena that interact to make climate in air above, and what might be termed "water climate" in the aquatic element beneath, form one part of the program. The geology and geography of the solid land that forms the shores, and of the deep-drowned rocks that make up the ocean basins, jutting up here and there as islands or volcanoes, occupy another section. Then there are the multitudinous forms of life that swim as fishes and whales, or float as sea-jellies and protozoa, or cling and creep on the bottom, as well as the plant life, ranging from microscopic single cells to hundred-foot kelps, on which the animal life ultimately depends. A fascinating and challenging group of problems can be found where biology becomes geology, that is, in the formation of coral islands and reefs.

All these phases, and others besides, are actively under way in the North Pacific area, and it is here that the most rapid advances may be expected, according to Dr. Vaughan. Promising initial steps are being taken in the southwestern Pacific also. As yet little has been done in the southeastern section of the ocean, although some of the South American countries, notably Chile and Peru, have evinced interest and may eventually bring the scientific knowledge of their oceanic "spheres of influence" up to the level of that attained in regions where an earlier start has been made.

VOLCANIC ERUPTIONS IN HAWAII

HOW much lava a volcano can disgorge, even in short-lived eruptions, is indicated by calculations by Dr. Howard A. Powers, of the Hawaiian Volcano Observatory. A cubic box, one and a sixth miles on each side, would be required to hold the lava that has been left in the inner pit of the Halemaumau volcano in the three brief eruptions that have occurred since 1925. These figures have enabled the volcanologists to predict another eruption this fall.

In the period since 1925 a total of 8,692,000 cubic yards of solidified lava has been left in the pit, filling it to a depth of 210 feet. Actually, even more lava than this has been given out, but some of it sank back after the eruptions. For instance, the eruption of July 25 brought a total of 136,850,000 cubic feet of molten lava into the pit, but when it subsided, only 97,350,000 cubic feet of the solidified lava remained.

The previous eruptions in the period measured were in July, 1927, which left 85,430,000 cubic feet of lava, and in February, 1929, when 51,900,000 cubic feet additional remained.

From these data, Dr. Thomas A. Jaggar, director of the observatory, has formed the opinion that "the intensity of gas action and the freedom of flowing has increased in 1929, and at the same time the interval between outbreaks has decreased."

Dr. Jaggar has plotted a curve of the outbreaks, and this makes it appear that "the next inflow of lava should take place some time between now and November, 1929. This expectancy might be interfered with if Mauna Loa should erupt, but that would be an equally satisfactory demonstration that the Hawaiian lava column is alive."

RECORDING CALIFORNIA EARTHQUAKES

THE dots and dashes of radio transmission from an ordinary commercial station are now checking the times of southern California earthquakes. At the seismological laboratory of the California Institute of Technology, the code messages from the station are continually received and recorded by a flashing light on a revolving sheet of photographic paper. An accurate clock is recorded on the same sheet, so that the exact time of any dot or dash may be determined.

Scattered throughout southern California are a number of other seismograph stations, cooperating with the central station. At each of these is a similar automatic radio recorder, continually taking down the messages of the station. A clock, in which accuracy is not essential, records its ticks on the same sheet with the radio records. The same clock makes similar marks on the sheet on the seismograph drum, where the earthquakes are recorded.

In use, this permits the seismologist to tell the exact time at which the earthquake waves reach any station. For instance, suppose an earthquake record begins while the station is sending the word "ship." At Pasadena the record starts on the letter "s," while at Santa Barbara it begins on the letter "h." As the signals arrived at both stations simultaneously, the difference is due to the greater time it takes the wave to travel to Santa Barbara, and from the records of the standard clock at the central station this time may be precisely measured.

From the studies thus being made, it is planned to detect even the slightest tremblings of the earth in this region. From this it is hoped that enough may be learned of the dangers, so that proper precautions can be taken to prevent damage by earthquakes, or that a severe quake might be predicted sufficiently far in advance to prevent loss of life.

IDENTIFICATION OF PRECIOUS STONES BY SPECTROSCOPE

IDENTIFYING precious stones by means of the varied rainbow patterns they throw when examined under a

"micro-spectroscope" may supplant the time-honored acid tests now employed by gem dealers.

Dr. Edgar T. Wherry, of the U. S. Bureau of Chemistry and Soils, who has developed this unique test, will describe the phenomena revealed by the different stones in an article to be published soon in the *American Mineralogist*. In connection with the article he will present hitherto unpublished tables, giving the mathematical measurements of the color and absorption bands for red, blue and green stones.

