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SUPERNOVA FOUND IN DISTANT NEBULA

DISCOVERY of a gigantic celestial explosion, a supernova, or star that has flared in a far distant nebula to extraordinary brilliance, probably hundreds of thousands that of the sun, has been made by Dr. Fritz Zwicky while observing on Mount Palomar, Calif., where the 200-inch telescope is being erected.

This newly-discovered outburst is located in the elliptical nebula known as NGC 4621, a member of the Virgo cluster. It is about 15th apparent magnitude, which means that it can be seen only with a powerful telescope. Identification of it as a supernova was made from a spectrum obtained at Mount Wilson Observatory, and Dr. Walter S. Adams announced the discovery by communicating the information to Harvard College Observatory, the clearing house for astronomical information. This supernova is only the nineteenth reported in astronomical history. Dr. Zwicky has made a special search for supernovae and during the past few years has found several.

Famous among the rare supernovae of the past is Tycho's star, which appeared in November, 1572, and was for some days visible in daylight and brighter than Venus at her best. Another temporary star, observed by Kepler in 1604, was as bright as Jupiter and remained visible for two years. These were much closer to the earth than the supernova just discovered by Dr. Zwicky and were therefore seen by the unaided eye. More frequent are temporary or "new" stars giving out less light. These ordinary novae are not in the same class with the supernovae. But they attract much attention, both on the part of lay observers of the stars and the astronomers. Nova Herculis, which burst forth shortly before Christmas, 1934, was a spectacular ordinary nova.

Scientists speculate on what remains of novae when they fade away. One suggestion is that they become stars consisting of neutrons with no ordinary matter in their make up. The neutron is one of the basic building blocks of matter and it was discovered in 1934. Such a spent star of neutrons would be extremely dense. The earth's mass on the same density would be a ball less than two miles in diameter.

The outburst of a nova transcends in magnitude all other known physical catastrophes. Astronomers do not know just what happens. Favorite among theories is that there is a tremendous release of energy within the atoms of matter composing the star. Another suggestion is that novae occur when two stars collide.

TOOTH DECAY CAUSED BY DRINKING WATER

DRINKING water may be a weapon of to-morrow for fighting and conquering tooth decay or dental caries. This possibility looms as a result of a "startling finding" reported by Dr. H. Trendley Dean and his associates of the U. S. Public Health Service.

The amount of tooth decay among school children is not the same in one town after another, as might be expected. There was double and treble as much found among children in two Illinois cities, Macomb and Quincy, for example, as in the near-by cities of Galesburg and Monmouth. The difference, it appears, is related to differences in the water supplies, and particularly to differences in the amounts of fluorine in the drinking water.

Fluorine in drinking water is the cause of the ugly tooth condition of mottled enamel. But in Galesburg and Monmouth, where the water contains 1.8 and 1.7 parts per million of fluorine, the threshold of safety for mottled enamel, the children's teeth showed much less decay than in the towns of Macomb and Quincy where the drinking water contained only 0.2 parts per million of fluorine.

Dr. Dean is not yet ready to advise adding fluorine to drinking water to prevent tooth decay. Before recommending such a step he wants more evidence to show that it is the fluorine and not some other constituent of the drinking water that makes the difference in the amount of dental decay. But he called the latest findings "startling" and said that they showed the drinking water may be "deucedly important" in connection with the tooth decay problem.

Dental caries, or tooth decay, is second only to the common cold as the commonest of mankind's ills, affecting at least 19 out of 20 persons.

GRASSHOPPERS AND DRY WEATHER IN THE NORTHWEST

WAR between man and grasshopper hordes in the West is getting down to grim grips, according to field reports received at the U. S. Department of Agriculture. To the northwestern grain and range states particularly, where dry weather during the present month has favored the enemy, it has been necessary to send in heavy supplies of poison ammunition.

Shipments totaling 5,300 carloads, or 107,000 tons, of bran-sawdust-arsenic bait have gone to 1,000 points on the battlefront in the five states of Montana, Wyoming, the Dakotas and Minnesota, where the grasshoppers have been observed emerging from the ground "by the billion."

Normally, the young grasshoppers do not crawl far from their hatching areas, but content themselves with feeding on the near-by vegetation. However, drought this spring has stunted plant growth, and shortage of supplies may cause them to begin mass flights as soon as they have matured and grown their wings. It is for this reason that the entomological chemical-warfare squads are laying down poison-bran barrages as fast as they can.

Hatching has been general farther south, to the Mexican border and west to California. In some unfortunate spots in New Mexico and Arizona, 70 per cent. of the eggs in the soil have produced young grasshoppers. Populations of the insects as high as 1,500 per square yard have been counted in these spots.

