APPENDIX 1

Telescope Limiting-Magnitude & Resolution

Listed below are limiting-magnitudes and resolution values for a variety of common-sized (**SIZE** in inches) backyard telescopes in use today, ranging from 2- to 14-inch in aperture. (The 2.4-inch entry is the ubiquitous 60 mm refractor, of which there are perhaps more than any other telescope in the world!)

Values for the minimum visual magnitude (**MAG.**) listed here are for single stars and are only very approximate, since experienced keen-eyed observers may see as much as a full magnitude fainter under excellent sky conditions. Companions to visual double stars – especially those in close proximity to a bright primary – are typically much more difficult to see than is a star of the same magnitude placed alone in the eyepiece field. Among the many variables involved are light pollution, sky conditions, optical quality, mirror and lens coatings, eyepiece design, obstructed or unobstructed optical system, color (spectral type) of the star, and even the age of the observer. Only a few representative limiting magnitudes are given here (in increments of increasing aperture), as an indication of what an observer might typically expect to see in various sizes of telescope.

Three different values in arc-seconds are listed for resolution, which are for two stars of equal brightness and of about the sixth magnitude. These figures differ significantly for brighter, fainter and, especially, unequal pairs. **DAWES** is the value based on Dawes' Limit (R = 4.56/A), **RAYLEIGH** on the Rayleigh Criterion (R = 5.5/D), and **MARKOWITZ** on Markowitz's Limit (R = 6.0/D). Note that in these equations "A" (for aperture) and "D" (for diameter) are the same thing.

SIZE	MAG.	DAWES	RAYLEIGH	MARKOWITZ
2.0	10.3	2.28	2.75	3.00
2.4		1.90	2.29	2.50
3.0	11.2	1.52	1.83	2.00
3.5		1.30	1.57	1.71
4.0	11.8	1.14	1.38	1.50
4.5		1.01	1.22	1.33
5.0		0.91	1.10	1.20
6.0	12.7	0.76	0.92	1.00
7.0		0.65	0.79	0.86
8.0	13.3	0.57	0.69	0.75
10.0	13.8	0.46	0.55	0.60
11.0		0.42	0.50	0.55
12.0		0.38	0.46	0.50
12.5	14.3	0.36	0.44	0.48
13.0		0.35	0.42	0.46
14.0	14.5	0.33	0.39	0.43

APPENDIX 2

Constellation Names and Abbreviations

The following table gives the standard International Astronomical Union (IAU) three-letter abbreviations for the 88 officially recognized constellations, together with both their full names and their genitive (possessive) cases, and order of size in terms of number of square degrees of sky.

ABBREV.	NAME	GENITIVE	SIZE
AND	Andromeda	Andromedae	19
ANT	Antlia	Antliae	62
APS	Apus	Apodis	67
AQR	Aquarius	Aquarii	10
AQL	Aquila	Aquilae	22
ARA	Ara	Arae	63
ARI	Aries	Arietis	39
AUR	Auriga	Aurigae	21
BOO	Bootes	Bootis	13
CAE	Caelum	Caeli	81
CAM	Camelopardalis	Camelopardalis	18
CNC	Cancer	Cancri	31
CVN	Canes Venatici	Canum Venaticorum	38
CMA	Canis Major	Canis Majoris	43
CMI	Canis Minor	Canis Minoris	71
CAP	Capricornus	Capricorni	40
CAR	Carina	Carinae	34
CAS	Cassiopeia	Cassiopeiae	25
CEN	Centaurus	Centauri	9

ABBREV.	NAME	GENITIVE	SIZE
CEP	Cepheus	Cephei	27
CET	Cetus	Ceti	4
CHA	Chamaeleon	Chamaeleontis	79
CIR	Circinus	Circini	85
COL	Columba	Columbae	54
COM	Coma Berenices	Comae Berenices	42
CRA	Corona Australis	Coronae Australis	80
CRB	Corona Borealis	Coronae Borealis	73
CRV	Corvus	Corvi	70
CRT	Crater	Crateris	53
CRU	Crux	Crucis	88
CYG	Cygnus	Cygni	16
DEL	Delphinus	Delphini	69
DOR	Dorado	Doradus	7
DRA	Draco	Draconis	8
EQU	Equuleus	Equulei	87
ERI	Eridanus	Eridani	6
FOR	Fornax	Fornacis	41
GEM	Gemini	Geminorum	30
GRU	Grus	Gruis	45
HER	Hercules	Herculis	5
HOR	Horologium	Horologii	58
HYA	Hydra	Hydrae	1
HYI	Hydrus	Hydri	61
IND	Indus	Indi	49
LAC	Lacerta	Lacertae	68
LEO	Leo	Leonis	12
LMI	Leo Minor	Leonis Minoris	64
LEP	Lepus	Leporis	51
LIB	Libra	Librae	29
LUP	Lupus	Lupi	46
LYN	Lynx	Lyncis	28
LYR	Lyra	Lyrae	52
MEN	Mensa	Mensae	75
MIC	Microscopium	Microscopii	66
MON	Monoceros	Monocerotis	35
MUS	Musca	Muscae	77
NOR	Norma	Normae	74
OCT	Octans	Octantis	50
OPH	Ophiuchus	Ophiuchi	11
ORI	Orion	Orionis	26
PAV	Pavo	Pavonis	44
PEG	Pegasus	Pegasi	7
PER	Perseus	Persei	24
PHE	Phoenix	Phoenicis	37
PIC	Pictor	Pictoris	59
PSC	Pisces	Piscium	14
PSA	Piscis Austrinus	Piscis Austrini	60
PUP	Puppis	Puppis	20
PYX	Pyxis	Pyxidis	65

ABBREV.	NAME	GENITIVE	SIZE
RET	Reticulum	Reticuli	82
SGE	Sagitta	Sagittae	86
SGR	Sagittarius	Sagittarii	15
SCO	Scorpius	Scorpii	33
SCL	Sculptor	Sculptoris	36
SCT	Scutum	Scuti	84
SER	Serpens	Serpentis	23
SEX	Sextans	Sextantis	47
TAU	Taurus	Tauri	17
TEL	Telescopium	Telescopii	57
TRI	Triangulum	Trianguli	78
TRA	Triangulum Australe	Trianguli Australis	83
TUC	Tucana	Tucanae	48
UMA	Ursa Major	Ursae Majoris	3
UMI	Ursa Minor	Ursae Minoris	56
VEL	Vela	Velorum	32
VIR	Virgo	Virginis	2
VOL	Volans	Volantis	76
VUL	Vulpecula	Vulpeculae	55

APPENDIX 3

Celestial Showpiece Roster

Below are 300 of the finest deep-sky treasures for viewing and exploration with telescopes from 2- to 14-inch in aperture. Nearly all of them can be seen in the smallest of glasses, and many even in binoculars. Arranged in alphabetical order by constellation (which makes it more convenient to pick out objects for a given night's observations than with one ordered by coordinates), it features brief descriptions of each entry. Primary data sources were *Sky Catalogue 2000.0* and the *Washington Double Star Catalog*. Constellation (**CON**) abbreviations are the official three-letter designations adopted by the International Astronomical Union (see Appendix 2.)

Right Ascension (**RA**) in hours and minutes, and Declination (**DEC**) in degrees and minutes, are given for the current standard Epoch 2000.0. Other headings are the class or type of object (**TYPE**),* apparent visual magnitude/s (**MAG/S**) and angular size or separation (**SIZE/SEP**) in arc-seconds. (Position angles for double stars are not given, owing to the confusion resulting from the common use of star diagonals with refracting and compound telescopes, producing mirror-reversed images of the sky. Observers desiring the latest values of these as well as component separations should consult the US Naval Observatory's *Washington Double Star Catalog* on-line at http://ad.usno.navy.mil/wds.) Approximate distance in light-years (LY) is also given in many cases.

Double and multiple stars dominate this roster because of their great profusion in the sky and also their easy visibility on all but the worst of nights. This list extends down to −45 degrees Declination, covering that three-quarters of the entire heavens visible from mid-northern latitudes. (Two "must see" showpieces actually lie slightly below this limit.)

