SCIENCE NEWS

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ANOTHER NEW SUPER-NOVA

A SECOND super-nova five hundred million times as bright as the sun is announced by Dr. Fritz Zwicky, of the California Institute of Technology. Discovered on a photograph taken at Mt. Palomar on September 10, the new super-nova, like that found on August 29, is in a remote extragalactic system, in this instance NGC 1003 in the constellation of Perseus, at a distance of at least seven million light years.

In spite of its enormous luminosity, the super-nova is so distant that it appears to the eye as only a faint telescopic star of magnitude 10.5. The date of its outburst is unknown. Photographs of the spectrum of the new star, taken at the Mount Wilson Observatory of the Carnegie Institution of Washington by Milton Humason on September 12, show the broad bands characteristic of super-novae. Further confirmation of the remarkable character of the star was obtained by Dr. Walter Baade, of the Mount Wilson Observatory staff. Dr. Baade, by determining the distance of the spiral system of stars within which it occurs, found that the intrinsic brightness of the super-nova, at the lowest estimate, is absolute magnitude minus 16.2, or about ten times that of all the rest of the stars in the spiral system of which it is a member.

The suggestion made by Dr. Baade and Dr. Zwicky in 1934, that the explosive outbursts of super-novae may possibly play a part in producing cosmic rays, probably can not be tested in the case of either of the two super-novae, Their distances are too great for any noteworthy effect to be expected. Nevertheless, observers of cosmic rays will carefully examine their records covering the appearance of these new stars, since the nature and amount of any possible effect is still uncertain.

The discovery of the new super-nova was made through use of the 18-inch Schmidt telescope, a small instrument with a wide and roving eye. Perched on Mount Palomar in southern California, it is a sort of pilot for the giant 200-inch telescope now building which in a few years will see deeper into space than any other aid to human vision.

By discovering two super-novae, the 16th and the 17th the world of astronomy has known, within a fortnight, this Schmidt telescope in the hands of Dr. Zwicky has become a famous instrument. It promises to make more discoveries.

In its work of discovery, the Schmidt instrument is teamed with the 100-inch telescope of the Mount Wilson Observatory near Pasadena. The Schmidt instrument scans the sky for interesting events. It covers a portion of the sky many hundreds of times larger than does a large reflecting instrument and many pictures can be made in a single clear night. It is also less sensitive to atmospheric disturbances. Once the discovery is made by means of the Schmidt instrument, the great 100-inch telescopes and lesser mirrors are used to make detailed studies. This was the course of discovery in the case of the two distant, flaming, "new" stars that have exploded with such brilliance.

ROCK RECORDS OF METEORITES

GIANT meteorites, crashing into the earth's crust, like projectiles from super-artillery in outer space, leave in sub-surface rock layers records of their arrival that persist as permanent geologic features even after the great explosion craters have been weathered away. The geology of these deeper records has been studied by Drs. John D. Boon and Claude C. Albritton, Jr., of the Southern Methodist University. Common meteorites leave no such rock-written histories. The tiniest ones, no bigger than grains of sand, burn themselves out, through friction with the upper air, long before they can reach the earth. They are the "shooting stars" seen every night. Larger masses of astronomic iron or stone, weighing a few ounces or pounds, or even several tons, do reach the earth, but the blanket of air has braked their speed so much that they do not strike with force enough to penetrate deeply.

But Drs. Boon and Albritton envision a really big meteorite, like the one that made Meteor Crater in Arizona, as a mass 100 feet or more in diameter—about the size of a 10-story apartment house. Such a missile would plunge through the earth's atmosphere with practically no slowing down at all.

What its explosive effects would be, Meteor Crater offers impressive witness, even after probably thousands of years of erosion. A solid mass of iron or stone of that size sets up explosive effects on impact through conversion of part of its own substance, and of the rocks it strikes, into white-hot vapor. Explosive forces thus generated are calculated in tens of millions of pounds' pressure per square inch.

The effects on the deeper-lying rock, however, are not caused by the explosion, but by the impact of the solid mass itself. This, Drs. Boon and Albritton state, would throw the rock strata into waves, like the waves on a pond when a stone is thrown into it. These rock waves would "freeze" almost instantly, with a dome-shaped structure in the center and one or more concentric elevated rings around it; all buried beneath the earth's surface.

Geologic structures of this kind are known in at least half a dozen places in the United States. They have hitherto been called "cryptovolcanic," and were supposed to have been caused by deeply subterranean explosions of volcanic origin. Some of them are in very ancient rocks.

CYPRESS BARK CANKER AND THE MONTEREY CYPRESSES

ONE of America's most famous tree species, the Monterey cypress of California, is threatened with extinction by a fungus disease, the cypress bark canker. Under the leadership of the U. S. Department of Agriculture, with the voluntary cooperation of citizens and the aid of CCC workers, heroic efforts are now being made to check it.

The region where first defense efforts are being centered is on the Monterey Peninsula itself, where the only living natural stands of Monterey cypress are located. There are

two natural groves of the trees, one on Point Lobos, the other on Cypress Point. Thus far the disease has not reached these natural stands, but it has been rampant among ornamental and windbreak plantings of Monterey cypress within a very few miles of them.

