SCIENCE NEWS

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CHECKING THE LUNAR THEORY

USING more than 250,000 punched cards, and six automatic computing machines, workers at Columbia University have solved an astronomical problem, in two years, which originally required thirty years for its manual solution. Fifty years ago Professor Ernest W. Brown, of Yale University, set out on his life work of checking the application of Newton's law of gravitation to determine the motion of the moon. Finally, after thirty years' work, he solved this problem which was first raised—but never solved—by Sir Isaac Newton in 1687. Since 1923 astronomers and navigators, throughout the world, have been using mathematical tables of the moon's position and motion, based on Professor Brown's long-extended work. But never, until the recent Columbia automatic calculations, have the involved and tedious computations been checked.

Professor Wallace J. Eckert, of Columbia, perfected, two years ago, the astronomical punch card system and the alterations of the computing machines. The method is an adaptation of the same system which is used by large companies, schools and the U. S. Bureau of Census in compilations of vast masses of data. Working for two years with lunar data, the machines show that Professor Brown's original work was correct to within one hundredth of a second of arc, which is the degree of accuracy originally desired by the lunar theory. The mathematics of checking the lunar theory, according to Professor Eckert, consists of substituting into differential equations the harmonic series which represent coordinates. The series expression for each coordinate consists of about 500 terms with coefficients of ten significant figures. The principal part of the machine computation consists of multiplying such series (of 500 terms each) together in pairs.

The machines are standard electric business machines such as used in large-scale bookkeeping and accounting. They were supplied to Columbia University by the International Business Machines Corporation through the cooperation of its president, Thomas J. Watson, who is also a trustee of the university. Only slight alterations were needed in these standard machines to adapt them for computing astronomical calculations. A computing bureau, for astronomers throughout the world, has been established at Columbia University, to be known as the Astronomical Hollerith-Computing Bureau, after Herman Hollerith, who in 1890 first applied the machines in analyzing the U. S. Census of that date.

AMERICAN PREHISTORY

DISCOVERY of strong evidence that America had two prehistoric waves of pioneers before the famous Folsom hunters is reported by the Southwest Museum. The discovery is pronounced to be "of major importance to American archeology." It is as surprising an addition to our prehistory as if two boats earlier than the *Mayflower* had been found bearing colonists to New England shores in our historic era.

A joint expedition of the Carnegie Institution of Washington and the Southwest Museum, led by M. R. Harrington of the latter institution, unearthed stone relics of the long-departed and long-lost Americans. Investigating the shore of a brackish pond in Lake County, California, where C. C. Post, of Berkeley had found spearheads of one of the oldest known cultures of America, new chapters of prehistory were opened out.

The surface layer, turned topsy-turvy by recent ploughing, contained spearheads, knives, drills and scrapers typical of the Folsom hunters. With such implements, Folsom Men killed the mammoth and giant bison and prepared the kill for food and clothing. The loosely estimated antiquity of this Folsom era is seven to twelve thousand years ago. With Folsom Man's handiwork the archeologists found quite different stone spearheads and other implements. These different tools have recently been turning up at Lake Mohave and another western site, leaving doubt as to whether people older than the Folsom hunters had or had not been found. Now, the mystery is believed to be solved, since digging into the Lake County site brought the Mohave type of tool to light in a camp deposit definitely below the Folsom tools—and therefore older than the Folsom tools.

There may have been, not merely one, but two kinds of primitive pioneers inhabiting America at the same time in those pre-Folsom days. For Mr. Harrington reports finding a new type of spearhead, which he calls the Borax Lake type, which was found buried at about the same levels as the Lake Mohave tools. Most surprising of all, was the discovery that below these relics lay still older weapons, made by people "as yet entirely unknown quantities in American archeology." These dawn men of America made crude and coarse stone implements, described as mainly large scrapers and hand axes which they clutched in the first, using no handle.

Finding the deep levels of the site thus undisturbed after thousands of years convinced Mr. Harrington that these unknown ancients lived about 13,000 B. C., or perhaps earlier. It is pointed out that "These are staggering figures to persons under the spell of the misleading implications behind the term 'New World,' but evidence is accumulating throughout the Americas that this hemisphere is no more new than its great western ocean is Pacific."

AN EXPEDITION TO THE TULAROSA BASIN

A "LOST WORLD" of a different kind, consisting of an island area of white sand on a surrounding "sea" of black lava beds, will be studied for evolutionary effects on its animal population by a Field Museum expedition headed by Dr. Wilfred Osgood. The region is in the Tularosa basin, a desert area of some 300 square miles in south central New Mexico. Dr. Osgood's companions will be Dr. Frank W. Gorham, of Los Angeles, and Walter F. Nichols, of Pasadena.

