

Figure 4.15
Second astronomical clock
of Strasbourg Cathedral,
1574. After an engraving by
Tobias Stimmer, *Archives
et Bibliothèque, Strasbourg*

ANNOUNCEMENTS!

MEETINGS

GENERAL MEETING - FRIDAY, January 5, 7:30 P.M. at Flandrau Planetarium
First half- Dr. Mike Lesser will give a talk on
"Evaluation of CCDs" and second half- Mr. Schaup
from Photometrics will make a presentation.

FRIDAY, February 2, 7:30 P.M. at Flandrau Planetarium
Saul Levy will give an "Insider's View of Astronomy"
AND James McGaha will speak on "Creation Science".

FRIDAY, March 2, 7:30 P.M. at Flandrau Planetarium
Dr. Carolyn Porco will present a talk on "Rings 'n Things
Voyager 2- Neptune Encounter".

FRIDAY, April 6, 7:30 P.M. at Flandrau Planetarium
Dr. Bill Robinson, founder of International Dark Sky
Association will speak on light pollution.

EXECUTIVE MEETING - THURSDAY JANUARY 11, 7:30 P.M. at Flandrau Planetarium.

STAR PARTIES - SATURDAY, JANUARY 6 at 6 P.M. Jupiter Observing Party at
Dean Ketelson's home.

SATURDAY, JANUARY 20 Empire Ranch Star Party
(alternate date in case of clouds JAN.27)

TAAA EXECUTIVE

President	Tim Hunter	299-2972
Vice-President	Dan Krauss	881-2639
Executive Sec.	Dick West	1-762-5831
Recording Sec.	Sharon Niehaus	883-4397
Treasurer	Terri Lappin	790-5053
Member-at-Large	Dean Ketelsen	293-2855
Chief Observer	Terri Lappin	790-5053
Past President	Duane Niehaus	883-4397
Desert Skies ed.	Dolores Hill	325-9820
Asst. ed.	Rik Hill	

MEMBERSHIP IN THE TAAA

Individual Membership	\$20.00
Family Membership	\$25.00
Senior Citizen (over 60)	\$18.00

Sky & Telescope subscription (optional) \$16.00

To become a member contact Treasurer, Teresa Lappin,
P.O. Box 41254, Tucson, AZ 85717 Phone: 790-5053

Desert Skies Publishing Guidelines

All articles, announcements, news etc. must be submitted by the 20th of the month.
Materials received after that date will appear in the NEXT issue.

All submissions are retained by the editor unless prior arrangements are made.

Articles, artwork, and photos should be camera ready. Photos should be screened.

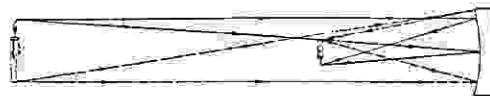
We will not publish slanderous or libelous material!

Send articles, announcements etc. to Desert Skies c/o Dolores Hill 4632 E. 14th St.,
Tucson, AZ 85711 (phone: 325-9820).

RAFFLERAFFLE***RAFFLE***RAFFLE***RAFFLE***RAFFLE**RAFFLE

A fund-raising RAFFLE will be held at the Jan. 6 meeting of the TAAA. Get ready and bring anything you would like to donate to the meeting! Items will be "auctioned off" to the highest bidder and proceeds will benefit the club. So, come one & come all to enjoy!

FOR SALE:



HEWLETT PACKARD 41CX Programmable calculator for sale - 41 Advantage, 25K, card reader, Navigation pack, 2 extended memory cartridges 7000K, TWELVE astronomical programs available (!).....asking \$250

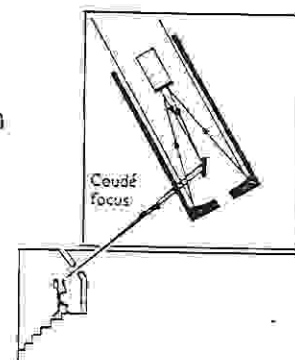
Call James McGaha at work 750-3034.

6" f/8 apochromat refractor made by Astrophysics Co., equatorial mount with setting circles (no clock drive), "Christian triplet"....best offer....

Call Gilbert Friedman 571-1662

Glass blanks (crown, flint) for 6" achromat \$150 O.B.O.

Call Bob Goff 790-1452



ANNOUNCEMENT OF TEFLON SUPPLY

Jack Herron has a supply of Teflon about 1/8" thick... If you need some call 885-6933.

*HELP**HELP**HELP**HELP**HELP**HELP**HELP**HELP**HELP**HELP*

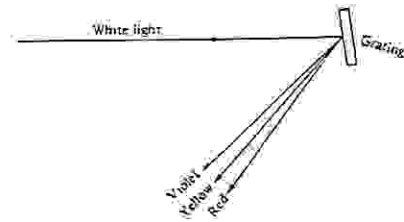
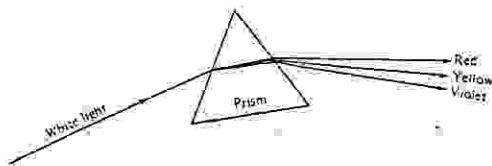
The TAAA is looking for PUBLICISTS to contact newspapers, television and radio stations regarding club meetings, star parties etc. Since this is a lot of work many people are needed to serve on a publicity committee. If you are interested please contact Dick West (762-5831).

WHAT NEEDS TO BE DONE:

At the November 9th executive meeting, Andy Meyers expressed an interest in helping with publicity for the association. We would still like a few more members to help out with telephoning television and radio stations. A few more members could help with mailing announcements out. Others could simply listen to the radio stations and let us know which stations are making the announcements. If you can help out, talk to Dick West, Andy Meyers or Teresa Lappin.

