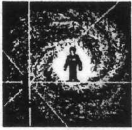


# The Dark Sky Observer



A publication of  
The North Jersey Astronomical Group



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## An Open Letter from Mike Lynch to the NJAG Membership

As I have accepted a position with a company in another time zone, I regretfully must vacate my position as co-chairman of the Computer Committee with NJAG. Let's face it, it'd be a miserable commute.

I've been a member of NJAG for only one and a half years, and it dawned on me that I could make a few (terrestrial) observations about the club. After all the first sentence of this letter told you that you won't be seeing me there any more, so everything else you read here is simply being written to fill up the page (and because I think it needs to be said). It's been an honor to have known and be associated with a group of people such as yourselves. The club is laid back, yet quite organized. There is a large core group that keeps things running smoothly. Statistically, 10% or less of the people in an organization would (voluntarily) get involved in running it. Instead, you've got more than twice that. And what amazes me is that this core group is fluid. It's always different people getting involved. Granted, one can always find certain familiar faces there every week, but there's an equal number of newcomers and/or not as active members there as well. So you find a wide range of talent and interests.

In the movie "Starman", the alien was asked what he had observed about people. He summarized it all to one sentence and it applies to NJAG. He said, and I feel "You people are at your best when things seem at their worst." NJAG is a GREAT club. Be involved in it. Go out and observe, even if it's just picking out constellation borders. You don't know what you're going to miss until you can't do it anymore.

Take care

Mike

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## LAST MEETING

The last meeting of the N.J.A.G. was called to order at 8:10 p.m. by president Glenn Burke and was attended by 18 members and 2 guests. The minutes from the previous meeting were read by Grace Casalino for Julie Conroy and accepted.

Corresponding Secretary, Dennis Koenig reported that he will begin sending copies of our newsletter to other astronomy clubs as well as Astronomy Magazine.

Treasurer, Ruth Koenig reported a balance of \$593.16. Vice President, Grace Casalino reminded members that the NJAG will be represented by herself and Glenn Burke at the convention held at Kean College this year for teachers of science.

The Astrophotography committee had no report.

The Computer committee reported that the modem is on line and a bulletin board service is hoped to eventually be set up.

The Darkroom committee reported that the slide copier is still on back-order, but a letter has been received and it should arrive within 30 days.

The Education committee reported that the spring semester astronomy class has been cancelled due to low enrollment.

The Membership committee reported reported a current membership of 65 members. Members were reminded that dues for those who joined the club during the months of February and March are now due.

The Newsletter Committee reported that the second edition of the DSO is out and asked for contributions and suggestions. A suggestion was made from the floor to number the pages of the DSO. Glenn Burke asked all members to contribute to the newsletter. Members were reminded that the newsletter is a product of the club.

The Observation committee detailed the upcoming "Messier Marathon". As an exact date has not yet been picked, Members were urged to call the answering machine for more details. Any member wishing to qualify on any of the scopes should see Glenn or Dennis.

The Program committee reported that a trip to

the Hayden Planetarium is in the works.

The Project committee reported that an attempt to make a full size ceramic tool for the 12" mirror was a complete failure. An attempt is being made to correct the problem. Anyone with an idea for a scope to house the mirror should contact Roger or Joe.

Glenn Burke explained the Stellafane trip to members and mentioned that a side trip to the Adirondaks is being considered. Anyone interested in attending should contact Glenn.

John Miksits announced that two new books have arrived and will be placed in the library.

Angelo Restivo informed the group of a type of battery he purchased for about \$10.00 that, when used with two in series, can power a scope and dew cap for an evening.

Glenn Burke announced that the hand pump for the hypering chamber has cracked and he would like to replace it with a reasonably priced electric vacuum pump. Anyone with information about obtaining one should see Glenn.

The meeting was adjourned at 8:40 p.m.