Heavy shipments of poison bran-sawdust bait have already been made to these more southerly threatened points. But all this costs money, and the 'hopper-fighters would rather see rain do their work for them. Rain helps in two ways: indirectly, by causing better growth of food plants, thus immobilizing the hordes; and directly, by battering the young insects into the ground and killing them or by encouraging the growth of fungus diseases that decimate their ranks.

PLANT SEX HORMONES IN A LOW FORM OF WATER FUNGUS

FOUR different hormones, created and acting in sequence, control the preliminary sex functions in a newly discovered species of fungus water mold, a very primitive plant form, according to Dr. John R. Raper, fellow of the Harvard Biological Laboratories.

Sex hormones have been studied for many years in human beings, animals, and higher plants, and there have been a few indications that such substances operated in low plant forms. But the activity of sex hormones in a plant have not been shown clearly and conclusively until Dr. Raper's work.

Two of the four hormones observed by Dr. Raper arise in the female plant, and initiate responses in the male plant; the other two hormones are produced by the male and initiate responses in the female. The hormones are known as "diffusion hormones," originating in plants of one sex and spreading through the water to plants of the other sex.

In his elaborate and delicately controlled tests, extending over two years, Dr. Raper determined that the hormonal activation and coordination of reproduction in the water mold is exercised as follows: hormone "A" arises from the female plant, is carried to the male plant through the water habitat, and induces the formation on the male plant of shoots, known as antheridial branches; hormone "B" arises from these new male branches, diffuse to the female plant, and gives rise there to small bulbs, known as oogonial initials, which afterwards contain the egg cells; hormone "C", arising from the female bulbs, attracts the male branches into contact; hormone "D" arises from the branches and delimits the female plant bulb. Reproduction of the water mold is rapid when male and female plants are placed in the same culture; but the plants are sterile when the sexes are separated.

Dr. Raper emphasized that his findings apply only to certain low forms of plant life, and perhaps not to other low forms or to higher more complex forms, such as flowers and trees. It may well be that the reproductive cycles of other low forms and the higher forms have entirely different controls from those observed in the water mold.

His work provides ground for belief that at some points the functions of sex hormones in the water mold are quite similar to those in animal forms. It was shown that in the primitive water mold the hormone control of the reproductive cycle is extremely complex, as it is in the higher animals.

LIFE-SAVING FUNCTION OF TONGUE

YOUR tongue saves your life, Dr. Curt P. Richter, of the Johns Hopkins Hospital, pointed out at the American Neurological Association meeting in Atlantic City on June 5. Not only can it save you from swallowing poisons, but the tongue and its taste buds can guide your selection of foods so that you will get all the life-essential elements of diet, from salt to vitamins.

"The tongue is the watchdog of the diet," Dr. Richter said, "but dietitians and doctors have largely neglected it in their consideration of human diets."

The tragic story of a three-year-old baby girl whose craving for salt was not recognized as a vital demand of her body until too late to save her life was a dramatic example of the importance of the tongue as a guide to diet that occurred coincidently with Dr. Richter's innumerable tests of rats' tasting abilities which were the actual basis of his report.

The little girl was brought to the Johns Hopkins Hospital from Florida to find why she was growing up too fast, with precocious sexual development. While in the hospital she was given the dietetically correct food for her age. After her death, it was found that a tumor of the adrenal glands was responsible for the sexual precocity. More than this, it had crowded out the vital outer part of these glands, causing a condition like that in the once-fatal Addison's disease.

In this condition, large amounts of salt are lost from the body and must be made up in the diet. Because the condition had not been recognized before her death, the child was not given any extra salt. But afterwards her mother reported that the child had for a long time craved salt, eating it by the handful, as most children like to eat sugar. This same condition in rats helped Dr. Richter to discover the vital importance of the tongue and its taste buds. Rats, he has found, can tell the sweetness, sourness, saltiness and many other flavors of foods or drinks. They tell it by taste.

This was proved when the animals lost their tasting ability after all nerve connections were cut between the taste buds of the tongue and the brain centers. So long as some of the nerve connections remained the animals could detect different tastes.

The rats that had no adrenal glands, for example, could detect salt well enough to save themselves from death by drinking all the salt water they needed. When all the nerves were cut, however, taste was completely destroyed. The animals drank indifferently from either salted or unsalted water supplies. They thus failed to get enough salt and died. Taste guides the animals not only to enough salt. Normal rats, relying on taste alone, can select as good a diet for themselves, with the necessary amounts of fat, sugars and starches, proteins, minerals and vitamins, as scientists with all their knowledge can provide. Dr. Richter discovered this when he supplied the animals with a wide variety of food substances and let the animals help themselves.

When he gave them a diet lacking in any essential, vitamin B for example, and supplied this in a tube of

water identical with the drinking water tube, the animals invariably drank enough of the vitamin B water, although the only way they could tell it was by the taste.

