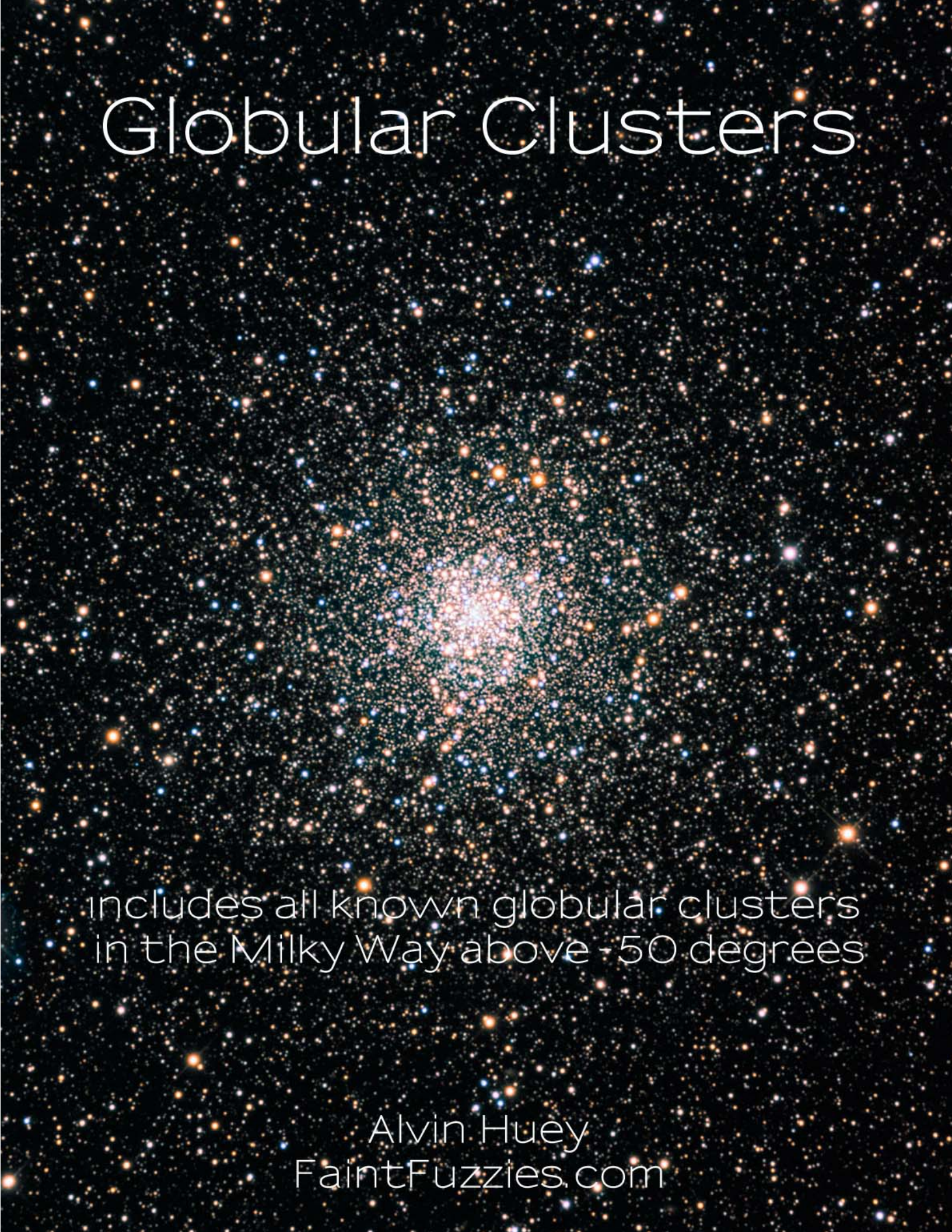
Globular Clusters



includes all known globular clusters
in the Milky Way above -50 degrees

Alvin Huey
FaintFuzzies.com

Globular Clusters

(Includes all known globular clusters in the Milky Way above declination of -50° plus some extras)

by Alvin Huey

www.FaintFuzzies.com

Updated: March 2024

Observing Books by Alvin Huey

Hickson Group Observer's Guide, Second edition

The Abell Planetary Observer's Guide, Second edition

Observing the Arp Peculiar Galaxies, Revised edition

Observing Guides by FaintFuzzies.com

Herschel Objects – Parts I, II, and III

Selected Small Galaxy Groups

Galaxy Trios and Triple Systems

Globular Clusters – North of -50°

Planetary Nebulae and Supernovae Remnants

The Local Group

Flat Galaxies

Abell Galaxy Clusters

Voronstov-Velyaminov Catalogue – Part I and II

Rose Catalogue of Compact Galaxies

Variable Galaxies

Selected Shakhbazian Groups

Ring Galaxies

Palomar Compact Galaxy Catalogue

Object of the Week 2012 and 2013 – Deep Sky Forum

All Maps by MegaStar™ v5
All DSS images (Digital Sky Survey) archive.stsci.edu/dss/acknowledging.html

This and other publications by the author are available through www.faintfuzzies.com

Contents

Globular Cluster List

Page	Name	Const	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size (')
12	NGC 288	Scl	8.1	15.3	12.6	13.7	13
13	Whiting 1	Cet	15.0	-	-	-	1.2
14	Eridanus Cluster	Eri	14.7	20.4	17.6	-	-
15	NGC 1851	Col	7.1	16.1	13.2	12.5	12
16	M79 (NGC 1904)	Lep	7.7	16.2	13.1	12.6	9.6
17	NGC 2298	Pup	9.3	16.2	13.4	12.8	5
18	NGC 2419	Lyn	10.3	20.2	17.3	13.6	4.6
19	Koposov 2	Gem	17.6	-	-	-	-
20	Pyxis Cluster	Pyx	12.9	18.7	15.2	15.9	4
21	NGC 3201	Vel	6.9	14.8	11.7	13.4	20
22	NGC 4147	Com	10.4	16.9	14.5	13.6	4.4
23	M53 (NGC 5024)	Com	7.7	16.9	13.8	13.3	13
23	NGC 5053	Com	9	16.7	13.8	14	10
24	M3 (NGC 5272)	CVn	6.3	15.6	12.7	12.6	18
25	NGC 5466	Boo	9.2	16.6	13.8	14	9
26	PSO j174.0675-10.8774	Crt	~16	-	-	-	-
27	Koposov 1	Vir	14.2	-	-	-	-
28	NGC 5634	Vir	9.5	17.8	-	13.2	5.5
29	NGC 6229	Her	9.4	18	15.5	12.7	4.5
30	M13 (NGC 6205)	Her	5.8	15	11.9	12.3	20
31	M92 (NGC 6341)	Her	6.5	15.2	12.1	12.2	14
32	AM 4	Hyd	15.9	21.6	20.5	18.3	3
33	M68 (NGC 4590)	Hyd	7.3	15.6	12.6	12.5	11
34	NGC 5694	Hyd	10.2	18.5	15.5	13.4	4.3
35	NGC 5986	Lup	7.6	16.5	13.2	12.5	9.6
36	NGC 5824	Lup	9.1	18.5	15.5	13.4	7.4
37	NGC 5897	Lib	8.4	16.3	13.3.	13.6	11
38	M5 (NGC 5904)	Oph	5.7	15	12.2	12.5	23
38	Palomar 5	Oph	11.8	17.4	15.5	16.3	8
39	M107 (NGC 6171)	Oph	7.8	15.6	13	13.4	13
40	M10 (NGC 6254)	Oph	6.6	15.1	12	13.1	20
40	M12 (NGC 6218)	Oph	6.1	14.7	12	12.1	16
41	NGC 6235	Oph	8.9	16.7	14	12.4	5
41	NGC 6287	Oph	9.3	17.1	14.5	12.7	4.8
42	NGC 6284	Oph	8.9	16.6	-	12.9	6.2
42	NGC 6325	Oph	10.2	17.3	14.7	13.3	4.1
43	M14 (NGC 6402)	Oph	7.6	17.2	14	12.8	11
44	IC 1257	Oph	13.1	19.8	17	14.3	1.7
44	NGC 6366	Oph	9.5	15.7	13.6	15.1	13
45	Haute Provence 1	Oph	12.5	18.6	16	12.9	1.2

Page	Name	Const	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size (‘)
46	NGC 6426	Oph	10.9	18.1	15.2	14	4.2
47	NGC 6517	Oph	10.1	18	16	13.1	4
47	NGC 6539	Oph	8.9	18.3	15.9	13.4	7.9
47	Palomar 7	Oph	10.3	17.7	15.7	14.8	8
48	[PWM78] 2	Oph	-	-	-	-	2
49	NGC 6535	Oph	9.3	15.8	12.8	12	3.4
50	M19 (NGC 6273)	Oph	6.8	17	14	13	17
50	NGC 6293	Oph	8.3	16.5	14.3	12.9	8.2
51	NGC 6355	Oph	8.6	17.2	-	11.7	4.2
52	M62 (NGC 6266)	Oph	6.4	16.3	13.2	12.3	15
52	NGC 6304	Oph	8.3	16.2	14.5	12.8	8
52	NGC 6316	Oph	8.1	17.8	15	11.8	5.4
53	M9 (NGC 6333)	Oph	7.8	16.2	13.5	13.2	12
53	NGC 6342	Oph	9.5	16.9	15	12.7	4.4
53	NGC 6356	Oph	8.2	17.7	15.1	13.2	10
54	NGC 6401	Oph	7.4	18	15.5	8.7	1.8
55	NGC 6440	Sgr	9.3	18.7	16.7	12.5	4.4
56	M4 (NGC 6121)	Sco	5.4	13.4	10.8	13.2	36
56	NGC 6144	Sco	9	16.5	13.4	13.3	7.4
57	M80 (NGC 6093)	Sco	7.3	16.2	12.5	12.3	10
58	1636-283 (ESO 452-SCII)	Sco	12	16.6	15.3	12.4	1.2
59	NGC 6139	Sco	9.1	17.9	15	13.7	8.2
60	NGC 6256	Sco	11.3	18.2	15.3	14.4	4.1
61	Liller 1	Sco	15.8	24.4	20.5	13.2	0.3
62	NGC 6388	Sco	6.8	17.2	14.8	11.9	10.4
63	NGC 6496	CrA	8.6	16.5	14.3	12.3	5.6
63	NGC 6541	CrA	6.3	15.3	12.1	12.2	15
64	NGC 6380	Sco	11.5	19.5	17	14.3	3.6
64	Tonantzintlia 2 (Pismis 26)	Sco	12.2	18.2	-	-	2.2
65	Djorgovski 1	Sco	13.6	20.8	-	13.1	0.8
66	NGC 6441	Sco	7.2	17.5	15.4	12.1	9.6
66	NGC 6453	Sco	10.2	17.5	14.3	14.6	7.6
67	FSR 1735	Ara	12.9	-	-	-	0.8
68	ESO 280-SC06	Ara	12.0	17.4	14	-	1.4
69	AL 3	Sgr	14.0	-	-	-	1.3
70	NGC 6522	Sgr	9.9	16.9	14.1	14.8	9.4
70	NGC 6528	Sgr	9.6	17.1	15.5	13.1	5
71	NGC 6558	Sgr	8.6	16.7	-	-	4.2
71	NGC 6569	Sgr	8.4	17.5	14.9	12.4	6.4
72	NGC 6624	Sgr	7.6	16.1	14	12.3	8.8
73	UKS 1	Sgr	17.3	25.5	22	18.8	2

Page	Name	Const	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size (‘)
74	2MASS-GC1	Sgr	27.7	-	-	-	3.3
74	2MASS-GC2	Sgr	24.6	-	-	-	1.9
75	NGC 6544	Sgr	7.5	14.9	12.8	12.3	9.2
75	NGC 6553	Sgr	8.3	16.9	15.3	13.1	9.2
76	NGC 6540	Sgr	14.6	15.3	-	15.5	1.5
76	ESO 456-SC38	Sgr	9.9	17.6	15.5	14.9	9.9
77	M22 (NGC 6656)	Sgr	5.2	14.2	10.7	12.7	32
77	M28 (NGC 6626)	Sgr	6.9	15.7	12	12.6	13.8
77	NGC 6638	Sgr	9.2	16.5	14.2	13.5	7.3
77	NGC 6642	Sgr	8.9	16.3	-	12.7	5.8
78	M69 (NGC 6637)	Sgr	7.7	15.9	13.7	12.7	9.8
78	M70 (NGC 6681)	Sgr	7.8	15.6	13	12.3	8
78	NGC 6652	Sgr	8.5	16	13.3	12.4	6
79	M54 (NGC 6715)	Sgr	7.7	18.2	15.2	13.1	12
80	NGC 6723	Sgr	6.8	15.5	12.8	12.4	13
81	M55 (NGC 6809)	Sgr	6.3	14.4	11.2	12.7	19
81	Arp GC2	Sgr	13	18.2	15.5	14.8	2.3
82	M75 (NGC 6864)	Sgr	8.6	17.5	14.6	12.8	6.8
83	M56 (NGC 6779)	Cyg	8.4	16.3	13.2	13.1	8.8
84	M71 (NGC 6838)	Sge	8.4	14.5	12.1	-	7.2
85	NGC 6749	Aql	12.4	19.7	16.5	15.4	4
85	NGC 6760	Aql	9	17.5	15.6	13.8	9
86	NGC 6712	Scu	8.1	16.3	13.3	13.1	9.8
87	NGC 6934	Del	8.9	17.1	13.8	13.2	7.1
88	NGC 7006	Del	10.6	18.8	15.6	13.4	3.6
89	M72 (NGC 6981)	Aqr	9.2	16.9	14.2	13.3	6.6
90	M30 (NGC 7099)	Cap	6.9	15.1	12.1	12.3	12
91	M2 (NGC 7089)	Aqr	6.6	16.1	13.1	12.6	16
92	NGC 7492	Aqr	11.2	17.6	15.5	14.3	4.2
93	M15 (NGC 7078)	Peg	6.3	15.9	12.6	12.6	18

M-31 Globular Clusters

Page	Name	Const	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size (‘)
95	G1 (M31 GC)	And	13.7	-	-	12.2	0.5
96	G78, Vitesnik (M31 GC)	And	14.2	-	-	12.2	0.4

Palomar Clusters

Page	Name	Const	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size (‘)
98	Palomar 1	Cep	13.6	16.8	16.3	15.8	2.8
99	Palomar 2	Aur	13	21.7	18.8	14.7	2.2
100	Palomar 3	Sex	13.9	20.5	18	14.9	1.6
101	Palomar 4	UMa	14.2	20.8	18	14.8	1.3
38	Palomar 5	Oph	11.8	17.4	15.5	16.3	8
102	Palomar 6	Oph	11.6	19.1	-	12	1.2
43	Palomar 7	Oph	10.3	17.7	15.7	14.8	8
104	Palomar 8	Sgr	10.9	17.3	15.4	14.5	5.2
105	Palomar 9 (NGC 6717)	Sgr	8.4	15.6	14	12.1	5.4
106	Palomar 10	Sag	13.2	19.4	18	16.2	4.0
107	Palomar 11	Aql	9.8	17.4	15.5	14.8	10
108	Palomar 12	Cap	11.7	17.1	14.6	14	2.9
109	Palomar 13	Peg	13.8	17.7	17	13	0.7
110	Palomar 14	Her	14.7	20	17.6	16.7	2.5
111	Palomar 15	Oph	14.2	19.9	17.1	-	3.0

Terzan Clusters

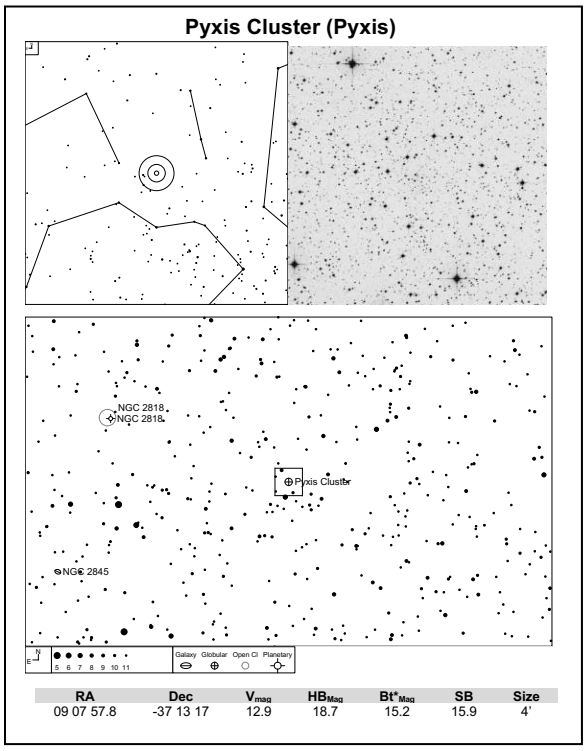
Page	Name	Const	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size (‘)
113	Terzan 1	Sco	15.9	21.4	18.5	-	2.4
113	Terzan 2	Sco	14.3	19.8	-	13.2	0.6
113	Terzan 4	Sco	16	21.6	-	-	0.7
115	Terzan 3	Sco	12	17.3	15	-	3.0
102	Terzan 5	Sgr	13.9	22.5	20.5	15.8	2.4
116	Terzan 6	Sgr	13.9	22.3	20.5	14.6	1.4
117	Terzan 7	Sgr	12	17.9	15	-	1.2
118	Terzan 8	Sgr	12.4	18	15	-	3.5
119	Terzan 9	Sgr	16	20.3	17.2	12.5	0.2
119	Terzan 10	Sgr	14.9	21.9	19.7	15.8	1.5
121	Terzan 11	Sgr	16.4	20.5	18.5	-	1.0

Planetary Nebulae Within Globular Clusters

Page	Name	Const	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size (‘)
123	Pease 1 in M15	Peg	-	-	-	-	1.0"
124	GJJC1 in M22	Sgr	-	-	-	-	-
126	JaFu1 in Palomar 6	Oph	-	-	-	-	-
127	JaFu2 in NGC 6441	Sco	-	-	-	-	-

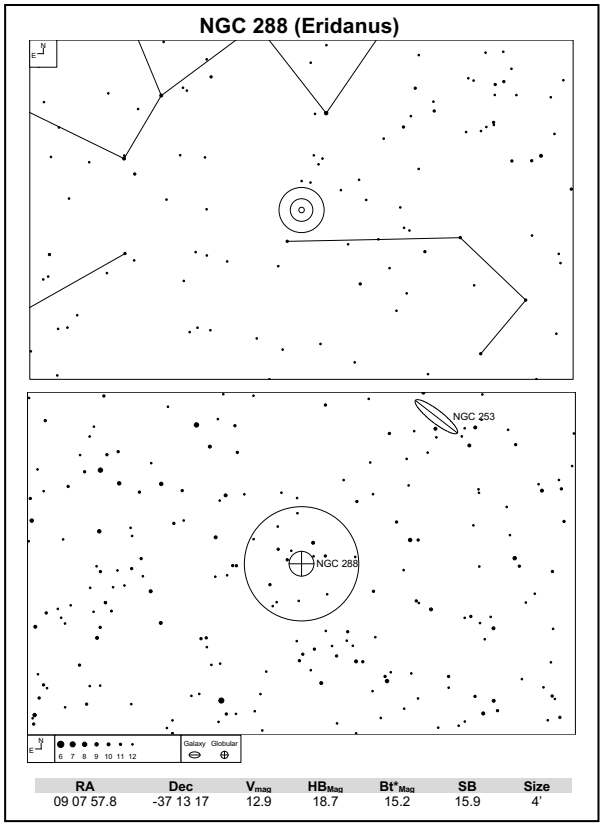
How to Use the Atlas

The Atlas takes on two forms: one with and other without DSS image.



With DSS image:
The left panel contains the naked eye field with the Telrad™ superimposed on the center of the globular or, if multiple globular clusters, the center of the finder field. The top right panel contains the inverted DSS image. The image is 15' square.

The bottom panel is a finder field of about 4.8º across and 3.0º high. The finder field is wide enough for the finder scope and detailed enough for those who choose to use a low power eyepiece as a "finder", like I do. The limiting magnitude of the field stars is set between 10 and 12. Pay attention to the magnitude scale on the bottom left. The field of the DSS image is superimposed on the finder chart.



Without DSS image:
The top panel contains the naked eye field with the Telrad™ superimposed on the center of the globular. If there are multiple globular clusters, the finder field is centered. The bottom panel is a finder field of about 4.8º across and 3.0º high. The limiting magnitude of the field stars is set between 10 and 12. Pay attention to the magnitude scale on the bottom left. One-degree circles are centered around each cluster for sense of scale.

