

The View From Arunah

Arunah Hill Natural Science Center

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Oct- Nov-Dec

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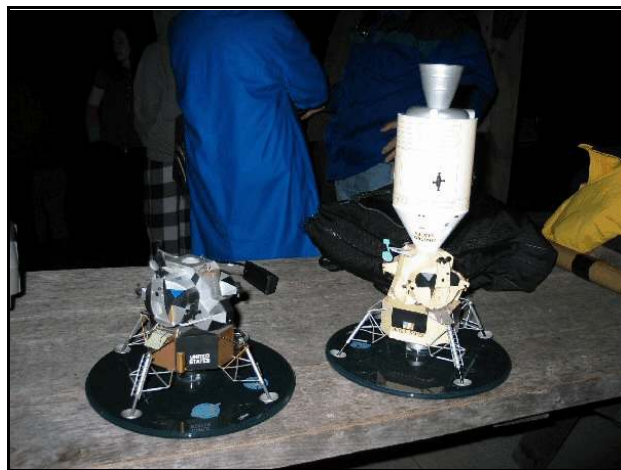
Photo of Joe Gavin's Talk at this year's Arunah Hill Days. Photo by Dan Carnevale.



A Note from the Treasurer

I don't know if you noticed it, but there is something new on the mailing label. We added the date that your membership expires. So please check it (10/2004 means that your membership expires at the end of Oct 2004). If the date on your mailing label indicates that your membership has expired, this will be the last issue of "The View from Arunah" that you will receive unless we hear from you. We value you as a member but if you don't value us we can't continue to bring you the benefits of membership in the Arunah Hill Natural Science Center. So, if this applies to you, act now before you forget, and renew your membership!

Thank you, Peter Scherff,



Mr. Gavin brought his toys to Arunah Hill Days!

The Editor's Desk

by Steve Pielock

Fall 2004

Arunah Hill Days Report

Arunah Hill Days started out kind of shaky with predictions of a weekend with tropical storm Ivan.

Overcast sky's prevailed for our Friday night speaker Glenn Chaple. Glenn gave a very engaging talk on variable star observing that was appreciated by all who attended. The activities concluded with "Really Bad Science Fiction Theater" and evening thunderstorms.

Saturday morning signaled improving weather conditions. In the afternoon, we had model rocketry and the annual Astronomy Association Horseshoe Throwing Tournament. Arunah Hill retained its title when Nick Volant won the final match!

By late afternoon, a northern cold front pushed into the region giving us hope for a clear night sky. As people gathered for a talk by keynote speaker Joe Gavin, they were treated to a stunning Arunah Hill sunset.

Joe gave an inspiring talk about how we engineered our way to the moon with project Apollo. At the conclusion of his talk, we were told that Joe had come to Arunah Hill on his 84th birthday! Thank you, Joe!

Joe Zuraw and Bruce Blanchard entertained us in the pavilion, and the evening ended with one of the most transparent observing conditions I've ever seen at the Hill. All and all not a bad weekend for one that was predicted to be a total tropical washout. So much for Ivan!

Thanks for attending this year's event,

Steve



How to Submit Material to *The View from Arunah*

The View from Arunah welcomes material submitted by guest contributors. The strength of this publication is its writers and photographers, so we are always on the lookout for new contributors. If you have an idea that you think might make a good article, or if you are an astrophotographer who would like others to enjoy your work, then please consider contacting us. Our staff will be happy to provide any assistance that you might need to get your work published in *The View From Arunah*.

To submit articles, photographs, or drawings, please send them to: Steve Pielock, 132 Sand Gully Rd, So. Deerfield MA 01373. Materials submitted via electronic mail should be sent to "pielock@pielock.com". Comments and criticisms are always welcome. Letters to the Editor or any of the section editors are also welcome.

