APPENDIX 1

Internet Resources

Web Sites: Reviews and Resources

- *Adventures in Deep Space* (http://www.angelfire.com/id/jsredshift/). The focus of this site is "challenging observing projects" aimed at dark-site observers, but this excellent collection of pages contains much information on observing the deep sky of interest to City Lights astronomers.
- *The Astronomical League* (http://www.astroleague.org/). The prime attraction is the Observing Clubs section, and especially the Urban Club.
- *Sky Charts* (http://www.stargazing.net/astropc/). The home page for *Cartes du Ciel*, the excellent freeware planetarium program. The charts in this book, are based on the output of this wonderful planetarium program.
- *The NASA Extragalactic Database* (http://nedwww.ipac.caltech.edu/). Aimed largely at professional astronomers, this is also an incredible tool for the amateur, with detailed information on thousands and thousands of galaxies.
- *SEDS Messier Database* (http://www.seds.org/messier/). This online illustrated Messier catalog is one of my most frequently used web sites. In addition to in-depth info on each object, it includes links to other resources on the Messier objects.
- *SEDS Interactive NGC Catalog Online* (http://www.seds.org/~spider/ngc/ngc.htm). SEDS also has the NGC catalog available in a format similar to its online Messier catalog. Not quite as well done or information-rich as the Messier database, this is still a handy and quick way to get the vital statistics of NGC objects.
- *Sketching and Observing the Deep Sky* (http://www.skyrover.net/ds/). Thousands of excellent drawings of deep sky objects (DSOs). I often find drawings of DSOs more indicative of what I'll see through the eyepiece than the best long-exposure images.

- *Skyhound* (http://skyhound.com/sh/skyhound.html). This site is produced by Greg Crinklaw, developer of the *Skytools 2* program, and contains information on objects appropriate for observing for the current month. It also contains features and information on deep sky observing of interest to all observers.

Mailing Lists

- *Rod's City Lights* (*Yahoo Group*) (http://groups.yahoo.com/group/rodscitylights/). The author's Yahoo mailing list for discussion of this book and city-based observing in general.
- *Urban Astronomers* (*Yahoo Group*) (http://groups.yahoo.com/group/urban_astronomers). This online forum is not very active, but when there's message traffic it shows great potential.

Digitized Sky Survey Images

The DSS images used throughout this book are here thanks to the kind permission of Palomar Observatory and the Digitized Sky Survey created by the Space Telescope Science Institute (STScI), operated by AURA, Inc. for NASA:

> The Digitized Sky Surveys were produced at the Space Telescope Science Institute under U.S. Government grant NAG W-2166. The images of these surveys are based on photographic data obtained using the Oschin Schmidt Telescope on Palomar Mountain and the UK Schmidt Telescope. The plates were processed into the present compressed digital form with the permission of these institutions.
>
> The National Geographic Society—Palomar Observatory Sky Atlas (POSS-I) was made by the California Institute of Technology with grants from the National Geographic Society.
>
> The Oschin Schmidt Telescope is operated by the California Institute of Technology and Palomar Observatory.

APPENDIX 2

Finding Directions in the Sky

Degrees, Minutes, and Seconds

From our perspective, the sky appears to be a globe just like the globe of the Earth, and can, like the Earth, be divided into 360° of circumference. We define distance in the sky using this system. Object "X" is said, for example, to be 10° from object "Y." How far is a degree in the sky? Luckily, there's a simple measurement system that's been used for ages and which is surprisingly accurate. 1° is the width of your index finger held at arm's length. 10° is the width of your closed fist, again held at arm's length. 20° is the distance from the tip of your thumb to the tip of your little finger on your spread hand. A degree is further divided into 60 arc minutes (′), and a minute is split into 60 arc seconds (″). The Moon is about 30′ (minutes) in diameter.

To find objects using the directions given in the tours in this book, it is vital you know the diameter in degrees and/or minutes of your eyepiece and finder fields. Determine the amount of true field your eyepieces show with a particular telescope by dividing an eyepiece's *apparent* field (given by the manufacturer in his specifications for the eyepiece) by the magnification it yields in your instrument. A 25-mm eyepiece with a 50° apparent field that's delivering a magnification of 80× yields a true field of 37.2 min, a little over half a degree:

$$50/80 = 0.62 \text{ degrees}$$

$$60 * 0.62 = 37.2 \text{ minutes}$$

The easiest way to find the size of your finder's true field is by placing a bright star on one edge of its field. Find another prominent star directly across from this one in the field. Referencing a detailed star chart, measure the distance between the two in degrees and minutes (use the declination scale). My telescope's finder just barely includes both Castor and Pollux in one field. Looking at a chart, I can see that makes my finder's field about 4° 30' in diameter.

Right Ascension (RA) and Declination (Dec)

Right ascension (RA) and declination (Dec) are the longitude and latitude of the celestial sphere. Just as it's more convenient to say a city lies at 30° north and 88° west instead of saying that it is 10° south of New York City, it's convenient to be able to describe a location in the sky in exact terms. RA and Dec seem difficult to understand at first, but they are really easy concepts; if you understand Earthly latitude and longitude, you already understand RA and Dec. Declination is measured from the celestial equator, which is at 0° declination, to the poles which are at 90°. Degrees north of the celestial equator is expressed as a positive (+) value (if there's no sign given, the Dec is assumed to be north), while degrees south of this imaginary line is expressed as a negative (−) declination. The north celestial pole is at a declination of +90°; the south celestial pole is −90° declination.

On Earth, Longitude is measured from Greenwich, England. In the sky, some arbitrary point had to be chosen for celestial longitude to "begin." That place in the sky is *The First Point of Aries*, the Vernal Equinox, the spot where the Sun crosses the celestial equator on its way back North. RA increases to the east and, unlike Earthly longitude, is expressed in *hours, minutes, and seconds* rather than degrees, minutes, and seconds. This makes sense because the celestial sphere is "turning" once every 24 h (approximately). Point your scope at a spot in the sky, turn off the drive, come back in an hour, and the scope will now be focused on a spot *one hour of RA east* of its original point. The celestial globe has turned one hour of RA westward. One hour of RA is equivalent to 15° in the sky—the celestial globe is rotating at a rate of 15° per hour.

