

1-79

# THE PRAIRIE ASTRONOMER

Volume 19, Number 2

January 30, 1979

## SOLAR SYSTEM INCLUDES REMAINS OF ANCIENT EXPLODING STAR

Evidence is mounting that the Earth and planets were formed when a nearby star 20 times the size of the sun exploded and showered our neighborhood with the seeds of creation.

The evidence says that at the time the solar system was born almost 4.6 billion years ago, there was a massive nuclear explosion in the not-too-distant heavens that scattered radioactive debris across billions of miles of space and into the vicinity of what is now our solar system.

The evidence places the birth of the solar system and the stellar explosion no more than 5 million years apart, which, in cosmological terms, is insignificant.

"Something went off with a hell of a big bang just before the solar system was born", said Dr. Gerald J. Wasserburg of the California Institute of Technology, where much of the recent evidence has been gathered. "We're talking about a difference in time that is almost instantaneous, a difference so close that it's almost zero."

Scientists say they believe the exploding star sent such a strong shock wave through space that it forced the gas and dust swirling in the neighborhood of what was to become

our solar system to come together and begin to form planets.

The vast quantity of radioactive debris thrown into space by the explosion of the star is also believed to have had a strong role in the formation of the planets and possibly the formation of the sun. It was, Wasserburg said, the "last salting of the soup."

The evidence lies in two meteorites that fell from space to Earth in the last 10 years. One, the Allende meteorite, dropped several tons

*(Continued to Page 3)*

### JANUARY 30TH IS NEXT MEETING

The January meeting of the Prairie Astronomy Club will be held at Hyde Observatory, 7:30 p.m., Tuesday January 30.

As announced last month, meetings will start promptly at 7:30.

The first part of the program will be "The Sounds of a Solar Eclipse", presented by Earl Moser. Second part, in preparation for the February 26 event, will be a presentation by Carroll Moore on "How To Observe a Solar Eclipse." This "how to" discussion by a veteran eclipse watcher is a good chance to pick up valuable pointers before February 26.

THE PRESIDENT'S REPORT:

Last month I presented a few ideas on how we could improve our meetings so that more of our membership would be interested in attending. Well, they seem to be working since the last meeting was pretty well attended, especially considering it fell between two holidays. I also saw a lot of new people and a few old members I hadn't seen for awhile. I received a couple of letters and a few phone calls from interested members who had other suggestions to add. I really appreciate any suggestions, and most are going to be put to good use, so please keep suggesting.

This month's meeting will be an important one because we'll have to decide what the club will do publicly on the day of the solar eclipse, the morning of February 26. (We'll have 85% of the sun's surface covered here in Lincoln.) We'll need volunteers to run the observatory, take pictures, etc. I'm sure we'll get a lot of public interest and news coverage on this, so think about what you could do and we'll discuss it at the meeting.

We also have the opportunity as individual members to subscribe to ASTRONOMY magazine for \$10.00 per year. (Regular subscription: \$15/year, cover price: \$24/year). We would need at least 10 subscriptions to get the group rate so if you're interested, let me know at the meeting or call me by February 5. This is a good deal on a fine, non-technical astronomy magazine. I think it's well worth the price.

Now, if you'll allow me to do just a little bragging...I can't help but feel proud of the association we have and especially of the interest and devotion of so many of our members. Look at what our club is doing!!! Carroll Moore is organizing a trip to North Dakota to view the total eclipse.

(Continued to Page 5)

TO CONTACT CLUB OFFICERS:

President -- Ron Veys (464-1449)

Vice President -- Walt Baumann  
(423-5740)

Secretary -- Budd Duvall (489-7933)

Treasurer -- Lee Thomas (489-3855)

Prog. Chairman -- Rick Johnson  
(423-6726)

THE PRAIRIE ASTRONOMER is published monthly by the Prairie Astronomy Club, and is free to club members. Yearly subscription without club membership is \$4.00. Regular membership (includes one-year subscription to Sky & Telescope, club newsletter, and four quarterly issues of the Astronomical League newsletter), is \$12.00. Family membership (includes all regular privileges, plus one additional vote in club elections) is \$14.00. Newsletter Editor, Lee Thomas (489-3855). Address all correspondence to PRAIRIE ASTRONOMY CLUB, INC., P.O. Box 80553, Lincoln, Nebraska 68501.