A table provided at the end of the page contains the following data.[1]

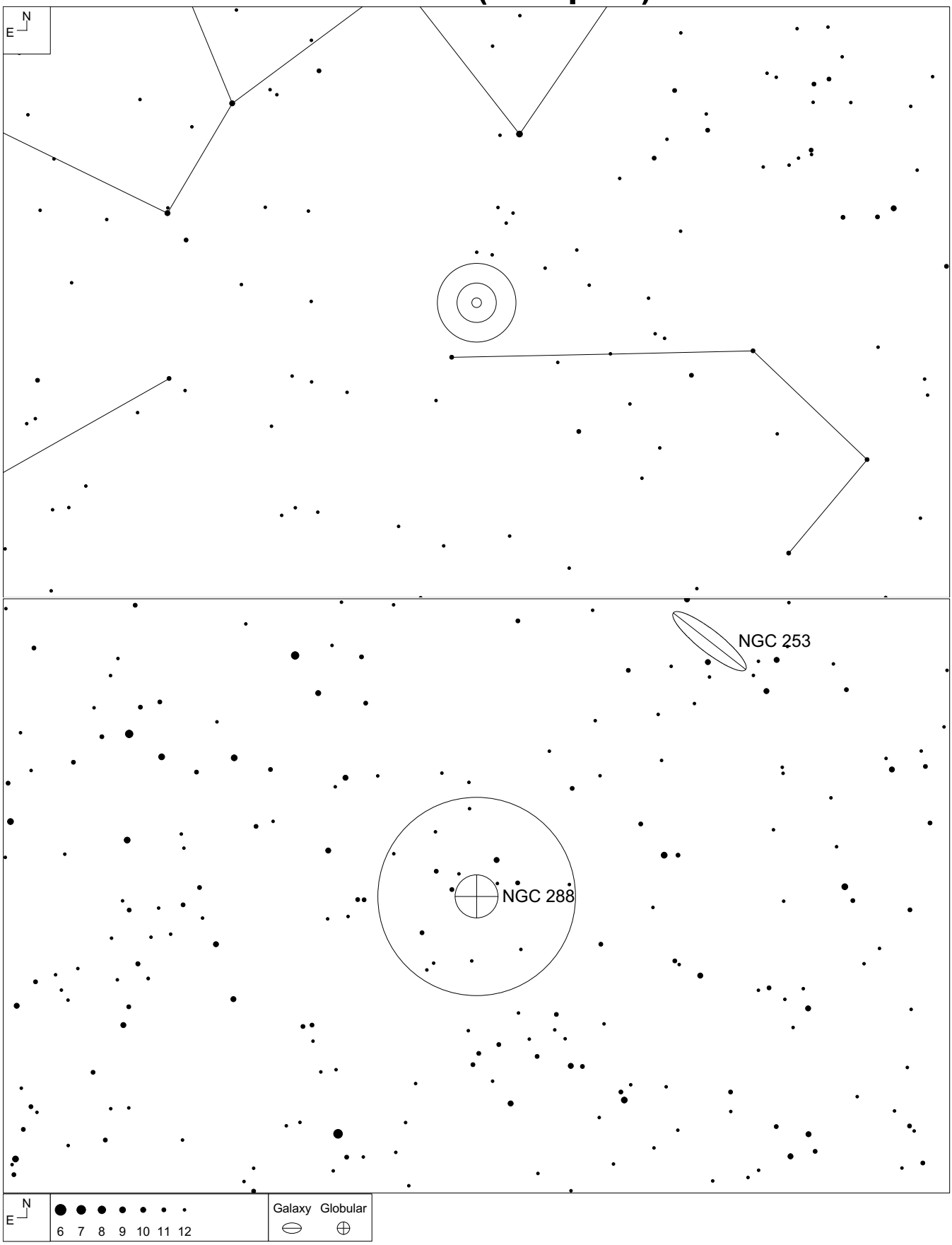
- **RA** and **Dec** – coordinates in 2000 coordinates
- **V_{mag}** – Visual magnitude
- **HB_{mag}** – V magnitude of the horizontal branch of the globular cluster, where large number of stars become visible, indicates being resolved.
- **Bt^*_{mag}** – V magnitude of the brightest star
- **SB** – Surface brightness in V magnitude per square arcminute
- **Size** – in arcminutes

Any comments or to share any observations, send them to Alvin.Huey@FaintFuzzies.com.
Any feedback or suggestions would be greatly appreciated. I hope to keep this resource updated and made available to all of you, the deep sky observer.

[1] Source data is from Brent A. Archinal and Steven J. Hynes. *Star Clusters.* Richmond, VA: Willmann-Bell, 2003.

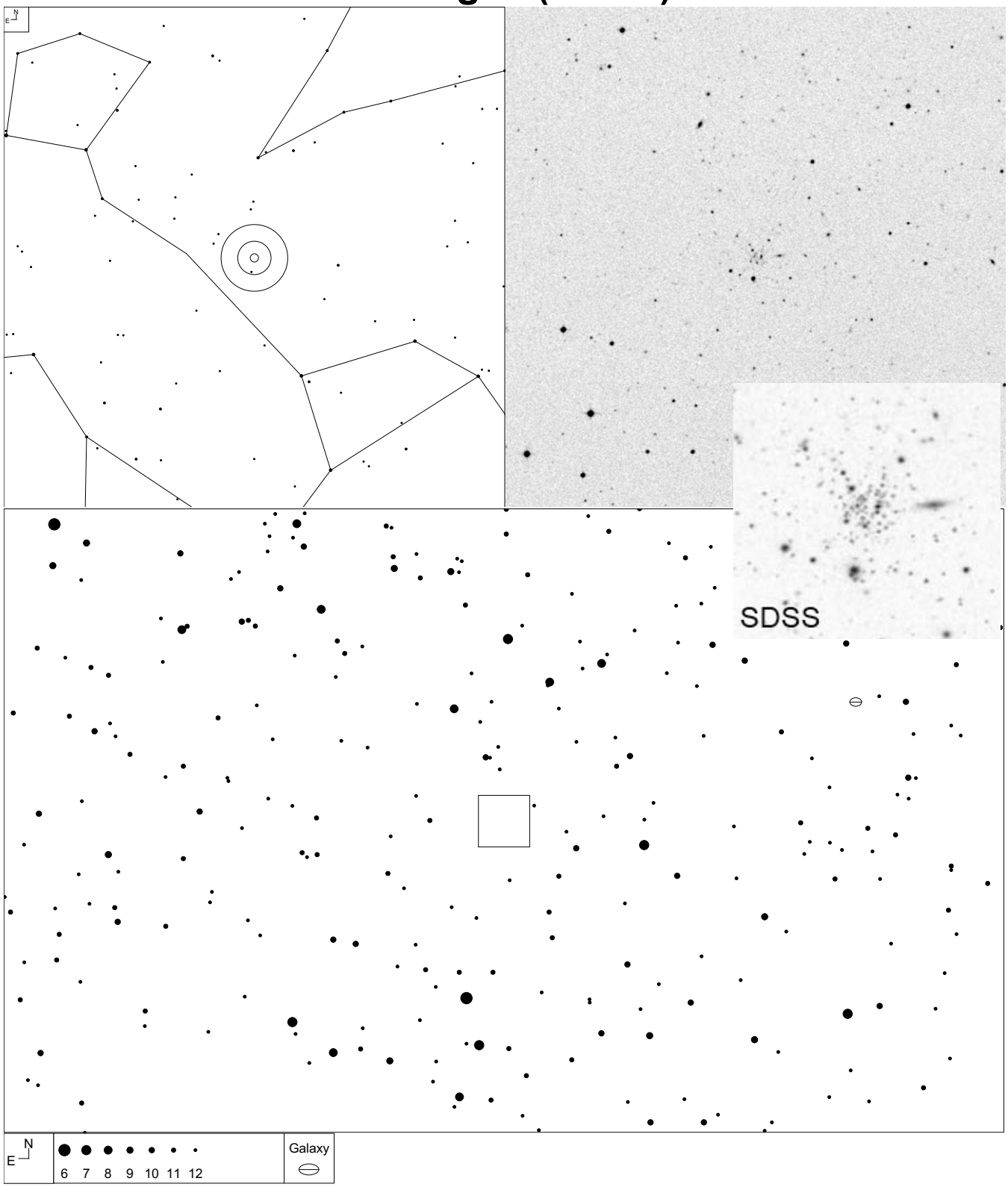
The Milky Way Globular Clusters
(above -50° declination)

NGC 288 (Sculptor)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
00 52 45.5	-26 34 51	8.1	15.3	12.6	13.7	13’

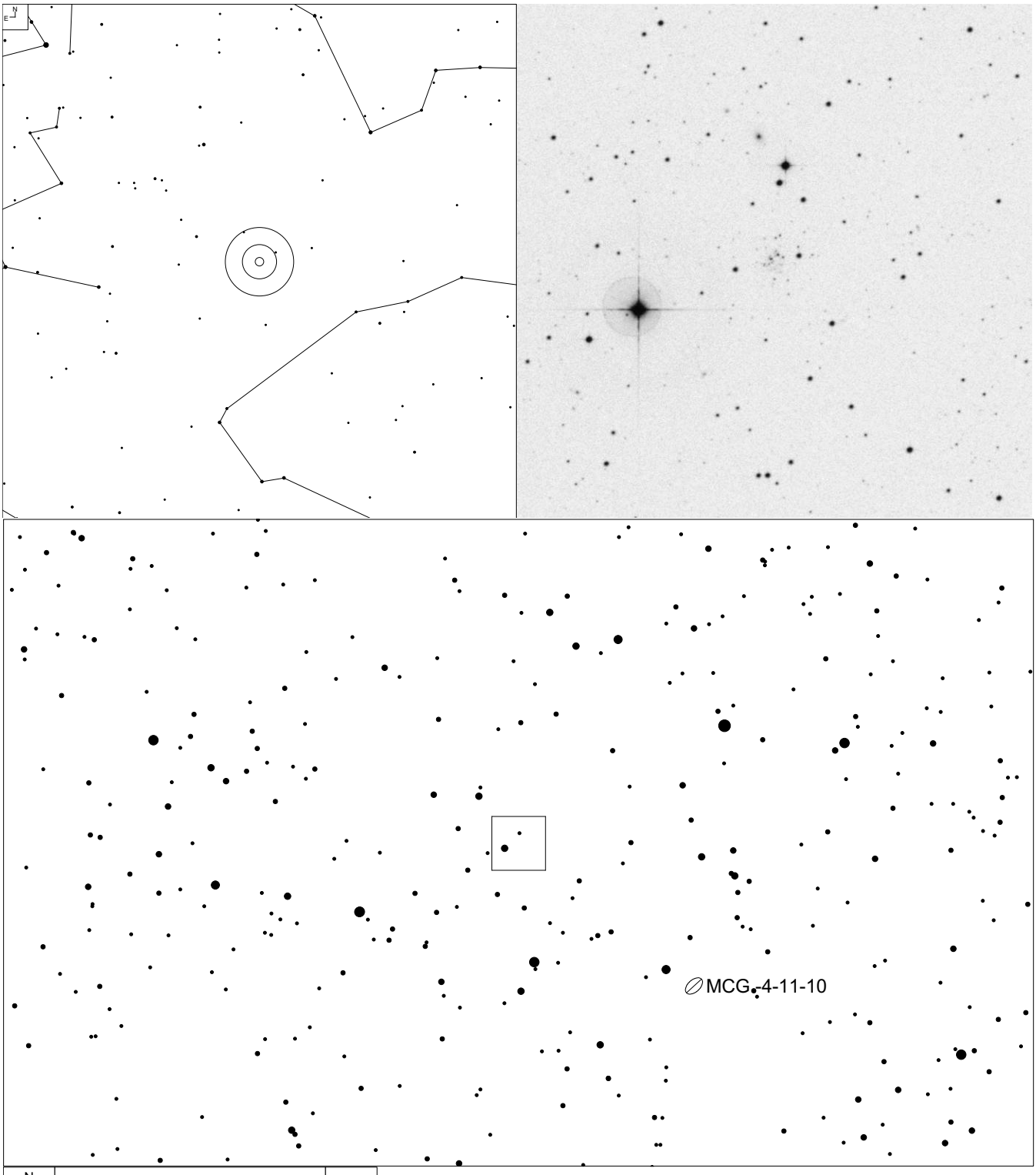
Whiting 1 (Cetus)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
02 02 57	-03 15 10	15.0	-	-	-	1.2’

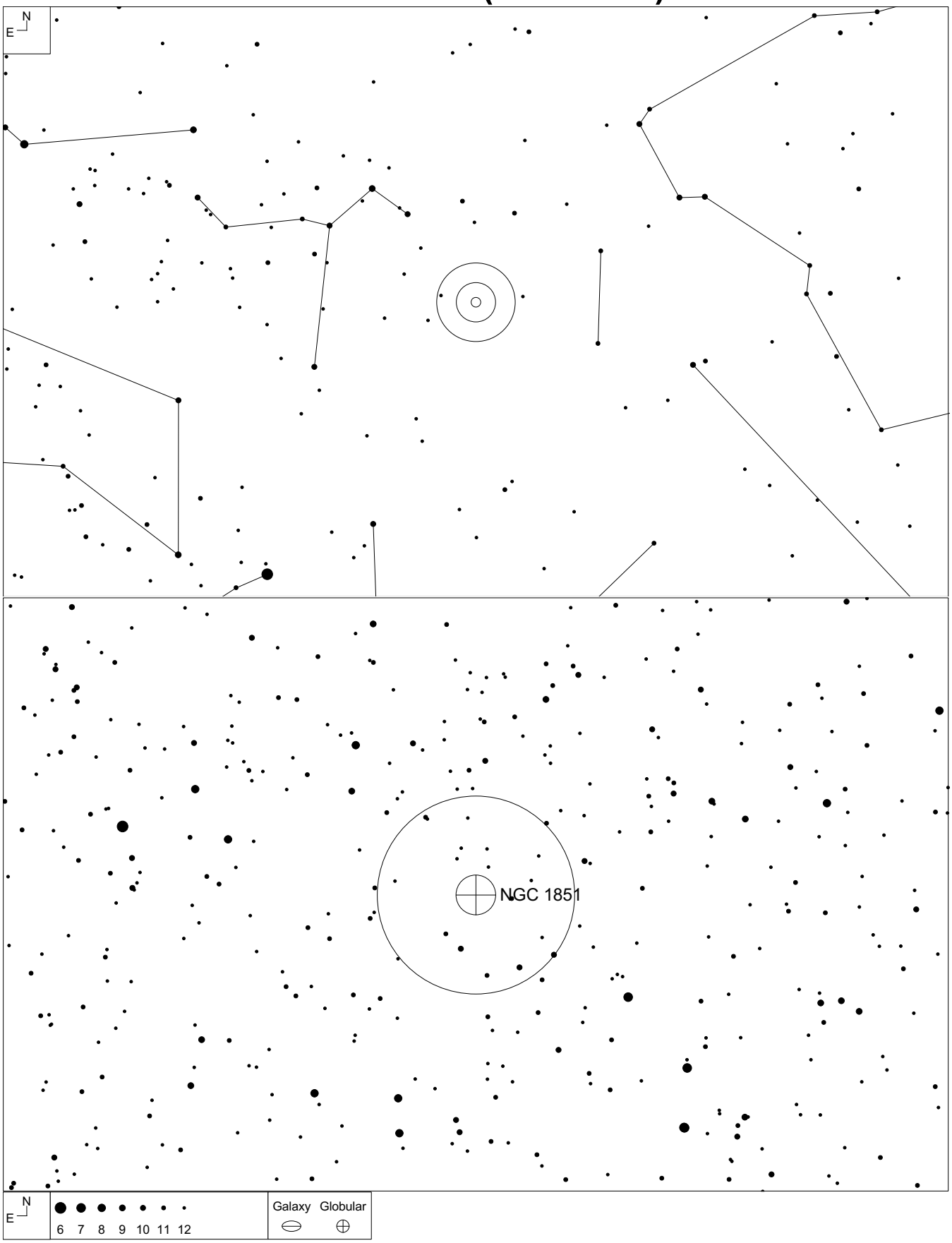
Discovered in 2002 by Whiting, Hau and Irwin.

Eridanus Cluster



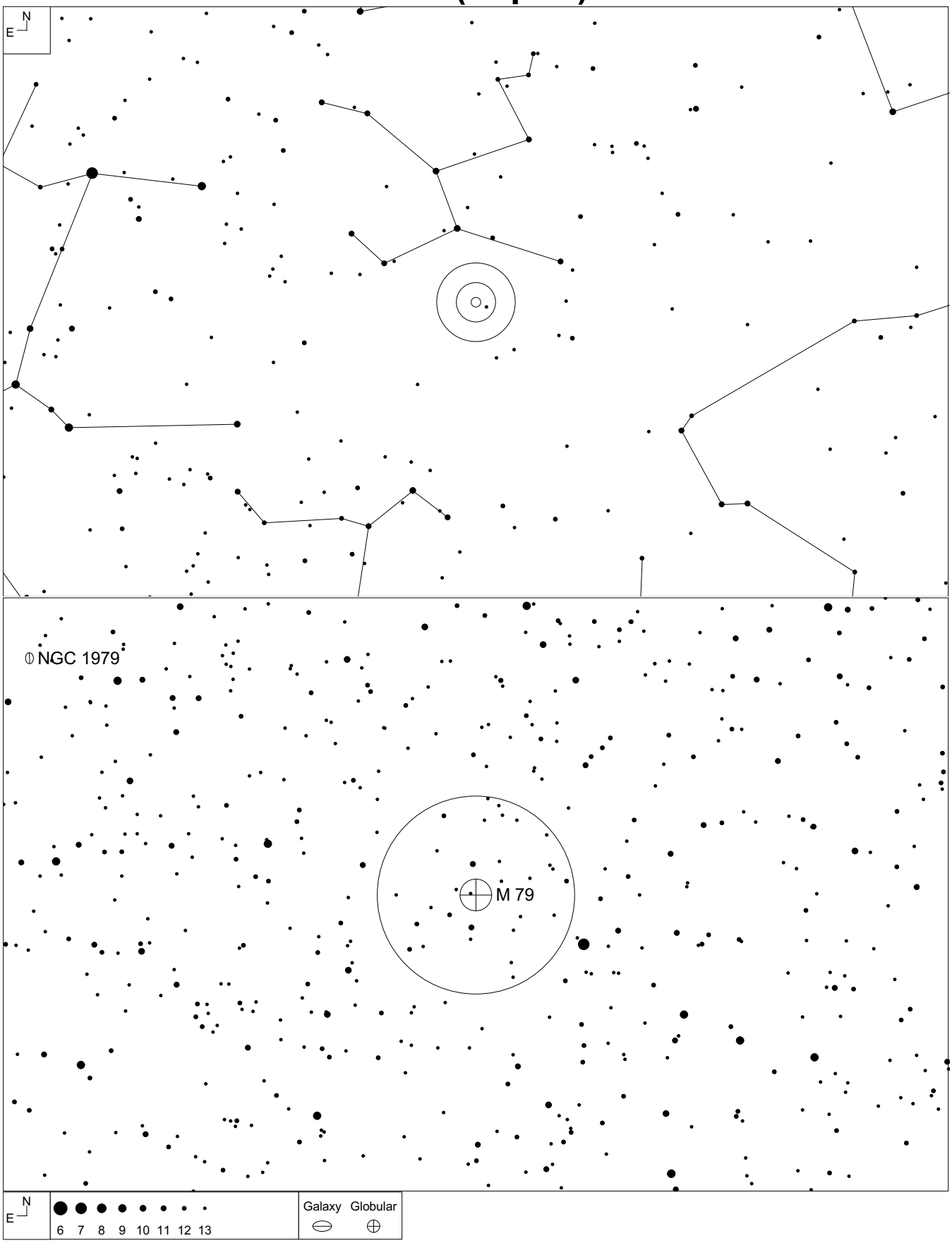
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
04 24 44.5	-21 11 13	14.7	20.4	17.6	-	-

NGC 1851 (Columba)



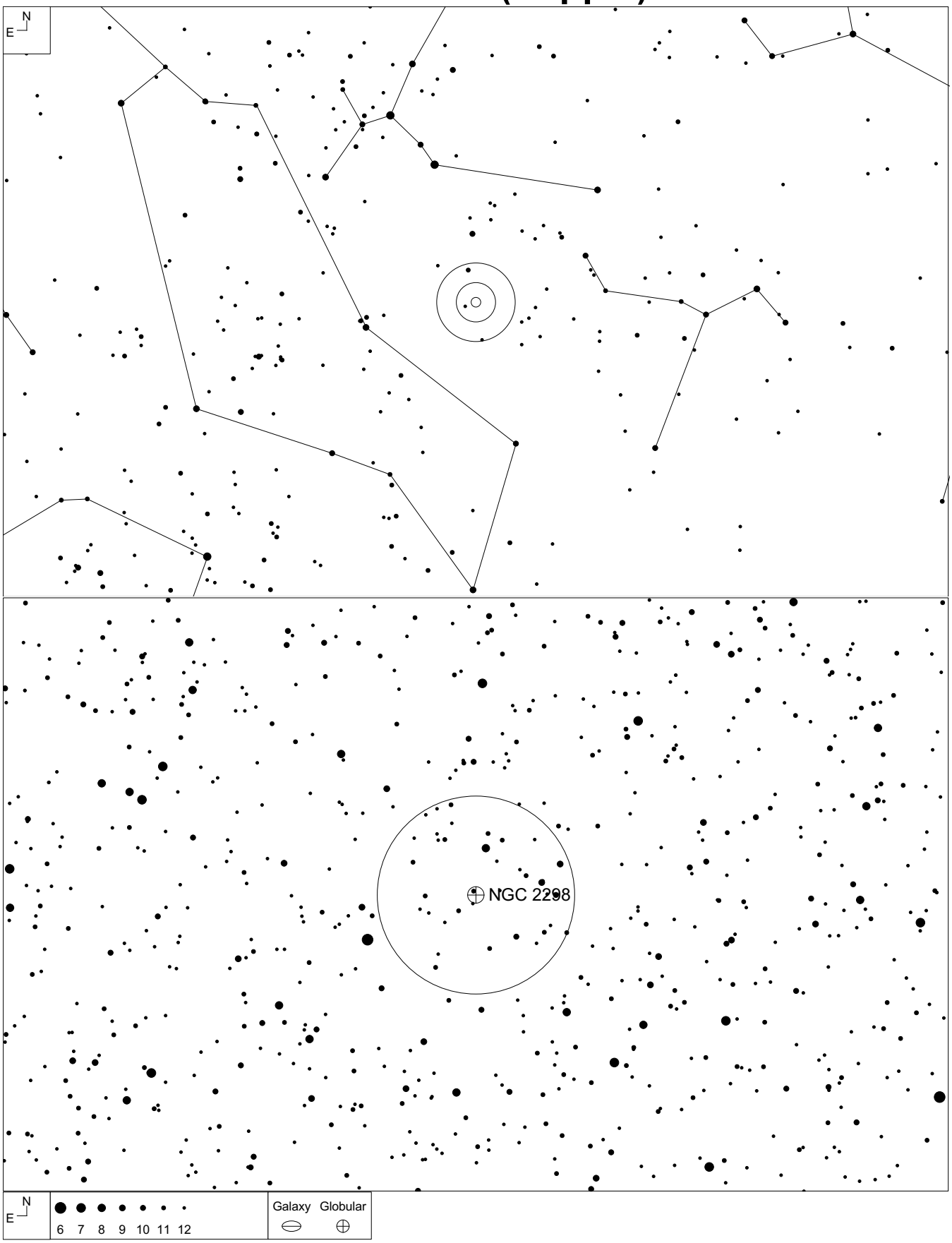
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
05 14 06.3	-40 02 50	7.1	16.1	13.2	12.5	12’

