EPHEMERIS

Vol. 2 No.1 Official Publication of the San Jose Astronomical Association JANUARY 1990

SJAA EVENTS THIS MONTH

Kevin Medlock will speak on the status and goals of Group 70 and the Large Amateur Telescope project at the January 6th General Meeting. The meeting begins promptly at 8 PM at the Los Gatos Red Cross. Kevin will also touch on the CCD camera, which was demonstrated in prototype form at last September's equipment night.

Please make note of the Branham lane star party dates. Your volunteer help is need to make these public programs a continuing success. On January 13th there will be a Board Meeting a the Red Cross, 6:30 PM. New members of the Board will be elected at the February General Meeting. Members may wish to swing by and present names to the nominating committee on Jan. 13th. Tired of seeing the same old people on the Board? Then here is your chance to become part of the organization. The nominating committee is Tom Ahl and Steve Greenburg. Contact them with suggested condidates.

Don't forget about the 2 star parties this month. January 20th at Grant Ranch, and January 27th at Fremont Peak State Park. Both are dusk-till-frozen events, and weather permitting.

ASTRONOMY CLASS BEGINS JANUARY 13TH

1990 kicks-off another year of the SJAA's Introductory Observational Astronomy class. Starting this year, Wolfgang Hanish will be our teacher. An educator by profession and also a professional photographer, "Wolf" will guide us through the seasonal constellations each month. Guest speakers will also be featured, covering such subjects as observing double stars, grazing occultations, astrophotography, using telescopes, binoculars, coordinate systems, and much, much more.

Jack Zeiders, originator of the class and its teacher for the last 3-years is taking a long overdue sabbatical. Jack literally put hundreds of hours of his own time into developing the class program, creation of computerized star charts, and the astrophotography of the constellations. On behalf of all SJAA members and officers I would like to extend our sincere appreciation to Jack, and a hearty *THANK YOU!* for a job well done. SJAA members are encouraged to attend the class and especially invite your friends. Do you know anyone who received a telescope or binoculars for Christmas? If you do, send them down. No previous astronomical knowledge is necessary. The class has been extremely successful in fostering new interest in amateur astronomy. It's a chance to meet new people and to make new friends. PLAN NOW TO ATTEND!!!

BRANHAM LANE STAR PARTIES

Don't forget that the SJAA is holding public star parties on the following Fridays. Here are the upcoming dates: January 5, February 2, March 2, April 6, May 4, June 1, June 29, July 27, August 31, September 28, October 26, December 28. Bring a telescope and tell your friends. For more information please contact Tom Ahl or Jim Van Nuland. Their telephone numbers are listed elsewhere in this issue.

ELECTRONICS ORIENTED ASTRONOMY SEMINAR

The third Electronics Oriented Astronomy Seminar is to be held on March 17, 1990, Chapman College, Orange California. CALL FOR PAPERS! The seminar will not be held unless there is enough people to create a program. Perhaps we could get Kevin Medlock to present a talk on his experiments with the CCD camera that will be demonstrated this month. The SJAA pioneered astro-video in the early 80's using a CID device. Please send papers by February 15th to: John Sanford, 2215 Martha Ave., Orange CA 92667

LATE BREAKING NEWS

Club members Jack Peterson (our Treasurer) and Maria Sye got married December 9th. May they live long and prosper together.

THE EIGHTIES - LOOKING BACK

- JOHN GLEASON

Ten years has suddenly slipped by us all! While contemplating this thought, I could not help but look back a the products and events that have had a significant impact on the enjoyment of our hobby - Amateur Astronomy.

So here are a few items for everyone to reflect

JANUARY 6TH 8:00 PM KEVIN MEDLOCK GROUP 70 UPDATE

DECEMBER 23: NO-HOST STAR PARTY AT FREMONT PEAK STATE PARK.

JANUARY 5: (FRIDAY) PUBLIC STAR PARTY AT BRANHAM LANE PARK. DUSK TILL DAWN. 5 PM.

JANUARY 6: GENERAL MEETING 8:00 PM, KEVIN MEDLOCK - GROUP 70 UPDATE.

JANUARY 13: SJAA BOARD MEETING, 6:30 PM. NEW INTRODUCTORY ASTRONOMY CLASS BEGINS AT 8 PM.

JANUARY 20: SJAA STAR PARTY AT GRANT RANCH PARK. DUSK TILL FROZEN.

JANURAY 27: SJAA STAR PARTY AT FREMONT PEAK STATE PARK. DUSK TILL FROZEN.

FEBRUARY 2: (FRIDAY) PUBLIC STAR PARTY AT BRANHAM LANE PARK. STARTS AT DUSK

FEBRUARY 10: SJAA BOARD MEETING AT 6:30 PM. INTRODUCTORY ASTRONOMY CLASS AT 8:00 PM.