Directions in the Sky

Often, when novice astronomers are trying to describe an object's position in the sky they will say something like, "It's just above and to the right of that big star." We all occasionally use "up," "down," "right," and "left" to describe sky positions, but this is an awkward and ambiguous way to describe locations. Much better is to use compass directions. If I say a galaxy is 5° east of Spica, you have a pretty good idea of exactly where it is in the sky, no matter what Spica's current position. To get a grip on compass directions in a telescope eyepiece, forget about terrestrial map directions and think only in terms of the sky. North is in the direction of Polaris. South is opposite. East is always at a right angle to north. West is the opposite direction.

To locate objects, you need to know what the compass directions are in your finder and in your main scope. In either telescope or finder field of view, no matter how the view is inverted or reversed, east is the direction where stars *enter* the field with the telescope's clock drive turned off (or when you move your scope toward the eastern horizon). West is where they *leave* the field with the drive off. Move the telescope west, and the stars will *enter* on the west side of the field and *leave* on the east. Slew your scope toward Polaris, and stars will *enter* the field from the north. South is the direction where stars *leave* the field when you move north. Nudge the telescope to the south, away from Polaris, and objects will *enter* on the southern side of the field and *leave* on the north. *Practice determining compass directions in the eyepiece field until you are as comfortable as possible with this concept.*

APPENDIX 3

Object Classifications and Descriptions

Globular Clusters

Globular clusters, ancient balls of stars orbiting the Milky Way's center, are sorted according to the classification scheme developed by Harlow Shapley and Helen Sawyer Hogg. In this system, they are rated on a 12-step scale from I (very concentrated) to XII (not concentrated). It's common to see Shapley–Sawyer classes written as either Roman numerals or Arabic numbers.

Open Clusters

The Trumpler system for classifying open (galactic) star clusters, groups of newborn stars that reside in the Milky Way's spiral arms, was developed by R.J. Trumpler in the 1930s, and groups open clusters according to following three characteristics: concentration, range in brightness, and richness.

- *Concentration:*
  - I. Detached, strong concentration toward center;
  - II. Detached, weak concentration toward center;
  - III. Detached, no concentration toward center;
  - IV. Not detached from surrounding star field.
- *Range in Brightness:*
  1. Small range;
  2. Moderate range;
  3. Large range.

- *Richness:*
  - p. Poor (<50 stars);
  - m. Moderately rich (>50 stars <100 stars);
  - r. Rich (>100 stars).

An open cluster labeled as a "II, 1, p," for example, would be a "detached cluster with weak concentration with a small range in star brightness, which is poor in richness, containing 50 stars or less."

Galaxies

The famous Hubble Type galaxy classification system arranges galaxies, "island universes," according to basic appearance, characteristics of their arms and nuclei, and other features such as flatness in the case of ellipticals.

Elliptical Galaxies (E), E0–E7

E0 is a spherical galaxy, E7 is a highly flattened, almost saucer-shaped elliptical.

- *Other Elliptical Specifiers:*
  - d: Dwarf;
  - c: Supergiant;
  - D: possesses a diffuse halo.

S0 Galaxies are transitional types between spirals and ellipticals. They share some characteristics of both types, but these disk-shaped galaxies are not necessarily evolved from one type or evolving into another.

Spiral Galaxies (S)

Sa: tightly wound arms;
Sb: moderately wound arms;
Sc: loosely wound arms.

Barred Spiral Galaxies (SB). These are galaxies whose central regions sport a "bar-shaped" feature composed of dust, gas, and stars.

SBa: tightly wound arms;
SBb: moderately wound arms;
SBc: loosely wound arms.

Irregular Galaxies are those shapeless (and usually small) objects similar to the Milky Way's Magellanic Clouds.

Ir: Irregular Galaxy.

Planetary Nebulae

The Vorontsov–Velyaminov (VV) Types system is the most common means of describing planetary nebulae, the remnants of dead solar mass stars. It is used in the famous PK catalog of planetaries.

1. Stellar;
2. Smooth disk (a: brighter center, b: uniform brightness, c: ring structure);
3. Irregular disk (a: irregular brightness distribution, b: ring structure);
4. Ring structure;
5. Irregular form (like a diffuse nebula);
6. Anomalous form (no structure).

The Dreyer (NGC) Codes

The Great NGC catalog, that old standby of both amateur and professional astronomers, features detailed descriptions for each of its objects. Unfortunately, these descriptions are expressed in a cryptic system of "codes." These codes are often modified with a large range of descriptive letters such as "p" for "pretty" as in "pretty bright." A complete list of these letters and their meanings can be found at http://www.seds.org/billa/ngc.html

- *Brightness:*
  - B Bright
  - pB Pretty bright
  - cB Considerably bright
  - vB Very bright
  - eB Extremely bright
  - F Faint
  - pF Pretty faint
  - cF Considerably faint
  - vF Very faint
  - eF Extremely faint
- *Size:*
  - L Large
  - pL Pretty large
  - cL Considerably large
  - vL Very large
  - eL Extremely large
  - S Small
  - pS Pretty small
  - cS Considerably small
  - eS Extremely small
  - vS Very small

- *Shape:*

R	Round
vlE	Very little extended
E	Elliptical
cE	Considerably extended
pmE	Pretty much extended
mE	Much extended
vmE	Very much extended
eE	Extremely extended

Object Abbreviations Used in This Book

dif = diffuse nebula
dst = double star
gal = galaxy
glb = globular star cluster
OC = open (galactic) star cluster
QSO = QUASAR
ref = reflection nebula
snr = supernova remnant

