

10<sup>TH</sup> ANNIVERSARY



# Sky Scanner

# 1981 ANNUAL

FEB. 1981

Vol. 11 No. 2

The SKY SCANNER is the monthly (more or less) publication of the BREVARD ASTRONOMICAL SOCIETY: P.O. Box 1084; Cocoa, FL 32922. The Society meets every second (2nd) Sunday of the month at 7:30 pm at Astronaut Memorial Hall on the Cocoa campus of Brevard Comm. College.

---



---

O F F I C E R S

---



---

Pres: Rick Armstrong; 412 N. Waterway Dr; Satellite Beach, FL 32937.  
 V-P: J. Allyn Smith; 800 N. Fiske Blvd: Apt 815; Cocoa, FL 32922.  
 Secr: Roxann Walters; 1605 Pinecrest Ct; Cocoa, FL 32922.  
 Trea; Dalene Root; 1012 S.W. Essex Ct; Palm Bay, FL 32905.  
 Libr; Ken Toole; 1607 Calvodos Dr; Cocoa, FL 32922.

---



---

S K Y   S C A N N E R   S T A F F

---



---

The SKY SCANNER will publish any articles of interest to its readers. Any and all contributions are welcome and should be sent to the editor by the first of the month. Photos (B&W) are welcome.

EDITOR: See V-Pres. above.

CONTRIBUTORS: (this month):

Bob Brater	Roxann Walters	Dalene Root
Tony Boatright	Steve Morgan	

---



---

B I R T H D A Y S

---



---

Birthdays coming up this month - club members - are:

Bill LeFever - Feb 15

Rich Sweetser - Mar 4

---



---

C L U B   P A T C H

---



---

The new BAS club patch is displayed in B&W on this month's front cover. Steve Morgan should have price information for patch production at an upcoming meeting. These will be distinctive patches and I would urge every member to obtain one for display at events, astrofairs, stellathons, SERAL conventions,.....

## from the HEAD SHED

The past year has been an exciting one for BAS. Our Astrofair and Stellathons were great successes. Steve Morgan has returned to form the International Meteor Research Network. Our club has grown immensely and it continues to grow. With our membership we have nowhere to go but up. Some of our activities have involved hard work and I know that our members would not hesitate to do it all again.

Enough about the past, the coming year looks to be a great one. An Astrofair for April and the SERAL convention in June. The monthly star parties and meetings should not suffer because of these extra activities as they will not be allowed to interfere with the normal club functions. If you are interested in helping out with one or both of the upcoming events, please contact one of the officers.

Finally, I would like to thank everyone for allowing me to continue as President of our society and hope I will not do anything to destroy your confidence in me. Congratulations to everyone for making BAS a success.

## Observatory Shut Down

— Bob BRATER

After performing beyond its design specifications and project requirements for more than seven years and playing an important part in developing data to help confirm the existence of black holes, NASA's Orbiting Astronomical Observatory (OAO-3) has been shut down.

Spacecraft science operations were ended on Dec. 31, after eight and a half years of operations. Named Copernicus, the OAO-3 spacecraft established a performance profiles described as "astonishing" by Goddard Spaceflight Center.

Contact with the spacecraft will be maintained until Feb. 15, to allow completion of a series of engineering tests. Its future, according to project engineers, is uncertain. It may orient itself permanently toward the Sun, begin a permanent orbitla tumbling action, or a vaiartion of both.

The main instrument (an 81 cm reflector) was used for ultraviolet spectral observations that are otherwise invisible to ground-based telescopes because of the Earth's atmosphere. This instrument and an X-ray telescope yielded important information on X-ray sources such as candidate black holes and neutron stars. It was instrumental in the discovery of the suspected black hole Cygnus X-1.

## Treasurer's Report Dalene Root

1980. The past year was a year of growth for the B.A.S. Membership increased, old members came back to the area, and the treasury grew. BAS had a net increase in assets of \$272.06. The major breakdown is listed below, as it was figured by our treasurer, Dalene Root.

Balance 1-1-80 ----- \$ 90.44

### Income 1980

Dues	210.00
Stellathon I	152.00
Stellathon II	264.00
T-shirt sales	49.50
Binder sales	58.85
Misc. income	47.79

782.14

### Expenses 1980

Binders	48.00
P.O. Box rent	32.00
Stamps & Postage	104.00
T-shirts	55.00
A.L. Dues	29.03
Stellathon I	96.28
Stellathon II	119.15
Service Charges	15.80
Misc. expenses	10.82

510.08

Net change in 1980 ----- 272.06

Balance 12-31-80 ----- 362.50

Summing up some of the high lights of the year, the two Stellathons hosted by BAS had a net increase for the treasury of \$200.57. This would make these ventures seem profitable for the future, if labor continues to be cheap (free). Binder sales for Astronomy Magazines yielded a net increase of \$10.85. T-shirt sales for the first Stellathon resulted in a slight loss, but it is over-shadowed by the profit from the event. All in all it was a pretty good year for BAS, and looking toward a better 1981.