FEBRUARY 17: SJAA STAR PARTY AT GRANT RANCH COUNTY PARK. DUSK TILL FROZEN.

FEBRUARY 24: STAR PARTY AT HENRY COE STATE PARK. DUSK TILL FROZEN.

upon. A lot of products appeared from 1980 to the end of 1989, most of which we take for granted today. These are not necessarily in chronological order, and this certainly isn't everything!

A whole array of accessories and telescopes became readily available to the amateur in the 80's. How many do you have?

Silver coating on telescope mirrors, multiple eyepiece holders, dew guns, observing chairs, astronomer's flashlights, projection reticle eyepieces, 2" star diagonals, adjustable telescope tripods, quick release mechanisms, Super Polaris mountings, Hyperbolic astrographs, AstroMacs, Starfires, Renaissance, Genesis, Oracle, Super Planetary, Compustar, LX1,2,3,4,5,6, coma correcting eyepieces, CAT paws, wiggle wompers, photographic field flatteners, DC stepper motor drives, Barn door camera platforms, digital setting circles, electric focus motors, black painted telescope tubes, Plossl eyepieces, super Plossl eyepieces, super wide-angle eyepieces, Deep sky filters, Ultra-high contrast filters, hydrogen beta filters, astronomer's red goggles...

Astronomer's red goggles? Don't ask!

It is amazing to think that 10 years ago there were no Tele Vue eyepieces! 40mm surplus Erfle and Brandon Orthoscopics were considered the standard for observing. Now there are so many specialized eyepieces of such high quality and high price, you need to take out a second mortgage to afford them!

Fluorite refractors did not arrive on the amateur scene until the early 80's. They were the result of Celestron expanding its product line through the importation of department store type Japanese refractors. Takahashi, has only recently become a household word. Life without fluorite, I can't imagine it! Along with the fluorite came a renaissance for the refractor. Observers old and new came to appreciate its fine imaging quality. Roland Cristian began producing a new line of Apocromatic, 3-element refractors in the mid 80's.

400 speed color film off-the-shelf was the fastest that you could get at the time. By 1989, we have a supermarket of "super speed", fine grained films from which to choose. The use of cold cameras for astrophotography was in its prime in 1980, now all but a few astrophotographers are hypering with forming gas and getting spectacular results. Light Pollution Rejection filters were just becoming popular on the observing front. Now we are blessed with an array of specialized interference filters, rendering such objects as the Horsehead nebula visible by direct observation.

17.5" telescopes became an observing standard at star parties in the 80's when Coulter Optical introduced a cheep 17.5" mirror set in late '79. As a result, Dobson type telescopes have exploded in numbers at star parties. Dobsonian reflectors have also gone through a mini revolution. Bulky cardboard tubes and heavy plywood mounts have given way to lightweight truss assemblies and "aircraft" type construction. Telescope Making (Dobsonian Quarterly) magazine appeared due to renewed interest in amateur telescope making and the popularity of the Dobson.

Wil Tirion presented the world with his Sky Atlas 2000 and later, the incomparable Uranometria 2000. Both atlas' will no doubt remain the standard for some time to come. Many new books on astrophotography appeared, filling a technical void of about 20-years.

How many of us knew what a Apple Macintosh was 10 years ago? As the personal computer burst upon the scene, there seemed to be a natural mating of the PC to amateur astronomy. We witnessed the first commercial implementation of a computer controlled telescope by Celestron, and the amazing "Voyager" software for the Mac. Both products represent the first generation of user friendly interfaces between amateur astronomer and computer. More recently, CCD type cameras have appeared in the hands of amateurs, directly linking telescopic imaging to the PC in the field.

Noticeably missing as we enter the next decade are Dynamax/Criterion telescopes, A. Jeagers Optics, Optical Techniques (makers of the Quantum 4 & 6), Bob Little, and Leo Henzl. What ever happened to Leo Henzl anyway? Leo was a pioneering astrophotographer with the cold camera and the Celestron 8.

Major events also shaped the last 10 years. In 1985 we saw the return of Halley's Comet. I will never forget that early morning in March 1986 at Fremont Peak, viewing and photographing Halley in the pre-dawn glow. Many SJAA members found themselves a few weeks later observing Halley at the zenith from Australia and New Zealand. It was truly a memorable event. The grand opposition of Mars in 1988 was spectacular. Never before could any of us remember viewing as much Martian surface detail as we did during this passage.

In 1984 the ground broke for the 30-inch observatory at Fremont Peak. This major event made the state park even more popular for observers and even prevented the planned closure of the park! Earlier in the decade, the SJAA had its first astronomy weekend at Yosemite. This popular activity has become an annual event for the last 6 years. The SJAA also went through 4 different bulletin editors, and moved its General Meeting location 3 times.