### Stars

by Sara Teasdale

Alone in the night  
 On a dark hill  
 With pines around me  
 Spicy and still,  
 And a heaven full of stars  
 Over my head,  
 White and topaz  
 And a misty red;  
 Myriads with beating  
 Hearts of fire  
 That aeons  
 Cannot vex or tire;  
 Up the dome of heaven  
 Like a great hill,  
 I watch them marching  
 Stately and still,  
 And I know that I  
 Am honored to be  
 Witness  
 Of so much majesty.

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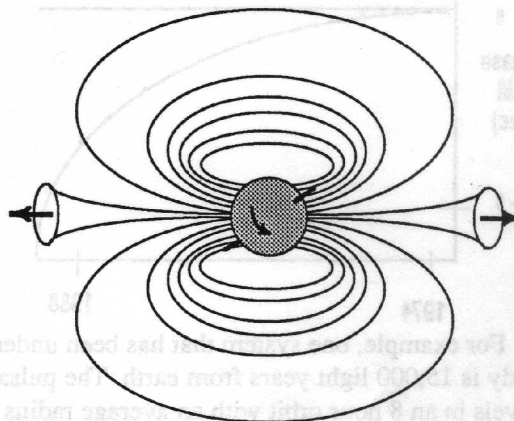
## Millisecond Pulsars

by Jim Beirne

One advantage of being a Physics teacher is that from time to time you get together with others of your kind and entertain each other with fascinating lectures and demonstrations. On March 11th we met at Princeton University for a full day conference. One of the speakers was Joe Taylor, a Princeton Astrophysicist who specializes in binary pulsars. I'll forgo the math and equations and try to give you a brief summary of his talk, "Binary Pulsars and basic Physics"

A pulsar is created when a star that is about eight times the size of our sun explodes into a supernova. About 90 percent of the material blows out into space, the rest explodes inward, crushing electrons into protons to form neutrons. The resulting neutron star has about one and a half solar masses and is approximately ten miles in diameter. This star has a density on the order of an atomic nucleus, about  $10^{15}$  grams/cm, it is a giant model of the nucleus of an atom, and many atomic physicists can test what is happening in the nucleus of atoms by studying neutron stars. There is a very powerful magnetic field associated with a neutron star about  $10^{12}$ , (earth's field is about 1 Gauss) this is due to the fact that it is a superconductor and that it is rotating at tremendous speeds. All normal stars have some inherent spin. When it collapses to a small fraction of its original radius it speeds up, just as an ice skater does by pulling mass closer to the axis of rotation. Since there discovery in 1967 there have been over 500 pulsars discovered with rotation rates between 4 and 642 cycles/sec this translates to 1/4 sec and 1.55 milliseconds respectively.

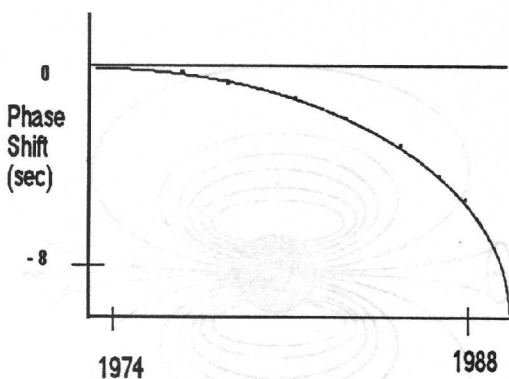
All pulsars are neutron stars but not all neutron stars are pulsars! The reason we can "see" pulsars is that in the outer regions there exist various ions, electrons and other "impurities", they get trapped by the magnetic field and are forced into oscillation at the pole regions. To make a electromagnetic wave all you have to do



is to take a charged particle and shake it! The resulting wavelength depend upon the frequency of the oscillation. It seems that pulsars are emitting a beam in all wavelengths along the poles of their magnetic fields like a lighthouse in space. As the diagram shows the spin axis is not necessarily lined up with the magnetic axis. The strongest emission seems to be in the radio part of the spectrum, so giant radio telescopes are the instruments of choice when you wish to observe pulsars.

