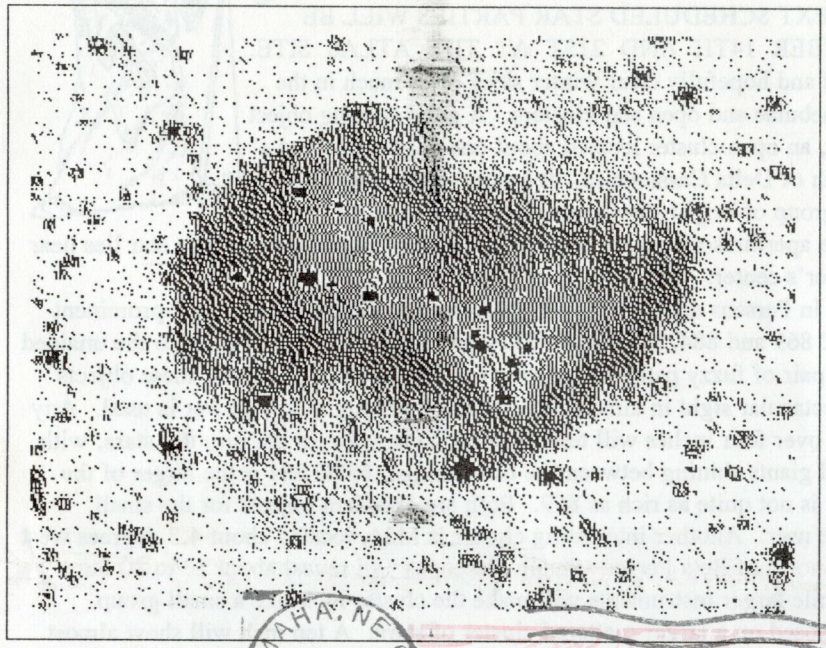
magnitude star, while an eight inch will make it into a small bright fuzzy bluish disk with hazy edges. A ten inch aperture at high power will show a hazy outer shell in contact with a nearly circular inner disk that has some vague detail in it. A ten will also reveal the faint central star.



Next Meeting November 27, 1990

Volume 31 #11
November 1990

THE Prairie Astronomer

1991 Club Officers Elected

Prairie Astronomy Club officers for 1991 were voted into office at the October meeting. The newly elected officials will take over their positions at the November meeting. Here is how the voting turned out:

President:	**Dave Knisely**
Vice President:	**Eric Hubl**
Secretary:	**Ron Veys**
Treasurer:	**L. Lee Thomas**
2nd Vice Pres:	**Jack Dunn**

Congratulations to everyone, and best of luck in the coming year!

President's Message

by Dave Knisely

As many of you know by now, the famous Prairie Astronomy Club Election Railroad came chugging around the bend again at the October meeting and ran over me! Seriously, I am quite flattered with this vote of confidence. I just hope I can live up to the expectations some of you probably have of the office. It will be difficult to fill Ron Debus's shoes, since he did a fine job during his terms, and I hope mine prove as fruitful. And those of you who voted for Eric Hubl, take heart (I made SURE he got vice president!).

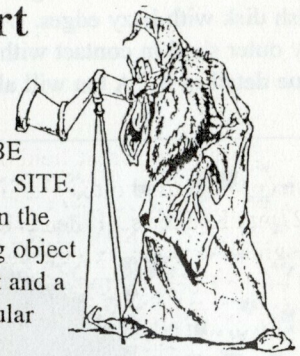
On a more serious note, at the November meeting, we must decide what to do about re-scheduling the December meeting date, since the last Tuesday of the month is Christmas. We have several options, but the best one would probably be moving it to Wednesday the 26th at the usual time. This might help bring in the people who got telescopes for Christmas. Also, several former club members, most notably Larry Stepp of NOAO in Tuscon, often return to Lincoln to visit relatives, and frequently make the December meeting. Last year, Larry gave us a fine program on the spin-cast telescope mirrors he deals with, so those who didn't come missed out.

As for other news, one of the Chemistry professors at Doane College in Crete recently started a basic Astronomy course for non-science majors. He ran into a few problems with the equipment that Doane has, so Rick Johnson graciously volunteered his assistance on Tuesday the 13th, and I tagged along just to harass him! What we found was an 8" Celestron in pretty fair shape, and 8" Dynamax in rather poor condition, and two RV-6 Newtonians, one with a balky clock drive. Rick checked out the C-8's noisy drive and focuser and got the drive on the RV-6 working, while I collimated the Newtonians and gave the professor some useful information on telescopes in general. We got a lot of thanks from the professor and hopefully we should see some more Astronomy activity from Crete in the near future. That's all for now. See you at the meeting.