Last, but certainly not least, in 1988 a group of Bay Area amateur telescope makers began formulating the ideas and plans for the world's largest amateur telescope - the 72-inch.

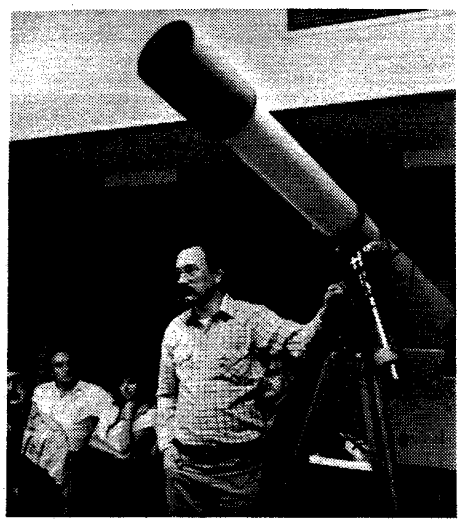
We can only dream about what the next 10 years will bring. As we enter the last decade of the 20th century, I want to wish to all SJAA members and friends, the best of health, prosperity, and dark skies. **HAPPY NEW DECADE!!!**

DOUBLE, TRIPLE AND MULTIPLE STARS

- PATRICK M. DONNELLY

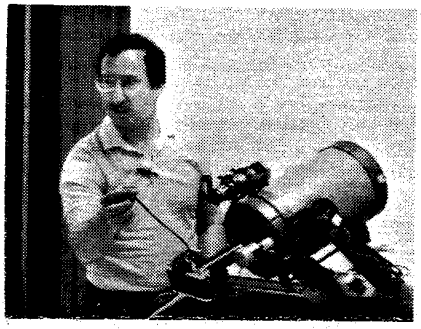
Since I had the entire week of Thanksgiving free from both work and school, it seemed appropriate to dust off the scope and do some observing. As it happened, I accidentally pointed the scope towards the Pleiades cluster, and stayed there for the rest of the observing session. It was a nostalgic trip through the stars that I had chosen for my observational astronomy project. As an eager young sophomore at the University of Illinois, I undertook a project to measure the distance to the Pleiades. My result came out to be 140+/- 10 parsecs, which is not far from the presently accepted value of 125 parsecs.

The Pleiades Cluster is an open cluster; a group of stars gravitationally bound and moving through space with a common proper motion. This means that the Pleiades, by definition, constitutes a multiple star system. The total number of stars in the cluster is about 500-1000, and it is a relatively young cluster being only about 30,000,000 years old. The remnants of the nebulosity, out of which the stars formed, can still be seen on photographs of the cluster. However, even though the whole cluster is one big multiple star system, there are several double and multiple stars worth investigating. Begin your tour at Alcyone (25 Tauri). There is a little triangle of stars next to Alcyone about 1 arc minute on each side. The stars are magnitude 9 and this quadruple star is always a fine sight. On the other side of the cluster is Taygeta (19 Tauri). This star has a 9th magnitude companion about 70 arc seconds from Taygeta. Also, Atlas and Pelione (27 and 28 Tauri) are a nice wide pair at 5' and so are 21 and 22 Tauri on

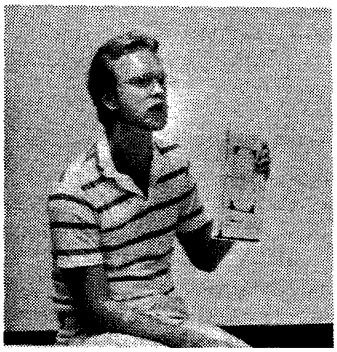


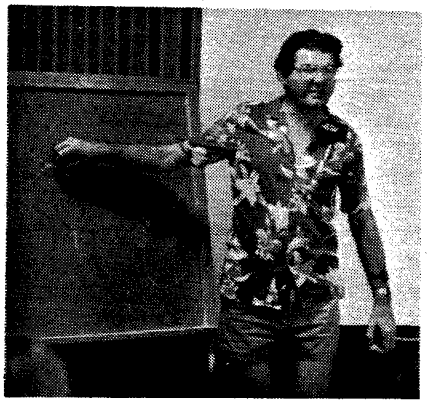
INTRODUCING AMATEUR ASTRONOMY!

Here is a look back at the last 12 months of our introductory astronomy class. In addition to the regular class program, guest speakers have presented information on specialized amateur astronomy topics. The SJAA is indeed fortunate to have this level of expertise in its membership.