TAAA INFORMATION PACKET!

Our new members information packet needs some help. Terri would like to have someone write up a summary of the clubs events for the past year which would be included in the packet. This helps new members to get a feeling for what is going on in the club. Our last update on club activities was done in 1987. Contact Terri if you can do this project. It only needs to be a paragraph or two long.



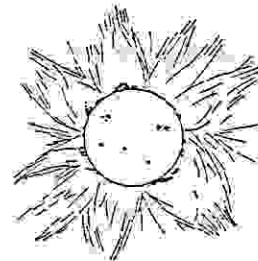
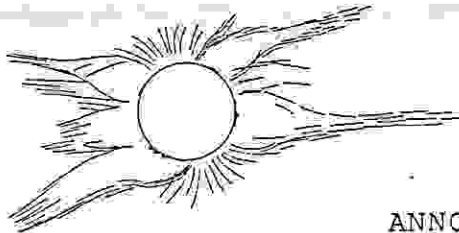
WANTED: Ideas for the TAAA FUND RAISING PORTFOLIO! Contact Tim Hunter at 299-2972.

TAAA MEMBER INTEREST QUESTIONNAIRE

In the next few months each member will be asked to fill out a questionnaire designed to serve as a source for sharing information on astronomical interests, special skills, occupations, and other items. Bob Goff will be looking for YOU at meetings to make sure we have full participation.

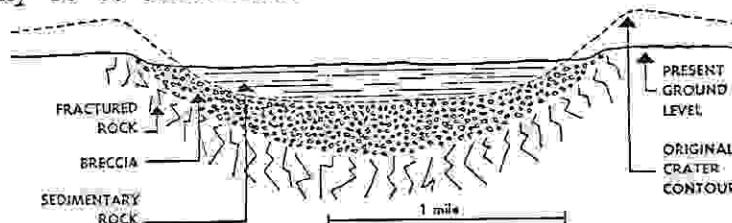
HELP! HELP! HELP! HELP! HELP! HELP! HELP! HELP! HELP! HELP!

The Association of Lunar and Planetary Observers - Solar Section is swamped with work. Most of it is of a secretarial nature. We are looking for an official ALPOSS Secretary whose duties would include answering mail and distributing the Handbook. This person would be fully credited for the position as an ALPOSS staff person in the Journal of the ALPO, The Strolling Astronomer. Interested persons should call Richard Hill at 325-9820.

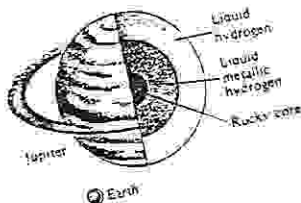


ANNOUNCEMENT

The observatories owned by Richard and Dolores Hill, located at 4632 E. 14th St., and formerly known as La Estrella Observatories, will, by permission of the University of Michigan, be henceforth known as the James Loudon Observatories in honor of Jim who passed away in January, 1988, at the age of 44. Jim was on the staff of the University of Michigan Exhibit Museum and was well known as a lecturer and space and astronomy popularizer throughout the Great Lakes region. He was well liked and is sorely missed. Formal dedication will take place in a future ceremony to be announced.



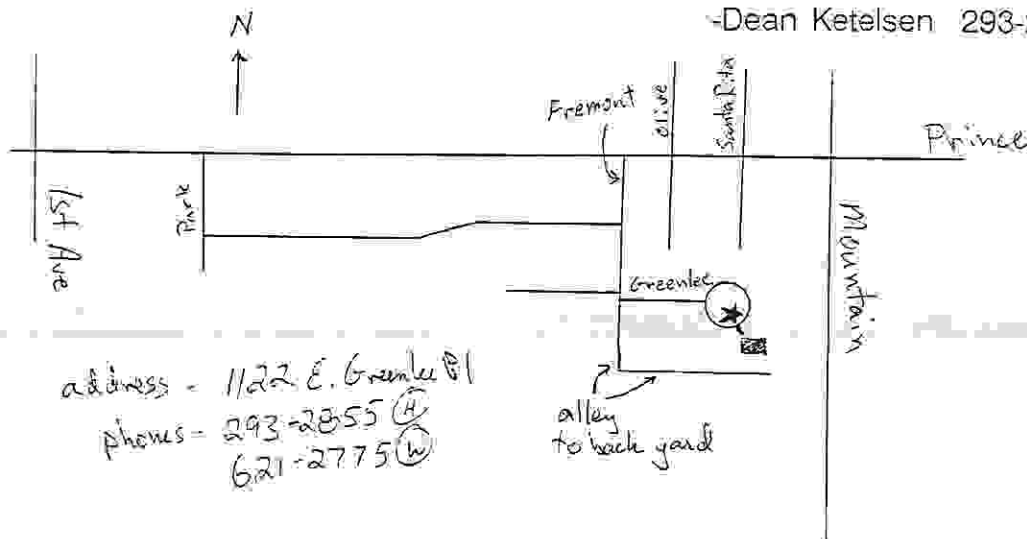
PERIODIC SUMMARIES OF THE Mt. GRAHAM INTERNATIONAL OBSERVATORY CONSTRUCTION ACTIVITIES ARE AVAILABLE FOR TAAA MEMBERS. IF YOU WISH TO RECEIVE COPIES OF THE WEEKLY UPDATES, PLEASE CALL KELLY MERRILL AT 621-3398.



