THE FOCAL POINT

Vol. I, No.VIII — *The Newsletter of the Atlanta Astronomy Club* — April 1989

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CLUB CALENDAR

Next Meeting: April 21, 8:00 p.m. at Bradley Observatory.
Program: Club member Mike Kazmierczak will speak on observing grazing occultations.

Editor: ..... Steve Gilbreath
Contributing Editors: ..... Dr. Ralph Buice, Hal Crawford, Richard Jakiel, Mark Lancaster

The Focal Point is published monthly during the academic year by the Atlanta Astronomy Club, Inc. The AAC is a non-profit organization dedicated to the advancement of amateur astronomy. Meetings are held the third Friday of each month (except the second Friday in December) at the Bradley Observatory on the Agnes Scott campus. Dues are $25 annually for a single membership and $30 for a family membership and include a subscription to **Sky & Telescope** magazine and use of the club observatory in Villa Rica.

Submissions: Article submissions are welcome, and may be delivered to the editor for consideration. Articles on computer floppy disk are encouraged.

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OBSERVER'S CORNER

by Richard Jakiel

On Monday, March 13, 1989 a spectacular auroral display was visible throughout most of the southern region of this country. The Aurora Borealis, or "Northern Lights" was observed in a broad arc stretching as far south as Jacksonville and Mobile to Texas and northward to Denver and beyond. According to an NOAA researcher in Boulder, Colorado this was the "most intense display seen in this country in the past 30 years." In Atlanta, a brilliant deep red arc covered most of the sky, while prominent rays and large diffuse greenish-white areas appeared intermittently. The main display moved gradually southward and was generally observed to around 9:45 EST, with faint reddish patched lingering to well past midnight.

The aurora occurs in both hemispheres, and has inspired awe since ancient times to a wide variety of cultures. The Eskimos associated the aurora with "the play of unborn children", or the "dead carrying torches" to aide the living during the long polar night. The Roman emperor Tiberius sent fire fighters to the port of Ostia as a result of the reddish auroral glow, while Europeans in the Middle Ages associated the phenomenon with "conflagration and holocaust." Even today, auroral displays can inspire both fear and awe to those ignorant of its mode of formation.

Aurora Formation

The development of auroral phenomenon is contingent on three factors - the solar wind, earth's magnetosphere, and solar flares. The solar wind is a stream of charged particles, usually electrons, protons, plus heavier ions, emitted from the Sun. This high energy plasma flows outward at speeds of 300 to 700 kilometers/second until it contacts the Earth's magnetosphere. The Earth's magnetic field acts as a barrier to the solar wind, deflecting most of the particles around leaving a definable wake, analogous to a ship's prow cutting through water. However, some particles do leak through on the sunward side of the field to become trapped in the Van Allen Belt or to directly interact with the Earth's atmosphere to produce the aurora.

The actual generation of an aurora is believed to be similar to the action of an electric generator. Some of the Earth's magnetic field lines become interconnected with those of the solar wind; coupled with the motions of this wind generated the "auroral dynamo" The circular fluxtube of the aurora can have an electric potential of 100,100 volts, and generate up to a trillion watts of power - substantially more than the US currently generates. The glowing arcs of color are the product of energetic electrons interactive or "exciting" the gases in the ionosphere, causing the fluorescence of those gases.

Solar flares are the third main part of the auroral equation. Large flares pump vast quantities of very high energy protons (and heavier ions) into the solar wind and can speed up the flow

to 1500 km/sec. A very powerful solar flare occurred on March 11, 1989 which lead directly to the spectacular display seen two days later. Powerful flares can drop an auroral display from polar/high latitudes down to subtropical/tropical latitudes, although such events are extremely rare.

