



## THE GUM NEBULA: BORN OF A SUPERNOVA?

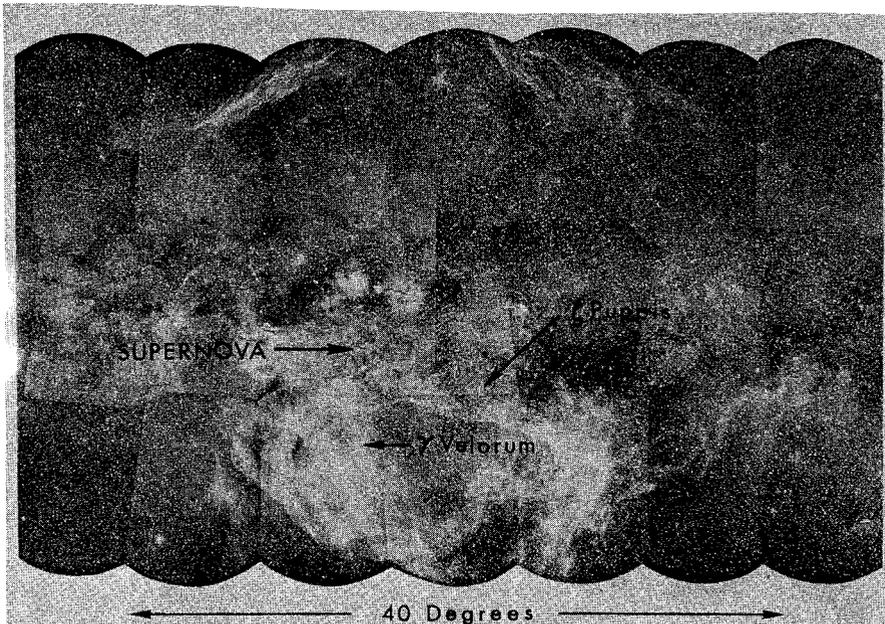


John C. Brandt

Research on the unusual Gum Nebula will be discussed by Dr. John C. Brandt at the May 1 meeting of the National Capital Astronomers.

Detailed observations of H-alpha brightness, atomic hydrogen absorption, and pulsars are combined with a determination of the distance to Gamma Velorum to determine the physical conditions and extent of the Gum Nebula. Its diameter is about 3000 light-years; the sun lies near the boundary of the nebula but definitely outside. The stars in the appropriate region of our galaxy are unable to maintain an ionized region of this large size, but the required amount of energy is probably available from a former supernova outburst. The date of the supernova can be estimated from observations of the Vela pulsar, and is about 9000 B. C. In visual wavelengths, the supernova would have been about as bright as the quarter-moon. Possible observations may be found in archaeological records.

The Gum Nebula



CHIEF OF SOLAR PHYSICS

John C. Brandt earned his Ph.D. in astronomy from the University of Chicago in 1960. In 1960-61, he held an NSF post-doctoral fellowship at the Hale Observatories, California. Now Chief of the Laboratory for Solar Physics at Goddard Spaceflight Center, Dr. Brandt has worked at Kitt Peak National Observatory and taught at Maryland, Columbia, Berkeley, and New York University.

Among our speaker's publications is the excellent book, "Solar System Astrophysics," and many papers dealing with the solar wind. He has also discussed observations of the solar "glory" and of the zodiacal light.

NCA MAY CALENDAR

May 1, Saturday, 6:15 P.M. Dinner with Dr. John Brandt at Bassin's Restaurant 14th and Pennsylvania Ave. N.W. No reservations required.

May 1, Saturday, 8:15 P.M. May meeting of NCA, Department of Commerce Auditorium, 14th and D Sts. N.W. Dr. John Brandt will speak on the Gum Nebula. Election of officers. Present officers and trustees please attend.

May 8, Saturday, 2 P.M. Md.-DC Juniors meet at Chevy Chase Library, Connecticut Avenue. Advisor is Jean Radoane, 434-0443.

May 21, 28, Friday, 8 P.M. Observing with the NCA 5-inch telescope on the grounds of the U.S. Naval Observatory. Call Larry White, 461-9681, if interested.

May 28-30, Friday-Sunday. Middle East Region convention, Princeton, N. J.

No discussion group in May.