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Horsing Around

By John Davis

As so many observers at summer star parties each year are reminded, the appearance in the eastern evening sky of the Great Square of Pegasus unmistakably signals the approaching of autumn. The familiar quadrangle of stars will appear tilted up on one corner, much as we might visualize a baseball diamond. This “Great Square” of four 2nd magnitude stars is really a giant asterism, and the star on the NE, at (“third base”), Alpheratz, actually belongs to Andromeda. The square represents the front half of the body and the wings of the great upside-down flying horse. His forefeet, head and neck stretch from the west corners of the square westward across the sky.

Pegasus was the mighty winged horse of Greek mythology that sprang up from the spilled blood of the slain Gorgon, Medusa, a monster whose head with hair of snakes was severed by the sword of the hero, Perseus. According to legend, Pegasus was tamed by and became the steed of another hero, Bellerophon, whose exploits and adventures included slaying a fire breathing monster Chimaera, and riding Pegasus, making a foolhardy attempt at soaring up to the temple of the gods on Mount Olympus, only to fall to his death. Pegasus did make it however, and Zeus, King of the gods used the great winged horse to deliver his thunderbolts and lightning back to Earth.

On mid-autumn evenings the Great Square rides high on the meridian, ideally positioned for viewing its deep sky treasures. In Pegasus these are predominantly galaxies that generally abound away from the dust laden zone of the plane of our galaxy, so evident along the path of the Milky Way. However this constellation can boast to being home to the glorious globular cluster **M-15** (or **NGC-**

7078), perhaps the finest in the autumn sky. Its only competition is its neighbor, M-2, just 13° S in Aquarius and a near twin to M-15 although somewhat more concentrated. In fact, few observers would disagree with putting M-15 among the “top ten” of the finest globular clusters in the sky. You can easily find M-15, located in the extreme western part of the constellation by starting at mag. 3.5 θ Peg. in the “head” of the horse, sliding barely over 7° NW to 2nd mag. ε Peg. (Enif) and continuing along that same line NW 4° to a 6th mag. star with a fuzzy patch adjacent, only 20 arc. min. W. That 12.3' fuzzy patch in your finder is M-15, glowing at mag. 6.35 from a remote spot 34,000 light years away. Discovered by Jean Dominique Maraldi in Sept. of 1746, this magnificent globular actually spans roughly 150 light years of space and contains possibly over 250,000 stars, all in a densely concentrated aggregation – class IV on the Shapley-Sawyer scale of I – XII, in which “I” represents the most densely concentrated globulars. If you have excellent eyesight under pristine transparent dark sky conditions you might be able to glimpse M-15 (and M-2) with the naked eye. M-15 has an extremely bright core, and even with a good 4 inch scope you’ll be able to resolve its outer regions. More stars will be resolved with increasing apertures, and under excellent sky conditions you might be able to resolve stars across the core at higher magnifications with good scopes of 8 or 10 inches of aperture.

M-15 is definitely an object that deserves scrutiny as you progress to larger apertures. As is the case with so many globulars, immediately evident are the several chains and strings of stars radiating outward, as well as are odd clumps of stars scattered around the central region. Years ago, pioneer Harvard astronomer, Harlow Shapley noticed the oblate shape of the central mass of the cluster. This elliptical form however, gives way to a spherical arrangement of stars surrounding the core area. Often mentioned are the presence in several areas of dark lanes and patches, noticed as early as the mid 19th Century. T.W. Webb cites an

astronomer named Buffham who, using a scope with a "9 inch speculum mirror" found a dark patch with two dark lanes near the center. Since then long exposure photographs have revealed other small dark patches, and, as is the case with M-13, amateurs have observed them in M-15, especially NW and SE of center. If you observe with a 12" or larger scope at powers of 150x or more you may want to check out these dark patches, possibly indicating the presence of residual dust in an ancient cluster. M-15 is also home to a large number of variable stars, over 100 of them, mostly of the RR Lyrae type.