Aurora Structure

The lower boundary of an aurora is sharp, starting at 98 km. The maximum activity of an aurora is usually centered between 110-120 km fading to an upper limit of 300 to 400 km, although in extreme cases this can be up to 1000 km. Excitation of Nitrogen produces blue and red emissions, which is concentrated in the lower (<100 km) part of the aurora. A greenish-white glow is indicative of Oxygen excitation in the mid-level (100-250 km), while a steady red glow (also Oxygen) is produced by lower energy electrons striking the upper level of the atmosphere.

Auroras have been classified according to five basic forms: 1) Patches - small, isolated glows, 2) Arcs - curving light strips, 3) Bands - irregular arcs with kinks and folds, 4) Rays - vertical shafts of light which includes curtain formations, perhaps the most familiar auroral form, and 5) Veil - diffuse glow covering most of the sky. A variety of structures, are associated with each form such as rays, striations, or no substructure at all (homogeneous). Large, powerful auroras can show most of these forms and structures as demonstrated by the most recent event. Relative intensity of events range from 0 (or too faint to see) to 4, which is bright enough to cast shadows.

But perhaps the most fascinating and eerie aspect of the auroral phenomenon is the motion of the display. An excellent example is the powerful event I witnessed in western New York during the spring of 1979. The aurora was a massive curtain display covering all of the northern sky with numerous ray structures reaching the zenith. The main mass undulated like a giant sidewinder rattlesnake with a slow sinuous rhythm. The upper parts of the curtain flickered like a video screen, while great synchronous pulses of light would travel up the rayed structures taking several seconds to complete the journey. I also observed similar pulsations in some of the rays associated with the recent event, along with abrupt changes in prominent knots and folds.

Observations

Large, brilliant auroral displays such as the past event are quite uncommon at this latitude, so proper documentation is important. Basic information that should be included in any aurora observation: 1) Time/duration of the event, 2) Observing conditions, 3) Auroral forms and general elevations, and 4) General intensity of the display, including colors noted. Auroral photography can prove to be both beautiful and of scientific value. Exposures and camera settings should be similar to those for constellation photography. The camera should be set on the widest possible setting (largest f-stop), mounted on a tripod, and using a wide angle lens if possible. Fast color film and short exposures (less than 30 seconds), will allow you to capture some of the finer structural detail.

With the upcoming solar maximum solar flare activity will increase opening the possibility of more auroral events during the next two years. So keep a lookout for the possible return of one of nature's grandest events - the Aurora Borealis.

THE CASUAL ASTRONOMER: APRIL 1989

by Hal Crawford

Getting Involved

As the 1988-89 calendar year of the Atlanta Astronomy Club begins to move toward its final months, it becomes easy to reflect on what has happened in the past year. Numerous meetings, astronomical happenings (particularly the lunar occultations, and Mars observations), and other events of interest to the astronomy buff have kept the club very busy.

As a closely knit group with a strong common interest in mind, it's easy to presume that there is no lack of volunteers or programs to educate and entertain the intellectual masses. Such an assumption is sadly false. The work that goes into each meeting and additional activities that are planned every month only serves to demonstrate the work and dedication that our club's officers put forth throughout the year. I find it both encouraging and gratifying to have a great group of officers performing incredible feats of finding speakers, putting together activities, and publishing a monthly journal to describe it all. Then there are the "behind the scenes" people, who set up the meeting room before the meeting, who make the refreshments magically appear afterward, and perform countless tasks to keep the club active.

A lot of the work is easy, but most of it is not. The Atlanta Astronomy Club needs volunteers to help out, to donate their time and their energy to promote the club and keep the work load on the officers to a minimum. I'm really not asking a lot -- after all, if a lot of people did just a little -- incredible things could get done.

"What exactly are you suggesting?" you may ask. I could be specific here, but to me volunteerism relies a lot on personal imagination and ingenuity, the qualities that make the AAC a great club. To tell you the obvious would be cheating. I'll try not to dwell on specifics:

Do you have something to say? Write it down, then send it to the newsletter editor. You'd be surprised to find that you have a supportive audience, even if you've never written anything before. It can be humorous or sad, informative or simply entertaining. Perhaps a true-life experience. Our intrepid and long-suffering editor probably won't balk at it (he's still printing my stuff, isn't he?).

