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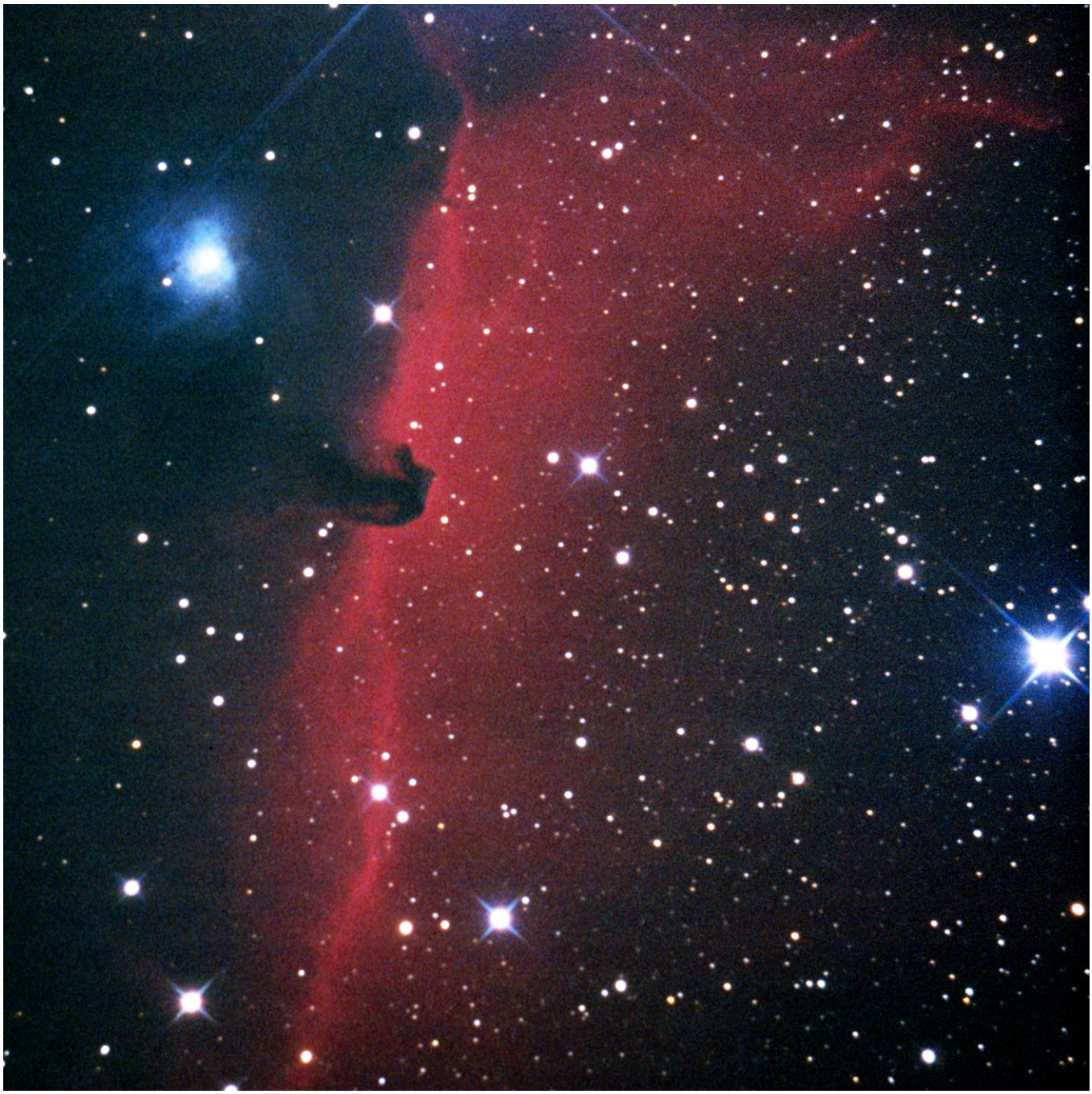

Volume 37 No. 3 December 2005/January 2006

the ASTROGRAPH

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COVER PHOTOGRAPH

Object.....IC 434, the Horsehead Nebula

Photographer.....Lee C. Coombs

Instrument.....10 inch F/5 Newtonian

Exposure\Film.....35 minutes/Kodak Ektachrome P200

Date.....15 January 2004

VOLUME 37 No. 3

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Product Evaluation: Celestron 80EQ

by
Robert C. Price

The product being evaluated is a "Celestron FirstScope 80EQ", model 21072, sold by Celestron and also under the L.L. Bean label. The 80EQ telescope comes with a small equatorial mount with manual controls. The mount was not evaluated and the optical tube assembly was removed from the equatorial mount and, as shown in figure 1, attached to a Losmandy universal dovetail plate for a Losmandy G-11 equatorial mount. The Celestron 80EQ telescope is an older model telescope that is not listed among the current Celestron products. This same optical tube assembly does appear to be sold in other manufacturer's telescopes. The Orion ShortTube 80mm rich-field refractor appears to be one such telescope. The Celestron 80EQ telescope has a short-tube optical system consisting of a 400mm focal length F/5 lens. Inspection of the optics reveals that the lens is an air-spaced achromatic. The optical description does not indicate that the lens contains any ED type glass. This was confirmed by the blue halo around bright stars. The blue halo is a good indication that there is no ED glass in the lens. ED glass in a lens allows a lens design that better brings the entire visible spectrum of light into sharp focus. The 80EQ telescope lens was compared to a Canon 300mm F/4 type FD camera lens with an adapter for the Canon 300D digital camera. This 300mm F/4 type FD lens consists of 6 elements. The adapter which allows FD type lenses to fit Canon EOS type cameras such as the 300D contains an optical element which increased the focal length of the lens to about 375mm. First comparisons of the 80EQ telescope lens and Canon 300mm FD camera lens were done in daylight. The image produced by the 80EQ telescope lens was not as sharp as that produced by the 300mm camera lens. The contrast was also better with the camera lens. The image was about 30 percent brighter with 80EQ telescope lens even though both lenses had almost the same diameter, 78mm for the 80EQ telescope lens and 73mm for the 300mm camera lens. Long exposure night photography showed some