M79 (Lepus)



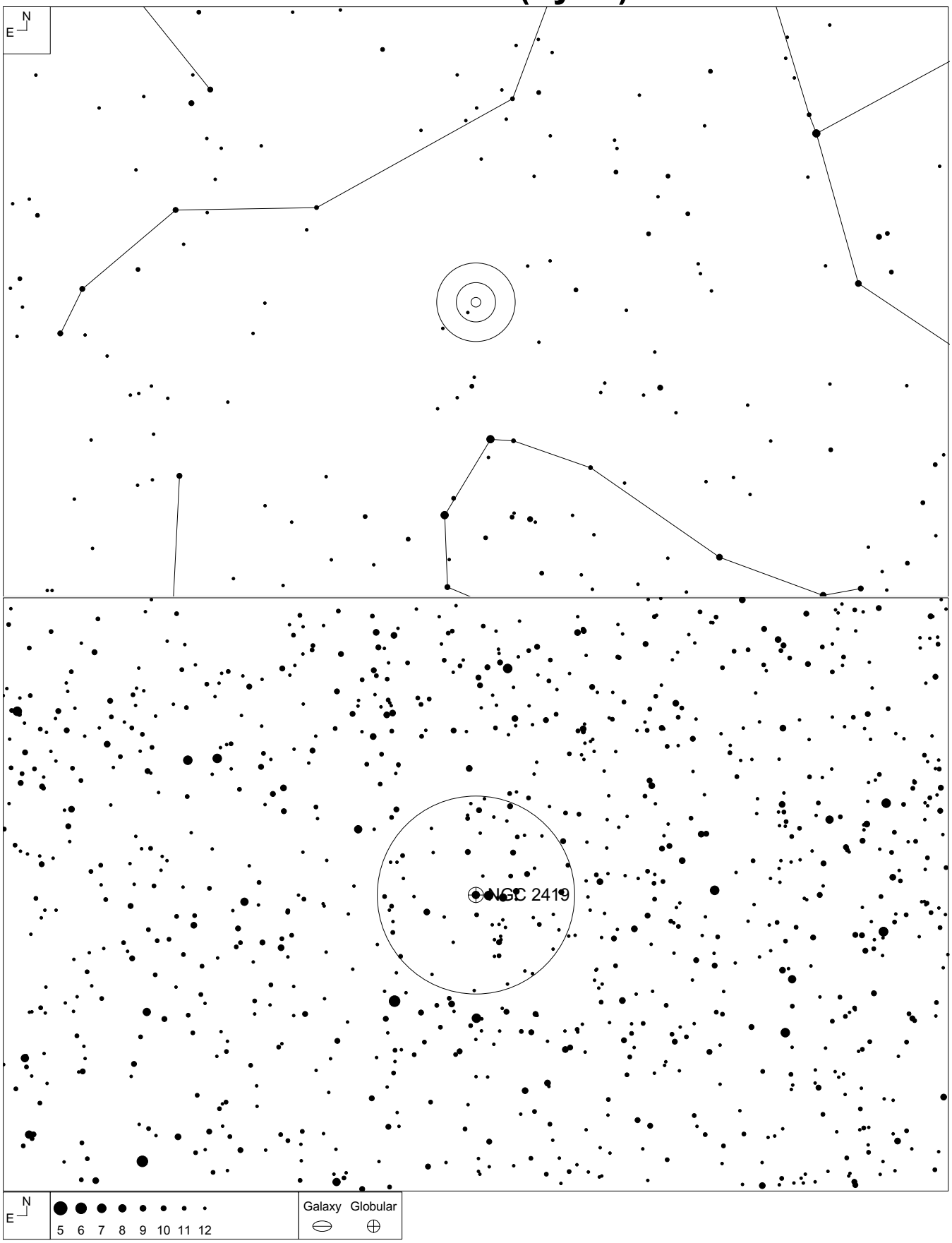
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
05 24 10.6	-24 31 27	7.7	16.2	13.1	12.6	9.6’

NGC 2298 (Puppis)



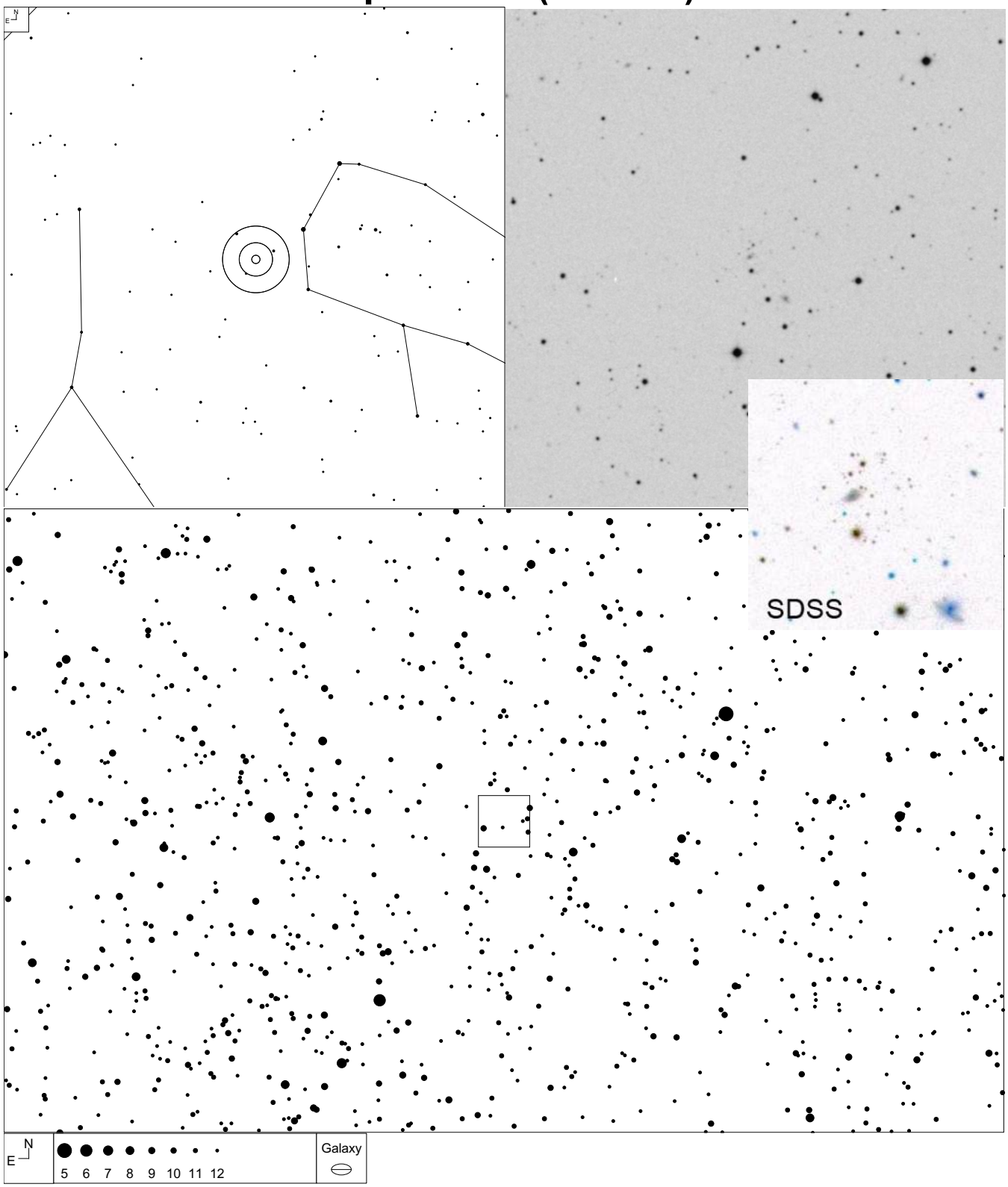
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
06 48 59.2	-36 00 19	9.3	16.2	13.4	12.8	5’

NGC 2419 (Lynx)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
07 38 08.5	+38 52 55	10.3	20.2	17.3	13.6	4.6’

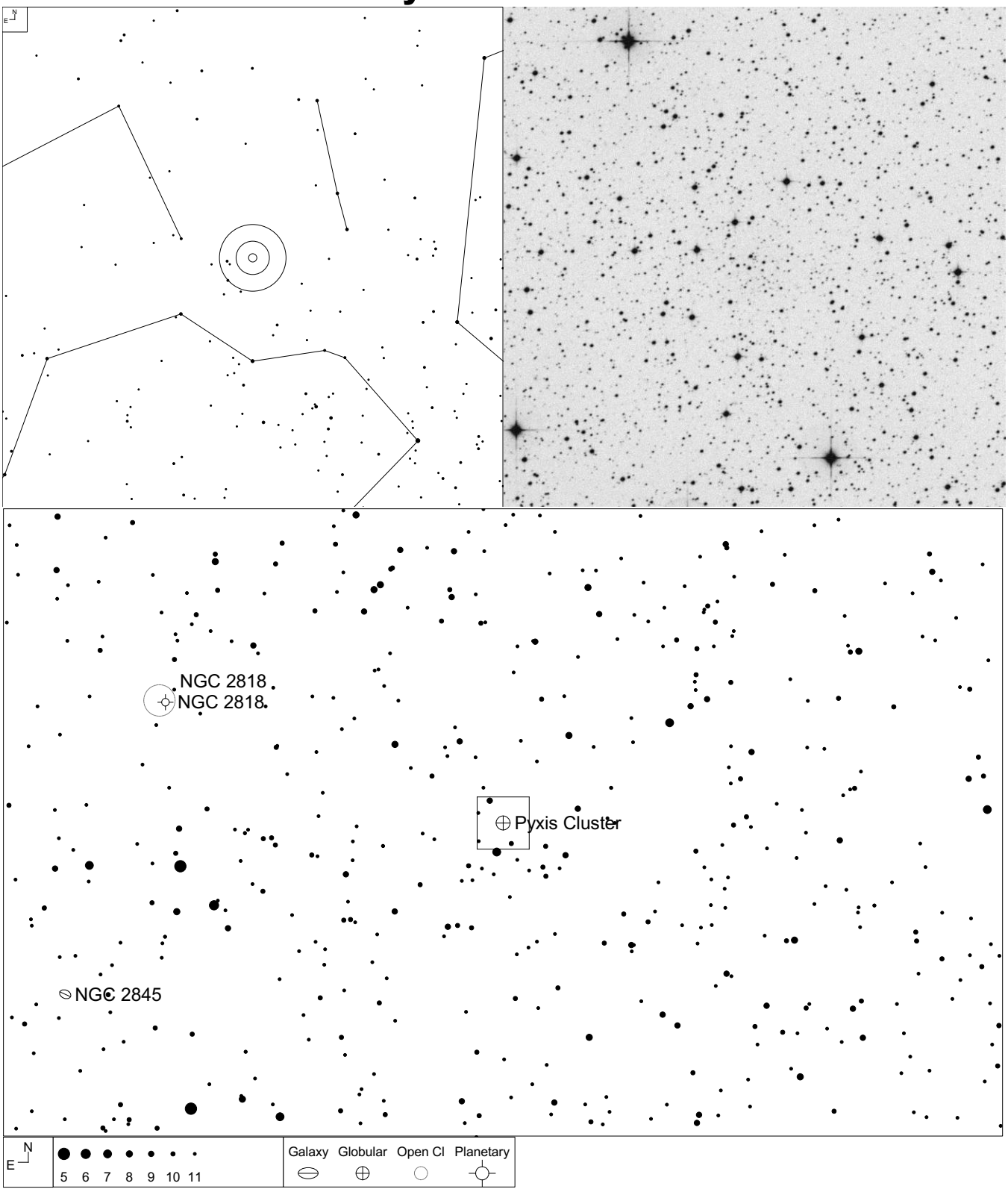
Koposov 2 (Gemini)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
07 58 17.0	+26 15 18	17.6	-	-	-	-

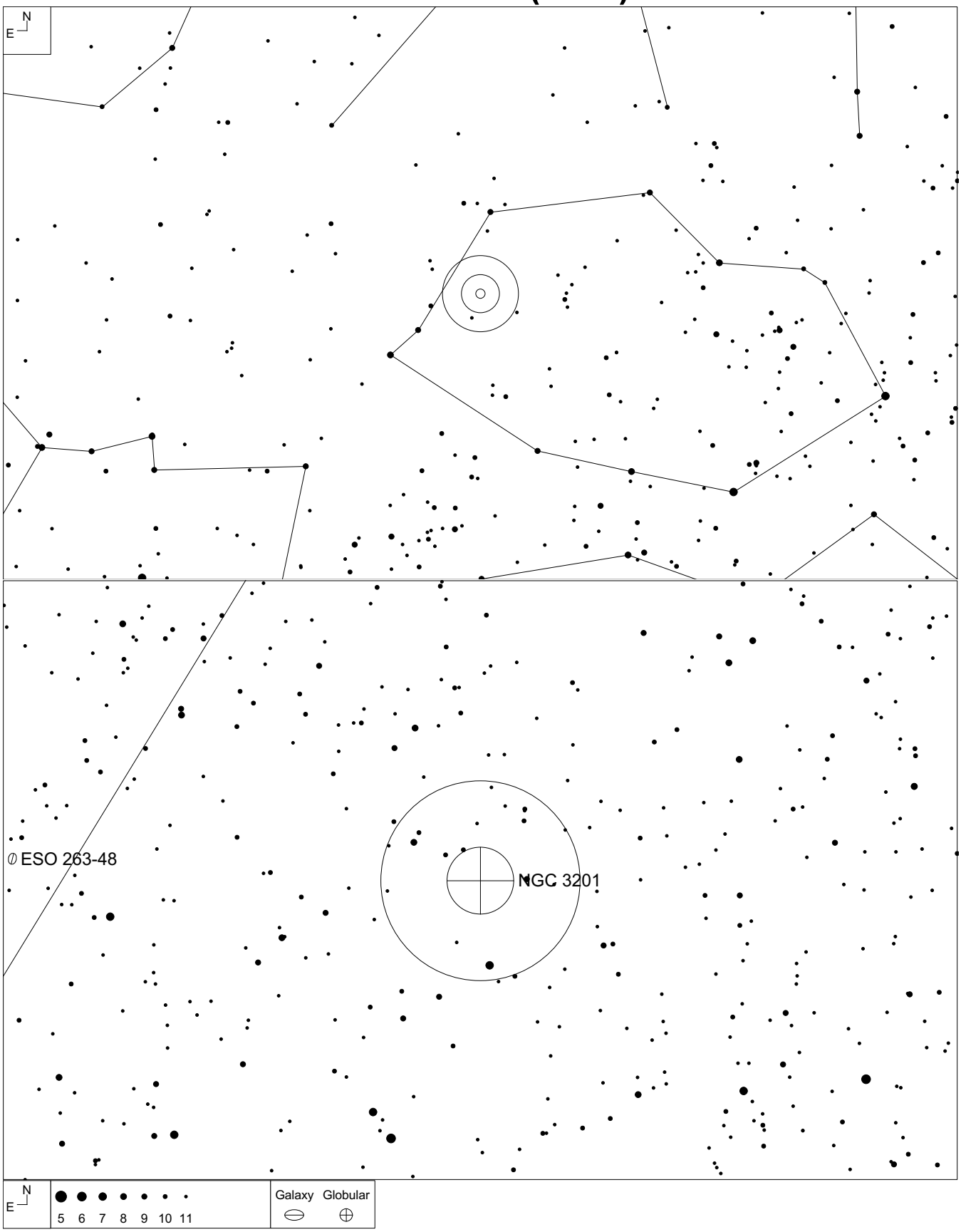
Discovered in 2007 by Koposov et al.
Recently observed by Jimi and I with his 48" telescope in April 2012. **48" at 488x** - Very faint small round even surface brightness glow. Popped in and out, 75% of the time. About 0.3' across.

Pyxis Cluster



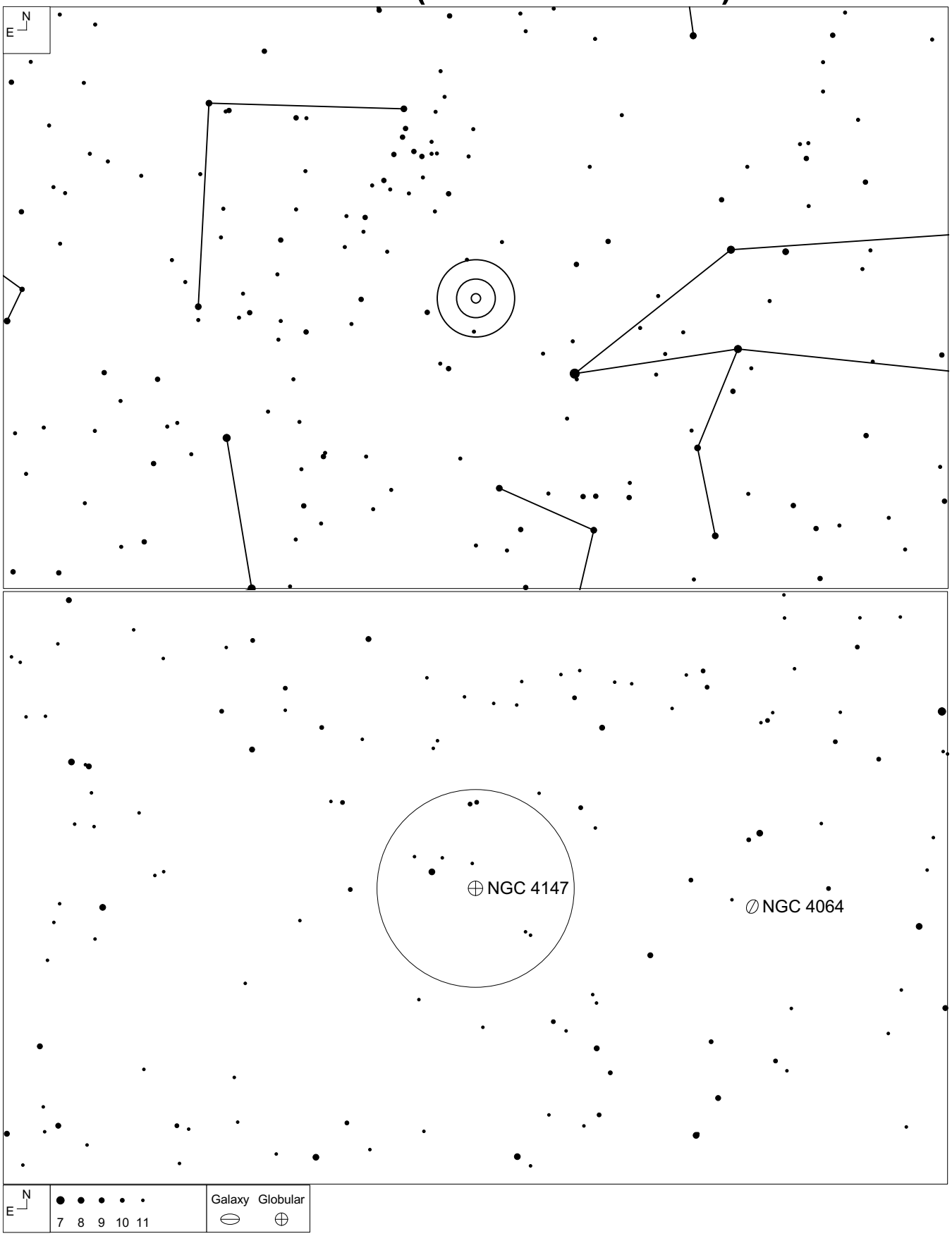
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
09 07 57.8	-37 13 17	12.9	18.7	15.2	15.9	4’

NGC 3201 (Vela)



