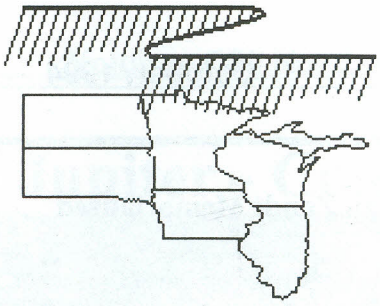


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Roaming the Region

by Janet Stevens

David Oesper, who is a member of the Des Moines Astronomical Society, the Southeastern Iowa Astronomy Club, the Popular Astronomy Club, and the Quad-Cities Astronomical Society has become a Board Member of the International Dark-Sky Association. David was one of the organizers for the first annual Midwest Regional Meeting of I.D.A. which was held in Ames, Iowa, on June 4, 1994. About 50 interested individuals attended the meeting where several papers were presented. The program also included discussions about light pollution, a luncheon given by Musco Lighting, a public lecture about the Messier Objects, a public star party, and a tour of good and bad lighting examples in the Ames area.

The Chicago Astronomical Society held another successful Astrofest. About 750 amateur astronomers from all over the country attended this year, and were treated to two clear nights of observing. Not only were there more attendees this year, there was a large increase in the population of yellow jackets who seemed to enjoy our presence. Unfortunately, several people were stung, but no one was seriously injured. Everyone managed to enjoy themselves anyhow. Next year, Astrofest will be held the weekend of September 15-17, 1995.

Comet Shoemaker-Levy 9 Impacts Jupiter.

by Bert Stevens

Comet Shoemaker-Levy 9 (1993e) has had its rendezvous with history, and the planet Jupiter. From July 16 through July 22, fragments of the comet impacted on Jupiter's southern hemisphere just south of the Great Red Spot in the south temperate zone. Each of the 22-odd major fragments was traveling almost directly northward when they hit the planet. Professional astronomers, amateur astronomers, the press, and interested people the world over watched the outcome of each impact.

Comet Shoemaker-Levy 9 was discovered in March of last year by the observing team of Eugene Shoemaker, Carolyn Shoemaker, and David Levy. The Shoemakers, a husband and wife team, had been engaged for many years in searching the skies for minor planets (asteroids) that pass close to the Earth. David Levy is a comet hunter who holds the modern record for finding comets, many with his backyard telescope in Tucson, AZ. They discovered the Comet with one of the smaller telescopes at the Mt. Palomar Observatory near Los Angeles, CA.

On seeing the Comet for the first time on the discovery plate, Dr. C. Shoemaker said, "It looks like a squashed comet!". Comet 1993e appeared as a string of pearls threaded along their mutual orbit. A sheet-like tail emanated from the group, and dust spread along the orbit. After additional study by many astronomers, Dr. Brian Marsden, arbiter of comet orbits, announced that S-L 9 was in orbit around Jupiter. He also reported that it would hit Jupiter in July 1994.

Astronomers, both professional and amateur, from all over the world began making plans to observe the event. Every conceivable instrument, from the Hubble Space Telescope, to the smallest toy telescope was pointed at Jupiter sometime during the event. Predictions of the effects of the impacts ranged from tremendous explosions to nothing at all. Since no one had ever observed an event like this, there was no precedent for predicting the results.

Each impact occurred just a short way around the backside of Jupiter, out of sight of the Earth. Jupiter's rapid rotation would then bring the impact site into view only fifteen minutes after the event. Two hours later it would be near the center of the Giant Planet's disc. Astronomers eagerly awaited the event.

As the first fragment, Fragment A, approached Jupiter on July 16, telescopes

focused in on the impact area and watched as the fragment impacted behind the planet. Infrared telescopes were the first to report detection of the event from sites in Chile and Spain. A plume of hot gas and dust rose above the edge of Jupiter and was easily detectable in the infrared. Visible-light observations showed no signs of the plume. "It's brighter (in infrared) than Io (a large moon of Jupiter)," exclaimed co-discoverer Eugene Shoemaker. "I mean, it's bright." Shoemaker and his fellow discoverers were at the Space Telescope Science Institute in Baltimore. They received early data via computer from observatories around the globe. Elation showed on their faces and in their voices time after time as the initial reports started arriving.

