

ASTRONOMY

If Sun Were Hotter

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► THE WHOLE human race and all life on earth would be wiped out, but the earth itself would suffer only superficial burns if the sun were to become a brilliant and hot "new star" or nova, as other stars have been known to do.

The American Astronomical Society, meeting in Philadelphia, was presented computations by its secretary, Dr. Dean B. McLaughlin of the University of Michigan Observatory, which show that if the sun increased about 100,000 times in brilliance and held this heat for 10 days, the crust might be melted to a depth of seven to eight miles but the continents and oceans would not be extensively altered.

New stars, which are seen to flash from comparative obscurity to great brilliance in just a few days, sometimes become temporarily millions of times brighter than normal, but Dr. McLaughlin assumed rather less spectacular but more frequently observed, increase of about 100,000 times. His theoretical study allows the star to shine at this terrific rate for 10 days, with its radiation partly intercepted by a planet at the same distance from it as the earth is from the sun. The planet is like the earth in size and composition and during the 10 days it receives a total of 3,800 trillion trillion (3,800,000,000,000,000,000,000,000,000) calories of heat from the blazing nova.

Contrary to popular belief this tremendous energy would be far from enough to vaporize or even to melt a planet like the earth. The mass of the earth is 6,000 trillion trillion (6,000,000,000,000,000,000,000,000,000) grams. Thus, the energy received is only 0.6 calories per gram, or enough to heat the entire earth's crust through only 300 degrees centigrade, assuming the earth's crust to have only 1/100 the mass of the whole earth.

Because of poor conductivity of the crust, however, the actual melting effect would be even more limited, Dr. McLaughlin estimated, probably affecting only the surface layers, to a depth of about seven or eight miles. The heat would then be sufficient to raise the siliceous rocks to the melting point of about 1,500 degrees centigrade. The

surface of the planet would boil and bubble and the rocks turn into liquid and vapor, but only while the nova could keep supplying the needed energy.

Soon after novae reach maximum brilliance they begin to fade. On the average, the sun as a nova could maintain the boiling of terrestrial rock only about a month, after which a return to normal would begin for both planet and star.

Science News Letter, July 8, 1944

Defect Detects Stars

► EIGHT STARS of remarkable redness, one of them blazing 500 times as brightly on red-sensitive photographic plates as on ordinary blue-sensitive emulsions, were reported to the Society by a young Mexican astronomer, Guillermo Haro, of the new National Astrophysical Observatory at Tonanzintla.

The first of these to be discovered by Senor Haro on the photographs taken by him with telescopes at the Oak Ridge, Mass., station of Harvard Observatory, where he did his researches, has a magnitude of 8.10 when measured on red

plates. On ordinary plates sensitive to blue and green light it would rate only 14.75, making it quite inconspicuous. (Stars achieve naked eye detection at about 6th magnitude.)

The Haro star is apparently a giant, millions of times larger in volume than our sun. Like the famous red giant stars, Betelgeuse in Orion's shoulder and Antares in the Scorpion's heart, it is a sort of huge bubble of such low density that it can be visualized as a luminous vacuum. It is cool as stars go, with a surface temperature of only about 1500 degrees centigrade. A variable star, it has a range of 1.5 magnitude, which means that it varies about four times in brightness.

Even the best glass lenses of astronomical telescopes cannot bring blue and red light to a focus at exactly the same place. This optical defect in refracting telescopes was used by Senor Haro in his continued search for red stars in the Hercules-Vulpecula region of the Milky Way.

An ingenious method of detecting red stars was developed some years ago by Dr. V. M. Slipher of Lowell Observatory and Dr. G. Z. Dimitroff of Harvard Observatory. It consists in taking photographs alternately at the blue and red focuses of the telescope, using panchromatic plates which are sensitive to red as well as blue light. At the blue focus, blue stars appear normal with small round images, but red stars appear as tiny black dots surrounded by halos.



NO WAITING—Although only partially completed, this airfield somewhere in France is already in use for gliders loaded with supplies for troops.

Blue light produces the central dot. The halo is due to red light being photographed out of focus.

Senor Haro's first red star was so red that the central dot was entirely absent. Closest approach in redness to this star was one discovered in 1935 by Drs. F. K. Edmondson and A. M. Rogers, then at Lowell Observatory.