It seems that this emission of energy along with a spin down torque created by the magnetic field slows the pulsar down. Minute variations in the pulse rate can be detected when the pulsar is studied over a long enough time interval. This requires a tremendous amount of calibration of equipment and amazing attention to detail in the calculations. When the period of rotation goes below a certain value the pulsar can "turn off" its beacon and become just a regular neutron star.

Professor Taylor is interested in a special breed called binary pulsars. Many stars are part of a binary system, so it is not surprising to find that some pulsars have regular star companions. It seems that the pulsar is taking in mass from the companion star and is not slowing down but is instead speeding up! The fastest observed pulsars have all been of the binary variety.



For example, one system that has been under study is 15,000 light years from earth. The pulsar travels in an 8 hour orbit with an average radius of 1 million miles. Due to its radial velocity a doppler shift in the pulse rate of 1.5 microseconds can be detected. This information yields accurate details of the orbital elements of the binary pulsar system. To be as accurate as possible the observed red shift has been corrected for the motions of the earth and the general relativistic effects of the other planets, the asteroids, as well as the phase of our moon. Did you know that all the clocks on earth slow down slightly during a full moon! The masses of the components has been found to be 1.44 and 1.38 solar masses, well within the Chandrasakar limiting mass.

This system has been under observation since 1974, a graph of change in phase shift caused by the decay of the orbit shows that the orbit decays at the rate of 1 millimeter per revolution !

At the end of the lecture Professor Taylor enthusiastically shared with us some cassette tapes he made at the radio telescope at Aricebo PR of various pulsars. The slower ones give off a clear whoosh - whoosh noise while the fastest sound more like a kitchen blender. It is hard to imagine something that massive whizzing around that fast.

When the subject of the 1987A pulsar came up, Professor Taylor was skeptical of the measurements of a rotation rate of nearly 2,000 cycles/ second. This rate would be beyond the theoretical breakup point. If the observations hold up we are going to have to reevaluate our theories of atomic nuclei and pulsar dynamics. Only time will tell.



## Astronomy News

### Worlds Largest Telescope Under Construction

by Paul Yorlegg

Scientists at the University of California in San Diego have designed a telescope that will out do all of the other scopes built thus far to date. This scope will use the refracting effect of the gravity of a black hole, that will be put in orbit during the next space shuttle mission.

George Epstein, an astrophysicist at UCSD, explains that a system to create and contain low gravity black holes on earth has been developed by a group of students. The black hole is created by using six particle accelerators together. The six are set up to direct streams of electrons at a point from all four sides and the top and bottom. When five electrons converge on the one point simultaneously a new particle is created that is not yet named.

The reason for the sixth accelerator is because of the infrequency of all five coming together. It took two weeks of constant running to get the first one to occur. Using five could, theoretically, take years.

The particle that is produced is extremely unstable and disrupts the space time continuum. It can only exist for several minutes in normal space then as it explodes into gamma radiation, it tears a hole in space itself, causing matter from everywhere in the universe to be sucked into the one space. Enough matter is pulled in and collapses into a black hole. The particle must be transferred into a magnetic field produced by 100,000 volts being run through a superconducting coil in order to prevent it from sucking in all the matter on earth.

There are now three black holes being stored at the Jet Propulsion Labs in Pasadena, but their focal lengths are too short for a geostationary orbit.

The gravitational effects of the black holes will cause light to be bent around them and focus on the surface of the earth. Therefore the focal length of the scope will be exactly

22,300 miles which is the distance of the geostationary orbit it will be launched into. Its effective diameter will be just over 1000 miles, giving it a ratio of about  $f/21$ .

Oculars are now being ground to get images at 10,000 power from an earth based observatory, a Naglar Type 5! The observatory will need to be mobile in order to keep a single object in the scope without moving from the field. It will be limited to objects located near the celestial equator. Scientists hope to learn more about the origin of the universe by observing farther reaches of the universe using these extremely high magnifications.