Jupiter Observing Party

I am having a party for TAAA members interested in observing Jupiter on January 6, 1990. It starts at 6:00 pm, and you are encouraged to bring telescopes for observing Jupiter or the moon, which is just past first quarter. I thought I'd keep the same food format as last time - we will call in for pizza at 7:00 so if you are interested in getting in on the deal, please arrive or notify us by then. The cost for pizza was about \$4 per person last time. This is a good chance for new members to meet and observe with the rest of the club with various instruments without leaving town, so everyone is encouraged to attend. If cloudy, we can still talk about club affairs or show slides or watch a perfectly horrible science fiction movie - "Night of the Comet", which I unfortunately recently obtained. For those with telescopes - please park in the alley behind my house where you can unload directly into the back yard. See the map for details.

-Dean Ketelsen 293-2855



Kitt Peak Visitor Center, Box 26732, Tucson, Arizona 85726

Telephone (602) 620-5150

Kitt Peak National Observatory

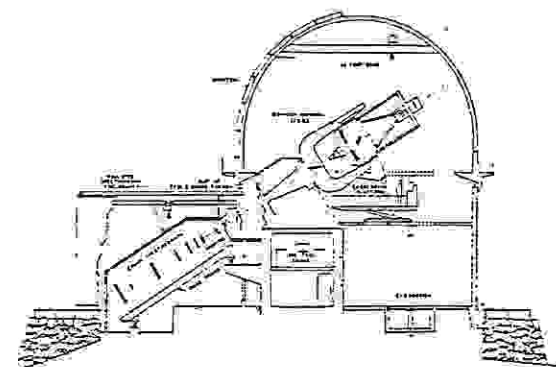
KITT PEAK PUBLIC EVENING SERIES
 FALL - WINTER
 1989

Date	Loading	Depart	Return By
Saturday, October 7, 1989	2:30 pm	3:00 pm	8Midnight
Saturday, November 4, 1989	2:00 pm	2:30 pm	8Midnight
Saturday, December 2, 1989	2:00 pm	2:30 pm	8Midnight
Saturday, December 30, 1989	2:00 pm	2:30 pm	8Midnight
Saturday, January 27, 1990	2:00 pm	2:30 pm	8Midnight

The above dates are the openings for the Fall/Winter Public Evenings.

The tours consist of a chartered bus ride to Kitt Peak, dinner on the mountain, a view of the sunset, and observation of the sky using several telescopes, including the 12.36" reflecting telescope. Staff members will be on hand to point out visible objects and answer questions. All viewing is weather dependent; in poor weather a behind-the-scenes tour of the extensive Kitt Peak facility is substituted. Bring your own picnic-style meal as there are no public eating facilities on the mountain. Please, no alcohol.

Forty-four (44) tickets per date are available, with a limit of four (4) tickets per person, at \$15.00 each. Tickets are available by mail, (use the address on the letterhead,) or they may be purchased at the Kitt Peak Visitor Center on the mountain. With each ticket you will receive a map for parking, a list of items you may want to bring along, and suggestions on what clothing to wear for comfort. If you have any questions, you may contact the Visitor Center at the telephone number listed on the letterhead. Once purchased, ticket prices are not refundable.



WARNING: Possible health risk to those with cardiac, locomotion or breathing problems. Please be aware that the summit of Kitt Peak is at 7000 feet of altitude. The tour involves considerable walking up and down of hills at this altitude. The observatories have no elevators and stairs are the only access; therefore, this particular group of tours is not recommended to those using wheelchairs.

Send your order by mail, indicating first and second choice tour dates, and a check for the full amount (\$15.00 each) made payable to: NORA, Inc.

Send to: Kitt Peak Visitor Center, Box 26732, Tucson, Arizona 85726.

We are currently updating our mailing list. If you wish to remain active on our mailer, please contact the Kitt Peak Visitor Center by mail or telephone.

VARIATIONS ON A THEME

by
Richard E. Hill

Cepheid variable stars (CVS) are a class of variable stars famous for their regularity of period and use as distance indicators. Originally the light variations of these stars were thought to be due to eclipses of two stars. It was difficult to explain the variations in this manner and as more stars were discovered with shorter periods it eventually became impossible. The hypothesis broke completely down when stars of such short periods were found that the smaller star would have to be orbiting within the atmosphere of the larger! From spectroscopic evidence it was easy to see that this was not the case. Just prior to World War I Harlow Shapley developed the first theory of stellar pulsation as his inaugural task at Mt. Wilson Observatory. These stars and the Delta Scuti, Beta Canis Majoris, RR Lyrae, Mira and Long Period variables vary their light output by literally expanding and contracting radially like giant balloons!