The identification, Dr. Wherry explains, is made by means of the very interesting phenomena revealed by the spectroscope. Light thrown by the gem is broken up into its component parts of red, orange, yellow, green, blue and violet, the colors being arranged in the order of their wave-lengths as in the rainbow. The widths of the color bands vary according to the mineral substance, and the black absorption bands between the colors likewise vary, both in width and intensity.

A red stone, for example, might be glass, garnet, synthetic ruby or ruby, worth from ten cents to two hundred dollars. The spectroscope, inserted in the eyepiece of a microscope, quickly analyzes the light from the stone, arranging the color bands and black absorption bands in a pattern that reveals the true composition without possibility of error, because the patterns for no two gems are alike.

Dr. Wherry states that as far as clear, colored stones are concerned, such as rubies, sapphires and emeralds, the new test is far more certain than the old methods of subjecting the stones to acid or scratching them with minerals, which often injure the jewel. In a spectroscope test the stone does not even have to be removed from its setting and even a minute fragment can be identified.

MILK AS A SUBSTITUTE FOR LIVER

ATTEMPTS to increase the nutritional value of milk by the simple technique of giving cows and goats more copper salts in their food than they would normally have access to has failed to work.

The valuable factor in liver, which has become the up-to-date physician's most substantial prop in treating pernicious anemia, was recently found by Dr. E. B. Hart and a group of investigators at the University of Wisconsin to be copper rather than iron, as was first believed. Liver in the proportions necessary to produce curative effects becomes an exceedingly disagreeable medicine to many patients. Other foods, consequently, that supply the needed element are highly desirable.

Naturally the Wisconsin investigators turned their thoughts to various ways of increasing the copper content in other foods. Milk, which in earlier analyses showed from .38 to 1.4 milligrams of copper per liter, was found under carefully controlled conditions to have only .123 to .184 milligrams per liter, not sufficient to prevent rats, fed on a milk diet, from developing anemia. The earlier figures are believed to be the result of contamination with copper from metal vessels used during analysis.

Cows and goats fed on an experimental diet showed milk with the same proportion of copper as that found in the recent analyses. Increasing the copper content of their food even in considerable proportions, however, did not produce any increase in the amount of the element in their milk. So anemia patients can't look to milk for relief from liver.

CHLOROPHYLL AND PLANT GROWTH

PLANTS whose leaves contain the most chlorophyll are the most efficient at the business of making new plant tissue—which is, from the farmer's point of view, the chief end and object of plant existence.

Ever since pioneer plant physiologists found out what chlorophyll is, and learned that its function is to capture carbon dioxide out of the air and with the help of sunlight to combine it with water to make sugar, it has been taken for granted that the more chlorophyll a plant has per square inch of leaf surface the faster it can make new stems and leaves.

It has remained for Dr. H. B. Sprague and Dr. J. W. Shive, of the New Jersey Agricultural Experiment Station, to determine the relation accurately, using the exact analytical methods of the chemical laboratory. They have recently reported their results in detail to the American Society of Plant Physiologists.

They grew standardized breeds of corn under carefully controlled conditions. They supplied nutrient chemicals at a known rate. They measured the areas of leaves, extracted the chlorophyll and determined its quantity per square centimeter, and weighed their plants as they harvested them.

Correlating their data, they found that the strains with the most chlorophyll per unit area had produced the most cornstalk in a given time. They also found that the plants which produced the greatest spread of leaves were most efficient at the business of growth. A yellow pigment, carotin, which is found in leaves, bore a similar relation to the rate of new stalk and leaf production as did the chlorophyll.

TUNGSTEN CARBIDE

TUNGSTEN carbide, the hardest compound known to science, and for years a mere curiosity, has now begun to find extensive commercial use. With it, hard alloys, such as manganese steel and armor plate, can be machined in lathes, planers and shapers, says Dr. Samuel L. Hoyt, of the General Electric Co., in a report to the Engineering Foundation, soon to be published in *Research Narratives*.

One of the constituents of this remarkable substance is tungsten, the familiar metal of which the filaments of our electric lamps are made. Though years of research resulted in a process of making tungsten so soft that it could be drawn into fine wires, when combined with carbon it makes a substance second in hardness only to the diamond. Tungsten carbide will scratch a sapphire, which is the second hardest natural mineral.

At first, despite its hardness, tungsten carbide was too porous to stand the strain imposed upon a cutting tool. But researches of Dr. Hoyt and his associates have shown

how these difficulties can be overcome. In this form it it known commercially as "carboloy."

"In testing high-speed steel tools," said Dr. Hoyt, "it is customary to use a 'test log,' *i.e.*, a long, round bar of nickel-steel, making a cut in it at about 50 feet per minute. Because of the lack of effect on the carboloy cutter, however, it was necessary to increase the speed to 200 feet per minute. At this speed a high-speed steel cutter failed in 16 seconds, with its edge burned off. The tungsten carbide tool, under identical conditions, was run for an hour before the test was arbitrarily stopped, although the tool was still cutting and capable of continuing for a much longer time.

