SCIENCE NEWS

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HUMAN RESEMBLANCES IN FOSSIL APE BONES

NEW points of resemblance between man and the recently discovered higher-ape fossils of Sterkfontein have been worked out by their discoverer, Dr. R. Broom, of the Transvaal Museum, Pretoria, South Africa. As more and more of the bone was cleared from its encasing stony matrix, new details of the cheek bone, thus made visible, showed that the animal had less of an ape-like snout and a straighter, more "human" facial angle than Dr. Broom had at first supposed. The eye teeth are relatively small, and there is no gap between them and the first pre-molars—again a man-like rather than an ape-like character. In general, the new findings support his earlier opinions and those of Professor Raymond A. Dart, of Witwatersrand University, that this extinct genus of apes was not related to any living type of great apes and shows a closer approach to the human physical make-up than do any other known apes.

Dr. Broom considers his specimen to be sufficiently different from the much more ancient one found by Professor Dart to justify a separate name for it. He proposes the zoological title *Australopithecus transvaalensis*. Since first reporting discovery of skull fragments, brain cast and teeth, a year and a half ago, Dr. Broom has also found bones of most of a hind leg, the base of a spinal column and one bone of a pelvic girdle. These are still embedded in a stony matrix, awaiting the tedious job of drilling, chiseling and scraping them free. As soon as he can find time to do this, he expects to be able to form some idea of the animal's posture in walking—whether stooped far forward like an ape, or more nearly erect like a man.

SYNTHETIC RADIOACTIVE MATERIAL USED TO TREAT DISEASE

FOR the first time a synthetic radioactive substance is being used to treat disease. This became known when injection of radiosodium into two sufferers from leukemia was reported by Drs. Joseph G. Hamilton and Robert S. Stone, of the University of California Medical School. The clinical value of the radium-like treatments was pronounced inconclusive, but these experiments are expected to pave the way for further tests upon this disease and also cancer, which leukemia is like in some respects. The radiosodium used was made by the bombardment of sodium chloride with hearts of heavy hydrogen (deuterons) shot out by the powerful cyclitron devised by Professor Ernest O. Lawrence, of the University of California.

Radiosodium was seized upon for medical use because it promises to have the beneficial effects of radium and other natural radioactive substances without their dangers. Radium and its salts if injected into the human body become fixed in the body tissues and continue to bombard them until death is caused, usually in a few years. This is not possible with radiosodium, as its activity is over in a few hours instead of continuing for many years. The half-life of radiosodium is only 14.8 hours. This short duration of radiosodium's activity made necessary speedy team work between the physicians and the physicists in the leukemia experiments just reported. Sodium chloride was bombarded, rushed to the hospital, dissolved in water, boiled, filtered, tested for activity, and then injected into the veins of the patients, who were men 29 and 23 years old. Incidentally this use of radiosodium gives science a new method of measuring what the human body does with sodium, so important in our daily food. Because the radio sodium "broadcasts" radioactivity, delicate instruments can be used to detect where it travels and what it does.

BRIGHTNESS OF VARIABLE STARS

DURING the past 32 years, over half a million measurements of changes in the brightness of eclipsing variable stars have been made at the Princeton Observatory. Approximately 300,000 of them have been made by Dr. Raymond S. Dugan, professor of astronomy at Princeton University and president of the Commission on Variable Stars of the International Astronomical Union. He is generally regarded as having the most accurate photometric observing eye in the world. Authoritative light curves of 19 eclipsing variable stars have been published by Professor Dugan. One of them was based on a series of over 14,000 measurements, and for another he took observations over a period of nine years in order to obtain the necessary data. The process of making each measurement involves adjusting a photometer so that the eclipsing variable star and another star of constant luminosity appear equally bright. Although a measurement can be made in less than a minute, the exacting nature of the work restricts the number that can be made during one observation period, and weather conditions usually permit measurements on only about 100 nights a year.

Eclipsing variables are "double stars" which are so close to each other, astronomically speaking, that they could not be distinguished individually by a telescope a hundred times more powerful than any in existence today. Some of these stars are much bigger and brighter than the sun, but they are so far away from the earth that only a few can be seen with the naked eye. The stars, many of which are stretched by mutual attraction into a shape resembling a football, eclipse each other once in every revolution, and the measurements are designed to determine the length of the eclipses, which star is the larger and brighter and whether the eclipses are total or partial. Professor Dugan has observed pairs which eclipse each other six times every day, and one in which the eclipses last about two years and occur at 9,883-day intervals.

Observers in many parts of the world are now investigating this field of astronomy, and Professor Dugan seeks to keep them acquainted with the latest information and to coordinate their efforts whenever possible. Since he began his work in 1905, the number of definitely known

variable stars has increased from 50 to approximately 1,000 and new ones are being discovered at the rate of about 100 each year. Further aid in deducing variations in the periods of eclipse is being obtained through the cooperation of the Harvard Observatory, where photographic material on the subject was compiled as far back as 1890. Miss Frances W. Wright, of the Princeton Observatory, is now engaged in examining these plates and comparing the results obtained by visual and photographic means.