Above: Figure 1, Celestron 80EQ telescope lens evaluation. Shown above is the 80EQ telescope optical tube assembly mounted to a Losmandy universal dovetail plate using the mounting rings that were originally used to attached the telescope to the 80EQ equatorial mount.

surprising results. Both lenses exhibited a significant amount of blue light blooming or bright blue haloes around brighter stars. The 300mm camera lens exhibited less blue light blooming, but not significantly less. A lot less blue light blooming should be expected with a high end 300mm camera lens which contains 6 elements that are designed to bring the entire visible spectrum of light into sharp focus. The optical element in the FD to EOS adapter may be the problem. Another unexpected result that was observed when comparing long night exposures was the sharpness of the 80EQ telescope lens. Although focusing the Canon 300D camera is more difficult than older film cameras such as the Canon AE-1 and Minolta 101, the authors brief test revealed that images taken with the 80EQ telescope lens showed sharper star images than those taken with the 300mm camera lens. Because of the difficulty in focusing the Canon 300D camera, this author will do more testing to confirm that the 80EQ telescope lens is indeed sharper than the 300mm camera lens. Additional tests with film and a Canon AE-1 camera instead of the Canon 300D should show if the FD to EOS lens adapter causes the poorer focus of the 300mm camera lens. Figure 3 and 4 show the differences in long exposure night images taken with the 80EQ telescope lens and the 300mm camera lens. Images taken with the 80EQ telescope lens showed slightly larger blue haloes around the brighter stars while also showing sharper images of the fainter stars. The author attempted to reduce the blue halos around bright stars by placing a 77mmUV filter in front of the 80EQ telescope lens. No reduction in the size of the blue halo was apparent. Both the 80EQ telescope lens and 300mm camera lens had about the same useful field, a circle about 1.4 degrees in diameter. Both lenses showed about the same amount of coma, but the 300mm camera lens showed better corner focus.



Above: Figure 2, equatorial mount and guide scope configuration used for making long exposures with the Celestron 80EQ telescope lens and the Canon FD 300mm F/4 lens. Shown above is the Losmandy G-11 equatorial mount with side-by-side mounted 900mm Orion guide scope and Celestron 80EQ telescope optical tube assembly.



Above: Figure 3, Celestron 80EQ telescope lens evaluation. M31 photographed by Robert C. Price on 31 October 2005 using a Celestron 80EQ F/5 telescope lens. Exposure was 263 seconds using a Canon 300D digital camera at 400ASA. Shown above is an enlarged portion of the image. Processing included dark frame subtraction, hot pixel reduction, and level adjustment. Color was not adjusted.



