

SCIENCE NEWS

*Science Service, Washington, D. C.*CORE SAMPLES FROM THE OCEAN
BOTTOM

THE next voyage of the ketch *Atlantis*, of the Woods Hole Oceanographic Institution, will take cores from the ocean bottom that should disclose new knowledge of the world's prehistoric weather back to Ice Age days and beyond.

A new and special core-sampling device that is exploded by a charge of 155 mm. howitzer cannon powder and drives a core-boring mechanism into the sediment of the ocean bottom will be carried. Dr. Charles S. Piggot, of the Geophysical Laboratory of the Carnegie Institution of Washington, inventor of the core-sampler, will be a guest during the cruise. The itinerary has not been settled definitely, but a proposal has been to go from Woods Hole to the Gulf Stream and follow the great ocean current southward to the Virginia Capes. Then the *Atlantis* would turn westward to the continental shelf off the Atlantic Coast and follow it north to Woods Hole, passing the under-ocean canyons that slice through the shelf in this territory.

The coming voyage will follow the present cruise of the *Atlantis* on which the ocean's bottom is being investigated in another way. Artificial, tiny vibration waves are now being set up in the mud on the ocean's bottom by exploding charges and the time of transmission of these waves to microphones laid on the floor of the sea is measured. This technique uses vibration waves that are really artificial, small earthquake shock waves. The waves start from the point of origin and go through the mud, covering the floor, to the solid rock at the bottom. There, a part of the wave is reflected and detected by the water-tight microphones. The speed of transmission of the waves can be used to disclose, in some detail, the thickness of the muddy bottom.

The experiments on the coming voyage will pierce the mud covering of the ocean floor. It has been found that these deposits contain the remains of prehistoric marine animals, layers disclosing great changes in the earth's climate including the great Ice Age, and also evidences of vast volcanic action at some time in the past, probably in Iceland.

A THREE DIMENSIONAL MAP PROJECTOR

A STEREOSCOPIC map projector is under construction which makes aerial maps so realistic that the user feels like some super-being standing over the earth and able to caress the tops of mountains with his hand. The device is the multiplex projector which can "pick up" a 25 square mile tract by an airplane photograph and set it down on a table top in three dimensions. It is being built by the Bausch and Lomb Optical Company for the U. S. Army Air Corps.

The method uses no model making with tools; yet a complete representation of a countryside can be obtained in an army field station within a few hours after an exploring plane takes off for observation and photography. The first step in the new mapping presentation is to

assign a plane to aerial photography in the usual method whereby the altitude is known of three different points in the territory being mapped. As the plane flies from the known to the unknown region the camera shutter clicks at intervals.

On the plane's return the aerial photographic film is developed and printed on small glass plates that serve as lantern slides in a battery of projectors mounted above the viewing table. The images formed by adjacent projectors on the table overlap just as do the areas covered in successive photographs. Alternate projectors form their images in red and green light. This is what makes possible the three dimensional effect for in viewing the scene the user wears spectacles having one green and one red lens. Thus the overlapping areas are seen stereoscopically in relief. By simple measurement with a scale in the reduced model one can measure the height of a hummock or the slope of a road as easily as one might measure the height of an inkstand on a desk.

SEX IN THE PARAMECIUM

Sex has been discovered in Paramecium. For decades, this one-celled animal has been the classical example of sexless mating. Dr. Tracy M. Sonneborn, associate in zoology at the Johns Hopkins University, has reported this discovery in the *Proceedings of the National Academy of Sciences*.

Occasional mating in such minute unicellular animal organisms has been observed for many years, but there has been no indication of sexual difference. Two of the five races of Paramecium examined have shown sex differences, and have exhibited a mating process fundamentally the same as that known in higher life. The actual presence of individuals of opposite sex, under favorable conditions, has apparently been found to be the only requirement for inducing an instantaneous sexual reaction. Dr. Sonneborn reports, too, that sex is inherited and determined in much the same way as that of man and of higher life in general, and is similarly governed by the Mendelian laws of heredity.

Placing the study of the genetics of unicellular animals on a "quantitative and predictable" plane for the first time, Dr. Sonneborn estimated that his discovery, which brings with it perfect control of mating and a consequent certainty of rapidly acquiring a knowledge of the genetics of Paramecium, "should lead rapidly into a systematic, coherent body of knowledge in close touch with the rest of genetic science." The discovery will open wide the field for the study of heredity in unicellular animals, which comprise a large portion of the animal kingdom.

In the Paramecium, a small oval-shaped animal, approximately one two-hundred and fiftieth of an inch in length and about one third as wide, often found in stagnant waters, reproduction is known to take place by a simple division of the parent body. Occasional conjugation occurs in the temporary union of two individual cells. In the process, complicated divisions of the central portions, or nuclei, of the Paramecium occur, there is an

exchange of nuclear particles, and the *Paramecium* separate again. Despite the resemblance to true sexual reproduction, biologists long held conjugation to be an example of sexless mating.