APPENDIX 4

The Urban Astronomer's Guide: Complete List of Objects

Object Name	Type	Constellation	Right Ascension	Declination	Magnitude	Size
M94	gal	CVn	12h51m08.7s	+41°05′16″	8.9	5.0′ × 3.5′
M51 (Whirlpool)	gal	CVn	13h30m07.0s	+47°09′49″	8.9	11.0′ × 7.0′
M106	gal	CVn	12h19m14.7s	+47°16′21″	8.3	17.4′ × 6.6′
M63 (Sunflower)	gal	CVn	13h16m04.6s	+41°59′53″	8.6	12.6′ × 7.5′
M81	gal	UMa	09h55m36.0s	+69°04′00″	6.9	21.0′ × 10.0′
M82	gal	UMa	09h56m22.0s	+69°39′27″	8.4	10.5′ × 5.1′
M101	gal	UMa	14h03m25.2s	+54°19′05″	7.9	22.0′ × 22.0′
M97 (Owl)	pln	UMa	11h15m06.5s	+54°59′22″	11.0	3.4′ × 3.3′
M 108	gal	UMa	11h11m51.9s	+55°38′47″	10.0	8.1′ × 2.7′
M3	glb	CVn	13h42m26.2s	+28°20′54″	6.3	18.0′
Cor Caroli	dst	CVn	12h56m17.5s	+38°17′13″	2.9	—
M65	gal	Leo	11h19m13.0s	+13°03′46″	10.2	9.1′ × 2.2′
M66	gal	Leo	11h20m32.3s	+12°57′36″	9.6	8.7′ × 4.1′
NGC 3628	gal	Leo	11h20m34.1s	+13°33′28″	10.3	12.0′ × 3.3′
NGC 2903	gal	Leo	09h32m28.3s	+21°28′42″	9.1	12.6′ × 5.5′
NGC 3190	gal	Leo	10h18m23.5s	+21°48′24″	12.1	5.5′ × 1.7′
NGC 3193	gal	Leo	10h18m43.1s	+21°52′04″	12.0	3.5′ × 1.8′
M105	gal	Leo	10h48m07.1s	+12°33′14″	9.6	4.8′
NGC 3384	gal	Leo	10h48m18.0s	+12°38′00″	10.0	5.9′
NGC 3389	gal	Leo	10h40m30.0s	+12°32′00″	12.0	2.7′
M95	gal	Leo	10h44m15.0s	+11°40′33″	9.7	6.0′ × 4.0′

(*cont.*)

Object Name	Type	Constellation	Right Ascension	Declination	Magnitude	Size
M96	gal	Leo	10h46m48.0s	+11°49′00″	9.3	6.0′ × 4.0′
NGC 3521	gal	Leo	11h06m05.6s	−00°03′50″	9.7	9.5′ × 5.4′
Algieba	dst	Leo	10h20m16.5s	+19°48′54″	2.2	—
Melotte 111	OC	Com	12h25m22.9s	+26°04′31″	2.9	5.0°
M64 (Black Eye)	gal	Com	12h57m00.0s	+21°39′09″	8.5	9.3′ × 5.1′
NGC 4565	gal	Com	12h36m37.5s	+25°57′21″	9.6	14.8′ × 2.1′
M53	glb	Com	13h13m11.0s	+18°08′22″	7.6	13.0’
NGC 5053	glb	Com	13h16m42.9s	+17°40′11″	9.8	9.0’
M88	gal	Com	12h32m15.9s	+14°23′22″	9.6	6.8′ × 3.6′
M99	gal	Com	12h19m06.2s	+14°23′09″	9.9	5.3′ × 4.6′
M100 (Catharine)	gal	Com	12h22m48.0s	+15°30′26″	12.6	4.7′ × 1.1′
M85	gal	Com	12h25m40.8s	+18°09′36″	9.1	7.4′ × 5.9′
NGC 4394	gal	Com	12h26m12.3s	+18°10′59″	10.9	3.5′ × 3.3′
NGC 4725	gal	Com	12h50m42.9s	+25°28′10″	9.4	10.4′ × 7.2′
NGC 4559	gal	Com	12h36m14.3s	+27°55′42″	10.5	11.0′ × 4.9′
NGC 4147	gal	Com	12h10m22.8s	+18°30′39″	10.3	4.0′
24 Com	dst	Com	2h35m22.8s+	18°20′46″	6.7	—
M60	gal	Vir	12h43m56.6s	+11°31′19″	8.8	7.2′ × 5.9′
NGC 4647	gal	Vir	12h43m49.0s	+11°33′05″	11.9	2.8′ × 2.3′
M59	gal	Vir	12h42m18.7s	+11°37′02″	9.6	5.0′ × 3.8′
M58	gal	Vir	12h38m00.5s	+11°47′16″	10.8	5.0′ × 3.8′
M89	gal	Vir	12h35m42.0s	+12°33′00″	9.8	5.0′ × 4.6′
M90	gal	Vir	12h37m06.6s	+13°07′55″	9.5	9.5′ × 4.5′
M87	gal	Vir	12h31m05.7s	+12°21′38″	8.6	7.0′
NGC 4476	gal	Vir	12h30m15.7s	+12°19′05″	13.1	1.8′ × 1.3′
M84	gal	Vir	12h25m20.6s	+12°51′21″	9.1	6.7′ × 6.0′
M86	gal	Vir	12h26m28.8s	+12°54′54″	8.9	9.8′ × 6.3′
NGC 4387	gal	Vir	12h25m58.4s	+12°46′45″	12.0	1.7′ × 1.1′
NGC 4388	gal	Vir	12h26m03.5s	+12°37′53″	11.0	5.5′ × 1.4′
Porrima	dst	Vir	12h41m56.0s	−01°28′46″	3.5	—
3C 273	QSO	Vir	12h29m23.3s	+02°01′19″	12.8	—
M12	glb	Oph	16h47m29.6s	−01°57′35″	6.1	16.0′
M10	glb	Oph	16h57m24.8s	−04°06′42″	6.6	20.0′
M5	glb	Ser	15h18m49.7s	+02°03′40″	5.6	22.0′
M 107	glb	Oph	16h32m48.9s	−13°04′01″	7.9	10.0′
NGC 6235	glb	Oph	16h53m24.0s	−22°11′00″	10.2	5.0′
M62	glb	Oph	17h01m32.0s	−30°07′19″	6.5	15.0′
NGC 6572	pln	Oph	18h12m06.0s	+06°51′00″	9.0	11.0″
Mirfak	dst	Her	16h08m18.8s	+17°02′08″	5.0	—
M80	glb	Sco	18h36m41.7s	−23°54′05″	5.1	32.0′
M17	dif	Sgr	18h21m03.9s	−16°09′38″	6.0	11.0′
M16	dif	Ser	18h19m06.6s	−13°45′48″	6.0	15.0′
M8 (Lagoon)	dif	Sgr	18h04m00.0s	−24°23′07″	5.0	45.0′ × 30.0′
NGC 6530	OC	Sgr	18h05m03.9s	−24°18′52″	5.1	14.0′
M4	glb	Sco	16h23m54.5s	−26°32′17″	5.9	26.0′
M6	OC	Sco	17h40m06.0s	−32°13′00″	4.2	20.0′
NGC 6144	glb	Sco	16h27m32.4s	−26°02′04″	9.1	7.4′

