

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 $19\frac{1}{2}$ 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 pro-



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)

jected separation is 440 astronomical units.

Science News Letter, February 5, 1944

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. Arnheim 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-

gine, and aerodynamic, airborne, ventilating and miscellaneous noises," Mr. Arnhyrn stated.

Various technical methods of decreasing noises at their source were discussed by the speaker. Aerodynamic noises, caused by the flow of fast-moving air over the plane and its parts, are decreased by proper design of the plane. Airborne noises are those which originate during flight and are usually due to inefficient design.

Cabins in military planes necessarily contain many openings through which

outside noises enter. In commercial airliners these noises can be kept out. In military planes part of them may be absorbed by covering the walls and ceiling with suitable materials "to trap the soundwaves which strike them in millions of diminutive air pockets and convert the sound energy into heat."

Sound-proofing materials must be easy to flame-proof without losing their properties, highly moisture-repellent, vermin-proof, stable, easy to apply, and have good heat insulation values.

Science News Letter, February 5, 1944

determines the ultimate working life of the assembly." He is "held to be a factor 16 times more important than design, metallurgy, or processing."

"Good design and materials, heat-treatments, and superior manufacturing processes all are desirable," Mr. Almen said, "but the fatigue strength of highly loaded bolts, studs, and nuts finally is determined by the man with the wrench—and how little, or much, he applies that tool in the tightening procedure."

Tests show, according to the speaker, that if the initial tension on a bolt is increased from 1,420 pounds to 8,420

ENGINEERING

Not For Automobiles

High-octane fuels are not suitable for car engines. Any machine which could be developed would be too heavy, too noisy and too expensive.

► HIGH-OCTANE fuels such as are used in aircraft, are not suitable for ordinary automobiles. These fuels produce tremendous pressure, and any automobile engine which could be developed to use them effectively would be too expensive, too heavy and too noisy.

This is the opinion expressed by C. B. Veal, of the Coordinating Research Council, Inc., New York, at the Detroit meeting of the Society of Automotive Engineers. The council he represents is sponsored jointly by the Society of Automotive Engineers and the American Petroleum Institute.

Even if designers should produce an automobile engine capable of satisfactory operation with high-octane fuels, petroleum refiners would be forced to adopt expensive and uneconomical refining methods, he stated.

"Production of these fuels consumes special chemicals at costs prohibitive in peacetime," he added, "and greatly reduces the yield of fuel per barrel of crude oil."

Science News Letter, February 5, 1944

Chrome-Plated Cylinders

► CHROME-PLATED cylinder barrels of new automobile engines give longer service life, and the art of plating worn cylinders is developing into a science. New plating techniques which make engine cylinders highly resistant to wear and corrosion were presented at the meeting of the Society of Automotive Engineers by B. A. Yates of the McQuay-

Norris Manufacturing Company of St. Louis.

Treated surfaces are showing a wear-life several times greater than that of metals generally used, he said, assuring longer periods and higher operating efficiency between overhauls. He indicated that salvage of worn cylinders presents unusual problems. The preparation of the surfaces requires specialized techniques in grinding, honing and finishing, but scientific methods are proving satisfactory.

Chromium-plated piston rings, particularly with the top ring plated, drastically cut engine wear, according to Tracy C. Jarrett of the Koppers Company, Baltimore, who presented data to show that with such rings, even under abnormal dust conditions, cylinder wear is cut one-half at least. The data indicated that a 2,000-horsepower engine operated 590 hours developed cylinder wear of only 0.003 inches when a porous chromium-plated ring was run in a chromium-molybdenum cylinder. With a plain cast-iron ring, 307 hours of operation produced more than twice this amount of wear.

Science News Letter, February 5, 1944

Proper Machine Assembly

► THE MAN with the wrench holds the responsibility for the service life of assembled machine parts, declared J. O. Almen of the General Motors Corporation at the same meeting. "Just how much he tightens a nut, bolt or stud

SCIENCE NEWS LETTER

Vol. 45 FEBRUARY 5, 1944 No. 6

The weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St., N. W., Washington 6, D. C. North 2255. Edited by WATSON DAVIS.

Subscriptions—\$5.00 a year; two years, \$8.00; 15 cents a copy. Back numbers more than six months old, if still available, 25 cents.

Copyright, 1944, by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Entered as second class matter at the post-office at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices, Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and in the Engineering Index.

The New York Museum of Science and Industry has elected SCIENCE NEWS LETTER as its official publication to be received by its members.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., Pennsylvania 6-5566; and 360 N. Michigan Ave., Chicago, STAt 4489.

SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: Henry B. Ward, University of Illinois; Edwin G. Conklin, American Philosophical Society. **Nominated by the National Academy of Sciences:** R. A. Millikan, California Institute of Technology; Harlow Shapley, Harvard College Observatory; W. H. Lewis, Wistar Institute. **Nominated by the National Research Council:** Ros G. Harrison, Yale University; C. G. Abbot, Secretary, Smithsonian Institution; Hugh S. Taylor, Princeton University. **Nominated by the Journalistic Profession:** O. W. Riegel, Washington and Lee School of Journalism; A. H. Kirchofer, Buffalo Evening News; Neil H. Swanson, Executive Editor, Sun Papers. **Nominated by the E. W. Scripps Estate:** Frank R. Ford, Evansville Press; Warren S. Thompson, Miami University, Oxford, Ohio; Harry L. Smithton, Cincinnati, Ohio.

Officers—President: Edwin G. Conklin. **Vice President and Chairman of Executive Committee:** Harlow Shapley. **Treasurer:** O. W. Riegel. **Secretary:** Watson Davis.

Staff—Director: Watson Davis. **Writers:** Frank Thone, Jane Stafford, Marjorie Van de Water, Morton Mott-Smith, A. C. Monahan, Martha G. Morrow. **Librarian:** Jerome Harris. **Science Clubs of America:** Joseph H. Kraus, Margaret E. Patterson. **Photography:** Fremont Davis. **Sales and Advertising:** Hallie Jenkins. **Business Manager:** Columbus S. Barber.