ASTRONOMY

Faintest Star Discovered

A million like it would be needed to equal the brilliance of our sun. Finding will help astronomers understand the nature of such stars.

➤ THE DISCOVERY of a star of such extremely low luminosity that a million stars like it would be needed to equal the sun's brilliance has been announced from the McDonald Observatory of the Universities of Chicago and Texas.

This important contribution to astronomical observations follows closely upon the heels of the finding at the same observatory of an atmosphere of methane around Saturn's largest satellite. (*See SNL,* Jan. 29)

The present discovery was made by Dr. G. Van Biesbroeck of the Yerkes Observatory when comparing two plates taken at the prime focus of the 82-inch McDonald Observatory reflecting telescope. On these plates the star known as "BD plus 4 degrees 4048" is found to have a companion star at a distance of 74 seconds of arc away.

The companion is identified by the fact that it shares the apparent motion of the brighter star across the sky; the companion itself is of the 18th magnitude as seen on the plate.

In order to determine the intrinsic brightness of this star, however, its distance from us must be known; this is of course practically the same as that of the primary star. This star happens to be rather close to the sun as astronomical distances go, its distance being about six parsecs, or 19½ light years. In other words, light traveling at some 186,000 miles per second requires nearly 20 years to reach us from that star.

However, the nearest star is no nearer to the sun than one-fifth of this distance. The faint companion star's intrinsic luminosity comes out very faint; it is expressed by astronomers as being of absolute magnitude 19 on red plates. This makes it three magnitudes, or about 15 times, fainter than the faintest star previously observed, Wolf 359, which has a red absolute magnitude of 16.

Wolf 359 is only eight light-years away, so its earlier discovery is not surprising. The sun is on the order of a million times as bright as the new faint star.

In making his announcement, Dr. Van Biesbroeck calls attention to the fact that if this star and Jupiter were placed at the same distance, Jupiter at its brightest would still be seven magnitudes fainter than the companion of the star known as "BD plus 4 degrees 4048." This is a factor of about 600 times and makes it fairly certain that the faint star is shining by its own light rather than reflecting light from its primary; whereas Jupiter shines only by reflected sunlight.

Jupiter is the largest planet in the solar system, so it is also one of the brightest even though it is five times as far from the sun as the earth is. The new faint companion star, however, is some 440 times the earth-sun distance from its principal star which makes it quite certain that its light is not reflected. At present nothing can be said about the mass of this newly found faint star but it must evidently be rather small unless it is some unusual sort of highly condensed star. Ordinarily the mass of a star is closely related to its luminosity.

The importance of this problem is its relation to that of the recently discovered stars of very small mass such as the invisible companion of 61 Cygni. This latter star discovered by Dr. K. Aa Strand of Swarthmore has a mass only 16 times that of Jupiter but Dr. Strand's observations reveal nothing of its brightness. The small star is invisible, and is detected by its gravitational effect on the primary star around which it revolves.

Is Van Biesbroeck's new star of as small mass as Dr. Strand's? If that question can be answered considerable light will be thrown upon whether to call such small and faint objects stars or planets. Astronomers are at present undecided which term ought to apply, but discoveries such as Dr. Van Biesbroeck's are rapidly clearing up the matter. It is possible that the distinction between planet and star may some day almost cease to be plausible.

Included in the information supplied to the Harvard clearing house by Dr. Van Biesbroeck for distribution to American and foreign astronomers is that the position angle of the faint star is 150 degrees; that the common proper motion is 1.45 seconds toward 204 degrees; that the parallax is 0.17 seconds and the projected separation is 440 astronomical units.

Science News Letter, February 5, 1944

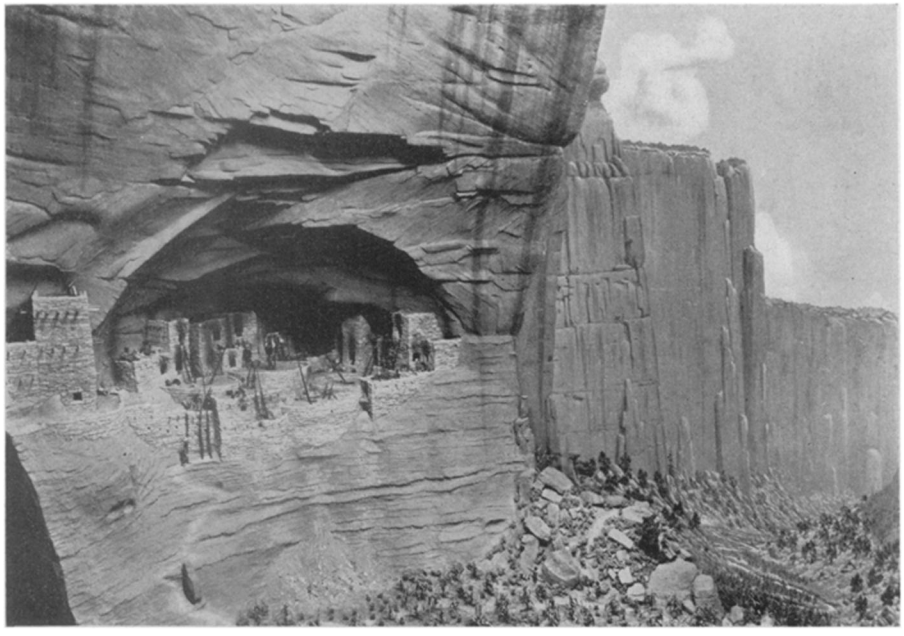
NOT THE DEVIL—But a restoration of a Hopewell Indian with a ceremonial deer-antler headdress of copper. These mound-building Indians left objects of copper, mica, stone and silver, showing great skill and artistry. Part of the exhibit in the new Hall of Indian America at the Chicago Natural History Museum. (See also page 86)

