SCIENCE NEWS

Science Service, Washington, D. C.

PARIS ASTRONOMICAL CONFERENCE ON STELLAR EXPLOSIONS

LIFE histories of the heavens' most mysterious stars, gigantic and brilliant stellar explosions that are believed to end as almost unbelievably dense but very dim stars, are being explored at an international congress of astrophysics in Paris, July 17–23, that brings together fourteen of the world's leading astronomers, seven of them Americans.

Novae, or "new stars," and white dwarf stars are the special subjects of this congress. Those participating were this week in Paris as guests of the unique Singer-Polignac Foundation, sponsored and financed by the heiress of the Singer fortune, the American-born Princess Singer-Polignac, in memory of her late husband, Prince Polignac, who had been conducting research in astronomy before his death.

Professor Henry Norris Russell, of Princeton University, is presiding over the conference. The other Americans are: Dr. Gerard P. Kuiper and Dr. S. Chandrasekhar, of the Yerkes Observatory; Dr. Walter Baade, of the Mt. Wilson Observatory; Dr. Sergei Gaposchkin and Dr. Cecilia Payne Gaposchkin, of the Harvard Observatory; Dr. C. S. Beals, of the Dominion Astrophysical Observatory at Victoria, and Amos J. Shaler, of the Massachusetts Institute of Technology, who is secretary and interpreter.

Sir Arthur Eddington and Professor F. J. M. Stratton, of Cambridge, England, the Chanoine Georges Lemaître, the Belgian cosmologist; Dr. B. Strömgren, of Copenhagen; Professor K. Lundmark, of Lund, Sweden; Professor Bengt Edlen, of Uppsala, Sweden, and Professor N. Grotrian, of Potsdam, Germany, comprise the European delegation.

The conference is attempting to clarify the life history of a star. It is believed at present that an ordinary star, such as the sun, eventually reaches the point where it no longer can give forth its quota of heat and light. Its internal equilibrium becomes so disturbed that some change must occur. This change may take the form of a sudden explosion. Such violent explosions of stars and even entire galactic systems have not infrequently been observed by astronomers—the star becomes what is called a nova, or a "new" star. After the star has suffered an explosion of this sort, and it has settled down to a new equilibrium, its internal structure is radically different. It is thought that those white dwarfs—faint stars of a type characterized by densities so great that, volume or volume, they are millions of times heavier than lead—are the end products of the cataclysms observed as novae.

THE SUPERNOVAE

DR. HENRY NORRIS RUSSELL, of Princeton University, in the address he expected to give at the opening of the Singer-Polignac Congress of Astrophysics on July 17, states that super-exploding stars, the supernovae, although they are the most tremendous phenomena known to man, constitute a mystery to astronomers.

There seems to be no escape, according to an advance copy of his address, from the conclusion that "a supernova may reach such amazing brilliance that it will shine for a few days with light comparable to that given off by a whole galaxy of stars. The fortunate recent discovery of two supernovae, one of the eighth magnitude, in time to permit detailed spectrographic observation, has greatly increased our information and also our puzzlement. The spectra, though similar from one supernova to another, are utterly unlike those of any other celestial bodies, so that despite careful study it has not yet been possible to identify a single feature with any radiation known in the laboratory."

Dr. Russell has not given up hope that the problem of the kind of light emitted by supernovae will be explained by known properties of atoms, perhaps atoms that are moderately ionized, that is, with not more than half-a-dozen electrons stripped from them. The energy emitted by a supernova is enormous, reaching as much as 50,000,000 times that of the sun. Two supernovae that occurred within the Milky Way, the galaxy in which the sun and earth are located, are authenticated. These are famous Tycho's star of 1572, the brightest ever observed visually, and one recorded in China and Japan in 1054, which survives as the nucleus of the Crab Nebula, which itself represents the material ejected during the cataclysm.

There are lesser exploding stars, the ordinary novae, which are now occurring with extraordinary frequency. Six very conspicuous novae have appeared during the first forty years of this century, an unequaled record. This happy accident—for astronomers—Dr. Russell attributes to the chance of our position in space because the actual dates of the outbursts differed by many centuries due to the differences in distance from the stars to the earth.

MEASURING THE CURRENT IN LIGHTNING BOLTS

ATOP the 42-story tower of the University of Pittsburgh's Cathedral of Learning there is a spinning wheel that traps bolts of lightning, studies their electrical characteristics and then discharges them harmlessly through lightning arresters. The device spins at 3,400 revolutions a minute. In continuous operation since June 3, it turned over its 210,000,000th revolution on July 16. In a normal lightning season of 200 days it will come close to a billion revolutions.

The device that willingly and purposely awaits the direct hits of lightning is called the fulchronograph. Designed by Charles F. Wagner and Gilbert D. McCann, Westinghouse engineers, it is essentially a motor and a slotted aluminum wheel filled with laminated permanent magnet steel, projecting like fins from each side of the wheel and rotating through two coils which carry the total surge current from the lightning stroke being measured. As the small fins pass between the magnetic field of the coils they are magnetized in proportion to the amount of current that is carried by the lightning stroke in time intervals as brief as forty millionths of a second.