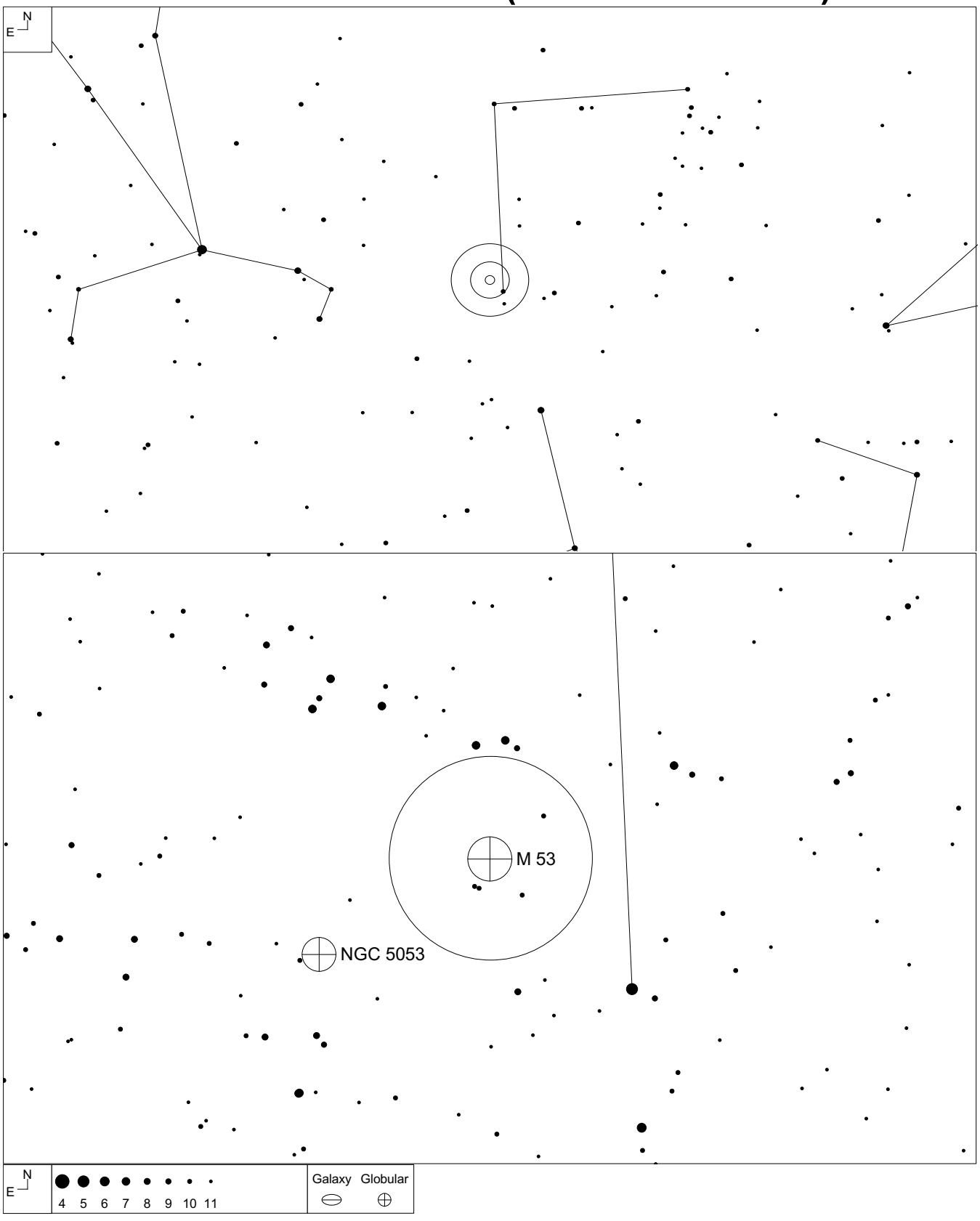
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
10 17 36.8	-46 24 40	6.9	14.8	11.7	13.4	20’

NGC 4147 (Coma Berenices)



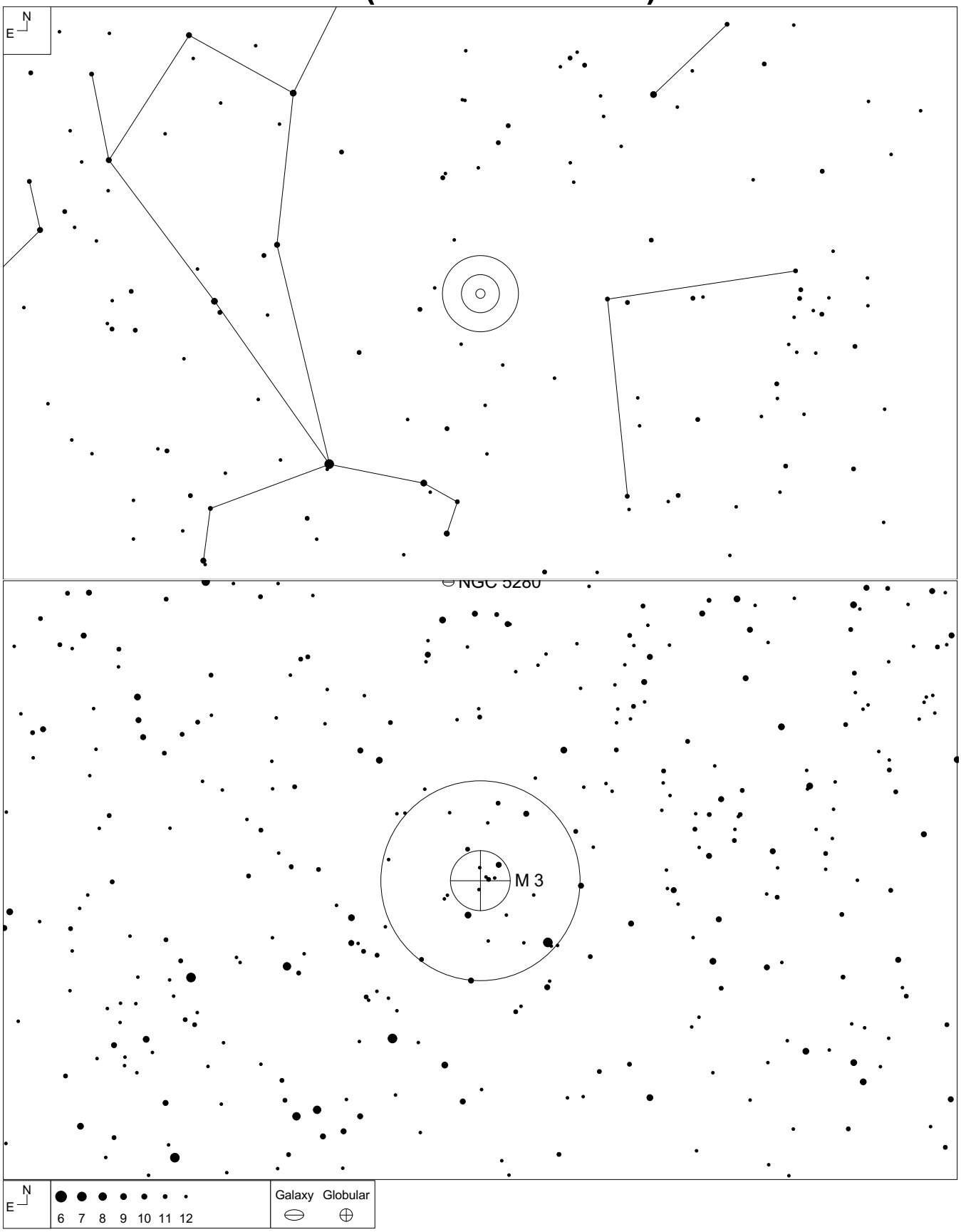
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
12 10 06.2	+18 32 31	10.4	16.9	14.5	13.6	4.4’

M53 and NGC 5053 (Coma Berenices)



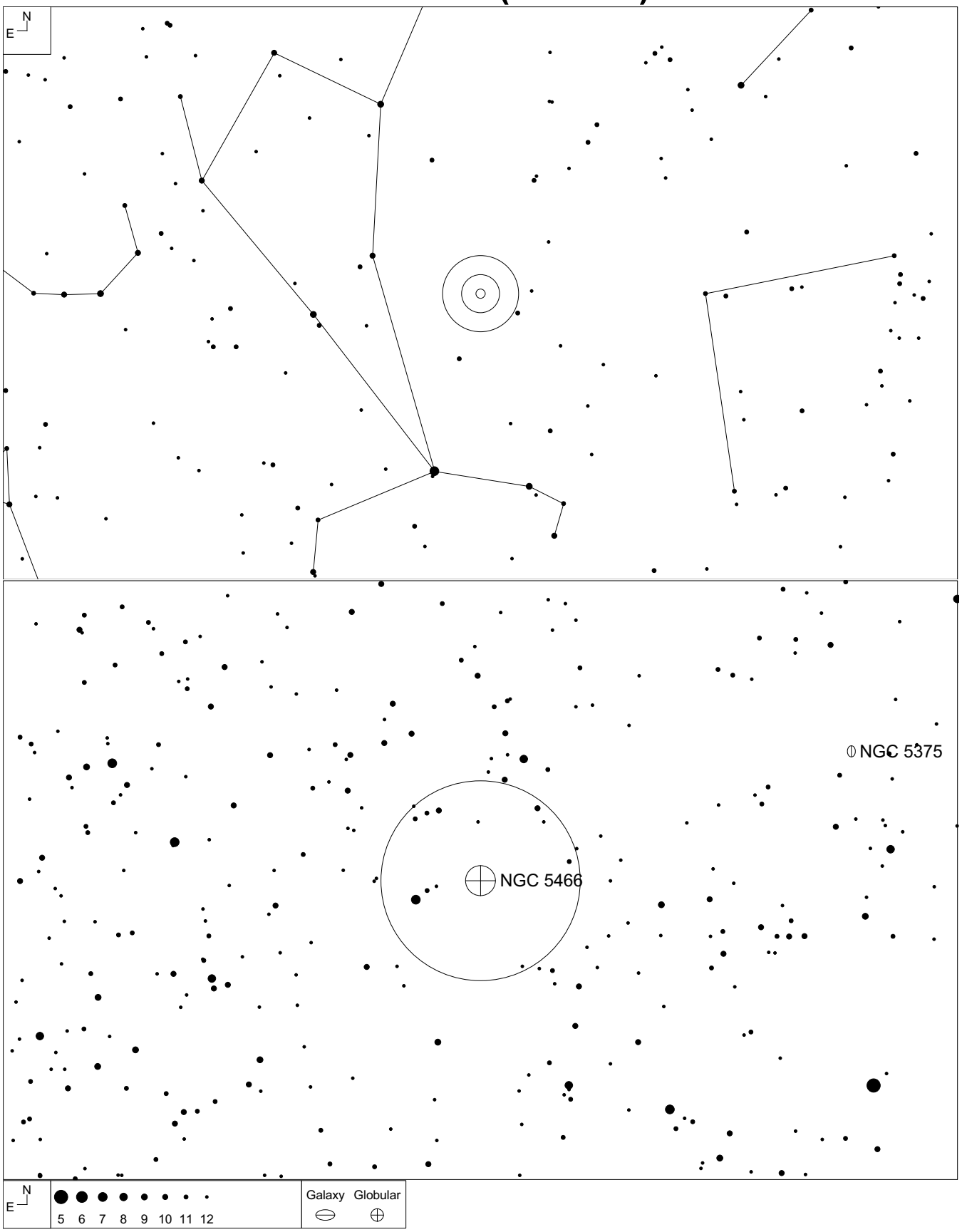
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M53	13 12 55.3	+18 10 09	7.7	16.9	13.8	13.3	13’
NGC 5053	13 16 27.0	+17 41 53	9	16.7	13.8	14	10’

M3 (Canes Venatici)



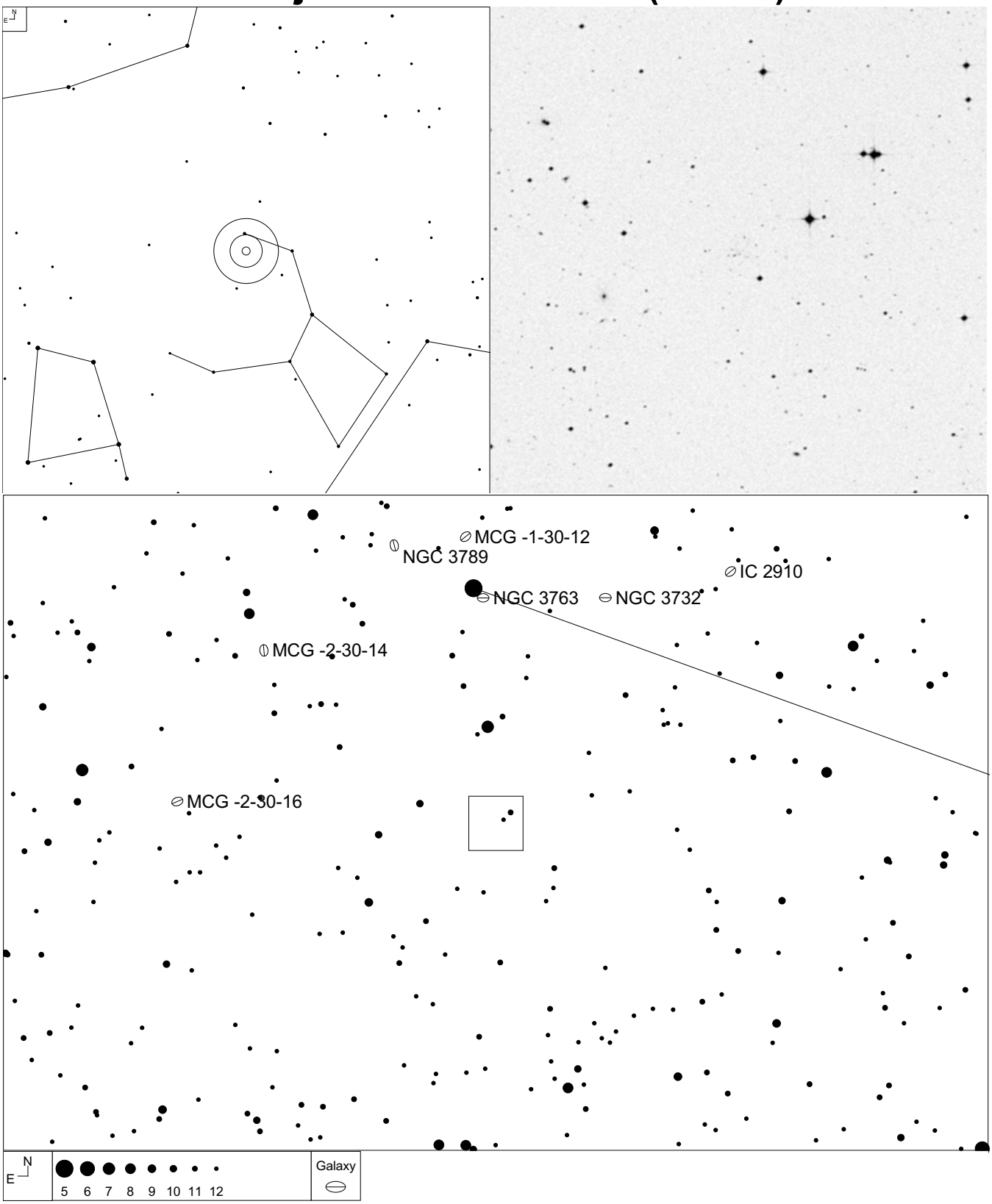
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
13 42 11.2	+28 22 32	6.3	15.6	12.7	12.6	18’

NGC 5466 (Bootes)



RA	Dec	V_{mag}	HB_{Mag}	$Bt*_{Mag}$	SB	Size
14 05 27.3	+28 32 04	9.2	16.6	13.8	14	9’

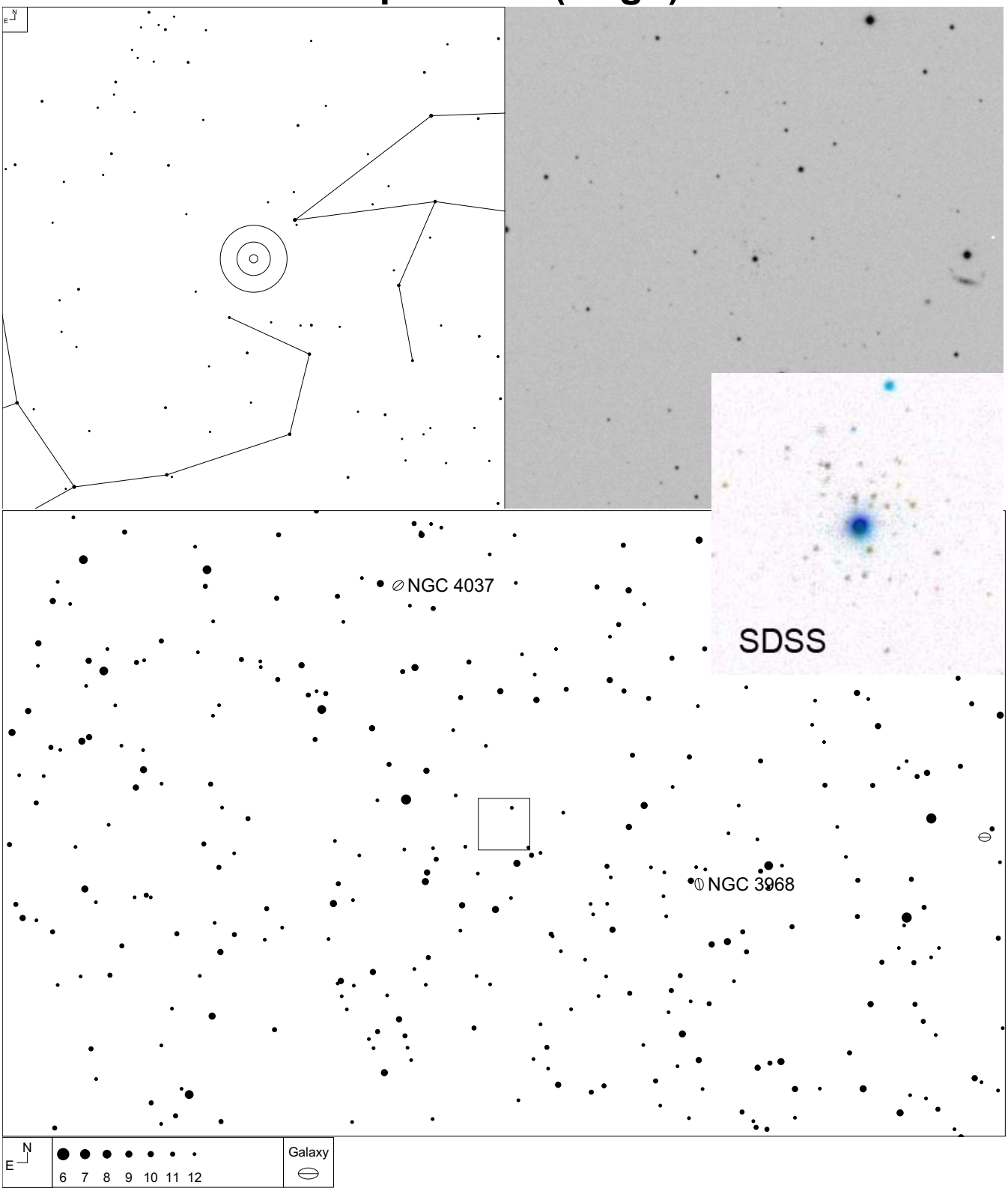
PSO j174.0675-10.8774 (Crater)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
11 36 16	-10 52 38					

Discovery paper: http://arxiv.org/abs/1403.6593

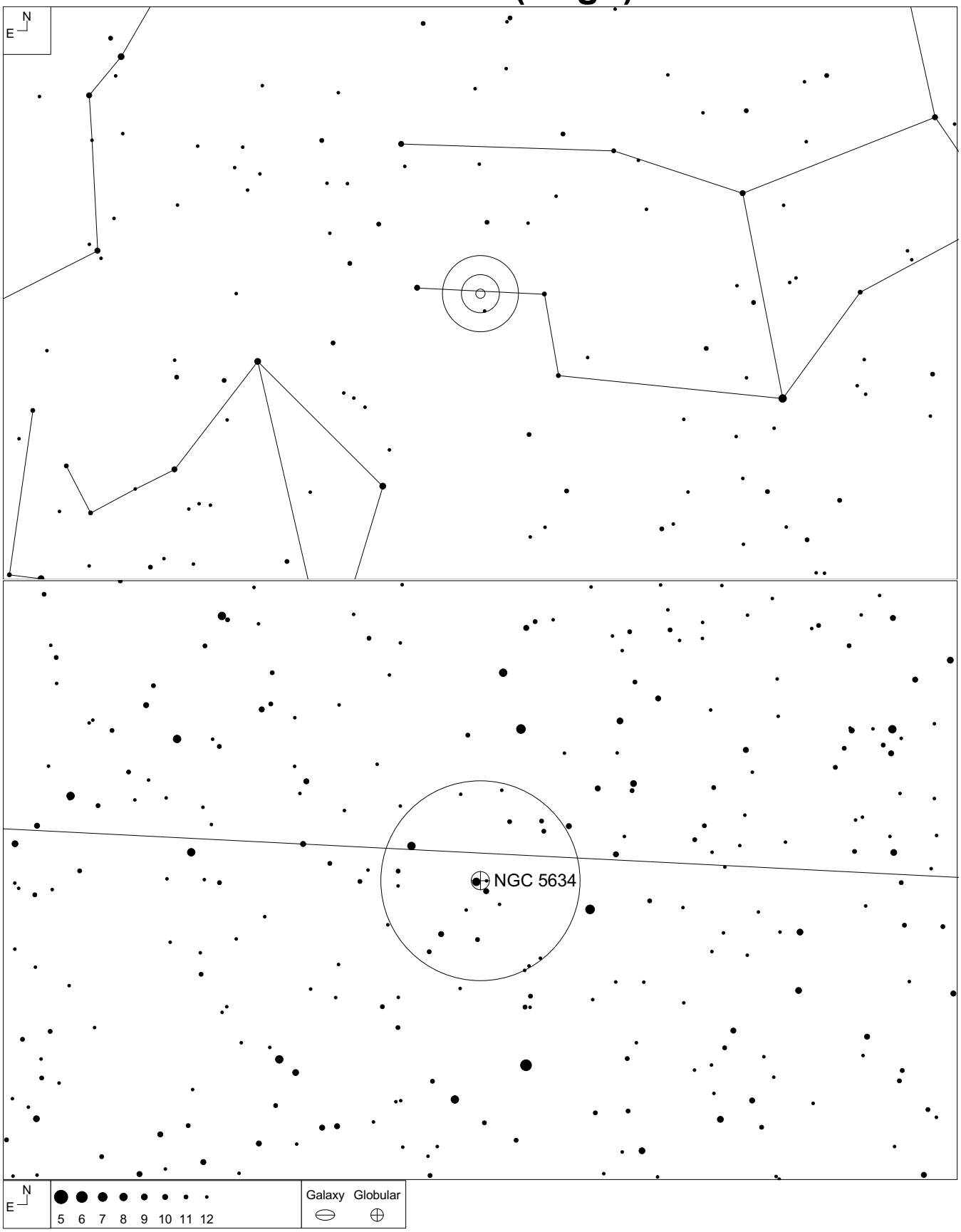
Koposov 1 (Virgo)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
11 59 18.4	+12 15 36	14.2	-	-	-	-