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**A VISIT TO AMATEUR ASTRONOMERS INC.,  
CRANFORD, NEW JERSEY**

by Ruth Koenig

On Wednesday, March 15, at Rifle Camp Park, Doug Nicholson mentioned that the Cranford Club was having a meeting on Friday, March 17 with a guest speaker on Deep Sky Observing. Just having been out on Friday, March 10 for the Messier Marathon, I thought this would be an interesting talk, so I went around and asked who wanted to go.

We arrived at Union County College at about 7:20 after sitting in typical Friday night traffic on the Parkway. We found our way to the lecture hall supposed to be held only to find darkness and just a handful of people. However, after a short time, Doug Nicholson introduced us to Karl Hriko, AAI's secretary. We were greeted very cordially and stood around and chatted about astronomy. Finally the doors opened and our group of ten NJAG members found seats. Before the talk, AAI conducted their business meeting. It was quite interesting to sit and watch another club conduct their business meeting. Theirs was very similar to ours, but seemed much shorter.

Then came the guest speaker, Mr. John Marshall, past president of Amateur Astronomers Association of New York. He showed slides of the skies of the different seasons. Mr.

Marshall recommended to anyone just starting out to buy a pair of 7x50 binoculars instead of a telescope and first learn the "road map of the sky". He went on to talk about how to find some Messier objects by using "bent lamp shades", "Indian Arrowheads", "ladders" and several other formations of his imagination. Sound familiar? After the lecture we all moved over to Sperry Observatory where coffee, tea, hot chocolate, cake and doughnuts were served. In the observatory they have a 24" in one dome and a 10" refractor in the other. Unfortunately, we did not get to see the 10" refractor because it was closed for repairs to its clock drive. Since the sky was partly cloudy we only got to see the moon in the 24". After checking out the telescope and dome, other members of the Cranford club came over and chatted with us and we all enjoyed comparing notes about our clubs. Even though we had to battle the GSP traffic and got a little clouded out, I think the trip was worth it and we should visit some other clubs in the future.

☆☆☆☆☆☆☆☆☆☆

**THE FAR SIDE**

By GARY LARSON



All day long, a tough gang of astrophysicists would monopolize the telescope and intimidate the other researchers.

## **OBSERVATION COMMITTEE REPORT** **The 1989 NJAG Messier Marathon**

by Glenn Burke

Last year the N.J.A.G.'s first annual Messier marathon ended in a West Milford field on a cold March evening, the finish line not in sight. Angelo Restivo and I were the only participants, but we came up short as clouds rolled in. Our combined total of objects was about 60 or so, far short of the 110 objects in the Messier catalog. We vowed to return next year and finish the race.

The prospect for the running of the second annual Messier Marathon looked pretty good. The weather for the period of March 10th into the 11th was predicted to be clear and cold. For a change the forecasters were right on both accounts. I was the first to arrive, battling Friday night commuters on Route 23 (a marathon in itself I assure you). as I drove into the the field I could see that the marathon would be run on snow. While the sky was still somewhat blue, I bagged the Andromeda Galaxy, M-31 and it's companion M-32 and M-110. Jim Beirne then drove in and the race was on! He and Angelo extolled the virtues of using setting circles in finding objects. I like to think of the use of setting circles in these terms; Think of driving across the country to see the Grand Canyon, but putting a bag over your head during the trip, only removing it when arriving at your destination. In my opinion star hopping is best. Not only do you get to see the object you're looking for, but you get to see a lot of things along the way.

By the time I was going for M-74 in Cetus, many members were starting to arrive. One of our new members came in with her headlights on. She was met with a chorus of reprimands, but none of us had realized that she had not been told ahead of time to dim her lights when entering the field. The friendly countenance of some of our members changes like Dr. Jekyll to Mr. Hyde when hit with white light while observing. When everyone arrived, we had 17 people and 10 and 1/2 telescopes. You might ask how we

could have 10 and 1/2 telescopes. Our good editor, Roger Sudol, had been preparing for the Messier marathon for days, and even arrived early. But shortly after he arrived, I heard this gut wrenching "oh nooo". He had brought his telescope, but left the tripod legs at home. Later Roger would remark in a typical fashion, "Just wait till next year!"