*Key: SS = First-magnitude/Highly tinted and/or Variable single star, DS = Double or multiple star, AS = Association or asterism, OC = Open cluster, GC = Globular cluster, DN = Diffuse nebula, PN = Planetary nebula, SR = Supernova remnant, GX = Galaxy.

OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
γ AND	02 04	+42 20	DS	2.3, 5.5	10″	Almach. Brilliant topaz-orange & aquamarine double – superb contrast! B is close blue & green, 61-year binary for 8″ & larger scopes. 300LY
59 AND	02 11	+39 02	DS	6.1, 6.8	17″	Neatly matched, easy bluish-white pair.
56 AND	01 56	+37 15	DS	5.7, 5.9	190″	Wide golden pair parked on SW edge of cluster NGC 752. 360LY
NGC 752 AND	01 58	+37 50	OC	5.7	50′	Large, sprawling clan of over 60 stars. 1,200LY
M31/M32/M110 AND	00 43	+41 16	GX	3.5/8.2/8.0	178′ × 63′/8′ × 6′/ 17′ × 10′	Andromeda Galaxy & companions – magnificent! Nucleus, disk, dust lanes, spiral arms all visible. Binocular wonder! 2,400,000LY
NGC 7662 AND	23 26	+42 33	PN	8.5	32″ × 28″	Blue Snowball. Small but striking soft-blue cosmic egg. 5,600LY
NGC 891 AND	02 23	+42 42	GX	10.0	11′ × 2′	Often-pictured but dim edge-on galaxy with dust lane. 13,000,000LY
U ANT	10 35	–39 34	SS	5.4–6.8	–	Striking red "carbon" star – seldom observed owing to low altitude.
ζ AQR	22 29	–00 01	DS	4.4, 4.5	2″	Matched, bright, off-white close pair. Famous 850-year binary. 76LY
94 AQR	23 19	–13 28	DS	5.3, 7.3	13″	Lovely pale rose or reddish & light emerald-green double.
M2 AQR	21 34	–00 49	GC	6.5	13′	Stellar beehive – a starburst in larger scopes. 37,000LY
NGC 7009 AQR	21 04	–11 22	PN	8.3	25″ × 17″	Saturn Nebula. Striking bright, bluish-green ellipsoid. 3,000LY
15 AQL	19 05	–04 02	DS	5.5, 7.2	38″	Easy, wide duo. Yellowish-orange & ruddy-purple or lilac.
57 AQL	19 55	–08 14	DS	5.8, 6.5	36″	Another roomy pair. Both stars bluish-white – hint of other hues.
V AQL	19 04	–05 41	SS	6.6–8.4	–	A lovely glowing red ember!
γ ARI	01 54	+19 18	DS	4.8, 4.8	8″	Mesarthim. Stunning, perfectly matched blue-white pair! 200LY
λ ARI	01 58	+23 36	DS	4.9, 7.7	37″	Wide color/magnitude-contrast double. 105LY

α AUR	05 17	+46 00	SS	0.08	–	Capella. A radiant golden-yellow sun! 42LY
θ AUR	06 00	+37 13	DS	2.6, 7.1	4″	Tight mag.-contrast pair for steady nights. Lilac & yellow. 110LY
14 AUR	05 15	+32 41	DS	5.1, 7.4–7.9	15″	Neat double with variable companion.
UU AUR	06 36	+38 27	SS	5.3–6.5	–	Beautiful red color – a celestial stoplight!
M36 AUR	05 36	+34 08	OC	6.0	12′	Lovely cluster of 60-some stars. 4,000LY
M37 AUR	05 52	+32 33	OC	5.6	24′	Very rich & uniform stellar jewelbox – superb! Best in AUR. 4,500LY
M38 AUR	05 29	+35 50	OC	6.4	21′	A hundred suns arranged in an oblique-cross formation. 4,000LY
α BOO	14 16	+19 11	SS	–0.04	–	Arcturus. A splendid yellowish-orange stellar gem! 37LY
ε BOO	14 45	+27 04	DS	2.5, 4.9	3″	Izar. Bright, tight double – superb pale-orange & sea-green! Struve's "Pulcherrima" (the most beautiful one). Needs good seeing. 160LY
ξ BOO	14 51	+19 06	DS	4.7, 7.0	6″	Striking – yellow & reddish-orange or purple. 150-yr.binary. 22LY
μ BOO	15 24	+37 23	DS	4.3, 7.0, 7.6	108″, 2″	Neat triple system! B-C is 260-yr. binary. Yellow, two oranges. 95LY
κ BOO	14 14	+51 47	DS	4.6, 6.6	13″	Pretty double – tints real but elusive.
π BOO	14 41	+16 25	DS	4.9, 5.8	6″	Closer version of κ BOO.
ζ BOO	14 41	+13 44	DS	4.5, 4.6	0.7″	Matched white, ultra-close 125-yr. binary. Stellar egg in small glass.
Struve 1835 BOO	14 23	+08 27	DS	5.1, 7.4	6″	Sweet pair – white & bluish or lilac.
32 CAM	12 49	+83 25	DS	5.3, 5.8	22″	Nice matched off-white pair. Little-known – a pity! 495LY
U CAM	03 42	+62 39	SS	8.1–8.6	–	One of the reddest stars in the sky.
ST CAM	04 51	+68 10	SS	7.0–8.4	–	Another ruddy stellar gem.
NGC 2403 CAM	07 37	+65 36	GX	8.4	18′ × 11′	One of the brightest galaxies & finest spirals in sky. 12,000,000LY
ζ CNC	08 12	+17 39	DS	5.6, 6.0, 6.2	0.9″, 6″	Close, matched trio with 60-& 1150-yr. periods. All yellow. 70LY
ι CNC	08 47	+28 46	DS	4.2, 6.6	30″	Albireo of Spring. Superb orange & blue pair! 165LY
X CNC	08 55	+17 14	SS	5.7.5	–	A stellar ruby! Tint obvious even in small glass.

OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
M44 CNC	08 40	+19 59	OC	3.1	90′	Beehive Cluster. A sprawling commune of over 50 suns. Best seen in binoculars & wide-field telescopes. 590LY
M67 CNC	08 50	+11 49	OC	6.9	30′	Lovely but overlooked cluster in shadow of Beehive. 2,500LY
α CVN	12 56	+38 19	DS	2.9, 5.5	20″	Cor Caroli. Magnificent blue-white double – one of the finest! 130LY
Y CVN	12 45	+45 26	SS	5.5–6.0	–	La Superba. A fiery reddish-orange interstellar beacon. 400LY
M3 CVN	13 42	+28 23	GC	6.4	16′	Spring's Globular. First bright GC of season – radiant starball! 35,000LY
M51 CVN	13 30	+47 12	GX	8.4	11′ × 8′	Rosse's Whirlpool Galaxy. Big, beautiful face-on spiral. 31,000,000LY
M63 CVN	13 16	+42 02	GX	8.6	12′ × 8′	Sunflower Galaxy. Like some vast celestial flower. 35,000,000LY
M94 CVN	12 51	+41 07	GX	8.2	11′ × 9′	Small, bright tightly-wound spiral. 22,000,000LY
M106 CVN	12 19	+47 18	GX	8.3	18′ × 8′	Big, bright & bold spiral for small glasses. 33,000,000LY
NGC 4631 CVN	12 42	+32 32	GX	9.3	15′ × 3′	Humpback Whale Galaxy. Large edge-on spiral. 39,000,000LY
α CMA	06 4	–16 43	DS	–1.46, 8.5	7″	Sirius. Blazing blue-white sapphire with famed white-dwarf companion! A 50-year binary, now widening. Just 9LY away!
ε CMA	06 59	–28 58	DS	1.5, 7.5	7″	Adhara. A miniature Sirius – and much easier! 490LY
h3945 CMA	07 17	–23 19	DS	4.8, 6.8	27″	Albireo of Winter. Splendid reddish-orange & greenish-blue pair!
W CMA	07 08	–11 55	SS	6.4–7.9	–	Red ember in nice contrast with surrounding blue-white field stars.
M41 CMA	06 46	–20 45	OC	4.5	38′	Lovely big, bright sparkling clan of 80 suns below Sirius! 2,400LY
τ CMA/NGC 2362	07 19	–24 57	OC	4.1	8′	Tau Canis Majoris Cluster. Small glittering jewelbox of 60 diamonds surrounding a bright central star. 5,400LY

