# SCIENCE NEWS

*Science Service, Washington, D. C.*

## SUPER-HEAVYWEIGHT STARS

*(Copyright, 1939, by Science Service)*

THREE new super-heavyweights among stars, so solid that each cubic inch of their substance weighs not pounds but tons, are the latest discoveries made by Dr. G. P. Kuiper, using giant telescopes of McDonald Observatory at Fort Davis, Texas, and Yerkes Observatory at Williams Bay, Wis.

Known as white dwarfs, the newly found heavyweights are called Wolf 1516, the primary of the wide double star Wolf 672, Ross 640. This brings the number of white dwarfs known to 22, all stars relatively near the earth. Wolf 1516 is believed to have a diameter about four tenths that of the earth and such dense material that it weighs between 500 and 1,000 tons (1,000,000 and 2,000,000 pounds) per cubic inch. It has, however, not yet had its size and weight precisely determined, but it resembles an older one, A.C. 70 degrees 8247, that does have this amazing super-weight.

These two stars are the hottest white dwarfs known, with surface temperatures of over 30,000 degrees Centigrade. Only two other white dwarf stars, Wolf 457 and Wolf 219, are known to be similar to these stars. They are possibly even slightly heavier, at most about double in density. The other two new white dwarfs are probably less extreme. Dr. Kuiper has not yet finished his studies of them. Two other stars, Ross 22 and Wolf 923, are suspected of belonging to the same class and are also being investigated further.

More than half of all the white dwarfs known, 13 out of the 22, have a weight nearly the same as the famous companion of Sirius, about 3 tons per cubic inch, while the rest of them are heavier.

These very dense stars may be the result of a great stellar explosion, causing a collapse of a more ordinary star into smaller space. One idea is that they consist of stripped atoms, deprived of their electrons.

## A QUANTUM WORLD

*(Copyright, 1939, by Science Service)*

AN amazing quantum world, where all elephants seem to have fur, where a tiger appears not as one animal but a whole group, and where a machine gun instead of a rifle would be needed to kill one of them, was described by Professor George Gamow, of the George Washington University, speaking before the Philosophical Society of Washington.

You could enter the quantum world if you could shrink down smaller than did Alice in Wonderland and become the size of an atom. Or you could do it, as did Professor Gamow, by increasing the magnitude of the quantum constant (which determines the uncertainty in position and motion of objects) so that it would have a noticeable effect on large objects.

If you went tiger-hunting in a quantum jungle, Professor Gamow explains, the elephant on which you would ride would appear to be covered with fur. This would only be the uncertainty in the size of the elephant, so that it appeared to have a fuzzy, furry outline.

The tiger for which you are searching would be the most baffling sort of animal. Instead of a single beast, it would entirely surround your elephant. To try and shoot it with a rifle by careful aiming would be useless. The chances would be many thousand to one that you would miss it. All you could do would be to use a machine gun and spray the landscape in the general direction of the "multiple" tiger. Eventually, and only by chance, would a bullet finally hit the tiger and finally kill it by direct impact.

Fantastic and imaginary as is Professor Gamow's tiger hunt, the happenings are similar to those which physicists now believe exist in the tiny world of an atom where individual particles are so minute that the quantum constant, determining the uncertainty of position, is a very real problem.

In experimental atomic physics the elephant corresponds to the heavy nuclei of atoms and the "multiple" tiger to the fuzzy, indeterminate position of an electron about the nucleus. The machine gun technique of hitting the "tiger" corresponds to attempts to bombard atoms in transmutation experiments where whole hosts of particle "bullets" must be fired in order to make a single hit.—ROBERT D. POTTER.

## ULTRA-VIOLET AND INFRA-RED RADIATIONS

ULTRA-VIOLET and infra-red radiation can have many uses on the electrified farm of the future, if only current becomes cheap enough and suitable equipment is developed, according to L. C. Porter, of the General Electric Company's incandescent lamp department in Cleveland, who spoke at the Chicago meeting of the American Society of Agricultural Engineers.

Infra-red rays are best known for their heating effects, Mr. Porter stated. Adaptations of the familiar dull-red-glowing electric heaters can readily be made for use in poultry houses, in barns to keep newborn animals warm and in the quick drying of hay. If their operation can be made cheap enough, their greater compactness and less fire risk will give them considerable advantage over present types of equipment.

Ultra-violet rays are known to have certain well-marked physiological effects, as in activating sterols to produce vitamin D and in keeping in check plants' growth in length. For producing well-proportioned plants in greenhouses, Mr. Porter suggested the use of a new kind of incandescent lamp, which has a globe permeable to ultra-violet as well as to visible rays. With these and other lamps in proper proportions, he stated, a close approximation to natural sunlight can be obtained, with control of duration and intensity not possible under natural conditions.

The well-known germicidal effects of ultra-violet rays still await a number of possible practical applications on the farm, Mr. Porter pointed out. They may be used in stables and dairy buildings as they now are in hospitals,

to keep down the germ population of the air. They may be called on to control the spread of epidemics among farm animals, and to check the growth of molds and other fungi on hay, grain and other products. Their fluorescent effects may aid in diagnosing animal diseases and in examining vegetables and fruits.