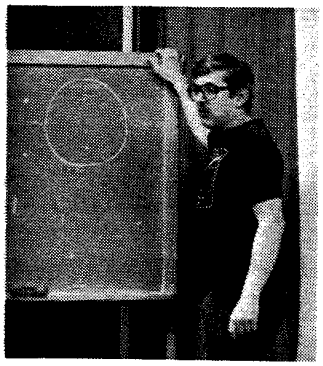


Counter clockwise from the top: 1). Jay Freeman discusses the fundamentals of binoculars and how to use them in amateur astronomy. 2). Jack Zeiders conducts the class at the Fremont Peak Observatory. Here each member gets a chance at using the 30-inch telescope. 3). Bob Fingerhut presents the basics of astrophotography. 4). Jim Van Nuland tells us how to observe grazing occultations. 5). A club member checks out Jack Zeiders' home built 17.5 Newtonian. 6). (Bottom) Pat Donnelly shows members how to observe and enjoy double, triple, and multiple stars. 7). Frank Van Slater describes his Questar 3.5" during Telescope Nite. 8). John Gleason presents advanced techniques for astrophotography. 9). Jack Peterson shows us how to use telescope coordinate systems. 10). Paul Mancuso shows-off his 6-inch fluorite refractor during Telescope Nite.





So "come on down" and join us on January 13th!



the north edge of the cluster, with 21 and 22 Tauri separated by 3 arc minutes.

In addition to these very easy double stars, there are five very difficult multiple systems to resolve. The first is B 536 (called D1 for "difficult number one"). It consists of four stars of magnitudes 8.5, 8, 9.5, and 12. The configuration is similar to the double-double in Lyrae with the 8.5 and 9.5 separated by 0.6 arc seconds and the other pair separated from this pair by 39 arc seconds. The second pair is separated by 18 arc seconds. I have seen the entire group about a year ago with the Fremont Peak 30-inch telescope under almost perfect seeing. Finally, the two primary members offer a pleasing yellow-blue contrast in small telescopes. In the northern part of the cluster reside B537 (D2) and Sigma 449 (D3). B537 is double consisting of an 8.5 magnitude primary and a 10.5 magnitude secondary. They are separated by a very stingy 0.9 arc seconds. However, under good conditions this pair is resolvable in an 8-inch telescope under very high powers.

Sigma 449 is next to B537 about 2 arc minutes away. It is much easier to resolve with a 8.5 magnitude primary and an 11 magnitude secondary separated by about 7 arc seconds. This double is visible in a 6-inch telescope under high power. About 5 arc minutes south of Alcyone is Sigma 450 (D4). Sigma 450 is an easy double consisting of a 7th magnitude primary and a 9th magnitude secondary separated by 6 arc seconds. Finally, on the east side of the cluster is O Sigma 64 (D5). O Sigma 64 is a neat triple, and I have occasionally used it to check sky conditions. The triple consists of a 7th magnitude primary, a 10th magnitude secondary at 3 arc seconds, and a 9th magnitude companion at 10 arc seconds. The position angle for the secondary components are about the same, which makes resolution of all components difficult. The star is resolvable in an 8-inch telescope under high power.

As a final note, you may have some difficulty finding the dimmer stars. This is because the sky background from the nebulosity is quite bright. Also, even under high powers other cluster members are visible in the same field, which serves as a distraction. When you're all finished, use a low power eyepiece that you have to get the grand view of the Pleiades Cluster. This may be the best view of all!

ASTRO-TIPS

- PAUL M. SUMMERS

After using my Telrad finder for several months, it occurred to me that there might be a way to make it even more useful. Since it projects its reticle at infinity, you should be able to see it against the sky in a pair of binoculars. I tested this hypothesis on M8, the Lagoon Nebula in my front yard, and to my satisfaction it worked as expected. There was M8, bright and fuzzy, and there was the big red bull's eye, right next to it. Centering the Bull's eye on M8 was quite simple, as there was no need to turn the reticle on and off, or guess where M8 should be.

The most difficult part is locating the reticle with the binoculars. You have to remember that you'll only see it in one eye, and movement is exaggerated due to the increased magnification. I generally have to turn the reticle up to full brightness to locate it, then turn it down again to a reasonable level. After you do this a few times, you learn where to find the reticle behind the scope.

I have demonstrated this technique several times at the Branham lane star parties, and each time I've been met with the astonished reply, "Why didn't I think of that?" So, to add my contribution to the increased enjoyment of astronomy, I pass it along to you.

