ASTRONOMY

Space and Stars Are Same

Finding that stars were formed out of space helps support recent American theories as to their origin, astronomers learn.

➤ TWINKLE, twinkle, great big star,
Astronomers know just what you are.
The self-same stuff is space between,
It's atoms rare and quite unseen.

Or, as the astronomers attending the International Astronomical Union meeting in Zurich would put it:

Interstellar matter has the same composition as normal stars.

Space and the stars that shine are much the same, except that the matter in the stars is close together.

This finding reported by Prof. Bengt Stromgren of the University of Copenhagen Observatory helps support some of the latest American theories as to how the stars were formed in the beginning.

Stars were formed out of space material. That is a part of the theory of Prof. Lyman Spitzer, Jr., of Princeton, that atoms in space stick together to form bits of matter. Prof. Fred Whipple of Harvard carried the idea further, showing how the stars and planets were formed.

A chunk of interstellar space the size of a big room contains about 10,000,000 atoms of hydrogen, 60 atoms of sodium, 100 atoms of calcium, four of potassium, and two of titanium, Prof. Stromgren reported.

Although we do not yet know how abundant helium is, about a million atoms of it may be present. All the other elements are also represented, being about as abundant as in normal stars.

Science News Letter, August 28, 1948

Hot Stars' Lives Brief

➤ IN THE HEAVENS there are spendthrift stars that in their youth are very brilliant and enormously hot. But these stars soon use up their atomic fuel and disappear from sight.

Tau Scorpii, so hot on the surface it reaches a temperature of 20,000 degrees Centigrade, and similar hot stars generate energy at a prodigious rate during their short but fiery lives of less than 3,000,000,000 years. But much of their hydrogen (astronomical atomic fuel) is soon converted into helium.

As they grow old, they contain little hydrogen and disappear from sight, at least as hot, blue (B-type) stars, Prof. Henry Norris Russell, famed astrophysicist of Princeton University, has reported to the meeting in Zurich.

Prof. Russell's communication was delivered by Dr. Otto Struve, of the Yerkes and McDonald Observatories of the Universities of Chicago and Texas, as chairman of the symposium on the chemical composition of the universe. He, like many at the meeting, was surprised to hear from Dr. A. Unsold of the University of Kiel, Germany, that the sun, stars and other bright bodies in the heavens have not changed much since they were created.

Even such hot stars as Tau Scorpii, Dr. Unsold found, have kept pretty much their original composition.

There is little difficulty in seeing why nebulae and the matter between the stars have undergone little change. They lack the mechanism which converts hydrogen into helium by means of the famous "carbon cycle," first proposed by Dr. Hans A. Bethe of Cornell University.

The sun and normal cool stars generate energy at such a slow rate that, during their lifetime, they cannot have converted a large amount of hydrogen into helium. Now astronomers are told that hot stars such as we now see in the sky also have changed little in their lifetime.

Science News Letter, August 28, 1948

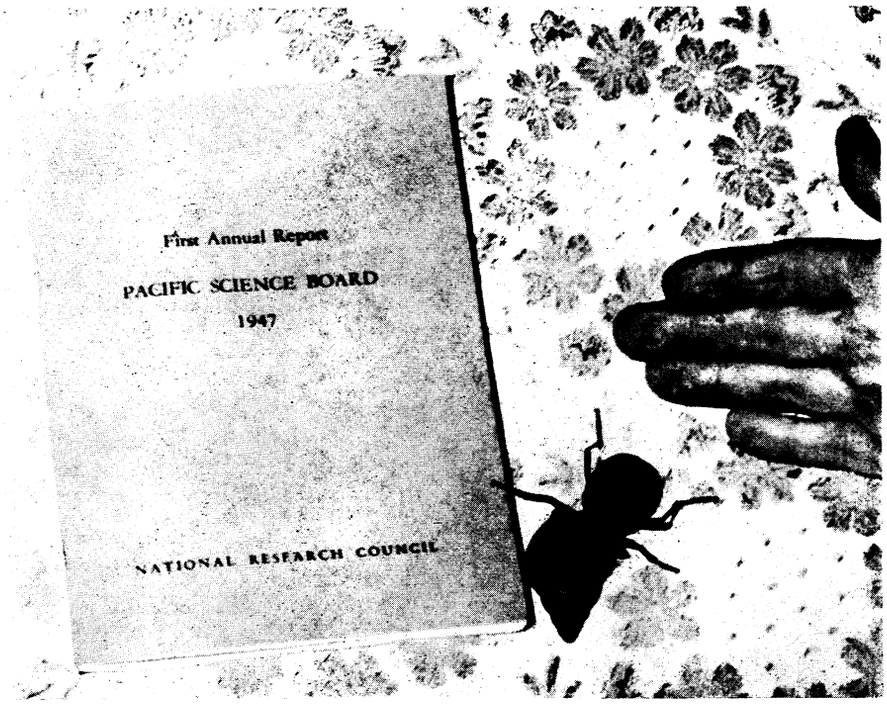
Uranium in Sun and Stars

➤ URANIUM, the atomic bomb element, is undoubtedly present in the sun and stars, but there is no danger or likelihood that it will explode.