In infrared, the plume appeared as a bright spot on the edge of Jupiter's disc about five minutes after the actual impact. Five minutes after first appearing, the rising plume rotated into view of the Earth-based telescopes. The hot plume shone very brightly in the infrared, brighter than Jupiter's moon Io with its volcanoes and sulfur flows. About ten minutes after the impact, the plume reached maximum brightness in the infrared. The impact plume was only about five thousand degrees Fahrenheit, not hot enough to shine brightly in visible light.

The first impact occurred in the late afternoon for the United States. As Jupiter rotated to bring the impact site into view, astronomers saw a black spot, the darkest cloud feature ever seen on Jupiter, where the impact had occurred. Jeff Biesh of the Association of Lunar and Planetary Observers was the first amateur astronomer to report observing the dark spot. His observatory on Florida's east coast gave him the first view of the impact from North America. As night fell over the rest of the country, amateurs with clear skies could plainly see the 18,000-mile-wide dark spot on Jupiter's surface.

Fragment A was the smallest of the fragments, but it set the tone for the rest of the impacts. Each struck the planet in very nearly the same position relative to the center of the planet. The fragments approached Jupiter traveling due north. Each hit at 45 degrees south latitude; accordingly the fragments entered Jupiter's atmosphere at a forty-five-degree angle.

"We are all flabbergasted at what we are seeing," said Heidi Hammel, who is leading the team of scientists gathered in Maryland to analyze the images taken by the Hubble Space Telescope. "We can be very glad that this comet was heading for Jupiter and not the Earth."

As the fragment entered the thin outer atmosphere, it pushed back the air molecules, leaving a hollow tube in Jupiter's atmosphere behind it. Penetrating the ammonia cloud layer, the fragment hit the denser atmosphere above the water clouds. It's energy of motion was converted into heat in a huge fireball. Within two seconds, the fireball reached maximum brightness and lit up the surrounding atmosphere so brightly that the flash was visible from Earth. Over the next 25 seconds the fireball expanded, began to cool, and faded out in the visible. Jupiter's dense atmosphere kept the expanding fireball from spreading out too quickly, but the hollow tube the fragment punched in the atmosphere provided no resistance. A mixture of blazing comet and deep atmospheric matter shot out of the hollow tube like a bullet out of a gun.

This mixture rose more than 3,000 miles above Jupiter's atmosphere, so high that it became visible to Earthly astronomers looking over the edge of Jupiter. The glow from the heated plume lit-up

Rollin Van Zandt Memorialized

The poem below was written by David Grebner of the Peoria Astronomical Society as a memorial to our friend Rollin Van Zandt. Art Grebner, David's father, worked with Van during the construction of the 24-inch telescope and the Decker-Grebner-Van Zandt Observatory.

Rollin Van Zandt (May, 1994)