## ANCIENT EXPLODING STAR SEEDS EMBRYONIC SOLAR SYSTEM

of debris onto Mexico. The other, known as the Santa Clara meteorite, scattered a few hundred pounds of iron across Mexico.

Inside the Allende meteorite were abundant "marbles" of radioactive elements unlike any seen on Earth or in moon rocks.

Scientists found in Allende strange mixtures of barium, calcium, strontium, neodymium, and samarium. Robert Clayton of the University of Chicago found an odd mix of an isotope of oxygen known as oxygen-16.

All this made it appear as if Allende was the leftover of a hydrogen-bomb explosion rather than the workings of Mother Nature.

"There are some objects in Allende which did not come from any normal solar mix," Wasserburg said. "Every element in some of those little marbles in Allende looks like it was made in Oak Ridge", the U.S. atomic energy facility in Tennessee.

Most significant of all, the Allende meteorite contained huge excesses of an isotope called magnesium-26 that could have only come from the radioactive decay of another isotope known as aluminum-26. This isotope has all but vanished from the solar system because its half-life of 700,000 years is short enough to have long ago made it extinct.

Never before had scientists seen evidence that aluminum-26 was found in such abundance in the rock being formed at the birth of the solar sys-

tem.

Among other things, it told them that a nuclear event was responsible for the original production of aluminum-26 and that enormous heat was being generated inside the rocks from the radioactive decay of elements like aluminum-26.

"At the levels we measured, there was enough radioactivity in the dust and gas cloud at the birth of the solar system to melt a planet", said Wasserburg, who found the first evidence of aluminum-26 with Typhoon Lee and D. A. Papanastassiou of the California Institute of Technology.

"If the whole solar system had aluminum-26 as abundant as our numbers said, there was more energy present than the binding energy of the sun", Wasserburg said.

Fresher evidence has come from the Santa Clara meteorite, which produced an unexpected abundance of an isotope of silver known as silver-107.

Again, the large excess of the silver isotope meant it had been put there by the radioactive decay of another extinct isotope--in this case, an isotope of the metal palladium called palladium-107, whose existence in nature had never before been confirmed.

"People have thought about palladium-107 and looked for palladium-107 for 30 years", Wasserburg said. "We claim to have found it."

(Continued to Page 4)

## DECEMBER MEETING RECAP... EYEPIECE, PHONE NUMBERS, OBSERVING

Purchase of a 2-inch 50 mm plossl eyepiece from Astrophysics Corp. for use on the 14-inch Celestron telescope at Hyde Observatory was approved by the Observatory Committee prior to last month's club meeting. Rick Johnson reports that the eyepiece has been ordered and received, so we will be able to take a look at (and perhaps through) it at the January meeting.

It was suggested that phone numbers of club officers be printed in the monthly newsletter, and that is being done effective this issue (see box on page 2). This is especially important if you find you don't have a ride to a club meeting--a call to any of the club officers will get you a lift.

There was discussion about having one special night per month for club members to use the Hyde Observatory telescopes (in addition to the regular meeting night), but some members felt that might be pushing things a bit in tying up observatory facilities. It was suggested that, if that were the case, perhaps regular meetings could be moved back to Olin Hall. There was general agreement, however, that the public would find it simpler and more convenient to attend club meetings if they were held in the same place as public nights, when prospective members can be told, "last Tuesday of the month right here." We are investigating regular monthly observing nights, and a

report should be made at the January meeting on their feasibility.

## EXPLODING STAR SEEDS SOLAR SYSTEM...

(Concluded from Page 3)

The claim appears in the current issue of Geophysical Research Letters under the names of Cal Tech's William R. Kelly and Wasserburg.

The evidence that palladium-107 existed in large quantities in a meteorite whose origins go back 4.6 billion years is the strongest evidence yet that the solar system was seeded with "stardust" at the time of its birth.