With Dr. L. J. Buttolph, physicist of the General Electric Company, Mr. Porter will publish some of his suggestions in the forthcoming issue of *Agricultural Engineering*.

## THE DISCOVERY OF NEW OIL IN NEBRASKA



To the successful discovery of oil in Michigan and in Illinois can be credited the new discovery of petroleum in Nebraska at Falls City, near the Kansas border, according to a report of the U. S. Bureau of Mines.

The petroleum finds in Michigan and Illinois were based on geologic "basins" which look like some giant dinner platter with a corrugated bottom. Overlying the basin is surface material—in the case of Michigan, glacial drift—so that the ground level over the drift is not by itself indicative of the underlying depression in rock strata.

The new Nebraska finds have been based on two years of exploration of the Forest City basin, an area comparable to, though smaller than, the Michigan basin.

A typical procedure of geologists in searching for petroleum in a basin area is to follow "trends," the lines of the corrugations. A network of these corrugations is worked out and wells drilled at the intersections of the trend lines.

Production in the first Nebraska well is small, and it appears that the operators will have to push the well greatly to get sufficient oil to win the $15,000 prize offered by the state legislature for the first well which will produce 50 barrels daily for 60 days. In much greater production is the Mississippi discovery of oil, also recently reported, in Yazoo County. Over 700 drilling permits have been issued, but the possible extent of this field has not yet been determined.—ROBERT D. POTTER.

## THE TREATMENT OF SYPHILIS

A NEW syphilis medicine, which can be taken in pills, has been developed by Dr. Paul J. Hanzlik and his assistants at the School of Medicine of Stanford University.

Success with exacting trials of the drug for over four years, in syphilis clinics in San Francisco and in Los Angeles, Cleveland and Philadelphia, has been reported. The council on pharmacy and chemistry of the American Medical Association in Chicago has accepted the new medicine as an anti-syphilitic agent.

Sobisminol is the name of the drug. It is a bismuth compound. Its great advantage is that it can be taken in pills, or capsules, at home, thus cutting down the number of visits to clinic or doctor's office and, of course, making unnecessary the hypodermic injections of bismuth which have been part of syphilis treatment.

The new medicine, however, is not a short-cut to a syphilis cure. It must be taken in combination with injections of arsphenamine or one of the other arsenical compounds. The total course of treatment still takes nearly two years, made up of alternating periods of six to 10 weeks of weekly arsphenamine injections and 10 to 20 weeks of taking the sobisminol capsules.

The new medicine will be sold on a physician's prescription only. Bismuth, the active ingredient, is a poison which is not safe for patients to prescribe for themselves. The new medicine is protected by patent held by Stanford University and the licensing agreements already made with three drug manufacturing firms restrict the sale of the drug without prescription and also forbid its exploitation to laymen by newspaper advertising, radio or window displays. Royalties will be used for further research in syphilis and related problems.

Sobisminol is said to produce prompt healing of syphilitic lesions and to have a killing effect on syphilis germs in the blood and tissues. Because of its ability to penetrate the brain and nervous system, it has been found to bring relief from pain in a high percentage of cases in the late stages of neurosyphilis. One physician who used it in treating patients reported that if used early in syphilis it "may prove to be of value in the prevention of neurosyphilis," the terribly destructive late stage in which the disease attacks the brain. The preventive action of the new medicine, however, can not be determined conclusively at this time, because neurosyphilis generally does not appear until 10 or 15 years after the first infection.

The production of a bismuth compound for oral treatment involved making a hypothetical chemical compound which had never been actually manufactured. This is triisopropanolamine, which is combined with sodium bismuthate and propylene glycol to make a bismuth compound that can be absorbed from the stomach into the blood, which is stable enough to withstand chemical action in the digestive system, and which prevents heat coagulation of the blood.

## A NEW TREATMENT FOR PNEUMONIA



A NEW chemical treatment for pneumonia, using a new drug, sulfathiazole, has been announced.

Physicians who tested it experimentally on human patients pronounce it even better than sulfapyridine, widely hailed in recent months as the chemical conqueror of pneumonia. The new drug is safer than sulfapyridine, and it does not make the patients sick. Nausea and vomiting, which have been a distressing feature of sulfapyridine treatment, are practically absent when sulfathiazole is given.

Developed in the Squibb Institute for Medical Research by Drs. H. B. van Dyke, R. O. Greep, Geoffrey Rake and C. M. McKee, the first report of the new drug is being published in the current issue of the *Proceedings* of the Society of Experimental Biology and Medicine.