# The Art of Meteor Astronomy

Conducted by

Stephen L. Morgan

The Art of Meteor Astronomy. A term not often used, it encompasses the humanistic and aesthetic aspects of meteor astronomy, in contrast to the scientific and computational aspects. In this column, we'll explore this wide ranging yet oft neglected side of meteor astronomy. Topics ranging from visual acuity of individual observers, and problems encountered when operating a large battery of patrol cameras, to the reliability of hourly counts made while combating raging hordes of biting insects, and the special trials and tribulations of telescopic meteor observation. While some of these topics may seem to be rather light and frivolous on the surface, they are in fact, very important. By dealing with the human aspects of meteor astronomy, they deal with the most critical link in the research system. Whether the activity is the gathering and analysis of observational data, reporting of this data accurately and promptly, searching through cotton fields for tektites, or any of the many other areas of meteor research, the human element remains the key element.

---

## PART I

### THE CONVERSION EXPERIENCE

"I'm on fire, burning with a passion in my mind.  
Strange desire, seems there's nothin' left for me to find.  
... Now I wonder, is somethin' going to make it all worthwhile?"

- Kansas

What is it that turns a casual observer into a die-hard meteor astronomer? Is it the desire to add to the storehouse of scientific knowledge? This desire has led men to the rims of active volcanoes, the deepest depths of the oceans, and to the surface of the moon. But is this the force which drives some to lie outdoors for hours on cold winter nights? Is it the dire importance of hourly meteor counts to human advancement that compels the dedicated falling-star gazer to maintain the watch in the face of innumerable biting insects on a hot, sultry evening? Or is it a simple matter of insomnia?

All of the above reasons, and many more, are the karma of the meteor astronomer. A conversation with any of our number will detail to you that individual's thoughts on the importance of meteor astronomy to cosmic knowledge; charts and graphs of hourly rates of overall activity and of particular showers; magnitude distribution tables; radiant lists. An interview with a more advanced member of the crew might produce some star charts with meteor trails plotted back to the area of the radiant of an annual shower; collections of back issues of Meteor News and Meteoros magazines; characteristic star-streaked meteor photographs. If however, you run across a real dyed in the wool, hard core, I-don't-much-care-that-I-don't-own-a-telescope-who-needs-one-anyway meteor astronomer, you will probably hear a tale of what I call "The Conversion Experience". This Experience is the singular event in that person's life which converted them from a casual observer to a dedicated meteor astronomer. Invariably, the Experience is the witnessing of the fall of an extremely brilliant fireball.

For me, the Experience occurred on the night of 19/20 April 1974, while on a fishing trip to Blue Cypress Lake in south central Florida. The Blue Cypress area was at that time, and still is, rather removed from civilization. Realizing the astronomical opportunities this posed, my friend and fellow astronomer Dan McGuire and I decided to drag our cameras and tripods along and do some meteor photography. On the evening in question, the sky was clearer and darker than I had ever seen before or since. There were so many stars visible that evening, that we had some difficulty identifying the constellations. At first, the evening seemed as though it would be ruined. We sat up the camera assemblies in a remote corner of the camping area, ready for a long night of peaceful observing. I need only mention that we were both at that time beginning observers and the more experienced reader will realize at once what the night spoiling problem was. Murphy's First Law of Astrophotography had held true:

On the darkest, clearest night you have ever seen, you will have left your cameras cable release at home.

I distinctly remembered seeing Dan pick them up at the house; he also recalled seeing them already in my camera bag. We put our equipment away, and lay back to sulk as those beautiful magnificently clear skies sped westward and away from us forever.

As the evening wore on, however, our mood lightened. After all, it had been a good days fishing on the lake, and fish cooked over cypress wood had a definitely distinct and delicious flavor to it. Then -- it fell. We were both looking right at the northern sky when it appeared.

It was bright, -9 magnitude. It was big,  $\frac{1}{2}^\circ$  in diameter, shaped just like a proverbial teardrop. It was colorful, robins-egg blue at first, falling to a bright green, disappearing a bright orange. It was fantastic! I was hysterical! Dan was in a state of shock! After we had recovered, we plotted the path of the meteor on the back of two paper plates, and recorded all of the relevant data on it. Others, of course, had seen the fireball and an excellent solution, AMS Number 7037, was obtained.

I will never forget the spectacle of that mighty fireball as it fell on that cool spring evening. Even now, I can close my eyes and see it falling above the treeline, lighting up the northern sky with the purest tonal colors I have ever seen. While observing the 1980 Geminid shower with Hal Povenmire, who also saw AMS 7037, we discussed the merits of meteor astronomy. Hal summed it all up, on top of all of the scientific recording of data, hourly counts, and with all of the inconveniences and hassles involved with meteor astronomy, "There's always the chance that you might see something spectacular, that will make this evening one of the most memorable ones in your life." It's that chance, that remote possibility, that keeps us out there on those cold December evenings, and those hot August nights.