Science News Letter, July 8, 1944

Unusual Double Stars

➤ UNUSUAL double stars in Cassiopeia, now visible toward the north in the evening sky, are believed to furnish further evidence in the evolution of nebulous matter in space into full-fledged stars.

The stars, known as SX and RX Cassiopeiae, are variable stars which owe their apparent changes in brightness to the fact that they are double. The components of both of these stars are large, giant stars, one a white A-type star and the other a yellow G-type star.

Discoveries reported to the meeting by Dr. Sergei Gaposchkin of Harvard Observatory indicate that the A-type white star in each case seems considerably smaller in photographic light than in visual or yellow light, an effect usually caused by stars of small nuclei being surrounded by extended atmospheres.

Entirely independent observations have been made on RX and SX Cassiopeiae by Dr. Otto Struve of the Yerkes and McDonald Observatories of the Universities of Chicago and Texas, who found the A-type star in each case surrounded by a thick envelope of nebulosity. It is probable that the envelope engulfs the entire system, including the giant G star.

Study of these stars is complicated by their being double, but a discovery of this kind could probably not have been made for a single star. Further complications in the case of RX Cassiopeiae arise from the fact that one of the two stars (which one is not known) every 517 days undergoes a rhythmic fluctuation in brightness which can be attributed only to physical changes within the star itself.

Science News Letter, July 8, 1944

Pleiades Are Receding

➤ THE STARS of the Pleiades, or Seven Sisters, are speeding away from the solar system at about five miles each second, according to a paper sent by Dr. J. A. Pearce, director of the Dominion Astrophysical Observatory at Victoria, British Columbia, for presentation before the

meeting. This figure agrees quite well with estimates based on the apparent motion of the stars across the sky.

At least six of the stars of this famous group, located in the shoulder of Taurus, the Bull, are visible to the naked eye. People with very keen eyesight can spot possibly 12 stars in all. But the cluster of stars, packed together about 30 times more densely than are the stars in the vicinity of the sun, is estimated to comprise at least 500 stars.

"Their spectra are exceedingly difficult to measure accurately," Dr. Pearce reported, "the spectral lines being very wide, nebulous and lacking in contrast. In general, for each star, only six or seven diffuse lines of hydrogen and helium are available for measurement. The poor quality of the spectral lines undoubtedly has discouraged students of stellar motion, leaving the motion of the cluster an unsolved problem."

The brightest stars of the cluster, although extremely blue stars, should be classed as dwarfs like the sun, Dr. Pearce believes. Alcyone, the brightest Pleiad, outshines the sun 730 times. On the average, however, the 12 stars visible without a telescope are only 200 times as bright as the sun, which makes their luminosities quite low for blue stars. The average diameter of these particular stars is only 2.6 times that of the sun.

The comparatively small diameter combined with the rapid rotation of these particular stars is believed to be largely responsible for the unusually diffuse character of their spectral lines.

Science News Letter, July 8, 1944

MILITARY SCIENCE

New Army Camouflage Net Resembles Woman's Veil

➤ A NEW TYPE open-mesh weave camouflage head net for use with the steel helmet and its plastic liner has been designed by the Quartermaster Corps and the Corps of Engineers of the War Department.

The netting is a modification of a type developed by the engineers for camouflaging field guns and artillery emplacements in theaters of operation, and can be manufactured on lace-making machines and certain types of knitting machines.

The head net has an elastic band attached to the net fabric which fits over the helmet liner and holds the net in place, while the net itself drapes over the outer steel helmet like a veil on a woman's hat. The ends hang down to cover either the face or the back of

the head and neck, to break up their characteristic outline. It can be worn either with the helmet or with the liner alone.

The mesh is large enough to permit leaves or twigs to be placed in the openings to blend into surroundings.

The net is treated with a mildew-proofing agent.

Science News Letter, July 8, 1944

SCIENCE NEWS LETTER

Vol. 46 JULY 8, 1944 No. 2

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. Monthly Overseas Edition: By first class mail to members of the U. S. armed forces overseas, \$1.25 a year. To others outside continental U. S. and Canada by first class mail where letter postage is 3 cents, \$1.25; where letter postage is 5 cents, \$1.50; by airmail, \$1.00 plus 12 times the half-ounce airmail rate from U. S. to destination.

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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 4439.

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