East Valley Astronomy Club

January 1998 Newsletter Scottsdale, Arizona

To Catch an Asteroid

(Past and Future Asteroid Occultations)

William J. Peters, EVAC

On eleven occasions I have attempted to witness the occultation of a star by an asteroid but have always been unsuccessful. In an asteroid occultation, a distant asteroid approaches and merges with a background star, dimming its light for a few moments. My first successful observation of an asteroid occultation occurred early in the morning last December 4 when a few lucky EVAC members and I witnessed the occultation of a +5.96 magnitude star close to Sirius by the asteroid 105 Artemis.

The observation of such events by amateur astronomers can be very useful in attempting to ascertain the shapes and sizes of asteroids. Data from observers who time the event can be graphed to reveal a cross section profile of the asteroid (see p. 2). For example, observations of the 105 Artemis event indicate that the asteroid is an oblong object of dimensions 70 by 63 miles. This same event also indicated that the occulted star, SAO 134036, is a binary star with a +9.5 magnitude companion. In addition, there is the remote possibility of discovering an asteroid moon. Some astronomers have estimated that as many as 20% of all asteroids have moons. The December 1997 *Sky & Telescope* reported that three small Earth grazing asteroids were found to each have moons, indicating that asteroid moons may be commonplace.

Until recently much luck and good timing was involved with such observations. The data derived from the Hipparcos satellite has enabled astronomers to accurately pinpoint the locations on earth where asteroid occultations can be observed. The combination of Hipparcos data with the observations of amateur astronomers should go a long way in determining the physical characteristics of asteroids. This is important research that any interested amateur astronomer can participate in.

Fortuitously, the brightest asteroid-star occultation prediction for 1998, the occultation of the 6.9 magnitude star SAO 77237 in Taurus by the asteroid 2421 Nininger, should be visible from Phoenix. The occultation is predicted to occur on Saturday, January 17 at 9:06 pm. For more information on the 2421 Nininger event and other asteroid occultation predictions for 1998 see the February 1998 issue of *Sky & Telescope*, p. 86. If you have any questions concerning these observations please contact Bill Peters (602/813-4242, bpeters@asu.edu) or David Dunham, president of the International Occultation Timing Association (dunham@erols.com).

Special Notice: MSLS Missile Launch

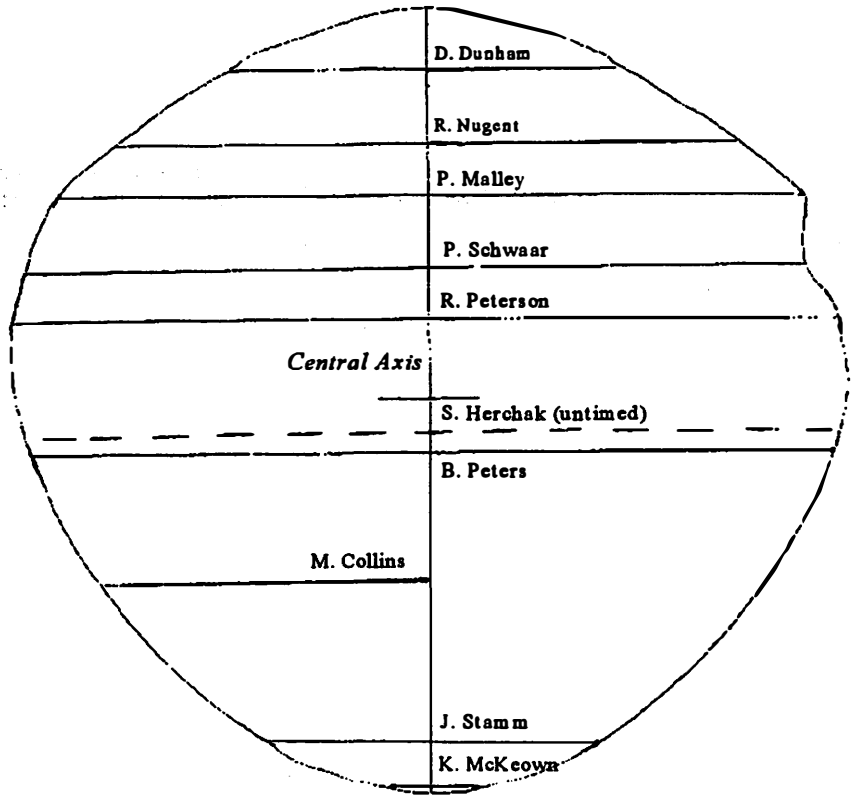
Brian Webb

A missile launch scheduled for 17:39 PST on January 15th should be visible in four western states and northern Mexico.