Object Name	Type	Constellation	Right Ascension	Declination	Magnitude	Size
Antares	dst	Sco	16h29m42.9s	−26°26′41″	0.96	—
M39	OC	Cyg	21h32m20.9s	+48°27′25″	4.6	32.0′
M29	OC	Cyg	20h24m06.2s	+38°32′25″	7.5	6.0′
M71	glb?	Sge	19h53m58.3s	+18°47′11″	8.3	6.0′
NGC 6910	OC	Cyg	20h23m14.0s	+40°47′22″	7.3	7.0′
NGC 6866	OC	Cyg	20h03m52.6s	+44°00′03″	9.0	6.0′
NGC 6819	OC	Cyg	19h41m27.7s	+40°11′26″	9.5	5.0′
NGC 6834	OC	Cyg	19h52m23.4s	+29°25′14″	9.7	5.0′
NGC 6830	OC	Vul	19h51m14.4s	+23°04′10″	8.0	12.0′
NGC 6823	OC	Vul	19h43m19.6s	+23°18′36″	7.0	12.0′
Albireo	dst	Cyg	19h30m54.3s	+27°57′53″	3.1	—
M57 (Ring)	pln	Lyr	18h53m45.3s	+33°01′44″	9.4	1.1′
M27 (Dumbbell)	pln	Vul	19h59m48.1s	+22°43′47″	7.3	8.5′ × 5.7′
NGC 6826 (Blinking)	pln	Cyg	19h44m54.5s	+50°31′52	8.8	24.0″
NGC 6302 (Bug)	pln	Sco	17h14m04.2s	−37°06′38″	12.8	1.2′ × .5′
Cat's Eye	pln	Dra	17h58m32.1s	+66°37′30″	8.3	24.0″
Epsilon 1 Lyr	dst	Lyr	8h44m29.3s	+39°40′07″	5.0	—
Epsilon 2 Lyr	dst	Lyr	18h44m31.8s	+39°36′40″	5.2	—
M15	glb	Peg	21h30m11.2s	+12°11′06″	6.4	12.3′
M2	glb	Aqr	21h33m41.3s	−00°48′16″	6.5	8.0′
M56	glb	Lyr	19h16m46.7s	+30°11′17″	8.3	7.0′
NGC 6934	glb	Del	20h34m24.6s	+07°25′05″	8.9	5.9′
M72	glb	Aqr	20h53m43.5s	−12°31′15″	9.4	6.6′
Mesarthim	dst	Ari	01h53m47.4s	+19°19′08″	4.8	—
M31 (Andromeda)	gal	And	00h42m58.9s	+41°17′51″	4.0	178.0′ × 63.0′
NGC 206	OC	And	00h40m44.6s	+40°45′42″	4.0′	
M32	gal	And	00h42m56.5s	+40°53′39″	9.08	8.8′ × 6.5′
M110	gal	And	00h40m37.0s	+41°42′50″	8.93	21.9′ × 9.8′
M1 (Crab)	snr	Tau	05h34m48.5s	+22°01′20″	8.4	8.0′
NGC 404	gal	And	01h09m42.3s	+35°44′45″	11.3	3.4′
NGC 7331	gal	Peg	22h37m16.2s	+34°26′24″	10.3	10.7′ × 4.3′
Stephan's Quintet	gal	Peg	22h36m12.4s	+33°59′22″	12.0	3.2′
Almaak	dst	And	02h04m11.1s	+42°21′23″	2.3	—
E.T.	OC	Cas	01h19m19.9s	+58°21′30″	7.0	13.0′
NGC 436	OC	Cas	01h15m54.9s	+58°50′35″	8.8	6.0′
M103	OC	Cas	01h33m12.0s	+60°42′00″	7.4	6.0′
Trumpler 1	OC	Cas	01h35m57.7s	+61°19′03″	8.1	5.0′
NGC 654	OC	Cas	01h44m21.7s	+61°54′47″	6.5	5.0′
NGC 663	OC	Cas	01h46m21.2s	+61°16′43″	7.1	16.0′
IC 166	OC	Cas	01h52m50.1s	+61°51′30″	11.7	5.0′
M52	OC	Cas	23h24m23.9s	+61°37′08″	6.9	13.0′
NGC 7789	OC	Cas	23h57m14.2s	+56°45′24″	6.7	16.0′
NGC 129	OC	Cas	00h30m07.9s	+60°15′20″	6.5	21.0′

(*cont.*)

Object Name	Type	Constellation	Right Ascension	Declination	Magnitude	Size
NGC 189	OC	Cas	00h39m49.9s	+61°06′14″	11.1	3.7′
NGC 225	OC	Cas	00h43m40.8s	+61°49′12″	7.0	12.0′
NGC 133	OC	Cas	00h31m28.6s	+63°23′20″	9.4	7.0′
NGC 146	OC	Cas	00h33m17.7s	+63°19′19″	9.1	7.0′
King 14	OC	Cas	00h32m04.8s	+63°11′19″	8.5	7.0′
Achird	dst	Cas	00h49m21.3s	+57°50′38″	3.4	—
NGC 253 (Sculptor)	gal	Scl	00h47m47.0s	−25°15′49″	7.72	27.7′ × 6.8′
NGC 288	glb	Scl	00h52m58.8s	−26°33′32″	8.1	13.8′
M 77	gal	Cet	02h42m55.7s	+00°00′27″	9.64	7.0′ × 5.9′
NGC 1055	gal	Cet	02h42m00.1s	+00°27′46″	10.6	6.8′ × 3.2′
M30	glb	Cap	21h40m24.0s	+23°11′00″	7.5	11.0′
Kaffaljidhma	dst	Cet	02h43m33.1s	+03°15′24″	3.5	—
Merope Nebula	ref	Tau	03h46m29.5s	+23°47′03″	—	—
M78	ref	Ori	05h47m03.9s	+00°05′07″	8.0	8.0′ × 4.0′
NGC 2071	ref	Ori	05h47m21.9s	+00°18′07″	8.0	7.0′
NGC 2186	OC	Ori	06h12m26.8s	+05°27′10″	6.8	20.0′
NGC 2174	OC	Ori	06h09m42.6s	+20°40′04″	8.7	4.0′
NGC 2175	OC	Ori	06h09m54.6s	+20°29′03″	6.8	20.0′
NGC 2022	pln	Ori	05h42m23.1s	+09°05′22″	12.4	19.0″
NGC 1973	ref	Ori	05h35m21.3s	−04°43′50″	7.0	—
M42 (Orion)	dif	Ori	05h35m33.2s	−05°22′50″	4.0	90.0′
M43	dif	Ori	05h35m45.2s	−05°15′50″	9.0	20.0′
Meissa	dst	Ori	05h35m25.3s	+09°56′18″	3.6	—
M76	pln	Per	01h42m24.0s	+51°34′00″	11.0	3.0′ × 2.0′
M34	OC	Per	02h42m19.7s	+42°48′15″	5.2	35.0′
NGC 1023	gal	Per	02h40m41.8s	+39°05′14″	11.0	7.9′ × 3.5′
NGC 957	OC	Per	02h33m58.2s	+57°33′44″	7.6	11.0′
IC 2003	pln	Per	03h56m22.0s	+33°52′30″	12.0	8.0′
Miram	dst	Per	02h51m02.4s	+55°55′14″	3.8	—
M46	OC	Pup	07h42m02.6s	−14°48′52″	6.6	27.0′
NGC 2438	pln	Pup	07h42m05.4s	−14°44′53″	11.0	1.1′
M47	OC	Pup	07h36m50.8s	−14°29′29″	4.3	29.0′
M93	OC	Pup	07h44m51.0s	−23°52′06″	6.5	22.0′
NGC 2237 (Rosette)	dif	Mon	06h31m10.7s	+05°02′49″	5.5	80.0′ × 60.0′
NGC 2264 (Cone)	dif	Mon	06h41m17.4s	+09°53′46″	3.9	20.0′
NGC 2261 (Hubble's)	ref	Mon	06h39m29.2s	+08°44′46″	4.0	2.0′ × 1.7′
Adara	dst	CMa	06h58m50.2s	−28°58′51″	1.5	—
NGC 869 (h)	OC	Per	02h19m21.2s	+57°10′25″	4.3	29.0′
NGC 884 (Chi)	OC	Per	02h22m46.5s	+57°08′16″	4.4	29.0′
NGC 1528	OC	Per	04h15m46.5s	+51°15′31″	6.4	24.0′
NGC 2392 (Eskimo)	pln	Gem	07h29m29.7s	+20°54′09″	10.0	40.0″
NGC 1245	OC	Per	03h14m59.4s	+47°16′29″	8.4	10.0′
NGC 1545	OC	Per	04h21m14.7s	+50°16′07″	4.6	18.0′
Castor	dst	Gem	07h34m56.3s	+31°52′45″	1.9	—