\*\*\*\*\*                   \*\*\*\*\*                   \*\*\*\*\*                   \*\*\*\*\*                   \*\*\*\*\*                   \*\*\*\*\*                   \*\*\*\*\*

The Art of Meteor Astronomy, Part I, will appear in Issue #1 of Firefall, the Newsletter of the International Meteor Research Network, in March 1981. It appears in the 1981 Annual SKY SCANNER prior to publication by permission of the author and the Network. The BAS, a founder of the Network, will be voting on the issue of becoming a Group Member of the Network, and electing the BAS Representative to the International Council of the Network, at the regular January meeting.

\*\*\*\*\*                   \*\*\*\*\*                   \*\*\*\*\*                   \*\*\*\*\*                   \*\*\*\*\*                   \*\*\*\*\*                   \*\*\*\*\*

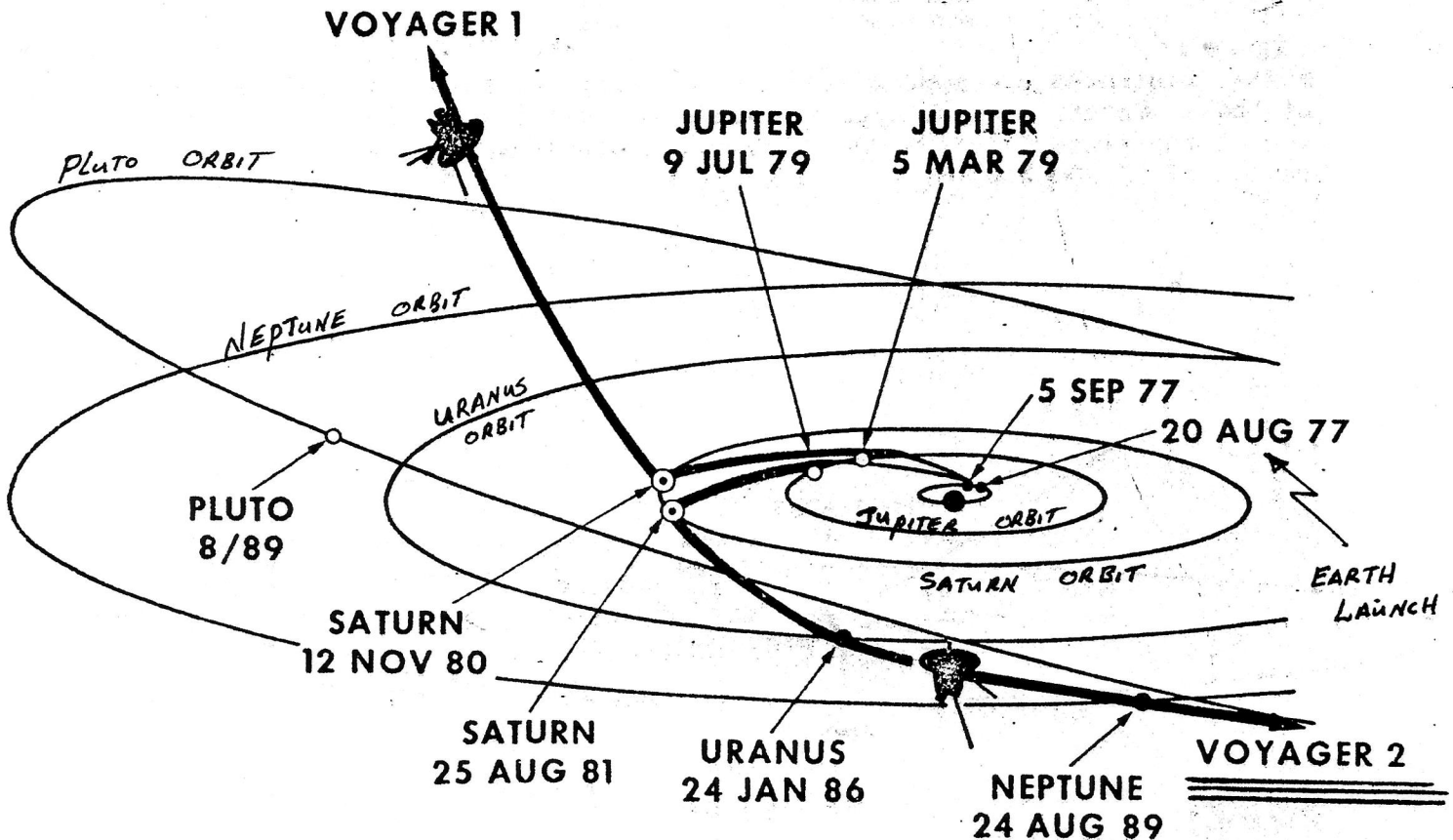
7  
**VOYAGER**

Bob Brater

ON  
LAUNCH  
TEAM

Twenty months after dazzling us with spectacular photos and data about Jupiter, Voyager I did it again with Saturn in early November 1980. Excellent computer enhanced photos and coverages are just now appearing in publications such as the January 1981 issues of Astronomy and Sky and Telescope.