What do you know about astronomy, and can you describe it to the rest of the club in half an hour or less? You may be a program source. Or do you know someone who can

give a talk? Convince them to come talk to us.

Know anything about telescope making? How about astrophotography? A lot of members want to learn, all they want is someone to show them how. Offer to do a workshop.

New officers will be elected in the next few months. Consider an office. Or join the Light Pollution Committee -- this last meeting alone has proved that light pollution will be the most important topic of the 1990's.

Being an AAC member doesn't stop after the monthly meeting. Talk up being an Astronomy Club member! Bring interested friends and acquaintances to the meetings, or introduce them to the observatory. Keep everybody posted about what's going on.

Volunteer to help out at the Fernbank Science Center. They regularly conduct astronomy classes, and sometimes need assistants. When the observatory is open, volunteers can help answer questions and keep the public informed.

As pointed out earlier, you are only limited by your imagination. Get involved!

Taurus, The Bull

By now knowing where the Little Dipper and Orion are in the sky, you now have two good reference points to locate every Winter and Spring constellation. To find this month's feature, Taurus, you just have to follow the belt stars of Orion upward until you come to a V-shaped group of stars, and then move onward until you see a small but bright cluster of blue stars. The celestial equator crosses right through Taurus, and after a little study you should have no trouble picking out the head and horns of The Bull. Taurus was one of the earliest groups of stars to be considered a constellation. From 4000 to 1700 B.C., it served as a symbol of the vitality of spring, and heralded the start of this season until precessional motion carried the vernal equinox toward the west. In Greek mythology, Taurus was identified with the form that Zeus took to seduce the maiden Europa. Other folklore around the world indicates that the constellation was related to the Egyptian bull god Osiris, and the Chinese regarded Taurus as part of a "White Tiger," and also as the "Great Bridge."

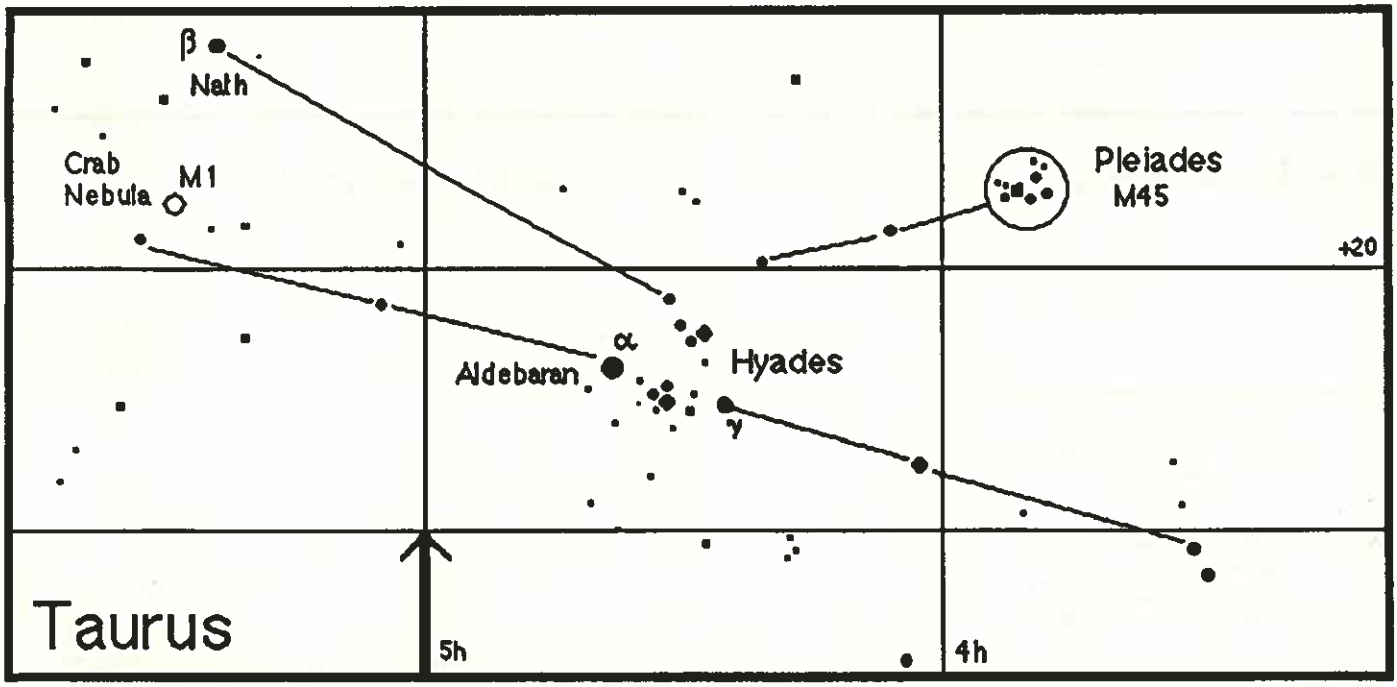
The brightest star in the constellation is Aldebaran (al-DEB-ah-ran), which means "The Follower," presumably because it follows the Pleiades across the skies. Its spectral class is K5, indicating that it is an orange giant. Glowing at magnitude 0.9, it lies 70 light-years away from us and is the 9th brightest star in the sky. It has a 13th magnitude yellow-orange dwarf star companion, about 650 AU from the primary.