The U.S. Air Force will launch an MSLS missile (a

EVAC & Other Events: 1998

	Mtng	Local	DS	Other
Jan	14	17	24	
Feb	11	21	28	
Mar	11	21	28*	28: Messier Marathon*
Apr	8	18	25*	25: Sentinel Star Gaze*
				19-26: Texas Star Party
May	13	16	23	2: Astronomy Day
				22-25: Riverside TMC
Jun	10	20	27	13-20: Grand Canyon Star Party
				27-28: Universe '98
Jul	8	18	25	24-25: Stellafane
Aug	12	15	22	
Sep	9	12	19	11-13: Astrofest
Oct	14	10	17*	?: All-AZ Star Party*
Nov	11	14	21	
Dec	9	12	19	



Asteroid 105 Artemis

Cross section of asteroid 105 Artemis obtained on December 4, 1997 by EVAC members and other amateur observers. Each horizontal line, or chord, was derived from timings made of the length of obscuration as the asteroid occulted a +5.96 magnitude star.

modified Minuteman II) on a ballistic (non-orbital) trajectory from Vandenberg AFB, California towards an impact area near Kwajalein Island in the central Pacific.

The MSLS will fly a steep ballistic arc and reach a maximum altitude of about 500 miles. At launch time, the sky will be either in evening twilight or dark, depending on your location.

Several seconds after launch, when it reaches the upper atmosphere, the smoke trail and exhaust plume will be backlit by the sun and create an impressive sight visible as far away as central Arizona, central Nevada, southern Utah, most of California, and northern Mexico.

Besides providing a fine visual display, the launch should also be a great photo opportunity. If you're within 200 miles of Vandenberg, a 35mm camera, 50mm lens, tripod, and Fujicolor 400 print film is all you'll need to catch the event on film. If you're more than 200 miles away, use a 105-180mm lens and Fujicolor 800. When you shoot your photos, place the center of your viewfinder on the brightest part of the exhaust plume and use your light meter to get an exposure reading.

On the evening of January 15th, an attempt will be made to provide countdown updates via ham radio in the 3.5-4.0 MHz (80 meter) or 7.1-7.3 MHz amateur radio band. A Vandenberg Launch Net will also be conducted on the wide coverage Santa Barbara 147.000 MHz 2-meter ham radio repeater.

As the launch date approaches, refer to my web page for updates (the address is given below). Also, call the Vandenberg Launch Update Line at 805-734-8232 extension 61857.

Also, those of you in outlying areas may want to give advanced notice of this event to your local newspaper (especially the photographers) and radio and TV stations.

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January/February 1997

All Times MST

If Betelgeuze and Procyon
Amid the glories of the sky,
To gauge with studious eye
The angle of twice forty-five
with Pollux bright be cast
shines a triangle vast;
the form that shines afar
shows 'tis rectangular

-Admiral Smyth

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
11 Mars & Jupiter 5° apart	12 ○ Full Moon 10:24 pm	13	14 **EVAC mtng** **7:30 pm at SCC**	15 MSLS Missile Launch (see p. 1)	16 Venus at Inferior Conjunction	17 **EVAC Local Star Party** Asteroid Nininger Occultation
18 Tomorrow: Neptune at Conjunction	19 *Martin Luther King Jr. Day*	20 ◑ Last Quarter 12:40 pm	21 Yesterday: Mars & Jupiter very close	22	23 Moon near Antares	24 **EVAC Deep Sky Star Party**
25	26	27 ● New Moon 11:01 pm	28 Uranus at Conjunction	29 Easy Young Moon between Mars & Jupiter	30	31 Julian Day: 2,450,844.5
1 February Moon near Saturn Day 32/333	2 *Groundhog Day*	3 ◐ First Quarter 3:53 pm	4 C. Tombaugh, b. 1906	5 PAS mtng	6	7
8	9	10 Tomorrow: Full Moon (near Regulus) 3:23 am	11 ○ **EVAC mtng** **7:30 pm at SCC**	12	13 SAC mtng	14 *Valentine's Day*

Venus Departs

M. Aaron McNeely, Editor

Venus is leaving the evening sky during January. After **inferior conjunction** on Jan. 16 the planet will begin to appear progressively higher in the dawn sky. These events held great significance to early observers in the Middle East and Americas. Both the Mesopotamians and Maya practiced elaborate rituals dedicated to Venus. The early Greeks held Venus to be two different bodies, Hesper and Phosphor, the evening and morning apparition respectively.