THE CELESTIAL TOURIST SPEAKS

- JAY REYNOLDS FREEMAN

Recently I bought a 90mm fluorite refractor from another club member. This instrument - a Celestron model SP-90F - made its way to the Bay Area as part of a batch of equipment Celestron donated to the Fremont Peak Observatory Association in 1985. Although I have observed many times with this telescope, in a sense I bought it sight unseen: I don't believe I had ever seen it other than by darkest night on Fremont Peak. That's all right. You don't look at telescopes, you look through them, and I knew from experience that these optics were fine: A careful combination of ordinary crown glass with fluorite yields an objective essentially free of chromatic aberration, and this particular one is well-corrected for spherical aberration as well.

I picked it up on October 6, and drove straight to the public star party at Branham Lane Park. Little refractors are great instruments for star parties - compact, durable, and quick and easy to set up and align. This one is a particularly nice size. At f/9, the tube is only eight inches shorter than my other refractor's (4-inch f/10), but the smaller instrument is noticeably more portable, even through the 4-inch has an altazimuth mounting instead of an equatorial.

It was the kind of night that manufacturers of small, expensive telescopes wish for more of. The seeing was not bad enough to cause trouble for 90mm aperture - at 202X I could continuously see diffraction rings around brighter stars, though the rings were always in motion. But telescopes of 8-inch aperture and up were not doing so well: Their images were breaking up into many wriggling parts. Several nearby Schmidt Cassegrains were out of collimation, and at least one large Newtonian was hampered by tube currents, What's more, the sky was too bright for the bigger instruments to strut their stuff observing faint fuzzies. In such conditions, a small telescope with excellent optics may substantially outperform its larger brothers. The fluorite did. I received many unsolicited comments from newcomers as to how good the images looked compared to some others. Such a telescope does wonders for its owners' conceit - not that I had anything to do with its construction, but presumably I had sufficient knowledge, taste, and liquid assets to obtain a quality product.

We looked at Saturn - a gem in almost any telescope - hard and bright in the eyepiece, without a trace of spurious color. I was using 68X so as not to have to reposition the telescope between successive viewers (I did not yet have a battery adapter for the electronic siderial drive that came with the instrument), but some Cub Scouts wanted me to "make it wide", so I did. Even only about 15 degrees above the horizon, the image at 202X was good, with dusky detail visible on the globe of the planet. I explained to one of them that Saturn was the first astronomical object I ever saw through a telescope, when I myself had only just joined Cub Scouts.

Later I examined gamma Andromeda with the same magnification. This lovely wide double provides a beautiful color contrast - I see it as pale yellow and an almost asure blue. The fainter component of the wide pair is itself a double whose separation is only about 0.4 of the theoretical resolving power of a 90mm objective. Notwithstanding, I suspected a trace of elongation of the image (but my observation is biased because I knew what to expect).

It was too bright for any telescope to provide really excellent views of deep-sky objects, but I already knew that the 90mm was well capable there. Some years ago, the telescope's previous owner and I were able to detect Stefan's Quintet with it.

Small refractors are making a comeback among today's amateur astronomers, and observations such as these are surely part of the reason. Do I therefore recommend that you

rush right out and buy one? Not necessarily. There is a down side. This used 90mm refractor cost me twelve hundred dollars. That's not unreasonable - the previous owner kept the eyepieces, but the instrument came with a fully-featured Super Polaris mount with motor drive, and with an electronically controlled oscillator to vary the drive rate. But twelve hundred dollars will buy a lot more telescope. On the used market, it will get a comparably equipped Celestron or Meade Schmidt-Cassegrain, which will probably outresolve even a perfect 90mm optical system, provided seeing, optics and collimation are all reasonable. It will also buy a new Coulter 17.5-inch Dobson-mounted Newtonian, which with even half-way decent optics will certainly outperform a 90mm fluorite, if only by means of a 100mm off-axis stop.

And many amateur astronomers not only like to see fine detail but also want to look at faint objects, and here small refractors are permanently hampered: That takes aperture, and glass doesn't stretch. It's worth a boast when you detect Stefan's Quintet with 90mm, but at least two galaxies in this group are easy in an eight-inch, and a 17.5-inch will pull in all five and begin to give you an idea of their structure.

So if I had to have just one telescope, and had a twelve-hundred dollar budget to buy it with, I certainly wouldn't buy a small refractor, no matter how exquisite its optics. But if I were to have two telescopes, an instrument like the SP-90F might well be one of them.

GREAT RED SPOT

- JIM VAN NULAND

Jupiter remains large enough to pick out details even at low power, though I've needed 150x to find the Great Red Spot. With considerable more color than for many years, first-time observers are spotting it with little difficulty.

The dark lump in the North Equatorial Belt, mentioned last month, remains rather prominent, and seems to be catching up to the Great Red Spot. It bears watching, as it may fade any time. The "missing" South Equatorial Belt may be returning: the SEB region is very slightly darker, and appears striated at moments of best seeing.

