★ STAR DUST

Volume XXXI January 1975 Number 5

MOON DUST — SOME INTERESTING SURPRISES

DR. BERG

The January lecture meeting of the NCA will be held on the *second* Saturday, January 11.

Dr. Otto E. Berg, Principal Investigator for the cosmic dust experiment placed on the lunar surface by the Apollo 17 astronauts, will describe some new and unexpected findings. The experiment was designed to record impact parameters of micrometeorites and of lunar ejecta. While the data meet these objectives, they also reveal a lunar soil migration phenomenon associated with the passage of the sunrise and sunset terminators. Electrostatic levitation is suggested as a possible mechanism. The experiment thus may answer one of the major questions concerning the lunar surface: How is the fine soil transported so effectively on the Moon?

Dr. Berg will begin with a slide description of the operation of the lunar instrument and of pre-launch lunar environment simulations, and a graphical presentation of the experiment objectives.

Otto E. Berg has been involved in space research since 1949 when he was at the Naval Research Laboratory using captured German V-2 rockets. He succeeded in obtaining the first color photo of the Earth and a full-scale hurricane in 1955. The four-foot-square original hangs in a prominent position in the Smithsonian. He has been involved in measuring atmospheric densities and pressures at rocket altitudes, firing rockets into aurorae to investigate the phenomenon, studying solar radiation, and laboratory simulation of micrometeorites having velocities of 30 miles per second. He is the Principal Investigator for two experiments presently orbiting the Sun, as well as for the lunar experiment.

JANUARY CALENDAR — *The public is welcome.*

Friday, January 3, 10, 17, 24, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Monday, January 6, 13, 20, 27, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Saturday, January 11, 6:15 PM — Dinner with the speaker at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. Reservations unnecessary.

Saturday, January 11, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. Otto E. Berg speaks.

N. B. — In February, the lecture meeting will be returned to the first Saturday.

DECEMBER LECTURE

Dr. Warren M. Sparks discussed computer models of processes leading to nova outbursts, at the December 7 meeting of National Capital Astronomers.

The Goddard Space Flight Center astronomer reviewed computer methods of simulating astrophysical conditions, observations of major novae, the red-giant-white-dwarf binary model of Kraft, and Sparks' own models.

In 1934 DQ Herculis was discovered to be emitting nebular material. Eight years later it burst forth as a nova. Forbidden lines of doubly ionized oxygen and singly ionized nitrogen were prominent. The cloud around GK Persei is expanding at 1,000 km per second.

It is thought that all nova outbursts may be explained by some form of mass exchange in a binary system. About 20 percent of novae are known *not* to be spectroscopic binaries, but these may be binary systems viewed along the polar axes so that spectroscopic resolution of the components is precluded.

In the model developed by Kraft, material accretes onto a white dwarf from a red supergiant companion that has filled its Roche lobe. The captured material degenerates and heats without expansion, finally turning the white dwarf into a thermonuclear runaway. Before the nova outburst occurs, a mass of at least 0.7 solar mass is required. Chemically, the white dwarf must become rich in carbon, nitrogen, and oxygen; the reaction then proceeds from carbon 12 through isotopes of nitrogen and oxygen until iron is created as an end product of the nova.

Dr. Sparks showed a three-dimensional computer model of a stellar shock wave. He noted that about 10^{45} ergs are released by a nova, whereas a typical supernova, an entirely different phenomenon from that of the nova, radiates about 10^{51} ergs. By comparison, the Sun radiates steadily about 10^{33} ergs per second.

NOTES ON CURRENT RESEARCH

Venus' air sour — Analyses of the 8-14μ infrared spectrum of Venus, the refractive index given by polarimetry, and the very small amounts of upper-atmosphere water vapor detected, all point to a mainly sulphuric-acid atmosphere on Venus.

J. Martonchik of the Jet Propulsion Laboratory finds that a single cloud layer of 75 percent acid and a particle density of 100 cm^{-1} fits the observations well. The top of the cloud layer would be at the 15-mb pressure level and the bottom at 600 mb. The nature of the temperature change with altitude (Mariner 5) and that all Venus' CO_2 lines follow a square-root absorption law suggest a single-layered atmosphere, but some other data supprot a two-layered one. More infrared spectra are needed.

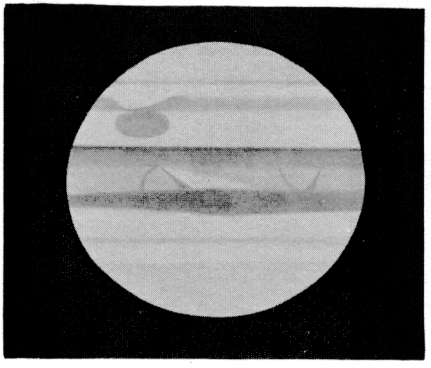
Pair closer— The parallax of the bright binary system, 70 Oph, having visual magnitudes 4.3 and 6, was recently redetermined as 0.217 sec based on 1914-1971 plates from Sproul Observatory. The 1914-1939 value was 0.040 sec smaller. The difference is attributed to the use of lower quality plates in the earlier determination. Orbital data on this binary have been controversial, many astronomers favoring an unseen-third-body influence until recently. Worth and Heintz remark on past visual observations that

"Visual observers have vastly overdone this bright pair in the past, and many hundreds of poor observations by inexperienced observers have to be rejected. Moreover, in this particular case several well-known and reliable observers show conspicuous systematic errors in the separations. For this reason, the third-body hypothesis has repeatedly been preferred to the assumption of rather unbelievably large errors, until photographic measurements enabled Strand to present strong evidence to the contrary."