The fulchronograph gives a schematic picture of the wave shape and surges in a single lightning stroke. This

is compared with the wave shape and surges created by artificial lightning bolts in the laboratory, and can be used to improve the protection of exposed power circuits.

The first lightning stroke actually measured by the fulchronograph was found to last one sixtieth of a second and showed a maximum current of 21,000 amperes, or enough to light 40,000 ordinary light bulbs.

CORRECT EATING

VICTORIES over disease in the past have been won for us by others. Future victories will depend increasingly upon oureslves, our willingness to change our food habits and eat what is good for us, was pointed out by Dr. Victor G. Heiser, of New York City, in the eighth Maiben Lecture, delivered at Milwaukee before the recent meeting of the American Association for the Advancement of Science.

"In the past the extraordinary success in liberating man from the pestilential diseases has been achieved largely in the field of environmental sanitation. No great change has been required in man's personal habits. Typhoid fever and cholera have been controlled through the engineer providing man with safe water. He has been saved from plague by keeping rat fleas from him. Smallpox and diphtheria have been made puny enemies by vaccination, and malaria and yellow fever can also be prevented by community effort."

Now, however, man is confronted with the challenge of increasing his own welfare by his own efforts. Are we, Dr. Heiser asked, ready as whole peoples to wean ourselves away from tradition and custom and learn how to eat our own way to better health? Many of us voluntarily deny ourselves certain foods for religious reasons; we are conscientious vegetarians or we eat no pork or we abstain from meat on certain days. Will we do that kind of thing for the sake of our health?

The answer is not easy, the speaker admitted. He told of the dramatic demonstrations of the role of polished rice in producing the disabling disease, beriberi, among the millions of the Orient, of the equally dramatic disappearance of that plague from groups fed on the unpolished grain. Yet Orientals still blandly persist in their preference for polished rice—and still get sick with beriberi. And vast numbers of our own countrymen suffer needlessly from pellagra because of a similar dietary stubbornness.

A really enlightened diet will not only prevent the so-called deficiency diseases, it will ward off many of the conditions that now-a-days make surgical operations necessary. He told of large-scale experiments with colonies of white rats, which lived in perfect health as long as they were given a physiologically adequate diet, but which, when placed on rations of what might be called the "civilized poverty" level, proceeded to develop such surgical conditions as sinus trouble, infection of the middle ear, gastric ulcer, kidney and bladder stones, gangrene, heart diseases and bad teeth.

Correct eating need not be expensive eating, Dr. Heiser urged: "All too often we eat far too much of a substance that is not needed, and still suffer from hunger if a needed substance is not present in sufficient quantity."

FRANK THONE

ITEMS

WHATEVER federal funds are allotted to tuberculosis control, a large proportion should go for training personnel, is the belief of Dr. Chesley Bush, of Livermore, Calif., as stated in his presidential address before the National Tuberculosis Association at Boston. Not the least of this training of personnel, he said, should be training in medical administration of institutions. In the fight against tuberculosis, prevention and treatment go hand in hand, he pointed out. For example, an operation to put the infected lung at rest may arrest the patient's disease but it also prevents the spread of infection. Similarly a family survey may detect a minimal case of tuberculosis and make this lung operation unnecessary.

NEUTRAL atomic fragments by the billions, 1,000 times more plentiful at thirteen miles overhead than at sea-level, give the first clue to a new kind of atom smashing, Dr. S. A. Korff, of the Bartol Research Foundation of the Franklin Institute, suggested to members of the American Physical Society. The fragments are neutrons, atomic particles without electrical charge that have amazing ability to pierce all atoms. Sending a new type of neutron detector 70,000 feet up in unmanned balloons, Dr. Korff found that while cosmic ray intensity was increasing 100 times over sea-level intensities the neutron intensity was increasing by 1,000 times. Explaining the origin of the stratosphere neutrons, Dr. Korff said: "If a cosmic ray collides with a nitrogen nucleus and completely disrupts it, seven neutrons will be liberated. The presence of neutrons may be an indication of some such explosion induced by cosmic rays in our atmosphere. Cosmic rays are the only agency with sufficient energy to produce such a disruption. Possibly these neutrons are the clue to an important new atom-smashing process."

A BILLION times a second, on the average, a molecule in a gas at ordinary pressure and temperature will collide with another, was reported by Dr. Eugene P. Wigner, of Princeton University, to the American Chemical Society symposium at Madison, Wis., on the kinetics of homogeneous gas reactions. Despite this large number of collisions all chemical reactions in gases are not instantaneous, because not every "bump" between molecules leads to a chemical change. A great many molecules are moving slowly and have too little energy. A certain threshold energy exists below which molecules will not react. This is known as the activation energy. Another reason for the lack of reaction when molecules collide, Dr. Wigner added, is that they may have too much energy. This excess energy may disrupt the newly-formed compound.

NOW adapted for household refrigerators are the new ultraviolet producing lamps which will kill bacteria and keep mold growth under control. The lamps developed by the Westinghouse Electric and Manufacturing Company for hospital operating rooms and the preservation of meats in stores are available as a 1939 refrigerator accessory. They burn only a fourth as much electricity as a small 25-watt bulb.