Most notable and unique about M-15 however, is that this globular harbors a small faint planetary nebula. It was discovered in 1927 by F.G. Pease on photographic plates taken using the 100 inch Hooker telescope on Mount Wilson in California and is catalogued variously as Pease 1, PK 65-27.1 or K-648. It has been found to be a true member of the cluster, located northeast of center. Its tiny, 1 arc second glow at a dim 13.8 mag. makes finding it however another matter and offers a real challenge for serious observers. Observing this planetary visually has been accomplished however. The late Walter Scott Houston cited three different successful observations by amateurs, each using an Oxygen III narrowband filter and "blinking it in and out between the eye and eyepiece" to reveal the presence and identify the planetary among the myriad stars. So whatever the size of your scope, or your motivation in observing M-15, this is one glorious object you'll not want to leave off your fall observing list!

Let's swing back now easterly toward the SE corner of the Great Square to find **NGC-7479**, a beautiful barred spiral galaxy (Hubble type SBc), best seen in a moderate to larger aperture telescope, but which at mag. 10.8 and a surface brightness of 13.4 can even be picked up in a small scope like a good 3 inch refractor. Looking from second magnitude Markab (α Peg. At the SE corner of the Great Square) about 6° toward the SE, you will find a pair of stars about two degrees apart: 4th mag. ξ (xi) Peg. (nearer to α) and 3rd mag. ζ (zeta) along the "neck" of the horse. You can easily pinpoint the location of NGC-7479 just 3° south of Markab, and forming

the right angle of a right triangle with 4th mag. ξ Peg. (the closer star to Markab of the aforementioned pair). It lies just $4\frac{1}{2}^\circ$ due W from the galaxy. You might spot 6th mag. 52 Peg. in this area; NGC-7479 is just $1\frac{1}{2}^\circ$ to its ENE.

Spanning about 4 x 3 arc min. of sky and glowing at mag.10.8 from a very remote part of the universe over 100 million light years away, this great barred spiral is a giant among galaxies, measuring 120,000 light years across, considerably larger than our Milky Way galaxy and more nearly the size of the great Andromeda galaxy, M-31. Its most prominent feature is its fairly bright central bar, 4 arc min. long and aligned N-S around a small brighter nucleus. In moderate to large scopes of 12" to 15", especially with averted vision you might be able to make out, particularly at the S end, the beginnings of the curved spiral arms seen extended in long exposure photographs curving around in a reversed "S". Concentrated and patient gazing may reveal the longer extensions of these curved arms. The brighter S arm curves around a faint 14th mag. star. Scopes with apertures upwards of 20" under perfect conditions might even reveal mottling, a hint of bright knots indicative of star forming H-II regions and intervening dust lanes. As the author and keen eyed observer Stephen J. O'Meara has remarked: "Owners of monster Dobsonian telescopes can have a field day with this galaxy."

Now we'll hop northward to a spot beyond the "forefeet" of our winged horse to arrive at what is unquestionably the finest galaxy in Pegasus and ranks high among the better ones in the northern sky. This is the beautiful Spiral **NGC-7331**, another giant galaxy lying a remote 48 million light years away and glowing brightly at mag. 9.5. Start at 2nd mag. Scheat (β Peg.- 2nd Base) lying at the NW corner of the Great Square. Slide 5° WNW to 3rd mag. η (eta) Peg. in the N "forefoot". Continue NW just over $3\frac{1}{2}^\circ$ to 5.5 mag. 38 Peg. which sits just about 1° NNE of a 6th mag. star. Now starting at that 6th mag. star, and using the two stars as pointers, run your finder back through 38 Peg. NNE $2\frac{1}{2}^\circ$ from 38 where you should find NGC-7331 in your scope's low power eyepiece field. Just over 1° N of the galaxy, a pair of close (10') 6th mag. stars should appear in your finder. Of the Hubble type