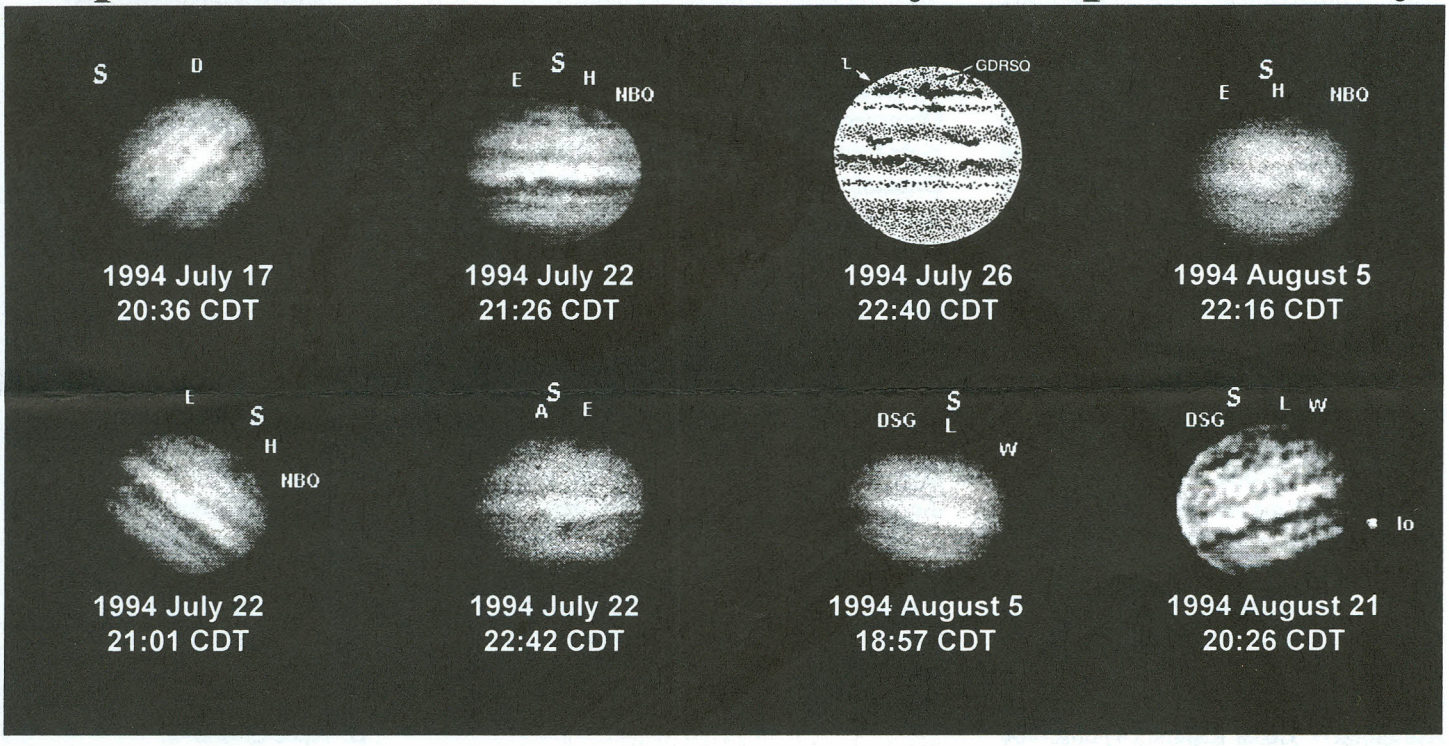
Though eclipsed by death
before nature's big show
your light still shines
through sudden loss
and chilling darkness
like the silvery glow
of that annular event.

And your light too
will brighten again
on the silvered mirrors
of telescopic eyes
projected on the screens
of treasured memories
on, at last, with the moon and stars.

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Articles and ideas for articles about any astronomical topic of interest to amateur astronomers are invited and should be mailed to the above address. *Northern Lights* is edited by Berton and Janet Stevens. All material is copyright 1994 by the authors and used with their permission.

Jupiter - Comet Shoemaker-Levy 9 Impact Gallery



Images taken during and after the impacts of the Comet Shoemaker-Levy 9 fragments on Jupiter's southern hemisphere show the dark features resulting from the impacts. The above CCD images were taken with an ST-4 CCD camera on the 16-inch f/20 Cassegrain telescope at the Modine-Benstead Observatory of the Racine Astronomical Society, Racine, Wisconsin. The drawing was done at 194x with a 10-inch f/7 Newtonian. Notice how the early images show the impact features as distinct blotches on Jupiter's cloud deck. The later images show the impact features smearing together into a temporary, broken belt. CCD images taken by Bert and Janet Stevens, Mark Schmidt, and Chris Tobias. The drawing was done by Brian Halbrook, from the *Star Times* of the Marquette Astronomical Society, Marquette, Michigan.

Jupiter's moons with a dull red light that was barely detectable. The mixture then began to fall back onto Jupiter's cloud-tops. Since the fragment came from the south, the mixture fell back mainly to the south of the point of impact. Each impact feature is surrounded on the south by a dark crescent of ejected material floating on the cloud tops.

A small amount of the mixture rose high enough to be captured by Jupiter's magnetic field. The plasma was carried along the magnetic field and rained down on Jupiter's northern hemisphere, creating an intense aurora. These auroral features were seen best in the ultraviolet.

Astronomers are just beginning to understand the data they gathered during the impacts. There are images, light-curves, photometry, spectrograms, and more to be analyzed. It will take years to fully understand every aspect of the event, but one thing is already clear: Comet Shoemaker-Levy 9 was definitely a comet. There had been some speculation that the Comet might actually have been a minor planet that had broken up and the "tail" was dust from the breakup. Spectroscopic observations have detected water vapor from the Comet, proving that it is a comet since minor planets do not have water in any appreciable quantity.

Amateur astronomers all over the North Central Region observed the impact features. Every available observatory examined Jupiter during and after the impacts. Amateurs made drawings, took photographs, CCD images and made video-tapes of the Giant Planet and its new markings.