α-2/1 CAP	20 18	–12 33	DS	3.6, 4.2	380″	Algiedi. Naked-eye/binocular orange pair with faint comps. at 7″ & 46″ forming weak double-double. Stars unrelated: 110LY & 700LY!
β CAP	20 21	–14 47	DS	3.4, 6.2	205″	Wide binocular combo – yellowish-orange & sky-blue. 560LY
ο CAP	20 30	–18 35	DS	6.1, 6.6	22″	Neat, closely matched blue-white pair for small scopes.
RT CAP	20 17	–21 19	SS	6.5–8.1	–	Lovely warm-hued gem.
M30 CAP	21 40	–23 11	GC	7.5	11′	Pale-white starry globe nicely contrasted with 8th-mag. star. 40,000LY
η CAS	00 49	+57 49	DS	3.4, 7.5	13″	Easter Egg Double. Beautiful yellow & ruddy-purple or garnet color & magnitude-contrast combo. A 480-year binary. Nearby – just 19LY
ι CAS	02 29	+67 24	DS	4.6, 6.9, 8.4	2.5″, 7″	Elegant but tight triple system. Hues yellow, lilac & blue. 160LY.
σ CAS	23 59	+55 45	DS	5.0, 7.1	3″	Tight pair with intense bluish & greenish tints. Quite distant – 1,400LY
Struve 163 CAS	01 51	+64 51	DS	6.8, 8.8	35″	Colorful, unequal faintish pair – ruddy-orange & blue.
Struve 3053 CAS	00 03	+66 06	DS	5.9, 7.3	15″	Beautiful miniature of Albireo in CYG. Yellowish-orange & blue.
M52 CAS	23 24	+61 35	OC	6.9	13′	Rich, triangular-shaped sparkling group of at least 100 stars. 4,000LY
M103 CAS	01 33	+60 42	OC	7.4	6′	A small fan-shaped clan of several dozen suns. 8,000LY
φ CAS/NGC 457	01 19	+58 20	OC	6.4	13′	Owl/ET Cluster. Distinctive splash of 80 suns & two "eyes"! 9,300LY
NGC 7789 CAS	23 57	+56 44	OC	6.7	16′	Caroline Herschel's Cluster. Rich uniform assemblage of more than 300 faint stars against stardust. Wondrous sight on dark night! 6,000LY
ω CEN	13 27	–47 29	GC	3.6	36′	Omega Centauri Cluster. Colossal stellar beehive containing more than a million suns – an amazing spectacle in any size scope! 17,000LY
NGC 5128 CEN	13 26	–43 01	GX	7.0	18′ × 14′	Black Belt Galaxy. Large globe split by dark dust lane. 22,500,000LY

OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
β CEP	21 29	+70 34	DS	3.2, 7.9	13″	Neat unequal pair – greenish-white & blue or purple. Exquisite! 980LY
δ CEP	22 29	+58 25	DS	3.5–4.4, 6.3	41″	Striking pale orange & blue gems. Primary prototype of famed Cepheid variables – period 5.4 days. 1,000LY
ξ CEP	22 04	+64 38	DS	4.4, 6.5	8″	Neat bright pair with subtle colors – bluish & yellowish. 80LY
μ CEP	21 44	+58 47	SS	3.4–5.1	–	Herschel's Garnet Star. Reddest naked-eye star in N. sky. 2,800LY
Struve 2816 CEP	21 39	+57 29	DS	5.6, 7.7, 7.8	12″, 20″	Striking triple system with double Struve 2819 (7.5, 8.5, 12″) in field!
Struve 2840 CEP	21 52	+55 48	DS	5.5, 7.3	18″	Lovely pair – greenish-white & bluish-white.
NGC 40 CEP	00 13	+72 32	PN	10.2	60″ × 40″	Dull reddish-grey disk with central star. 3,000LY
NGC 7023 CEP	21 02	+68 12	DN	6.8	18′	Iris Nebula. Bright reflection nebula surrounding 7th-mag. blue star.
NGC 6939/6946 CEP	20 31	+60 38	OC/GX	7.8, 8.9	8′/11′ × 10′	Unique cluster-galaxy combo set 38′ apart! 4,000LY & 10,000,000LY
γ CET	02 43	–03 14	DS	3.5, 6.2	3″	Close, bright pair with delicate tints – yellow & ashen. 63LY
M77 CET	02 43	–00 01	GX	8.8	7′ × 6′	Intense star-like core surrounded by circular haze. 82,000,000LY
24 COM	12 35	+18 23	DS	5.2, 6.7	20″	Vivid orange & blue-green duo – a lovely jewel! 300LY
M53 COM	13 13	+18 10	GC	7.7	13′	A dim ball of minute stars. Needs aperture to really enjoy. 65,000LY
M64 COM	12 57	+21 41	GX	8.5	9′ × 5′	Blackeye Galaxy. Superb bright spiral with dark "eye". "Like a colossal pendent abalone pearl in rayless void"! 25,000,000LY
M88 COM	12 32	+14 25	GX	9.5	7′ × 4′	Like a miniature Andromeda Galaxy. Stellar nucleus. 40,000,000LY
M99 COM	12 19	+14 25	GX	9.8	5′ × 5′	Pinwheel Nebula. Wonderful face-on spiral. 50,000,000LY
NGC 4565 COM	12 36	+25 59	GX	9.6	16′ × 3′	Ghostly edge-on spiral with dark equatorial dust lane. 20,000,000LY

MEL 111 COM	12 25	+26 00	OC	1.8	275′	Coma Star Cluster. Large hazy, naked-eye & binocular wonder. 270LY
γ CRA	19 06	–37 04	DS	4.8, 5.1	1.3″	Twin yellowish binary – stars appear in contact. 69LY
ζ CRB	15 39	+36 38	DS	5.1, 6.0	6″	Pretty pair of bluish-white & greenish-white suns.
σ CRB	16 15	+33 52	DS	5.6, 6.6	7″	Like ζ but stars are yellowish. Binary with 1000-yr. period.
δ CRV	12 30	–16 31	DS	3.0, 8.4	24″	Algorab. Nice color & mag. contrast – yellow & violet or lilac. 125LY
Struve 1669 CRV	12 41	–13 01	DS	6.0, 6.1	5″	Neatly-matched close pair of yellowish-white suns.
NGC 4361 CRV	12 24	–18 48	PN	10.3	80″	Large, round dimly glowing nebulous disk. 2,600LY
NGC 4038/4039 CRV	12 02	–18 52	GX	10.7	3′ × 2′	Antennae/Ring-Tail Galaxy. Colliding pair of galaxies! 90,000,000LY
α CYG	20 41	+45 17	SS	1.25	–	Deneb. Colossal blue supergiant 60,000 × Sun's brightness! 1,600LY
β CYG	19 31	+27 58	DS	3.1, 5.1	34″	Albireo. One of grandest sights in the heavens! Magnificent topaz & sapphire-blue pair in radiant MW setting. Finest double star. 380LY
o-1 CYG	20 14	+46 44	DS	3.8, 7.7, 4.8	107″, 338″	Lovely wide trio – orange, blue & white in rich MW setting. 200LY
δ CYG	19 45	+45 08	DS	2.9, 6.3	2.5″	Bright, close unequal pair – tough but pretty. Greenish-white & ashen. Best seen in larger apertures. An 800-yr.-period binary. 270LY
16 CYG	19 42	+50 32	DS	6.0, 6.1	39″	Lovely matched golden duo in wide field with Blinking Planetary.
61 CYG	21 07	+38 45	DS	5.2, 6.0	30″	Beautiful easy orange pair. Famous as first star to have its distance (parallax) directly measured – 11LYs. Slow 650-year binary.
V460 CYG	21 42	+35 31	SS	5.6–7.0	–	Striking red gem – an unresolved binary harboring a black hole!
M39 CYG	21 32	+48 26	OC	4.6	32′	Large triangular-shaped splash of 30 stars – best in binoculars & RFTs. 890LY
NGC 6826 CYG	19 45	+50 31	PN	8.9	27″	Blinking Planetary. Pale blue disk with obvious 10th-mag. central star. Alternating between direct and averted vision makes it blink! 3,300LY.

OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
NGC 6819 CYG	19 41	+40 11	OC	7.3	5′	Foxhead Cluster. Small, dim but rich clan of 150 stars. 7,300LY
NGC 6960/6992-5 CYG	20 51	+31 13	SR	–	70′ × 6′/60′ × 8′	Veil/Filamentary/Cirrus Nebula. Large ghostly arcs 3 degrees apart from supernova explosion some 5,000 years ago. Best seen in large binoculars & wide-field telescopes. 1,500LY
NGC 7027 CYG	21 07	+42 14	PN	9.0	18″ × 11″	Stephan's/Webb's Proto-Planetary. Small, blue & intense! 3,000LY
γ DEL	20 47	+16 07	DS	4.5, 5.5	10″	Stunning golden-yellow & greenish-blue combo – splendid object! "Ghost Double" Struve 2725 (7.6, 8.4, 6″) in field. 100LY
μ DRA	17 05	+54 28	DS	5.7, 5.7	2″	Cozy, yellowish-white identical-twin 480-year binary. 82LY
ν DRA	17 32	+55 11	DS	4.9, 4.9	62″	Another pair of perfectly-matched suns, but brighter & much wider than μ. Both white – superb! Nice binocular pair. 120LY
ψ DRA	17 42	+72 09	DS	4.9, 6.1	30″	Pretty yellow & lilac combo – easy for small glass.
17/16 DRA	16 36	+52 55	DS	5.4, 6.4, 5.5	3″, 90″	Nice triple system like μ BOO but primary has comp. All white.
41/40 DRA	18 00	+80 00	DS	5.7, 6.1	19″	Pale-yellow pair with 7.5-magnitude star nearby.
RY DRA	12 56	+66 00	SS	6.8–7.3	–	A glowing stellar ruby!
UX DRA	19 22	+76 34	SS	5.9–7.1	–	Another stunning red sun.
NGC 6543 DRA	17 59	+66 38	PN	8.8	22″ × 16″	Cat's Eye/Snail Nebula. Bright blue-green egg with 10th-mag. nuclear sun. One of the finest of its class & always above horizon! 3,500LY
NGC 5907 DRA	15 16	+56 19	GX	10.4	12′ × 2′	Splinter Galaxy. Long, narrow & dim edge-on spiral. 35,000,000LY
ε = 1 EQU	20 59	+04 18	DS	5.4, 7.1	10″	Neat pair – both yellowish. Primary close (0.7″) visual binary. 200LY
λ = 2 EQU	21 02	+07 11	DS	7.4, 7.4	3″	Tight but striking identical-twin suns.
θ ERI	02 58	–40 18	DS	3.2, 4.3	8″	Radiant white, far-south gem! 120LY

32 ERI	03 54	–02 57	DS	4.8, 6.1	7″	Lovely topaz-yellow & sea-green in superb contrast – a beauty! 300LY
o-2 ERI	04 15	–07 39	DS	4.4, 9.5, 11.2	83″, 8″	Faint pair an amazing white-dwarf & red-dwarf 248-year binary. 16LY
NGC 1535 ERI	04 14	–12 44	PN	9.4	20″ × 17″	Lassell's Most Extraordinary Object. Blue-green "celestial jellyfish."
NGC 1316 FOR	03 23	–37 12	GX	8.8	7′ × 6′	Fornax A. Luminous leader of Fornax Galaxy Cluster. 55,000,000LY
NGC 1360 FOR	03 33	–25 51	PN	9.4	6′ × 4′	Bright egg-shaped overlooked jewel. 980LY
NGC 1365 FOR	03 34	–36 08	GX	9.5	10′ × 6′	One of the finest barred-spirals in the sky.
α GEM	07 35	+31 53	DS	1.9, 2.9, 8.9	4″, 72″	Castor. Dazzling blue-white 470-yr. binary – a magnificent sight! Orange comp. is eclipser YY GEM, ranging from 8.9 to 9.6 over 20 hours. A & B are spectroscopic binaries – a vast six-sun system! 52LY
δ GEM	07 20	+21 59	DS	3.5, 8.2	6″	Close yellow & reddish-purple duo. Binary – 1200-year period. 53LY
20 GEM	06 32	+17 47	DS	6.3, 6.9	20″	Neat yellowish-white and bluish-white pair. 450LY
M35/NGC 2158 GEM	06 09	+24 20	OC/OC	5.1/11	28′/5′	Lassell's Delight. Big splashy & spectacular stellar jewelbox with tiny remote clan shining dimly on outskirts. Clusters lie at vastly different distances from each other – 2,700LY & 16,000LY!
NGC 2392 GEM	07 29	+20 55	PN	8.3	20″	Eskimo/Clown Face Nebula. Vivid blue disk with 10th-mag. central sun looking like a hazy star at low power. 3,000LY
α HER	17 15	+14 23	DS	3.1–3.9, 5.4	5″	Rasalgethi. Bright, intensely tinted orange & blue-green pair – superb! Primary huge pulsating semi-regular variable – a supersun! 380LY
δ HER	17 15	+24 50	DS	3.1, 8.7	14″	Famed, very delicate optical (unrelated) pair. White & violet. 94LY
κ HER	16 08	+17 03	DS	5.3, 6.5	28″	Striking yellow & garnet jewels!
ζ HER	16 41	+31 36	DS	2.9, 5.5	0.7″	Herschel's Rapid Binary. 34-yr. period – over 6 orbits since discovery! 30LY

OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
ρ HER	17 24	+37 09	DS	4.6, 5.6	4″	Bright, cozy bluish & greenish pair – stunning.
95 HER	18 02	+21 36	DS	5.0, 5.1	6″	Lovely twin suns – amazing "apple-green & cherry-red" tints! 380LY
100 HER	18 08	+26 06	DS	5.9, 6.0	14″	Another matched pair but wider & pale off-white hues. Little-known.
M13 HER	16 42	+36 28	GC	5.9	17′	Hercules Cluster. A magnificent stellar beehive! Fuzz-ball as seen in binoculars, resolved to its glittering core in 6-inch glass. 24,000LY
M92 HER	17 17	+43 09	GC	6.5	11′	Overshadowed Globular. Eclipsed by M13. Intense core. 26,000LY
NGC 6210 HER	16 44	+23 49	PN	9.3	20″ × 16″	Small featureless blue disk – needs magnification to enjoy. 3,600LY
NGC 6229 HER	16 47	+47 32	GC	9.4	4′	"Sea-green in starry triangle." Long mistaken for a PN. 90,000LY
ε HYA	08 47	–06 25	DS	3.3, 6.8	3″	Tight 890-yr. binary. Primary is also a 15-yr. visual binary! 150LY
N HYA = 17 CRT	11 32	–29 16	DS	5.8, 5.9	9″	Perfectly matched, yellowish-white twin suns.
54 HYA	14 46	–25 27	DS	5.1, 7.1	9″	Pretty pair for small glass – yellowish & violet tints.
U HYA	10 38	–13 23	SS	4.8–6.5	–	A fiery, reddish-orange stellar gem.
M48 HYA	08 14	–05 48	OC	5.8	30′	Big, bright splendid splash of some 50 stars the size of Moon. 1,900LY
M68 HYA	12 40	–26 45	GC	8.2	12′	Neglected owing to low DEC – needs dark, steady night. 45,000LY
M83 HYA	13 37	–29 52	GX	8.0	11′ × 10′	Big, bold face-on spiral – one of brightest in the sky. 10,000,000LY
NGC 3242 HYA	10 25	–18 38	PN	8.6	40″ × 35″	Jupiter's Ghost. Superb bright planetary with pale-blue disk as big in apparent size as Jupiter. Also known as the Eye & CBS Neb. 3,300LY
8 LAC	22 36	+39 38	DS	5.7, 6.5, 10.5, 9.3	22″, 49″, 82″	Blue-white duo – fainter companions form delicate quadruple. 1,900LY
NGC 7243 LAC	22 15	+49 53	OC	6.4	21′	Nice loose clan of 40 stellar gems. 2,800LY