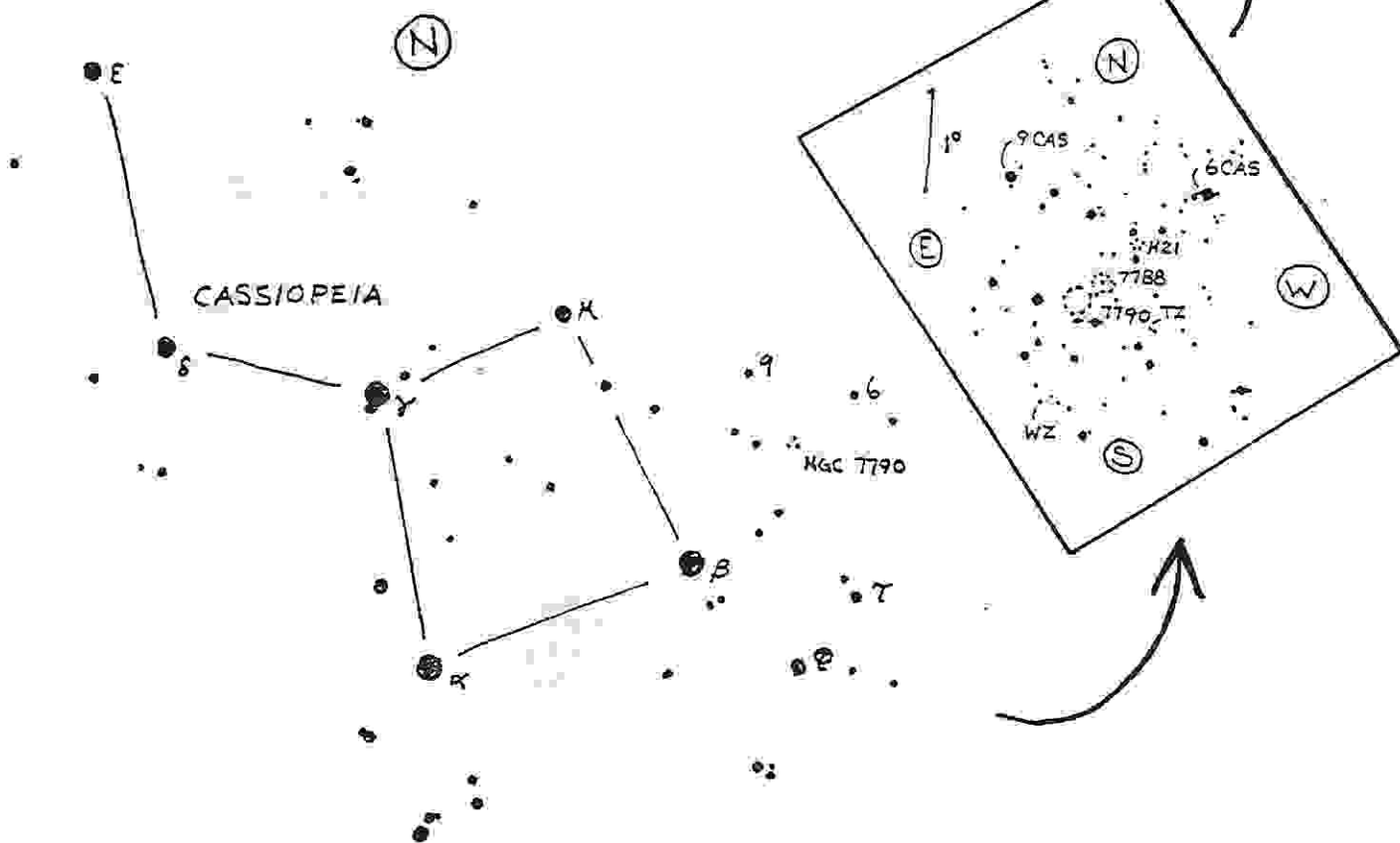
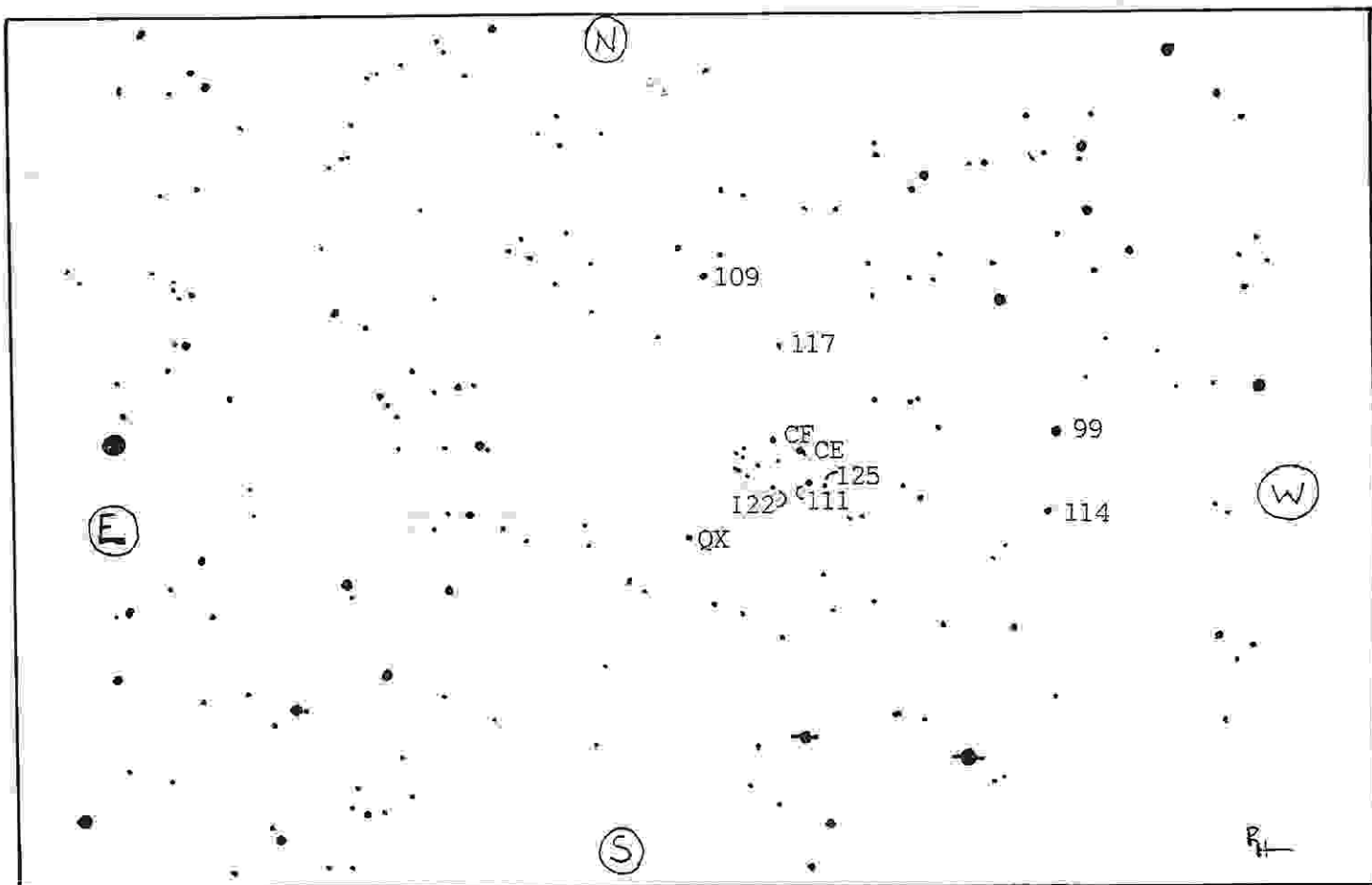
The fastest pulsating stars go through their cycles in less than an hour while the longest pulsations can take well over a year. In general, the longer the pulsation the greater the range of variation. (This is not a strict rule among the longer period stars.) In the middle are the Cepheids with periods of 0.5 to 50 days and amplitudes or ranges around 0.5 to 1.5 magnitudes. Here in southern Arizona, with our sufficiency of consecutive clear nights, an observer can make an observation of a Cepheid right after twilight and again just before retiring for the evening. After a few days of this (at least one period of the star) one would have enough data to plot a light curve. A light curve is a plot where the abscissa (horizontal axis) is time and the ordinate (vertical axis) is the star's magnitude or brightness. Such a plot can tell a lot about a star. With Cepheids there are a variety of light curves. They are characterized by a rapid rise to maximum brightness (in about 20 to 30% of the total period) followed by a slower decay to minimum. This decay can often have humps in it which are slight rises or "standstills" in brightness. These irregularities repeat themselves faithfully each period.