SUPERGIANT STARS YOUNGER THAN EARTH

Dr. Anne Underhill of the Goddard Spaceflight Center turned our attention from pulsars and quasars to supergiant stars, at the April lecture. These residents of the upper right corner of an H-R diagram are 100 to 1000 times as young as the earth. They range from A stars with surface temperatures of 40,000° K. to 3,000° M stars. In the relatively nearby Milky Way regions are 31 supergiants brighter than visual magnitude 3.5. Some notable examples in various spectral classes are M - Betelgeuse, Alpha Hercules; K - 31, 32 Cygni; F - Delta Canis Majoris, Alpha Persei; B - P Cygni.

P Cygni had a novalike outburst in 1650 and has varied in brightness by 4 to 5 magnitudes since then. Supergiants lose portions of their atmospheres to space--cool ones due to mechanical energy produced by their hot chromospheres; hot ones due to radiation pressure from within. Satellite-based astronomy promises great advances in our understanding of supergiants.

Dr. Underhill declared that this country needs the inspiration which research in pure astrophysics provides; concrete applications of this physics will surely come later.

ERRATUM

The name of new member Walter Farrar, Jr., was misspelled in April.

## FEBRUARY 10, 1971 LUNAR ECLIPSE

Jean Radoane took the eclipse series at left using a 6-inch reflector, eyepiece projection, and a 50-mm camera lens. Exposures ranged from 1/25 second (uneclipsed moon, top) to 1 second (total eclipse, bottom).

## NOTES ON CURRENT RESEARCH

An excellent panel discussion of the physical nature of solar flares was held at the 52nd American Geophysical Union meeting April 13. One of the panelists was Dr. Elske Van P. Smith who spoke before NCA last year.

Flares have a distinctly nonthermal cause. When the protons they eject have energies greater than 10 million electron volts (mev), they travel directly to the earth's vicinity without diffusion across interplanetary magnetic field lines. Thus, tracing these proton events backward in time using many different observing tools, results in a better understanding of the flares which produced them.

There are two basic kinds of solar flare particle-emission events--high-energy protons and very fast electron streams emitted; low-energy electrons, and no protons emitted.

Solar radio astronomy can detect a vast array of solar events by using radio frequencies from very high to very low. For example, solar flare shock waves at great distances from the sun emit wavelengths meters long, while 1 to 100 kev electrons in the chromosphere emit wavelengths of a few centimeters. It is now thought that rare flares visible in white light are the result of photosphere heating by high-energy protons ejected downwardly from the chromosphere, and not synchrotron radiation.

Solar flares are high-density filamentary structures of the chromosphere, whose development begins in the complex transition region between the chromosphere and corona. Their histories are closely connected with variations in complex local magnetic regions.

## IMPORTANT EQUATIONS IN ASTROPHYSICS - II

The electromagnetic energy  $E$  radiated into space by a star is

$$E = \frac{L}{4\pi R^2}$$

where  $L$  is luminosity, determined by calculating the energy received from the star at the top of the earth's atmosphere and summing that energy over a sphere having a radius equal to that of the earth-star distance;  $R$  is the actual stellar radius, and  $\pi = 3.14$ .

ARMAND SPITZ DIES

Dr. Armand N. Spitz, 66, died April 14 after a long illness. He had been a member of NCA since 1960, and was active in other local societies and the Astronomical League before residing in this area. Mrs. Grace Spitz survives him at 3314 Barclay Drive, Fairfax, Virginia. A memorial service will be held at the Friends Meeting, 2111 Florida Avenue, N.W., Washington, Saturday, May 1 at 1 p.m.

Of his writings and the teaching aids which he devised, the Spitz Planetarium in itself will memorialize him. We like these words from his speech before the American Association of Museums, May 28, 1964: "It should never be forgotten that only a small person will look at the universe and see only a series of phenomena of mass and matter and space. Man still gropes to master its understanding and still comes up with quasars."

MIDDLE EAST REGION CONVENTION

The Amateur Astronomers Association of Princeton, N.J., will be host to the Middle East Region of the Astronomical League May 28-30. The first session will be Friday evening at the Princeton Day School. Registration fees are \$1 single, \$2 family; banquet \$5 each. Send registrations to George R. Parker, Schalk's Crossing Road, Plainsboro, N.J. 08536, and ask for particulars especially pertaining to motels which are distant. Dr. Jonathan Arons, Assistant Professor of Astrophysics at Princeton University, will speak on "Quasars" at the banquet. Reservations must be made more than a week in advance. To present a paper, write to Donald Martz, 4 Piedmont Drive, R.D. 1, Cranbury, N.J.

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