Willis W. Wagener, of the Department of Agriculture, has made a critical study of the fungus and the symptoms that indicate its presence in the trees. The fungus is known ony as the cause of this particular disease. It is considered to be a new species, and the technical name *Coryneum cardinalis* has been proposed for it. It gets into the wood of the tree, works its way around through the inner bark and the growth layer, or cambium, until it has the twig or branch completely girdled. A common but not invariable symptom is excessive oozing of gummy balsam.

The disease has now been discovered in planted Monterey cypresses over about two thirds of the entire state of California. It also attacks the imported Italian cypresses, though less virulently. Laboratory experiments have shown that other conifers related to the cypress may be susceptible, but thus far they have not been found infected under field conditions.

If it is found in an early stage, infecting only a few twigs or branches on a tree, it may be stopped by drastic surgery, removing the wood well below the infected place and spraying the foliage heavily with Bordeaux mixture to kill spores that may be there. But if the infection is more extensive, the only price for a safety of trees still unattacked is to cut down and burn the entire infected tree. Citizens, reached by appeals to make this sacrifice for the sake of one of California's greatest rarities and most beautiful scenic features, have voluntarily destroyed their own plantings by thousands.

The advance of the canker toward Point Lobos and Cypress Point has been checked at least for the present. What the future may bring is, in part at least, a matter of vigilance by scientists and citizens alike.

EXPLORATIONS IN UTAH

EXCAVATING floors of caves in the Salt Lake region of Utah, Dr. Julian H. Steward, of the Smithsonian Institution, has discovered traces of human life entirely different from the Pueblo Indians, or the older Basket Maker Indians, or the still older Folsom bison hunters, who represent the main stream of ancient history in our Southwest. The expedition, the report of which Dr. Steward has just published, was financed jointly by the Smithsonian Institution and the University of Utah.

Salt Lake cave dwellers go back at their earliest to 10,000 or even 15,000 years ago, Dr. Steward estimates from the geology of the region. Black Rock Cave, scene of some of the discoveries, became dry and habitable about that time when old Lake Bonneville was receding, and the evidence is that early hunters lost little time moving in.

A baby found buried in the floor of the Black Rock Cave was one of its earliest occupants. With the child, Dr. Steward found only a dagger-like article of bone. Hunting weapons of men of this era were also unearthed, and the archeologist reports that these small dart or arrow points do not offer any evidence that these Utah cave dwellers were related to the Folsom bison hunters, though they may have been contemporaries in the Southwest. So new are the Salt Lake aborigines to science that even the successive occupants of two caves can not be fitted into their relationships one with another.

The latest inhabitants, who lived in the region about 1000 A.D., after the Pueblo Indians had vanished from northern Utah, have left numerous clues to their way of living. Dr. Steward suggests calling these Indians the Promontory people, from a cave at Promontory Point, where they first came to light. Features of their unusual culture include: a unique type of crude black pottery, decorated by the thumbnails of the potters; soft-soled moccasins resembling baby bootees and mittens with the thumb ingeniously tailored, both of which, Dr. Steward believes, were borrowed or inherited through some relationship with far northern hunting tribes; a variety of gaming devices, including flat bones, cane gambling pieces, a netted hoop and dart games and an ornamented beaver tooth rather similar to those used as dice by northwest coast tribes. Promontory people of Utah were economical, for out of 248 moccasins found in one cave, all but 58 had been repaired with half soles, patches and even patches on patches.

SOME FURTHER PAPERS READ BEFORE THE FIFTH INTERNATIONAL CONGRESS OF RADIOLOGY

DRS. JOHN H. LAWRENCE, Paul C. Aebersold and Raymond E. Zirkle, of Berkeley, Calif., reported to the Fifth International Congress of Radiology held recently in Chicago, that neutrons are five times as effective as x-rays in destroying breast cancer of mice. Unlike x-rays, Dr. Lawrence explained, neutrons can penetrate dense substances such as lead but are absorbed by lighter materials such as tissue which is rich in hydrogen. Since their discovery, it has been hoped that they would prove a potent weapon against cancer, but proof of this has so far been lacking. Dr. Lawrence and his associates compared the killing or growth-checking effect of neutrons and x-rays on wheat seedlings, drosophila eggs, fern spores, a transplantable breast cancer of mice and whole normal mice. The neutrons were more effective than the x-rays in every case, but in different degrees. They were two times as effective on drosophila eggs, five times on wheat seedlings, four times on normal mice, five times on the breast cancer, and two and a half times as effective on fern spores. The results of these studies seem to indicate that neutrons may be able to single out from the rest of the body and destroy the cells of some kinds of cancers.

THAT cosmic ray particles reach the earth's atmosphere with the immense voltage of ten billion was reported by Dr. Bruno Rossi, of Padova, Italy. Dr. Rossi presented the latest results of researches upon the penetrating radiation from outer space that man has not yet been able to use practically. Whereas a million or two is about the peak voltage practically used in connection with x-rays and

neutrons in medical treatment or research, Dr. Rossi told the congress that a greater part of the primary cosmic radiation is composed of electrified particles and that most of the particles observed reach the earth's atmosphere "with an energy greater than 10,000,000,000 volts." He traveled to the Italian colony of Eritrea on the Red Sea to make some of his cosmic ray observations.

