The View From Arunah

Arunah Hill Natural Science Center

Winter 2000 The Journal of the Arunah Hill Natural Science Center, Inc. Volume 28

Inside this issue:

Deep Sky Treasures
The Real View From Arunah
More CCD Notes

DEEP SKY TREASURES

by John Davis

As the winter chill gradually envelops our region after a mild November, and the end-of- millenium year 2000 is knocking on our door, many of us here in the Northeast are preparing to brave the elements to observe and enjoy some of the most spectacular treasures in all the heavens as the winter constellations move into our evening sky. Great showpieces, some of which we've featured here previously like the Orion Nebula and bright attractions like the Pleiades, the fascinating Crab Nebula and numerous Messier open clusters along the winter milky way will again vie for our attention. But along the way there are others – lesser known, perhaps, yet well worth our seeking out, especially if you've tempted to make that chilly observing session more memorable by adding a little "frosting to the cake". So after marveling at the magnificence and intricacies of the Orion Nebula you may want to swing that 'scope away a few degrees and take in other less visited but nonetheless interesting sights.

One of these, **NGC 2371-72** an often overlooked double-lobed planetary nebula is tucked away in Gemini near Castor and Pollux. You can locate it by looking 4 ½ degrees W of Pollux to find 3.6 mag. Iota (60 Gem) accompanied by two 5th mag. stars (64 and 65) one degree to the E. Now slide just 1 2/3 degrees N of Iota and you should have this interesting 11.3 mag. object in your eyepiece. The two small bright lobes are immersed in a connecting haze 1 arc minute across which in large apertures (16" and up) may reveal a glimpse of a very faint central star. Altogether you might find this planetary somewhat reminiscent, perhaps a smaller version of M76-The "Little Dumbbell Nebula" in Perseus.

Now, for an interesting diversion before moving on to our next telescopic target, take your binoculars (7 x 50's are ideal) and see if you can find what I call the "Bent Arrow", a delightful asterism just 7 degrees N of Lambda Orionis (the star marking the head of Orion). It is a remarkable chain system of 5th and 6th mag. stars forming the 5 degree long "Arrow", bending up from above Betelgeuse and pointing toward Aldebaran and the Hyades.

In the upraised club of Orion just to the left (E) of the stem of the "Bent Arrow" are two 4th mag. stars, Nu and Xi Orioni's 1 ½ degree apart. Less than 1 degree SW from a line joining Nu and Xi, and equidistant from each star lies **NGC 2169**, a bright little open cluster 7' across and shining at mag. 5.9 from 3600 L.Y. Though sparsely populated, its individuality becomes immediately apparent in the telescope owing to its unique arrangement breaking down into two separate fairly compact clumps of stars displaying a good range of several bright and a number of fainter stars, each group sharing one of the two brightest (6h and 7th mag.) stars. You'll find at least one reddish star and two doubles among the cluster members. What is really remarkable and striking about this cluster, however, is the outline of the number 37 formed by the stars in the two groups. This feature alone is so unmistakable that you may even enjoy return visits to this object, visible in binoculars as a fuzzy spot in the upraised club of Orion.

At the other corner of Orion, by looking about 5 degrees NNW of brilliant Rigel we'll find a nice wispy little gem visible in most scopes. It's the reflection nebula **NGC 1788** which lies a little under 2 degrees N of 3rd mag. Beta Eridani (Cursa) and just over 1 degree N of a 5th mag. pair of stars, half a degree apart and immediately N of Beta, 66 and 68 Eridani. The nebula itself spans a generous 5' x 8 arc minutes elongated E and W in an irregular splash, brighter at the southern end and involves a 10th mag. star with a brighter 8.5 mag. star near the W edge. With other stars nearby, the view is quite nice with powers of 80x to 100x; NGC 1788 is well worth seeking out.

Now, we'll slide toward the E and the dim but richly endowed constellation Monoceros along the winter Milky Way. Approximately one third of the distance from Betelgeuse toward Procyon lies a straight line, 7 degrees long of three 4th mag. stars, tilted at a NE-SW angle, each of the stars about 3 ½ degrees apart, which form the head of Monoceros, the Unicorn. Once you spot them, from the Center star, 13 Mon, we'll hop 6 degrees SE to 4.5 mag. 18 Mon, Thence SSE barely over 2 degrees; and in so doing we'll come upon one of the real gems of this part of the sky. It is the bright and splendid open cluster **NGC 2301**, truly a visual treat, yet too frequently overlooked by many, although a favorite among veteran observers. At 2500 L.Y. distance NGC 2301, shining at mag. 6 sprawls over a full 18 arc minutes and presents a marvelous elongated Y-shaped array of sparkling stars, ranging from 8th mag. on down to 11th or so. Along the length of the cluster is a triangular know of stars arranged together, a lube-orange double, and other outlying groups. Veteran deep sky observer and author Phil Harrington sees in the N-S stretching aggregation of stars a large bird (perhaps an eagle) in flight with outstretched wings and refers to the cluster as the "Great Bird of the Galaxy" – truly an apt description for this magnificent cluster. Be sure to check this one out!