The Chicago Astronomical Society co-sponsored an impact party with the Cernan Earth and Space Center of Triton College in River Forest, Illinois. The event was scheduled for the first Saturday of the impacts (July 16), but it was cloudy in the Chicago area. Dan Troiani brought out his shortwave radio and treated the two-hundred-plus people who attended the event with radio noise from Jupiter. Dan had tested the equipment for weeks before the impacts started and found a clear channel at 21.150 MHz. Aiming his 22½-foot dipole antenna at Jupiter, he heard an enhancement of Jupiter's noise around the time of Fragment B's impact. Mr. Troiani was joined by fellow C.A.S. member Dan Joyce for a series of informal public telescope viewing sessions at the Cernan Center. These were held on every clear night for the remainder of the week.

At the Modine-Benstead Observatory of the Racine Astronomical Society, R.A.S. members manned the observatory every night during the impacts, just in case it cleared. Their 16-inch f/20 Cassegrain, two 14-inch Celestrons, and a dozen smaller instruments were allo pointed Jupiter-ward. Sunday night and Wednesday night were both mostly clear and yielded good images of Jupiter.

The public night at the Racine Observatory was Thursday night, July 21. Observatory Director Mark Schmidt gave an interview on local radio in the early evening while rain fell outside. By 9:30 p.m., the sky was slowly clearing. They set-up one telescope with a TV camera and displayed the image to the over 150 people who came to the Observatory that night. They also enjoyed a look at Jupiter and its new scars through one of the Celestron 14-inch telescopes.

Observers from the Cedar Amateur Astronomers (Cedar Rapids, IA) observed the event at their Palisades-Dows Observatory using both their 12½-inch Cassegrain and their newly completed 6-inch f/15 refractor. Their 12½-inch was used for videotaping, while the 6-inch was for visual work. The Cedar Amateur Astronomers also presented a program at the Cedar Rapids Science Station. Jim Rutten spoke about the comet collision inside, while other members set-up their telescopes in the parking lot outside. John Karn, director of the Science Station, estimated approximately 200 people attended the evening's program.

The Marquette Astronomical Society conducted a public observing session just after the impacts finished on Friday, July 22. This event was held at the Hiawatha Music Fest. The clouds cleared just in time for the seven telescopes ranging from 8-inches to 12½-inches in aperture. Many Fest attendees had never looked through a telescope before and were most grateful to see "history in the making". Before the night's end, hundreds of people had looked through the 'scopes.

The Milwaukee Astronomical Society had their observatory open for members only. Over a dozen members came out on the best night for viewing through their 25-inch Cassegrain, two 12½-inch Newtonians and many smaller telescopes. Observers watched Jupiter every clear night from the Observatory. Observatory Director Gerry Samolyk said that in addition to visual observing, the main activity was the timing of the central meridian passages of the impact features both during and after the impacts occurred.

This has just been the first chapter in the story of the Comet Shoemaker-Levy 9 and Jupiter. Much more will be learned from the analysis of the data, things that we cannot even guess at now. Our understanding of Jupiter's atmosphere and magnetosphere, comets and impact events in general will be changed forever by this event.

Trivia, Trivia, Trivia!

The following is the Trivia Questionnaire and answers from the NCRAL Convention at Burlington, Iowa last April.

1. What is the NGC number of the object in the picture below?
   A. NGC-1264
   B. NGC-4216
   C. NGC-6214
   D. NGC-2164
   E. NGC-2146

2. Cassiopeia and Cepheus' most famous daughter was _____.
   A. Aeoropa
   B. Columba
   C. Andromeda
   D. Virgo
   E. Spectra

3. Who wrote "We do not ask for what useful purpose the birds do sing, for song is their pleasure since they were created for singing. Similarly, we ought not to ask why the human mind troubles to fathom the secrets of the heavens..."?
   A. Johannes Kepler
   B. Galileo Galilei
   C. Blaise Pascal
   D. Albert Einstein
   E. Edwin Hubble

4. The second woman in space was:
   A. Judy Resnick.
   B. Sally Ride.
   C. Kathy Sullivan.
   D. Alice Cramdon.
   E. Anna Lee Fisher.

5. The Crab Nebula, M1, is expanding at a rate of _____.
   A. 50 miles per second.
   B. 600 miles per second.
   C. 3700 miles per second.
   D. 9300 miles per second.
   E. 12000 miles per second.