Aldebaran stands in front of the second closest cluster to us, the Hyades. Although about a dozen stars are readily visible to the naked eye, the cluster actually contains several hundred stars, 132 of which are brighter than ninth magnitude. This is a great region of the sky to scan with binoculars.

Northwest of the Hyades is the brilliant Pleiades star cluster (Messier 45). The Pleiades also contains several hundred stars, the brightest of which are known as the Seven Sisters from Greek mythology: Alcyone, Atlas, Electra, Maia, Merope, Taygeta, and Celaeno.

The best way to view this impressive feature is with binoculars or even a small scope. Dark nights may help reveal faint reflection nebulosity surrounding several of the stars, particularly Merope. The Pleiades are approximately 410 light years from our system.

Taurus abounds with several small star clusters. I have not indicated them on the map (they require at least a small telescope and thus beyond the scope of this article), but can be easily



found in any star atlas. I will briefly mention one deep-sky object -- M-1, the Crab Nebula (NGC-1952). Its magnitude is around 9, making it just a fuzzy patch for most scopes. It is the visible remains of the 1054 A.D. supernova documented by American Indian and Chinese observers. It lies 3,500 light years away.

Warm weather is coming up soon. With luck (and time), I'll see you in Villa Rica!

ASTRONOMY / GASTRONOMY

Once again it's time for our annual Atlanta Astronomy Club Banquet and this year it should be our biggest and best one yet. We'll be celebrating our club's 40th anniversary so you don't want to miss it. In addition to fine food and a good time we are pleased to announce that our keynote speaker for the evening will be John Burgess of Fernbank Science Center. Mr. Burgess has done extensive and original work with ancient calendars and should provide a very interesting talk. The banquet will be held on Saturday, May 20 at 7:00 p.m. at Cox Hall, on the Emory University campus. Tickets for the banquet are only $14.50 and can be purchased at the April meeting or by mail by using the enclosed order form in this newsletter. Mark your calendars and we'll save a seat for you.

CLASSIFIED ADS

For Sale: Tasco telescope; 10 months old.
Contact: Steve Seawell
299-1936

For Sale: Meade 6 inch Newtonian reflector; clock drive, tripod; 9mm and 25mm eyepieces; filters $300
Contact: Tom Fallon
458-2589

THE FOCAL POINT

First Class Delivery

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