# SCIENCE NEWS

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## NOVA CEPHEI

NOVA CEPHEI, the brilliant new exploding star discovered simultaneously on the night of June 18 by four independent observers in this country and Europe, gives indications that it may become brighter.

The nova, first to come into view since the famed Nova Herculis in 1934, is the same type of exploding star as its predecessor. Located in the constellation Cepheus in the Milky Way, the body is of the third magnitude and easily visible to the naked eye. It is a little north of the zenith at 4 A.M., but in high northern latitudes it is visible all night. It can be seen two degrees southwest of the familiar variable star, Delta Cephei.

Word of the discovery was received at Harvard College Observatory, the clearing house for astronomical news in the Western Hemisphere, from four observers. They are Leslie C. Peltier, Delphos, Ohio, amateur astronomer who a few weeks ago discovered a new comet in the same part of the sky; Eppe Loreta, of Bologna, Italy; A. V. Nielsen, of Aarhus, Denmark, and C. Hoffmeister, of Sonneberg, Germany. News of the discovery has been flashed to observatories all over the world and already data concerning this important stage in the development of the nova are being received.

The Yerkes Observatory has reported the magnitude as 2.9, and places it in the high temperature class, "B–9." According to Dr. Otto Struve, director of the observatory and a specialist in the study of stellar spectra, the star shows diffuse hydrogen and magnesium absorption lines as well as strong interstellar calcium lines. The rate of explosion is estimated about 1,000 kilometers or more than 600 miles per second.

Observations made by Dr. Dean B. McLaughlin at the University of Michigan, communicated by its director Dr. H. D. Curtis, confirm those made at Yerkes Observatory.

Astronomers all over the world are observing the star, for, like Nova Herculis, it is capable of contributing valuable information on the nature of stars and evolutionary processes in general throughout the universe.

## ACTIVITY OF THE STARS

THE inside of a star is a factory which makes complex elements out of the simplest element of all, namely hydrogen. This is the point of view presented to the American Physical Society, meeting at Seattle on June 19, by Dr. R. M. Langer, of the California Institute of Technology.

The output of the factory is not complex elements but energy which is radiated away as the star shines a few billion years. The complex atoms are left behind mostly in the form of iron. Only a minute fraction of the energy of a single star, the sun, is caught by our earth and this energy is what makes our factories work to make complex things out of simple ones.

The stellar factory would blow up in its enthusiasm for energy production were it not for the stabilizing effect of the complex atoms. Of these the most important stabilizer is heavy hydrogen. When things get too hot heavy hydrogen breaks up into a neutron and an ordinary hydrogen atom and things are back where they started.

It is this accident of the balance between neutrons and deutons which determine how hot the star becomes and how long it lives. The internal temperatures are about half a billion degrees and the life is several billion years. According to Sir James Jeans the stars shine much longer than that, but few agree with him. No process known to happen is competent to keep a star going over ten billion years. No process known is able to heat a star over a billion degrees because the radiation at that temperature would exhaust any process ever suggested before that temperature would be reached.

At these high temperatures matter is quite different from the matter we know. No compounds exist. No solids or liquids are possible. Neutrons, positive electrons and deutons, all newly discovered and rare on the earth, abound. Above all and predominating everything, photons of light fierce as x-rays rage to and fro. Nothing is safe from their influence. They create matter and are created by matter. Things are so lively that we can never hope to make any direct experiments under these conditions. Yet the basis for Dr. Langer's calculations are the experiments which are being made in many laboratories with comparative ease shooting atoms at one another at high speed and scoring the hits.

## NEW HIGH-VOLTAGE SYSTEM

AN improved system of generating extremely high voltage in which the equipment is virtually "wearless," has been developed by Dr. Odd Dahl, physicist of the Department of Terrestrial Magnetism at the Carnegie Institution of Washington. It has potential use as a cheap form of apparatus with which to disrupt atoms.

Like the great electrostatic generator of Dr. Robert Van de Graaff, of the Massachusetts Institute of Technology, which works on principles of electrostatic electricity known for half a century, the new device of Dr. Dahl goes back fifty years to the old rotating disk type electrostatic generator used by the German investigator Holz in the 1870's.

But unlike the Van de Graaff device which carries its electrical charge bit by bit on a paper belt to an insulated sphere and thus creates high voltage, the new Carnegie equipment uses insulating plates on a whirling disk to carry the electrical charge over to the storing terminal.

The disk, spinning 1,350 times a minute, passes through a space in which there is ionized air from a corona discharge and picks up the charge. There is no direct rubbing contact and hence very little wear in the apparatus other than the normal wear on bearings in the electrical motor drive and in the shaft of the disk.

With a small, compact design of equipment, Dr. Dahl has obtained a potential of 220,000 volts and drawn currents of from 10 to 30 milliamperes. This is ten times

as much electric current as can be obtained from the giant Van de Graaff generator of the Massachusetts Institute of Technology or from the 1,200,000 electrostatic generator in the laboratory of the Carnegie Institution in Washington.