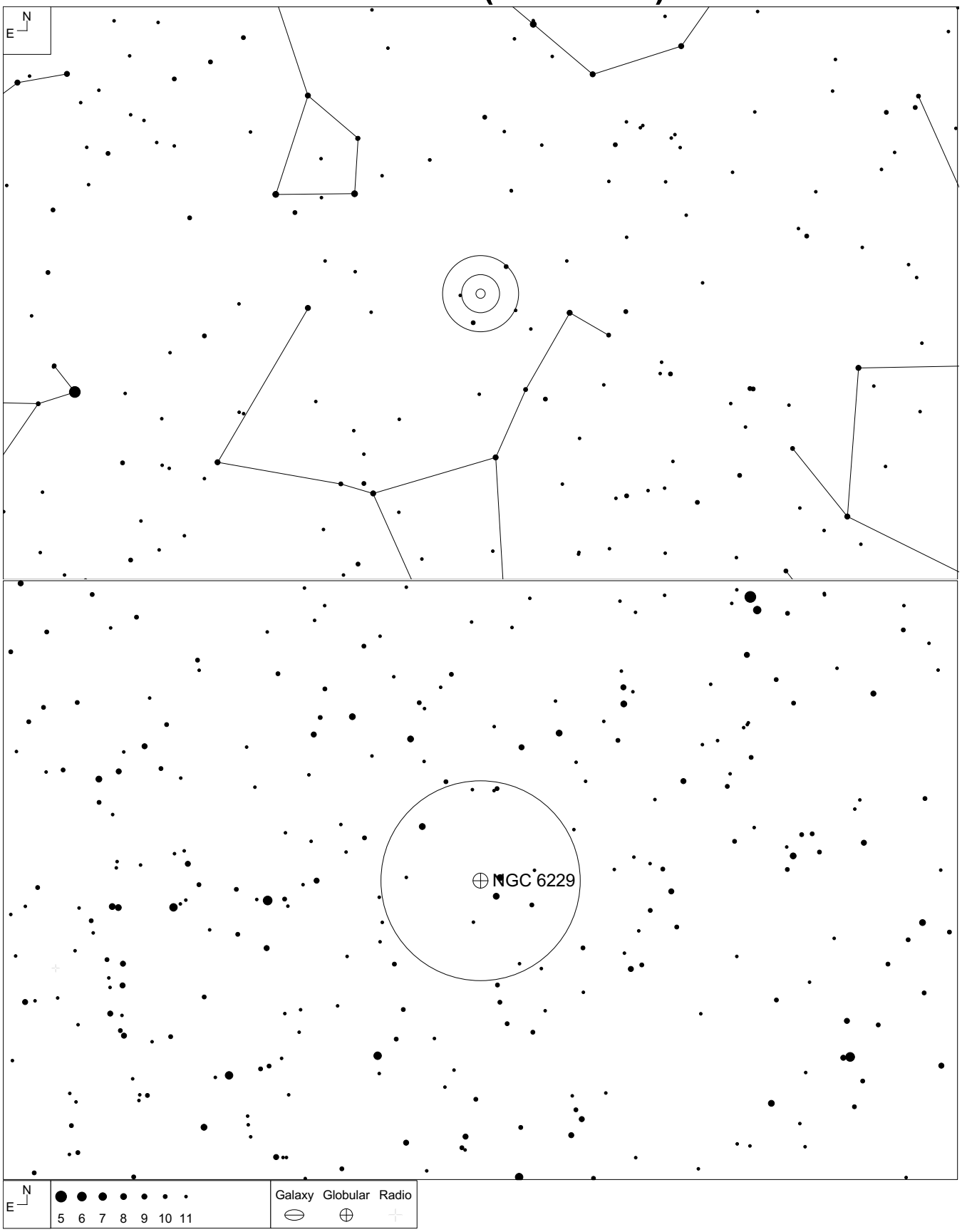
Discovered in 2007 by Koposov et al.
Recently observed by Jimi and I with his 48" telescope in April 2012 **48" at 488x** - Some speckling was detected around a considerably bright very small fuzzy star in the center.

NGC 5634 (Virgo)



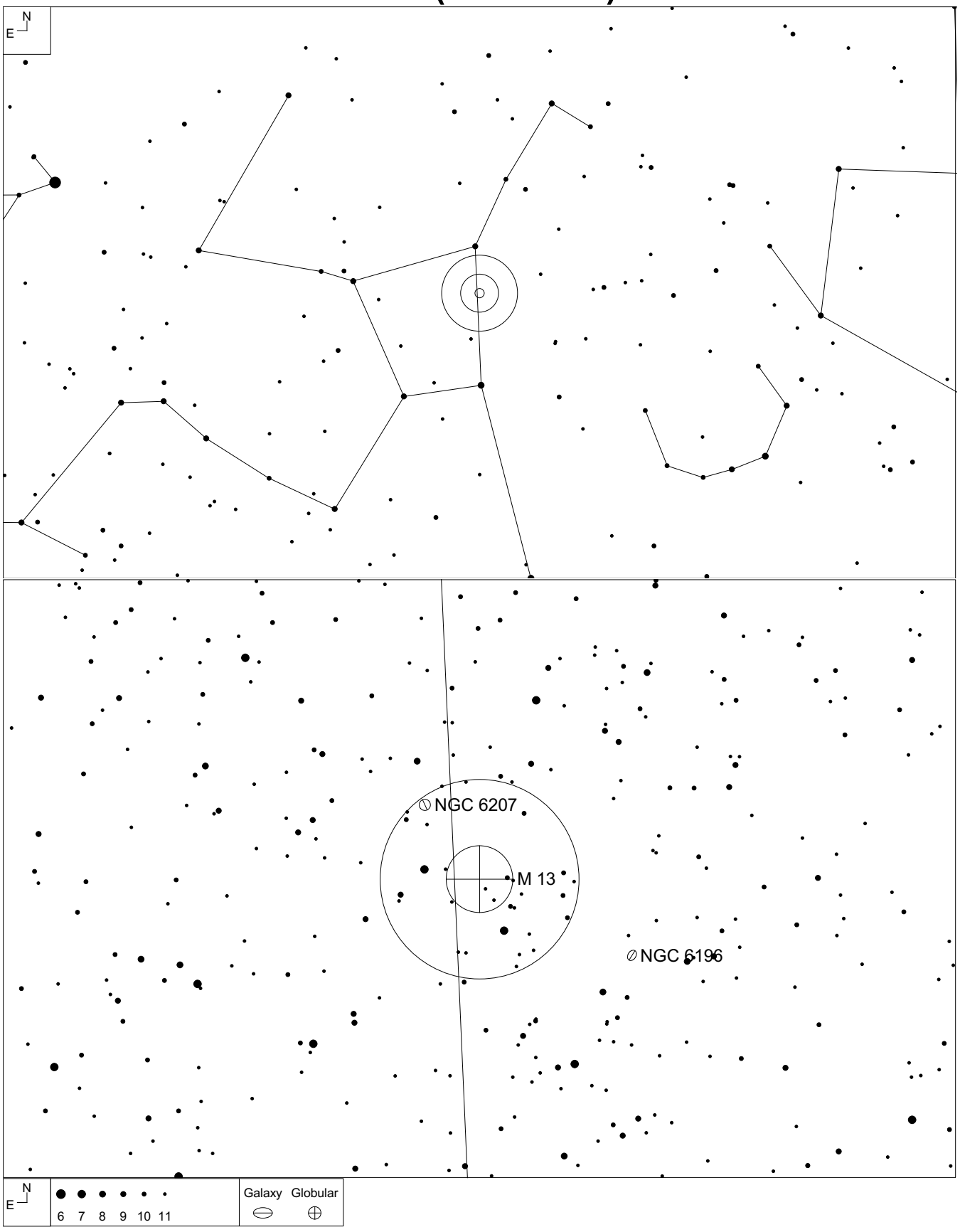
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
14 29 37.3	-05 58 35	9.5	17.8	-	13.2	5.5’

NGC 6229 (Hercules)



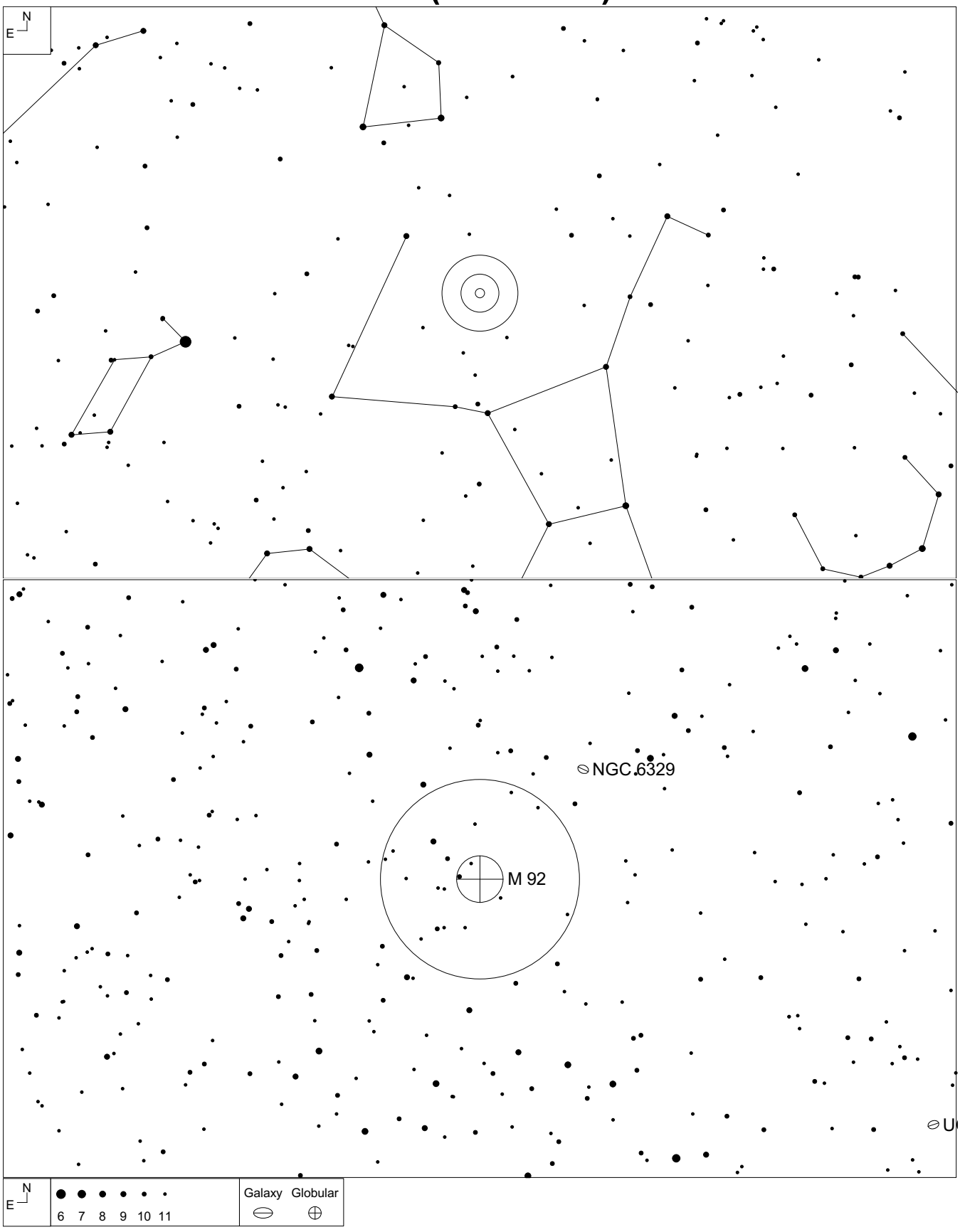
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size'
16 46 58.9	+47 31 40	9.4	18	15.5	12.7	4.5'

M13 (Hercules)



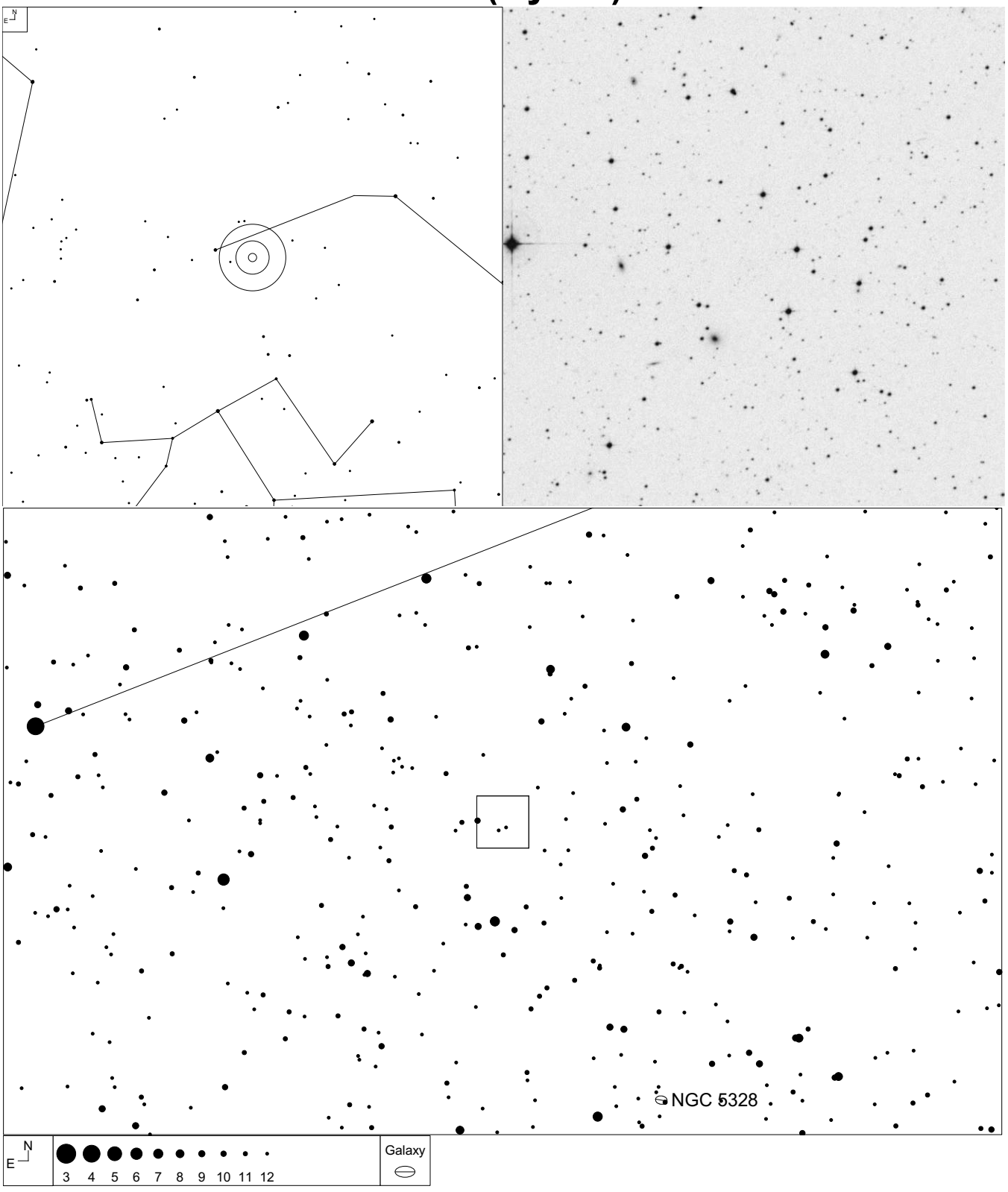
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
16 41 41.5	+36 27 37	5.8	15	11.9	12.3	20’

M92 (Hercules)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
17 17 07.3	+43 08 11	6.5	15.2	12.1	12.2	14’

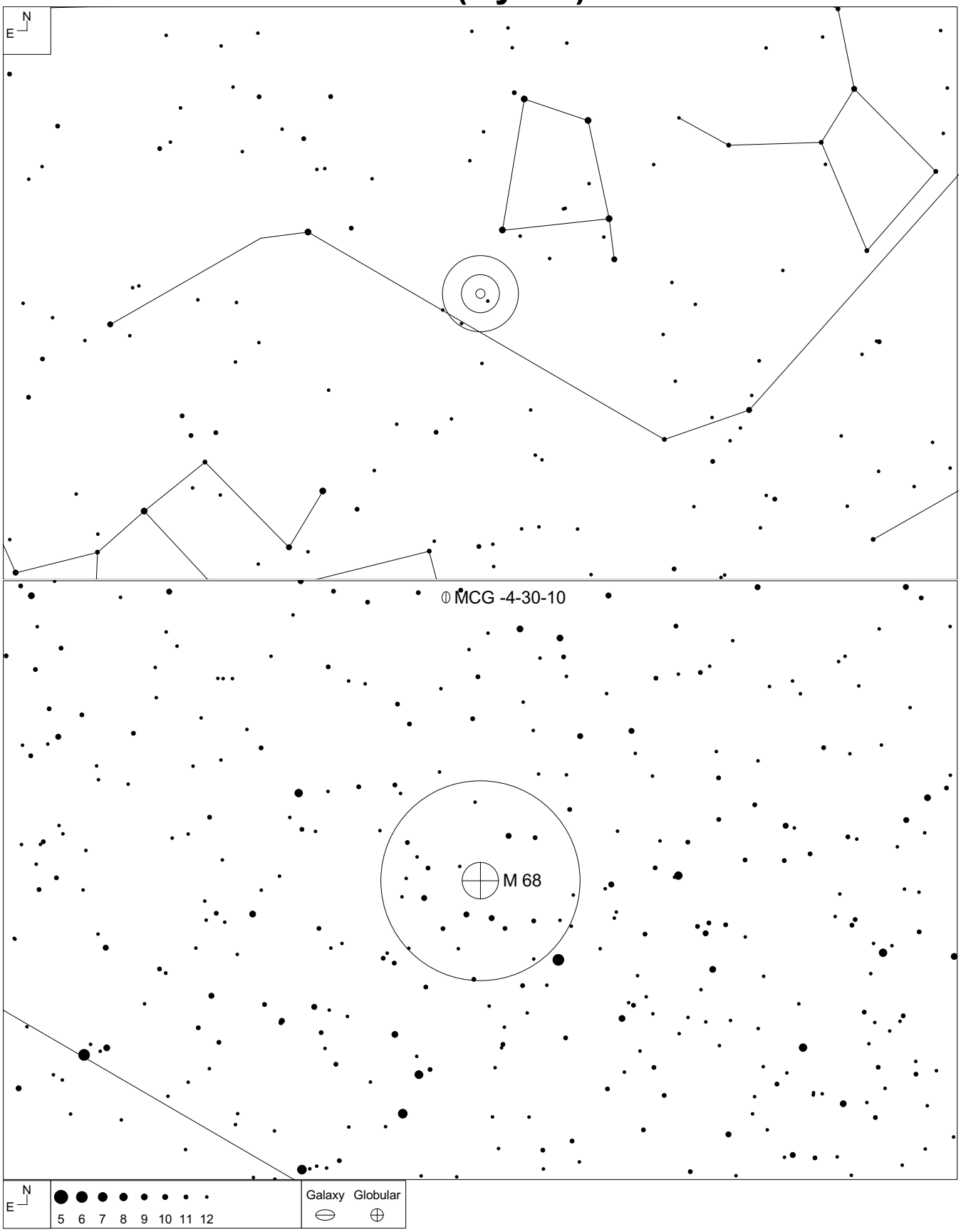
AM 4 (Hydra)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
13 56 21.0	-27 09 42	15.9	21.6	20.5	18.3	3’

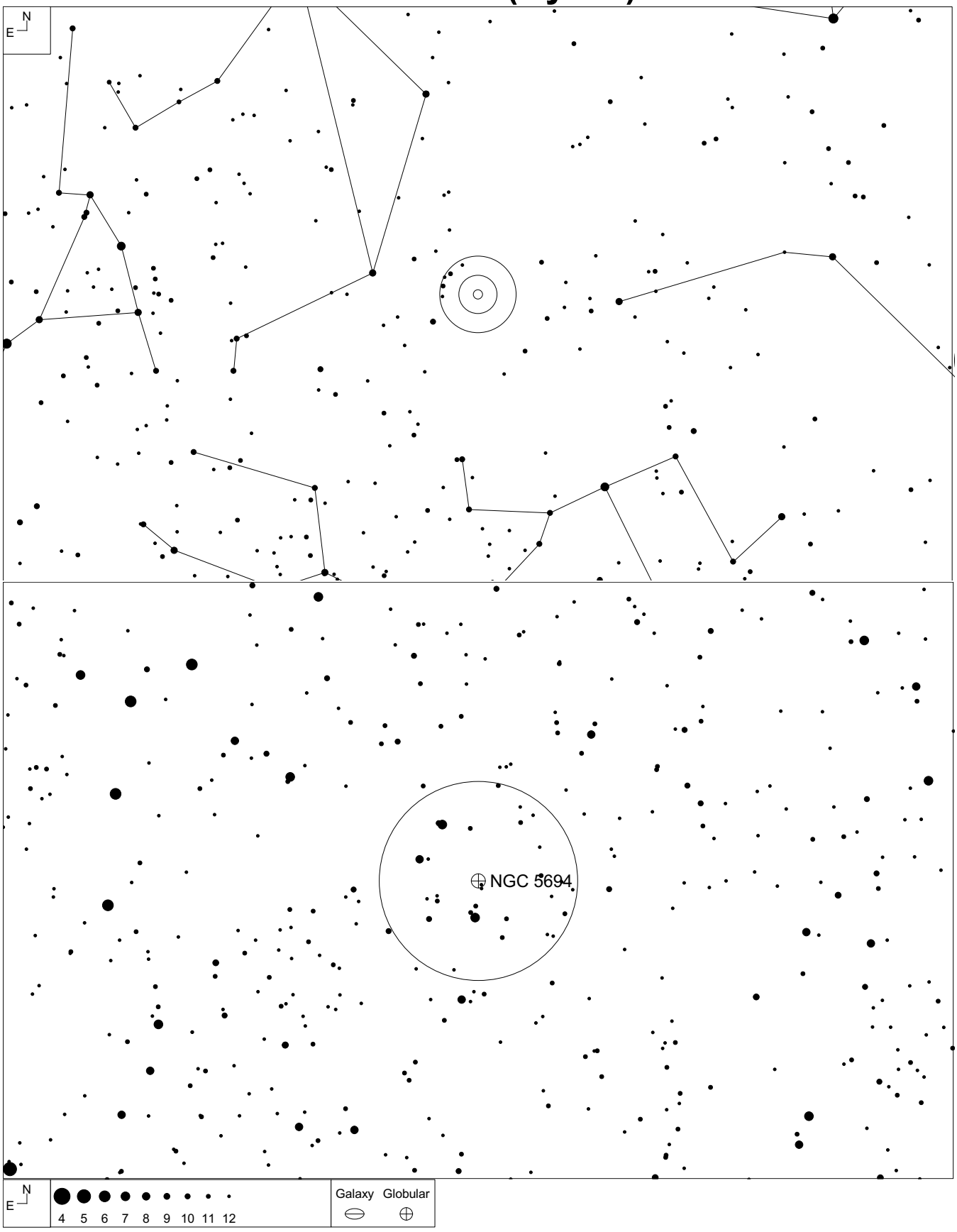
Discovered in 2007 by Arp and Madore in 1982.