This is the second spacecraft to give us detailed looks at Saturn which are better than Earth based telescopes. Pioneer 11 (Pioneer G) successfully slipped between Saturn and its rings 14 months earlier in September 1979. Voyager, with its more powerful telescope and camera system, gives a 40 times better photo resolution than Pioneer.



MISSION PLAN - After its flyby of the Saturn system in November, Voyager I will be on an escape trajectory from the solar system which will carry it above the ecliptic plane. Voyager 2 will reach Saturn in August 1981 and then has the opportunity to continue to encounters with the planets Uranus and Neptune. Neither ship will come close to the solar system's ninth planet, Pluto, in its 248-year trip around the sun.

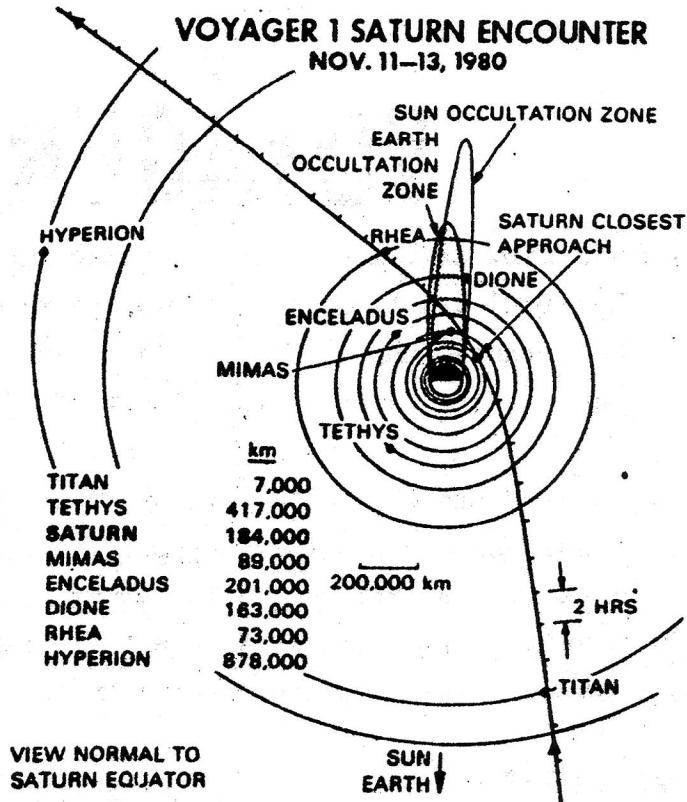


Figure 2:

Note: Distances are approximate closest approach measured from center of body. Saturn closest approach will be about 184,000 km from the center of the planet, or 124,000 km from the cloudtops, using a Saturn radius of 60,000 km.

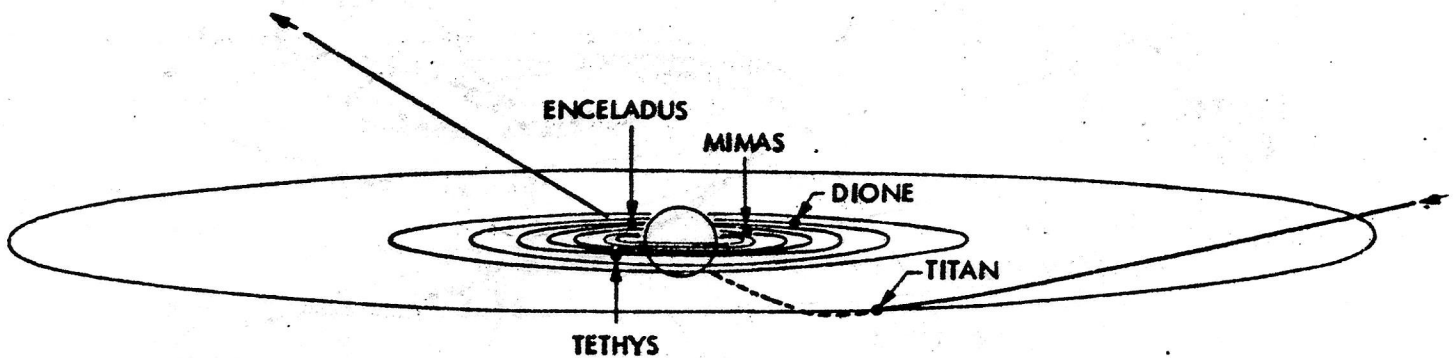


Figure 3:

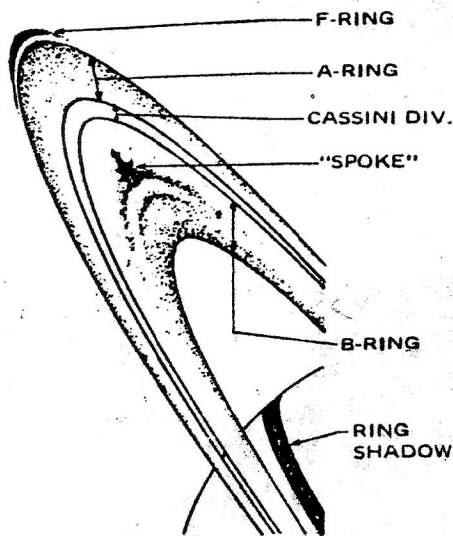
**BENEATH THE RING PLANE** - On November 11, Voyager I passed about 4330 km (2500 miles) from Titan's clouds, and then below the ring plane. About 22 hours later, on its outbound leg, Voyager I rose above the ring plane once again, passing through an area where Dione is thought to clear a path through the E-ring particles.

Figure 1 shows the Voyager mission plans. Voyager I's mission is now complete except for giving interstellar cruise data and some later communications tests. Figures 2 and 3 show the path through the Saturn ring system for Voyager I.

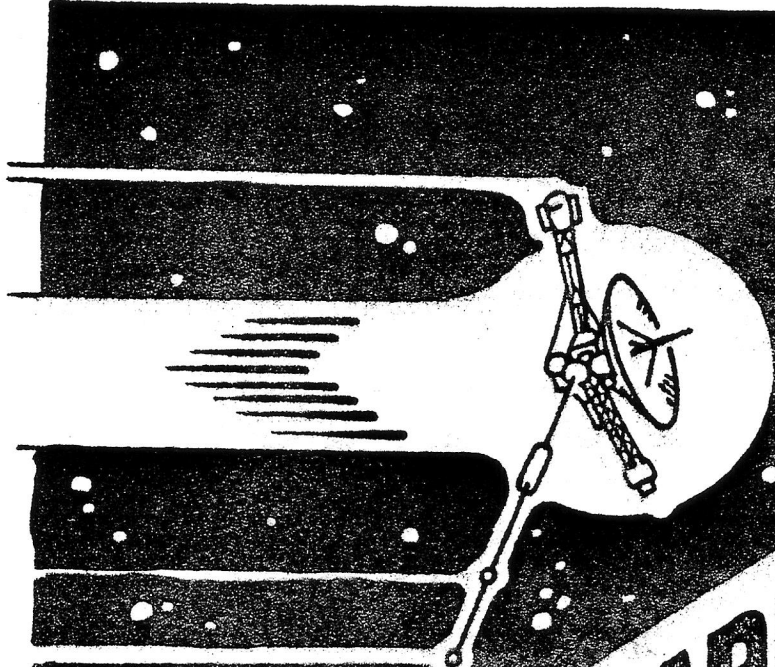
Voyager II is due to reach Saturn this August. As shown in Figure 1 it has a "grand tour" assignment to look at four of the Solar System's planets; Jupiter, Saturn, Uranus, and Neptune.

Continuous Voyager updates are available from JPL. A taped message can be reached at 213-354-7237, and the Voyager Bulletin Editor can be reached at 213- 354-4438.

The latest update (Jan 26) has V2 123 X 10<sup>6</sup> miles away from Saturn with a fly-by scheduled for Aug 25, 1981. This week it will be performing tests and instrument calibrations. V-1 will be performing house-keeping functions as it is 61.1 X 10<sup>6</sup> miles from the planet. Voyager 2 will be concentrating on the rings of Saturn, primarily the; nebulous spoke features, the braided F-ring, the hundreds of ringlets, and the small moons - Iapetus and Hyperion.



**SATURN'S SPOKES** - New features that have never been seen before appear in this photo of Saturn's rings taken by Voyager 1 on October 5, from a distance of 51 million kilometers (32 million miles). The photo has been computer-enhanced to bring out faint details in the rings. This and similar Voyager photos are the first pictures to show irregular patterns in the rings. Visible in the B-ring is a dark, fingerlike area that rotates around the planet like a spoke in a wheel. Studies of this and similar photos reveal many similar objects; some retain their identities for several hours, despite the fact that at the inner edge of the new features, ring particles orbit Saturn once in 9-1/2 hours, while particles at the outer edge take more than an hour longer. Consequently, spokelike features like this should be erased as the inner particles "race" ahead of the outer ones. However, some features have been observed that last three or more hours. Voyager's imaging team scientists have not yet solved the question of how the spokes develop or why they remain for hours. It is unlikely that the new features are composed of groups of particles. Rather, they are more likely to be regions where there are fewer particles, reflecting less light, than other parts of the rings.