Evening Planets

The planetary parade of **Venus**, **Mars**, **Jupiter**, and **Saturn** will continue into January. At the beginning of January, a line of planets consisting of Jupiter, Mars, and Venus will lie above the southwest horizon in evening twilight. Saturn is also positioned to the upper left of this grouping. The moon lies near Jupiter on Jan. 1. Venus, at inferior conjunction on the 16th, departs the evening sky. Jupiter and Mars swap positions relative to each other following a close conjunction on January 16. On February 1 the moon lies close to Saturn, Mars and Jupiter will be low in the WSW evening twilight. In summary, late 1997

January 1998							February 1998						
S	M	T	W	Th	F	S	S	M	T	W	Th	F	S
				1	2	3	1	2	3	4	5	6	7
4	5	6	7	8	9	10	8	9	10	11	12	13	14
11	12	13	14	15	16	17	15	16	17	18	19	20	21
18	19	20	21	22	23	24	22	23	24	25	26	27	28
25	26	27	28	29	30	31							

Lunar Almanac: 1998

	FQ	Full	LQ	New
Jan	5	12	20	27
Feb	3	11	19	26
Mar	5	12	21	27
Apr	3	11	19	26
May	3	11	18	25
June	1	9	17	23
July	1	9	16	23
	31			

	Full	LQ	New	FQ
Aug	7	14	21	30
Sep	6	12	20	28
Oct	5	12	20	28
Nov	3	10	18	26
Dec	3	10	18	26

and early 1998 have and will be presented with some wonderful planetary groupings.

Asteroid Nininger

On Saturday, January 17 the asteroid **2421 Nininger** occults a 6.9 magnitude star in Taurus (see "To Catch an Asteroid," p. 1). Meteorite buffs will recognize that the asteroid was named for **Harvey Harlow Nininger** (1887-1986) the great meteorite hunter and populizer.

Groundhog Day

Groundhog Day, or **Candlemas**, is the day closest to the midpoint between the winter solstice and the spring equinox. Days such as this, that lie halfway between solstices and equinoxes, were termed Cross-Quarter days in Old European tradition. Each day has its associated myths and rituals. Candlemas is associated with the rebirth of nature after the "death" of winter.

Full Moon Lore

In old European folklore, the **full moon** of January is called the **Old Moon** or the **Moon after Yule**. The full moon of February is called the **Snow Moon**, **Hunger Moon**, or **Wolf Moon**. The full moon of January 12 will lie halfway between the stars Pollux and Procyon. The full moon of February 11, the night of the February **EVAC meeting**, will lie close to the bright star **Regulus**.

In Astronomical History

January 11-31

Jan. 11, 1787: William Herschel discovers Oberon and Titania, satellites of Uranus.

Jan. 25, 1736: Joseph Louis Lagrange, b.

Jan. 28, 1611: Johannes Hevelius, b.

Jan. 31, 1862: Alvan Clark, Jr. discovers the white dwarf companion of Sirius.

February 1-14

Feb. 4, 1906: Clyde Tombaugh, b.

Feb. 7, 1889: W. S. Holden founds the Astronomical Society of the Pacific.

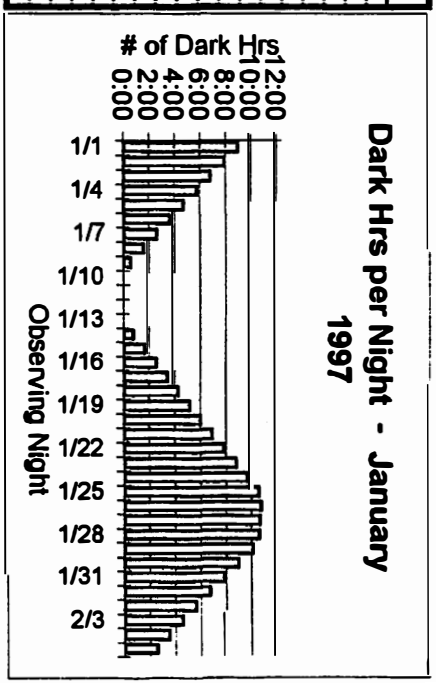
Feb. 12, 1947: Impact of iron meteorites at Sikhote-Alin, Russia.