M68 (Hydra)



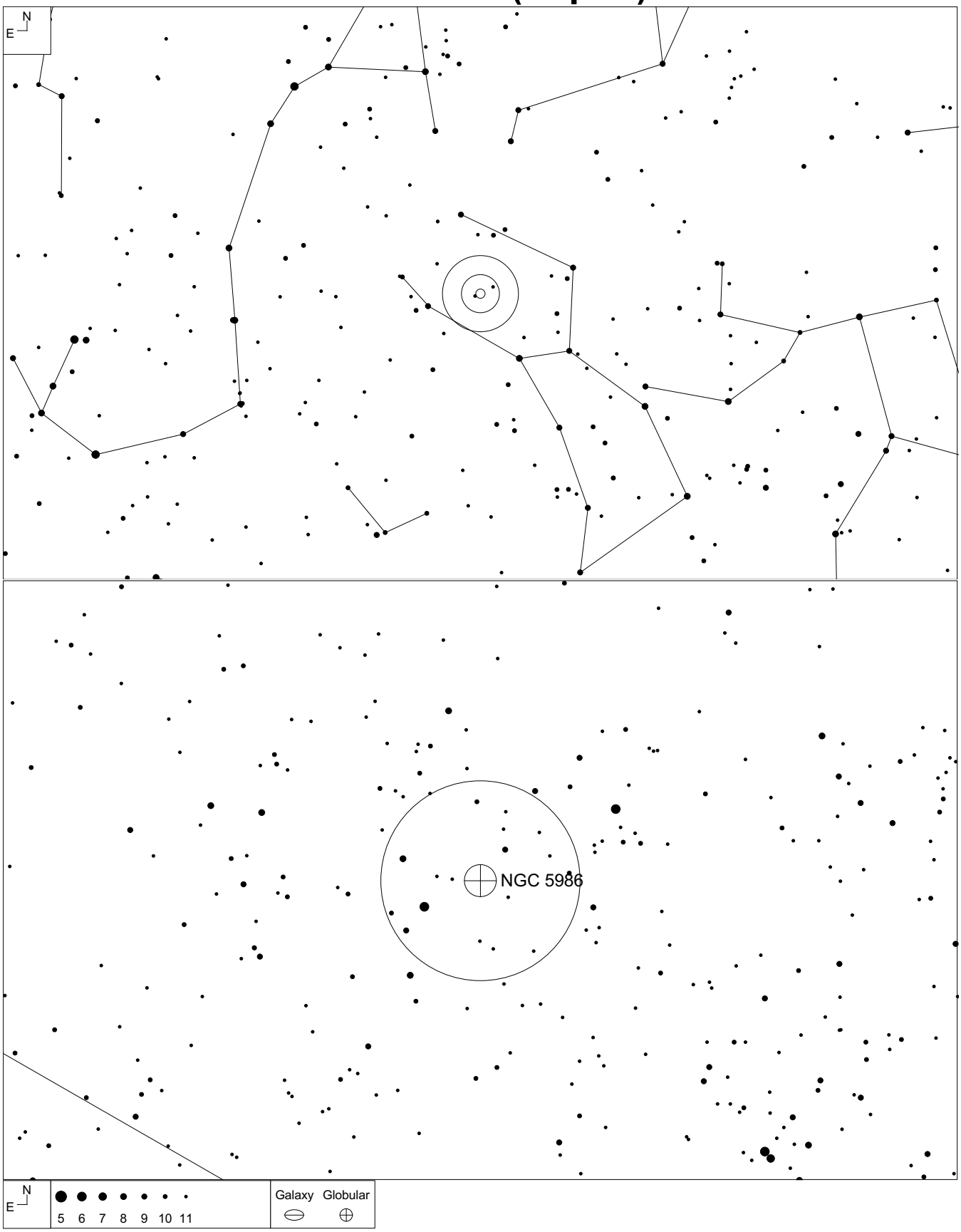
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
12 39 28.0	-26 44 34	7.3	15.6	12.6	12.5	11’

NGC 5694 (Hydra)



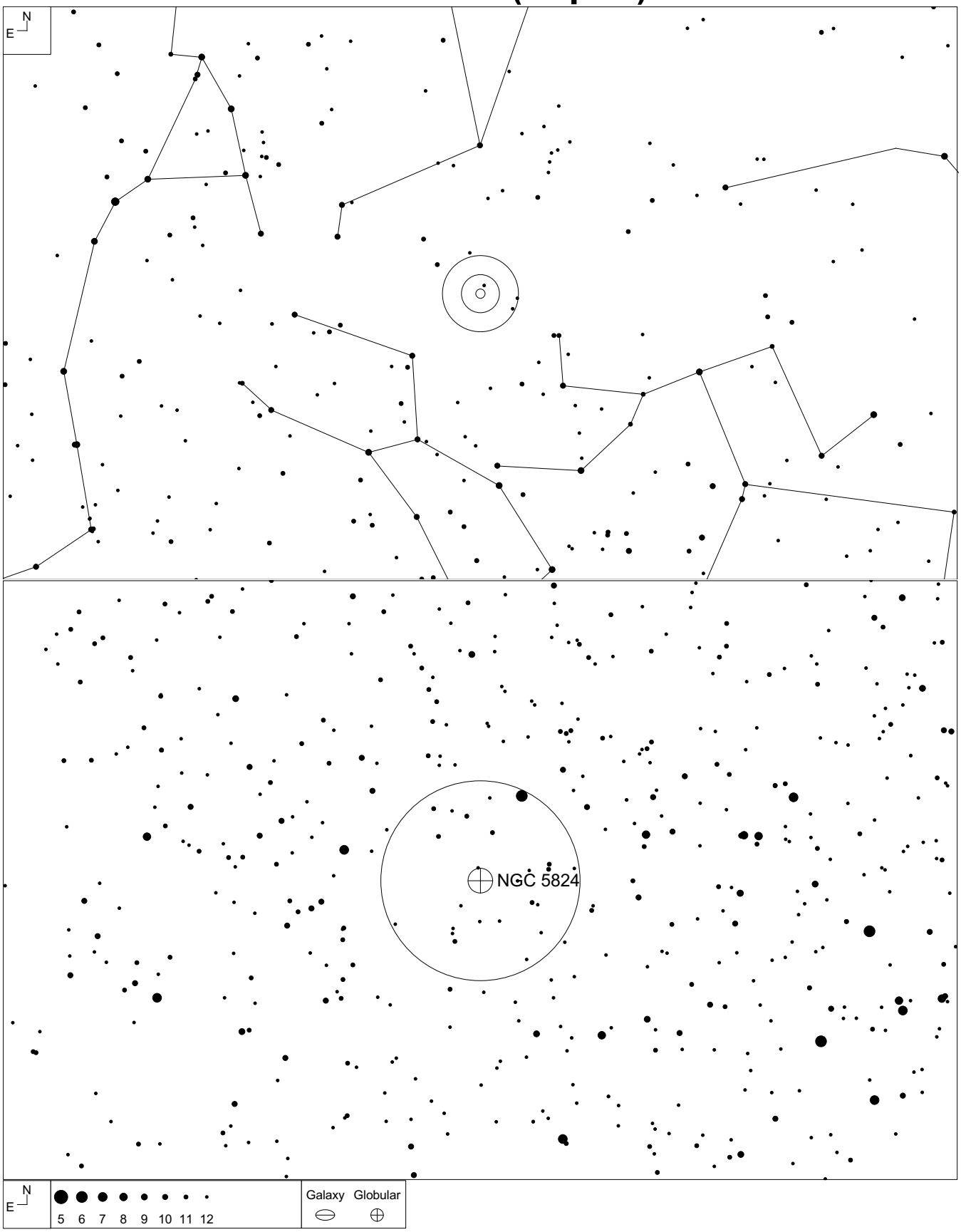
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
14 39 36.5	-26 32 18	10.2	18.5	15.5	13.4	4.3’

NGC 5986 (Lupus)



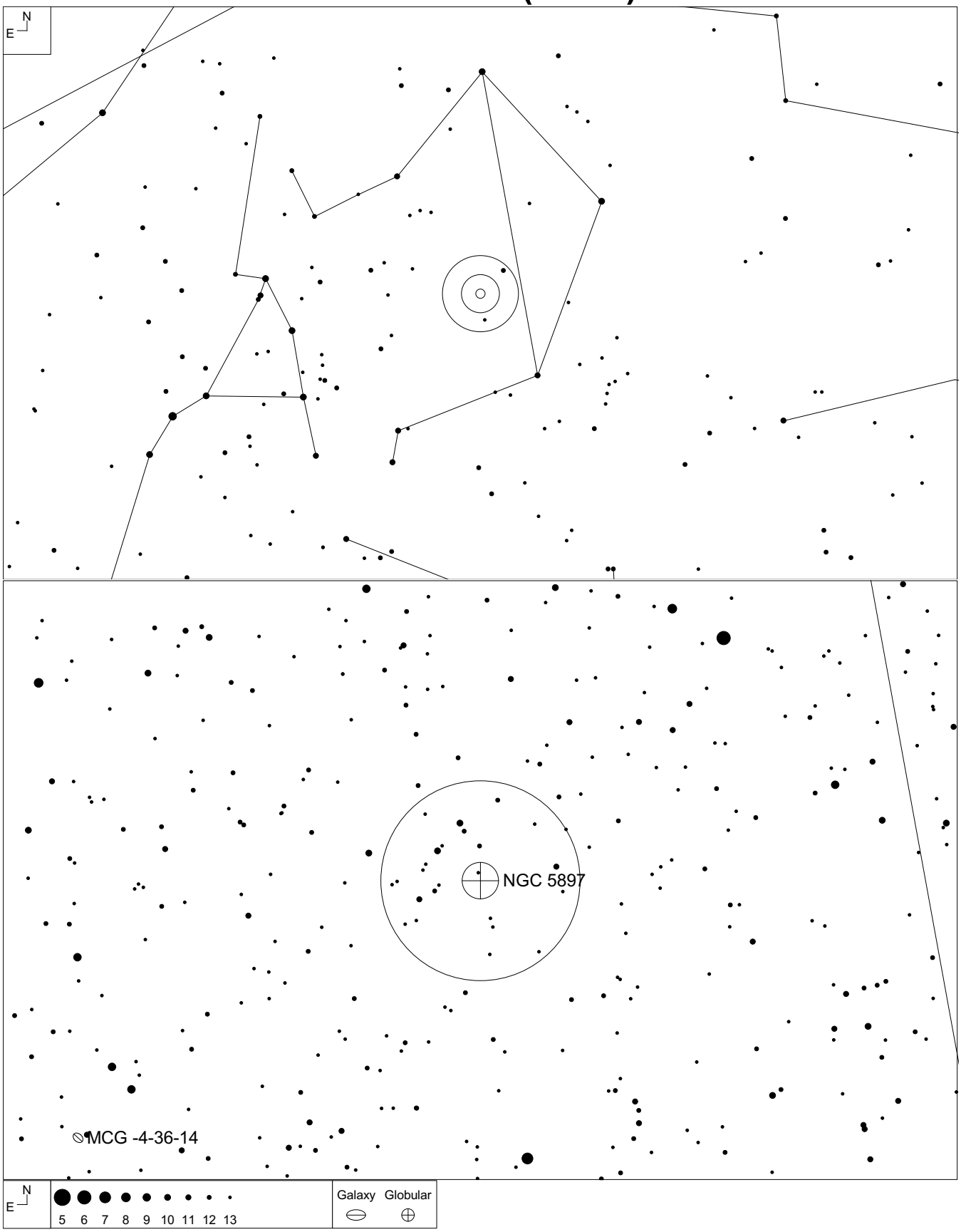
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
15 46 03.5	-37 47 10	7.6	16.5	13.2	12.5	9.6’

NGC 5824 (Lupus)



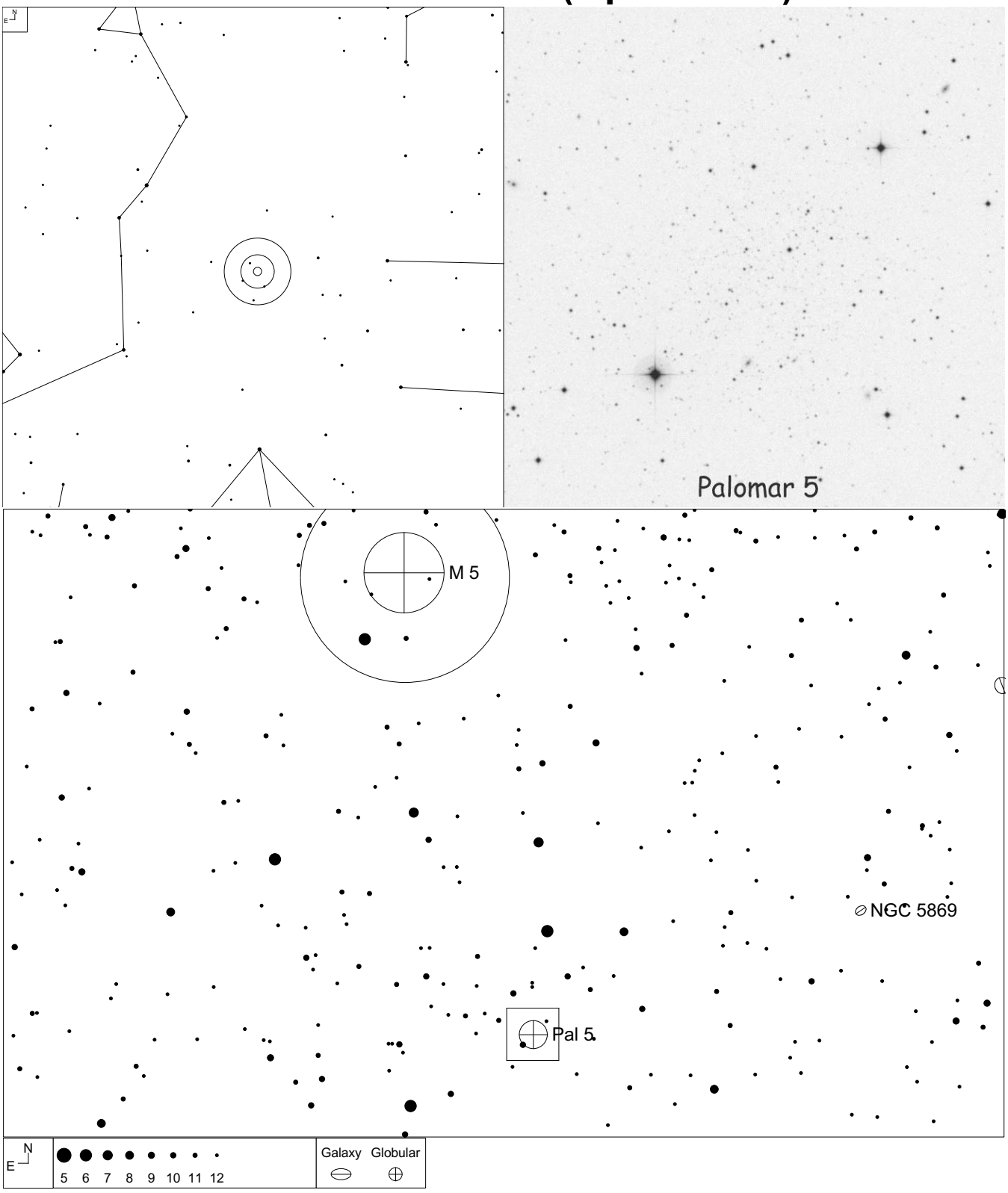
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
15 03 58.5	-33 04 04	9.1	18.5	15.5	13.4	7.4’

NGC 5897 (Libra)



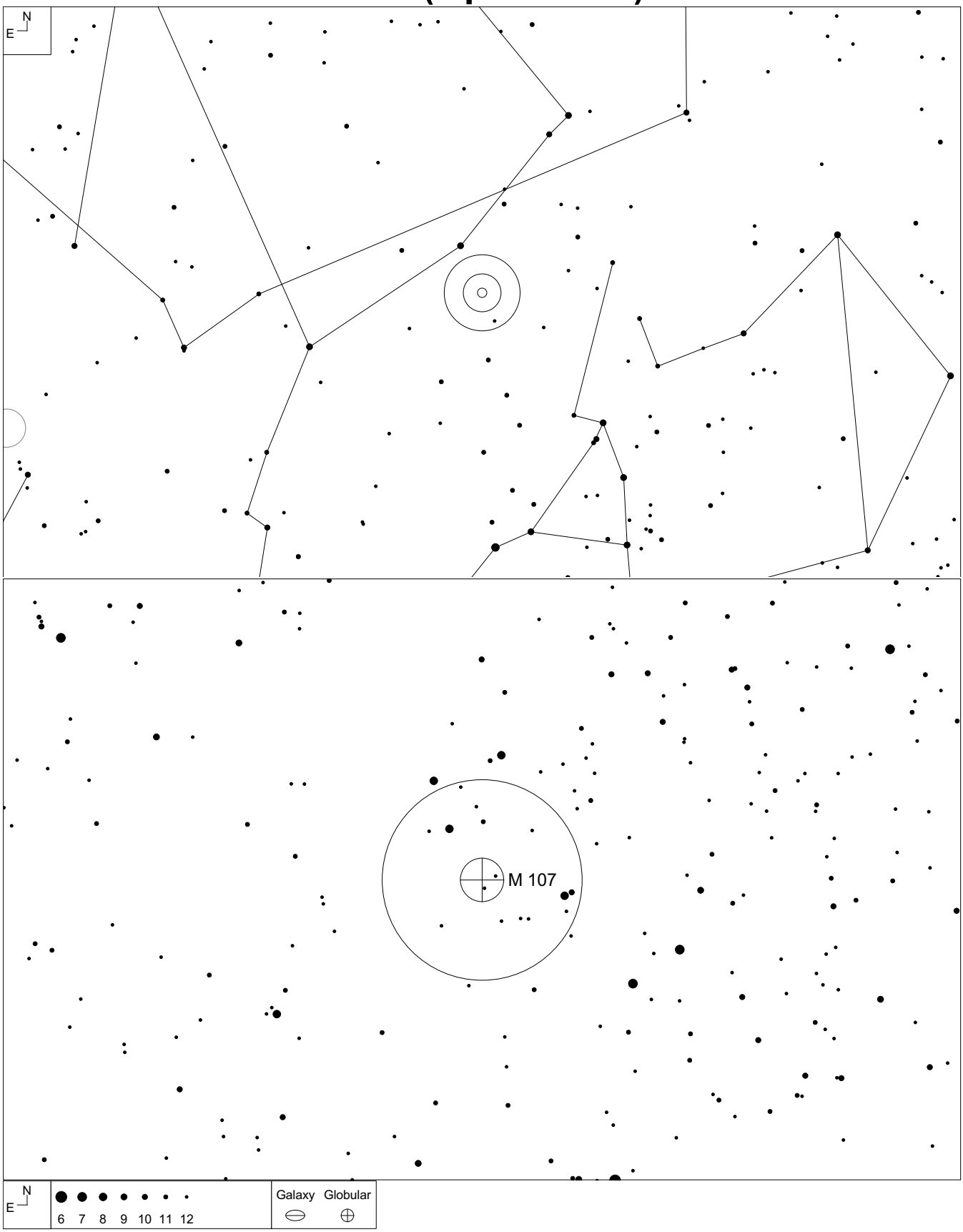
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
15 17 24.5	-21 00 37	8.4	16.3	13.3.	13.6	11’

M5 and Palomar 5 (Ophiuchus)