The Spot has suddenly reversed its motion in latitude, so the times given below are later compared to last month. The difference amounts to several minutes, so you will want to get to the telescope just a little early to catch the Spot.

Good seeing and a power of about 200-300 are needed. Begin half an hour before the given time. Focus carefully, then scan the southeast quadrant of Jupiter. Watch carefully for those moments when the air is especially stable, and the Spot will show itself in all its glory. Let me know of your results, especially if you are using an instrument smaller than 8-inches, or if you try various filters.

COMET COMMENTS

- DON MACHHOLZ

Comet Helin-Roman-Alu (1989v) is visible in our northern sky while a bright new comet has been discovered recently.

Periodic Comet Sanquin (1989z): B. Weller, R. Coker, and K. Meech recovered this comet on Nov. 9. It was then magnitude 22. This comet has an orbital period of 12.5 years and will be closest the Sun at 1.8 AU on April. 2. But it will then be on the far side of the Sun at magnitude 18.

Comet Aarseth-Brewington (1989a1): Knut Aarseth of Volda, Norway and Howard Brewington of Newberry, South Carolina discovered this comet on Nov. 16 in the evening sky at magnitude 8.5. Brewington was using an 8" reflector at 27X on an altazimuth mount, piggy-backed on a 16" reflector. He had searched for 230 hours over 14 months to find this, his first comet. This is the first comet discovery from South Carolina.

The comet is rapidly moving toward perihelion which will be Dec. 27 at 0.30 AU. It may attain magnitude 3 by then, but it will be too close to the sun for observation. Following perihelion it will dim at small elongation, so our last chance to observe it is in mid-December.

Periodic Comet Tuttle-Giacobini-Kresak (1989b1): Jim Gibson used the 1.5-meter reflector at Mt. Palomar to recover this comet at magnitude 19. With a 5.46 year orbital period, it will be closest the Sun (1.07 AU) on Feb. 8. This is a favorable appearance, and the comet may be magnitude 11 by next month. Occasionally it will outburst, becoming even brighter.

SEEKING COMETS

How rapidly do comets move against the background stars when they are discovered? This is important for visual comet hunters, as they often have to wait an hour or so to detect motion. Photographic comet hunters may be interested in knowing what focal length and exposure is needed so that new comets appear as short streaks, and not just nebulous blobs.

The 28 morning sky comets found by amateurs from 1975 through Jan. 1989 show an average speed of 3.3 (+/- 3.2) arc minutes per hour, which translates to 1.3 degrees per day. The evening comets averaged 2.1 (+/- 1.1) arc minutes per hour, or 0.8 degrees per day.

It is probably safe to say that for most comets, motion can be visually detected in under an hour if an accurate drawing of the area is made. As for photographic image scale, a long focal length is generally needed for a half-hour to show motion.

The comet with the greatest motion in this study is Comet Austin, 1984i. It was moving 6.5 degrees per day, when found in the morning sky, and was five weeks away from close perihelion of 0.29 AU. A final factor contributing to its apparent speed was its close distance to the Earth, only 0.26 AU.

VISUALLY OBSERVING THE HORSEHEAD

- STEPHEN R. WALDEE

As a telescope salesman, I frequently encounter questions about the visibility at the eyepiece of the famous "horsehead" dark nebula (Barnard 33) in Orion. One customer, obviously a beginner, bragged loudly in front of his young son about vividly seeing the nebula in his 6-inch Newtonian. One quickly learns to deal with such naive and undoubtedly incorrect assertions with a great deal of tact!

My first attempt at visually observing the Horsehead was with a telescope that I figured would offer certain success: the 22" Cassegrain at Lick Observatory. UC's history docent Shilo Unruh and I searched for the nebula on an early spring night over a year ago, and at the time I thought I had failed. Because of the long focal length of the instrument, higher power than desirable had to be employed in order to use my Televue 40mm eyepiece and Orion "Ultra-Block" nebular filter, and all I perceived was a general mottling of the sky background in the vicinity of Zeta Orionis. Understanding what I do now, I believe I probably spotted the nebula, but without knowing what to expect, I passed over it in frustration. Furthermore, the sky glow from the Santa Clara Valley was devastating at the constellation's low elevation above the horizon.

I renewed my efforts this fall, in part inspired by Jay Freeman's comments about discerning faint objects at the limit of one's scope performance and perception. On Mt. Loma Prieta south of San Jose, not a particularly dark site

but at least presenting Orion in a better aspect than in my earlier experience at Mt. Hamilton, I was at last treated to a convincing visual depiction of the nebula.