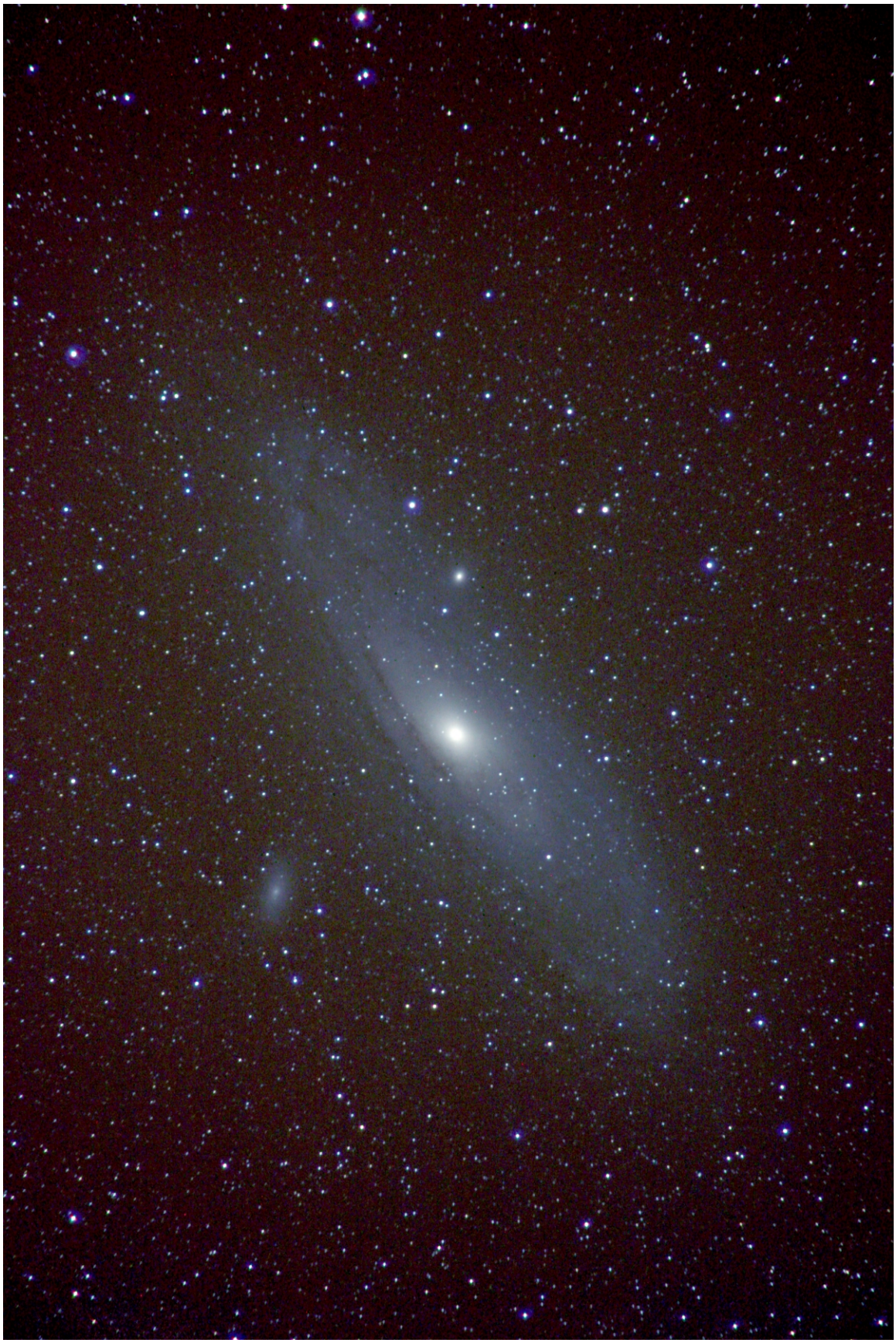
Above: Figure 4, Celestron 80EQ telescope lens evaluation. M31 photographed by Robert C. Price on 31 October 2005 using a Canon FD 300mm F/4 telephoto lens with an FD to EOS lens adapter. Exposure was 259 seconds using a Canon 300D digital camera at 400ASA. Shown above is an enlarged portion of the image. Processing included dark frame subtraction, hot pixel reduction, and level adjustment. Color was not adjusted.



Above: Figure 5, Celestron 80EQ telescope lens evaluation. M42 photographed by Robert C. Price on 12 November 2005 using a Celestron 80EQ F/5 telescope lens. Exposure was 567 seconds using a Canon 300D digital camera at 400ASA. Shown above is the full image frame. Processing included dark frame subtraction, hot pixel reduction, level adjustment, and color adjustment.



Above: Figure 6, Celestron 80EQ telescope lens evaluation. M45 photographed by Robert C. Price on 31 October November 2005 using a Celestron 80EQ F/5 telescope lens. Exposure was 278 seconds using a Canon 300D digital camera at 400ASA. Shown above is the full image frame. Processing included dark frame subtraction, hot pixel reduction, level adjustment, and color adjustment.



Above: Figure 7, Celestron 80EQ telescope lens evaluation. M31 photographed by Robert C. Price on 31 October 2005 using a Canon FD 300mm F/4 telephoto lens with an FD to EOS lens adapter. Exposure was 259 seconds using a Canon 300D digital camera at 400ASA. Shown above is the full image frame. Processing included dark frame subtraction, hot pixel reduction, level adjustment, and color adjustment.



Above: Galactic cluster NGC457 photographed by Lee C. Coombs on 1 October 2000 using a 10 inch F/5 Newtonian. Exposure was 22 minutes on Kodak Ektachrome P200 slide film.

Astrophotography for December and January

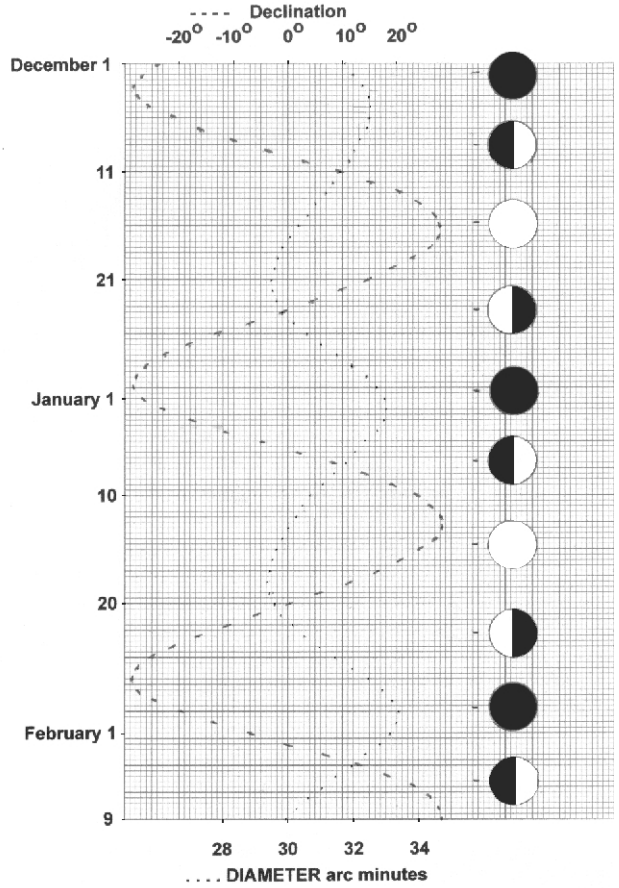
by

Ralph Proctor

Mercury begins December lost in the Sun's glare, but emerges from the Sun's glare in early December as a morning object low in the eastern sky. Mercury moves higher in the eastern sky and reaches a greatest western elongation of 21 degrees on 12 December when it will be in poor photographic position with a declination of minus 17 degrees. During January Mercury moves lower in the eastern sky and disappears into the Sun's glare in early January, reaching superior conjunction on 26 January.