Dark of the Moon Table -- January 1998

OBSERVING NIGHT	START OF DARK		END OF DARK		TOTAL DARK
THURS/FRI	1/1 9:05 PM	MS	1/2 6:04 AM	SOT	8:59
FRI/SAT	1/2 10:10 PM	MS	1/3 6:04 AM	SOT	7:54
SAT/SUN	1/3 11:15 PM	MS	1/4 6:05 AM	SOT	6:50
SUN/MON	1/5 12:19 AM	MS	1/5 6:05 AM	SOT	5:46
MON/TUES	1/6 1:23 AM	MS	1/6 6:05 AM	SOT	4:42
TUES/WED	1/7 2:27 AM	MS	1/7 6:05 AM	SOT	3:38
WED/THURS	1/8 3:30 AM	MS	1/8 6:05 AM	SOT	2:35
THURS/FRI	1/9 4:32 AM	MS	1/9 6:05 AM	SOT	1:33
FRI/SAT	1/10 5:31 AM	MS	1/10 6:05 AM	SOT	0:34
SAT/SUN	none	--	none	--	--
SUN/MON	none	--	none	--	--
MON/TUES	none	--	none	--	--
TUES/WED	none	--	none	--	--
WED/THURS	1/14 7:10 PM	EOT	1/14 7:55 PM	MR	0:45
THURS/FRI	1/15 7:11 PM	EOT	1/15 8:50 PM	MR	1:39
FRI/SAT	1/16 7:12 PM	EOT	1/16 9:44 PM	MR	2:32
SAT/SUN	1/17 7:12 PM	EOT	1/17 10:37 PM	MR	3:25
SUN/MON	1/18 7:13 PM	EOT	1/18 11:30 PM	MR	4:17

OBSERVING NIGHT	START OF DARK		END OF DARK		TOTAL DARK
MON/TUES	1/19 7:14 PM	EOT	1/20 12:23 AM	MR	5:09
TUES/WED	1/20 7:15 PM	EOT	1/21 1:16 AM	MR	6:01
WED/THURS	1/21 7:16 PM	EOT	1/22 2:11 AM	MR	6:55
THURS/FRI	1/22 7:17 PM	EOT	1/23 3:06 AM	MR	7:49
FRI/SAT	1/23 7:17 PM	EOT	1/24 4:03 AM	MR	8:46
SAT/SUN	1/24 7:18 PM	EOT	1/25 4:59 AM	MR	9:41
SUN/MON	1/25 7:19 PM	EOT	1/26 5:54 AM	MR	10:35
MON/TUES	1/26 7:15 PM	EOT	1/27 6:02 AM	SOT	10:47
TUES/WED	1/27 7:21 PM	EOT	1/28 6:01 AM	SOT	10:40
WED/THURS	1/28 7:22 PM	EOT	1/29 6:01 AM	SOT	10:39
THURS/FRI	1/29 7:55 PM	MS	1/30 6:01 AM	SOT	10:06
FRI/SAT	1/30 9:03 PM	MS	1/31 6:00 AM	SOT	8:57
SAT/SUN	1/31 10:10 PM	MS	2/1 5:59 AM	SOT	7:49
SUN/MON	2/1 11:15 PM	MS	2/2 5:59 AM	SOT	6:44
MON/TUES	2/3 12:20 AM	MS	2/3 5:58 AM	SOT	5:38
TUES/WED	2/4 1:23 AM	MS	2/4 5:58 AM	SOT	4:35
WED/THURS	2/5 2:25 AM	MS	2/5 5:57 AM	SOT	3:32
THURS/FRI	2/6 3:24 AM	MS	2/6 5:56 AM	SOT	2:32

EOT = End of Astronomical Twilight MR = Moonrise SOT = Start of Twilight MS = Moonset NOTE: Applies to Phoenix area (Mtn Std Time)



Bernie Sanden 12/97

The Southern Idaho Regional Star Party

Steve Bell, EVAC

After hearing my mention of the star party I attended this summer, Aaron asked that I write a brief description of my experiences. Before launching into a description of the event, I must first admit to a personal bias for the party as I was (and remain) a member of the sponsoring club and have attended the star party for several years.

The Southern Idaho Regional Star Party is an annual event hosted by the Boise Astronomical Society, held each August on the weekend nearest new moon at Bruneau Dunes State Park. This park is approximately 60 miles southeast of Boise in farm and ranch country near the Snake River. This is Great Basin Desert country at 3000+ feet above sea level (sagebrush but no cacti). Park facilities make for very civilized star gazing, with bathrooms, showers, trash pick-up, power and water. Both tent and full hook-up motor home campsites are available. In addition to the camping area, the park contains nature trails, two large sand dunes (the park's namesake) and two small lakes. For those so-disposed, hiking, birdwatching and fishing are available for daytime activities. The Boise club's relationship with the park staff is excellent, and cooperation and support for the event is outstanding.

The star party has remained a smaller gathering, with 30 to 40 telescopes typical. It features three nights of observing (Thursday, Friday and Saturday), with an early public star party on Saturday night, as well as Saturday seminars, a swap meet, door prizes and a barbecue.

The weather for the 1997 edition was excellent, with clouds in the afternoon dissipating shortly after sunset on all three days. The skies were transparent, fairly steady and black (there are a few small light smudges on the horizon, less than 5 degrees in altitude). Temperatures were northern desert-typical, with warm afternoons and cool (cold) nights.

Saturday night (Sunday morning) provided the best skies of the weekend. I saw a lot of detail in M33 with an 8 inch SCT; the brightest H2 region was distinct (no averted imagination), as well as good views of galaxies (NGC 253, ...) in the Cetus and Sculptor region.