6. Sidereal time matches solar time on:
   A. January first
   B. the spring equinox
   C. the summer solstice
   D. Christmas Day
   E. the fall equinox



7. How many space stations have been built in space?
   A. Zero
   B. 1
   C. 2
   D. 3
   E. 4

8. What was the first double star to be discovered?
   A. Polaris in Ursa Minor
   B. Albireo in Cygnus
   C. Castor in Gemini
   D. Mizar in Ursa Major
   E. Double-Double in Lyra

9. Einstein dreamed of _____.
   A. Curved space.
   B. cyberspace.
   C. double space.
   D. parking space.
   E. Peyton Place.

10. The meaning of "Bootes" is _____.
   A. Bird of Paradise
   B. Charioteer
   C. Herdsman
   D. Small slippers
   E. Champion

11. What does V.L.B.I. stand for?
   A. Very Long Baseline Inferometry
   B. Very Large Blackhole Intrusion
   C. Variable Light by Inflection
   D. Variable Light Binary Inspection
   E. None of the Above

12. What is the diameter of the volcanic crater on Olympus Mons?
   A. 60 Km
   B. 70 Km
   C. 80 Km
   D. 90 KM

13. Who suggested a heliocentric theory 18 centuries prior to Copernicus?
   A. Ron of Green Bay
   B. Galileo
   C. Einstein
   D. Doppler
   E. Aristarchus of Samos

14. In what year were pulsars discovered?
   A. 1960
   B. 1950
   C. 1967
   D. 1966
   E. 1970

15. Who discovered Pulsars?
   A. Jacelyn (Bell) Burnell
   B. Paul Burnell
   C. Alexander Bell
   D. Robert Goddard
   E. Doctor Ruth

16. CCD means _____?
   A. crucial charging diagnosis
   B. cloud chamber design
   C. carbon cycle dating
   D. charge-coupled device
   E. camera-computer duo

17. A huge chain of galaxies some 400 million light-years from Earth and stretching for 500 billion light-years across the sky is called the _____.
   A. super cluster.
   B. local group.
   C. great wall.
   D. universal divider.
   E. galactic barricade.

18. In the Doppler Effect, if the light is moving toward the observer, the frequency increases, the wave length is shorter, and the light is _____.
   A. Blue
   B. Red
   C. Yellow
   D. Green
   E. White

19. Escape velocity from the Earth is _____.
   A. 1400 mph
   B. 5400 mph
   C. 17500 mph
   D. 25000 mph
   E. 134,548 mph

20. Where would you see the sun rise if you lived on the north pole of Uranus?
   A. In the east.
   B. In the west.
   C. In the south.
   D. It would always be overhead.
   E. You would never see it.

Trivia Answer and Sources:

1. C - Source: "The Sky" - computer software program.
2. C - Source: "The Constellations", by Lloyd Motz and Carol Nathanson, Doubleday, 1988, pp. 65.
3. A - Source: "Cosmos", by Carl Sagan, Random House, 1980, pp. 45.
4. B - Source: "NASA - Visions of Space", by Robin Korrad, Courage Books, 1990, pp. 162-163.
5. B - Source: "Turn Left at Orion", by Guy Consolmagno and Dan M. Davis, Cambridge University Press, 1989, p. 47.
6. E - Source: "Dictionary of Scientific Literacy", by Richard P. Brennan, John Wiley & Sons, Inc., 1992, pp. 270.
7. C - Source: Ibid., pp. 278.
8. D - Source: "Turn Left at Orion", pp. 83.
9. A - Source: "Dictionary of Scientific Literacy", pp. 64
10. C - Source: "The Constellations, pp. 403.
11. A - Source: "Contemporary Astronomy", by Jay M. Pasachoff, Saunders College Publishing, 1981, pp. 489.
12. C - Source: Ibid., pp. 327.
13. E - Source: Ibid., pp. 238.
14. C - Source: Ibid., pp. 204.
15. A - Source: "Contemporary Astronomy, pp. 204.
16. D - Source: Sky & Telescope, May, 1994, pp. 4.
17. C - Source: "Dictionary of Scientific Literacy", pp. 132.
18. A - Source: Ibid., pp. 79.
19. D - Source: Ibid., pp. 100.
20. C - Source: "1001 Things Everyone Should Know About Science" by James Trefil, Doubleday, 1992, pp. 279.