The actual race was lost early on. After finally barely detecting the galaxy M-74, it was too late to get M-77 in Pisces. This galaxy slipped over the horizon, unobserved by anyone. Undaunted, however, we pressed on. By 9:00 I had bagged 30 objects and was far ahead of Angelo, who had arrived late, and was closely pursued by Jim Beirne. Not all present were in the race. Mike Koenig was busy testing his newly acquired Polaris mount, which he had bought from some sap for an outrageously low price. Mike was so busy, in fact, we thought he had frozen solid at his mount. We were afraid he would still be there in the spring, frozen in a block of ice. Since Roger had only half a scope, he helped Sal find objects in Gemini with his C-8. Doug Kittredge was busy trying to complete his quest of finding every object in the northern sky. Dennis Koenig in usual fashion was scurrying from scope to scope, while trying desperately to find some thing through his own. I never did find out how he made out. I didn't have the time because ahead of me lay the dreaded Virgo galaxy cluster.

With the use of setting circles, Jim and Angelo passed me by in the cluster. I had forgotten my route in. There are very few bright stars in the cluster, so star hopping is virtually impossible. I had to forget about the finder and galaxy hop through the main scope. The 14 was great at seeing dim objects, but that very ability made getting through the Virgo cluster even harder. Besides the 10 or so Messier galaxies in the cluster, there are hundreds of NGC galaxies. At times I would have 7 or 8 galaxies in one eyepiece field. I had to make a tactical retreat from the cluster and try again. In the meantime, Jim had dropped out of the race because he had a physics teachers conference at Princeton early the next morning. Angelo had some bad coordi-

nates on some objects in the cluster that he couldn't find. Not at the mercy of incorrect coordinates I was able to catch up to Angelo and emerge from the cluster, somewhat disheveled but intact.

It was now about 11:30 and everyone was either already gone or about to leave. I was just ready to embark on the second half of the marathon. My parka was still in reserve and I felt refreshed after having some of the iced tea that Alan Koenig gave me. (Unfortunately I later lost my supply of iced tea because it froze solid in my cup.) This only served to strengthen the conviction that I am slightly unbalanced. This left only Angelo, Doug and I, the die-hards. Doug was bogged down in the Virgo cluster and only emerged early in the morning, a shaken individual. Angelo and I continued to pursue M objects down toward the eastern horizon. With his setting circles, Angelo had the annoying ability of finding objects just above the horizon, between the branches of the trees. However, by star hopping I was able to stay even with Angelo and the setting circles. As Sagittarius began to rise over the trees, we started on this, the last great frontier of objects before the finish line. The trees in the eastern part of the field plagued me all during this time. As Sagittarius slowly ascended, it also moved to the west, keeping the constellation just at tree top level. But I found objects between the branches.

At about 4:30 Doug helped me move my scope over, out of the line of the trees. It was hard because my telescope was frozen to the ground. Time was running out because twilight wasn't far off. I had 3 objects left in Sagittarius when I noticed the sky was getting lighter in the northeast. I turned around to look at my star chart, and when I looked back I saw the sky turning blue. I just managed to find 2 of the three remaining objects in Sagittarius before dawn was fully upon us. The marathon was over. This year the finish line was in sight but just out of reach. After all was said and done, I had found 103 out of 110 Messier objects. Angelo had slightly less, only because he had missed earlier objects that set before he had

arrived. The field looked strange in the morning daylight. Angelo, Doug and I left at about 5:30 a.m.. I knew that when I got home I would only get about an hour and a half of sleep because I had to leave for our club's presentation at Kean College at 8:00 a.m.. But what is a little lost sleep compared to seeing almost all of the seasons constellations marching across the sky. The Messier marathon was fun. Next time we can try something even tougher. NGC marathon anyone?