Scopes at the gathering this year ranged from a 60mm refractor to the club's 25 inch Obsession, with the usual collection of SCT's and Dobs. There was one Meade 7 inch Mak which I wanted to look through, but somehow never did. The 25 inch was too strong an attraction. Galaxy mirrors do live up to their reputation.

The one negative aspect of the party this year was part of the park's charming wildlife. The two lakes in the park are world-class mosquito hatcheries and everyone observing was buying OFF in the large economy size. Thursday night was the worst and everyone felt as though they needed transfusions on Friday morning.

This was a most enjoyable gathering. It was an observer's star party and I would recommend it to anyone seeking a relatively small, intimate star party. There is one users' warning, though. Those dark skies and sparsely inhabited country come with a price - it's a 900 mile drive. I will provide information in the summer of 1998 for anyone desiring to attend. I receive the BAS newsletter as well as looking at their home page occasionally and will provide dates, directions and contact information to anyone desiring them, as well as providing it to the newsletter editor.

Out There

Louis A. Frank and Patrick Huyghe

Here is the story of what happened to Louis Frank between the discovery of the small comets in 1986 and their confirmation in 1997. This story first appeared in *The Washington Post* on Sunday July 13, 1997.

The universe is what it is. I don't bury observations that stand in the way of conventional wisdom. I don't gloss over things I don't understand. I will not compromise my integrity. Unfortunately, this stance has made me the target of scientific vandalism.

It all began in the mid-1980s, when a camera aboard a NASA spacecraft called Dynamics Explorer presented me with data that many scientists would have ignored or overlooked. Curious black spots appeared in the images of Earth's aurora, one of the phenomena I have devoted my career to studying as an experimental physicist. I came to realize that the black spots in the images were not caused by "instrument noise," as many scientists believed, but were evidence of a remarkable geophysical phenomenon occurring unnoticed right above our heads.

In the spring of 1986, I published my explanation of the black spots in a scientific journal: The Earth's atmosphere was being bombarded by house-sized, water-bearing objects traveling at 25,000 mph, one every three seconds or so. That's 20 a minute, 1,200 an hour, 28,800 a day, 864,000 a month and more than 10 million a year. Spelled out in this way, the numbers

truly boggle the mind. These objects, which I call "small comets," disintegrate high above the Earth and deposit huge clouds of water vapor into the upper atmosphere. Over the history of this planet, the small comets may have dumped enough water to fill the oceans and may have even provided the organic ingredients necessary for life on Earth.

Scientists reacted to my announcement as if I had plowed through the sacred field of established science with a bulldozer. I had. If the small comets were real, one scientist commented, textbooks in a dozen sciences would have to be rewritten. And so scientists dismissed the small comets, in much the same way they discounted Alfred Wegener and his theory of continental drift in the early part of the 20th century.

I spent more than a year answering the objections of critics. But I didn't convince them. It was 10,000 to 1 -- actually 2, myself and John Sigwarth, whose task as my graduate student assistant had been to help me resolve this black-spot mystery. "We have taken a representative poll of current opinion in this field," an editor at *Nature* wrote in rejecting a small-comet paper we submitted to them in 1988, "and the verdict goes against you." It was my first encounter with taking polls as a way of doing science.

Now, a decade later, many of those who had "voted" against us are changing their minds. In May at a meeting of the American Geophysical Union, we presented images acquired by our ultraviolet camera aboard NASA's Polar spacecraft, a satellite sent up to study the Sun's effects on the Earth's environment. This camera, too, had picked up the black spots in the Earth's sunlit atmosphere. And this time there was no doubt: these black spots or atmospheric holes, as we called them, occurred in clusters of pixels or picture elements, not single pixels as in the Dynamics Explorer images. The phenomenon could not be due to instrumental artifacts. We could also see these black spots expanding and moving as they entered Earth's atmosphere. And the filters on our visible-light camera confirmed that these objects consisted of water -- enough water to produce clouds of water vapor 50 miles across, high in the atmosphere.

The new evidence stunned many of our former critics into admitting that we had been right. The University of Michigan's Thomas Donahue, one of the world's leading experts in atmospheric science, said so, as did Robert Meier, a space physicist from the Naval Research Laboratory in Washington. "I guess I'll just have to swallow crow," wrote one detractor. These former critics now agree that these objects are indeed water-bearing, but they don't want to call them small comets because they don't have the dust that the large, well-known comets do. That's okay. Call them "cometesimals" if you want -- that's the term Donahue prefers -- but the fact remains: They carry lots of water just like the large comets, and they are millions of times smaller than Hale-Bopp and Halley.