The animal population does not consist of fabulous surviving dinosaurs, but principally of small, mouse-like

rodents. The evolutionary phenomena of interest are not conservative survivals of old forms but the rapid development of new ones—"evolution while you wait," it has been termed. Of special interest is the fact that in the comparatively brief geological life of the white-sand "island" its animal population has become very pale-colored, while closely related forms in the surrounding black-lava region are very dark. It looks like a very good case of natural selection operating through protective coloration, for presumably animals that match their respective background colors have better chances for survival, while those with contrasting colors have been picked off more easily by hawks, owls, foxes and other predators.

It is the usual custom to collect animals of this kind by killing and skinning them. However, in order to insure their arrival at the Field Museum in absolutely fresh condition, with colors quite unchanged, the animals trapped by the present expedition will be sent back alive by airplane.

ROCK FORMATION FROM MOLTEN MAGMAS

GRIMY greenish-gray rocks, broken from the ice-carved, wind-swept slopes of an extinct volcano in the almost unexplored Raymond Fosdick Mountains of Antarctica, by Dr. Thomas C. Poulter, senior scientist of the second Byrd Antarctic Expedition, may increase our knowledge of how rocks are formed. Reporting the results of a study of these rocks to the Geological Society of America, Dr. C. N. Fenner, rock expert of the Geophysical Laboratory of the Carnegie Institution in Washington, finds that old ideas of rock formation need to be reviewed.

Until recently, it was believed that molten rocks deep under the earth's crust resembled basalt, a dark heavy rock, of which the Palisades of the Hudson, the Giant's Causeway in Ireland, the Devil's Postpile in California, and many other famous clifflike structures are made. As these molten rock masses came near the surface, certain compounds in them crystallized as the rock cooled, leaving other mineral compounds molten until further cooling took place, and changing, as cooling went on, the chemical composition of the remaining molten material.

According to this theory, which has received much support, alkaline materials should crystallize first from a molten rock magma, leaving it more acid than before. The rocks from the Antarctic, however, do not follow the theoretical rules of change, suggesting to the geophysicists that laboratory conditions do not duplicate field conditions very closely, and that tests should be made of the rocks themselves and their minerals, and not of laboratory specimens under simpler conditions than those existing in nature.

YARN FROM SOYBEAN

A JAPANESE company is preparing to start production this fall on a small commercial scale of another new synthetic fiber, produced this time by chemical means from the soybean, food plant grown widely in northern Asia and of increasing importance throughout the rest of the world.

Fibers and cloth derived from the soybean, the latest source for a flood of new synthetic fibers that is revolutionizing the textile industry in every country, are to be manufactured at a rate of 20 to 30 tons a day when the factory begins operations. Development of the process for converting soybean protein into fiber is credited to Ryojei Inouye, awarded recently the Fujii prize of the Physical and Chemical Study Council of Kyoto Imperial University, one of Japan's "big six" universities, for his accomplishment. The drive to produce the new material as soon as possible is admittedly inspired by German success with a process that makes a fiber containing 50 per cent. fish albumin and 50 per cent. cellulose and from an Italian method which turns casein into yarn.

Soybean cake, the material remaining after the oil is pressed from the plant in giant mills in Manchuria, is the starting point for the process. The soybean, object of intensive research in laboratories in nearly every country including our own, is the source for a wide variety of synthetic products. Aside from its uses in Asia as a food and for fodder for domestic animals, the plant has found application in the manufacture of paints and enamels, synthetic plastic, varnish, glue, printing inks, rubber substitutes, insecticides, linoleum, glycerine, flour, soy sauce, breakfast food, candies, roasted beans with a nut-like flavor and in other ways. The U. S. Department of Agriculture maintains a Soybean Experiment Station at the University of Illinois, one of whose research goals is the development of just such a process as is reported here.

THE SOUTH SEAS CLIPPER

THE seemingly never-ending saga of bigger and better airplanes added another chapter with the launching and first flight at Seattle of the *South Seas Clipper*, 72-passenger Boeing giant built for Pan-American Airways. Weighing 83,000 pounds loaded, the newest empress of the air is the first of six Atlantic-type clippers intended for service on Pan-American's coming transatlantic and U. S.-New Zealand services. All will be delivered by midsummer.

Said to be one of the finest craft of any type ever built, the new plane will carry 72 passengers by day or 40 by night a maximum of 4,000 miles at 200 miles an hour. Four new Wright Whirlwind 1500-horsepower engines, the most powerful gasoline engines ever built and installed so as to be accessible during flight, power the clipper. A crew of eight will handle her. Five tons of mail and express can be carried by the double-deck liner. These decks will be linked by a spiral staircase in the best shipboard manner.

Its 159-foot wingspread necessitated final assembly out of doors. A special 15-ton beaching gear was required to haul it from the factory to the water's edge. Its tail surfaces alone have a greater area than the total wing area of many twin-engined transports now in operation. The new Boeing clippers, the first invasion of the company into the big seaplane field, are the third series of big boats placed into service by Pan-American on its lengthy overseas routes as traffic and mileage have grown during recent years. The first of the really big boats were the *Sikorsky S-42*'s, now used on the main Caribbean routes and the run between New York and Ber-

muda. The second was the series of *Martin Clippers* that have been running like clockwork back and forth across the Pacific for more than a year. Big as this craft is, it is still a pygmy compared to craft now on the drawing boards and in the imaginations of engineers both of the operators and of the manufacturers. Designs for aircraft capable of carrying a hundred passengers at a load have been requested of leading builders by Pan-American and at least six designs are known to have been submitted. But to-day, and for at least a year or two to come, the 109-foot long, 28½-foot high liner is and will be empress of the air.