Dr. Sonneborn's discovery of two distinct sexes each of which will conjugate only with members of the opposite sex, followed in the course of his study of endomixis, a process similar to conjugation, but lacking fertilization. He found that after this process, "in certain cases the numerous descendants of a single individual that has undergone endomixis will not conjugate together, but they will under the same conditions conjugate with descendants of certain other exdomititic individuals. Following this clue, the entire stock was found divisible into two sex classes." The original work was done with a "Race S" of *Paramecium*, found in a pond at Cold Spring Harbor, Long Island.

A study of the habits of the organisms over a period of three months showed that the normal sex reaction will not take place at certain times in the life history, notably during the first week following conjugation, during endomixis, and whenever the animal is overfed. It was found that in cases of reproduction by division, sex is invariably inherited from the parent; while in cases in which conjugation or endomixis has intervened, inheritance is determined strictly according to the Mendelian laws which govern inheritance of sex in man. Thus, the examination of several thousands of individuals has shown that the distribution of the sexes is purely a matter of chance. As in the case of most other organisms, Dr. Sonneborn reports, "it is evident that the method of inheritance indicates that sex determination is nuclear."

VITAMIN C IN THE TREATMENT OF PYORRHEA

A LINK between pyorrhea and scurvy has been forged at the laboratories of the Harvard Dental School. Drs. Paul Boyle and David Weisberger have under way research which indicates that a lack of vitamin C in the diet may be the cause of—or at least a contributing factor to—pyorrhea just as this vitamin C has long been known to cause scurvy. While the findings are yet incomplete they indicate that as far as the general practitioner is concerned vitamin C treatment for pyorrhea "can be adopted with safety and it probably should be adopted as a routine measure in addition to, but not in place of, other recognized forms of therapy."

The Harvard dentists have been working with both animals and humans in their studies. Guinea-pigs were fed diets varying in their vitamin C content and later checked to see the degree of pyorrhea which they developed. X-ray and microscopic examinations of these animals showed all the characteristics of true pyorrhea in reproducible form. Forty-eight human patients were studied in the dental school where their degree of pyorrhea symptoms were compared with the content of vitamin C in their blood. Twenty-three patients with a low vitamin C blood content had marked evidence of the disease. Ten patients with a reduced vitamin C blood content showed the gum disease but to a lesser extent than the first group. Among fifteen patients with normal vitamin

C blood content only one case had the disease. These findings, it is emphasized, are not conclusive, but they do offer a most consistently positive finding in cases of the advanced disease.

To the layman and the average dental practitioner the research has three significant points: (1) The new test of vitamin C in the blood as employed is not practical for a dental office and will probably largely be confined to hospitals. (2) The suggested use of vitamin C is a relatively safe procedure, for most experts agree the body can handle an overdose easily. This is not true with vitamin D. (3) The improvement in the mouth tissues, around the teeth, which occurs when vitamin C is administered indicates the practical value of the treatment.

Vitamin C, found naturally in limes and lemons principally, is also available in tablet form as ascorbic acid or cevitamic acid. To maintain the normal amount of vitamin C in the blood a daily intake of 50 milligrams is sufficient. The suggested dose for treating pyorrhea is a gram in five or six days, or about 150 to 200 milligrams daily.

HUMAN RESOURCES OF THE UNITED STATES

THAT America's human resources are disappearing four times as rapidly as her soil resources are being depleted by dust storms, crop removal and erosion, was reported by Dr. O. E. Baker, agricultural economist of the United States Department of Agriculture, to the International Congress on Population meeting in Paris from July 29 to August 1.

Famine of agricultural products is not likely to be a danger in the United States. Dr. Baker was of the opinion that "From the standpoint of agricultural prosperity, we have too much land in the United States and too few people."

Despite the large losses in soil depletion, amounting to about five per cent. a decade, the rapidly declining birth rate which has fallen as much as 20 per cent. in the same length of time makes a shortage of food most unlikely. If present trends are not greatly altered, the population will increase only about 8,000,000 in the next 20 years by which time the maximum will have been reached.

Dr. Baker estimates that no increase in arable land will be needed to feed these additional 8,000,000 persons. "In 1930, a year when exports of farm products required the use of about 50,000,000 acres of crop land, when per capita consumption of farm products was fully normal and when the population was only about 6,000,000 less than at present, there were 41,000,000 acres of crop land lying idle or fallow in the United States, and 109,000,000 acres of plowable pasture, and the area of crops harvested the preceding year was nearly 50,000,000 acres greater than in 1936, in part because of the much greater exports. "The land that requires only plowing to be put into crops exceeds the prospective need threefold. Meanwhile, the use of tractors and the substitution of gasoline for horse-feed seems very likely to continue. This process has reduced the area of crops needed to feed horses and mules by about 40,000,000 acres during the last 20 years, and if this rate continues this process alone

will release land almost as rapidly as it is needed by the increasing population, since to feed a horse requires as much land as to feed a human being."