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc., and is free to all club members. Membership status and expiration date are listed on the mailing label. Membership dues are: Junior Members and Newsletter Only Subscribers...$10/yr; Regular Members...$24/yr; Family Memberships...$27/yr; Address all new memberships, renewals, or questions to THE PRAIRIE ASTRONOMY CLUB, INC., P.O BOX 80553, LINCOLN, NE 68501. For other club information contact one of the following officers: Dave Knisely (Pres)223-3968, Eric Hubl (V.Pres)423-6267, Ron Veys (Sec)486-1449, Lee Thomas(Tres)483-5639, Jack Dunn (2nd V. Pres)475-3013. All newsletter comments and articles should be sent to Newsletter Editor JOHN LORTZ, 12023 PARKER PLZ #105, OMAHA, NE 68154 no later than 7 days before monthly club meetings. Club meetings are held the last Tuesday of each month at Hyde Observatory in Lincoln, NE.

Observing Chairman's Report

by Dave Knisely



THE NEXT SCHEDULED STAR PARTIES WILL BE DECEMBER 14TH AND 21ST AT THE ATLAS SITE. The cold and hopefully clear winter skies offer much in the way of nebulae and open star clusters. A good starting object is M103, an open cluster located about one degree east and a half north of Delta Cassiopeiae. It appears as a triangular shaped group of bright stars in small telescopes, with moderate apertures revealing 25 or 30 members. An unusual orange star lies near the cluster's center.

In Perseus are a number of interesting clusters, but the most prominent are NGC 869 and 884, the h and Chi Persei double cluster. Visible to the unaided eye as a pair of fuzzy patches just over a degree north of g Persei, these objects are a spectacular sight in almost any telescope as long as low power is used. Any aperture over four inches will tend to show some color in the brighter stars, with some red giants shining between the two groups. NGC 884 is the larger of the two, but is not quite as rich as 869. Both are excellent objects for the small telescope user. Another interesting cluster is M34, located about 4.3 degrees west and two north of Beta Persei. Small telescopes will reveal about 20 to 30 faint stars, while larger instruments will make the cluster look like a small group superimposed on a larger scattered cluster of stars. A ten inch will show almost 50 members of this easy Messier object. Also in Persius is the famous "Butterfly" or "Mini-Dumbbell" nebula, M76. It can be found a degree north and one third degree west of Phi Persei, and it can be seen in apertures as small as three inches as a very faint small double puff of light. Larger telescopes will make it brighter and better defined, while the use of nebular filters will sometimes show the faint wings of light which give the nebula its name.

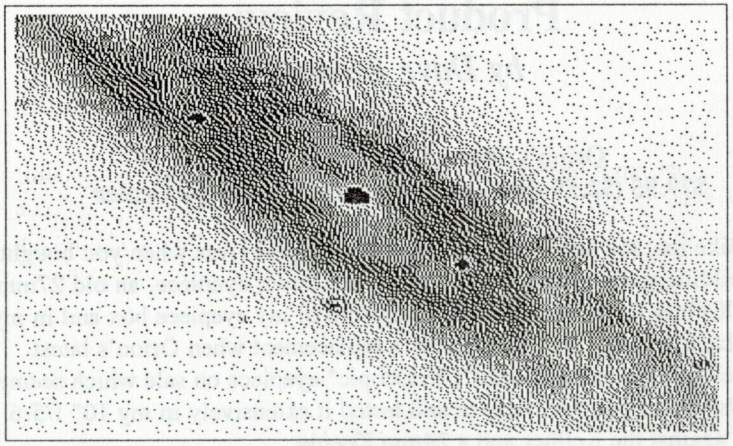
I have found another "Double-Double" star about three degrees west and 3.5 degrees north of the Pleiades. The brightest one is ADS 2682 and is a close pair of sixth or seventh magnitude stars, but northward lies another pair with a somewhat wider separation. This quadruple star should be resolvable in moderate to small instruments, with both pair easily seen in a 30 minute field of view. I am quite surprised that more observers haven't run into this pretty grouping before.