BERYLLIUM WHICH IS LIGHTER AND STRONGER THAN ALUMINUM

THE Temporary National Economic Committee in its hearing on the newborn beryllium industry is slipping back the curtain for a glimpse at a coming revolution in metal, for whose control potent industrial interests are already maneuvering.

Not one person in a thousand has ever seen a sample of the metal itself or of an alloy containing it, but beryllium, two thirds as heavy as aluminum and several times as strong, may produce greater changes in the next ten years than aluminum in the last thirty.

The use of beryllium thus far has been held back by costs which, until only a few years ago, were prohibitive, but with the price dropping—it is now $15 a pound for beryllium in the form of an alloy with copper—engineers and metallurgists all over the world are putting it to work.

Its enormous tensile strength and, in the form of an alloy of about three parts of beryllium to one of aluminum, its resistance to wear and unusually high melting point are putting it into experimental airplane engine pistons. Not only are tremendous amounts of weight saved—and every pound saved in the construction of a plane is worth $40 to the owner of the plane—but it gives better service and enables more power to be taken out of the engine. Both the Army and Navy have purchased sizable quantities for study.

"Be-Al" alloy has about the same weight as pure aluminum and two-thirds that of duralumin, the aluminum alloy now most widely used in airplane construction. Its tensile strength is claimed to be four times that of duralumin and is much greater than that of pure aluminum. Hence its potential usefulness in plane structures.

When added in small amounts to copper, copper's properties are changed amazingly. About two per cent. of the new metal increases its conductivity of electricity by nearly a fifth. Other low-beryllium-content copper alloys are as hard as steel and are used for making machine tools for use in places where steel tools would be dangerous because of sparking.

Beryllium in its pure state is not likely ever to find wide use because it is extremely brittle. But that is apparently its only undesirable physical property, which would make it something of a phenomenon among metals, for almost all others have many more than one serious objection to their characteristics.

It is the third in the trio of light metals which science has brought the world in the last 50 years—aluminum, magnesium and beryllium. In time it is likely to be the most important.

ITEMS

WHILE plans for an American Antarctic expedition are being speeded, the destination of the proposed venture, for which a $340,000 appropriation is asked of Congress, is unannounced. The difficulty of choosing a practical region for the landing and for a scientific laboratory is seen as a main reason. Admiral Byrd, who is being consulted on all matters in regard to the expedition, faced the same problem in guiding his expedition. Major scientific organizations in the United States have been invited to a conference to discuss participation in the Antarctic expedition, by the Interior Department, sponsor of the project. It is expected that these organizations will send men and equipment to study cosmic rays, terrestrial magnetism, and other scientific problems on which an Antarctic laboratory, maintained for three or four years, might make progress.

CHILDREN'S heads grow most rapidly in length between the ages of two and five, in length between two and four. Length increase then drops off sharply until seven, and there are further pulsations of growth until about 13. Then boys' heads take on a new spurt, but girls' heads slow down in growth. These are among the results of measurements taken year after year on the heads of more than 250 children from the time they were two years old until they were sixteen or seventeen, reported in the June issue of *Human Biology* by Dr. Marcus S. Goldstein, of New York University. Girls who reached physiological maturity earliest had heads definitely larger than their late-maturing companions, Dr. Goldstein found.

THE latest reports to the U. S. Public Health Service indicate that the infantile paralysis outbreak in South Carolina continues unabated while the rest of the nation is remarkably free from the disease. The Federal health service has had three officers investigating the outbreak and expects to send experts on infantile paralysis aftercare to South Carolina as soon as possible. During the week ended May 20 there were 28 cases of the ailment in South Carolina, most of them in and around Charleston. In the rest of the nation there were 15 cases scattered throughout nine states. The South Carolina outbreak has been building up since before Christmas, with a sudden increase during the first week in May. Health officials would expect about 19 cases of the disease in the entire country at this time of year. No major outbreak of infantile paralysis has occurred since the summer of 1937. Health officials are unable to predict whether the South Carolina epidemic will remain local or will spread throughout the rest of the country this summer.

GENTLE rains are usually thought of as friends of the soil, in contrast to the heavy, slashing, "gully-washer" type of downpours, yet they also do their share of harm to the land in the Piedmont region of the East and Southeast, declare scientists in the U. S. Soil Conservation Service. The gentle rains soak in, soften the soil, and where gullies have already been cut, the edges and sides crumble and slump off. If this débris were left to lie and become grass-grown, it would not be so bad. But then come the heavy rains, the "gully-washers." They scour the gully bottom clear, leaving these gashes in the earth wider year by year. The cure prescribed: check-dams, planting of grass, bushes and trees, field terraces that follow contour lines and intersect the water's precipitate lines of flow.