A Celestial Neonate

Astrophysical Journal

Orion nebula: Star nursery:

Astronomers who are interested in finding stars in the throes of being born have been looking more and more toward the constellation Orion. The nebula in that constellation has become the favorite hunting ground as observation has shown that it consists of dense clouds of dust and gases and that these clouds appear in some cases to be falling together. The theory of star formation says that a star begins when some disturbance causes clumping in one of these dust and gas clouds. The clump becomes a gravitational attraction for the rest of the cloud, and the cloud, or part of it, falls onto the clump. The condensing mass is heated by friction until thermonuclear burning begins, and a star is on its way.

When thermonuclear burning begins, the thing can really be said to have become a star. The radiation produced by such burning should be detectable, and it should be characteristic of a very young star. For some time now many astronomers have suspected that an infrared source in the Orion nebula called the Becklin-Neugebauer object might be such a newborn star. At this week's meeting of the American Astronomical Society in Austin, Tex., a group of astronomers from Kitt Peak National Observatory reported that spectral evidence they have obtained leads them to conclude that the B-N object is a young star, one that began its thermonuclear burning only 1,000 or 2,000 years ago.

One of the astronomers, Donald B. Hall, told SCIENCE NEWS that what they have obtained is the first high-resolution spectrum of the B-N object in the infrared range between 1.5 and 5 microns. This gave them two significant pieces of evidence: absorption lines characteristic of carbon monoxide and emission lines characteristic of hydrogen.

There appear to be two systems of carbon monoxide. One of them is at rest with respect to the B-N object, and is presumably part of it. The other "appears to be matter forced outward from the B-N source at high velocity," Hall says. Such an expanding shell of matter is expected to be found around a young star. Its expansion would be driven by the stellar wind that is generated after thermonuclear burning begins.

The hydrogen emissions that appear in the spectrum of the B-N object consist of the radiation called Brackett alpha and gamma. This radiation is characteristic of a hydrogen region that theory expects to find around a young star of the early B class. With this information, the general theory of stellar development, which is based on observations of thousands of stars, enabled Hall and his co-workers to calculate the probable amount of time since thermonuclear burning began in the B-N object as being about 1,000 to 2,000 years. □

Antarctic meteorites: The collection grows

Most recovered meteorites are less-than-ideal objects of study, since they have often lain for who knows how long, eroding, rusting and suffering contamination by organic and inorganic materials alike. Antarctica, the world's southern cap, thus becomes a choice place to seek relatively pristine samples, since the subfreezing temperatures and oft-renewed snow cover conspire to protect meteorites from atmosphere, sunlight and organics, while substantially reducing their oxidation rate.

Fortunately, thanks in part to the snow-removing winds, Antarctica is also a place where meteorites, once fallen, can be found. From December 10, 1976, through January 20, 1977, for example, a U.S.-Japanese research team found 11 of them sitting atop the sheet ice, including a 407-kilogram chunk that is one of the largest stony meteorites ever found in the world. Now the team has returned to the region, and the pickings, except perhaps in size, are even better.

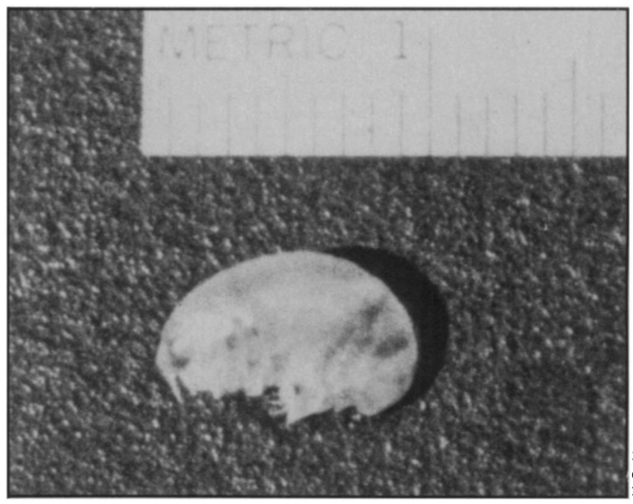
Within two hours of setting up camp near the isolated peak named Allan Nunatak in Victoria Land, says team leader William A. Cassidy of the University of Pittsburgh, 21 more meteorites were discovered. In a frustratingly brief, two-sentence message to National Science Foundation headquarters in Washington, Cassidy added only that all of the chunks are small, with the largest weighing about seven to eight kilograms. As some of the best-preserved samples of known extraterrestrial material on earth, the samples were picked up with special gloves, placed in sterile bags and then sealed into "rock boxes" provided by NASA, which originally developed the containers to hold pieces of the moon gathered by Apollo astronauts.

Cassidy had proposed after the previous expedition that such wind-cleared, old ice surfaces seemed to be ideal places to look for meteorites, and the new finds imply that he was right. In fact, says Mort D. Turner of the NSF Division of Polar Programs, this is the first time that anyone has come up with an idea of where meteorites should be found without actually seeing one fall. (Seeing one fall would hardly be of help anyway, since gravitational or orbital "favoritism," if such an effect applies at all, was not one of Cassidy's criteria.)

The samples, along with any others that may be found, will be sent to U.S. and Japanese curatorial facilities for distribution to scientists. □

It came from beneath the ice

Captured from an environment never before seen by man — the waters beneath Antarctica's Ross Ice Shelf (SN: 12/31/77, p. 421) — this amphipod crustacean belongs to the smaller of two similar species (the larger is about 4 cm long) taken in a baited trap. Of about 130 individuals caught in two hours, some 30 percent were gravid.



U.S. Navy