The astronomers learned that changes in the heavier elements were completed when the universe was young. While vast atomic energy is manufactured from hydrogen, power from uranium is not possible under the conditions of the sun.

Long before the stars were formed, the universe may have been in a state of temperature and density which favored the nuclear reactions required to produce the abundances of the heavier elements, Prof. O. Klein of Stockholm's Technological Institute said.

Then, as the stars came into being, the abundances of the heavy elements became "frozen." There exist no nuclear processes which can operate under the present properties of stellar material and appreciably change the abundances of the heavy elements. Only the lighter elements continue



BEETLE VS. THE SNAIL—When the long-legged black beetle, Tefflus, attacks the giant African pest-snail, Achatina fulica, bet on the smaller but more powerful beetle. The beetle may become an ally of farmers on Pacific islands whose crops are being devoured by the snail, which when full grown gets to be as much as six inches long. The beetles are now being tested in Hawaii where they were brought from Africa by Dr. F. X. Williams of the Pacific Science Board of the National Research Council. (See SNL, July 17.)

their process of metamorphosis.

Science News Letter, August 28, 1948

Stars Have Much Hydrogen

➤ HYDROGEN is by far the most abundant element in the stars. For every atom of any metal there are about six atoms of carbon, nitrogen and oxygen; 500 atoms of helium; and 5,000 of hydrogen, Dr. A. Unsold of the University of Kiel, Germany, reported at the meeting.

Although we see only the outer layers of a star, we still have a pretty good idea of its total composition. Violent convective currents within the stars keep them constantly stirred up, stated Dr. F. Hoyle of the University of Cambridge, England. Thus the composition of the outer layers, which we observe, is the same as that of the interiors, where the nuclear processes take place.

Science News Letter, August 28, 1948

Letter To The Editor

Allopolyploid Redwood

THAT WAS a good article on my research (SNL, August 21, page 124) except for one thing. I did not call the California Coast redwood a hybrid, but an allopolyploid of hybrid origin. This distinction is more than academic. To the average scientist, whether botanist, zoologist or geneticist, the word "hybrid" refers to an organism like the mule, which is the first generation product of crossing, and is unable to reproduce its own kind, or if it can do so, fails to breed true. On the other hand, the process of doubling the chromosome number converts the hybrid into a full-fledged species which is not only fertile, but faithfully reproduces its own kind without undergoing Mendelian or any other kind of genetic segregation. Such allopolyploids are well known as established species in the plant kingdom. Cultivated wheat, cotton, and tobacco are all allopolyploids species which, in my opinion, have originated in the same way as the Coast redwood. However, they have been reproducing their own kind for thousands of years and, of course, cannot be compared to true hybrids like the mule. I don't know what terminology or explanation would put over this point best to the general public, but it seems to me an important one.—G. Ledyard Stebbins, Jr., Professor of Genetics, University of California.

Science News Letter, August 28, 1948

ENGINEERING

Harness Water Power

➤ PUERTO RICO'S great economic problem, too many people and too few jobs, is promised solution through hydro-electric power. With power available, factories will follow, and jobs will be plentiful. A big start toward the solution is well under way.

This American island, about one-half the size of New Jersey but relatively mountainous, has a population of 2,100,000, or over 540 persons per square mile. The amount of available farm land is far too little to support its people at any reasonable living standard by agriculture alone. Therefore industries are needed. Without domestic coal or oil, the water in its mountain streams is the logical source of power. It is already being harnessed.

The Puerto Rico Resources Authority, instituted by the Insular government in 1941, is behind the plans for water development. This agency has the job of the unification of water use for all purposes, including power, irrigation and domestic needs.

Its biggest dam is now near completion. This is a part of the so-called Caonillas project. The Garzas and Dos Bocas projects are already in operation. Fifteen smaller dams are also in use. These 18 together will give the island all the power it needs for the present, some 400,000,000 kilowatt hours per year.

As factories are established to use this power, other projects will be started. The island can produce about twice this amount of electrical energy. It will all be in use by 1970, it is expected.

Question Box

Photographs: Cover, p. 139, University of California; p. 131, National Research Council; p. 133, Puerto Rico Government; p. 135, Westinghouse.

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