What makes Cepheids so interesting is the Period-Luminosity relationship. It was discovered by Harvard astronomer Henrietta Leavitt while she was working on the Small Magellanic Cloud in 1912. She noticed that Cepheid variables with the same periods had the same brightness. She could assume the stars were at the same distance since the distance between them was vastly less than the distance between the earth and the Cloud. This made it easy to see the relationship. These observed magnitudes of the stars could be readily converted into luminosities. Once this relationship was understood for the Magellanic Cloud then all one had to do was find another Cepheid nearby that had a period like one in the Cloud. The nearby star's distance can be determined by a number of time tested methods and it's brightness could be compared to the star in the Cloud. This would give us the distance to the Cloud in terms of the distance to the closer star. These stars can be used to determine distance where ever the period could be observed! Since their discovery they have been used to determine the distance to many nearby galaxies as well as clusters in our galaxy. A refinement was added when it was further discovered that the Population I stars (spiral arm stars) and Pop. II stars (in the central bulge and globular clusters) had different period-luminosity relationships. But this was just an adjustment that changed some distances a little. The basic premise remains the same to this day.

This leads us to the point of this essay. There is a small cluster in Cassiopeia quite near Beta Cas, that contains three Cepheids and one eclipsing binary. This cluster is NGC 7790 located at 23h58m by +61°2' (2000). All of the stars have maxima above 12th magnitude which may not seem bright but at my urban location (Broadway & Swan) I can observe all of these with a 6 inch f/8 Dynascope. For the uninitiated I would not recommend less than an 8 inch aperture and a 12 inch makes the job easy. The variable stars in the cluster are CEa, CEB, CF, and QX Cas. This latter star is the eclipsing binary varying from 10.5 -10.9 magnitude every 6.00471 days. CF Cas is a Cepheid that varies from 11.9-12.7 magnitude every 4.87513 days. The most interesting of all the stars is CE Cas. It is a binary (i.e. gravitationally associated) Cepheid variable! CEa has a maximum of 10.5 magnitude a minimum of 11.7 and a period of 5.14021 days while CEB, only 2.5 arc seconds to the west varies from 10.5-11.3 magnitude in 4.4792 days. There is a fainter star to the south of this pair that is constant. Accompanying this article are finder charts, and a close-up chart of the region. The numbers next to the stars are their magnitudes to the nearest tenth with the decimal point omitted.

This field is a lot of fun since there is always something happening. To get the most out of this you should first use a low power and estimate the brightness of CF, CEab, and QX using the comparison stars provided. (For excellent instructions on the various methods for making estimates see: OBSERVATIONAL ASTRONOMY FOR AMATEURS, by J.B. Sidgwick, Chapter 17. This is available as a Dover reprint now.) Next, crank up the magnification enough to clearly see both components of CE and estimate the brightness of each if you can. If not, at least note which is brighter and by how much. (See the Herschel-Argelander Step Method in the above named reference for a way to note differences.) Do this procedure several times a night for a month or at least a couple of weeks and you will see changes in every star. By estimating both the combined and then individual brightnesses of the two components of CE Cas you will gain an insight into the work that goes into unraveling complex compound light curves of unresolved binary variable stars.

So here is a project both interesting and instructional. I would be interested in hearing of your results if you make observations. If we generate enough interest in this field we may be able to convince the AAVSO to add this to their program.