For those of you who feel like galaxy hunting, try the faint edge-on spiral NGC 891, located about three degrees east of Gamma Andromeda. Although visible in a four inch, this galaxy just looks like a faint streak of light, unless moderate to large apertures are used. An eight inch will show the nuclear bulge and hints of dark lane near the nucleus, while 10 inch and larger instruments will show the irregular lane running down most of the galaxy.

As a final target, look at the bright planetary nebula NGC 1535, located 2.5 degrees south of 39 Eridani. Small telescopes will show it as a fuzzy 9th

First, the "Ultrascopic" design is a five element multi-coated eyepiece in an 1.25" barrel. The optical design consists of two similar sized achromats separated by a single double-convex lens. It is slightly longer (3") and heavier than many 1.25" eyepieces, but is still much lighter than some of the "wide-field" oculars you find on sale these days. Its eye relief is good, and the eyepiece has an apparent field of 52 degrees. I measured the real field of the eyepiece when used on my ten inch, and found it to be only slightly greater than the 27mm Kellner's. I then calculated the apparent field and found it to be only 50 degrees, compared to the 55 degree field of the Kellner, and the 60 degree field of the Koenig. The eyepiece produces good pin-point star images over much of the field, with little or no curvature of field. When tested on my 10" Newtonian, I could see some astigmatism near the edge of the field, resulting in star images that were slightly elongated radially or parallel to the edge of the field, depending on the focus position. The astigmatism was far less than the Kellner gave, and for once allowed me to see the coma inherent in my telescope. The edge of field astigmatism of the Koenig was greater than that of my Ultrascopic, but so was the apparent field of the Koenig, so a comparison isn't very meaningful (most eyepiece designs suffer from edge of field astigmatism). The 30mm Ultrascopic had no discernible distortion or chromatic aberration, and thus outperformed the Kellner by a wide margin in those categories. The field was nice and dark right up to the edges of the star images, with very little scattered light. Very little ghosting was noted as well. The eyepiece also performed well with my 3 element Barlow, but still possessed the astigmatism noted earlier.

On the whole, the Orion 30mm Ultrascopic eyepiece performs well and would make a very good addition to the amateur's eyepiece collection. I wish the apparent field of view of the eyepiece was a bit larger and the astigmatism smaller. Still, eyepiece design is an affair of compromises, and it seems to me that the people at Orion got enough performance out of their design for me to recommend it (I would still wait until they have a sale, though).



A Journey Into Black Holes

This is a synopsis of a round table discussion held by the Forsyth Astronomical society regarding our universe, black holes and certain thought experiments that appear interesting as a comparison between the two. It was obtained from the Astronomy Forum on Compuserve.

Consider the concept of a Black Hole. Now consider what may be inside. Let's begin this exercise with a little imagery. Assume for a moment that we have a substantial number of neutron stars, in rotational equilibrium with each other such that their orbits are stable, but in fairly close proximity. Now consider the entire system as a unit. If the radius of the unit is small enough, and the mass of the unit is large enough, the escape velocity from the system can become greater than the speed of light and the system forms an event horizon and becomes a black hole (Scientific American, November 1987).

What's inside this black hole? Well, according to our previous definition of the system, inside is a cluster of neutron stars still in orbit around each other. Further, these neutron stars don't have to be combined together into a single contiguous mass; there can be a significant amount of empty space between them where there is gravitational equilibrium.

Now, assume an observer stationed within this black hole, adequately protected from whatever radiation the neutron stars may emit by some combination of distance and shielding. Also assume a second observer, stationed outside the black hole in an evenly distributed universe.

The outside observer would see only an event horizon, and percieve a black hole with no clue as to what may be inside, and totally oblivious to the inside observer. This is presumably what we would observe if we could make direct observation of a black hole within our universe.

But now, consider what the inside observer may see upon peering out and the situation becomes considerably more complicated. Since the outside universe is evenly distributed, the quantity of mass and energy absorbed at any point on the event horizon would be identical to that at any other point, so the inside observer would detect equal amounts of radiation in whichever direction he chose to look.

Further, since the black hole must be in a constant state of growth due to such an influx, the observer would perceive his local universe inside the black hole to be growing at a rate proportional to the gain. And since the mass and energy are

absorbed evenly throughout the event horizon, this growth would be perceived as uniform throughout the black hole.

Particles approaching the event horizon from outside would be accelerated in the gravitational field generated by the black hole. Since there is gravitational equilibrium at the point of the observer, the red shift associated with the acceleration due to gravity would also be uniform and the observer would perceive the radiation to have a uniform wavelength proportional to the field through which the radiation was accelerated. This would be detected as a uniform background radiation coming from all directions.