Sbc it is inclined about 20° from edge-on and visually is very similar in appearance to the Andromeda galaxy, M-31. Indeed, although it is some 25 times more distant than M-31 at about 50 million LY, it occupies a 10.5' x 3.7' chunk of sky, indicating that the size of this giant spiral, with a mass of about 300 billion suns is about equal to that of Andromeda, or around 130,000 LY in diameter, again substantially larger than our Milky Way galaxy. Its elongated disk is aligned very close to a north-south orientation. Clearly visible in modest sized telescopes as a hazy 9th magnitude oval wisp, it will reveal more detail of course when viewed in larger apertures. Around 10" of aperture will show a bright core with a small star-like nucleus along with an expanded disk. As you move up to larger apertures into the "teens" of inches, you can notice mottling in the disk, suggestive of spiral arms and star forming knots of H-II regions, as seen on long exposure photographs. In fact, several studies have shown that substantial starburst activity has taken place, even in the central core regions of the galaxy. Also, by using averted vision you might be able to make out the dust lane so evident in photographs along the western (nearer) side of the galaxy.

Adding to the enjoyment of observing in the neighborhood of NGC-7331 is the challenge of glimpsing several faint galaxies just to the E of the galaxy's oval, not to mention a fine galaxy cluster half a degree to the south-southwest! If your scope's aperture (in inches) is into double figures you might be able to pick out one or more of the four small faint galaxies on the E side of the big galaxy. **NGC-7335** at mag.13.3 is the brightest of these, located about 3.5' ENE of 7331. **NGC-7337** at 14th mag. is about 5' ESE (looking "double" to a faint adjacent star) and is tougher to glimpse, as is 13.8 mag. **NGC-7340**, some 8' E. The faintest and tiniest, **NGC-7336**, just 2' NNE of NGC-7335 is usually missed, possibly detectable in a 20" scope under perfect conditions. That galaxy cluster we referred to is a popular target in the fall sky, and a favorite challenge for amateur observers, lying at an incredibly remote distance of about 300 million light years!

It was discovered in 1877 by the French astronomer Edouard Stephan and is known as **Stephan's**

Quintet. It's located only one half degree south-southwest of NGC-7331 and is remarkable in that its brightest member, **NGC-7320** at mag. 12.9 is not a member of the cluster at all, but a foreground object with a substantially smaller red-shift than the other four galaxies, merely a chance "line of sight" alignment. Indeed it shows more detail on photographs, and radio emission studies seem to link it with NGC-7331. If the aperture of your equipment is 10" or more you should be able to make out perhaps two or three smudges of the quintet, occupying altogether an area of sky of only 4 arc minutes. NGC-7320 at the SE corner of the group, spanning only 1.7' x 1' will be visible only as a small faint disk. It takes over 15" of aperture to show anything more than ill defined smudges in the rest of the group. At around mag.13.5 each, and lying just NW of NGC-7320, **NGCs-7318 A & B** will look like one elongated blur unless your scope has sufficient aperture, and then only will the two appear separate inside one fuzzy halo. **NGC-7317** at mag. 13.6 on the W end, only a tiny 25" spot, looks like a double to a 13th mag. star next to it. Last of all, if conditions are good enough and your scope's aperture permits, you might discern 13th mag. **NGC-7319**, a narrow wisp N of NGC-7320 on the northeast corner of the group. Three of these galaxies are tidally distorted spirals, but both NGC-7317 and NGC-7318A are E2 elliptical galaxies. Photographically, each of the five galaxies in Stephan's Quintet appear to be involved in gravitational tidal interaction, though with the foreground NGC-7320 this apparent interaction is merely illusory. Incidentally, for a more "in depth" discussion of Stephan's Quintet and other compact galaxy groups, be sure to read the article: "Galaxy Train Wrecks" on pp 30-37 of the November, 2004 issue of Sky and Telescope magazine.

So while you're observing NGC-7331 in this part of the sky, why not take the challenge and go for these faint fuzzies! And since the great winged horse has so many galaxies, you'll likely want to observe others. For example, two good ones are **NGC-7217** and **NGC-7814**. With a good star atlas you can easily hunt them down while enjoying viewing under the crisp clear skies of the autumn season.