THE CAUSE OF CHRONIC GALL BLADDER DISEASE

GERMS of fairly ordinary types are the culprits that cause or at least pave the way for chronic gall bladder disease and they may be taken into account in treating the condition. Research showing this was reported by Drs. Martin E. Rehfuss and Guy Nelson, of Philadelphia, at the recent meeting of the American Gastro-Enterological Association.

Chronic gall bladder disease was produced in rabbits by repeated injections of small numbers of germs over a long period of time. The germs were obtained from the nose, throat, teeth and lower part of the digestive tract. They included staphylococci, streptococci and typhoid and colon bacilli. A streptococcus from the human digestive tract produced gall bladder disease in nearly half the animals in one study. In these animals changes in the gall bladder occurred similar to those found in human gall bladders removed at operation. In addition, the rabbits showed signs of kidney, heart and joint diseases, conditions which are being noticed more and more in association with gall bladder disease in human patients. In about a third of some 900 gall bladder patients, one of the doctors had noticed involvement of muscles, nerves or joints or impairment of heart and blood vessels.

Repeated attacks on the gall bladder by very small germ armies is enough to cause disease in this organ even if the germs are subsequently vanquished by the body and no trace of them found when the gall bladder is removed at operation. In a survey of over two thousand cases of its removal it was found that a little less than one out of every two removed on the operating table were infected. Cleaning up foci of infections in teeth, throats and elsewhere therefore becomes an important part of treatment for chronic gall bladder disease. Specially made vaccines have been used with unusual success at times in controlling these infections and the gall bladder condition. The diet of patients must also be watched to insure their getting enough vitamins A and D. These vitamins are found in fatty substances which gall bladder patients usually can not tolerate. Butter is recommended as the safest fat as a source of these vitamins.—JANE STAFFORD.

ITEMS

A STAR that is either the nearest or the second nearest star to the earth has been discovered at the Yerkes Observatory of the University of Chicago. It is named Wolf 424 and it has a visual magnitude of 12, which means that, close as it is, it can be viewed only with a powerful telescope. Professor G. P. Kuiper in recent months has obtained spectra of many faint stars of large proper motion, that is, they change their positions considerably in relation to other stars. He used a fast one-prism spectrograph attached to the 40-inch Yerkes telescope. Star Wolf 424 was found to have what astronomers call a very late M type spectrum which is duplicated in the heavens only by Wolf 359 star. This is the intrinsically faintest star known. The distance of Wolf 359 is eight light years (two and a half parsecs), that is, it takes light traveling 365,000 miles per second only eight years to travel from that star to the earth. But the Wolf 424 star newly observed is found to be 1.17 magnitudes brighter. Computations show that its probable distance would therefore be about 3.7 light years.

REPRESSURING, a new method of increasing oil production from partially depleted fields, recently applied near Lexington, Ky., to oil pools in the "corniferous" formation, has already caused a great increase in production, making available oil that would be forever unavailable to older recovery methods, according to Dr. Newell M. Wilder, who reports the work in the *Bulletin* of the American Association of Petroleum Geologists. Production of many wells was tripled when adjacent wells were filled with air under a pressure of 200–300 pounds, a few wells giving even greater increases. Four pressure wells to one producer, spaced only a few hundred feet apart, gave the best results in this field, although in some other field different spacings and pressures might work better. Telling what was done, and how it worked in this particular field, Dr. Wilder pointed out that these methods should not be applied indiscriminately in other oil fields, where conditions might be different.

ALL that remains of an early mouse, which dates back to the Paleocene Age 80,000,000 years ago, are a few teeth. Professor Glenn L. Jepsen discovered these in south central Montana in 1931, but only recently learned their significance. He now is certain that they came from a member of the rodent family and has named the animal *Paramys atavus*, meaning mouselike grandfather. Parts of the left wing of a 50,000,000-year-old duck were discovered in northeastern Utah during an expedition under the auspices of Princeton University in 1936. The remains were unearthed from an Upper Eocene deposit by John Clark, now at the University of Colorado. Dr. Alexander Wetmore, of the U. S. National Museum, has built up a probable body structure around them.

A NEW industry is growing up at Greer, W. Va., around "silica black," a new carbon and silicon-bearing material derivative discovered six years ago by Professor C. A. Jacobson, of West Virginia University. Produced when coal and a material like diatomaceous earth are mixed and distilled at 600 degrees Fahrenheit, "silica black" is an inky-dark powder for which a wide variety of uses is being found.