--WASHINGTON POST NEWS SERVICE

## MIDSTATES REGIONAL ANNOUNCED

The Mid-States Regional convention of the Astronomical League has been set for June 1-3 at Missouri Western State College in St. Joseph, Mo. Sponsors for this year's convention are the Midland Empire Astronomy Club and the Astronomical Society of Kansas City.

Major emphasis of the convention will be the awarding of both types of Messier awards for chalking your first 70 or all 107 of the M-objects. The awards will be presented during the Saturday evening buffet supper session.

Papers will be presented --club members should begin planning what

## PRESIDENT'S REPORT (Continued from Page 2)-----

(Many of our members are taking advantage of this.) Jack Dunn is teaching a backyard Astronomy class for the Communiversitiy. Both Carroll Moore and Merton Sprengel are teaching evening classes in Basic Astronomy for the Parks & Recreation Department. Rick Johnson will be teaching a class on Planetary and Lunar Photography through Parks & Rec. (Tuesday nights, 7:00 - 9:00 p.m., for 4 weeks starting March 6. Still time to sign up-- call 474-6147). I will be teaching a class through Parks & Rec on Amateur Telescope Making starting in April. Not to mention all the supervisors and telescope operators that give up their Saturday evenings to run the observatory. All of these activities are open to the public and all of these people are working without pay just because they're interested in what they're doing. Everyone in this club is willing to share his time, his experience, his knowledge with anyone who's interested. It doesn't matter how inexperienced you are or that you don't "know" enough to get involved. The opportunity is there for everyone to participate. That's why this club was formed...so that we can all share our mutual interest. Come to the meetings. Re-join our club.

Remember, the meeting starts at 7:30 p.m. sharp!!! See you there.

--Ron Veys

## MIDSTATES (CONTINUED)...

they would like to present. Two professional astronomers (unnamed at press time) are scheduled to address the convention.

Delegates are to be housed in the dormitory rooms at Missouri Western. The rooms are on a modular arrangement for singles, doubles and threes, with a "living room" and shower facility to each four rooms. Bed sheets, pillow cases, blankets, soap and door keys will be furnished. You bring your own toilet articles. No deposit will be required on individual door keys and rooms will be assigned per request.

All meals will be taken in the

Nelle Blum College Center Cafeteria across from the dormitories. Meals will start with the Friday evening (June 1) supper at 5:30 p.m., Saturday breakfast, 7:00 a.m. to 9:00 a.m., Saturday lunch, Saturday buffet, Sunday a.m. breakfast and end with the noon meal Sunday.

Accommodations and meals package is \$30.00 each person. Meal package only (6 meals, including Saturday evening buffet) \$13.50. Registration fee for all delegates, family or individual is \$5.00. Delegates who wish to stay in area motels or hotels may purchase the meal package at \$13.50, plus they will pay an additional \$4.00 off campus service fee.

## SO-CALLED "QUICK QUASARS" MAY BE EXPLAINED BY NEW THEORY

A basic rule in nature is believed to be the one that forbids anything to move faster than light. Yet at least four celestial objects have been observed that apparently exceed that speed limit by large margins.

As described to an astrophysics conference held in Munich, West Germany in late December, one seems to be flying through space at eight times the speed of light.

Einstein demonstrated that nothing could travel faster than the speed of light, and yet observations of mysterious distant objects known as quasars create the illusion that this absolute constant is being exceeded. The conference was attempting to find an explanation for this paradox.

Over the last few years, faster-than-light, or "superluminous" objects have been tracked as they flew away from three quasars. Recently, a very distant galaxy known as 3C 120 (it is of the Seyfert type noted for its explosive behavior) has been observed apparently ejecting two such objects in succession, the first at five times light's speed and the second at eight times that speed.

As long as such behavior seemed associated only with quasars, it was taken by those who doubt their extreme distance as evidence that they must be relatively near. The dominant view is that quasars are the most distant objects observable in the universe.

If they are relatively close, it is argued, they need not be moving so fast. The same principle applies to aircraft crossing the field of view. Very rapid apparent motion is plausible if they are near but remarkable if very distant.

Of the various explanations offered for the superluminous behavior, one has emerged at the conference as the apparent favorite. It is that these objects are moving obliquely toward the earth at almost the speed of light. They are therefore "chasing" their own emissions (which are observed at radio wavelengths whose velocity equals that of light.)