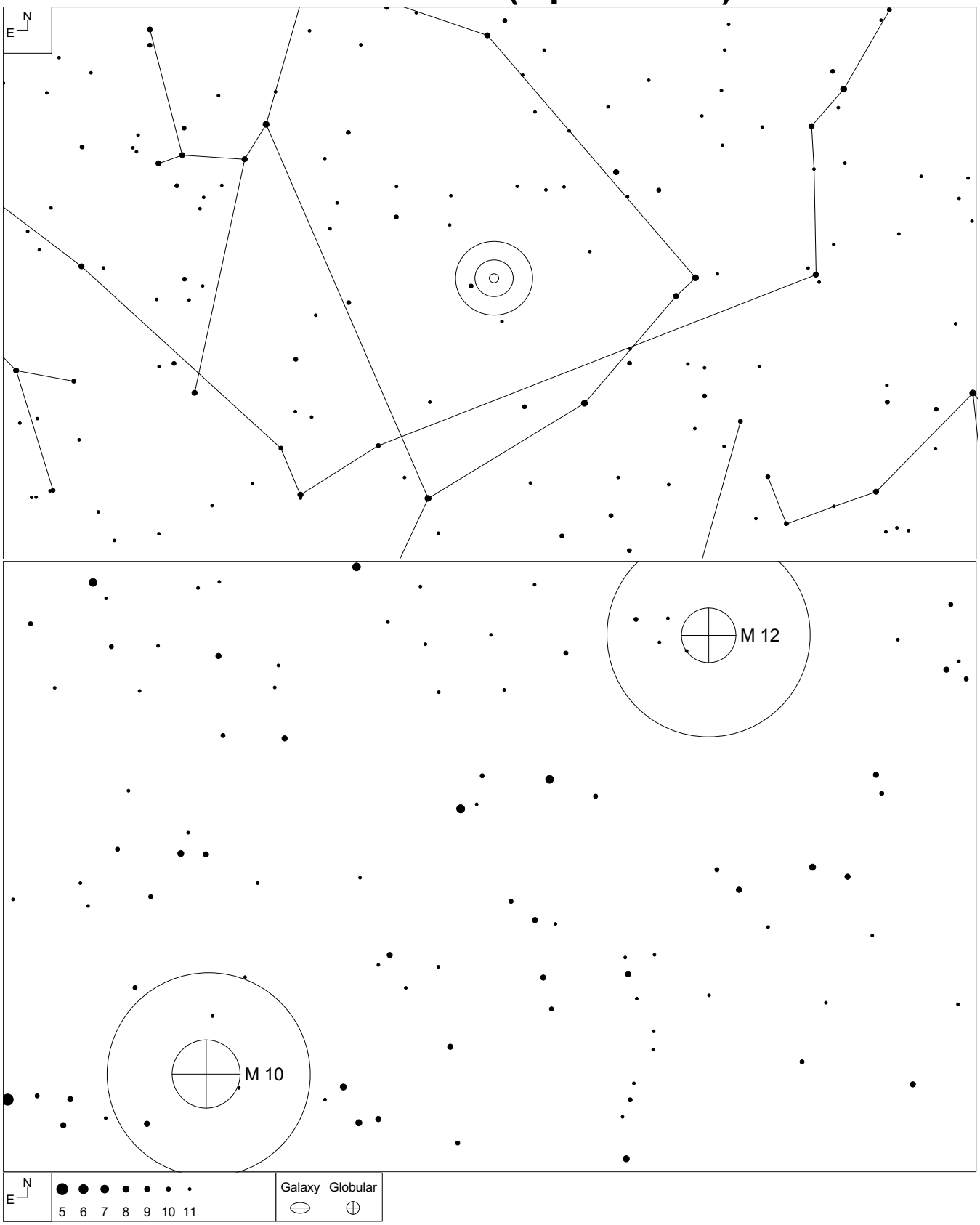
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M5	15 18 33.8	+02 04 58	5.7	15	12.2	12.5	23’
Palomar 5	15 16 05.3	-00 07 14	11.8	17.4	15.5	16.3	8’

M107 (Ophiuchus)



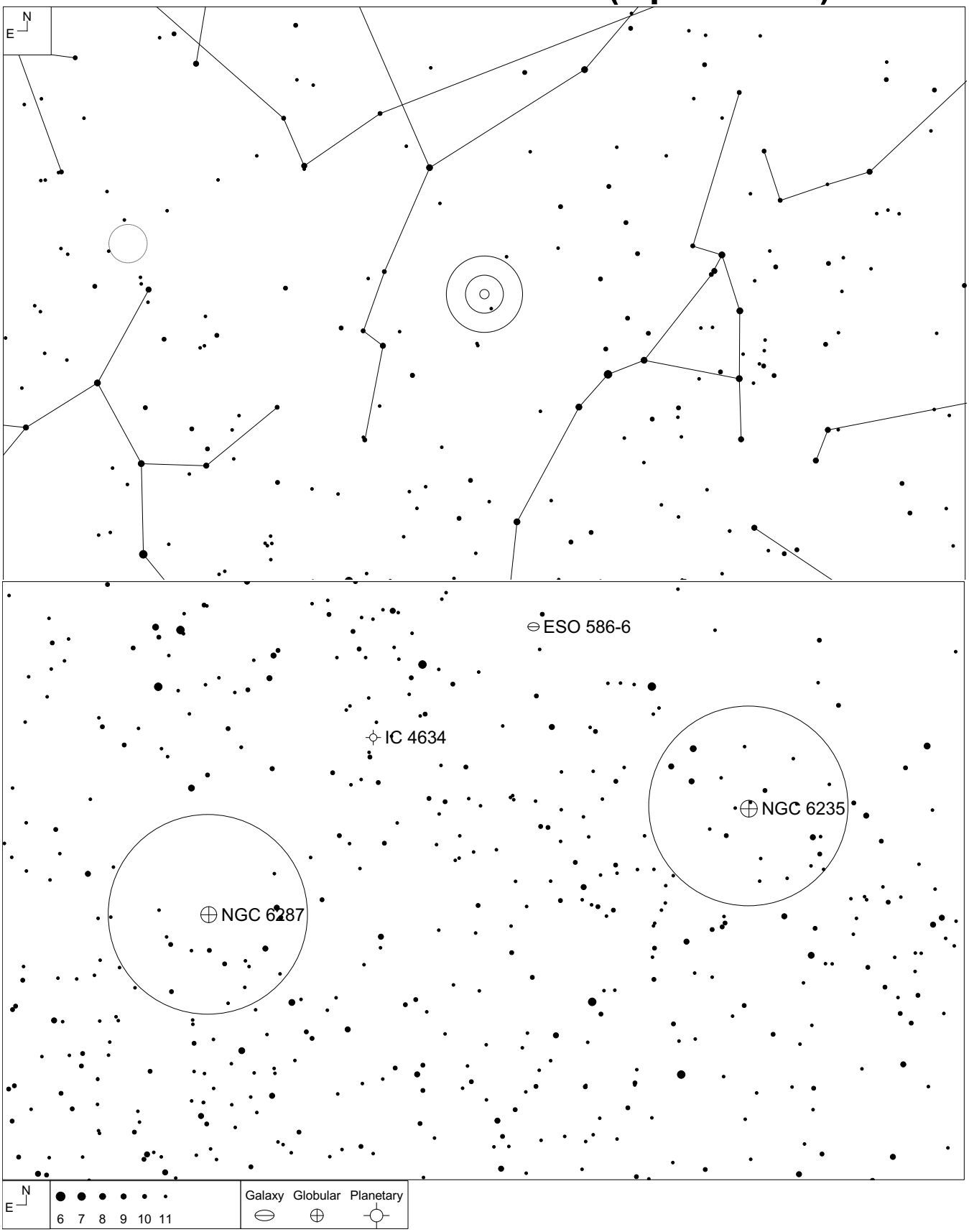
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
16 32 31.9	-13 03 13	7.8	15.6	13	13.4	13’

M10 and M12 (Ophiuchus)



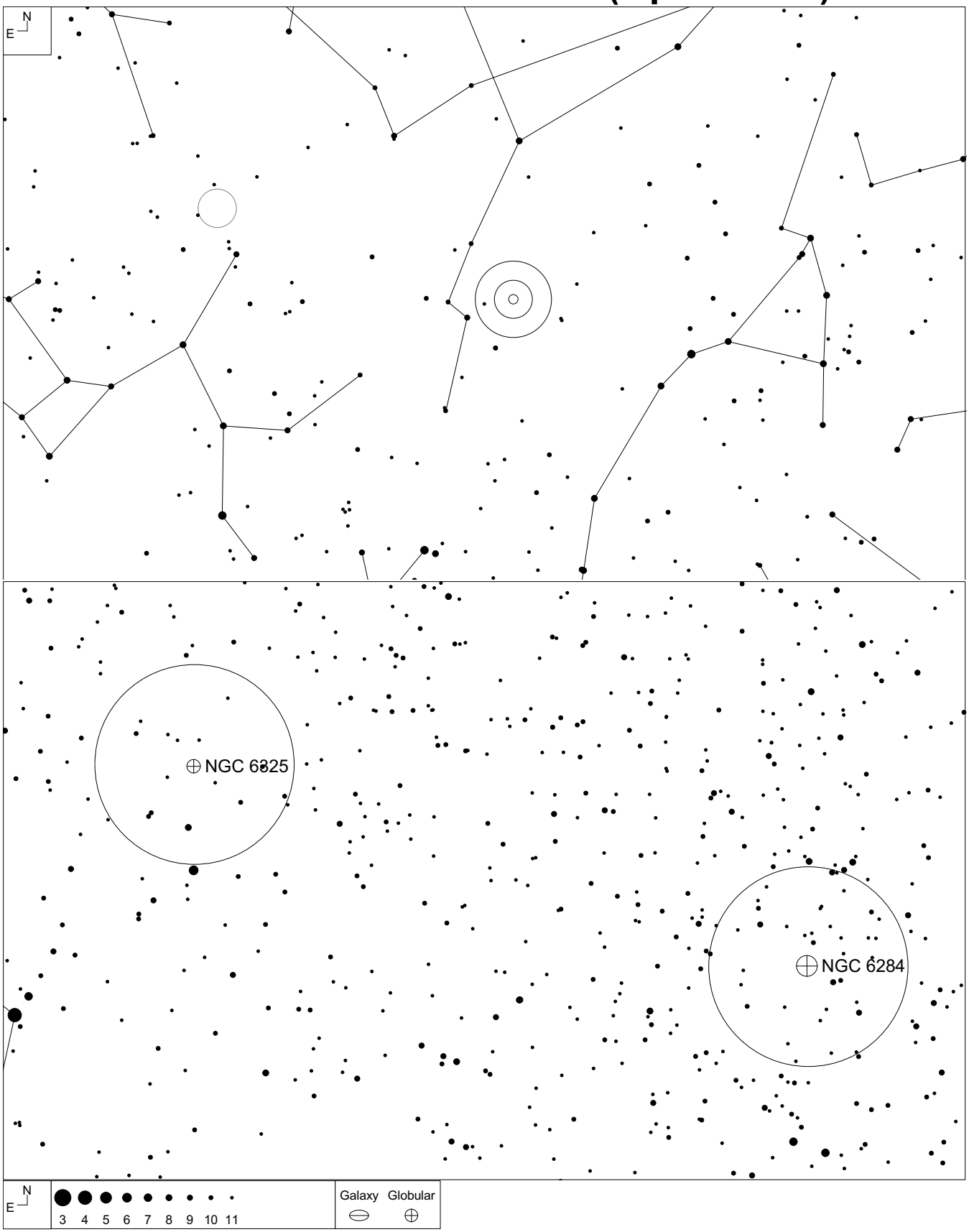
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M10	16 57 08.9	-04 05 58	6.1	14.7	12	12.1	16’
M12	16 47 14.5	-01 56 52	6.6	15.1	12	13.1	20’

NGC 6235 and NGC 6287 (Ophiuchus)



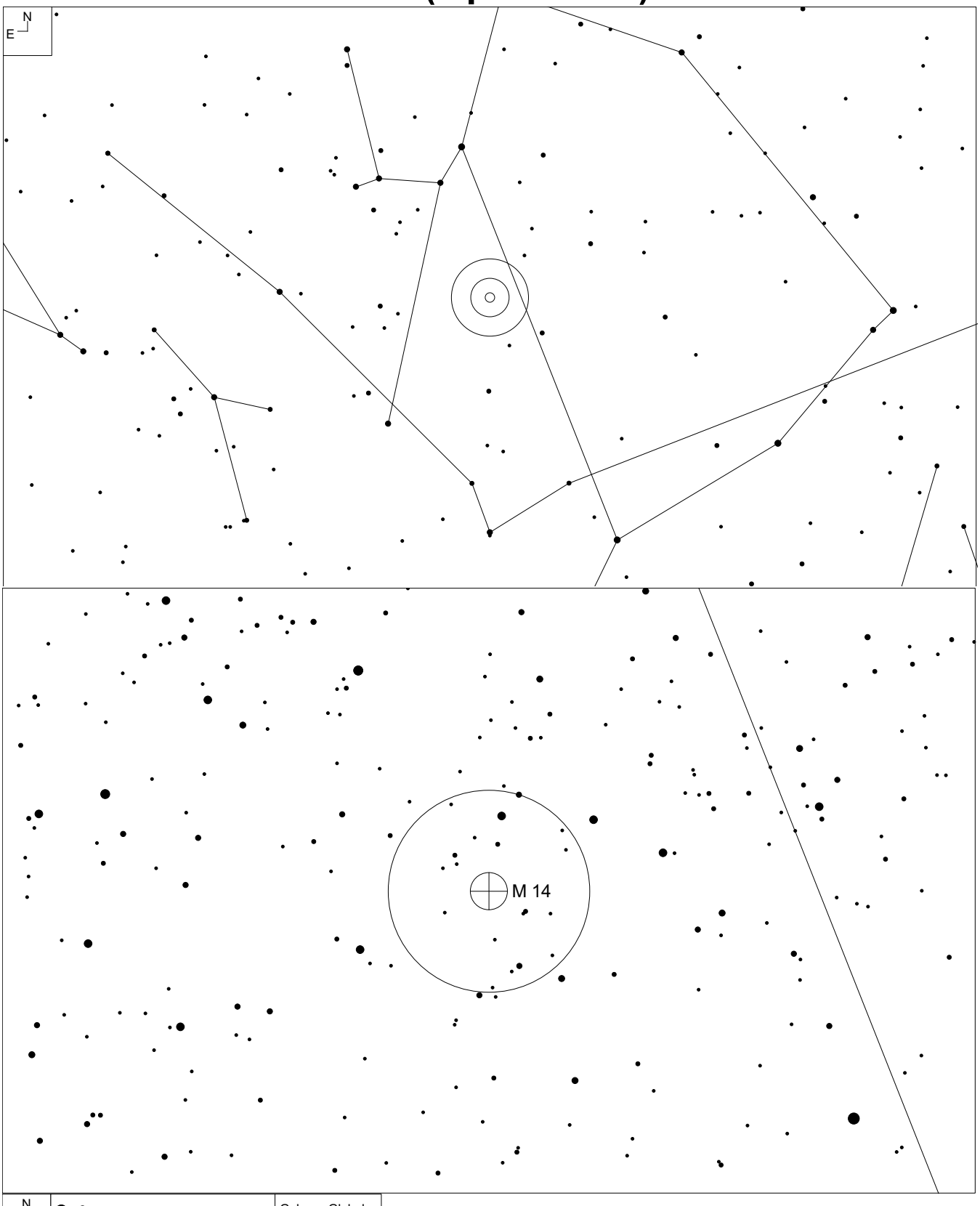
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6235	17 17 59.2	-23 45 57	8.9	16.7	14	12.4	5’
NGC 6287	17 05 09.4	-22 42 29	9.3	17.1	14.5	12.7	4.8’

NGC 6284 and NGC 6325 (Ophiuchus)



Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6284	17 04 28.8	-24 45 53	8.9	16.6	-	12.9	6.2’
NGC 6325	16 53 25.4	-22 10 38	10.2	17.3	14.7	13.3	4.1’

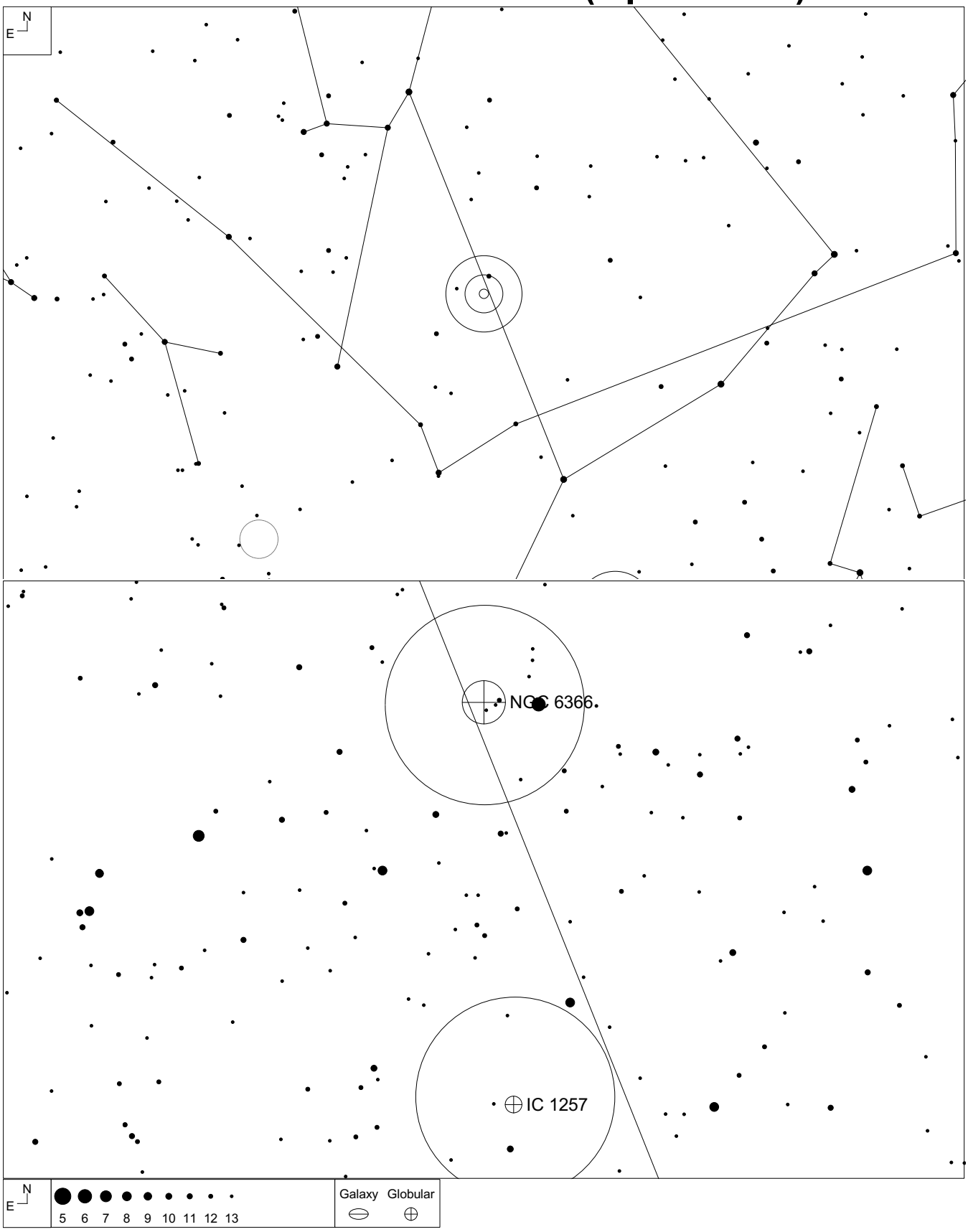
M14 (Ophiuchus)



Field: 7.3 x 4.5°

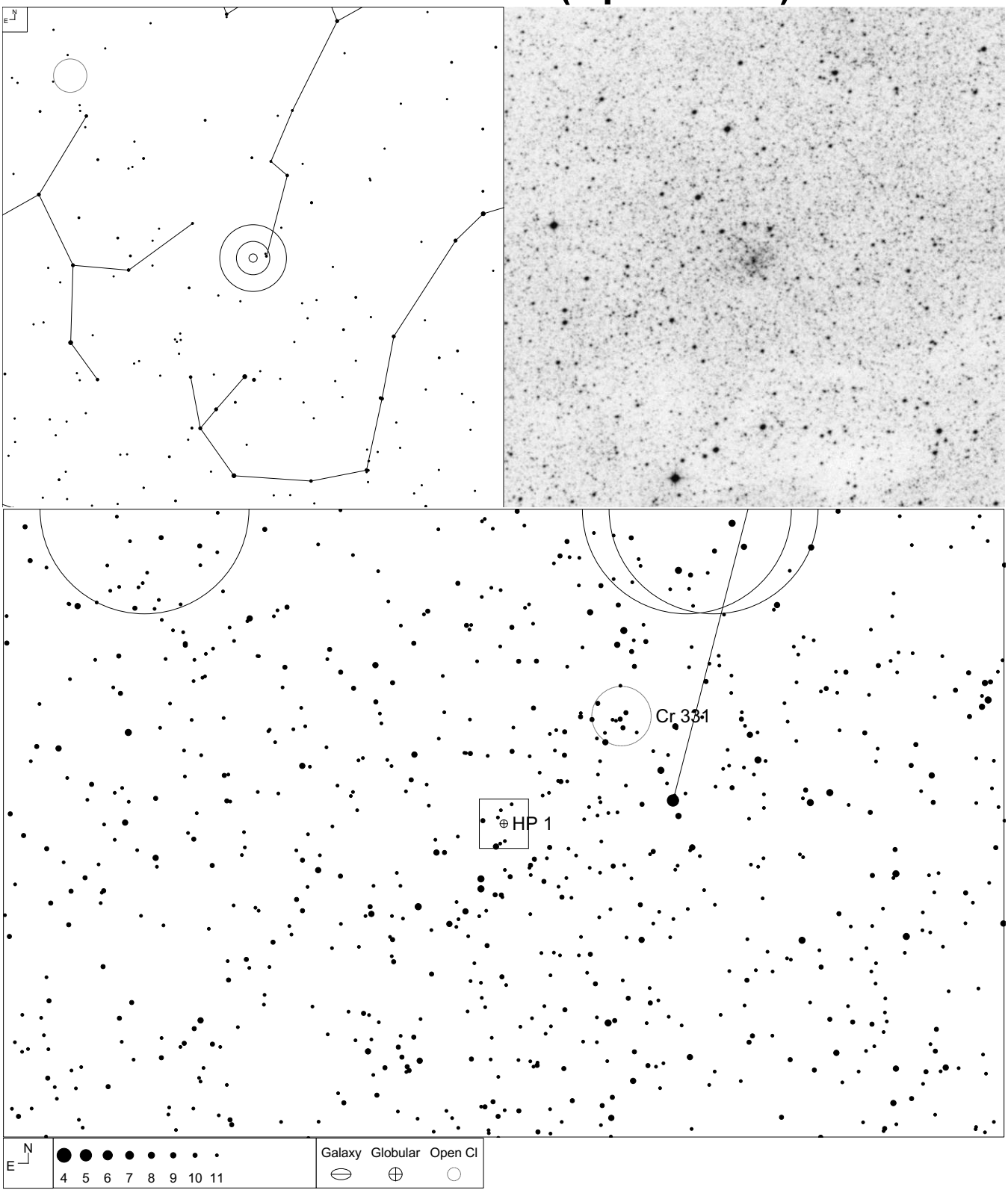
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M14	17 37 36.1	-03 14 45	7.6	17.2	14	12.8	11’