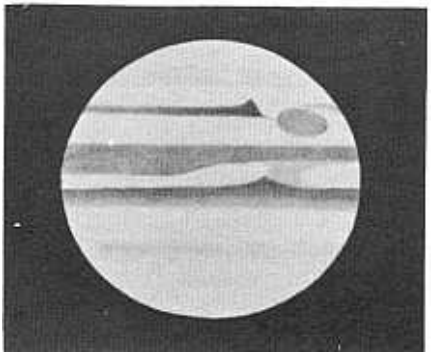
(*Astrophysical Journal*, November 1, 1974)

TELESCOPE AND AIRBRUSH

During the recent close approach of NASA's Pioneer 11 to the planet Jupiter, NCA's Daniel Costanzo of Arlington, Virginia made a series of observations with his 6-inch f/8 reflector, recording the planetary details with an airbrush.



November 16, 1974 - Costanzo



December 5, 1974 - Costanzo

These two selections from his series were made using a magnification of 200, and were recorded by Costanzo in color. Of the November 16 observation (left), Costanzo notes:

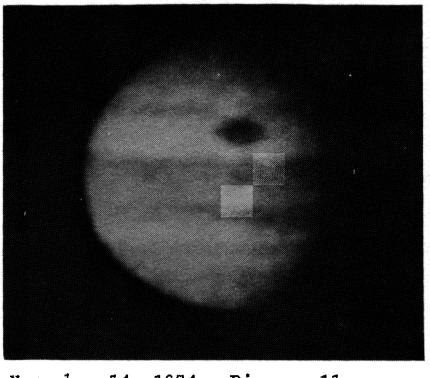
"STB appears as an expanded band with a notch in it above Red Spot. Red Spot both redder and smaller than usual. NEB darkest feature seen. SEB has a dark border on its S side. Small, faint festoons seen in Eq Z."

On the December 5 observation, he comments:

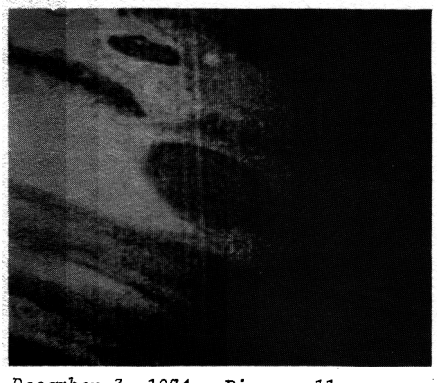
"STB darkest part of planet. A very faint streak connects this belt to Red Spot. Red Spot a very dark red color with slight darkening around its edge. It is also slightly slanted with respect to the STB. NEB dark on S side but lighter on N side."

Your *Observer's Handbook* defines and illustrates these standard designations of the Jovian features as used by Costanzo. (Page 50 in the 1974 edition.)

SPACESHIP AND CAMERA



November 14, 1974 - Pioneer 11



December 3, 1974 - Pioneer 11

Compare these NASA Pioneer 11 photographs with Costanzo's work. The November 24 photo was made when Pioneer 11 was still six million miles from Jupiter. When the close-up on the right was made, Pioneer was 238,000 miles from the planet, just 4h 16m before its closest approach. In these photos, many of the ever-changing features correlate with Costanzo's observations.

EXCERPTS FROM THE IAU CIRCULARS

1. K. A. Pounds, University of Leicester, reported that a variable X-ray source was detected in Tri. Aus. by a sensor on the UK-5 satellite. First seen on 12 November, it brightened to one-third the intensity of the Crab Nebula by 22 November and was still bright on 30 November.

2. November 19 — Holt, Kaluzienski, Boldt, and Serlemitsos, Goddard Space Flight Center, reported that Ariel V satellite detected a short-lived X-ray source in Lynx. The lunimosity of the object was approximately $1\frac{1}{2}$ times that of the Crab Nebula, but it was not detected during the preceeding or following orbits of the satellite.

3. Periodic Comet Honda-Mrkos-Pajdusakova (1974f) was seen at magnitude 10.5 on 3 December by Seki, and at magnitude 11 on 10 December by Sherrod. It may be several magnitudes brighter in early January, but will be low in the evening sky in Capricornus.

This listing furnished courtesy R. N. Bolster.

PARTIAL SOLAR ECLIPSE HAS LITTLE EFFECT ON ATMOSPHERE

William Winkler reports that his monitoring of the air temperature and pressure during the partial eclipse of December 13, 1974 showed a 1.5°F drop to 44.5° by one minute after eclipse maximum. No change in pressure was seen.

Winkler's measurements were made near the U. S. Naval Observatory.

* STAR DUST

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