**YOU ARE NOW  
LEAVING THE  
KNOWN UNI-  
VERSE...**

**PLEASE TURN  
OUT THE LIGHTS.  
THE MANAGEMENT**



From.....**TONIGHT'S ASTEROIDS**

\*\*\*\*\*

## ANNOUNCEMENTS

\*\*\*\*\*

ASTRONOMICAL CALENDAR 1981 is now available and may be ordered from Astronomical Calendar, c/o Department of Physics, Furman University, Greenville, SC 29613. The price is \$8.00 postpaid. The current edition of Guy Ottewell's annual masterpiece contains several more pages than the previous one, and the pages are much fuller. The monthly Sky Maps, redrawn to Epoch 2000 A.D., are more attractively presented, and so are the monthly Solar System Overviews. A number of instructive horizon diagrams for selected dates are included. This highly recommended volume is packed with information of interest and value to amateur astronomers. The many three-dimensional diagrams are great aids in clarifying difficult concepts. Detailed charts are included for planets, asteroids, and periodic comets. Large sections are devoted to eclipses, comets, meteor showers and many other topics.

The Central Section of Solar Observers of Poland is anxious to establish contact with American sunspot observers. Contact may be made through:

WACLAW SZYMANSKI,  
ul. 3-go Maja 4/15,  
41-300 Dabrowa Gornicza,  
POLAND.

**CONJUNCTIONS OF SELECTED ASTEROIDS WITH BRIGHT STARS**

The computations and data are from Belgian astronomer Jean Meeus, who credits David W. Dunham for astrometric ephemerides. All conjunctions are in right ascension. Time is given to the nearest hour. N = north and S = south. Magnitudes are visual.

Asteroid	Date		Hour UT	Distance	Star	Magnitudes	
	1981					Star	Planet
1 CERES	Jan	1	19 <sup>h</sup>	1° 18' N	β Gem	1.2	7.0
1 CERES		3	22	0 41 N	σ Gem	4.3	7.0
1 CERES		12	14	1 25 S	α Gem	1.6	6.9
1 CERES		17	23	0 49 S	ρ Gem	4.2	6.9
20 MASSALIA	Feb	11	14	0 51 S	59 Leo	5.1	9.3
4 VESTA	Mar	10	16	0 54 N	γ Leo	2.3	6.4
20 MASSALIA		15	10	1 03 S	ρ Leo	3.9	9.4
4 VESTA		17	12	0 05 N	SAO 81250	6.1	6.5
20 MASSALIA	May	10	1	0 35 S	ρ Leo	3.9	10.6
4 VESTA		14	15	0 55 S	γ Leo	2.3	7.5

\*\*\*\*\*

## OUR FEATURED ASTEROIDS

\*\*\*\*\*

- 1 CERES: Estimated diameter (D) 629 miles. Orbital period (P) 4.60 years. Inclination to Earth's orbit (I) 10.6 degrees. Rotation period (R) 9.08 hours. Albedo (A) 5.9%. Discovered (Ds) 1801 Jan 1 at Palermo, Sicily, by Giuseppe Piazzi (1746-1826). 1000 PIAZZIA. (See TA 26, pages 1-3, and TA 33, page 3.)
- 50 SAPPHO: D 51 mi. P 3.48 yr. I 8.7 deg. R 20+ hr. A 13.1%. Ds 1864 May 3 at Madras, India, by Norman Robert Pogson (1829-1891). 1830 POGSON. Sappho, born about 600 B.C. on the island of Lesbos, was the greatest poetess of ancient Greece, and by some has been acclaimed the greatest of all women poets. (See TA 31, page 1.)
- 97 KLOTHO: D 67 mi. P 4.36 yr. I 11.8 deg. R 16? hr. A 12.1%. Ds 1868 Feb 17 at Marseilles, France, by Ernst Wilhelm Liebrecht Tempel (1821-1899). Tempel discovered five asteroids, but is best remembered for his many comet discoveries. Klotho, the youngest of the Three Fates, spun the thread of life. Together with her sisters (120 LACHESIS and 273 ATROPOS) she helped determine human destiny.
- 111 ATE: D 97 mi. P 4.18 yr. I 4.9 deg. Ds 1870 Aug 14 at Clinton, NY, by Christian Heinrich Friedrich Peters (1813-1890). In mythology, Ate was the daughter of Eris and Jupiter, who sent her to Earth to punish the machinators plotting against Olympus. She was the goddess of evil, mischief, and infatuation, and was banished from heaven for raising sedition and jealousy. (Kravitz, Who's Who in Mythology.)
- 451 PATIENTIA: D 173 mi. P 5.35 yr. I 15.2 deg. R 20? hr. A 3.9%. Ds 1899 Dec 4 at Nice, France, by Auguste Honoré Pierre Charlois (1864-1910). In order to commemorate the human virtues, Charlois assigned this asteroid the Latin name for patience, an attribute he richly possessed. How else could he have discovered 99 asteroids? June LoGuirato officially proposed to the International Astronomical Union that an asteroid (1510 CHARLOIS) be named in memory of him. Miss LoGuirato's valuable contributions to Tonight's Asteroids span a period approaching 10 years.
- 4 VESTA: D 329 mi. P 3.63 yr. I 7.1 deg. R 5.34 hr. A 25.5%. Ds 1807 Mar 29 at Bremen, Germany, by Heinrich Wilhelm Matthias Olbers (1758-1840). In mythology Vesta, goddess of the hearth, was the guardian of family happiness. For notes on the discoverer (1002 OLBERSIA), one of the greatest amateur astronomers of all time, see TA 25, pages 1-2.
- 20 MASSALIA: D 83 mi. P 3.74 yr. I 0.7 deg. R 8.10 hr. A 18.9%. Ds 1852 Sep 19 at Naples, Italy, by Annibale de Gasparis (1819-1892), and independently on the following night at Marseilles by Jean Chacornac (1835-1873). 1622 CHACORNAC. Massalia was the ancient name for Marseilles. See TA 32, page 2.
- 43 ARIADNE: D 53 mi. P 3.27 yr. I 3.5 deg. R 5.75 hr. A 13.0%. Ds 1857 Apr 15 at Oxford, England, by Pogson. For the story of Ariadne, and for notes on its discoverer see TA 23, page 2.
- 313 CHALDAEA: D 76 mi. P 3.66 yr. I 11.6 deg. R 13 hr. A 3.3%. Ds 1891 Aug 30 at Vienna, Austria, by Johann Palisa (1848-1925). Chaldaea was a country in Asia, located between the Tigris and Euphrates Rivers. In a recent article, J. B. Zirker states: "The Chaldaeans noticed that eclipses recur at intervals of 18 years, 11 1/3 days, with paths displaced 120° westward in longitude. This period, later given the name saros, nearly equals 223 synodic lunar months (the interval between successive new moons)." (Zirker is director of the Sacramento Peak Observatory, Sunspot, NM. His paper entitled "Total Eclipses of the Sun" is in Science, 1980 Dec 19, pages 1313-1319. See also TA 32.)