At first glance, this apparent resolution to the small-comet affair would seem worthy of applause -- the scientific process of debate, peer review and criticism would appear to have functioned admirably. But the gap between appearance and reality is a large one. After I presented my findings on the small comets in 1986, the scientific community did its best to extinguish my career. In the past decade, I have been unable to get any other projects off the ground. Before the small-comet findings became public, my success in this regard was envious; I was able to get instruments on board several major spacecraft -- Polar, Galileo and Geotail. But after my small-comet announcement, I got nothing. I had my ongoing projects, such as the one on Polar that eventually produced the confirmatory data. But the new projects I proposed went nowhere -- even those that had nothing to do with small comets.

I am a very strong competitor. In my 40 years as an experimental physicist I have worked on experiments on 40 spacecraft. I have been on the forefront of many discoveries in the field of plasma physics. I made the first measurements of the plasma ring around Saturn. I was the first to measure solar-wind plasmas funneling directly into the Earth's polar atmosphere. I was the first to observe with a scientific instrument the belt of ions around the Earth that is now known as the "ring current." And I discovered the theta aurora, a luminous phenomenon which, seen from space, looks like the Greek letter "theta" stamped across the polar cap.

I can understand why the small comets were so startling to people. Their existence raises a number of questions: Where is the evidence of their passage through the Earth's atmosphere? Why haven't the seismometers left by the Apollo astronauts on the Moon recorded any small comet impacts? And so on.

These are the kinds of reasonable questions raised at the beginning of the small-comet debate, and I tried to answer them as best I could -- knowing, of course, that some answers could only come from additional research. But the intellectual discourse on the subject was brief, at best. Many of my colleagues labeled me a crank for my unwavering defense of the small comets, and I was blackballed from the community. Awards and honors with my name on them were canceled. It is public knowledge, for instance, that I was not elected to the prestigious National Academy of Sciences for this very reason.

The science game can be brutal. I was shunned by almost everyone. It got to the point that when I went to

out-of-town meetings, I normally ate alone, occasionally joined by a few close friends who are physicists. I've paid a stiff price. Perhaps I shouldn't have been so naive, but the behavior of some former friends and colleagues amazed me. It went far beyond what I expected.

There were a few people -- I can count them on one hand -- who started out as critics, but had the intellectual honesty to pursue this subject properly. One was John Olivero, then of Pennsylvania State University and now at Embry-Riddle Aeronautical University in Florida. Olivero and a graduate student named Dennis Adams collected data on water-vapor concentrations in the upper atmosphere and found temporary increases of the sizes and frequency one would expect if the small comets existed. Clayne Yeates, who has since died, was another. He was the science manager for the Galileo project. He devised a way of using the Spacewatch Telescope in Arizona to track the small comets -- which he doubted were real -- and managed to obtain a set of images showing the small comets in consecutive frames. It didn't take long for Yeates to be ostracized, just as I had been, and life for Olivero hasn't exactly been a picnic since he presented his controversial findings before the American Geophysical Union in 1987.

We began working on our instrument for the Polar spacecraft several years before the small comets were even a gleam in the eyes of Dynamics Explorer. We had the data from Dynamics Explorer by 1984, so we knew the small comets were real. But we were still a couple of years away from making our findings public. We began, however, to think about how we could modify our instruments -- under construction for Polar -- to include the capability of specifically looking for the small comets. We did this without any risk to the primary objective, which was studying the Earth's aurora. Basically, we made sure that the ultraviolet camera had a very large field of view and very low noise so that there would be no question of instrumentation being responsible for the black spots in the images. For the visible-light cameras, we put in filters that were not related to the aurora, and it was these filters that eventually told us the small comets had no sodium, no dust, but water -- lots of water.

Polar went up on Feb. 24, 1996. After we worked hard to get our instruments turned on, the first images came through. Sigwarth was at the Goddard Space Flight Center in Greenbelt and he called me back in Iowa City to say the black spots were there. He wasn't surprised. Neither was I. We had done our research carefully enough that we knew they just had to be there.

The new data from Polar have not silenced all my critics, however. Alexander Dessler, the editor who published my original small-comet papers in Geophysical Research Letters in 1986, is one of them. He published the material against the recommendation of his reviewers because he welcomed controversial topics and didn't want to miss a possible breakthrough. But he quickly became a critic, convincing people that the camera aboard the Dynamics Explorer wasn't working properly. Like most of those who continue to criticize the small-comet findings, he hasn't even seen our latest data. I can deal with my critics on an intellectual basis. But if they pound their chests and bray at the moon, there is absolutely nothing I can do about it.

I have submitted four papers on our latest small-comet findings to Geophysical Research Letters. A raft of reviewers is working hard to get them out so that everybody can see the results. It's been a fair review; some of the reviewers have been quite helpful in even squeezing more out of the results.