α LEO	10 08	+11 58	DS	1.4, 7.7	177″	Regulus/Indigo Star. Wide mag.-contrast pair with blue-white primary & comp. that's "seemingly steeped in indigo." And so it appears! 78LY
γ LEO	10 20	+19 51	DS	2.2, 3.5	4″	Algieba. Magnificent, radiant golden suns – one of the finest double stars in the heavens! A 620-year binary. 170LY
54 LEO	10 56	+24 45	DS	4.5, 6.3	6″	Lovely, little-known bluish-white & greenish-white pair. 150LY
R LEO	09 48	+11 26	SS	4.4–10.5	–	Peltier's Variable. Has rosy-scarlet hue throughout its cycle. 600LY
M65/M66/NGC 3628 LEO	11 19	+13 05	GX	9.3/9.0/9.5	10′ × 3′/8′ × 4′/15′ × 4′	Leo Triplet. A trio of bright spirals lying within the same wide field of view – wondrous sight! 30,000,000LY
M95/M96/M105 LEO	10 44	+11 42	GX	9.7/9.2/9.3	7′ × 5′/7′ × 5′ /4′ × 4′	Another trio of spirals sharing same field of view! 30,000,000LY
NGC 2903 LEO	09 32	+21 30	GX	8.9	13′ × 7′	One of best galaxies missed by Messier – easily spied. 30,000,000LY
γ LEP	05 44	–22 27	DS	3.7, 6.3	96″	Wide pale-yellow & garnet combo "awash in vivid color"! 29LY
R LEP	05 00	–14 48	SS	5.5–11.7	–	Hind's Crimson Star. A gleaming, intense stellar ruby. 1,500LY
M79 LEP	05 24	–24 33	GC	8.0	9′	Winter's Lone Globular. Small & faintish but unique. 50,000LY
α LIB	14 51	–16 02	DS	2.8, 5.2	230″	Zubenelgenubi. Nice wide, binocular & RFT combo. 65LY
Struve 1962 LIB	15 39	–08 47	DS	6.5, 6.6	12″	Pretty, perfectly-matched-white twins – nicely spaced.
ξ LUP	15 57	–33 58	DS	5.3, 5.8	10″	Seldom observed bright, sweet pair of bluish-white suns. 120LY
12 LYN	06 46	+59 27	DS	5.4, 6.0, 7.3	1.7″, 9″	Fascinating tight trio, all white. A-B is 700-year binary. 140LY
19 LYN	07 23	+55 17	DS	5.6, 6.5	15″	Attractive pair with subtle contrasting tints. A 9th-mag. lies nearby.
38 LYN	09 19	+36 48	DS	3.9, 6.6	3″	Bright close, unequal pair with elusive color contrast for steady night.

OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
NGC 2419 LYN	07 38	+38 53	GC	10.4	4′	Intergalactic Wanderer. Dim, small & amazingly remote for a globular cluster – 300,000LY!
NGC 2683 LYN	08 53	+33 25	GX	9.7	9′ × 2′	Bright, nearly edge-on spiral – cigar shaped. Distance uncertain
α LYR	18 37	+38 47	DS	0.0, 9.5, 9.5	63″, 118″	Vega. Dazzling pale-sapphire gem with faint comps. – beautiful! 26LY
β LYR	18 50	+33 22	DS	3.3–4.3, 8.6, 9.9, 9.9	46″, 67″, 86″	Struve's Eclipsing Binary. Set within starry triangle, forming delicate quadruple. Varies continuously in 13-day period. 860LY
ε-1/2 LYR	18 44	+39 40	DS	5.0, 6.1, 5.2, 5.5	2.6″, 2.3″	Famed "Double-Double" multiple system! 600-yr. & 1200-yr. binary pairs 208″ apart & slowly orbiting each other. All white. 200LY
ζ LYR	18 45	+37 36	DS	4.3, 5.9	44″	Easy topaz & pale-green double. 155LY
δ LYR	18 54	+36 58	DS	4.5, 5.6	630″	Ultra-wide but lovely reddish-orange & blue-green pair involved in sparse but colorful open cluster Stephenson-1. Both 800LY
Struve 2420 LYR	18 55	+33 58	DS	6.0, 7.7	45″	Fainter & wider miniature of Albireo, lying near the Ring Nebula.
T LYR	18 32	+37 00	SS	7.7–9.6	–	Rather faint but quite stunning! One of the reddest stars known.
M56 LYR	19 17	+30 11	GC	8.2	7′	A dim but sparkling stellar beehive in rich MW field. 45,000LY
M57 LYR	18 54	+33 02	PN	8.8	80″ × 60″	Ring Nebula. Finest and best-known planetary in the sky. A celestial smoke ring – superb sight! Central hole visible in small glass. 2,300LY
β MON	06 29	–07 02	DS	4.7, 5.4, 5.6	7″, 10″	Herschel's Wonder Star. Striking trio, all bluish-white, forming slender triangle. An amazing spectacle! B-C 3″ apart. 700LY
ε = 8 MON	06 24	+04 36	DS	4.5, 6.5	13″	Pretty gold & blue pair in rich Milky Way field.
M50 MON	07 03	–08 20	OC	5.9	16′	Beautiful stellar jewelbox of at least 100 suns. 2,900LY

12 MON/ NGC2244/ NGC 2237-9/ NGC 2246	06 32	+04 52	OC/DN	4.8/–	24′/80′ × 60′	Rosette Cluster/Nebula. Huge faint ring-shaped nebulosity surrounding irregular cluster of newborn suns centered on yellow giant. 2,600LY
15 = S MON/NGC 2264	06 41	+09 53	OC	3.9	20′	Christmas Tree Cluster. Big bright cluster of over 40 stars strikingly arranged in the shape of an upside-down evergreen tree! 2,600LY
R MON/NGC 2261	06 39	+08 44	DN	–	2′ × 1′	Hubble's Variable Nebula. Small, comet-shaped nebula – changes size, shape & brightness with pulsations of embedded variable. 2,600LY
λ OPH	16 31	+01 59	DS	4.2, 5.2	1.5″	Bright, tight 130-yr. binary. An elongated whitish egg in small glass.
36 OPH	17 15	–26 36	DS	5.1, 5.1, 6.7	5″, 730″	Pretty matched close pair with wide comp. All golden-orange. 18LY
o = 39 OPH	17 18	–24 17	DS	5.4, 6.9	10″	Lovely orange & clear-blue jewels – striking!
61 OPH	17 45	+02 35	DS	6.2, 6.6	21″	A neat, nearly-matched duo of silvery-white suns.
70 OPH	18 06	+02 30	DS	4.2, 6.0	5″	Famous yellow & red binary with 88-yr. period. Superb pair! 17LY
M10 OPH	16 57	–04 06	GC	6.6	15′	Big starry ball & near-twin of M12, just 3 degrees apart. 18,000LY
M12 OPH	16 47	–01 57	GC	6.8	15′	Along with M10, the best of the many GCs in OPH. 18,000LY
M14 OPH	17 38	–03 15	GC	7.6	12′	Noticeably fainter but richer cluster than M10 & M12. 33,000LY
M19 OPH	17 03	–26 16	GC	7.2	14′	Oblate Globular. Most oval GC known (from its rapid spin). 30,000LY
M62 OPH	17 01	–30 07	GC	6.6	14′	With M10, brightest GC in OPH. A near-twin of M19. 20,000LY
NGC 6572 OPH	18 12	+06 51	PN	9.0	15″ × 12″	Small but intense blue disk like NGC 6210 in HER. 1,900LY
NGC 6633 OPH	18 28	+06 34	OC	4.6	27′	Big, bright scattered clan of nearly 60 stars in unusual shape. 1,000LY

OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
IC 4665 OPH	17 46	+05 43	OC	4.2	41′	Called a Summer Beehive Cluster – sweet in binoculars! 1,300LY
α ORI	05 55	+07 24	SS	0.4–1.3	–	Betelgeuse. Fiery topaz-red supergiant sun – a dazzling gem! 520LY
β ORI	05 14	–08 12	DS	0.1, 6.8	10″	Rigel. Beautiful radiant blue-white supergiant sun with fainter attendant, forming a splendid magnitude-contrast pair! 770LY
η ORI	05 25	–02 24	DS	3.1–3.4, 4.8	1.5″	Bright tight, bluish duo – primary an 8-day eclipsing binary. 1,400LY
λ ORI	05 35	+09 56	DS	3.6, 5.5	4″	Neat cozy pair, both bluish-white with hint of violet or purple. 900LY
δ ORI	05 32	–00 18	DS	1.9–2.1, 6.3	53″	Wide mag.-contrast pair with 5.7-day eclipsing primary. Tints greenish-white & pale-blue or violet. Neat double for binoculars. 1,400LY
ζ ORI	05 41	–01 57	DS	1.9, 4.0	2.5″	Bright close blue-white duo. Flame Neb. (NGC 2024) in field. 1,400LY
23 ORI	05 23	+03 33	DS	5.0, 7.1	32″	Overlooked wide easy combo. Both stars bluish-white in hue.
σ ORI	05 39	–02 36	DS	4.0, 10.3, 7.6, 6.5	11″, 13″, 43″	Amazing colorful multiple star with faint triple Struve 761 (8.0, 8.5, 9.0, 68″, 8″) in field; all one vast system! Many hues evident. 1,200LY
ι ORI	05 35	–05 55	DS	2.8, 6.9	11″	Diamond-like pair with Struve 747 (4.8, 5.7, 36″) in same radiant gem-field – forming a wide double-double system! 2,000LY
θ-1 ORI	05 35	–05 23	DS	6.4, 7.9, 5.1, 6.7	9″, 13″, 22″	Famed "Trapezium" multiple star embedded in heart of Orion Nebula. Wondrous spectacle – like diamonds on green velvet! Also several fainter companions – an actual star cluster in formation! 1,600LY
M42/M43 ORI	05 35	–05 23	DN	4.0/9.0	66′ × 60′/20′ × 10′	Orion Nebula. Finest DN in the sky & perhaps the grandest deep-sky wonder of them all (with the

						exception of the MW itself). Magnificent fan-shaped cloud with wings and wisps overflowing the field of view. Obvious emerald-green/turquoise hue with subtle pinkish tints & the Trapezium diamonds at its heart. Thrilling beyond words! 1,600LY
θ-2 ORI	05 35	–05 25	DS	5.2, 6.6	52″	Wide bluish-white pair in Orion Nebula.
W ORI	05 05	+01 11	SS	6.2–7.0	–	Its ruddy glow warms the observer on cold Winter nights!
BL ORI	06 26	+14 43	SS	6.3–7.0	–	Another ruby – a twin of W ORI in both hue & brightness.
M78 ORI	05 47	+00 03	DN	8.0	8′ × 6′	Weird-looking, comet-shaped nebulosity with two dim stars. 1,400LY
COL 70 ORI	05 36	–01 00	OC	0.4	150′	Epsilon Orionis Cluster. Stunning circular starburst surrounding middle star in Orion's belt as seen in binoculars & RFTs.
ε PEG	21 44	+09 52	DS	2.4, 8.5	143″	Enif/Pendulum Star. Tap scope & see! Yellow & violet. 780LY
M15 PEG	21 30	+12 10	GC	6.4	12′	Rich, compact starball with intense core. 34,000LY
NGC 7331 PEG	22 37	+34 25	GX	9.5	11′ × 4′	Big bright, nearly edge-on spiral. 50,000,000LY
η PER	02 51	+55 54	DS	3.8, 8.5	28″	Color & mag.-contrast pair – vivid orange & blue hues. 890LY
α PER/MEL 20	03 22	+49 00	AS	1.8/1.2	185′	Mirfak/Alpha Persei Association. Binocular wonder! 600LY
β PER	03 08	+40 57	SS	2.1–3.4	–	Algol/Demon Star. Naked-eye eclipser – period 2.9 days. 100LY
M34 PER	02 42	+42 47	OC	5.2	35′	"A celestial aegis hung aloft in splendor!" Lovely sight. 1,500LY
M76 PER	01 42	+51 34	PN	11.5	140″ × 70″	Little Dumbbell/Barbell/Cork/Butterfly Nebula. Faintish, pearly-white miniature of the Dumbbell Nebula in VUL. 4,000LY

OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
NGC 869/NGC 884 PER	02 19	+57 09	OC/OC	3.5/3.6	30′/30′	Double Cluster. Two magnificent, overlapping radiant starbursts! Amazing colorful, stellar jewelboxes. Awesome in binoculars, RFTs & telescopes of all sizes. Related – 7,200LY & 7,500LY
α PSC	02 02	+02 46	DS	4.2, 5.1	2″	Alrescha. Tight pair with strange subtle tints. 720-yr. binary. 130LY
ψ-1 PSC	01 06	+21 28	DS	5.6, 5.8	30″	Easy matched pair – both stars blue-white.
ζ PSC	01 14	+07 35	DS	5.6, 6.5	23″	Pale-yellow & pale-lilac combo. 140LY
65 PSC	00 50	+27 43	DS	6.3, 6.3	4″	Neatly matched, pale-yellow cozy pair.
TX = 19 PSC	23 46	+03 29	SS	4.5–5.3	–	Lovely reddish-orange sun in Circlet Asterism of PSC. 400LY
α PSA	22 58	–29 37	SS	1.2	–	Fomalhaut. The "Solitary One." A sparkling blue-white gem. 25LY
k PUP	07 39	–26 48	DS	4.5, 4.7	10″	Superb bright pair resembling γ ARI. Both blue-white. 450LY
M46/NGC 2438 PUP	07 42	–14 49	OC/PN	6.1/11.5	27′/66″	Rich uniform clan of over 100 suns with a tiny, ghostly ring-shaped nebula projected against it. Unrelated – 5,400LY & 3,000LY
M47 PUP	07 37	–14 30	OC	4.4	30′	Grand broad splash of several dozen suns. 1,500LY
M93 PUP	07 45	–23 52	OC	6.2	22′	Glorious swarm of some 80 colorful stars. Wedged-shaped. 3,400LY
NGC 2440 PUP	07 42	–18 13	PN	10.5	16″	Tiny, bluish-white disk – a celestial opal. 3,500LY
NGC 2477 PUP	07 52	–38 33	OC	5.8	27′	Superb, rich cluster of 300 stars – like a loose globular. 4,000LY
M71 SGE	19 54	+18 47	GC	8.3	7′	Remote-looking but pretty, misty glow in rich MW field. 13,000LY
AQ SGR	19 34	–16 22	SS	6.7–7.1	–	Glowing reddish stellar ember.
M8/NGC 6530 SGR	18 04	–24 23	DN/OC	5.8/4.6	90′ × 40′/15′	Lagoon Nebula. Large floating nebulous patch crossed by great curving dark lane, with scattered cluster to

						one side. Wondrous sight! Finest of it class for N. observers after the Orion Nebula. 5,000LY
M17 SGR	18 21	–16 11	DN	6.0	46′ × 37′	Horseshoe/Omega/Swan Nebula. Multi-named glowing wonder. A long ray with hook at one end, crossed by dark lanes & many stars. 5,000LY
M20 SGR	18 03	–23 02	DN	6.3	29′ × 27′	Trifid Nebula. Although inferior to the Lagoon (which lies closeby), a dark-night revelation! Bulbous cloud trisected with dark rifts. 5,500LY
M21 SGR	18 05	–22 30	OC	5.9	13′	Bright stellar clan of some 60 suns lying near the Trifid. 4,000LY
M22 SGR	18 36	–23 54	GC	5.1	24′	M13 Rival. Big, bright magnificent stellar beehive, resolved to center even in small scopes! Stars look ruddy in larger glasses. 10,000LY
M23 SGR	17 57	–19 01	OC	5.5	27′	Big, rich & uniform stellar commune. Lovely sight. 2,100LY
M24 SGR	18 18	–18 25	GX	4.5	120′ × 60′	Small Sagittarius Star Cloud. Magnificent MW starcloud for sweeping with binoculars and wide-field telescopes. Overpowering! 16,000LY
M25 SGR	18 32	–19 15	OC	4.6	32′	Large splashy cluster of some 50 suns. Coarse but brilliant. Contains Cepheid U SGR, which varies from 6.3 to 7.1 over 7 days. 2,000LY
M55 SGR	19 40	–30 58	GC	7.0	19′	Large, loosely compressed orb. Needs dark, steady night. 16,000LY
NGC 6818 SGR	19 44	–14 09	PN	9.9	22″ × 15″	Little Gem Nebula. Small, bluish-green cosmic egg. 5,000LY
α SCO	16 29	–26 26	DS	0.9–1.8, 5.4	2.5″	Antares. Beautiful fiery-red supergiant with superb emerald-green companion! Very tight – good seeing a must. 900-yr. binary. 600LY

OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
β SCO	16 05	–19 48	DS	2.6, 4.9	14″	Graffias. Lovely blue-white pair resembling Mizar in UMA. 600LY
ν SCO	16 12	–19 28	DS	4.5, 5.3, 6.6, 7.2	1″, 2″	Colorful but tight quadruple with pairs 41″ apart. Tints subtle but real – striking sight in larger scopes. 440LY
ξ SCO	16 04	–11 22	DS	4.8, 7.3	8″	Yellow pair with Struve 1999 (7.4, 8.1, 12″) 280″ away forming wide double-double. Primary 46-year period close binary. 80LY
M4 SCO	16 24	–26 32	GC	5.9	26′	Big, softly-shining globular swarm, resolvable in the smallest of scopes. Noticeably elongated vertically. Lovely sight! Near Antares. 7,000LY
M6 SCO	17 40	–32 13	OC	4.2	25′	Butterfly Cluster. Like a butterfly with open wings! 1,400LY
M7 SCO	17 54	–34 39	OC	3.3	80′	Sprawling, radiant swarm of 80 tinted jewels. Binocular target. 800LY
M80 SCO	16 17	–22 59	GC	7.2	9′	Herschel's Delight. Tiny, densely-packed glittering starball. 27,000LY
NGC 6231 SCO	16 54	–41 48	OC	2.6	15′	Glorious, dazzling cluster – 120 suns plus blue supergiant! 6,000LY
NGC 6302 SCO	17 14	–37 06	PN	9.7	2′ × 1′	Bug Nebula. Strange, unusual-looking bi-polar nebula. 1,900LY
R SCL	01 27	–32 33	SS	5.9–8.8	–	Pulsating crimson jewel – one of reddest stars in the sky.
NGC 55 SCL	00 15	–39 11	GX	7.9	32′ × 6′	Huge, mottled edge-on star-city over ½ degree long. 7,000,000LY
NGC 253 SCL	00 48	–25 17	GX	7.1	25′ × 7′	Sculptor Galaxy. Big, bright & beautiful! Cigar-shaped – like a smaller Andromeda Galaxy – a wondrous sight! 7,500,000LY
M11 SCT	18 51	–06 16	OC	5.8	14′	Smyth's Wild Duck Cluster. A rich, glittering fan-shaped swarm of some 500 suns with an 8th-mag. star near apex – a beauty! 5,500LY

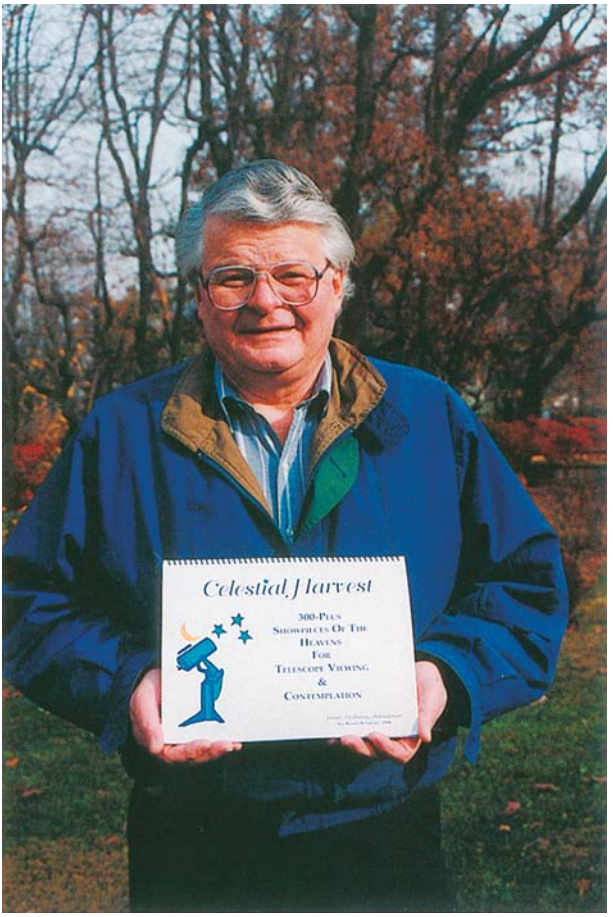
Milky Way SCT	18 40	–06 00	GX	–	720′ × 540′	Scutum Star Cloud/Gem of the Milky Way. "Downtown Milky Way!" An amazing binocular & RFT starry wonderland! Sense 3-D "depth"!!
δ SER	15 35	+10 32	DS	4.2, 5.2	4″	Striking, neatly-paired double with off-white hues – elegant! 85LY
θ SER	18 56	+04 12	DS	4.5, 5.4	22″	Wider version of δ SER. Pretty, easy pair for any glass. 140LY
M5 SER	15 19	+02 05	GC	5.8	17′	M13 Rival. Magnificent ball of stars – a starry blizzard! 25,000LY
M16/IC 4703 SER	18 19	–13 47	OC/DN	6.0/–	25′/53′ × 28′	Eagle/Star Queen Nebula & Cluster. A faintly fog-bound nebulous star cluster. Site of famous Hubble Space Telescope image. 8,000LY
IC 4756 SER	18 39	+05 27	OC	4.5	70′	Big, bright scattered group of some 80 stars – binocular clan. 1,400LY
NGC 3115 SEX	10 05	–07 43	GX	9.2	8′ × 3′	Spindle Galaxy. Elongated glow with bright center – typical elliptical galaxy shape but with pointy ends. 21,000,000LY
118 TAU	05 29	+25 09	DS	5.8, 6.6	5″	Nicely-paired combo – blue-white & bluish. Pretty.
α TAU	04 36	+16 31	SS	0.8–1.0	–	Aldebaran. Lovely topaz gem projected against Hyades Cluster. 65LY
θ-1/2 TAU	04 29	+15 52	DS	3.4, 3.8	337″	Wide naked-eye/binocular pair in Hyades Cluster. White & yellow.
MEL 25 TAU	04 29	+15 52	OC	0.5	330′	Hyades Cluster. Huge bright, striking V-shaped stellar clan abounding in star-pairs & colorful suns. A naked-eye & binocular wonder! 150LY
M1 TAU	05 34	+22 01	SR	8.4	6′ × 4′	Rosse's Crab Nebula. Celebrated remnant of the 1054AD supernova outburst with rapidly spinning neutron star/pulsar at core. An irregular pale elliptical glow with ragged edges. Neat close double Struve 742 (7.2, 7.8, 4″) lies unsuspected in field. 6,300LY

OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
M45 TAU	03 47	+24 07	OC	1.2	110′	Pleiades Star Cluster. Brightest, best-known & finest OC in the entire heavens! A brilliant starry commune of blue-white diamonds! Naked-eye, binocular & telescopic wonder. A thrilling spectacle! 410LY
NGC 1514 TAU	04 09	+30 47	PN	10.9	2′	A 9th-mag. star-nucleus surrounded by a faint circular nebulosity. "A most singular phenomenon!" exclaimed Sir William Herschel.
ι TRI	02 12	+30 18	DS	5.3, 6.9	4″	Little-known, close but lovely gold & blue-green pair. 200LY
M33 TRI	01 34	+30 39	GX	5.7	62′ × 39′	Pinwheel/Triangulum Galaxy. Big pale, face-on spiral with delicate arms & patches of nebulosity. A dark-night revelation! 3,600,000LY
ζ/80 UMA	13 24	+54 56	DS	2.3, 4.0, 4.0	14″, 709″	Famed Mizar with Alcor nearby. Trio of radiant blue-white diamonds! All three suns are spectroscopic binaries (like many other stars on list) & thus one vast sextuple system. First double star discovered. 78LY
ξ UMA	11 18	+31 32	DS	4.3, 4.8	1.8″	Historic 60-year binary (first to have orbit determined) which has made three circuits since discovery! Twin yellowish suns in contact. 26LY
VY UMA	10 45	+67 25	SS	5.9–6.5	–	Ruddy-orange beacon above the Big Dipper – visible year-round.
M81/M82 UMA	09 56	+69 04	GX/GX	6.9/8.4	26′ × 14′/11′ × 5′	Bode's Nebulae. Finest galaxy pair in sky! M81 is a bright oblong spiral with vivid nucleus; M82 is a long, narrow curved ray crossed by dark rifts. Splendid sight – both floating serenely ½ deg. apart. 7,000,000LY
M97 UMA	11 15	+55 01	PN	11.2	180″	Rosse's Owl Nebula. Large pale nebula with two subtle dark areas or "eyes" making it faintly bi-central. The cigar-shaped 10th-mag. spiral M108 is in the same wide field 48′ NW – a true celestial "odd couple"! The