One of the problems of human knowledge is that the world which we see from the surface of this planet on a sunny day bears almost no resemblance to the universe at large. Our Earth is made of iron and rock, but the universe as a whole is mostly hydrogen. The actions which we see on the surface of this Earth run mostly on sunlight, but the universe runs on gravity. What we see here are continents, oceans, rivers and lakes, mountain ranges, forests, tundra and prairies. But the universe at large is mostly gas, partly condensed by gravity to galaxies and stars and lightly sprinkled, here and there, with interstellar dust. The dust is made from hydrogen in the bellies of the stars, and scattered through the galaxies by the explosions and the stellar winds of stars much bigger and much hotter than our Sun. But the dust is scarce, and, like our bodies, the rock on which we live is made of these dusts. It is a collector's item. The heavier elements, such as iron, have sunk to the center, overlaid with the rocks of the mantle and the crust and a thin veneer of water and gas. Since the age of this museum piece is pushing five billion years, by now the water soluble compounds of the surface rocks have leached into the water layer, making the oceans salty. The saltiness of our blood is the saltiness of the ancient sea, some four hundred million years ago. That is when our sooty ancestors, on stumpy fins, crawled out across the land in search of other water and the sight of other fish. Descended as we are from them, we can think of our bodies, even now, as little bags of sea water, hung out on clotheslines of bone, gulping oxygen directly from the gas layer above us, and shambling out across the rocks to gaze with starry eyes, through the blackness of night, at the vast expanse of the universe beyond.

Even the oxygen which we breathe is freed by sunlight, through the instrumentality of our photosynthetic relatives, first by the blue-green algae in the sea, and now by the green leaves of the rain forest. Even the rain is driven by sunlight. But the universe at large has a reducing atmosphere, and it is without rain and without sunlight. It is very cold, very dark and very lonely, trying desperately to fall together by the seemingly inexplicable attraction of the particles for each other. Even the radiation of the Sun is driven by this attraction. It has pushed the central temperature up to some fifteen million degrees Celsius, and it is only because its gravitational collapse has been slowed by the nuclear fusion at its core that the Sun has bathed our Earth with its warming rays for nearly five billion years. Only this delay has made possible our long genetic development till we were able to climb out of the water and gaze in wonder at the starry sky of night. Although we, as living organisms, owe both our existence and our long genetic development to the Sun, its dazzling brightness prevents us from seeing the universe by day. The blueness of the daytime sky is not the color of the air, but simply the shorter wavelengths scattered from the sunlight by the gas layer above us. And that gas layer by night, unlit by the Sun, is sufficiently transparent so that through it we may gaze into the far reaches of the universe.

Because of this unfortunate discrepancy between what we see here by day and what we can see by night, some of us, with the willingness to serve, have banded together to help make it possible for other human dwellers on this planet to see the universe at large through telescopes at night. It is for this purpose that those who call themselves the San Francisco Sidewalk Astronomers have banded together. In order to increase the amount of equipment available for this effort they help and encourage others to build large, portable telescopes, and they get their own large telescopes out for public use on the sidewalks of the cities, and in the state and national parks. They have been once to Mexico and once to Canada, and now they are invited to India. Who knows, China may be next?

The human population of this planet now numbers in the billions; so the problem of making it possible for all those people to see and understand the universe in which they live has reached staggering proportions. If there were a thousand groups dedicated to this service, or a million Sidewalk Astronomers, world wide, they might tackle the problem with some hope of success. Billions of eyes are waiting. Let those who are willing do what they can!

Although the Sidewalk Astronomers, as a group, was founded only fifteen years ago, John Dobson, often referred to as the founder, had already been engaged for a decade earlier in making telescopes for public service. It had remained a low profile operation since at that time he was living as a novice in a monastery, and telescope making was not on the curriculum. It was a Vedanta monastery, of the Ramakrishna Order, well known in India for its splendid famine relief, flood relief and medical relief among the needy, and for its work in education. He made telescopes surreptitiously, grinding the mirrors on discarded ship's windows and the bottoms of gallon jugs. Sometimes he ground them with sand and polished them with rouge which he had to make himself from garden supplies available in the monastery. Some of those telescopes are still in use. Most of them were twelve inches, six or seven feet long, mounted on what are now known as "Dobsonian" mounts. They were wheeled from house to house on old rusty wheels from children's discarded wagons. He would wheel a telescope down the street till some child asked what it was. "It's a telescope," he would reply, "Do you want to borrow it?" Usually the answer would be yes, and they would look for a garage where he could leave it for a month, so the people in the neighborhood could use it. Often he would sneak out of the monastery at night to help operate the telescope and to explain to the viewers what they were seeing.

One of the telescopes which he had made, while still in the monastery, was an eighteen inch, with a nine foot focal length. Although it is now known as "The Little One," it was a bit too big to wheel conveniently around the neighborhood; so he left it in one place and rode through the streets in the evening, on a bicycle, inviting people to come and look through it.

Soon some of the older children wanted to make telescopes of their own, and they came to him for help. He couldn't turn them down, even though he feared that it might lead to the termination of his stay in the monastery, which it eventually did. But by that time there were a dozen twelve inchers in the neighborhood, and John was known to the neighbors as the "Pied Piper."

Born and raised in Peking, China, John was brought to San Francisco by his parents in 1927, at the age of twelve. He is a grandson of the founder of the Peking University. Having graduated in chemistry from the University of California at Berkeley, and having worked in the Lawrence Radiation Laboratory there, he joined the monastery in 1944. By the time he left, in 1967, he had been transferred by the monastery to the Sacramento area to help with the building of a Vedanta Center. After leaving the monastery, he returned to San Francisco. Then, with the help of a friend, he brought one of his twelve inch telescopes from

Sacramento and, with it, he became a fixture on the sidewalk at the intersection of Jackson and Broderick streets in San Francisco. In those days it was known all through the Bay Area that if you wanted to look through a telescope, you went to that intersection on any clear night. Many thousands of people came to see Jupiter, Saturn, the Moon or Venus, and a few more distant objects far beyond the companions of our Sun.

