SCIENCE NEWS

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PEKING MAN

MAN and his kindred among the animals, in all their forms and relationships, were discussed this week at simultaneous meetings of the American Association of Anatomists and the American Association of Physical Anthropologists, at the University of Pittsburgh. Professor Franz Weidenreich, of Peiping Union Medical College, delivered an address, on Thursday evening, on "Peking Man and His Significance for the Problem of Human Evolution."

Recent though the discovery of Peking Man fossils has been, the researches of Professor Weidenreich and his colleagues have already disclosed many significant facts about this ancient branch of the human race in Asia, both about its physical characteristics and its way of living. A condensed summary includes the following points: Peking Man was one of the most primitive of ancient human beings, perhaps the most primitive; his skull was more "low-browed" than that of Neanderthal Man, though in other respects it was rather similar; his lower jaw and teeth had both human and ape-like characters; he walked fully erect like a man, not stooped like an ape; two recently discovered thighbones, though broken, indicate a possible height of five feet four and a half inches. This is a good human stature, especially since these thighbones may have been those of a woman; animal fossils found in the same caves with Peking Man's remains show that he lived on earth during early Ice Age times, probably hundreds of thousands of years ago; he could fashion rough stone tools, and he knew the use of fire; he was probably a cannibal.—FRANK THONE.

A PROTEIN FRACTION OF THE TUBERCLE BACILLI

THE feat of using two chemicals obtained from tuberculosis germs to make animals give a positive tuberculin test, even though they are not tuberculous, was reported by Drs. Florence R. Sabin and Austin L. Joyner, of the Rockefeller Institute for Medical Research, New York, at the meeting of the American Association of Anatomists, in Pittsburgh. The research, which is part of the mass attack on tuberculosis launched by the National Tuberculosis Association and leading research institutions, brings investigators one step further in understanding how the tuberculosis germ causes disease. They hope this means also that they are one step closer to final conquest of the white plague.

The tuberculin test, familiar to thousands of parents and school children as a routine measure for detecting early tuberculosis in the children, is accepted as giving indication of the presence of living tuberculosis germs. It has been possible to make animals such as guinea-pigs susceptible to tuberculin, even though they have no tubercle bacilli in their bodies, by injecting the protein fraction of the tubercle bacilli. Enormous quantities of this protein material, however, and much time are needed to produce this result.

Drs. Sabin and Joyner reported that they have found they can produce the same response in non-tuberculous guinea-pigs very much faster if they inject a mixture of the protein from the bacillus with a fat-containing phosphorus substance also obtained by chemical breaking down of the tubercle bacillus.

The chemicals used in this work were obtained from living tubercle bacilli in the Yale University laboratories of Dr. R. J. Anderson. Dr. Anderson has obtained many other chemicals from the tuberculosis germs. Dr. Sabin, by injecting each of them alone and in combination into guinea-pigs, hopes eventually to learn which chemicals are responsible for the different symptoms of tuberculosis, such as the fever, the cheesy masses in the body tissues, called tubercles, and other symptoms. She even hopes to be able to produce complete germ-free, chemical tuberculosis in the animals. The great hope is that when all this has been learned, it will be possible to find ways of negatizing each of these symptom-producing chemicals—in other words, to have one or more specific chemical remedies for curing tuberculosis.—FRANK THONE.

THE ORIGIN OF STELLAR RADIATION AND ENERGY

OUT of the nuclei of atoms and their study by means of atomic bombardment machines is coming knowledge which may help solve some of the baffling problems of astronomy. A new hypothesis on the manner of origin of stellar energy and radiation—among the most difficult of all puzzles of the astronomers—is suggested in the current issue of the *Astrophysical Journal* by Professor Georges Gamow, authority on nuclear physics at the George Washington University.

It has been customary to consider the temperatures of a star's interior as mounting to staggeringly large values deep beneath the surface. The steady rise of temperature, with increasing depth, would lead to rapidly increasing rates of nuclear reactions, so that the main energy-production should be concentrated in the center of the star. But this picture led to some contradictory consequences. The giant star Capella, for example, should have had a central temperature and density lower than the sun. As a result, the energy production in Capella should have been very much smaller than that of the sun. In contrast, Capella's energy production is known to be a hundred times larger than the sun's.

By Professor Gamow's new hypothesis the nuclear reactions which give rise to stellar energy occur at some favored resonance energy value which he tentatively sets at about 10,000 electron-volts. Thus all the energy production of the star will not occur at the center of the star, as in the former concept, but in a spherical zone some distance from the center where the temperature reaches the selective value. Inside this zone, or shell, the temperature would remain constant and the energy production would be negligible.