						Owl lies 10,000LY away but the galaxy thousands of times as far.
M101 UMA	14 03	+54 21	GX	7.7	27′ × 26′	Pinwheel Galaxy. Large, pale circular glow – a vast face-on spiral displaying much subtle detail on dark nights. 15,000,000LY
α UMI	02 32	+89 16	DS	1.9–2.1, 9.0	18″	Polaris. Mag.-contrast pair having amazing (apparent) "24-hour orbital period" caused by Earth's rotation! Brightest Cepheid in sky. 430LY
γ VEL	08 10	−47 20	DS	1.8, 4.3	41″	Dazzling bluish pair – one of most beautiful in the heavens! 1,000LY
NGC 3132 VEL	10 08	−40 26	PN	8.2	84″ × 52″	Eight-Burst Planetary. One of brightest in sky – white ellipse with 9th-magnitude central sun and hints of multiple rings! 2,000LY
α VIR	13 25	−11 10	SS	0.97	–	Spica. Icy-blue supersun more than 2,000 × Sun's luminosity. 250LY
γ VIR	12 42	−01 27	DS	3.5, 3.5	0.5″	Porrima. Famed bright binary with 171-yr. period. Now opening up from its 2005 minimum separation, these blended stars look like some yellowish cosmic egg with slowly-turning long axis! 39LY
SS VIR	12 25	+00 48	SS	6.0–9.6	–	Ruddy pulsating interstellar beacon – easily spied when at its brightest.
M84/M86/M87 VIR	12 25	+12 53	GX/GX /GX	9.3, 9.2, 8.6	5′ × 4′/7′ × 6′/ 7′ × 7′	Coma-Virgo Galaxy Cluster. Three bright specimens (all giant elliptical galaxies) of the famed "Realm of the Nebulae." Here, hundreds of star-cities can be seen in small scopes – often several in the same eyepiece field – and more than 10,000 have been photographed! 70,000,000LY
M49 VIR	12 30	+08 00	GX	8.4	9′ × 7′	Another bright elliptical positioned between two stars. 65,000,000LY

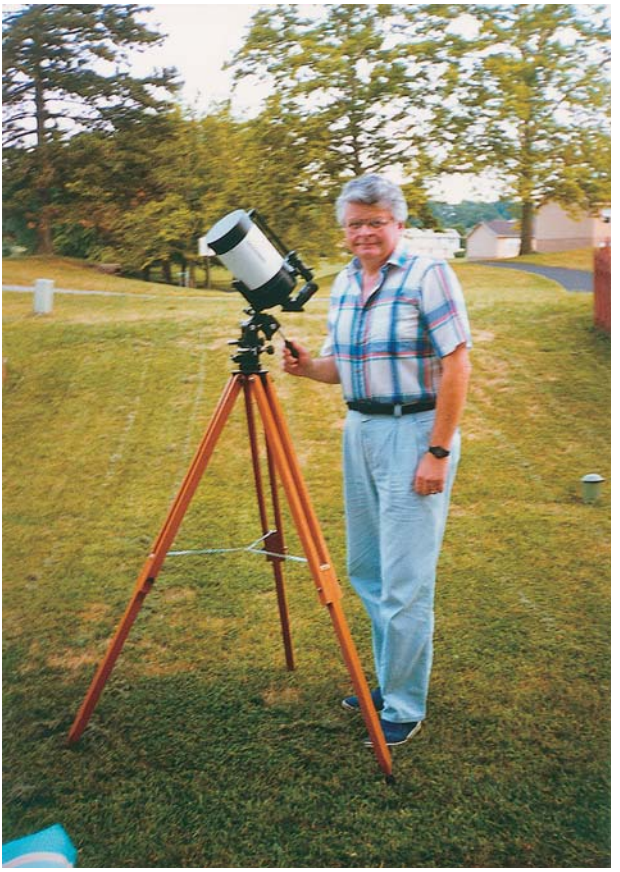
OBJECT/CON	RA	DEC	TYPE	MAG/S	SIZE/SEP	REMARKS
M59/M60 VIR	12 42	+11 39	GX/GX	9.8/8.8	5′ × 3′/7′ × 6′	Nice elliptical galaxy pair lying in same field 25′ apart.
M61 VIR	12 22	+04 28	GX	9.7	6′ × 6′	One of the many spirals in the Coma-Virgo Cluster – face-on with two arms.
M104 VIR	12 40	–11 37	GX	8.3	9′ × 4′	Sombrero Galaxy. One of brightest & most spectacular edge-on spirals in the sky! Bulbous glow with dark equatorial band. 28,000,000LY
NGC 4762 VIR	12 53	+11 14	GX	10.2	9′ × 2′	The Kite. Thin edge-on like paper kite – dim galaxy NGC 4754 nearby.
3C273 VIR	12 29	+02 03	GX	12.8	–	First Quasar. Also brightest & closest – visible in 4- to 6-inch glass as a dim bluish star despite its vast distance of 1,900,000,000LY!
COL 399 VUL	19 25	+20 11	AS	3.6	60′	Coat Hanger Asterism/Brocchi's Cluster. Like an upside-down starry coat hanger in binoculars. Superb in RFT scopes (which show it erect)!
NGC 6940 VUL	20 35	+28 18	OC	6.3	31′	More than 100 sparkling sapphires – brightest star ruby red! 2,500LY
M27 VUL	20 00	+22 43	PN	7.6	8′ × 5′	Dumbbell Nebula. Next to the Ring Nebula, the finest & best-known object of its class! Like a big puffy celestial pillow serenely floating among the stars of the Milky Way Galaxy, where it looks suspended three-dimensionally in space – a truly wondrous spectacle! 1,200LY

About the Author



The author, shown holding a copy of his book *Celestial Harvest: 300-Plus Showpieces of the Heavens for Telescope Viewing & Contemplation*. Originally self-published in 1998 (and updated in 2000), it was reprinted in 2002 by Dover Publications in New York. This labor of love was more than 40 years in the making! Courtesy of Warren Greenwald.

James Mullaney is an astronomy writer, lecturer, and consultant who has published more than 500 articles and five books on observing the wonders of the heavens, and logged over 20,000 hours of stargazing time with the unaided eye, binoculars, and telescopes. Formerly Curator of the Buhl Planetarium and Institute of Popular Science in Pittsburgh and more recently Director of the DuPont Planetarium, he served as staff astronomer at the University of Pittsburgh's



The author shown with his 5-inch Celestron Schmidt–Cassegrain optical-tube assembly mounted on an exquisite old Unitron altazimuth mounting with slow-motion controls. With excellent optics and a total weight of just 12 pounds, this highly portable instrument can go anywhere and is a joy to use. Photo by Sharon Mullaney.

Allegheny Observatory and as an editor for *Sky & Telescope*, *Astronomy*, and *Star & Sky* magazines. One of the contributors to Carl Sagan's award-winning *Cosmos* PBS television series, he has received recognition for his work from such notables (and fellow stargazers) as Sir Arthur Clarke, Johnny Carson, Ray Bradbury, Dr Wernher von Braun, and his former student, NASA scientist/astronaut Dr Jay Abt. His 50-year mission as a "celestial evangelist" has been to "Celebrate the Universe!" – to get others to look up at the majesty of the night sky and to experience personally the joys of stargazing. In February, 2005, he was elected a Fellow of the prestigious Royal Astronomical Society (London).

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Unless mentioned or illustrated in the text, individual celestial objects are not listed here. Deep-sky wonders (including stars) can be readily found under their respective constellations in Appendix 3.