A CONCEALED BLIND LANDING SYSTEM FOR THE SMALLER AIRPORT

THE dangerous Washington airport, and all other flying fields of the country where near-by menacing towers, smokestacks and other obstacles form a hazard to approaching aircraft in blind landing, should be made much safer by improvements designed by Harry Diamond and Francis W. Dunsmore, of the National Bureau of Standards.

By placing the transmitting apparatus of the blind landing beam in the center of an airport, under a concealed cover, it is possible to increase steeply the angle of the beam. The result, in the case of the small Washington airport, with its towering Washington Monument and Arlington radio towers, would be to permit aircraft to maintain altitude sufficient to clear these obstacles and yet "come down the beam" into the airport. A survey of the curving nature of the new beam system shows that while keeping a 600-foot height an airplane could reach such a beam only a mile and a third away from the airport. Under the flatter, older beam system an airplane would have to be about five or six miles away to stay at 600 feet.

In the case of the Washington airport this meant that planes could only land on a line parallel to the Arlington Cemetery Ridge and in an "aerial valley" having the Washington Monument on the northern edge and the Navy's skyscraping radio tower at Arlington on the other. This fixation of direction failed, naturally, to permit taking advantage of the best wind direction at the moment of landing. By locating the new Bureau of Standards system in the center of the landing field on a concealed, underground turntable, it is possible to swing the device to point the beam in any direction of the compass so that the plane, landing blind, can come down "into" the wind in approved fashion. Curiously enough, the radio beam signals, even though on the short wavelength of 3.3 meters, are not blocked out by the walls of the shallow pit from which they radiate. They bend around the surface rim of the pit and present a radio field pattern quite comparable with that developed when the transmitting antenna is a foot or two above the ground level. The major improvement is the much steeper angle with which the radio beam can be directed into the sky.

ITEMS

FOR more than eight months of a year the scattered ultra-violet light from the sky contributes more than half of all the erythema (tanning) ultra-violet energy incident on a horizontal plane. The finding, by Drs. M. Luckiesh, A. T. Taylor and G. P. Kerr, of the Nela Park laboratories of the General Electric Co., further shows that on some occasions the ultra-violet light from the sky, measured horizontally, may exceed that from the sunlight throughout an entire day.

EQUATORIAL South America was the shock center of the strong earthquake which shook the instruments of seismo-

logical observatories in the United States and Canada on July 19, according to calculations by the U. S. Coast and Geodetic Survey. The shock occurred at two hours, 35.7 minutes P.M., Eastern standard time, with the probable location of the epicenter fixed at 0.5 degrees south latitude and 77 degrees west longitude. This position places the shock center some 150 miles east of Quito, capital city of Ecuador, and near the Ecuador-Colombia border. Origin of the shock appears to have been from a depth of 100 miles.

URANIUM dioxide will increase the life span of certain types of electric light bulbs, according to a patent just granted in Washington to Dr. Wilhelm Dunkel of Berlin-Tempelhof, Germany. Uranium dioxide is a compound of uranium, the mother element of radium. The importance of Dr. Dunkel's discovery, which he has applied particularly to the powerful incandescent lamps used in movie projection machines and in photography with telling effect, is emphasized by the assignment of the patent to the General Electric Co. High wattage bulbs use large loads of electric current. When an ordinary bulb of this type is switched on, there is a sudden surge of current into the tungsten filament which is more than it can stand for any considerable length of time. The result is that the filament soon burns out. Dr. Dunkel has found that if a tiny capsule of uranium dioxide is connected in series with the filament inside the lamp, this surge of current is eliminated. Extra long life is thus attained.

THE deafening roar of riveting machines may be silenced by a "firecracker" rivet which literally rivets itself when a minute charge of explosive inside of it goes off. The new rivet is described in a patent just granted to two inventors, Karl and Otto Butter, of Germany. This type of rivet is particularly useful in joining together the framework of airplanes and dirigibles where small rivets and rivets of softer metals like copper and aluminum, are used. Only minute charges of explosives are needed to "upset" or rivet the rivet. The preferred explosive is lead azide. A carefully measured charge of it is tamped into a hole bored into the shank or rod part of the rivet. The loading is done on the job, before the rivet is inserted to join girders or plates. After inserting the rivet a heating device that looks like an electric soldering iron is placed against the head. In a second or two the explosive goes off. The explosion expands the shank into a barrel shape which exerts a wedge-like grip. Instead of using heat to explode the rivet, high frequency ultra sound waves of 200,000 cycles per second will also be used.

CLOSE kinship between South American and African fishes belonging to the group known as characins, demonstrated by Drs. William K. Gregory and G. Miles Conrad, of the American Museum of Natural History, has raised anew the question of an earlier land connection between the two continents. The fishes are and always have been fresh water forms, so the ancestors could not have swum across a wide gap of ocean. Geologists have suggested that there was once a narrow peninsula connecting Brazil with West Africa. Others think the two continents were once a single land mass that broke and drifted apart.