Object Name	Type	Constellation	Right Ascension	Declination	Magnitude	Size
M 41	OC	CMa	06h47m16.7s	−20°43′44″	4.8	38.0′
NGC 2359 (Thor)	dif	CMa	07h18m36.0s	−13°12′00″	10.0′	—
Sirius	dst	CMa	06h45m22.9s	−16°43′27″	−1.5	—
NGC 2354	OC	CMa	07h14m28.5s	−25°43′52″	8.9	20.0′
NGC 2362	OC	CMa	07h18m59.9s	−24°56′12″	4.39	8.0′
NGC 2280	gal	CMa	06h45m01.2s	−27°38′45″	11.0	7.0′ × 3.0′

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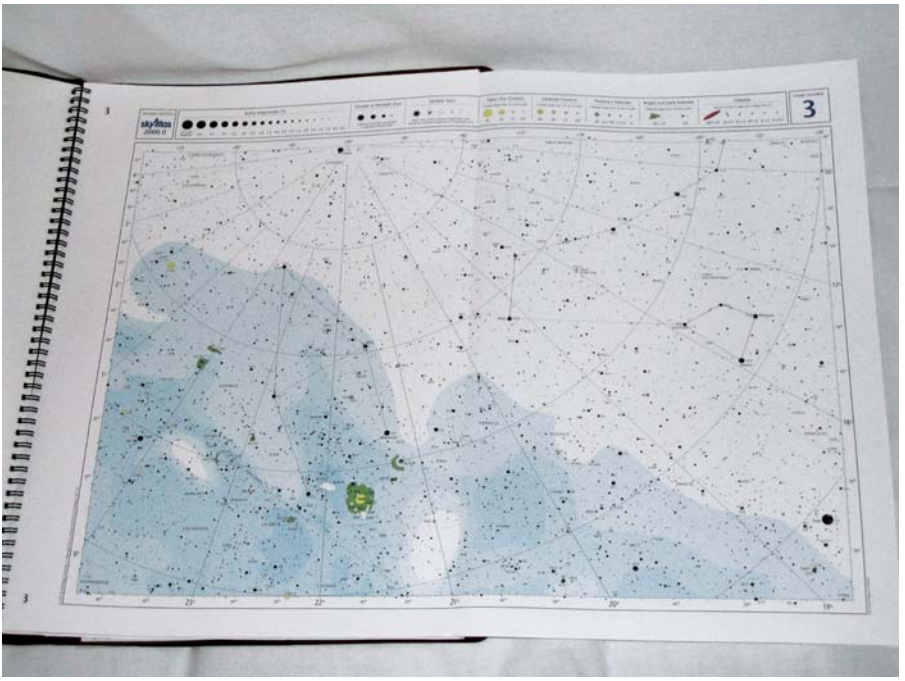

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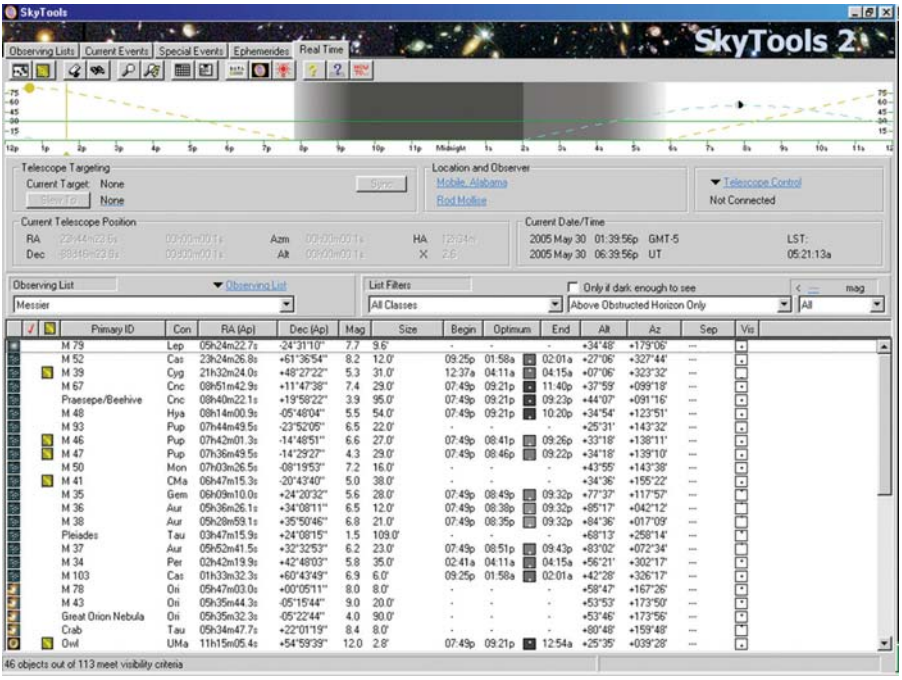