To obtain electrical pressures of over 1,000,000 volts, Dr. Dahl suggests that a number of these small whirling disk units could be connected together in tandem so that the voltage output would be additive. It is believed that the ultimate limit of the voltage would only be determined by the insulating difficulties.

## A NEW INSULIN COMPOUND

THE advantages of protamine insulin over ordinary insulin in the treatment of certain cases of diabetes were described by one of the co-discoverers of insulin, Professor C. H. Best, of the University of Toronto, at the Vancouver meeting of the Canadian Medical Association.

The new kind of insulin was developed by Danish investigators. It was not intended to supplant ordinary insulin in cases of diabetes which can be satisfactorily controlled by insulin alone, but was found a valuable adjunct to insulin in treating cases of severe diabetes. Protamine insulin is relatively insoluble and tends to be absorbed slowly and over a longer period of time than ordinary insulin. Consequently its blood sugar-lowering effect lasts longer—twice as long, in fact.

"The work of the Danish group on protamine insulin has been abundantly confirmed," Dr. Best said. "Various groups of clinicians in Boston, Toronto, London, Eng., and Rochester, Minn., have found that the duration of insulin action is much extended when insulin is combined under appropriate conditions with protamine."

Dr. Best and his associate, Dr. Robert Kerr, found that dogs having no insulin-producing pancreas tissue could be kept free from symptoms of diabetes by one injection of protamine insulin daily. At least two injections of regular insulin are needed to accomplish this result. The fluctuations observed in the amount of sugar in the blood when regular insulin is used are avoided with protamine insulin.

The use of protamine or some even more satisfactory agent will make it possible, according to Dr. Best, to maintain certain diabetic patients in a much more normal condition.

## DEATHS FROM DIPHTHERIA

LAURELS and censure are awarded to American cities by the American Medical Association. The laurels go to the nineteen large cities whose 1935 records show not a single death from diphtheria. The censure is applied to ten other cities whose high death-rates from diphtheria show that they do not appreciate what can be done to protect their children from this dangerous disease.

Knoxville, Tenn., had the highest diphtheria rate in the United States during 1935, with 13.6 deaths per hundred thousand population. Baltimore, Md., where the campaign for diphtheria prevention by immunization has been carried on actively, had the wonderful record of not a single resident death from this disease for one year and sixteen days.

"What is the matter with the other cities along the South Atlantic seaboard?" asks the editor of the association's journal. "One would expect Washington, D. C., to have as low a rate as Baltimore, but the average diphtheria mortality has been nearly ten times as great.

"Cities like Miami and Tampa, Fla., with a 'good climate' ought certainly to bring their diphtheria rates down to a level with those of the cities in 'bleak' New England and central New York."

Peoria, Ill., had a very high death-rate during the first six months of the year. Improvement in the second six months, as a result of immunization of children, drew from the medical journal editor the comment: "It should not be necessary to wait until a considerable number of children are attacked before general immunization is undertaken."

## THE THREAT OF GRASSHOPPERS

GRASSHOPPERS are again a major threat to crops in the West, due to high temperatures and lack of rain during early summer. And in most places ammunition to fight them is lacking. Unless the Congress acts, during its closing hours, on a resolution to transfer already appropriated but still unused funds from the chinch-bug appropriation of last year, disaster may await grain crops and pastures.

The situation is described by the U. S. Bureau of Entomology as "serious" in Oklahoma, Kansas, Nebraska, Montana, southern Iowa, and a few counties in northwestern Illinois. It is not yet serious in North Dakota, but is expected to become so very soon. South Dakota prospects are not so bad as they are elsewhere in the Northwest, though there is cause for concern in that state also.

What makes the situation particularly critical at the present juncture is that none of the states has funds of its own available for the purchase and distribution of poison bran bait, the standard means of anti-grasshopper combat. Neither is there any federal appropriation available for that purpose. The state legislatures will not meet until next year, and the Congress is about to adjourn. The one possibility lies in an anti-chinchbug fund provided last year, but left unused when natural bug-abating factors came to the aid of the farmers. A joint resolution is pending before the Congress to divert a part of this fund for grasshopper-fighting purposes, but speed will be needed to push it through before adjournment.

In one state only can the situation be met under the existing conditions. In Kansas, the county commissioners have authority to levy a special county "grasshopper tax" upon petition of a sufficient number of farmers. In some counties this has already been done.

## FERTILITY OF VOLCANIC COUNTRIES

VOLCANOES are far from being only smoking, portentous menaces to human life and property. Tropical countries where active volcanoes abound have the most productive soils in the world and are capable of sustaining large populations, according to Dr. E. G. Zies, of the Carnegie Institution of Washington.

Dr. Zies has conducted extensive researches on the relation of human life to volcanoes, recently leading an expedition into the highly volcanic country of Guatemala, in Central America. Most of Guatemala's population of 2,500,000 live on a belt of rich, porous, light soil formed of volcanic products. The fairly frequent falls of fine volcanic ash only add to the richness of the soil, and when one occurs toward the end of the rainy season it acts as a dust mulch, conserving soil moisture and insuring an unusually good crop for that year.