SLIDING INTO YEAR ELEVEN..... An Editorial.....

Here we are starting the second decade. This is a time for reflections upon the past. BAS has come a long way since the beginning back in 1971 at Satellite Beach High School. From the early days members have come and gone. Some have moved from the area, others are still here, some have left and come back, and still others have moved into the area to continue the growth of BAS. Some are still active in BAS and some never were.

Some of the members from the early days are still in the Society, or have rejoined after an absence. Rick Armstrong is the current President and J. A. Smith is the V-P. Others that are still active in BAS from the "good old days" are Larry Loper and Hal Povenmire - two founders or near founders - and Charlie Wofford, Ed Case, George Hughes, Ken Toole, Richard Sweetsir and Steve Morgan who just returned from the Navy. Jack Jewell was in Arizona working on his Ph.D. at last report. Doug Sharpe is back in the area and busy selling coins after spending time in Wyoming. Ed Strother is still at FIT and Bob Wood is still at BCC. Through it all, BAS has grown, and had its ups and downs. The activities have increased in scope, but some have fallen off in intensity.

The SKY SCANNER has grown, had its ups and downs and somehow survived. Several people have had their hands in the editorship, some have been successful and some not. Since Doug Sharpe started it, various members including yours truly, Rick Armstrong, Joe Huertas and others have been the editor before it came back to yours truly again. The SKY SCANNER has had problems throughout its life with a lack of material, and once in a while, too much (rarely).

BAS has grown and its activities changed. In the early years, BAS was the meteor counting leaders in the world. Other activities centered around graze observing and some variable star work and asteroid tracking. Hal headed up the graze efforts, and still does, everyone watched for meteors, and Doug, Jack and I watched variable stars and clouds (when Jack showed up). Satellite High had just put in place the 16" reflector and Astronaut Hall and FIT's equipment were still on the drawing boards or just unknown dreams.

Ten years later, Hal and the grazes go on. Steve Morgan has returned and is re-activating the meteor work that made BAS famous throughout the →

world. His efforts, along with the Florida Fireball Patrol should boost BAS back to the number one spot again, remember 1972. J. A. Smith is still watching variable stars and with the combined efforts of the FIT students and Ed Strother should be able to expand this work to other areas of star phenomenon. Atmospheric Optics have been investigated with the FIT equipment and the work is getting larger. Ed Case and Rick Armstrong are using photography for observing and recording events for the future, and for fighting light pollution. BCC has expanded and under the direction of Bob Wood, Astronaut Hall has come into existence with a 24" reflecting main telescope and several smaller ones. The Florida Fireball Patrol was formed and Hal discovered the Upsilon Pegs.

"Stellathon" and "Astrofair" have become common words and BAS members have made their feeling known at SERAL and AL conventions. The public has found out about us via the TODAY and open houses. Kohoutek has come and gone, West has come and gone, SKYLAB has come and gone, and Halley's and SHUTTLE are coming, so are new members, and others will leave.