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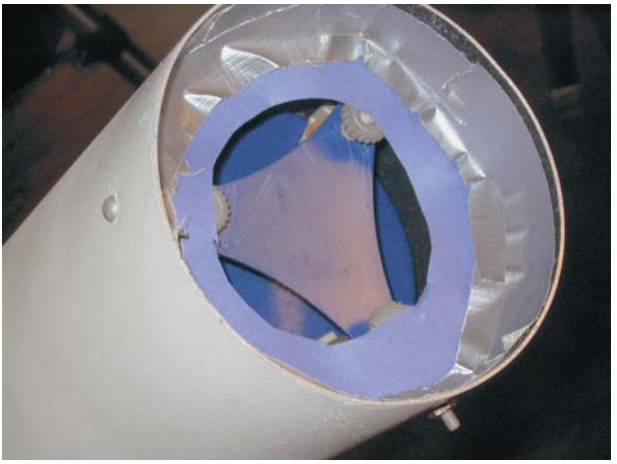

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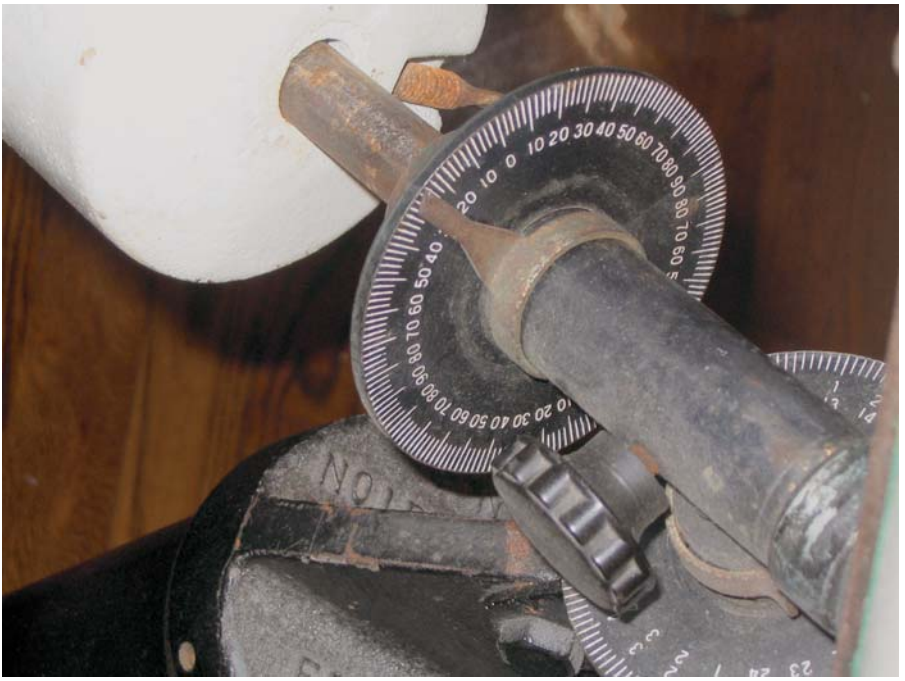

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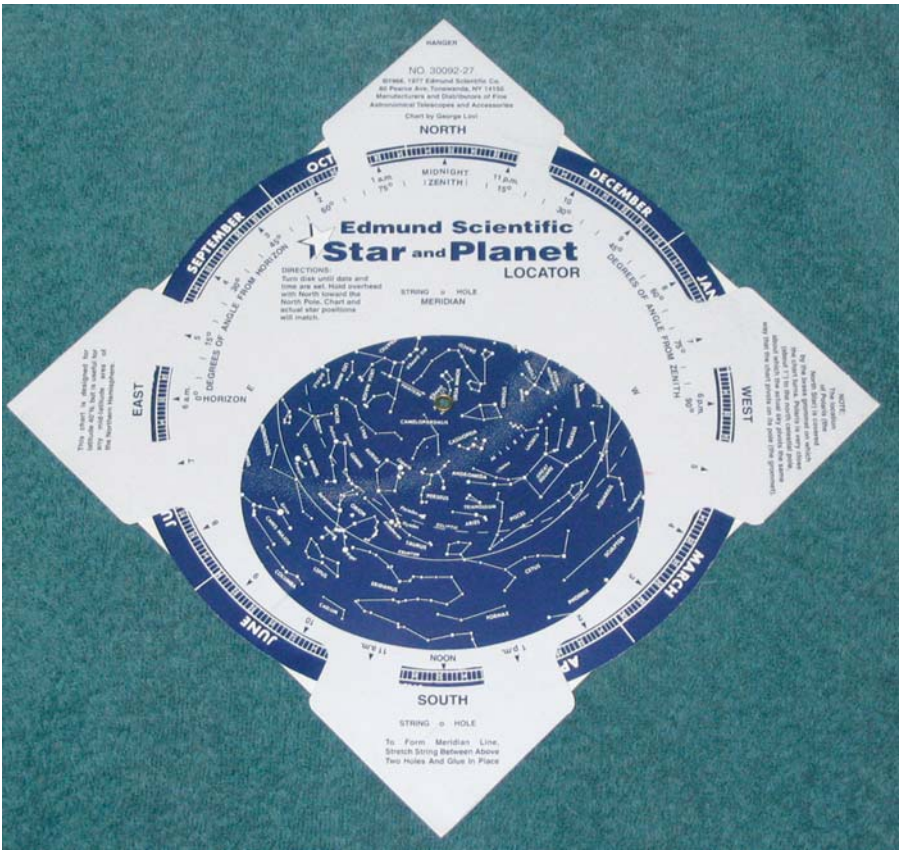