The one big difficulty with the volcanic-ash type of soil is its high susceptibility to erosion. The torrential rains and "flashy" rivers of the country cut it into deep, steep-sided arroyos, which make both farming and transportation difficult. The soil eroded from the uplands, however, is not entirely lost; it appears again on the lowlands after the floods have spread it out.

As an example of what can be done with a wholly volcanic land in the tropics, Dr. Zies pointed to the island of Java. Here, an industrious, frugal native people, under the scientific leadership of the Netherlands Government, maintains the astonishingly high population level of over forty millions, on an area of 36,000 square miles—about the size of the state of Iowa.

## ITEMS

A SUCCESSFUL method of inoculating against the ancient and much-dreaded disease, plague, is claimed in Russia. Protection or immunity is given by inoculations with a culture of harmless plague germs developed by Dr. M. P. Pokrovskaya, senior scientist of the Plague Combating Station in the Northern Caucasus. To test the effect of the germs on human beings, Dr. Pokrovskaya and the director of the station, Dr. I. S. Erlich, inoculated themselves. The germs had been made avirulent, or harmless, by treatment with bacteriophage. Inoculation of animals with these treated germs made them immune to deadly doses of plague bacilli.

LICKING their wounds, a practice universal among animals, has good bacteriological justification, is reported by Dr. Herman Dold, professor of hygiene at the University of Tübingen. Cultures of bacteria to which saliva was added failed to thrive, while untreated "control" cultures grew flourishing colonies of the germs. It therefore appears likely that in addition to keeping dirt and hair out of their wounds by the constant licking, the afflicted animals are also applying an effective antiseptic.

THE office of the U. S. Forest Service in San Francisco reports that the white pine blister rust, that most serious disease of the highly valuable white pine group, is now only about twenty miles from the northern boundary of California, the only remaining uninfected large area of this timber type. The disease, which is caused by a fungus, came from Europe. After ravaging the remaining white-pine stands of New England and other northeastern states, it made its way to the Pacific Coast lumber region by way of Canada. Efforts of the Forest Service, especially since the inauguration of the C.C.C., have held it somewhat in check, but have not availed to stop its spread entirely. The fungus spends part of its life on the leaves of currants and gooseberries, and only the total destruction of all bushes, both wild and cultivated, in the neighborhood of the trees will stop it. The extermination of all such bushes in the rugged Northwestern timber country presents an appalling task.

TWO encouraging communiques are received from the front in man's continual war on the insects. Aerial warfare of a new sort is to be used. An autogiro will spray poison upon canker-worm infested trees in Morristown, N. J., National Historical Park. Airplanes have successfully dusted and sprayed cranberry bogs and cotton fields in the past, but the autogiro, moving more slowly and landing with less area, promises an improvement. Poison is used freely in fighting insects. The use of arsenic containing sprays upon apples and other foods has been criticized. Not because it doesn't kill the insects, but because it may harm those who eat the food. Now a chemist of the Department of Agriculture has developed a new insoluble nicotine insecticide by combining the poison of tobacco with peat. Widely distributed, peat is an organic type of soil which might be called coal in infancy. The new nicotine peat may control chewing insects as well as hazardous inorganic insecticides such as those containing arsenic, lead and fluorine. Nicotine is an old favorite among insecticides, but has been applied usually dissolved in water.

A BLOOD test which has proved valuable in determining the probable outcome of pulmonary tuberculosis is described by Dr. A. H. Duncan, of the Muskoka Hospital for Consumptives, Gravenhurst, Ont., in a report to the Canadian Medical Association Journal. The test is made by drawing a sample of blood into a slender, upright tube and noting the rate at which the red cells settle out as sediment. Why the red blood cells should form a sediment at a different rate in disease and in health is not definitely known, but the rate of sedimentation seems to indicate the degree of tissue break-down going on in the body. This test is said to show the activity of pulmonary tuberculosis with an accuracy of 94 per cent. and gives more reliable information about the patient's condition than can be learned from such signs as fever, pulse rate, cough, sputum, loss of weight and the like.

RADIUM, followed by heat or pressure, explains a beautiful but puzzling blue color found occasionally in natural salt crystals, according to Professor Karl Przibram, of the Institute for Radium Research of the Vienna Academy of Sciences. Blue salt crystals have been known for a long time, but until after the discovery of radium and radioactivity there was not even a conjectural explanation of their cause. Then it was suggested that irradiation by radioactive elements was responsible for the blue color. Dr. Przibram and his pupils tested the theory in the laboratory, irradiating ordinary salt crystals with radium rays. The colorless crystals did take on color—but the color was yellow. Only when the yellow crystals were heated or put under pressure did the blue color appear. Yellow rock-salt crystals were unknown in nature, so the research appeared to have run into a blind alley. Lately, however, a salt mining engineer, O. Schauberger, found some natural yellow crystals in a salt mine in the Tirol. When heated in the dark, these crystals turn blue.