But the shabby treatment I've received at the hands of some science journals has continued. Last year, *Nature* rejected one of our team's new small-comet papers by saying: "We are unable to conclude that the paper provides the sort of advance in understanding that would excite the immediate interest of a wide, general audience." How wrong can you be? When we announced our results from Polar at the end of May, the story drew the attention of CBS, CNN, NPR, most of the major daily newspapers in this country, including this one (*The Washington Post*), as well as *Time*, *U.S. News and World Report*, and *Science*.

People tell me I should have dropped the whole subject, but that would have violated my sense of integrity. What has happened, however, is that science has lost its fun for me. The joy of working with the general scientific community is gone. But I have not lost my ability to do research at the very highest levels. I essentially have become a science machine: In the past three to four years alone, I have authored or co-authored nearly 100 papers on Jupiter's moons, non-linear plasma physics in the vicinity of Earth, the Earth's aurora and a dozen other topics. And during that same period I have presented or co-presented nearly 200 papers at national and international meetings.

I've done what I had to do. It took me a tenth of a century to do it. I've proved the atmospheric holes are there. I've shown that these objects have water in them. And I've shown that there are 10 million of these things coming in a year. What we have to do now is go up there and meet the small comets at 600 miles out. Polar sees these objects with great resolution but from a great distance. Now we have to get up close and see these objects in detail. And that's just what a group of

us -- Sigwarth and myself, along with some of my former critics, including Donahue and Michael Combi at the University of Michigan; Paul Feldman at John Hopkins University; Meier, George Carruthers and Charles Brown at the Naval Research Laboratory; and Ralph Bohlin at the Space Telescope Science Institute -- have proposed. We all agree that there is a really astounding number of previously unknown objects coming into our atmosphere, but we are in total disagreement about what they are. That's what the proposal says.

This proposed spacecraft is the first step in doing more sophisticated studies on these objects. Its two imagers will not only be more powerful and sensitive than those on Polar, but they will be able to look at the emissions coming from these objects. We are going to be looking for carbon, oxygen and simple organic gases. Maybe later we will be able to send a major mission after these objects and bring back samples. What an exciting adventure that will be for everyone. Meanwhile, we must begin to come to terms with the thought that as our planet twirls around the Sun, as the Earth's tectonic plates heave and dive, the cosmos is bathing us in a gentle cosmic rain.

For more information on Louis Frank and the small comet hypothesis check out the Small Comet web page at the following URL:

http://smallcomets.physics.uiowa.edu

EVAC Meeting Highlights

Don Wrigley, Secretary
December 10, 1997

President Sheri Cahn opened the meeting at 7:30 P.M. Introduction of club officers was made, and Sheri announced the dates for the December and January star parties and the January meeting:

Dec. 20 — Local Star Party at Florence Junction
Dec. 27 — Deep Sky Star Party at Vekol Road
Jan. 14 — Business meeting at SCC
Jan. 17 — Local Star Party at Florence Junction
Jan. 24 — Deep Sky Star Party at Vekol Road

Sheri announced that the January meeting will be in room 172, but the next four meetings (Feb, Mar, Apr, May) will be in room 170.

Tony Ortega followed up his article on Robert Burnham Jr. (author of Burnham's Celestial Handbook) with a short presentation revealing new facts about Burnham's life and work. He showed some fascinating slides of some of Burnham's collections, including slides of his outstanding collection of ancient coins. Burnham had a wide range of interests, and his cabin at Flagstaff had the look of a small museum complete with glass display cases. Other slides showed Burnham vacationing at the Grand Canyon and the Superstition Mountains. Tony also showed a notebook which contained some of the source material which Burnham used for his Handbook, and he indicated that he is in the process of tracking down some of Burnham's personal papers which may contain some original notes for his Handbook.

Rick Scott showed slides and videos of the Saturn occultation. He also showed some slides of the Harquahala Field Station, which was the topic of November's speaker.

Membership Dues & Subscriptions

Kathy Woodford, Treasurer

It is time to renew EVAC membership for 1998, and the dues must be in shortly. I also need to have the renewal slips for any magazine subscriptions: Some members that have renewed neglected to include the renewal information for their subscriptions (EVAC provides its members discounted subscriptions to *Sky & Telescope* and *Astronomy Magazine* at $27 and $24 respectively). A membership form is included at the end of this newsletter.

Thank you for all of your support. Happy new year!

Classified Ads

For Sale:
Custom 8" F6 On GEM — $850
DX SP Mount, Tripod, Skysensor — $950

For Details: John Vames at 602/946-3658

Editor's Corner

M. Aaron McNeely, Editor
amcneely@primenet.com

I would like to thank Dr. Louis A. Frank and Patrick Huyghe for permission to reprint the "Out There" editorial that originally appeared in *The Washington Post*. I have had an interest in Dr. Frank's theories for some time now and have read The Big Splash, his book about the small comets. I have also enjoyed hearing of Dr. Frank's recent observations/confirmations.