Venus begins December as an evening object low in the western sky. Venus moves lower in the western sky and disappears into the sun's glare in early January. Venus reaches inferior conjunction with the Sun on 14 January and by the end of January emerges from the Sun's glare as a morning object low in the eastern sky.

Lunar Declination and Diameter:



The Moon's full phase will be located high on the ecliptic and in excellent photographic position during December (December 16) and January (January 13), with an apparent declination of up to +28 degrees.

Mars begins December as an evening object high in the western sky in the constellation Aries. Mars reached opposition on 7 November and is still in good photographic position with a declination of plus 16 degrees. During December and January Mars moves lower in the western sky, decreases in brightness from magnitude -1.6 to + 0.2, and decreases in diameter from 17.1 to 8.9 arc seconds.

Jupiter begins December as a morning object low in the eastern sky in the constellation Virgo but moves into the constellation Libra in early December. During December and January Jupiter moves higher in the eastern sky, increases in brightness from magnitude -1.7 to -2.0, and increases in diameter from 31.4 to 36.1 arc seconds.

Saturn begins December as a morning object high in the eastern sky in the constellation Cancer. During December and January Saturn moves higher in the eastern sky and reaches opposition on 27 January. Saturn increases in brightness from magnitude +0.2 to -0.2 , and increases in diameter from 19.3 to 20.4 arc seconds.

Uranus begins December as an evening object low in the western sky in the constellation Aquarius. During December and January Uranus moves lower in the western sky, decreases in brightness from magnitude +5.8 to + 5.9, and decreases in diameter from 3.51 to 3.36 arc seconds. Uranus is located at R.A. 22 hours 36.8 minutes declination -9 degrees 34 minutes on 15 December and at R.A. 22 hours 40.9 minutes declination -9 degrees 09 minutes on 15 January.

Neptune begins December as an evening object low in the western sky in the constellation Capricornus. During December and January Neptune moves lower in the western sky, decreases in brightness from magnitude +7.9 to +8.0, and decreases in diameter from 2.25 to 2.20 arc seconds. Neptune is located at R.A. 21 hours 36.0 minutes declination -15 degrees 50 minutes on 15 December and at R.A. 21 hours 15.8 minutes declination -16 degrees 03 minutes on 15 January.

Pluto begins December lost in the Sun's glare but

emerges from the Sun's glare in mid-February as a morning object low in the eastern sky. During December and January Pluto remains constant in brightness at magnitude +14.0. Pluto is located at R.A. 17 hours 28.0 minutes declination -15 degrees 32 minutes on 15 December and at R.A. 17 hours 40.6 minutes declination -15 degrees 54 minutes on 15 January.

Events:

Mars will be occulted by the Moon on 12 December (05 hours Universal Time) for the northeastern portion of Siberia.
Spica will be occulted by the Moon on 25 December (14 hours Universal Time) for all but the southern portion of northern and Central America, the Caribbean, and the northern tip of South America; and on 21 January (22 hours Universal Time) for central Asia, southern Japan, the Philippines and New Guinea.
Antares will be occulted by the Moon on 29 December (02 hours Universal Time) for southeastern Asia, Indonesia, the Philippines, the northern half of Australia, Fuji, and western Samoa; and on 25 January (12 hours Universal Time) for central South America.

The Sun will undergo a total eclipse on 29 March 2006. The eclipse starts in eastern Brazil, crosses the Atlantic and continues into Ghana, Togo, Benin, Nigeria, Niger, northwestern Chad, Libya, the northwestern tip of Egypt, Turkey, northwestern Georgia, southwestern Russia, Kazakstan, the southern tip of Russia, and ends in the northern tip of Mongolia. The eclipse begins and ends at 7 hours 36.8 minutes and 12 hours 45.6 minutes Universal Time respectively. Central eclipse at local apparent noon occurs at 10 hours 33.2 minutes Universal Time.

Correction: The caption on page 20 of the October November 2005 issue should read as follows: "Above: Galactic cluster M11, NGC4450, photographed by Lee C. Coombs on 17 July 2001 using a 10 inch F/5 Newtonian. Exposure was 25 minutes on Kodak Ektachrome P200 slide film."