Rich Page employed the Lumicon H-Beta filter, with very narrow bandpass at 486 nm, in observing the Horsehead with his superb 14-inch f/6 Newtonian fitted with an enhanced silver diagonal. The dark spot was unmistakable, and totally disappeared without the filter. In my own 10-inch Newtonian, having only about half the light-gathering power as Riche's behemoth, I then employed the same filter to perceive the Horsehead's darkness well above the "threshold of imagination," though the effect was distinctly unimpressive. Substituting the Orion Telescope Center's "UltraBlock" nebular filter, I could still discern the elusive dark cloud, since, by working backwards from better to less effective equipment, I was able to mentally compensate and transfer my expectations.

Finally, I went for broke on my own and with even less light-gathering power. In late October on a crystal-clear night with a pitch-black sky at lake San Antonio in southern Monterey County, I decided to concentrate on faint objects that are usually swallowed up locally by stray San Jose photons, and the Horsehead seemed an ideal choice, as the constellation of Orion was near the zenith at 1 AM. Space limitations had necessitated my circa 1975 Celestron 8, offering less than 64% the brightness of the 10-inch Newtonian. In addition, I was bereft of the H-Beta filter, and so had to settle on the wider bandpass of the otherwise excellent Orion "UltraBlock," designed for general nebular observation.

A first pass of the Horsehead area at 50X netted no obvious results, so I gritted my teeth with a grim determination. Out came David Eicher's book "The Universe from Your Backyard" for a photograph of the area around Zeta, including the "Tank Tracks" (NGC-2024), the bright nebula IC-434, and the dim notch of the superimposed Barnard 33. I stared and swept. Nothing.

Now I was mad! Concentrating and focusing my attention, I tried deep-breathing the cold, dewy air the way I imagine that skilled observers like Stephen J. O'Meara accentuate their senses with droughts of oxygen. I relaxed and tried again.

Slowly over the next few minutes, the details came out. I learned which eyepieces to best employ (the 26mm Celestron Plossl, which gave 77x), and to place Zeta just outside the field. Gradually, the Horsehead region sank into my perception. I made sure not to look at the photograph, sketched what I saw, got up and walked around, returned to the scope to check my results, and then got out the picture for verification. Yes, the head of the horse was pointed just where it was supposed to be: I was not imagining things!

The next challenge is to try my 6-inch Newtonian, and maybe for laughs my 4" Astroscan. But even if I fail, I'll long remember the happily-rewarded efforts of an hour's deep concentration, one of my most satisfying astronomy moments.

COMET EPHEMERIS

DATE (UT)	RA (1950)	DEC	RA (2000)	DEC	ELONG	SKY	MAG
			Comet Helin-Roman-Alu (1989v)				
12-25	18h57.9m	+47°51'	18h59.2m	+47°55'	72°	E	10.8
12-30	18h46.3m	+49°31'	18h47.6m	+49°34'	73°	E	10.9
01-04	18h34.2m	+51°11'	18h35.4m	+51°14'	74°	M	11.0
01-09	18h21.4m	+52°54'	18h22.5m	+54°56'	76°	M	11.1
01-14	18h07.3m	+54°40'	18h08.3m	+54°40'	79°	M	11.2
01-19	17h51.3m	+56°30'	17h52.2m	+56°29'	82°	M	11.4
01-24	17h32.8m	+58°23'	17h33.6m	+58°21'	85°	M	11.5
01-29	17h10.7m	+60°17'	17h11.3m	+60°14'	89°	M	11.6
02-03	16h43.8m	+62°06'	16h44.4m	+62°01'	94°	M	11.8
02-08	16h11.1m	+63°41'	16h11.7m	+63°34'	99°	M	12.0
			Comet Aarseth-Brewington (1989a1)				
12-15	16h25.5m	-00°15'	16h28.1m	-00°22'	27°	M	5.0
12-20	16h32.3m	-10°12'	16h35.0m	-10°19'	23°	M	3.8
12-25	16h50.4m	-23°00'	16h53.4m	-23°05'	19°	M	2.8
12-30	17h33.8m	-36°02'	17h37.1m	-36°04'	18°	M	2.8