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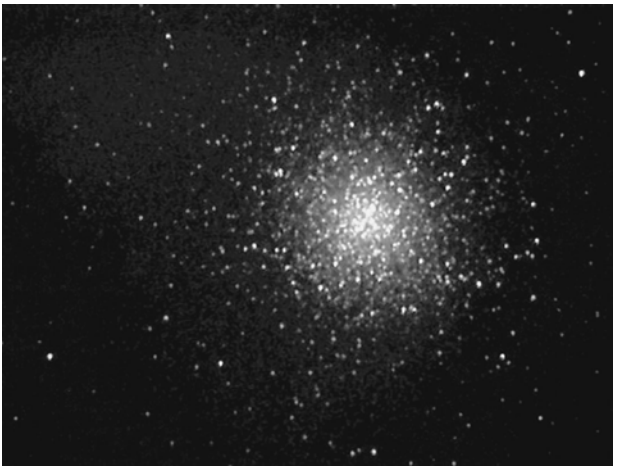

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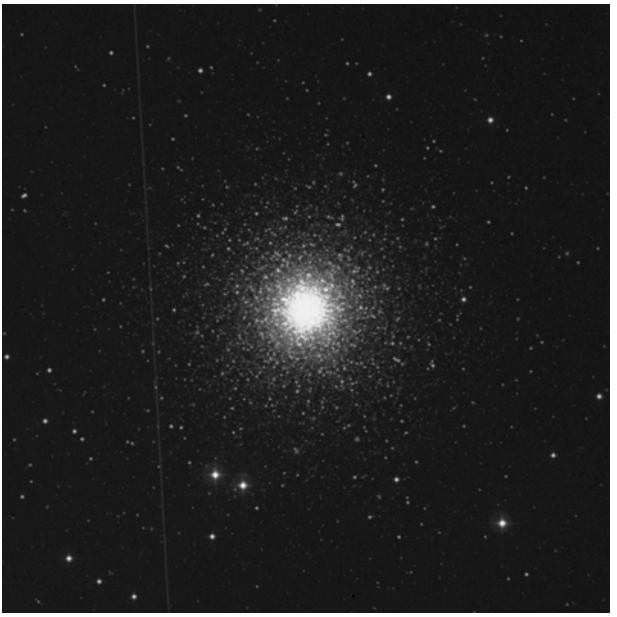

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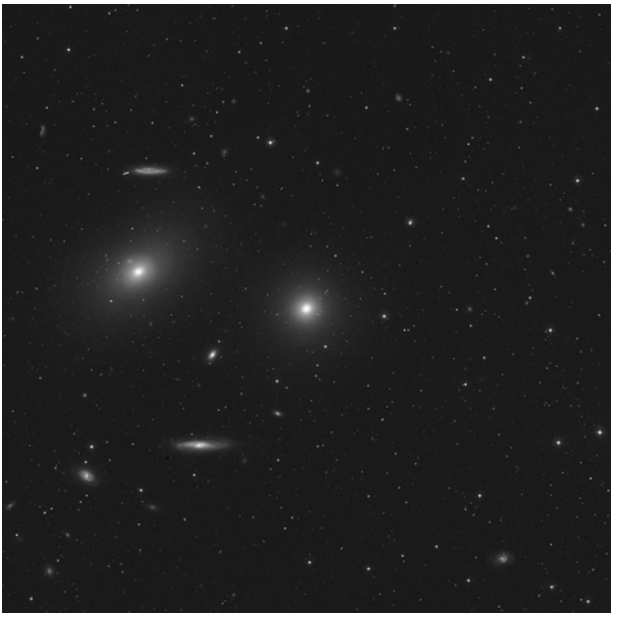

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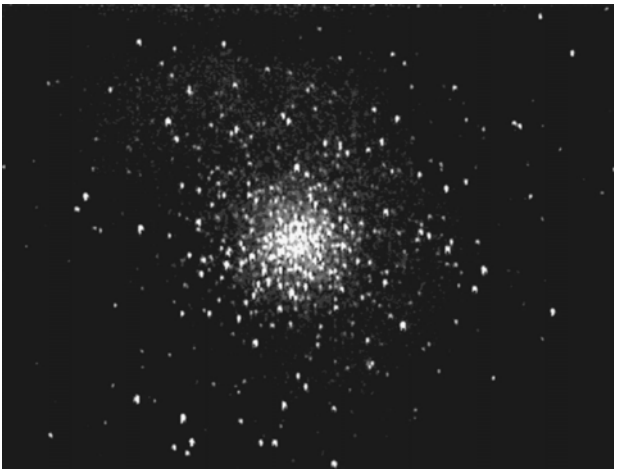

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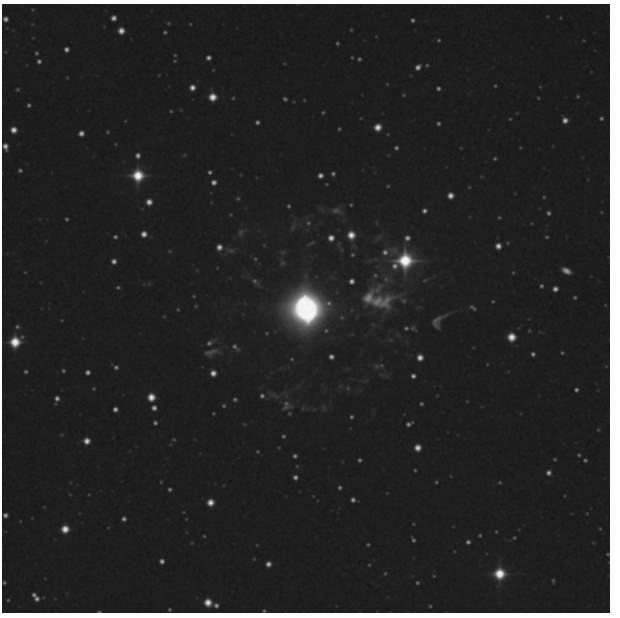

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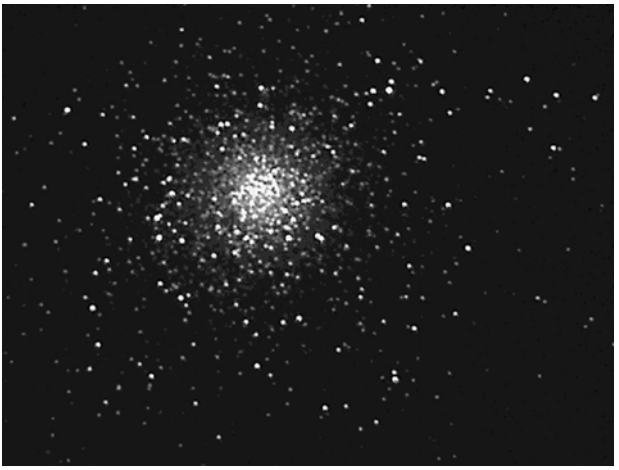