Laboratory experiments on hundreds of mice show that the toxicity of sulfathiazole is much less than the toxicity of sulfapyridine except in doses far larger than are needed to cure pneumonia. In the body sulfapyridine is rather rapidly combined or conjugated with acetic acid. This unfortunately makes the drug quite inert and unless in its effect on the infection, only the uncombined form being active. The new drug, sulfathiazole, however, is

combined with acetic acid to a much smaller extent, so that most of the drug given is effective until it is excreted. This means that doctors do not have to give as much sulfathiazole to treat a pneumonia patient. Chronic poisonous effects from accumulation of the drug in the body are much less apt to occur because sulfathiazole is excreted more rapidly than sulfapyridine.

Sulfathiazole is chemically related to sulfapyridine and sulfanilamide. It was prepared by several groups of scientists in the search for better chemicals with which to fight infections that threaten human life. The drug is given by mouth. In the mouse studies it had to be mixed with the food in order to make sure that all the drug given was being absorbed, so that comparisons between sulfapyridine-treated and sulfathiazole-treated animals would be on an exactly equal basis. For treatment of pneumonia patients, it is not necessary to mix the drug with the food.

## TRACHOMA ERADICATION

SULFANILAMIDE treatment of the blinding eye disease, trachoma, among American Indians has been so successful during its first year's trial that the Indian Service will launch a trachoma-eradication program next year.

Announcement of the success of the sulfanilamide treatment and of plans for a sharply expanded program, which it is hoped will bring this ancient scourge under control, was made by U. S. Commissioner of Indian Affairs John Collier in his report to Secretary of the Interior Harold L. Ickes.

The success of the new treatment will probably lead to its adoption in foreign countries, where trachoma is even more of a problem than it is here. Dr. R. Siri, a Siamese physician now in this country on a Rockefeller grant, plans to study the treatment on Indian reservations in the West before leaving for Siam in January. Out of Siam's population of 15,000,000, it is estimated that 3,000,000 persons are afflicted with trachoma.

Mr. Collier states that the disease has been eliminated completely by sulfanilamide treatment among the school children at Fort Apache, and trachoma in older Apaches is being rapidly cleared up. Of the more than 1,000 trachoma-afflicted Indians treated with sulfanilamide so far, 60 per cent. have improved to the point where physicians state the disease is "arrested." Since trachoma is caused by a germ and is largely limited to Indians in this country, it is believed that by arresting the disease in all patients, the spread of this eyesight-destroying scourge may be stopped. This would mean practical eradication of the disease. Quarantine regulations check its importation from foreign countries.

Sulfapyridine will be tried as well as sulfanilamide, according to Dr. J. G. Townsend, head of the Indian health service. The service is trying to determine which drug and what dosage will be most effective in arresting trachoma with greatest speed at least cost. One difficulty of the new treatment is in getting the Indians to take the medicine. Sulfanilamide is given them in the form of pills, and many of them can not understand why a pill should relieve an eye ailment. Nurses have found they must examine the children's mouths to be sure they swallow the pills.

Difficulty in checking trachoma in the past has been partly due to lack of sanitary facilities among the Indians. Many Navajos, Dr. Townsend pointed out, have to carry all their water, for drinking as well as washing, six or seven miles. Under such conditions, instructions about washing and the use of individual clean towels to prevent spread of germs are not too likely to be carried out.

## ITEMS

HOW America's flyers of to-morrow will be selected and trained was told by Dr. Dean R. Brimhall, assistant to the chairman of the Civil Aeronautics Authority, speaking as guest on Science Service's Adventures in Science program on Monday, December 11. A committee of nationally known psychologists is cooperating with Dr. Brimhall and the CAA in this work. Just as during the World War psychological tests were used to pick the proper jobs for soldiers, so in this new aviation activity psychology and other scientific methods are to be used in making the training most effective.

SEVEN billion or more young fish and eggs of four important commercial species—cod, haddock, pollock and flounder—have been planted in favorable spots along the North Atlantic coast of this country by the U. S. Bureau of Fisheries during the past year. The work was carried out by three marine hatcheries of the bureau in New England. The states of Maine and Massachusetts are also cooperating toward the repopulation of their offshore waters with lobsters.

A GREAT mass of living coral has been brought to St. Augustine, Fla., for the Marineland Studios by the fishing vessel *Porpoise*, which was fitted with a specially constructed well for the purpose. The coral tree was broken off its base, on the reefs near Walker City, Bahamas, and transferred into the ship without exposure to the air. Previous attempts to transfer living coral into aquaria have all ended in failure because even brief exposure to the air proved immediately fatal to the thousands of small polyp animals.

COTTON linings for irrigation ditches may be the new way to make a dent in the surplus cotton stock piles of the South, it was suggested to the National Reclamation Association meeting at Denver. The new utilization of cotton supplements the use of cotton fabrics as a binder for secondary highways and airport runways. W. H. Robinson, manager of an irrigation district in Idaho, described how a section of an irrigation canal was lined with a mixture of asphalt and gravel backed by heavy cotton fabric. Water losses in this section, which formerly ran from 20 per cent. to 30 per cent., have now been cut to about one and one half per cent. The standard method of lining irrigation canals is with concrete, which pays for itself despite high cost. The cotton-gravel-asphalt liner is cheaper.