JUPITER'S RED SPOT

Great Red Spot on Meridian PST

da	mo	d	h	m		da	mo	d	h	m		da	mo	d	h	m	
Su	12	31	7	54	pm	Su	1	14	1	33	am	Su	1	28	2	59	am
Tu	1	2	1	40	am	Su	1	14	9	26	pm	Su	1	28	10	54	pm
Tu	1	2	9	33	pm	Tu	1	16	3	10	am	M	1	29	6	44	pm
Th	1	4	3	12	am	Tu	1	16	11	1	pm	W	1	31	0	33	am
Th	1	4	11	9	pm	W	1	17	6	47	pm	W	1	31	8	19	pm
F	1	5	6	53	pm	F	1	19	0	37	am	F	2	2	2	13	am
Sa	1	6	4	51	am	F	1	19	8	25	pm	F	2	2	9	59	pm
Su	1	7	0	40	am	Su	1	21	2	19	am	Sa	2	3	5	56	pm
Su	1	7	8	36	pm	Su	1	21	10	12	pm	Su	2	4	11	42	pm
Tu	1	9	2	18	am	M	1	22	6	1	pm	M	2	5	7	30	pm
Tu	1	9	10	13	pm	Tu	1	23	3	54	am	W	2	7	1	20	am
W	1	10	6	3	pm	Tu	1	23	11	48	pm	W	2	7	9	12	pm
Th	1	11	4	2	am	W	1	24	7	38	pm	F	2	9	2	52	am
Th	1	11	11	57	pm	F	1	26	1	23	am	F	2	9	10	51	pm
F	1	12	7	42	pm	F	1	26	9	17	pm	Sa	2	10	6	37	pm

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SPACE PROGRAM UPDATE

- BOB FINGERHUT

ONE DOWN, ONE TO GO IN 1989

Discovery completed a mission for the Department of Defense on Nov. 27. The next shuttle launch is Columbia and is scheduled for December 18th. The mission is to launch the Syncom 4, F5 military communication satellite and to recover the Long Duration Exposure Facility, launched in April 1984, Columbia's mission is planned to last ten days.

COSMIC BACKGROUND EXPLORER

The COBE was launched into polar orbit on the last NASA owned and managed expendable booster. The satellite is in a 559 mile polar orbit where it can study the background radiation from the big bang that created the universe. The instruments aboard include the far infrared absolute spectrometer (FIRAS) and diffuse infrared background experiment (DIRBE).

GALILEO COMPLETES FIRST COURSE CORRECTION

The Galileo Jupiter spacecraft made its first course correction (17 meters/sec) on Nov. 9 - 11. Another course correction of 0.7 meters/sec is planned for December 22. The spacecraft is in good health but does have a few minor anomalies that will not affect the mission. Propellant margin is still negative by 30 Kg. It would be positive by 15 Kg if the asteroid Ida encounter is dropped. No decision will be made about the Ida encounter until more is known about actual fuel usage. Galileo will make its first encounter, the planet Venus, in Feb. 1990.

GEOSAT MEASURES EARTH'S GEOID

A precision altimeter onboard the U.S. navy's Geosat has been used to precisely measure the height of Earth's oceans.

FIRST PEGASUS LAUNCH DELAYED AGAIN

The first active flight tests of the Pegasus, winged, air launched booster was conducted in Nov. 9th. A second captive test is now planned due to two problems that were found on the first test. Chipping of thermal protective paint and brief communications dropouts between computers on tahe rocket and the B-52 aircraft were the cause. The first launch is now scheduled for mid-January.

EXPECTATIONS FOR HIPPARCOS SATELLITE INCREASED

The European astronomy satellite is now expected to last longer and complete more of its mission. The spacecraft is in a highly elliptical orbit because its apogee boost motor failed to ignite and put it into a circular geosynchronus orbit. The low point or perigee of the spacecrafts orbit was raised using the spacecraft's onboard maneuvering system. Additional ground stations have increased tracking coverage of Hipparcos to 90% of each orbit. Also, calculations of maximum eclipse length show there may be sufficient power to allow the spacecraft to function instead of being put in hibernation during times when the satellite is in the Earth's shadow.

SOVIET SPACE PROGRAM NEWS NOTES

The Soviet Union has successfully docked the Kvant-2 large building block module to its Mir station after trouble shooting a stuck solar array.

The Granat astronomy satellite was launched on December 1st. The largest instrument of Granat's high energy astrophysics astronomy payload is a French 3.5 meter coded-mask gamma imaging instrument.

MORE FROM THE COSMIC MIND BOGGLING BOOK

-NEIL MCALEER

HEAVY-HANDED

Sirius B, almost 9 light-years away from us, is an exceptional star - a white dwarf, the first of its class to be discovered. While it is just slightly smaller than the Earth, it contains so much matter that it weight nearly as much as the Sun. A handful of its matter would weigh about 500 tons.

DIAMONDS IN THE SKY

Some white-dwarf stars - at certain ages, temperatures, and densities - are probably composed of a crystalline form of carbon known as one of the hardest substances on Earth - diamonds, No doubt they would be the largest diamonds in the Universe, about the size of the Earth.

FIRMLY PACKED

After a supernova explosion, the star's compressed core remains - a neutron star (pulsar). A pinhead's worth of neutron star stuff would weigh about 1 million tons - over 10 times the weight of the aircraft carrier U.S.S. Nimitz.

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