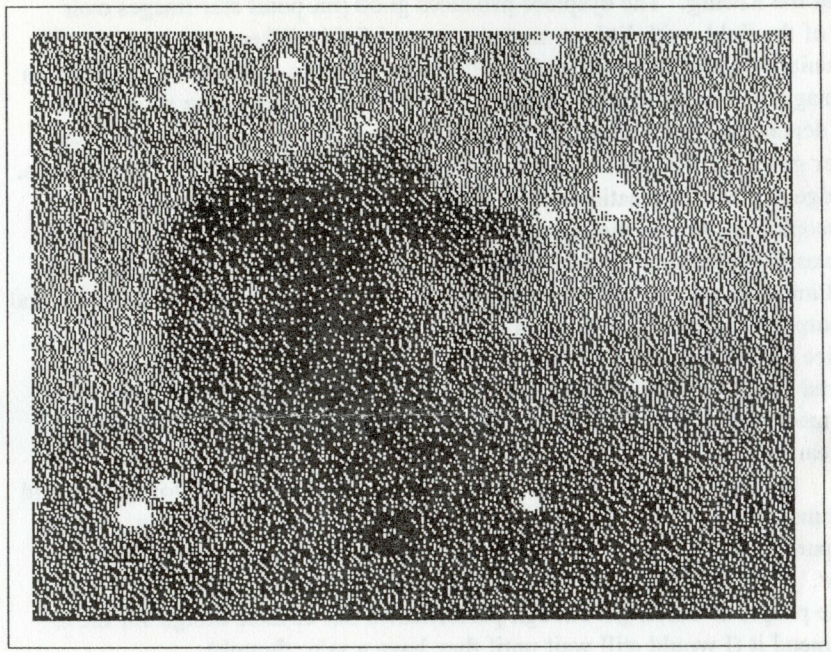
In the local universe within the black hole, anything traveling faster than the escape velocity of the black hole would move beyond the event horizon and be undetectable. The observer would perceive that nothing within his universe could travel faster than this speed, which he will label s. Further he would perceive that anything being accelerated to s would experience an asymptopic mass gain associated with this acceleration. (Standing outside this thought experiment, we have the perspective of seeing that the particle under such acceleration is actually experiencing a DECELERATION toward the event horizon with an associated mass gain opposite of that experienced by the particles previously referred to which experienced an energy loss when accelerated into the local universe through the event horizon. The red shift caused by the gravitational field reflects the energy loss. The reversal of the process causes a blue shift which will be interpreted as an energy gain and by the equivalence of mass and energy, a mass gain).

What would happen if this inside observer tried to shine a light toward the outside of his local universe within the black hole? The light, having a velocity of less than escape velocity (by definition) could not escape, but would go into orbit somewhere below the event horizon at a distance determined by the total massdensity of the system. Since the orbit would take the shape of an ellipse, the observer would conclude that his universe was bounded.

So far, we have our inside observer detecting the following:

- His local universe is expanding uniformly.
- A uniform background radiation of a specific frequency.
- The escape velocity of his local universe is a limiting factor and is directly observable.
- Any object accelerated near escape velocity experiences a mass gain which is proportional to the velocity of the object.
- His local universe is bounded.

What conclusions could the inside observer make regarding the universe outside of the black hole within which he is located? By a measurement of the growth of his local universe, he could determine the amount of mass and energy being absorbed by his black hole. This would allow him to determine the density of the outside universe near his black hole. Since his black hole came from the same material as the outside universe surrounding his black hole, he could infer the type of material being accreted by his black hole. Knowing that any material absorbed into the black hole would emit X-rays, and knowing the associated heat of the background radiation perceived within the black hole he could determine the rate of accretion and therefore the rate of growth of his universe.



Product Review

by Dave Knisely

Orion's 30mm Ultrascopic Eyepiece
$79.95 ($2.59 shipping) from Orion Telescope Center

If you are like me, the last time you bought an eyepiece was when you bought or finished building your telescope. My bread and butter eyepiece, an old 27mm wide field Kellner from Jaegers, was always out of my eyepiece box and in my T-Scanner solar filter, so I was looking for a replacement when Orion's latest catalog came. Orion had a 30mm "Ultrascopic" eyepiece on sale which seemed to fit my needs well. I got the eyepiece and tested it extensively in my 10" f/5.6 Newtonian against the Kellner and a 24mm Koenig.