AIR CONDITIONING

NEW medical aids by air conditioning in the treatment of disease, houses insulated in winter by the use of ice roofs, scientific studies that seek the answer to the perplexing question "What is a draft?" and research to improve the "liveliness" of air, were topics discussed at the meeting of the American Society of Heating and Ventilating Engineers in St. Louis.

More and more the science of medicine and the profession of engineering are joining forces to combat one major avenue by which disease still spreads. It has been found that hay fever and its kindred ailments yield to treatment in controlled air-conditioned rooms. Now a new committee of the society has been organized to investigate the purification of air in hospitals to prevent infection. A hospital, it is pointed out, goes to great lengths to sterilize its operating rooms, wards, instruments and the wearing apparel of the staff. Air conditioning for increased comfort to the patients and staff is now used in many places. But very few hospitals attempt to kill organisms in the air of the operating rooms or infectious wards for respiratory diseases. Yet science knows that radiation of specific wave-lengths can kill bacteria floating about in air. But the matter of turning this academic knowledge into engineering practice on an economical basis is a real and serious problem. Tied in with medicine also, in the field of physiology, is the major research problem of answering the simple question, "What is a draft?", or, said another way, "When is a draft not a draft?" On the answer to this question rests, in many ways, the future usefulness of forced ventilation—with either heating or cooling—which is the growing trend in making enclosed places more livable.

Admittedly home-air conditioning by mechanical refrigeration is luxury, and for a few years it may remain so. But already simple, less costly forms of ventilating engineering are coming into wide use. These will so demonstrate their usefulness that true air conditioning is not too far away in time or price. Growing in use are the forced air heating systems through small ducts which distribute cleaned, heated and moisture-controlled air throughout a home. When the owner wishes, it is not too difficult to tap into this system and add refrigeration.

FROST RESISTING SOUTH AMERICAN POTATOES

NONE of the agricultural crops in Europe suffers from such a great number of diseases as the potato. Hundreds of thousands of centners of potatoes perish every year from various diseases and from cold. At the same time the importance of this crop is growing yearly. Potatoes have become not only one of the staple food and fodder crops, but also a rubber-bearing plant, since synthetic rubber is now made from potato alcohol. In the USSR the area under potatoes reached 7,000,000 hectares in 1936. It is quite clear how important was the problem of creating varieties of potatoes which will resist disease and cold.

This problem can now be considered as solved. In the search for new stable varieties of potatoes the All-Union Institute of Plant Cultivation sent a number of scientific research expeditions to South America, the native land of potatoes. During six years, since 1926, the Soviet investigators thoroughly explored vast territories from California down to Southern Chile, where a great number of varieties of potatoes, both cultivated and wild, are concentrated. The last of these expeditions was in 1932–1933.

During the past three years the institute has studied the collected varieties and in 1935 published an extensive work entitled "South American Varieties of Potatoes," summing up the results of the work.

It appears that hitherto Europeans practically have not known potatoes because only a few varieties, brought to Europe from Chiloe Island (southern Chile) in the seventeenth century, have been at their disposal. The entire modern European and North American potato culture originated from these few tubers.

Around the isolated Indian villages in Ecuador, Peru, Bolivia, etc., seventeen cultivated varieties of potatoes, quite unknown, were found.

Besides, a great number of wild varieties have been discovered in Mexico and the Andes, which proved particularly valuable, as they resist phytophthora, the most dreaded disease of potatoes.

Now, as a result of long experimentattion, these varieties have been crossed with the usual potato in the experimental fields of the All-Union Institute of Plant Cultivation, and in 1926 the cross-breeds were sent to the fields of the Soviet collective and state farms.

In the mountains of Peru and Bolivia, at heights of 4,000–5,000 meters, was found a remarkable wild variety, "acaule," which is capable of resisting frost of 17 degrees Fahrenheit, and which can be successfully grown in the Transarctic region. Native potatoes suffer from the early spring and autumn frosts even in the central belt of the USSR.

The institute is now completing its work on the creation of a new hybrid by means of crossing native varieties with the South American wild varieties. The new cross-breed gives a high yield and resists disease and cold. One of such hybrids is already being cultivated, this year, in Khibiny, in the Transarctic region.

The cultivated varieties of the Peruvian and Bolivian potatoes, distinguished by their high yield, are also used for crossing with the old European varieties, and a great quantity of the most valuable sowing material has already been evolved.

PRAIRIE GRASS ROOTS

ROOTS are formed at the rate of two miles a day by an average clump of one of the wild prairie grasses of the West. When the plant is two years old, it has nearly 320 miles of roots, probing through a mass of soil seven feet deep and four feet square.