AERONAUTICS

Sound-Proofing of Aircraft Needed to Protect Crews

➤ SOUND-PROOFING military aircraft, to a reasonable extent, has been found highly desirable to protect flight crews from progressive deafness and from physical fatigue and nervousness caused by exposure to excessive noise and vibration, declared Albert A. Arnhym of the Solar Aircraft Co., San Diego, Calif., at the New York meeting of the Institute of the Aeronautical Sciences. The high degree of sound-proofing mandatory in commercial airliners is out of the question in warplanes.

"The main sources of noise on an airplane, in the usual order of their magnitude, are: propellers, exhaust, en-



MUMMY-CAVE VILLAGE—This is a model showing in miniature a cliff-dwelling as built in a cavern of Canyon del Muerto, Arizona, which was occupied about 1250 A.D. The Indians abandoned the cave about 50 years later because of drought and a military defeat, archaeological evidence indicates. This diorama is in the new Hall of Indian America at the Chicago Natural History Museum. (See also page 83)

the rear. Flying speed is recovered by nosing down and diving.

In the two new devices now ready, the pilot is warned of approaching stall by the sounding of a horn and the flashing of a light, Mr. George stated. These signals are actuated in one model when the airplane reaches a certain angle and the airflow is reversed, causing the turbulent wake. This forces a vane which projects from the leading edge of the wing to move upward, closing a switch.

The other model is operated when pressure reversal sucks a diaphragm upward and forces an attached metal plate against electrical contacts. It has a cut-out button which can be used during take-offs and landings.

The development work on one model was carried out in Pittsburgh by Westinghouse Electric & Manufacturing Company, together with the Carnegie Institute of Technology; the other in Troy, N. Y., by the W. & L. E. Gurley Company and Rensselaer Polytechnic Institute. Scientists of other institutions assisted.

Science News Letter, February 5, 1944

MEDICINE

Typhus Vaccine Reliable

➤ THE AMERICAN-MADE vaccine on which the United States and Britain are relying to protect their troops from typhus fever is at least as good as any other such vaccine, including those available to the Nazis.

This conclusion, based on a report from Germany of a "crucial experiment" by Dr. Erwin Ding, who describes himself as a storm troop leader, is drawn by the editor of the *Lancet* (Dec. 18, 1943) British medical journal.

The storm troopers must have suffered heavily from typhus fever, the *Lancet* editorial also suggests. Evidence for this is seen from the figures and other details in Dr. Ding's report.

He vaccinated six groups of persons with one or another of six types of typhus fever vaccine and left two other groups unvaccinated as controls. Although his results are given only in percentages, without stating how many persons were in each group, such figures as 0.5% complications suggest a number of the order of 200 in at least one group and show that several hundreds were involved altogether.

The vaccine used for American and British troops is made from the yolk sacs of infected developing eggs. The method was developed by an American scientist, Dr. Herald R. Cox, while on the staff of the National Institute of Health of the U. S. Public Health Service.

The difficult-to-make and costly Weigl vaccine from the intestines of infected lice; vaccines from lung suspensions from infected rabbits and dogs; and weaker preparations of egg yolk vaccine than the Cox vaccine, made in Marburg, Germany, as well as a Cox vaccine made in Germany, were those tested by the storm troop leader.

The weaker egg vaccines and a dog lung vaccine made in Rumania were less effective than the others. No deaths occurred in any vaccinated group except those receiving the Marburg vaccine. Deaths in the unvaccinated control groups ran to 20% and 33%.

The number of cases of typhus developing in the groups was unaffected by vaccination, but the severity of the disease was much less in the vaccinated.

Science News Letter, February 5, 1944

NUTRITION

Vegetables Prevented From Loss of Color

➤ DEHYDRATED vegetables and fruits are protected against loss of quality through the unwanted action of the life-agents, or enzymes, of their own cells during processing by a new method on which U.S. patent No. 2,340,170 has just been issued to John M. Baer of Chicago.

Certain plant enzymes promote oxidation. This is necessary while the plant is alive and growing, but if the enzymes continue their action after the vegetables or fruits have been peeled and sliced for dehydration they produce a dark coloration in such things as potatoes, peaches and apples, which reduces their market value. Heat destroys enzymes, so if the foods are pre-cooked before dehydration this trouble does not arise; but it is not always desirable to market the products in a cooked condition.

In Mr. Baer's process, the prepared vegetables or fruits are placed in a closed chamber and the air is rapidly pumped out, to a high degree of vacuum. Then they are quickly heated, though not to the cooking point, and the temperature maintained for only a couple of minutes. After that the temperature is reduced,