BAS has grown because of the support of its members. So, as you sit back and reflect, think of what BAS has done for you (or to you) in the past year, two years, five years, or whatever. Think of what you have done for the Society and what you could do in the future. What do you want BAS to do for you? What changes would you like to see? Are there any new programs you are interested in? Is there something you would like to do for the Society, or the SKY SCANNER? Is there a display you would like to see at the next astrofair (April 25)? That you could make?? If the answer to any of these questions is yes, bring them to the attention of the officers, or bring them up at the next meeting.

Yes, ten years is a long time to reflect upon, but the future is even longer. To see what will be in store for everyone, remember the words of the late John F. Kennedy, "Ask not what your country can do for you, but rather what you can do for your country".

With these in mind, let's push on to another ten years of growth and prosperity. Happy Birthday BAS, and many happy returns.

SPACE STUDIES INSTITUTE: A SUMMARY  
by Gerard K. O'Neill

President, SSI

Overview and Purpose: Several hundred people have become new Subscribers to the Institute within this past quarter, and many have written that they would like our newsletters to open with a non-technical introduction to the Institute's work. I'm glad to honor that request:

The Space Studies Institute was formed in 1977 to provide a private, non-governmental source of support for research and education. Institute support enables that work to be conducted efficiently on the basis of a logical long-term plan. To state the High Frontier concept succinctly, it is to open for human benefit the energy and material resources now going unused in space. The research supported by the Institute is directed toward the use of lunar and asteroidal materials to build-- in high orbit-- useful products. In the early period of High Frontier activity those products may be satellite solar power stations, to receive and relay to the Earth (as low-density microwaves) solar energy intercepted beyond the shadow of the Earth, where intense sunlight is available full-time. In this early phase, the main benefits will accrue from a saving in lift costs. The cost in energy of bringing material from the Moon into free space for construction is less than a twentieth as much as for bringing material from the Earth.

Ultimately, the energy-rich environment of high-orbital space, where abundant materials can be obtained without environmental damage, will become the favored location for large-scale human habitation. As described in my book, The High Frontier, a habitat constructed in space can contain an atmosphere, can rotate to provide a gravity equivalent to the Earth's, and can be supplied with normal sunlight through mirrors. The known materials of the asteroid belt are sufficient for the construction of space habitats with a total land area several thousand times that of the Earth. Their internal environments can be as Earthlike as desire and ingenuity permit, and each habitat can be several square miles in extent. In the long run we can expect a gradual movement of much of human civilization into space, where a high-level industrialized society can survive as long as the sun shines.

It is essential to the High Frontier concept that it requires no science beyond our present knowledge, and no engineering of a more advanced nature than we now employ routinely. The imperatives that will bring about its realization are eternal facts of nature, concerning quantities and locations of materials and the abundance of clean, free solar energy available everywhere outside the shadow of planets.

\*\*\*\*\*                      \*\*\*\*\*                      \*\*\*\*\*                      \*\*\*\*\*                      \*\*\*\*\*                      \*\*\*\*\*                      \*\*\*\*\*

The above article appeared in the Fall 1979 issue of the Space Studies Institute Subscribers Newsletter. The BAS is considering becoming a subscriber of SSI, and a discussion will be held on the matter at the regular January meeting. Subscriber rates are currently \$10.00 per year, and will afford the BAS with the opportunity to use SSI Newsletter articles and material in the SKY SCANNER. Individuals interested in their own subscription or other affiliation with the SSI may write to them at: SSI, PO Box 82, Princeton, NJ 08540 USA.

\*\*\*\*\*                      \*\*\*\*\*                      \*\*\*\*\*                      \*\*\*\*\*                      \*\*\*\*\*                      \*\*\*\*\*

## UPI!

FEB 11 First Quarter moon.  
 15 Galileo born 1564.  
 18 Full moon.  
 19 Jupiter - Saturn conjunction.  
 27 Last Quarter moon.

MAR 6 New moon.  
 8 BAS Meeting. 7:30 pm. Astronaut Hall, BCC Campus, Cocoa.  
 13 First Quarter moon.  
 14 Einstein born 1879.  
 20 Full moon.  
 28 Last Quarter moon.

APR 4 New moon.  
 11 First Quarter moon.  
 12 BAS Meeting. 7:30 pm. Astronaut Hall.  
 21-23 Lyrid meteor shower.  
 25 ASTROFAIR - Brevard Mall, Melbourne.

JUN 18 SERAL CONVENTION, COCOA BEACH, FL. SPONSORED BY BAS  
 19 SERAL CONVENTION  
 20 SERAL CONVENTION  
 21 Summer Solstice.

JUL 16-17 Partial Lunar Eclipse.  
 30 SOLAR ECLIPSE.  
 30 Jupiter - Saturn conjunction.

AUG 25 Venus - Saturn conjunction.  
 27 Venus - Jupiter conjunction.

BREVARD ASTRONOMICAL SOCIETY

P.O. BOX 1084

COCOA, FL. 32922

to: