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THE VELOCITY OF SHOOTING STARS

NEW proof that many of the brightest meteors that blaze through the atmosphere are not aimless cosmic "tramps" but are in reality minute rock planets traveling, like the earth, in orbits around the sun, has been reported by Dr. Fred L. Whipple, of the Harvard Observatory.

A feature of Dr. Whipple's investigation has been the successful use of a "meteor speedometer" in recording the terrific speeds of these shooting stars during the few seconds when they blaze out against the friction of the upper air. The complexities of computing the meteoric orbits also required the Harvard observers to undertake the intricate task of photographing the fiery paths of these bodies simultaneously with two widely separated telescopes.

In fifteen months of sky patrol, six of the bodies were "caught" by the two cameras, and data secured from which the distance, height, direction of motion, speed and orbit could be determined. Computing the masses of the meteors through measures of the braking effect of the earth's atmosphere on them, as shown in his "speedometer," Dr. Whipple found that the bodies observed ranged from several pounds for the slowest meteor to an ounce for the fastest. Their speeds in the atmosphere varied from nine to fifty miles per second.

Orbital computations have been completed for five of the observed bodies, Dr. Whipple reported. Four of these, he found, had been moving in small elliptical orbits about the sun, and were therefore members of the solar system. The fifth body had been moving in a hyperbolic orbit, indicating an origin in interstellar space outside the solar system. The hyperbolic meteor was calculated to have had a speed of twenty miles per second before it came into the sun's gravitational attraction. This speed is only slightly greater than the average speeds of the stars. The meteor cameras were placed twenty-four miles apart, one at the Cambridge station, and the other at Oak Ridge, in Harvard, Mass. The telescopes are the regular sky-patrol type in common use, and for this study were both trained at the same point in space, some fifty miles above the earth's surface. The "meteor speedometer," in the shape of an electrically operated "wind-mill camera," was attached to the Oak Ridge telescope. The main feature of this instrument is a set of fan blades revolving in front of the camera lens, interrupting the sky picture twenty times per second. When a meteor flashed down in front of the lens, its trail was cut twenty times for every second it was visible, and measurement of the artificially produced segments in the trail provided a precise indication of velocity. Dr. Whipple said that the underlying principle of this "speedometer" has been understood for many years, but because of various difficulties involved in its use, precise results have not been obtained by this method before.

The great distance between the two observing cameras was necessary to give a long enough "base" for geometric computations from the photographs of the position and movement of the bodies. Dr. Whipple found that the midpoints of the visibility of the meteors came at altitudes ranging from forty to seventy miles. The faster meteors were observed at higher altitudes, which is exactly what we should expect because the greater air friction of faster moving bodies would cause them to become visible at higher altitudes where the air is rarer. The meteors photographed would have appeared brighter than Mars to the naked eye and were therefore much brighter and larger than the average.

MINERAL SOURCES IN PREHISTORIC TIME

WHENCE did the ancient world draw its supplies of gold? New light on this interesting problem has been shed by the discoveries of a Russian expedition to Kazakstan in Central Asia sent out by the Soviet Government.

Large quantities of this precious metal—no less attractive to the peoples of antiquity than it is to the modern world—have been discovered from time to time in the tombs and burial places of prehistoric times in Mesopotamia, Egypt, Crete, Greece, especially at Mycenae, Italy, and in a lesser degree, in northern Europe. The jewelry, ornaments and vessels of gold, which were used by kings and nobles of their courts in their lifetime and accompanied them to their graves, are now to be seen in numbers in showcases of our modern museums.

It is of great interest and importance to archeologists to be able to trace not only gold, but also other minerals and material used by primitive and prehistoric man to their sources. If they succeed, this affords a valuable clue to cultural contacts and commercial relations of peoples of the early world. Study of these contacts has already shown that intercourse was far more frequent and far wider in extent than had been thought in early studies of archeology.

Archeologists for some time past have been trying to identify the source of copper found in quantities in the late Stone and the Bronze ages at Ur and other sites in Mesopotamia, through the nickel content. Nickel is rarely present in the known sources of copper of those eras. Though certain sources are possible, identification is not yet certain.

Some of the ancient gold in Egypt has been identified as coming from Transylvania. And a year or two ago Sir Flinders Petrie, Egyptologist, identified a gold earring, which he found when excavating at Gaza, as coming from Ireland in the second millennium B. C. At that time people of Ireland were beginning to exploit the rich store of gold from the Wicklow Hills, which was the material of so much of the characteristic Celtic art of the Bronze and Iron ages.

The Kazakstan mines, which now add another to the known sources of gold, were worked in the Bronze age. Although tools of bronze have been found, the majority were of stone or bone. The quantity found suggests that possibly hundreds of workers were employed. There are no iron tools.

By an accident, two skeletons of the miners have been preserved. They were killed by a fall of the roof. One skeleton when found had a necklace of glass and clay beads around the neck. In his hands were a bronze chisel and stone hammer. These skeletons show that the miners were not of Mongolian race. This, in view of the location of the mine, suggests that the gold may have been exploited by foreigners.