East Valley Astronomy Club

Membership Form

Please complete the information on the form and return to the address below along with a check payable to EVAC for the appropriate dues amount. See below:

Kathy Woodford, EVAC Treasurer
PO Box 213
Apache Junction, AZ 85217
Call: 857-3438 evenings

Enclosed:
___$20 annual
___$15 April -Dec.
___$10 July - Dec.
___$ 5 Sept.-Dec.

Please Print

Indicate any information you want kept confidential.

Name _____
Address _____
_____ Zip _____
Phone # _____

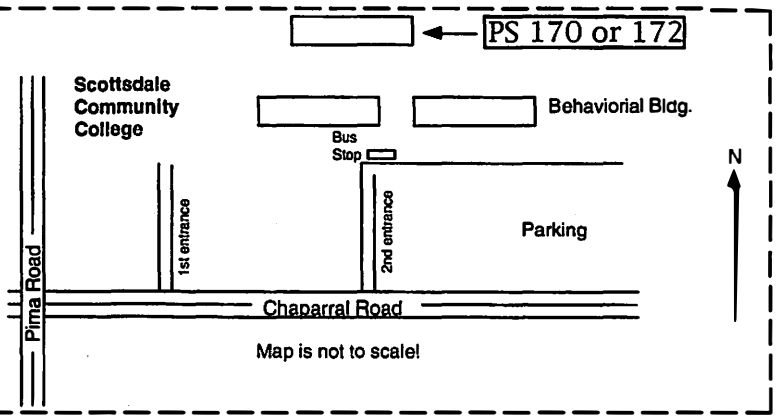
Email address _____

If you have have a web page or URL, please indicate address _____
How did you hear about the East Valley Astronomy Club? _____

Major area(s) of interest:
( ) General observing
( ) Lunar observing
( ) Planetary observing
( ) Telescope Making
( ) Astrophotography
( ) Deep Sky
( ) CCD/Computer
( ) Other _____

CLIP AND SAVE

Monthly business meetings are on the 2nd Wednesday of each month at 7:30pm.



EAST VALLEY ASTRONOMY CLUB
M. Aaron McNeely, Editor
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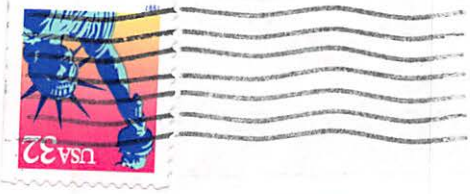
Phoenix, AZ 85018



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Next EVAC Meeting — January 14

Last issue, please renew

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EAST VALLEY ASTRONOMY CLUB—1998

EVAC Homepage—http://www.goodnet.com/~rkerwin/evac/evac.html

PRESIDENT:	VICE-PRESIDENT:	TREASURER:	SECRETARY:	PROPERTIES:
Sheri Cahn	Kathy Doyle	Kathy Woodford	Don Wrigley	Enrico Alvarez
602/841-7034	602/953-8184	602/857-3438	602/982-2428	602/837-0486

MEMBERSHIP & SUBSCRIPTIONS: $20 per year; renewed in December. Reduced rates to *Sky & Telescope* and *Astronomy* available. Contact Kathy Woodford, P.O. Box 213, Apache Junction, AZ 85217, 602/857-3438.

CLUB MEETINGS: Second Wednesday of every month at the Scottsdale Community College. 7:30 pm. Normally Room PS 170 or 172 in the Physical Sciences Building.

NEWSLETTER: Mailed out the week before the monthly Club meeting. Send your thoughts and stories to M. Aaron McNeely, 4402 North 36th Street, #22, Phoenix, AZ 85018, 602/954-3971. Email—amcneely@primenet.com

CHANGES: Address, Phone Number, or Email: Send to Bill Smith, 1663 South Sycamore, Mesa, AZ 85202, 602/831-1520. Email—bsmithaz@aol.com.

EVAC LIBRARY: The library contains a good assortment of books, downloaded imagery, and helpful guides and is usually brought to the Club meetings. Contact Enrico Alvarez for complete details, 602/837-0486.

BOOK DISCOUNTS: Great savings for members through Kalmbach and Sky Publishing. Contact Don Wrigley, 423 West 5th Avenue, Apache Junction, AZ, 602/982-2428.

EVAC PARTY LINE: Let other members know in advance if you plan to attend a scheduled EVAC observing session. Contact Robert Kerwin, 602/837-3971. Email: p24493@email.mot.com