We'll wind up our tour with a visit to Canis Major and a beautiful double star I ran across accidentally lat winter with a newly acquired pair of 20x80 binoculars while searching for tthe(previously featured) Tau Canis Majoris cluster, NGC 2362. It is located 3 ½ degrees NE of 2nd mag. Delta CM2 in the dog's hindquarters and just 1 2/3 degree N of Tau Ma (NGC 2362) although designated as **Herschel 3945** (also **ADS 5951**) I like to call it "the Winter Albireo". At low powers this gorgeous pair appears orange-gold and blue. The orange 4.8 mag. K5 primary and the blue-appearing 6.8 mag. FO secondary are separated by a generous 27 arc seconds in P.A. 55 degrees making for easy resolution, even in firmly mounted binoculars.

While you're in this neighborhood of the sky, be sure to take the time to hunt down some of the other showpieces of the winter Milky Way, making your chilly winter observing worth the effort of braving the cold!

The Real View From Arunah

Arunah Hill Pavilion

by Dave Bowman

The pavilion has been postponed! But don't despair, there will be plenty of work to do this year. Because of circumstances beyond my control, I am not able to devote as much time to the project as anticipated, so an alternative has been devised. We will build the foundation and deck during the summer and early fall, and cut the rest of the timber in the late fall (except for the logs left in the lower end of the clearing, which will be cut during the summer). The foundation for the pavilion will be of the pier type, so it will be a lot less exhausting than a normal foundation. The foundation for the Gaertner is a pier type foundation.

There are also plans for a medium-sized, half-domed building to be built at the base of the mountain this year. In some ways, this building will resemble the rollaway building planned for the summit. The foundation will be more involved, as it will be a cement block wall. However, once the wall is done, it will be a relatively easy procedure to put up the structure as this is the nature of these buildings. This will probably store the tractor for the winter, which will open up the barn for a warm place to do timber framing over the winter. Look for more specific information in the next issue of The View From Arunah about timber sawing dates and the foundation work.

Please plan on traveling to Arunah Hill on the first Saturday of the month to work on these and all the other ongoing projects. Even if there is no scheduled event revolving around these building projects, there is plenty to do. The more help we have, the faster we can accomplish our goals and have a good time all the while.

To refresh your memories, the pavilion is going to be a one and a half story, 20 x 32 foot open-air structure, with a balcony looking towards the south. It will be placed on the rock outcropping just south of last year's cooking area. The pavilion will serve as a place where dinners can be served, speakers can be heard and people can relax and enjoy each other's company. This will be a great addition to Arunah Hill's facilities.

Winter has, so far, been rather tough on us here on the hill. For three and a half weeks, we have been in the deep freeze, burning more wood than you can imagine. Every morning, I awake to find a thick film of ice on the windows. Stoking the fire at a furious pace, it still takes an hour or so for the temperature to rise. And only then does the ice begin to slowly melt. It really takes a sunny day to make it feel warm in my house.

The last week and a half (at the end of February), has seen temperatures in the high 40's and even the low 50's. This has been a welcome change, but it brings with it the scourge of muddy, rutty roads. This is the time of year when we go back in time and see how our forefathers lived. True, we now have four wheel drives and can power ourselves out of this muck, but, to step outside in boots and move around under our own power is rather difficult.

Having said this though, the road in to the parking lot is in good shape and can be traveled with any low riding car. The road up to the summit however, should be approached with much more caution. Only four wheel drive vehicles should make the journey, although some intrepid souls have made it (John Davis, to my amazement, made it up for the Messier Marathon). We have seen some erosion due to the spring thaw, and that has made the road all the worse. Come early summer, we will install some new culverts which will alleviate this problem. Road work is something that we need to complete this year (at least in it's most basic sense), to prevent erosion of the road and the surrounding terrain. Hope to see you there sometime soon. There is lots to do!

To CCD or Not to CCD…

By Rich Volant

This is the first in a series (I hope) of articles on CCD imaging.

Once upon a time, I dabbled in astrophotography. The quest was noble but filled with many dangers. I had a good camera, the famous Olympus OM-1. It was well suited for the task. The main problems were aiming, guiding and focusing. These, I found, were common ailments mentioned throughout the literature. Any one who has attempted this aspect of the great hobby of astronomy can relate. I was becoming frustrated. I did manage to get some nice photos, but it was discouraging to have to burn up a roll of film bracketing focus and exposure time only to get one or two descent shots.

Alas, the digital age to the rescue! CCD or charge coupled device cameras have become very popular and more affordable. These cameras are similar to the digital still cameras and even use the same CCD chips. The main difference is that the astro-CCD camera has some method of cooling the CCD chip below ambient. This allows for long, low light exposures by minimizing the amount of noise caused by stray infrared heat. You will also need a computer to control and get images from the CCD.

As I did my research into this new arena of toys, I discovered that although there seemed to be a fair amount of information out there, it followed a couple of major themes.

For one thing, there are the technical specs. Very nice if you're really picky about your equipment and wish to brag about things like pixel size and quantum efficiencies. Don't get me wrong, I am a tech freak.