The mines were inter-connected by underground passages, some nearly 500 feet long. They had natural ventilation and were lighted by fat in shallow bowls, some of which have been found. Props were provided by stone cross-pieces. A primitive ore crushing plant, constructed of stone slabs and hammers, was found close by.

A further expedition is being sent out to continue the examination of the mines and the extraction of ore, which was not exhausted by the ancient miners.—E. N. FALLAIZE, Royal Anthropological Institute of London.

BOTANICAL COLLECTING IN NORTHERN CANADA

PÈRE ARTHEME DUTILLY, of the Oblate Missions, has been away from the Arctic for a winter and spring, while he worked up his collections and notes in the laboratories of the Catholic University of America in Washington, D. C. He will botanize this summer in the region around the northern end of Hudson Bay. He has been there before. His trips have taken him along all the Arctic coasts of Canada: around Labrador, in Baffin Land, on the Keewatin Peninsula, across the long coast of the Northwest Territories, up the Mackenzie and Slave rivers. He has plucked Arctic poppies growing through the snow at Latitude 76 North on Ellesmere Island, and pulled up trees by the roots alongside the Alaskan boundary. (The birch and willow trees of the Arctic coast never grow more than six inches high.)

Père Dutilly spent four years in the Arctic before he "came out" to where he could get at library and laboratory facilities, arrange his specimens and send them to the herbaria that are to house them.

He expects to write a book on the plant ecology of the Arctic. He has seen some interesting things that still await telling. For example, there is the matter of foliage color. Arctic plants tend to be purple instead of green. The higher the latitude the deeper the color. Père Dutilly can tell, from looking at another man's specimens, about how far north they grew. His rule might be summed up: "The norther, the purpler."

Plants, however, are not the whole of his interest. Eskimo health, he reports, is being badly undermined by the kerosene stoves which the traders have introduced. The stoves overheat the snow igloos in winter, changing the walls to ice, which lets the heat escape. The traders can not be induced to stop selling stoves and kerosene, so missionaries are showing the Eskimos how to set up their summer tents of skin inside the igloos and thus prevent at least part of the damage to the snow walls.—FRANK THONE.

THE KEEPING QUALITY OF DRUGS

MAKING drugs right, so that they meet standards of purity and potency, is only half the pharmacist's or manufacturing druggist's job. The other half is to make drugs which will keep their potency. The importance and some of the difficulties of the problem can be illustrated by the following research reports.

Digitalis tinctures, on which many heart disease patients depend for their lives, lost from 10 per cent. to 50 per cent. of their strength within a year, tests on frogs showed. Yet Dr. H. H. Haag, professor of pharmacology at the Medical College of Virginia, found that many of these same tinctures when tested on cats showed no loss of strength.

Further data have been obtained by Dr. James C. Munch for the American Pharmaceutical Association. Fifty gallons of a tincture were made and bottled under commercial conditions for this research. Tests every 3 months for 2 years and then once a year for 7 years were made. For 3 years the tincture lost from 10 per cent. to 15 per cent. of its potency every year. Then the potency stood still for several years, followed by an increase in strength. This "old" tincture of digitalis was found useful when given to patients needing the drug to save their lives.

Ragweed and timothy pollen extracts are used in testing for hay fever and asthma and also for treating these conditions. Dr. Herbert M. Cobe, of Temple University, found that strong pollen extracts lose their strength within 6 months to a year when stored at ice-box temperature. When stored at room temperature for a year or two the material is apt to be worthless.

These and similar problems were discussed at a recent symposium during the annual meeting of the Pennsylvania Pharmaceutical Association.—JANE STAFFORD.

A POSSIBLE NEW TREATMENT FOR DIABETES

A BRIEF, preliminary notice in the pages of a leading Hungarian medical journal forms the first step in what may some day be a new way of treating diabetes. If the findings, announced by Professor Albert Szent-Gyorgyi, biochemist of Francis Joseph University at Szeged, Hungary, who was a discoverer of vitamin C and the newer vitamin P, in *Orvosi Hetilap,* are substantiated by further experience they may revolutionize the treatment of the disease by enabling therapy by mouth instead of by injection.

A long known drug, one of the fatty acids, known as amber-acid, appears to have the power to combat the acidosis condition which is the dangerous end result of diabetes. The drinking of a solution of amber-acid (or taking it by capsule because of its disagreeable taste) has checked the acidosis in clinical tests performed at the university by Dr. Andreas Koranyi. Although only a small number of cases has been treated the results have been so astounding that the findings are now being made available to the medical profession.

Taking amber-acid by mouth is not a substitute for the secretion of insulin by the human pancreas, the lack of which causes diabetes. Rather the new drug aids cases of diabetes uninfluenced by, or little influenced by, the use of insulin. In the clinical tests of Dr. Koranyi patients were fed a diet rich in fats to create the acidosis. When the acidosis appeared the patients then drank solutions of

the amber-acid in tap water. It is also given in capsule form. An initial dose of 10 grams was later reduced to one gram for severe cases or a half gram in light ones. In one out of four cases slight traces of acetone persisted. In the case of a 42-year-old woman, suffering for years from the malady which increased despite insulin treatment, a prompt and favorable reaction was produced. The chemical structure of amber-acid contains four carbon atoms and the formula of the drug is the following: $COOH–CH_2–CH_2–COOH$, ($C_4H_6O_4$).