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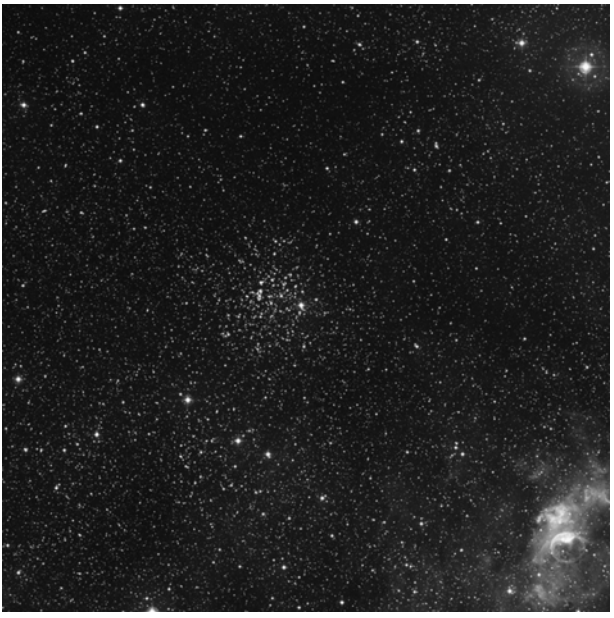

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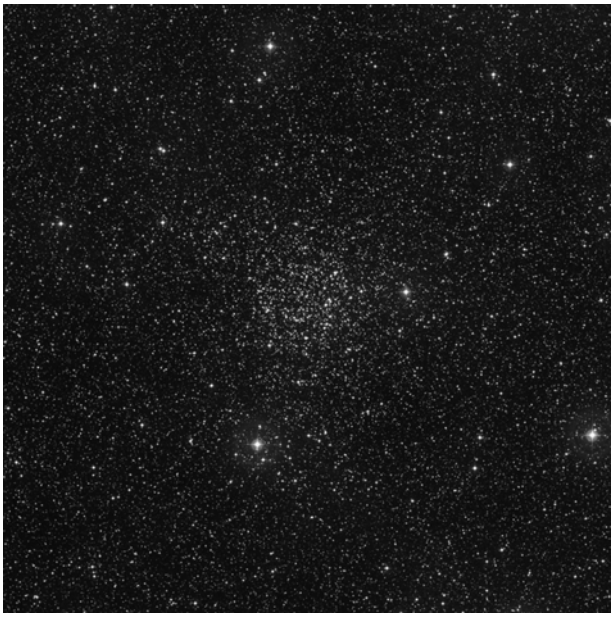

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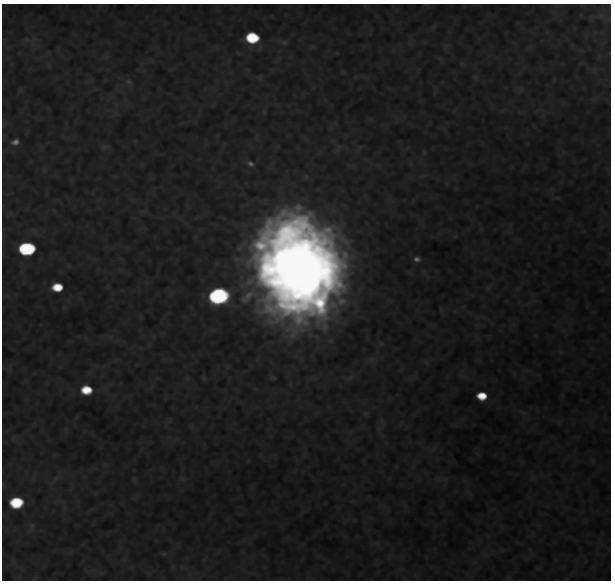

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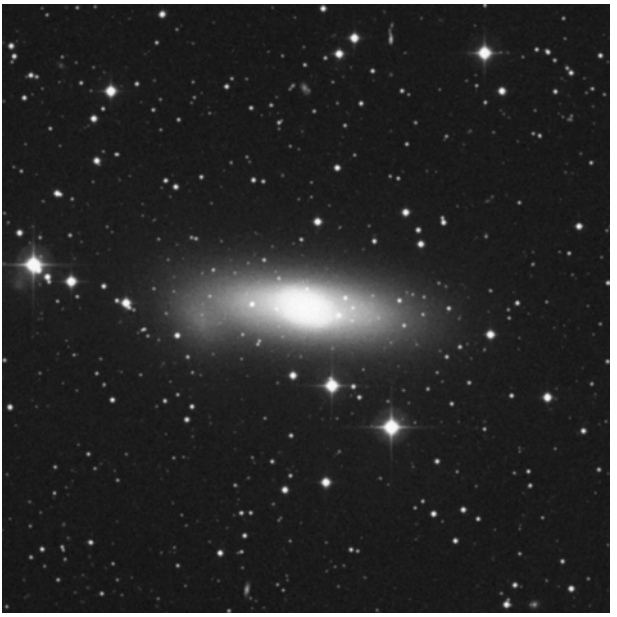

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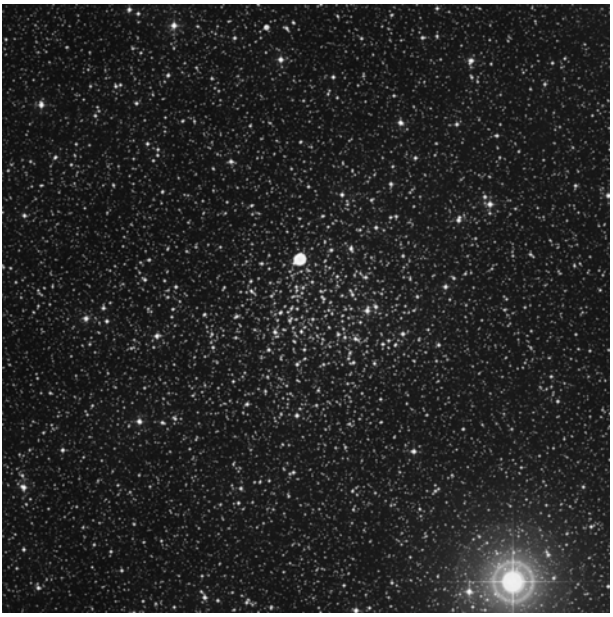

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