



BELL SHOWS DIFFERENCES AMONG CLUSTER STARS



DR. BELL

Dr. Roger A. Bell, Professor of Astronomy at the University of Maryland, will address the June 4 meeting of National Capital Astronomers.

He will describe recent spectral work on globular-cluster stars which reveals differences in composition among stars of the same cluster.

An example is Omega Centauri which, in addition to possessing six CH stars, contains six stars with very strong CN bands and a star which has an abnormally strong barium line. These results indicate that nuclear reactions must have produced large quantities of carbon and nitrogen, as well as large numbers of neutrons to form heavy elements such as barium, and that these elements have been convected to the stellar surface. From observations of RR Lyrae stars, however, it also seems possible

that the Omega Centauri stars were formed with different abundances of heavy elements such as iron and calcium. The giant branch of Omega Centauri is abnormally wide in the color-magnitude diagram, when compared with other globular clusters, and it may be that this excess width is caused by these abundance differences.

The properties of stars in other globular clusters and in the cluster NGC 2209 in the Large Magellanic Cloud will also be discussed.

Roger Alistair Bell received his B. S. from the University of Melbourne, Australia, in 1957, and his Ph. D. from the Australian National University in 1961. Other than at the University of Maryland, he has served as visiting professor, Copenhagen University Observatory, Principal Research Fellow, Royal Greenwich Observatory, and as Lecturer in Physics, University of Adelaide, South Australia.

He is a Fellow of the Royal Astronomical Society, and a member of the American Astronomical Society and the International Astronomical Union, and has published widely.

JUNE CALENDAR — *The public is welcome.*

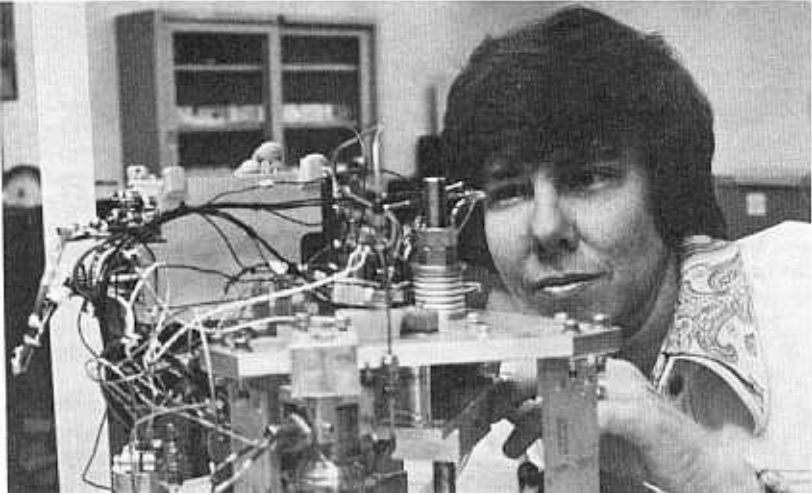
Friday, June 1, 8, 15, 22, 29, 8:00 PM — Telescope-making class at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, June 4, 6:15 PM — Dinner with the speaker at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. Reservations unnecessary.

Saturday, June 4, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. R. A. Bell will speak.

Saturday, June 11, 9:00 PM — *Exploring the Sky*, presented jointly by NCA and the National Park Service. Glover Road south of Military Road, NW, near Rock Creek Nature Center. Planetarium if cloudy. Information: Bob McCracken, 229-8321.

Saturday, June 18, NCA picnic at Manassas Battlefield Park. See page 40.



Dr. Straat with the Test Standards Module, functionally identical to the flight instruments, with which a response library was constructed using many terrestrial soils, some naturally sterile, and lunar soil. Synthetic soils are used in efforts to simulate the Martian responses chemically.

MAY LECTURE

Dr. Patricia A. Straat, of Biospherics, Inc., Co-investigator for the Labeled-Release Life-Detection Experiment on the Viking Mars Landers, addressed the May meeting of National Capital Astronomers. Originally scheduled to speak, Dr. Gilbert Levin, President of Biospherics, was ill.

Dr. Straat described the biology experiments, their principles, and the instrumentation, with particular emphasis on the Labeled-Release Experiment, with the development of which she has been intimately associated. She discussed the theoretical possibilities of Mars as a potential habitat, and examined the flight data in terms of alternative chemical hypotheses.

Covering a broad range of conceivable biological types, three detection schemes differ according to the way the organisms derive their energy. The Pyrolytic-Release Experiment monitors phototropes, which depend upon photosynthesis. In the test cell, the carbon monoxide and carbon dioxide of the Martian atmosphere are replaced by gases bearing radioactive isotopes of carbon, viz., $C^{14}O$ and $C^{14}O_2$. Thus exposed, a soil sample is incubated. The system is then flushed thoroughly with helium to remove the radioactive gases, and the sample is pyrolyzed to release any radioactive $C^{14}O_2$ that has been fixed by photosynthesis. Detector counts yield activity level and growth dynamics.

The Labeled-Release Experiment monitors heterotropes, which derive energy by breakdown of complex organic molecules. In terrestrial forms, the end product is CO_2 . Radioactive carbon is provided in the nutrient, and the test-cell atmosphere is monitored. Optional sequences and procedures allow flexibility for adaptation. Many such options have been exercised.