That old twelve, with a ten and a half inch called the "Psychedelic Giraffe", became the first two work horses of the Sidewalk Astronomers. They were soon joined by Brian Rhodes' sixteen inch and John's eighteen, and then by the twentyfour which the two of them built together. It took then only nineteen hours to grind and polish the mirror, and only three months to finish the telescope and have it free-way portable. The mirror was made from a navy porthole glass, about twentyfour and a half inches in diameter and one inch thick at the edge. The whole telescope weighs some six hundred pounds and, except for the tube and the mirror, it rides on its own trailer. By the time it was finished, both John and Brian were driving vans, either of which could haul the trailer and carry the tube inside, if the back doors were kept open. The telescopes travelled like this for several years, and about thirty thousand miles, in public service. Then, for several hundred dollars, they bought a 1952, forty passenger, school bus which they called "Starship Centaurus A". Brian took out most of the seats, and built beds for the telescopes, in transit, and for the crew, at the observing sites. Although the old bus was noisy, and objected to going more than fifty miles per hour, it had a large capacity and hauled the telescopes and crew for another twenty thousand miles before it broke down on the way back from Grand Canyon National Park in 1978. The telescopes and crew now ride in a motor home which the L. J. and Mary C. Skaggs Foundation bought for them. It doesn't have the capacity of the old bus, but it is much quieter and much more comfortable. It was largely through the generous help of the Skaggs Foundation that the Sidewalk Astronomers were able to visit the South Rim of the Grand Canyon again in 1980, and to tour eleven national parks in 1981.

Some might wonder why the Sidewalk Astronomers go to such trouble and expense to transport the telescopes so far from park to park. It is simply because the universe at large can no longer be well seen from the cities. Just as the Sun's light is scattered by the atmosphere by day, just so the light from the cities is scattered by the atmosphere by night, making it virtually impossible to get a good view of the universe beyond the confines of our little solar system where the objects are both close and lit by the Sun. In order to see into the depths of the universe, it is necessary to get both the telescopes and the observers to the mountains, or at least far from the glow of city lights. Within the national parks there are many suitable places, high above sea level and far from city lights, that are visited by millions of people each year. That is why the Sidewalk Astronomers take their telescopes there whenever they can afford to do it.

They have been many times to Death Valley National Monument, and to Glacier Point in Yosemite National Park, and last summer, with the help of the Skaggs Foundation and the B. R. Macmillan Planetarium in Vancouver, British Columbia, they took their telescopes to Canada. By now, more than a million people have looked through them, but that is only a drop in one of many buckets. Compared to India or China, the United States is a small country, yet even there less than one percent of the population has had the opportunity to use the telescopes. Billions of eager eyes are waiting.

But seeing alone is not enough. It is only the beginning. We must also understand what we see, and that has a history. Understanding rests on a foundation of concepts and information coming down to us from the past, albeit not the very distant past. It is not from the first few hundred million years after we came ashore in the swamps to look around, because in those distant days and nights the concepts which we framed, and the information which we gained, could not be transmitted from generation to generation. We lacked a mechanism to transmit it. It is not transmitted genetically, and there were then no words. The written word, by which concepts and information are largely transmitted in what we proudly think of as the "Age of Science", are only a few thousand years old. And vocal speech, itself, is fairly new. It was probably forced upon us by the failure of our body language in the surf when we, as brachiating primates, were driven by drought from the jungles to the beach, not more than ten or fifteen million years ago. And even the body language common to the Great Apes, and easily understood by the orangs, the gorillas, the chimps and ourselves, is less than fifty million years old. Our great gain in those earlier times was in our genetically transmitted capabilities. By the early demise of those with poorer eyes, we gained our visual acuity, and by the early demise of those with smaller brains, we improved our capacity to understand. It is that capacity which sets us apart amongst the watchers of the skies.

[This was written in response to a request from Shanghai for information about John Dobson and the Sidewalk Astronomers to be published in a magazine in China.]



THE SAN FRANCISCO SIDEWALK ASTRONOMERS

1600 BAKER ST. - SAN FRANCISCO, CALIFORNIA 94115

(415) 567-2063

1801 Golden Gate Ave

CELESTRON PHOTO CONTEST



Celestron is sponsoring a photo contest for entries taken with Celestron products in the following 8 categories:

ASTRONOMICAL PHOTOS

(Color or B&W)

Moon
Planets
Sun
Deep Sky
Unusual (comet/eclipse, etc.)

TERRESTRIAL PHOTOS

(Color or B&W)

Sports/Action
Wildlife/Animals
People and/or Unusual

Three prizes per category:

1st Prize:	\$300.00
2nd Prize	\$100.00
3rd Prize	\$ 50.00

Deadline for receipt of entries:

April 30, 1990

Winners chosen:

May 31, 1990

Photos submitted may be used for Celestron advertising and promotional purposes. For additional information, contact:

CELESTRON INTERNATIONAL

2835 Columbia St.
P.O. Box 3578
Torrance, CA 90510
(213) 328-9560
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8am-4pm Pacific time)

ENTER TODAY!!!!