#### NJAG Messier Guidebook

In 1989 the Observation committee would like to begin a project of putting together a guidebook to finding and observing all 110 Messier objects. I would like to collect the observations of our club's experienced observers using a variety of different telescopes at different locations. Such a book would be useful to newer members who are just beginning in astronomy and want to know just what they can see with their telescopes. I think putting this book together with the help of many club members will be fun, as well as informative. Also, a book put together by our club could explain to beginners the truth of exactly what the Messier object is going to look like, not what it looks like through the Palomar 200" scope. Many of us have used different types of handbooks and charts that are difficult for the beginner, and very dry. We can make our guidebook "user friendly". To get involved in this project, all you have to do is record any of your observations on the form that will be made available. Fill in all the pertinent information required and then write in notes of what the object looked like to you. Include such information as pertaining to a particular object. For example: one note may be as follows; 32mm eyepiece, M-31 fills the field, core is easily visible and two dark lanes are visible in the spiral arms. Best seen in low power, an awesome sight! On the observation sheet is information you might include for each type of object. Whenever you have some observations, please submit them to myself or Dennis Koenig on any Wednesday. With your cooperation, I think we could make a nice book. ☆

## PROJECT COMMITTEE REPORT

by Roger Sudol

Back in February, it became quite apparent that the sub-diameter tool that we were using to grind our 12" mirror was going to present a lot of difficulties as we got into the finer grits. When Glenn Burke mentioned that he had ground a mirror with a full size ceramic tool, suddenly a thought occurred to me. I know a person who runs a class in ceramic crafts, so I asked her if she could mold a tool to fit our mirror. She agreed to try but every attempt ended up in a pile of cracked ceramic. Next we spoke to Will Whitaker, a member of the Springfield Telescope Makers, a club that is well versed in the art of mirror grinding. He talked it over with other members and came back with a solution to our problem. He told us that, because we are using a sub-diameter tool, the mirror needed to be ground with the tool on top of the mirror, rather than the conventional method. We've since started grinding the mirror in this fashion and the turned edge has disappeared. Thank you Will!

Now the grinding can be resumed and the mirror should be finished (if no other problems slither in) sometime early this summer. Now is the time to start thinking about a telescope to house this mirror. A suggestion has been made to build a lens-less Schmidt camera, a special camera for taking wide field astrophotography. Anyone with any other ideas should see Roger or Joe.

Last month the hand operated vacuum pump for the hypering chamber broke down due to poor design. A search for a new (and hopefully electric) pump began. Edmund Scientific sold both the hand and electric type. The electric was much too expensive for the club's treasury and the hand pump seemed just plain overpriced for something that would probably end up the same way as the original. So I started asking some friends and co-workers if they knew of any good surplus outlets that could fill our needs. We scoured through some catalogs and came up with a few promising prospects. Then

a co-worker of mine came to me and said that old refrigeration compressors make excellent vacuum pumps. I mentioned this to Glenn Burke. He just happened to have an old air conditioner that could be scavenged for its parts. We took it apart and experimented with the compressor. Thus far our findings look very promising. Work is now being done to put it to use.

Last but not least there is the 4.5" refractor. This instrument, unfortunately, is of poor design to begin with, and seems to have been abused by it's previous owner. It will require quite a bit of work before it will function as it should. However, the base has been restored to the point that it can be used, although not very conveniently. Total restoration of this instrument, now nicknamed the "coffee grinder" and the "Beast from the East", could take quite some time, but NJAGers never give up!

## **Book Review**

### The Constellations

By Dennis Koenig

Did you know that Betelgeuse, the red giant star in Orion, is over 500 times larger than our sun? And did you know that two of the most distant galaxies from us are in the region of the Andromeda galaxy, nearly 10 billion light years away?

These facts and many more can be found in a new book called "The Constellations — An Enthusiasts Guide to the night sky" by Lloyd Motz and Carol Nathanson.