Professor Gamow points out that as the star gradually burns up its hydrogen, its chemical composition changes and the radius of the energy-producing shell will also change, resulting in a slow change in energy production. These slow changes in stellar energy with the age of the star would be in accordance with known observations. The new Gamow hypothesis also removes the paradox over Capella, already cited. Dr. Gamow writes: "It is now clear that for Capella, which has a radius about ten times larger than that of the sun, the selective temperature will be reached at much larger distances from the center than it will be for the sun. Consequently, the total energy production, which can be shown to be roughly proportional to the square of the radius of the shell of Capella, will be considerably larger than that for the sun."

A NEW VACUUM TUBE FOR USE IN TELEVISION

A KEENER "eye" for television cameras in the form of an extremely ingenious vacuum tube has been devised by Philo T. Farnsworth, active in television research in Philadelphia. Its great sensitivity to light will facilitate out-of-doors television for such events as parades or athletic contests and it will also permit more normal illumination in studios, largely obviating the glaring lights now used.

The invention promises to bring to television a device comparable with the "high-speed" cameras of photography. Moreover the new television camera permits what might be called "long exposures" on dark days. The "heart" of the new Farnsworth tube is known as the image grid. This is a piece of metal foil perforated by small holes to the extent of 160,000 to the square inch. On one side of this special metal foil, with its almost numberless perforations, is placed an insulating material, and upon the insulating material equally numberless little islands of photoelectric sensitive material. The image grid is placed in a suitably shaped vacuum tube, with its photoelectric sensitive side towards the window. In the neck of this tube is an electron gun. The optical image is focused, by means of a lens, upon the photoelectric sensitive side of the image grid. Each island emits electrons proportional to the amount of light falling on it, and in so doing the island becomes positively charged. The electron gun, in scanning, moves its beam over the back of the image grid in an ordered manner, spraying electrons upon the back of the image grid. The beam of the electron gun is deflected in scanning in the usual manner.

Consider a single island with its positive charge due to the light falling on it. As the beam of the electron gun falls on the back of this particular island, the positive charge draws great numbers of electrons through the small holes surrounding that island, and the increased number drawn through the holes is always proportional to the charge, and hence the light falling on that island. Thus the charge on the island acts like a valve, permitting an increased flow of electrons from the back. In front of the image grid, in the tube, is placed a coarse meshed screen, known as the signal screen. Through a suitable potential, the electrons which passed through the holes are drawn over to the signal screen, where they go to make up the signal current. Not only does the charge on the island act as a valve, as it were, to permit the passage of electrons through the holes from the rear, but enough electrons are also permitted to pass through to neutralize the charge and make the island ready for the next scanning.

Those familiar with radio will recognize here the principle of the triode tube, since the image grid island acts as the control grid, the back of the image grid as the cathode, and the signal screen as the anode. The discharge of the island itself may be likened to the grid leak in the triode tube, and since this grid leak can be controlled in the Farnsworth tube, another interesting and valuable phenomenon is encountered. It must be remembered that in television the complete picture is scanned, or gone over, thirty times a second. Actually in modern interlaced scanning sixty half pictures are scanned per second. This means that the time for scanning of each island is of the magnitude of a millionth of a second. Using the "grid leak" of the tiny triodes in the television tube it is possible to regulate the charges built up on the little photoelectric islands from one scanning to the next, so that an optimum amount of light is always used. This is equivalent to increasing the exposure time in a photographic camera on a dark day, or under other poor light conditions. In the television tube, of course, some sharpness is sacrificed when long exposures are obtained. But, in contrast, the method permits television scenes in light so poor that even high speed photographic cameras can not function. What the new television camera does is to permit exposures up to one sixteenth of a second, if necessary, instead of the millionth of a second obtained in previous television devices.

THE MEETING OF WESTERN GEOLOGISTS

TITANOTHERES and submarine canyons, landslides and borax mines, shifting continents and retreating glaciers were among the many subjects scheduled for discussion by Pacific Coast geologists at the meeting of the Cordilleran Section of the Geological Society of America recently held at Stanford University. Beginning their sessions with a speech by Dr. Ray Lyman Wilbur, president of Stanford University, geologists, mineralogists, paleontologists and experts in many other lines of work related to geology listened to specialized papers.

SLOW GROWTH, accompanied by much local bending and breaking, characterized the building of the ancient mountains in the southern Sierra Nevada in Nevadian time, perhaps 150,000,000 years ago. The slow growth of the mountain masses, the changes in the rocks because of heat and pressure, and the local variations in the structures were described in detail by Dr. Evans B. Mayo, whose field researches have been financed by the Geological Society. Later motion in the same areas is being determined by studies of the remains of extinct volcanoes.

DISCOVERY of a new canyon, half as deep as the famous Grand Canyon, but buried under a mile of water off the

California coast was reported by Dr. Francis P. Shepard, of the University of Illinois. Dr. Shepard worked aboard the Scripps Institution of Oceanography research ship, the *E. W. Scripps*. The half-mile deep break in submarine rocks was discovered while on an exploratory cruise.