The Gas-Exchange Experiment uses no radioactive tracers. An extremely complex nutrient is provided which contains many compounds, designed to support a wide variety of possible biochemical systems. Gas-chromatographic monitoring of the test-cell atmosphere provides the basis for analysis of the type and level of biological activity.

Each soil sample is divided, one portion heat-sterilized, and the experiment is repeated using a fresh test cell; negative results are expected. Certain known chemical reactions can yield a positive response in the Labeled-Release Experi-

NCA OFFICERS ELECTED

At the annual business meeting of National Capital Astronomers, the following officers were elected for fiscal 1978:

President: James H. Trexler, Head, Space Systems Division, Naval Research Laboratory.

Vice President: Daniel G. Lewis, Electrical Engineer, Federal Power Commission, in charge of the FPC Data Base.

Secretary: William R. Winkler, Meteorologist, National Oceanic and Atmospheric Administration.

Treasurer: Robert M. Lynn, Veterinarian, owner and operator of Lynn Animal Hospital, College Park, Maryland.

Trustee: Benson Jay Simon, Senior Budget Analyst, United States House of Representatives Budget Committee.

Sergeant at Arms: Richard J. Byrd, Attorney at Law.

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following grazing lunar occultations in June. For further information call Dave at 585-0989.

June	UT	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
5	2143	Golansville, VA	3.2	83	3N	2"
7	0905	Portsmouth, VA	6.6	63	4N	2"
21	0120	Taylorville, MD	7.7	17	2S	3"

ment. Sterilization at 160°C will not destroy them, but would destroy biological activity. The results of sterilization at various temperatures narrows the range of chemical possibilities.

As a habitat, Mars could support various known forms of terrestrial life. Its 5-mm atmosphere, mostly carbon dioxide with traces of oxygen, nitrogen, and water vapor, has no ozone ultraviolet shield; protective mechanisms might include shelter, coats, or complex enzymatic mechanisms for repair of UV damage to nucleic acids. Life may have evolved in earlier, more propitious conditions, and possibly some forms have adapted. Life is not precluded.

In the laboratory unit, the Test Standards Module pictured above, the activity of terrestrial soil samples reached plateaus of up to 200,000 counts upon nutrient depletion. Control samples sterilized at 160°C yielded only 500 counts. Second injections resulted in additional responses. Lunar soil showed a sterile result.

The first injection of nutrient on Martian soil yielded an immediate response and plateau of 10,000 counts; the second injection, however, decreased activity. Then, in apparent confirmation, the 160°C control sample yielded negative response. These results have been consistently repeated on Mars at both sites, on both exposed and sheltered soil. Samples heated to 50°C, which should not destroy a chemical response, yielded only 5,000 counts, suggesting biological activity. On one occasion a second injection resulted in an increased response. Further confirmation has been sought in exponential growth dynamics; none has been found.

The plateaus correspond to total utilization of only one of the 17 carbon atoms supplied. The counts show a first-order relation to substrate concentration — typical of chemistry, but not necessarily of biology.

There are many highly reactive compounds on the surface, but no organic compounds have been found. It is possible that the level of Martian organic detritus is below the sensitivity threshold of the instruments.

Chemical hypotheses are being investigated. Efforts to duplicate these reactions in chemical analogs of the Martian soil have developed interesting, but different results. Gamma irradiation, but not ultraviolet, can provide a positive response, but of different kinetics. One sample showed a decreased response on second injection.

There are many conflicts, many clues — and the question is still open. rm

EXCERPTS FROM THE IAU CIRCULARS

1. May 8 — Lewin, Hoffman, Doty, Li, and McClintock, MIT, reported the detection of 26 X-ray bursts from MXB1735-44 during the preceding week with the SAS-3 observatory. The bursts were short (3 to 7 seconds), sometimes at regular intervals of 50 minutes, and sometimes separated by more than 12 hours.

2. May 16 — A. D. Haschick, Haystack Observatory, observed a turn-on of the water maser complex W3(OH) in Cassiopeia. The emission increased ten percent per day for several days.

3. A. W. Harris, Jet Propulsion Laboratory, has provided improved predictions for the eclipse of Saturn VIII (Iapetus). Several events will occur on 1977 October 19-20 and 1978 January 7-8. (Only some of the January events will be observable from the Eastern United States.)

This listing courtesy R. N. Bolster.

NCA PICNIC AT MANASSAS BATTLEFIELD PARK TO BE HELD JUNE 18

Bring your picnic dinner, telescopes, and guests, and enjoy another NCA outing at Manassas Battlefield Park on Saturday, June 18, from 4:00 PM.

Go west on I-66 approximately 17 miles from the Beltway to Route 234, right on 234 1.7 miles to the site on the left. Follow the dirt road to the picnic tables. Picnic will be held regardless of weather short of rain at the time.

SMITHSONIAN MONTHLY LECTURE JUNE 18

On Saturday, June 18, at 9:00 AM the monthly Sky Lecture will be held in the Albert Einstein Spacearium of the National Air and Space Museum.

Tickets are required, but are free. For reservations, tickets, and information, call 381-4193 between 9:00 AM and 5:00 PM on weekdays.

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