MINOR PLANETS

		position			
		15 December		15 January	
Planet	Magnitude	R.A.	Decl.	R.A.	Decl.
Ceres	08.5- 09.0	18 hr 07.1 min	-25 deg 20 min	19 hr 02.7 min	-25 deg 23 min
Pallas	09.6 - 10.2	16 hr 39.9 min	+03 deg 21 min	17 hr 27.1 min	+04 deg 15 min
Juno	09.5 - 08.5	05 hr 04.7 min	-02 deg 01 min	04 hr 50.5 min	+01 deg 14 min
Vesta	08.5 - 06.8	07 hr 28.1 min	+21 deg 13 min	06 hr 56.1 min	+23 deg 35 min

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The Constellation Andromeda

by

Robert C. Price

The constellation Andromeda crosses the meridian just after 7 PM in mid-December. Andromeda is a medium size constellation located just north of the constellations Triangulum, Pegasus and Pisces. From east to west Andromeda is 3 hours 40 minutes in extent, from right ascension 22 hours 55 minutes to 2 hours 35 minutes. In declination it varies from 22 degrees north declination to 53 degrees north declination. On the north it borders Cassiopeia and Perseus, on the east Perseus, and on the west Lacerta. The constellation contains a number of galaxies, among which is M31, the brightest and largest galaxy in the sky. Andromeda also contains two galactic star clusters NGC 752 and 7686, and one planetary nebulae, NGC 7662. Some objects of photographic interest are listed in the table on page 45.

Zeta Andromedae is a good example of an "ellipsoidal variable" star whose components are probable in contact and shaped like ellipsoids because of gravitational distortions. The two stars rotate around their center of gravity with a period of 17.77 days and are separated by less than 10 million miles. Estimated distance to this pair is 100 light years.

Omicron Andromedae is a peculiar variable of undetermined class. The variability is about one magnitude and there is at times spectroscopic evidence of a gas shell abound the star. The shell is probably linked to the most interesting feature of the star, its rotational speed. At 215 miles per second it is the highest rotational velocity known.

R Andromedae is a long period pulsating red giant variable star of the Mira class. R Andromedae sometimes reaches 6th magnitude with an average period of 409 days. Its brightness range has exceeded 9 magnitudes. Estimated distance to this red giant is over 800 light years.

M31 is the well known Andromeda Galaxy, the brightest and closest spiral galaxy to the Milky Way. It is classified as a type Sb spiral galaxy and is tilted 15 degrees from an edge-on orientation. The Andromeda Galaxy contains over 300 billion individual stars. Estimated distance to this galaxy is 2.9 million light years, making it some 180,000 light years in diameter. The main visible portion of the galaxy is 2.7 degrees in extent or 110,000 light years in diameter. M31 has 4 companion galaxies which are gravitationally connected. M31 and NGC 205 are elliptical galaxies and are located close to M31. NGC 185 and NGC 147 are dim companions and are located about 7 degrees north of M31. These two dim companions are 58 arc minutes distant from each other. The Andromeda Galaxy is surrounded by some 140 globular star clusters whose distribution is similar to the globular star clusters that surround the Milky Way.

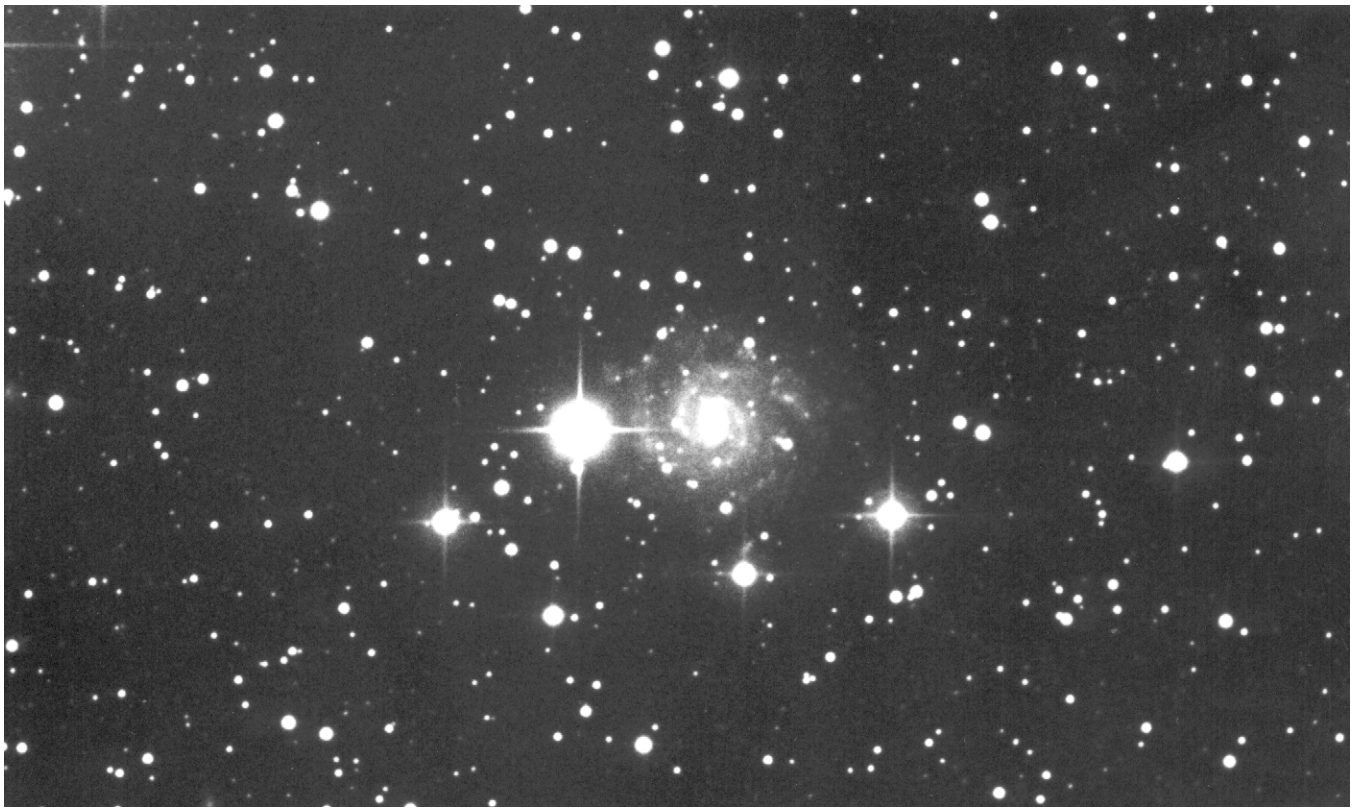
NGC 891 is a beautiful example of an edge-on galaxy complete with an equatorial dust band that extends the length of the galaxy. Estimated distance to this galaxy is between 20 and 40 million light years. Although not as bright as M31, NGC 891 has an estimated diameter of 110,000 light years.

NGC 7662 is a bright, slightly elliptical planetary nebula some 30 arc seconds in diameter. It has a bluish-green color, typical of most planetary nebula and caused by fluorescence from the strong radiation of the blue dwarf central star. At an estimated distance of 5600 light years this planetary nebula is 0.8 light years in diameter.

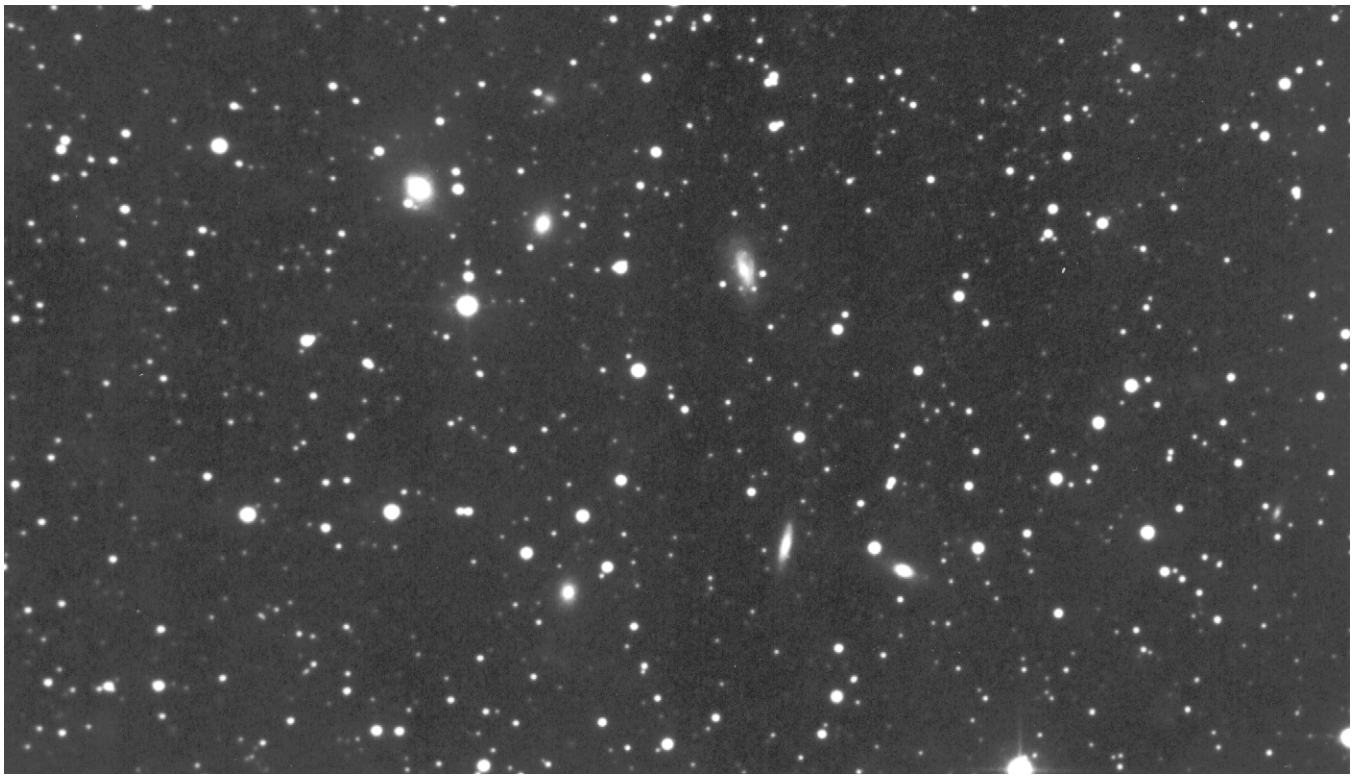
NGC 752 is a bright open star cluster consisting of some 125 members that range in brightness from 9th to 12th magnitude. At an estimated distance of 1300 light years this cluster must be some 17 light years in diameter.

Objects for Astrophotography in Andromeda

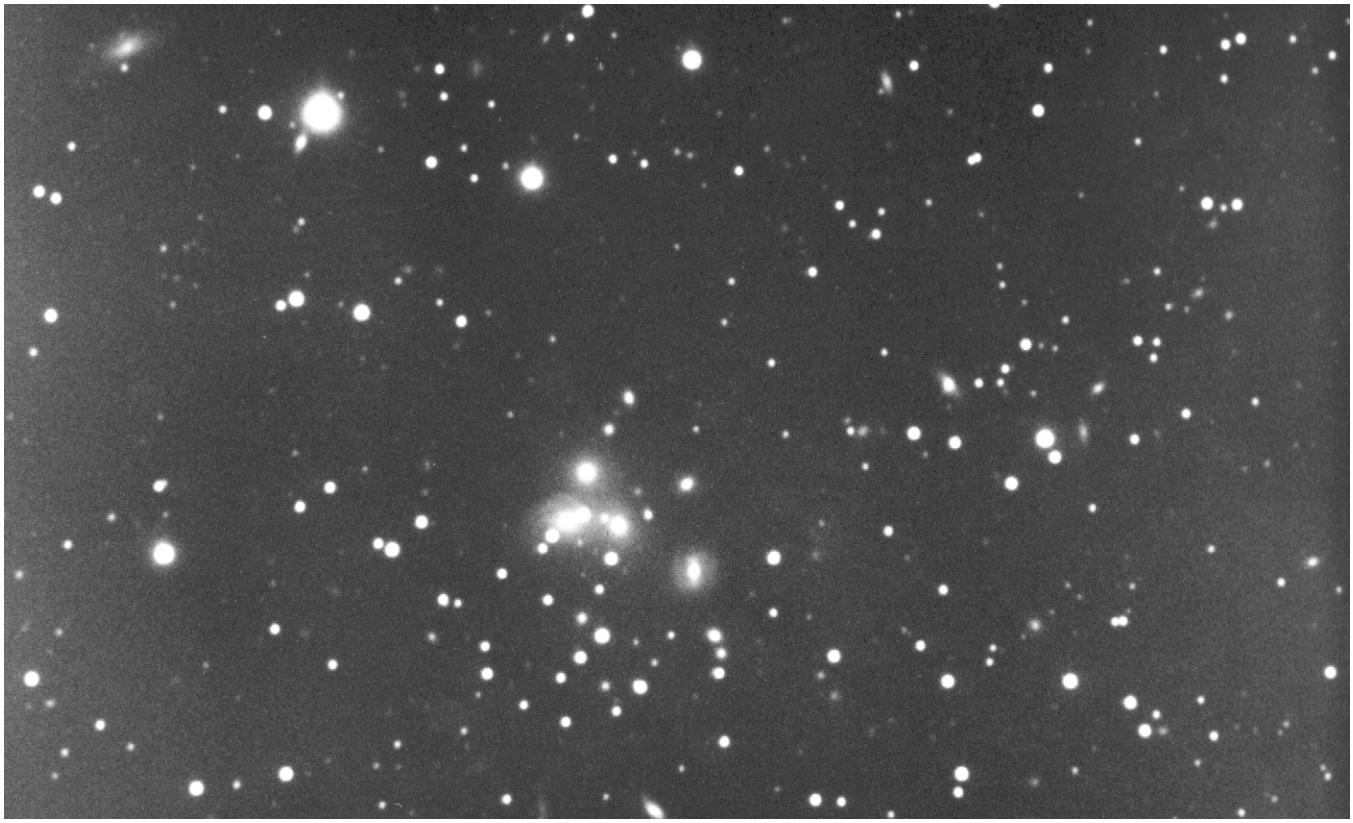
	Mag.	Size.	R.A.		Declination		Description
NGC 51	14.5	2.0' x 2.0'	00 hr	04.5 min	+48 deg	15 min	S0 spiral galaxy in a small cluster of galaxies.
NGC 70	14.5	2.0' x 2.0'	00 hr	18.4 min	+30 deg	04 min	Sc spiral galaxy in a small cluster of galaxies.
NGC 205	10.8	8.0' x 3.0'	00 hr	37.6 min	+41 deg	25 min	E6 elliptical galaxy.
NGC 214	12.8	1.4' x 0.8'	00 hr	38.7 min	+25 deg	14 min	Sb spiral galaxy
NGC 224	5	160' x 40’	00 hr	40.0 min	+41 deg	00 min	M31, the Andromeda Galaxy.
NGC 221	9.5	3.6’ x 3.1’	00 hr	40.0 min	+40 deg	36 min	M32, an E2 elliptical galaxy
NGC 404	11.9	1.3’ x 1.3’	01 hr	06.6 min	+35 deg	27 min	E0 elliptical galaxy.
NGC 708	13.5	0.5’ x 0.4’	01 hr	49.8 min	+35 deg	35 min	E1 elliptical galaxy.
NGC 753	12.9	1.8’ x 1.5’	01 hr	54.6 min	+35 deg	41 min	Sc spiral galaxy.
NGC 752		45’ dia	01 hr	54.8 min	+37 deg	26 min	Galactic star cluster with 70 members.
NGC 891	12.2	12.0’ x 1.0’	02 hr	19.3 min	+42 deg	07 min	Sb edge-on spiral galaxy.
NGC 7640	12.5	9.0’ x1.0’	23 hr	19.7 min	+40 deg	35 min	Sb spiral galaxy.
NGC 7662	8.5	30" dia	23 hr	23.4 min	+42 deg	12 min	Planetary nebula with 14th mag. central star.
NGC 7686		12’ dia	23 hr	27.7 min	+48 deg	51 min	Galactic cluster, irregular, with 12 members
IC 239	11.2	4.6' x 4.3'	02 hr	36.5 min	+38 deg	58 min	SBc spiral galaxy.



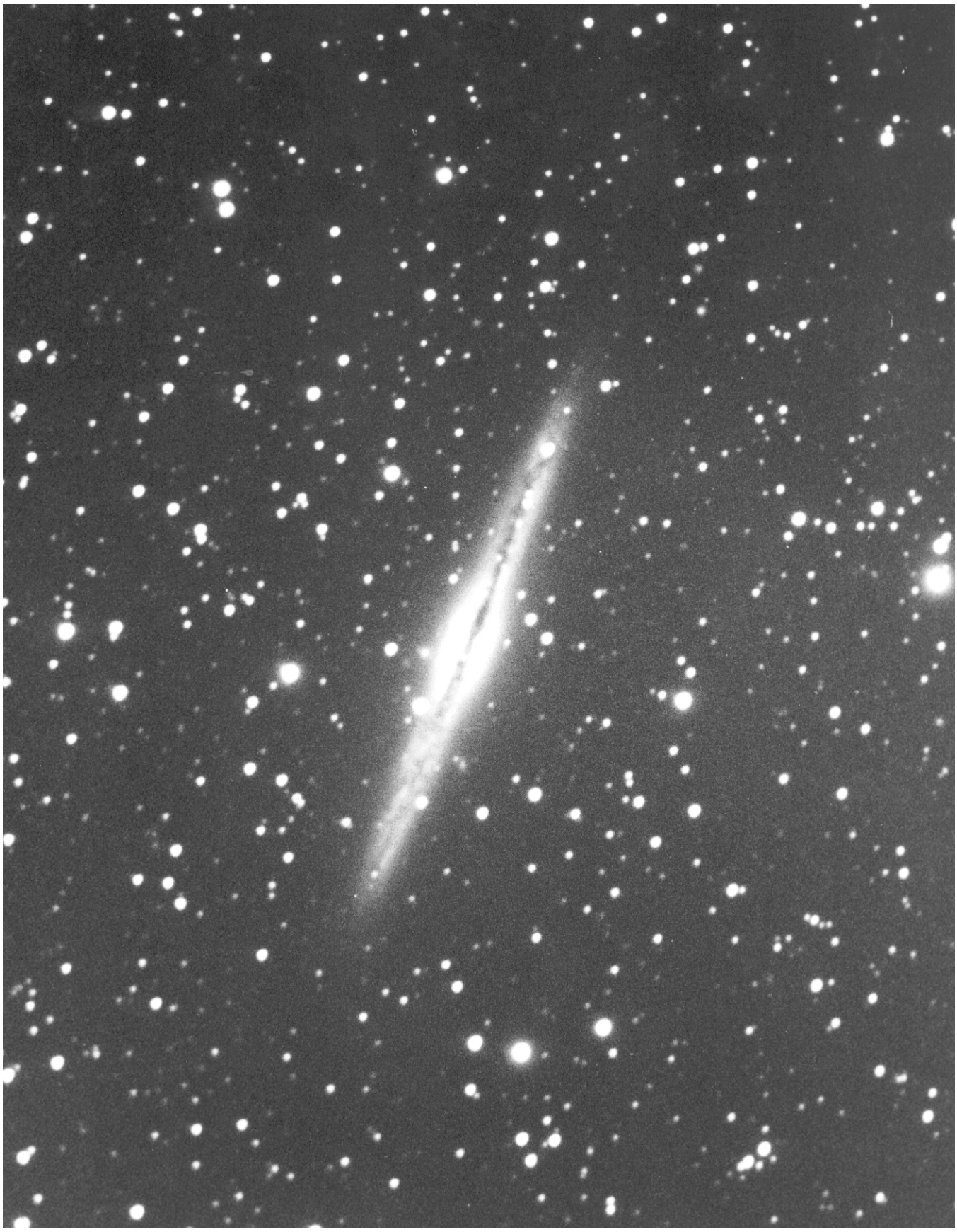
Above: Galaxy IC 239 photographed by Martin Germano from Mt. Pinos CA on 8 December 1996 using a 14.5 inch F/5 Newtonian with coma corrector and ST-4 autoguider. Exposure was 150 minutes on hypersensitized Kodak 2415 film developed in D-19 for 6 minutes at 68°F.



Above: NGC 51 galaxy cluster photographed by Martin Germano from Mt. Pinos CA on 21 November 1998 using a 14.5 inch F/5 Newtonian stopped to F/6 and ST-4 autoguider. Exposure was 110 minutes on hypersensitized Kodak 2415 film developed in D-19 for 7 minutes at 68°F.



Above: NGC 70 galaxy cluster photographed by David Healy from Sierra Vista Arizona on 15 September 1993 using a 14 inch SCT at F/7 and ST-4 autoguider. Exposure was 110 minutes on hypersensitized Kodak 2415 film.



Above: Edge-on spiral galaxy NGC 891 photographed by David Healy from Sierra Vista Arizona on 21 October 1995 using a 14 inch SCT at F/7 and ST-4 autoguider. Exposure was 90 minutes on hypersensitized Kodak 2415 film.



Above: Reflection nebula NGC 7023, the Iris Nebula, photographed by Lee C. Coombs on 13 August 2001 using a 10 inch F/5 Newtonian. Exposure was 30 minutes on Kodak Ektachrome P200 slide film.