DR. HOWEL WILLIAMS, volcano expert of the University of California, reported that seemingly-mysterious mile-wide craters, associated with volcanic regions, were caused by the shifting of melted rock under the surface, causing cave-ins of the walls of groups of small craters. Sometimes the molten rock is thrown out of the craters in fragments, as happened when the volcano Krakatau blew up; other times the lava drains off from lower levels, as has occurred at Kilauea.

SAND BARS and lava flows of an age before life appeared on earth, twisted, broken, heated, the rocks altered, but their record still readable, were described by Drs. John H. Maxon and Ian Campbell, of the California Institute of Technology. Under the auspices of the Carnegie Institution of Washington, the two geologists read the partly-erased record held in the rocks and learned not only of the original structure, but of the many periods of heating, breaking and bending which the rocks have undergone.

THAT the contorted rocks of the Panamint Valley, gold-bearing waterless region bordering Death Valley, were caused by the well-known geologic processes of folding and faulting, was reported by Dr. Richard H. Hopper, of the California Institute of Technology. The rocks were folded, then broken, and later filled with molten material which came up from deep in the earth. Recently, geologically speaking, more breaks in the rock occurred, diverting stream courses.

FOUR HUNDRED square miles of volcanic débris, 500 feet thick, that was melted soon after its deposition during the Pleistocene ice ages into a solid mass, were described at the meeting of the Cordilleran section by Dr. Charles M. Gilbert. Compressed while still hot by the overlying materials, the lower layers of ash were squeezed into a solid mass creating a formation technically named "welded tuff."

SURROUNDED by lava flows in the Nevada Desert, in the Steamboat Hills ten miles south of Reno, Nevada, a mass of rhyolite, a volcanic rock a few hundred feet in diameter, gives evidence of recent volcanic activity in that region. John A. Burgess, of the University of Nevada, related the story of the volcano, which erupted not much more than a million years ago.

DYNAMITING the floor of Yosemite Valley to make it tell its story, and the story learned from the seismic sounding of the valley, were described by Drs. Beno Gutenburg and John P. Buwalda, geophysicists of the California Institute of Technology. Two ice ages have left deposits above the ice-carved rock floor, with the present surface composed of materials laid down since the retreat of the most recent ice sheets.

ITEMS

MORE than 100,000 acres of wild forested lands belonging to the State of Prussia have been set aside as a permanent refuge for moose. The area lies in East Prussia, near the city of Königsburg. It has never been cultivated, and very little timber cutting has been done. Regulations are very strict. Not only are such obvious ill practices as lighting fires, cutting trees, and shooting game prohibited, but visitors are not even allowed to leave public roads and paths without special permit, or to bathe in streams and lakes, or to park automobiles or put up hammocks. Certain parts of the terrain are completely closed to visitors.

WARFARE against the Dutch elm disease has been made more difficult, and the eradication of the plague probably delayed, by three new discoveries: (1) The fungus that causes elm disease may remain dormant in some trees, not causing immediate appearance of the wilting, drying branches by which the malady is now diagnosed; (2) such infected but not dying trees may never become distribution foci of the epidemic, unless broken limbs should bring the infection to the surface; (3) the fungus can live and grow in trees after they have died. Scouts who have ready means for recognizing the disease now know that apparently healthy trees may still be harboring it. Hence checking of any suspected areas must be repeated again and again, probably for years. Removal of elms that are sickly, deformed, or otherwise of low value is now sought, even though the trees may not now have elm disease. Such low-value elms offer ready harborage and food for the elm bark beetles that carry the disease fungus, much as mosquitoes carry the germs of human malaria and yellow fever.

SHOWING three times as much area as ordinary lenses used in aerial photography, a new lens, named the metrogon, was recently designed by engineers of the Bausch and Lomb Optical Company. With older lenses, aviators had to fly higher to take in more area, and then were unable to get the desired detail in their photographs because of haze in the air. With the new metrogon, they can fly at lower altitudes to photograph the same area, avoiding much haze trouble. Designed to eliminate much of the distortion usually associated with wide-angle lenses, this new "eye" will show single railroad ties anywhere in a two-mile circle under the camera, when the plane is a mile above ground. The detail that can be recorded by the center of the camera's field is limited only by the ability of the film to record it.

DRS. FRED E. ANGLE AND WILLIAM H. ALGIE, of Kansas City, Kans., reported to the American College of Physicians that undulant fever, acquired generally from drinking raw milk from infected cattle, is probably more common than generally supposed. They found evidence of a mild chronic form of this condition in over one third of a group of 426 Kansas City school children. Tests made at the same time as those for tuberculosis showed a surprisingly large number possibly infected, and questioning of parents of these children showed that many of them complained chronically of nervous symptoms such as appear in undulant fever.