CELESTRON PHOTO CONTEST INFORMATION

1. All photos must be taken with Celestron equipment (any size or design).
2. Deadline for receipt of photos is April 30, 1990. Winners to be chosen May 31, 1990.
3. Any photo submitted may be used by Celestron for advertising or promotional purposes.
4. If you wish to have your photo(s) returned, include a self-addressed envelope with your entry. Celestron can not be responsible for damaged or lost entries.
5. Include your name, address and daytime phone number on the back of all photos.
6. Slides or prints are acceptable.
7. Photos of people must include signed model release form.
8. Each photo submitted should include:
 - a) Model of Celestron used
 - b) Serial # (if possible)
 - c) Approx. date purchased
 - d) Film used
 - e) Exposure time
 - f) Where taken
 - g) How taken
 - h) Other relevant info.
9. A panel of judges chosen by Celestron will select winning entries.
10. Entries to be judged on quality and (primarily for astronomical photos) difficulty. For example, a shot of Saturn taken through a 4" scope may be judged better than a good shot taken through a 14" scope based on difficulty.
11. Send all entries to:
CELESTRON INTERNATIONAL
Attn: Photo Contest
2835 Columbia St.
P.O. Box 3578
Torrance, CA 90510
12. Winners will be notified by mail.
13. Employees of Celestron and their families are not eligible.
14. Enter as often as you like! (Limit of 5 entries per category.)

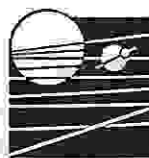
EYES ON THE UNIVERSE

"Eyes on the Universe" is a continuation of the Steward Observatory Public Evenings begun in 1922 by A. E. Douglass, the first professor of astronomy in Arizona. This series presents a wide range of topics, from astronomy and space science to space exploration. Guest speakers from a variety of disciplines also explore the relationship of astronomy to the arts and humanities. This forum includes monthly seasonal sky programs ideal for the backyard astronomer who wants to feel at home with the visible heavens. Explore the planets, locate the constellations, and learn about other wonders of the universe that can be viewed with the unaided eye.



STEWART OBSERVATORY

Founded in 1916, the Steward Observatory conducts research at the forefront of modern astronomy using telescopes located at a variety of sites in Arizona including Kitt Peak, Mt. Hopkins and the Catalina Mountains. With the Smithsonian Astrophysical Observatory, Steward Observatory operates the world's first Multiple-Mirror Telescope, presently the third largest optical telescope in existence.



LUNAR AND PLANETARY LABORATORY

An interdisciplinary research center aimed at understanding the origin of the solar system, the formation and evolution of the planets, and a variety of related phenomena. Detailed laboratory analyses, astronomical observations, and spacecraft-based instruments (as well as theoretical studies) are brought to bear on these questions. Many of the Laboratory faculty play major roles in the U.S. space science program.

GRACE H. FLANDRAU PLANETARIUM



Since its dedication in 1975, Flandrau Planetarium has become one of the major planetariums in the country. This unique facility provides specially designed programs for over 100,000 visitors annually. The Planetarium Star Theater transports its audience through time and space using the Minolta star projector, a high quality, multi-channel sound system and all-sky Atmospherium films. In addition, science exhibit halls provide challenging and memorable experiences. Touch a meteorite older than the Earth, study the solar spectrum, promenade along the Milky Way, manipulate light, and examine moon rocks all in a single day.

FLANDRAU PLANETARIUM

THE UNIVERSITY OF ARIZONA

CAPTURING THE COSMOS: THE ART OF ASTRONOMY and THE MAGIC EGG (August 29 - January 7)

8:30 p.m. Tuesday
7:30 & 8:30 p.m. Wednesday through Saturday
1:30 & 3:30 p.m. Saturday & Sunday

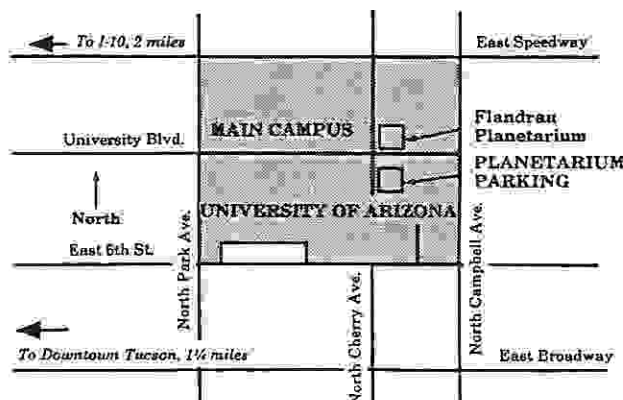
STAR OF WONDER (November 24 - January 7)

7:30 p.m. Tuesday (December 19 - January 7)
7:30 p.m. Wednesday through Saturday
1:30 & 3:30 p.m. Saturday & Sunday

FAMILY LASER SHOW

2:30 p.m. Saturday & Sunday
All seats \$3.75

Program Information: 621-STAR
Planetarium Offices: 621-4515



Planetarium Parking. Evening parking for Planetarium visitors is provided just across University Boulevard to the south at no charge. Additional street parking is available nearby to the north and east.

Museum Hours

Monday - Friday 9 am - 5 pm

Astronomy Store Hours

Monday 1 pm - 4 pm

Tuesday - Friday 10 am - 4 pm

Saturday & Sunday 1 pm - 5 pm

Tuesday - Saturday 7 pm - 9 pm

Public Telescope Hours

Winter 7 pm - 10 pm
Summer 8:30 - 10 pm

The 16-inch telescope is open to the public on clear nights.

Stellar Vision & Astronomy Shop

Tucson's Complete Astronomy Shop

Carries:

Telescopes, Binoculars, Books,
Star Map, Moon Maps,
Posters & Accessories.
Special orders welcome.

A complete selection of telescopes
for beginners or the professional.

In all price ranges by:

Celestron

Tele-Vue

Takahashi

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VISA

1835 S. Alvernon #208
Alvernon and 29th area.

Showroom & Astronomy Shop Hours:
Monday-Saturday 10-6:00
Sunday by appointment only

571-0877