THE USE OF MOTION PICTURES IN SCIENCE

MOVIES to the millions mean entertainment. But they are also becoming a most useful tool to science. As new dimensions of cinematographic sight are developed, usually under the primary incentive of making the movies more startling and interesting, scientists apply them to their researches.

Color, now relatively easily obtainable in amateur or 16 mm film, is allowing operations to be recorded in faithful reproduction and with more fidelity so that future surgeons can study and view repeatedly the best techniques. Flowers, animals and insects, chemical experiments with color reactions and a thousand other happenings are now captured in color as a record and for later study.

Perspective or depth in movies promises to be added to color in the near future. This is accomplished by taking two stereoscopic pictures simultaneously by polarized light of two different orientations, and then viewing them with the aid of glasses that sort out one kind of light for one eye and the other for the other.

X-rays have been wedded to the movies. Not only the common variety used in medicine and industry are used for x-ray movies, but softer rays allow scientists to record the internal workings of creatures too delicate in structure to be caught by the ordinary hard x-rays. An x-ray view of a woman's digestive process was recently filmed at Rochester.

Slow motion pictures allow the dissection of what happens in less than the wink of an eye. High speed cameras with film moving 70 miles per hour and taking 1,500 pictures a second (ordinary movies are about 16 per second) are in almost routine use in ballistic and other researches.

And movies, both sound and silent, give psychologists an indisputable way of recording the results of the experiments, whether they are on monkeys or babies.—WATSON DAVIS.

ITEMS

F. L. WELLMAN, of the U. S. Department of Agriculture, reports that celery in the great vegetable-growing region of Florida is afflicted with a mosaic disease that mottles the leaves, makes the stalks watery, and in general ruins the bunch. It is a virus disease, carried by an insect. Certain weeds near the fields have been found to be reservoirs of the virus. Thorough removal of these weeds in a zone 75 feet wide has cut down the attacks from a high of 90 per cent. to almost nothing.

FOSSILS collected by M. K. Elias, of the Kansas Geological Survey, testify that grass waved in the West fifteen million years ago. It has long been assumed by geologists that grass existed then, for fossils of wild horses and other mammals with grass-eating types of teth are found in abundance in the region. But until Mr. Elias made his discovery there was no direct evidence. Most of the fossils show short grasses with small seeds. However, in the later part of the period studied there were grasses with seeds larger than those of modern wheat.

ASTRONOMERS are continuing their watch on the "Fourth of July" comet first reported by Professor P. Finsler, of the University of Zurich, Switzerland. Reports to Science Service from Dr. Harlow Shapley, director of the Harvard Observatory, report that Dr. Hamilton M. Jeffers, of Lick Observatory, California, has been observing the new faint sky object. The newest observations show that the comet has moved from its originally discovered position of right ascension three hours, six minutes and 52 seconds and declination, north, 39 degrees and 35 seconds to the following position: right ascension three hours, nine minutes and 8 seconds and declination, north 40 degrees, 32 minutes and 35 seconds. Averaging the motion for the three intervening days between observations shows the comet's daily motion to be about 28 seconds of arc in right ascension and about 31 minutes of arc in declination.

CONFIRMING earlier scientific "suspicions," Dr. Harlow Shapley, director of the Harvard Observatory, has announced the discovery of a vast, sprawling cosmic dust cloud near the north pole of the sky, obscuring and reddening the light from stars in this area. While such dust clouds in the sky have been found in the Milky Way it is unusual to find one far removed. The discovery will probably mean that the established values for magnitudes and the colors of stars in the polar region will need correction. The polar dust cloud in space was found by studies of stellar photographs in a survey directed by Dr. Shapley and Miss Rebecca Jones. The cloud region is about two astronomical degrees in diameter and removed some three degrees from the North Pole of the sky. Besides being irregular in outline, the cloud is also probably irregular in its blocking effect on the light from more distant stars. The presence of the cloud leads one to suspect a lack of transparency throughout this region, where starlight is not only cut down in intensity, but is affected differently for different wave-lengths, with the result that star colors will be abnormal.

EXAMINING hundreds of human brains, a Soviet anatomist, Gregoire Levin, of the Bekhterev Institute for Brain Research in Leningrad, has discovered that supposed "signs of inferiority" exists in brains of prominent civilized personalities just as frequently as in brains of benighted savages. His verdict, which deals a blow to the hope of science to find visible reasons for inferiority in human brains, is reported in the forthcoming issue of *The Journal of Physical Anthropology*. M. Levin checked up on six of the supposed signs of inferiority, which are often pointed out in brains of primitive peoples, or in brains of mental defectives. He concludes that no special racial characters have yet been detected in the structure of the brain. "The whole subject," he says, "demands a thoroughly expert and adequate determination in the future."