These figures on the root "mileage" of crested wheat grass were presented at the meeting of the Botanical Society of Washington, by T. K. Pavlychenko, of the University of Saskatchewan. Mr. Pavlychenko was born in Ukrainia, but for several years has been a Canadian citizen. He has thus had long experience in two of the world's greatest grass-land areas, the steppes of Russian Eurasia and the prairie-plains region of western North America.

Crested wheat grass, the subject of his special study, was introduced from western Siberia into the plains area several decades ago, as a means for combating weeds which were spreading at an alarming rate in the old cattle country. The grass proved to be not only a very successful weed control and a good forage plant but also a remarkably efficient binder of the soil against the wind erosion that starts dust storms.

In the investigation Mr. Pavlychenko first dug down around the whole column of roots of one of the two-year-old wheat-grass tufts. That took a week. Then he carefully wrapped the whole thing in burlap, to keep it from crumbling. Then he enclosed the column in a kind of sectional cage, cutting the bottom loose from the floor of his trench. With the aid of assistants, he lifted the whole mass out, tilted it over sidewise, and laid it in a big tank. He poured in water, and let it soak for two days, until the soil was soft.

Then his real work began. Beginning at the bottom of the tank he directed a fine, brush-like spray of water, washing the soil away and exposing the intricate curtain of roots without breaking even the smallest branches. Inch by inch he worked, and as he cleared the roots he plotted on square-ruled paper, making a complete chart of the whole root system. This job, of washing and charting from bottom to top, took two weeks. The charts were then measured and the total length, 319 miles, obtained.

Mr. Pavlychenko's laborious piece of root-research is believed to be the first that has ever laid bare every inch of the whole fine-branched root system of a plant. Fellow-scientists looked on his specimen, laid out in a wide, shallow tank, with something like awe.

Mr. Pavlychenko pointed out that his method of root study can also be used to good effect on plants other than grasses. It might be a good technique to follow in studying the nitrogen-capturing root nodules of legumes, or for the investigation of diseases attacking plants underground. He has already made use of it in the study of the root systems of the weeds which the crested wheat grass is being used to crowd out.

FRANK THONE

ITEMS

TWO large groups of sun-spots, each a flaming cyclone in the solar atmosphere, have been photographed recently by Dr. Loring B. Andrews, of the Harvard Astronomical Laboratory. These whirlwinds constitute the greatest activity on the sun for some time, although the present outburst is merely the forerunner of increased activity in the immediate future, building up to the periodic maximum three years hence. The larger of these solar storms stretches along the surface of the sun for approximately 125,000 miles, while the other is about 70,000 miles in length. Several smaller groups have also been detected. The effects of these outbursts are shown by such terrestrial phenomena as auroral displays, magnetic storms and improved or hampered long-distance radio reception, all of which are dependent on the electrical conditions of the atmosphere.

USING special pendulums of fused silica, the most precise measurements on the absolute determination of gravity ever made have just been announced by the National Bureau of Standards. Dr. Paul R. Heyl and Guy S. Cook performed the measurements which fix the acceleration of gravity at Washington to be 980.08 centimeters per second. For years the measurements made at Potsdam, Germany, in 1906, have been the international base determination by mutual consent of scientists. Although the Washington scientists made fewer observations than did the German investigators, the accuracy of individual readings is higher so that the average valuable obtained is comparable in accuracy. The new Washington value differs from the value at Potsdam by 2 parts in 100,000. Whether the new value will be widely accepted, as was the 1906 in Germany, can only be determined by the future.

A PHOSPHORUS-CONTAINING material, relatives of which are found in the human brain and liver, has been isolated by Drs. Erwin Chargaff and Michael Levine, of the College of Physicians and Surgeons of Columbia University and Montefiore Hospital, from the body of a bacillus that causes tumors in plants. In plants there is a well-known disease, the crown-gall, which bears a slight resemblance to tumors in animals. It is produced by the *Bacillus tumefaciens*. Using the chemical methods developed by Dr. R. J. Anderson, of Yale University, who recently purified an acid from *tubercle bacilli* which produces symptoms of tuberculosis itself when injected into an animal, they are engaged in analyzing the crown-gall germ. Their first results show that it contains a phosphatide which stimulates rapid cell multiplication in plants. They are now working to learn the exact constitution of this chemical.

AN instrument resembling the organ, which produces sounds of oriental music as well as those of western music, has been invented by A. S. Ogoltevets. The octave of this instrument has 17 intervals. Demonstrated before the Academy of Sciences of the USSR, the new instrument won high praise. Soviet musical inventors have produced interesting results by using electricity to intensify the sound of violin and guitar music. Recent electric musical instruments introduced include the emiriton, violena and equodin.