When I began reading this book my first impression was that it was a "mini Burnams" since the format is basically the same. Each Constellation is broken down by it's mythology and then by the most important stars and objects in that constellation.

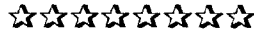
Oftimes in astronomy, as with other sciences, we have a tendency to get bogged down in dull, redundant facts. Sometimes a little imagination can cure this problem. This is exactly what the authors do in "The Constellations". Their description of mighty Orion warding off the horns of Taurus the bull was written in such a way that you just want to go outside and look. The mythology blended with astronomical facts and figures makes for an interest-



ing, warmly written book.

If you don't really feel like going outside because it's 20 degrees and windy or if you just don't feel like dragging out the 'ol scope, sit down and read thru "The Constellations". It'll be as close as you can get to being out under a clear dark sky . . .good armchair astronomy.

Editor's Note: This book is currently in the club library.



### Looking Ahead

The next business meeting of the North Jersey Astronomical Group will be held on April 12, 1989 at 8:00 at the Rifle Camp Park Observatory in West Paterson, New Jersey. Following the meeting Glenn will make a special slide presentation !. Business meetings are open to the public so, brig a friend. There will be three regular meeting/observing sessions this month on April 5, 19 and 26, 1989. There will be two traditional public nights held on April 14 and 21, 1989. All member are urged to help out. Glenn Burke has completed his mini-class on building barn-door hand crankers. We are now anxiously awaiting the results from the crankers that were built. The club often observes on clear Saturday and Friday nights, check with the club answering machine to find out if any other members will be going. Also any member can use the West Milford site whether or not other members will be present. Check with Glenn Burke or Dennis Koenig for instructions on getting permission. Anyone interested in attending the Stellafane Amateur Telescope Makers' Convention In Springfield Vermont on August 4, 5 and 6 should see Glenn Burke. Also a side trip preceding the convention is being considered.

**Reminder: If you have not paid your dues; this will be your last newsletter !**

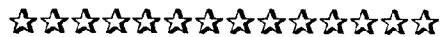
### CORRECTOINS

My deepest apologies to Doug Kittredge for screwing up the quote in his book review. In the review he quoted Thoreau with "Let us not underestimate the value of a fact, it will one day flower into a truth". The editor mistook the word "underestimate" for "understand". That's what happens when you work on the newsletter till 2 a.m. Once again, Sorry Doug!

The title of the March DSO seemed to have lacked a date and a volume number. I apologize for any inconvenience caused by this. If anyone needs a corrected copy of the first page for archival purposes, they will be available at the April business meeting, see Roger.

### FOR SALE

80 to 200 f4.5 Macro Zoom Lens, Pentax K mount, Like New, \$ 75 call  
Mike Koenig at 478-7699

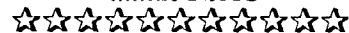


The Dark Sky Observer is a publication of the North Jersey Astronomical Group. All members are invited to write articles for the newsletter. Anyone interested in writing for the DSO, please contact the editor at a meeting or through the mail.

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# **ASTRONOMY DAY 1989**

**DATE: Saturday June 3, 1989**

**TIME: 1:00–10:00 PM**

**PLACE: Rifle Camp Park Observatory  
West Paterson New Jersey**

The once a year all day event for anyone who has even the slightest interest in astronomy. Many aspects of the science of astronomy will be explored. From the Moon to the Galaxies and all the planets, nebulae, stars and clusters in between. You can learn about the various telescopes and astronomical tools used to observe, study, measure, photograph and just plain enjoy the Universe beyond Earth.

Displays, talks, slide shows, solar observations, observatory tours and films will be presented all day and we will scan the skies at night.

All programs arranged and presented by the North Jersey Astronomical Group for the Passaic County Park Commission.

**NOTE:** Daytime activities will proceed rain or shine although night observation will be cancelled in the event of unclear skies.