"Consequently, the carbide tool in many operations effects substantial savings of time and costly labor. In others it gets much better results. With it numerous operations are feasible which are not possible with any other known tool material. Nevertheless, the alloys of tungsten carbide have limitations. They will break down, for example, in work involving very heavy pressures on the tools. Carboloy is as yet on the market only to a limited extent, although it has been in practical use for the past three years. A great advance in the art of cutting metals appears to be in immediate prospect."

NATIONAL PARKS IN SOVIET RUSSIA

THROUGH the Institute for Natural Sciences, Soviet Russia has established nature reserves for safeguarding its wild life comparable to the national parks of America, according to reports received at Berlin recently.

After the chaos of the revolution, when many of the rare animals of Russia preserved on the hunting estates of the Czar and the nobility were destroyed, considerable effort is being expended to restore the sable, sea otter, wisent and other fast-disappearing game to some semblance of their former numbers.

Prominent among the reserves set aside for protection is a tract of land of approximately 1,097 square miles in the Caucasus where there flourished formerly a herd of wisent, an old-world cousin of the American bison, now thought to be extinct except for a few zoological park specimens. When the grand dukes held hunting reserves in this region there were about 700 of them. A scientific expedition, sent there recently, failed to find a trace of this herd. The ibex, of alphabet-block fame, still survives in this section, however.

A small park of about 55 square miles has been established at Ilmen, one of the most beautiful parts of the Urals, said to contain a natural collection of 150 different kinds of precious and semi-precious stones.

At Astrachan, in the Volga delta, is a bird preserve of 88 square miles. A somewhat smaller area in the Crimea has been made a preserve of moufflon and various kinds of deer. A rest station for migrating birds has been located in a marshy region midway between the Caspian Sea and the Arctic. Besides these there are many other small government reserves, notably the estates of the writers Tolstoi and Pushkin, and the island of Kondo in the White Sea set aside for the eider duck.

In spite of the national interest in parks, the game laws, promulgated in 1924, still leave much to be desired. Under this edict it is made more or less a public duty to kill the larger predatory animals such as leopards, lynxes and wolves. Some of the former are extremely rare and might well enjoy a closed season. The eagle and various other rare birds of prey have also been put in this category.

ITEMS

REPORTS received by the Forest Service indicate that a total of 653,000 acres of National Forest land has been destroyed by forest fires this year in the territory west of the Mississippi. The cost to the government for emergency fire fighting measures has amounted to $2,100,000 in the short time from July 1 to September 10. That means that more than $20 is being spent every minute in the defense fund. The only possibility of putting out the raging flames lies in the very faint chance of rain. Weather Bureau experts do not believe that there is much likelihood that rain will come in the near future over western Washington and Oregon where the fires are the worst. The present forecast is for an increase of wind, without rain, which condition would only aggravate the present unfavorable weather state.

THE green patina that appears on copper roofs or drainpipes after years of service and that gives the metal its attractive appearance is due chiefly to sulphuric acid present in the air from coal smoke. This conclusion was announced at the meeting of the Institute of Metals, an English society now holding its first meeting in Germany, by Dr. W. R. J. Vernon and L. Whitby, of the Chemical Research Laboratory at Teddington. Samples of copper from buildings in London and other parts of England were studied. Some were as old as three hundred years. In the city specimens, the patina consisted of basic copper sulphate, caused by the action of atmospheric sulphuric acid. A piece of telegraph wire, exposed for 13 years within 200 yards of the sea, showed a patina consisting of basic copper chloride, the chlorine having been furnished from the salt water. At first, they found, the red copper turns black, but then the green patina develops later, and remains indefinitely.

TWO whooping cranes, representatives of a species almost as extinct as the passenger pigeon, were seen by Dr. E. W. Nelson, former chief of the U. S. Biological Survey, on a recent trip along the coast marshes of Louisiana. A hundred years ago whooping cranes, five feet tall standing, and almost pure white, used to fly over the prairies at migration times in vast armies. The clamor rising from the trumpeting of the vast hordes, early naturalists tell us, was almost deafening. Now, thanks to their size, conspicuous plumage and commendable flavor on the dinner table, they have virtually vanished. Dr. Nelson reported to the Cooper Ornithological Club that the Louisiana cranes were the first specimens he had seen in the field since 1870. According to local trappers, the pair seen by Dr. Nelson were the only ones in the region and had wintered in the marsh four successive years without rearing any young.