LIMITATIONS in the advantages of million-volt x-ray machines for the treatment of cancer were pointed out by Drs. Paul C. Aebersold and Milton A. Chaffee, of San Francisco. Working with a "phantom" subject in place of a patient, these investigators compared the effects of the two kinds of radiation for treating deep-seated cancers. They found that "Only for thick sections and small fields" is the advantage of the supervoltage appreciable. For sections as thin as the neck, they question the advisability of using supervoltage radiation in cross-fire technique, which is the technique generally used.

THE important part that x-rays can play in diagnosing unsuspected sinus disease and in treating the condition in some cases was reported by Dr. Fred M. Hodges, of Richmond, Va. For fifteen years it has been his practice to make a "scout sinus film" in every case sent in for chest examination unless the condition found by x-ray pictures of the chest was sufficient to explain the symptoms. "In this way," Dr. Hodges said, "a large number of unsuspected sinus infections has been found. Almost every common cold that failed to clear up after a reasonable time showed definite evidence of sinus infections." Dr. Hodges also stressed the importance of close cooperation between the nose and throat specialist and the radiologist.

X-RAYS may prove useful in detecting small amounts of metals in the organs of the body in cases of poisoning, it appears from studies reported by Dr. L. Grebe, of Bonn, Germany. The method would be equally useful in cases of poisoning due to industrial processes or in other types of poisoning. Lead, mercury, gold, silver, copper, zinc, nickel and cobalt were among the metals which Dr. Grebe was able to detect by this method, which combines the x-ray and the spectrograph. He was able to detect the metals in the kidney, liver, heart, skin, muscle, intestinal wall, gall bladder, stomach wall, stomach contents, blood, spleen, spinal cord, brain, adrenal glands and uterus.

ITEMS

FLYING fish, like airplanes, prefer to take off into the wind rather than with it, studies by Dr. Carl L. Hubbs, of the University of Michigan, have shown. In many observations by himself and his associates, flying fish of several species have been seen to take off almost always to windward when the wind was abeam of the ship that disturbed them. With either a head or a stern wind, the fish would take off to both port and starboard. The observations confirmed the opinion long held that flying fish do not really fly, but hold their long, plane-like fins rigid and glide through the air like sailplanes. The longest glides observed lasted about a quarter of a minute.

"SIGATOKA," a fungus disease that attacks and destroys banana plants in Guatemala, can be brought under control by use of a special type of spray, according to a report of K. Molesworth, assistant trade commissioner for the United States. A Bordeaux mixture spray, consisting of copper sulfate and lime, is effective in combating the disease which, accidentally introduced from Java, was causing serious inroads on banana plantations in Guatemala and in Honduras.

VITAMIN B_1, which prevents beri-beri, a severe nervous disease of man, and Vitamin C, which guards humans against scurvy, have been found to increase markedly growth of seeds raised in artificial media, James Bonner and Grice Axtman, of the California Institute of Technology, have found. Growth of pea embryos in glass was increased by very nearly 50 per cent. by the addition of small amounts of the vitamin to the seedlings' artificial food supply.

CINNAMON trees once grew in what is now Texas, millions of years ago, when there were dinosaurs to browse on their leaves. A group of fossils which includes leaves of plants like cinnamon, sassafras, sarsaparilla and maple, found near Stephenville, Texas, are described by Professor O. M. Ball, of the Agricultural and Mechanical College of Texas, in the *Journal of Geology*. The fossils represent one of the oldest, if not the oldest, groups of higher plants thus far discovered in America. Their geologic age is given as Lower Cretaceous.

STANDARDIZED maps for showing the world's weather were urged before an international meteorological meeting held recently at Salzburg, Austria, by Dr. W. R. Gregg, chief of the U. S. Weather Bureau. Dr. Gregg is president of the Commission on Projections for Meteorological Maps. In his address, Dr. Gregg pointed to an analogy between map projections and standard time zoning. Along only one meridian of longitude in any particular time zone do solar time and standard time agree. Elsewhere, time is falsified. But the practical benefits more than offset the disadvantages of such falsification. Similarly, any projection of the spherical surface of the earth on a flat map is correct along only one parallel of longitude. Everywhere else on the map there is spatial distortion. But the practical benefits offset the disadvantages. Dr. Gregg and his colleagues of the commission recommended that the thirtieth and sixtieth parallels of longitude be adopted by all nations as projection bases for their weather maps. Standard reduction scales were also recommended.

NINETY-SIX beavers, imported into Pennsylvania where they had been extinct, have multiplied to well over 15,000, according to the last beaver count. The 96 animals were brought in between 1917 and 1924; no beavers had been found in Pennsylvania for the seventy years prior to 1917. They represent a decided economic asset, for, now that trapping is permitted, the annual take ranges upward of 6,500 beavers worth more than $20,000.