Thus, the radiowaves emitted at a certain time and those emitted a year later arrive almost at the same moment, giving the illusion that the radio source in its oblique motion toward the observer has increased its apparent separation from the quasar or galaxy at incredible speed.

In the same manner, a runner would appear to be setting a new world record if the timers did not observe the starting gun until long after the race began.

This explanation has been offered by Dr. Martin J. Reese, director of the Institute of Astronomy at Cambridge University in England, who was a participant in the meetings. As suggested to the sessions by Dr. Kenneth Kellerman of the National Radio Astronomy Observatory in the

*(Continued next page)*

United States, the Reese hypothesis can also explain other puzzles relating to the quasars.

Kellerman, who is on leave from the Max Planck Institute for Radio Astronomy in Bonn, summarized the current state of efforts to understand the quasars. The conference was organized by the Max Planck Institute for Astrophysics in Munich as the Ninth Texas Symposium on Relativistic Astrophysics.

The meeting was given this name because the first was held in Texas in 1963. It sought, as have all its successors, to grapple with the problems raised by discovery of the quasars. From the yardstick normally used in long-range astronomy (the so-called red shift), quasars appear to be the most distant observable objects. Yet, if they are so far away, explaining their brilliance at optical and radio wavelengths, and also their rapid and radical fluctuations, remains a challenge.

From their bursts of energy, it has been assumed that the sources are extremely small and that such vast energy production within so tiny a volume is almost impossible to explain.

But if the emitting source is moving toward the earth at very high velocity, the duration of its emissions will appear foreshortened, giving the false impression of a small source region.

While this was regarded as an explanation for some of the rapid quas-

ar radio fluctuations, it seemed less plausible with regard to optical flashes observed on very short time scales.

Another perplexing feature of the quasars that may now be explained is the one-sided nature of jets radiating from them. The quasars with jets are those also ejecting superluminous objects, and the two phenomena are presumably related.

It has been reasoned that quasar jets should be symmetrical, radiating in opposite directions. Radio galaxies eject streams and blobs of gas upward and downward along their spin axes.

Kellerman showed a colored map of one, known as 3C 236.

The structure of the galaxy as mapped at radio wavelengths is 20 million light-years long, making it larger than the entire group of galaxies to which the Milky Way Galaxy belongs.

Because ejections in opposite directions seem characteristic of the violently active radio galaxies, it has been suspected that this would also be true of the extremely distant quasars. Yet typically only one jet is seen. Why, it was asked, are they so one-sided?

This, Kellerman said, can be explained if the observed jet is partly aimed toward the earth, moving outward at almost the speed of light. Its twin, moving in the opposite direction, would probably be invisible.

(Continued to Page 8)

## QUASARS... (FROM PAGE 7)

If the quasars prove relatively near, the energy requirements would be far easier to explain. But even though the conferees were shown photographs of quasars seemingly associated with nearby galaxies, most still seem convinced by other evidence that many quasars lie near the fringes of the observable universe.

The quasar energy source is referred to as "the machine"--a process that may be at work in the cores of all galaxies.

Candidates for "the machine" dis-

cussed at the conference include "spinars", which are wildly spinning accumulations of matter; chain reactions of star explosions, and entire stars falling into black holes a billion times more massive than the sun. A black hole is an accumulation of matter so dense that its gravity prevents the escape of light and would squeeze in-falling material sufficiently to release vast amounts of energy.

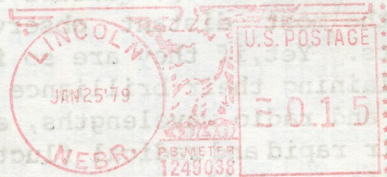
--NEW YORK TIMES SERVICE

THE PRAIRIE ASTRONOMER  
c/o PRAIRIE ASTRONOMY CLUB, INC.  
P.O. Box 20553  
Lincoln, Nebraska 68501

Mr. Earl Moser  
Hickman,  
Nebraska 68372

FIRST CLASS MAIL

9/79



(Continued to page 9)