

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.

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Hot Stars' Lives Brief

► **IN THE HEAVENS** there are spend-thrift 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.

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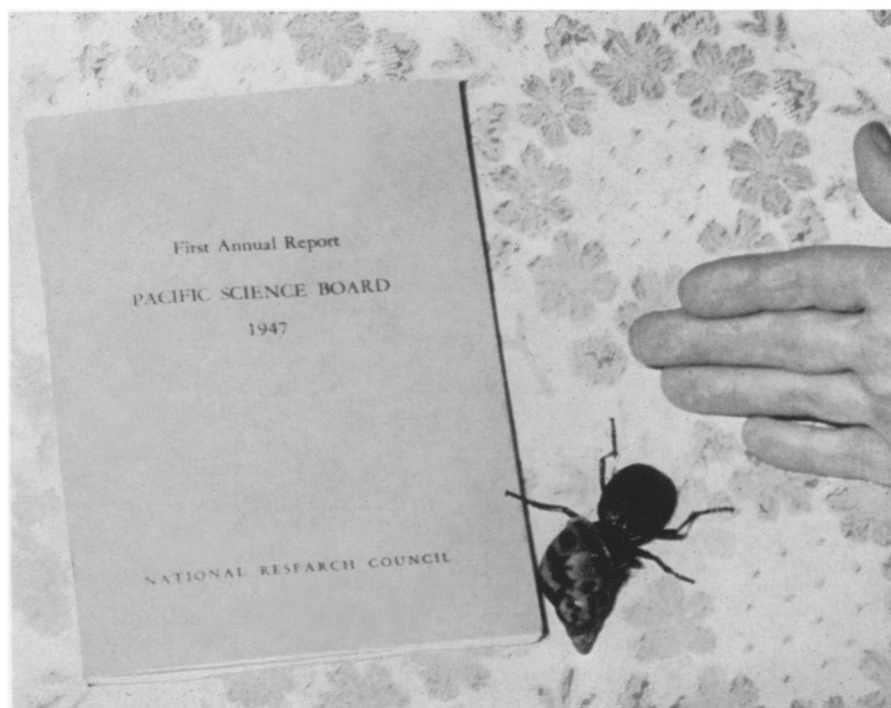
Uranium in Sun and Stars

► **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.)