The Backyard Legion

by Jack Kramer

(Reprinted from *Night Times*, the newsletter of the Lake County Astronomical Society.)

Probably all of us have gotten up well before dawn on a clear, dark, cold morning to take the dog out or get the newspaper. Or, perhaps, that's normally when you head off to work. Everything's darker at that hour because much of the ground illumination that plagues us in the evening has been turned off. Have you looked up at the sky and marveled how bright the stars appear? Have you longed for the time and/or gumption to set up a telescope and take a look around? On a morning in late *October, I go*t up wide awake at 5:00 a.m. and decided to act on impulse. As an added incentive, it happened to be around the peak of the Orionid meteor shower, which is a remnant of Comet Halley. I did see some bright, fast meteors, but judging by their radiants, most were not Orionids.

There's a certain urgency observing at this hour - the dawn will soon put an end to your sky wandering. I set up the copyscope and checked out some of the usual "hot spots", M42 in Orion, M35 in Gemini, and the "Christmas Tree" Cluster (NGC 2264) in Monoceros. With Taurus high overhead, the Crab Nebula (M1) seemed like a worthy target. To my surprise, it was fairly easy without a nebula filter, even in this small scope!

Leo was well up in the east, so maybe some galaxy hunting was in order. But the bright background through the telescope indicated that the Sun was beginning to make its presence felt. Looking overhead, it was still fairly dark. Without paying attention to any particular constellation, I noticed an enticing string of faint stars. Exploring this with the scope revealed a loose cluster of stars nearby. Taking in the naked eye view, I found myself aimed at the head of Auriga. I hadn't stumbled across a true cluster, but just an asterism near the center of the "Flaming Star" Nebula (IC 405). Of course, it wasn't possible to detect any of this nebulosity under the present conditions. But there were lots of true clusters around; this is a rich part of the winter Milky Way. This is the way many newcomers approach observing - doing some unplanned looking around, then spotting something interesting that arouses a curiosity. A good star atlas answers most such questions.

By now it was 6:00 a.m. and the sky was brightening. Fortunately, I didn't have to go into the office today, so there was time to have a cup of coffee and read the paper. It had been worth the effort to climb out of the sack so early. What a great way to start the day!

In Memoria

by Gordon Garcia

It is my sad duty to inform you of the passing of Mr. Harold J. Stelzer of River Forest, Illinois. Harold passed away on October 7, 1994 after a long illness. He was a long time member of the Chicago Astronomical Society.

Harold became an active observer after his retirement from Sears, Roebuck and Company in 1969. From his backyard observing site he became a keen observer of the solar system. He was a sustaining member of the Association of Lunar and Planetary Observers (ALPO).

Harold began making variable star observations with a photoelectric photometer about 1979. He became a member of the International Amateur-Professional Photoelectric Photometry (IAPPP) organization. Harold submitted observations to the IAPPP for many years. He is included as a contributor in many scientific papers on variable stars and was considered a national expert on photoelectric photometry.

He was also a long-time member of the American Association of Variable Star Observers (AAVSO) where he participated for many years in the Solar Division. Every clear day of the year, Harold would observe the Sun, making a whole disc drawing and sunspot count. He contributed his sunspot counts to the AAVSO American Sunspot Program. He also provided data to several international solar observers. Harold developed a unique method for observing the Sun directly. His method is featured in the Astronomical League publication *Observe and Understand the Sun*. He presented this method using binocular vision and a solar grid assembly attached to the telescope at the Astronomical League Convention at Kutztown State College, Pennsylvania, in 1976.

I first met Harold in 1982. After several years of observing the Sun with my C-8 telescope, I purchased a copy of *Observe and Understand the Sun*. I read Harold's article and decided to pursue his method of direct solar observation. I called Harold and he immediately invited me to his home to see how he observed. I was most surprised to find that instead of listening to him explain how he observed, I was going to explain to him how I was going to make my first drawing. Harold handed me an observing form and pencil. He then sat me down at his telescope and told me to complete a solar drawing. Although it took some time, I did complete my first drawing and was hooked.

I continued my association with Harold and enjoyed many a discussion with him on solar observing. Harold was more than my friend, he was my mentor. He was a very serious observer, but would find time to share his knowledge with anyone who had an interest. He will be missed by all that made his acquaintance.

★ ★ ★

Deadline for the next issue is November 30, 1994.