Another pack seems to run the highly opinionated review circuit. These guys like to review equipment by showing pretty pictures and spouting the same techno babble that first group provides. Lets face it; two different people using the same camera can get some very different results. Don't worry about getting just the right pixel size or chip area. Just figure out what you can afford, and go for it!

What I found lacking throughout all of this literature was a down- to-earth approach that provides basic information as to the real experience in getting started in CCD photography. What I wanted was a simple, concise story of what is needed and what to really expect. Is it really better than film?

You may feel that I am portraying a negative image, no pun intended, about this whole thing. On the contrary. I think that CCD imaging is one of the most rewarding and fascinating aspects of astronomy. It only sounds negative because I am not ashamed to share my learning curve and lack of patients with you. My hope is that you will try CCD imaging and by reading this, avoid some of the pitfalls that could detract from the astrophotography experience.

Lets start with the telescope, not the camera. First, to do photos of any length of time greater than 1 second, you will need a mount that can track with the stars. A CCD can take great pictures of bright objects like the planets and moon in less than a second. You will find however, that you will still need to be able to track just to get set up. Focusing will require that you track a star long enough to get several quick exposures. Generally your focus run will be very short if you use some techniques described later in this text. The other caveat to this focus-run, is that it will usually use only a portion of the CCD chip in order to get faster readouts. This in turn puts more emphasis on keeping that *&%$ star centered.

I ran into problems right off the bat when trying to focus. I was using a Schmidt-Cassegrain telescope, which is notorious for image shift when focusing. This is because the SCT moves the primary mirror in order to focus. That star kept disappearing! I was able to perform a maintenance procedure provided by the manufacturer that all but eliminated the focus shift problem. Another method often employed, is to add a more traditional focuser to the back of the scope for the fine adjustments.

I still found myself spending what I thought was too long to get the focus set up. Just imagine having a camera stuck into the scope and you think you're centered on a star. But when you start the focus run, you get no image on the screen. Now you don't know if, A) you're really not centered over that tiny chip or B) you're focus is so far off that you can't even see the airy disk.

Flip-mirror to the rescue! At this point you have discovered that you need to fork over some more cash for yet another toy. This toy would work nicely for film cameras as well. A flip-mirror is a little box that goes between the scope and the camera. In its simplest form it is just a mirror that directs the image to a side port with which you can use an eyepiece to center and rough focus, then flip the mirror and take the picture. There are fancier ones that have off-axis guide ports and fine adjustments to allow you to set a particular eyepiece to the proper distance so that when you see a focused image the camera does too (par focal). This really makes the fine focus run very fast. It is also essential for easy targeting of dim objects. I now consider the flip mirror to be an essential piece of equipment.

Another little gem, that you will want to check out, is a focal reducer. This is simply a lens that reduces the magnification

of the scope. It makes it possible to image a larger area of sky so that you can fit that favorite nebula into the frame. These can be purchased as a separate add-on or can be ordered built into some flip-mirrors. You can get one that changes an f/10 into an f/6.3 or even a 3.3. This also makes the exposures a bit shorter.

Now you would think that you're all set, right? Well, not quite. Now you will find that that quick polar alignment you did for visual observing is not going to cut the mustard. You see, even though the CCD is about ten times faster than film, star trails show up even in a 30 second exposure. The polar alignment MUST be VERY good. This is the one step that you will have to pay real attention to. The drift method is the most utilized procedure.

There are ways around this. All of which involve more money. You could get a computer-controlled scope, which uses a simple two star alignment and has periodic error correction. Or, if you have a scope that is motorized in both axes, you can use a CCD that provides feedback to the scope to automatically keep the image centered. This auto-guiding can be accomplished with the same CCD if it supports that function, or by using another cheaper CCD to do the job.
So now, lets check… We have a scope with descent tracking abilities. You've set it up doing a really good polar alignment. You have your flip-mirror in place with the camera attached. Your computer is hooked up to the camera. Don't forget that portable power supply, it could be a long night. Now you aim that baby at a star, using the eyepiece in the flip-mirror. You carefully focus. Now start the focus run on the computer. Soon you have an image of a star on the screen, which is being updated every few seconds. You tweak that focus. Now find your favorite nebula and take a picture. Ahhh, instant gratification. See, when you do it right, it really is easy!

Start with easy, fairly bright objects. Short exposures and get a good feeling about the whole thing. Then try the fainter objects. Longer exposures. You will soon find how good the tracking and polar alignment are. Don't worry too much. You can take multiple short exposures and add them together. Not quite the same as a long exposure, but the results can be very good.

The best part is when you use your favorite photo processing software to enhance the photos and bring out that amazing detail. You don't need expensive software. Many of the packages provide with printers and scanners will do for starting out. Your 8 or 10-inch scope will yield images that look like they came from Palomar!

I am hooked. I have a lot to learn, but that is what is so great about this hobby. You can be happy getting good pictures of your favorite objects, or you can explore photometry and even spectroscopy using CCD imaging. The sky's the limit. Literally.

Next time we will get a bit more technical and take a look at what's inside a CCD and how a CCD camera works.