NGC 6366 and IC 1257 (Ophiuchus)



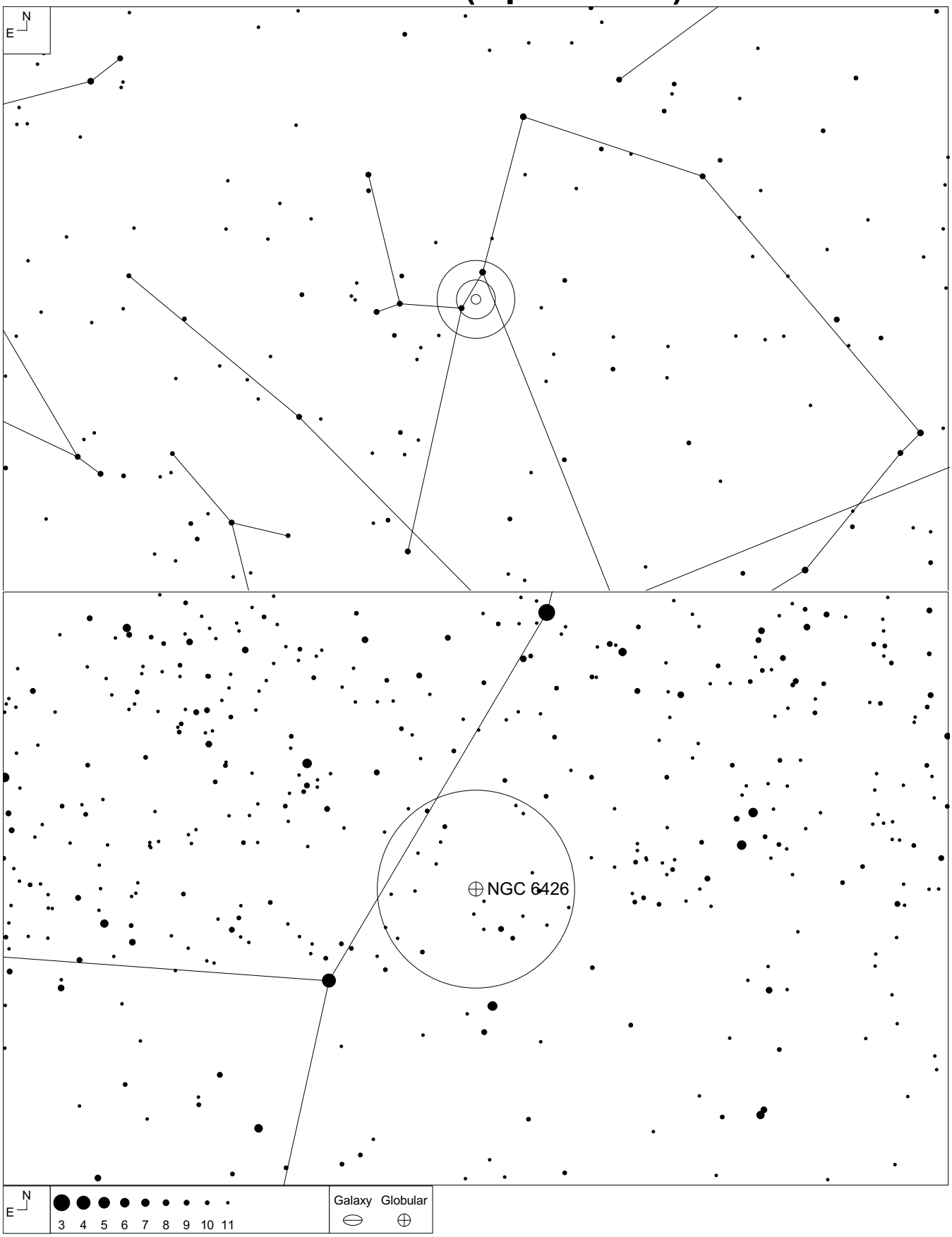
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6366	17 27 44.3	-05 04 36	9.5	15.7	13.6	15.1	13’
IC 1257	17 27 08.0	-07 05 36	13.1	19.8	17	14.3	1.7’

Haute Province 1 (Ophiuchus)



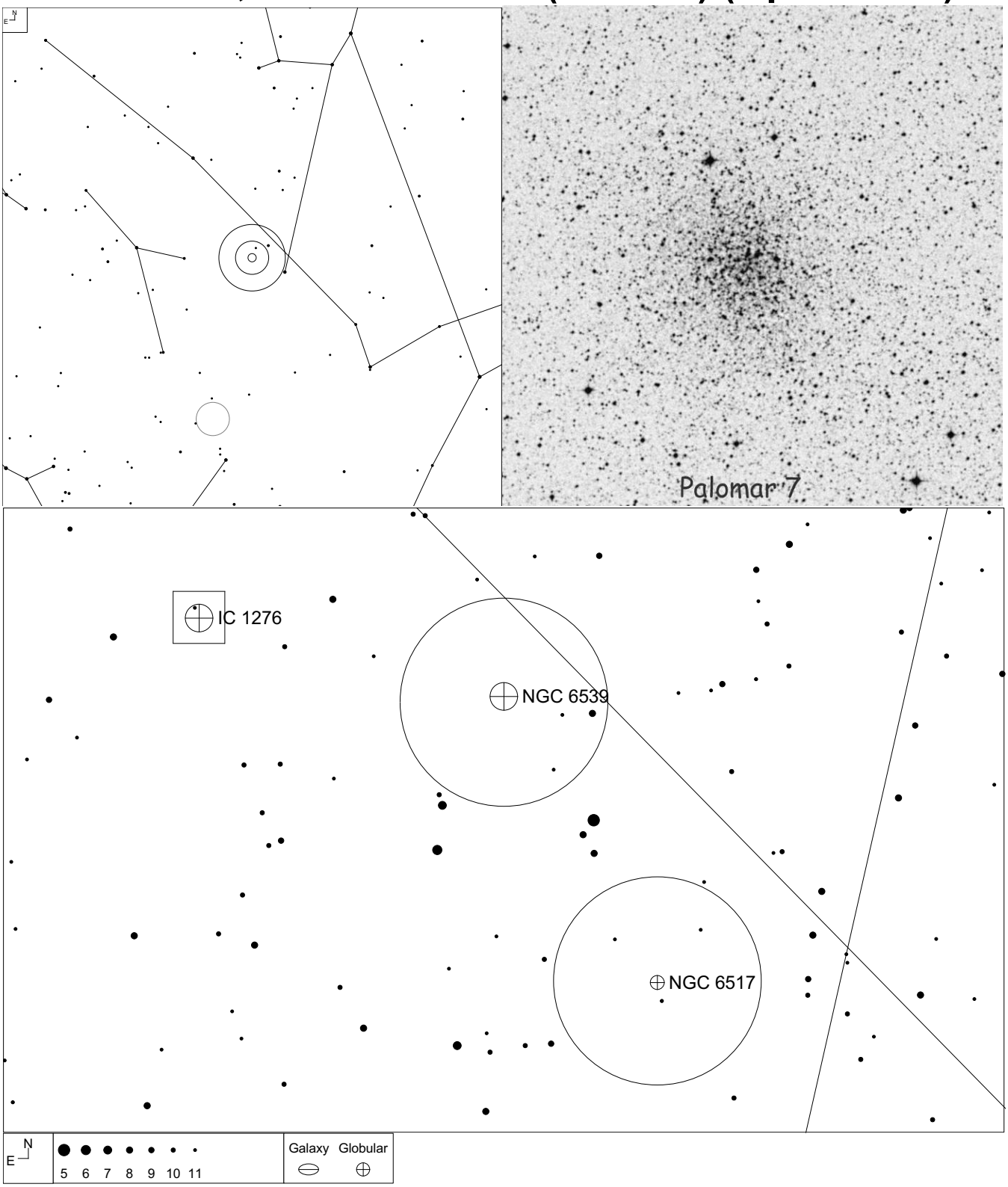
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
17 31 05.2	-29 58 54	12.5	18.6	16	12.9	1.2’

NGC 6426 (Ophiuchus)



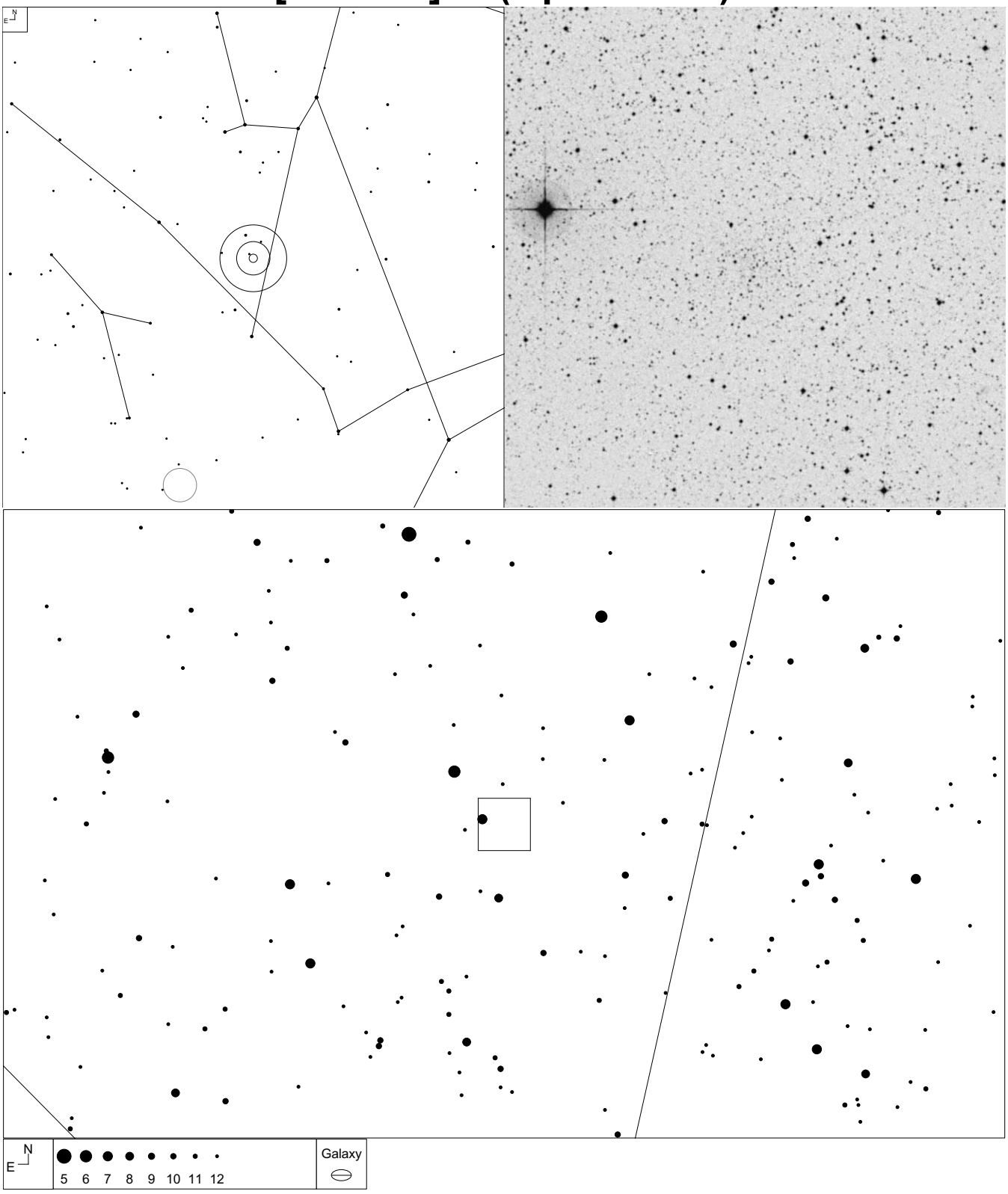
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
17 44 54.7	+03 10 13	10.9	18.1	15.2	14	4.2’

NGC 6539, 6517 and Pal 7 (IC 1276) (Ophiuchus)



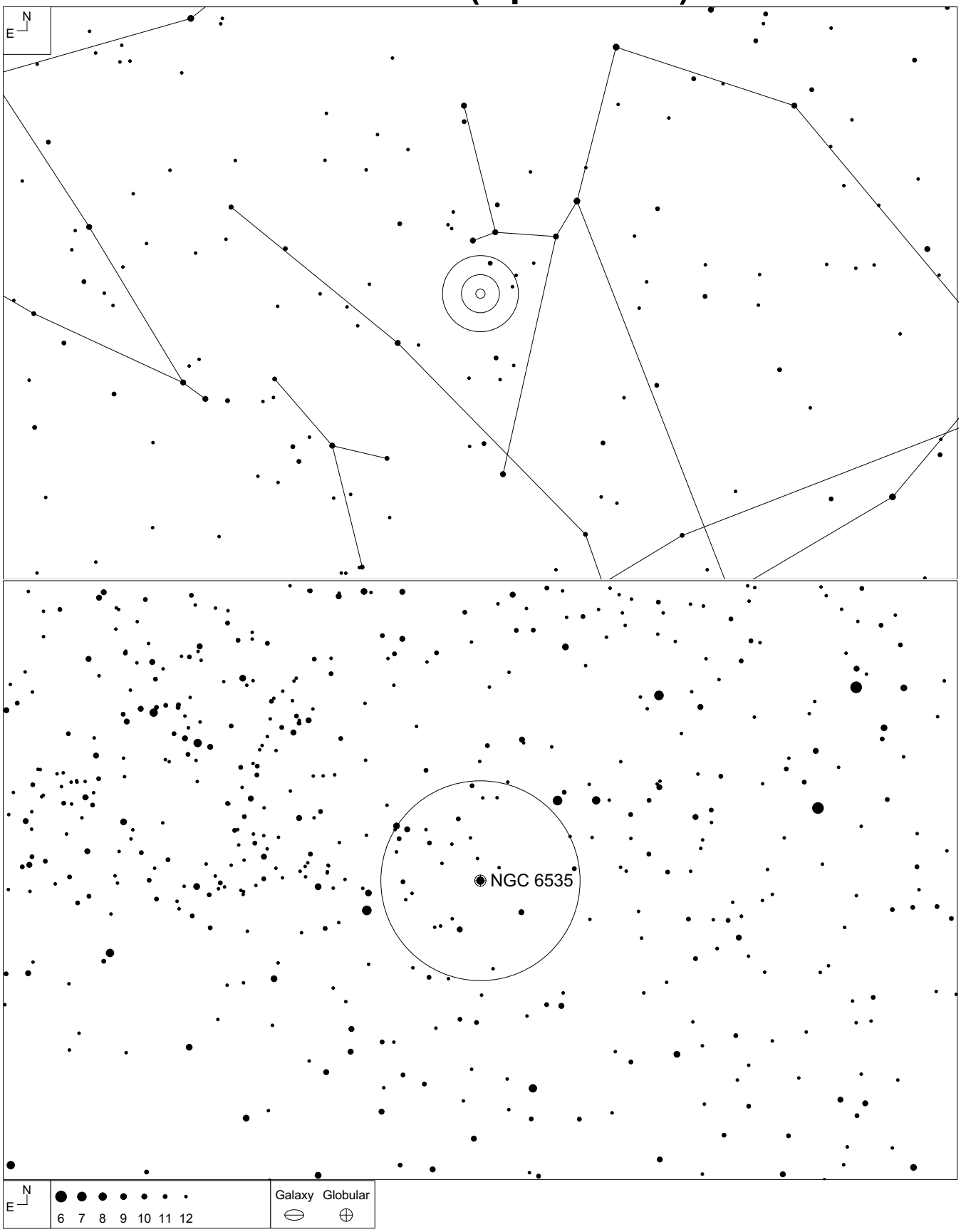
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6539	18 04 49.8	-07 35 09	10.1	18	16	13.1	4’
NGC 6517	18 01 50.6	-08 57 32	8.9	18.3	15.9	13.4	7.9’
Palomar 7	18 10 44.2	-07 12 27	10.3	17.7	15.7	14.8	8’

[PWM78] 2 (Ophiuchus)



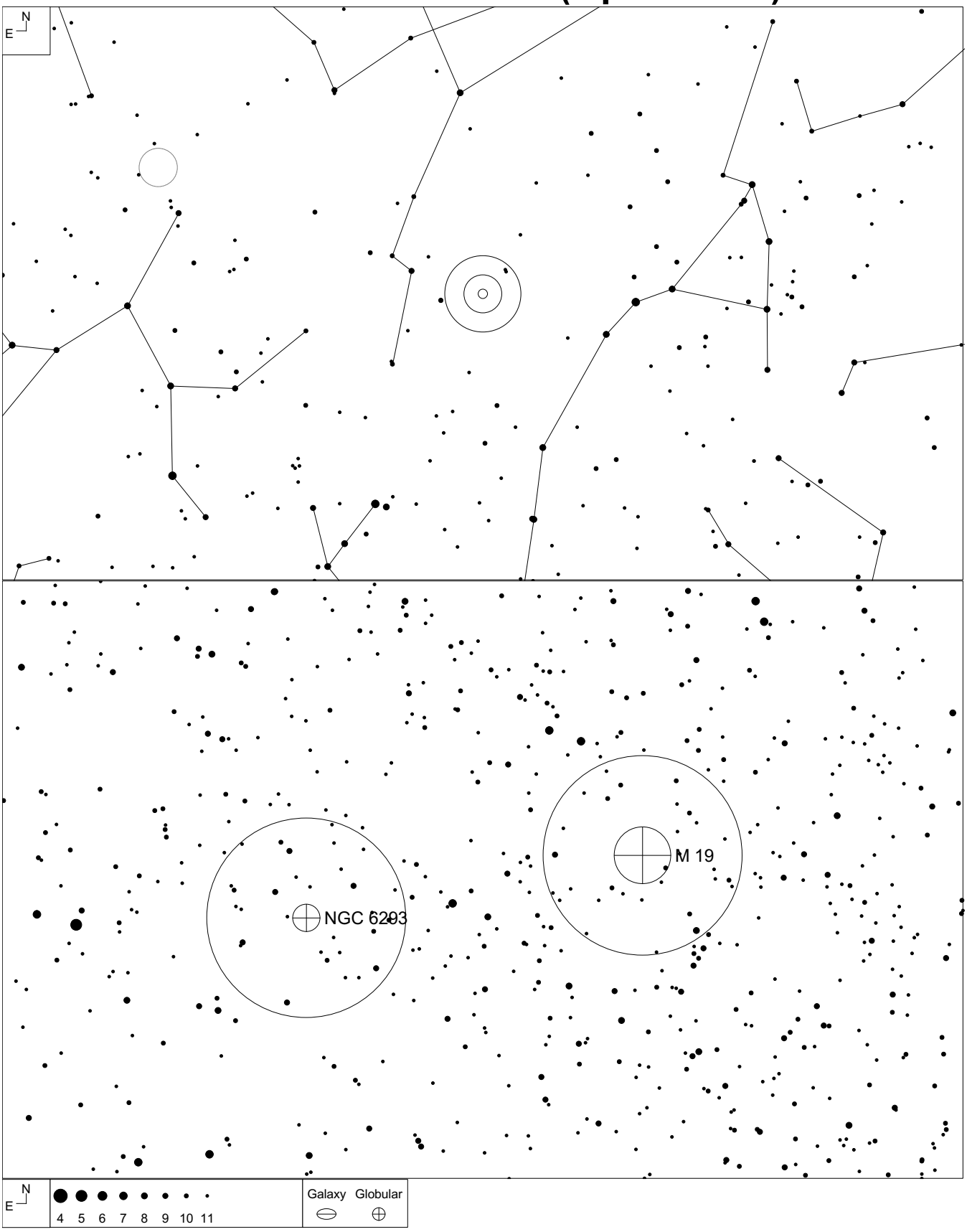
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
17 58 39.4	-05 04 21	-	-	-	-	2’

NGC 6535 (Ophiuchus)



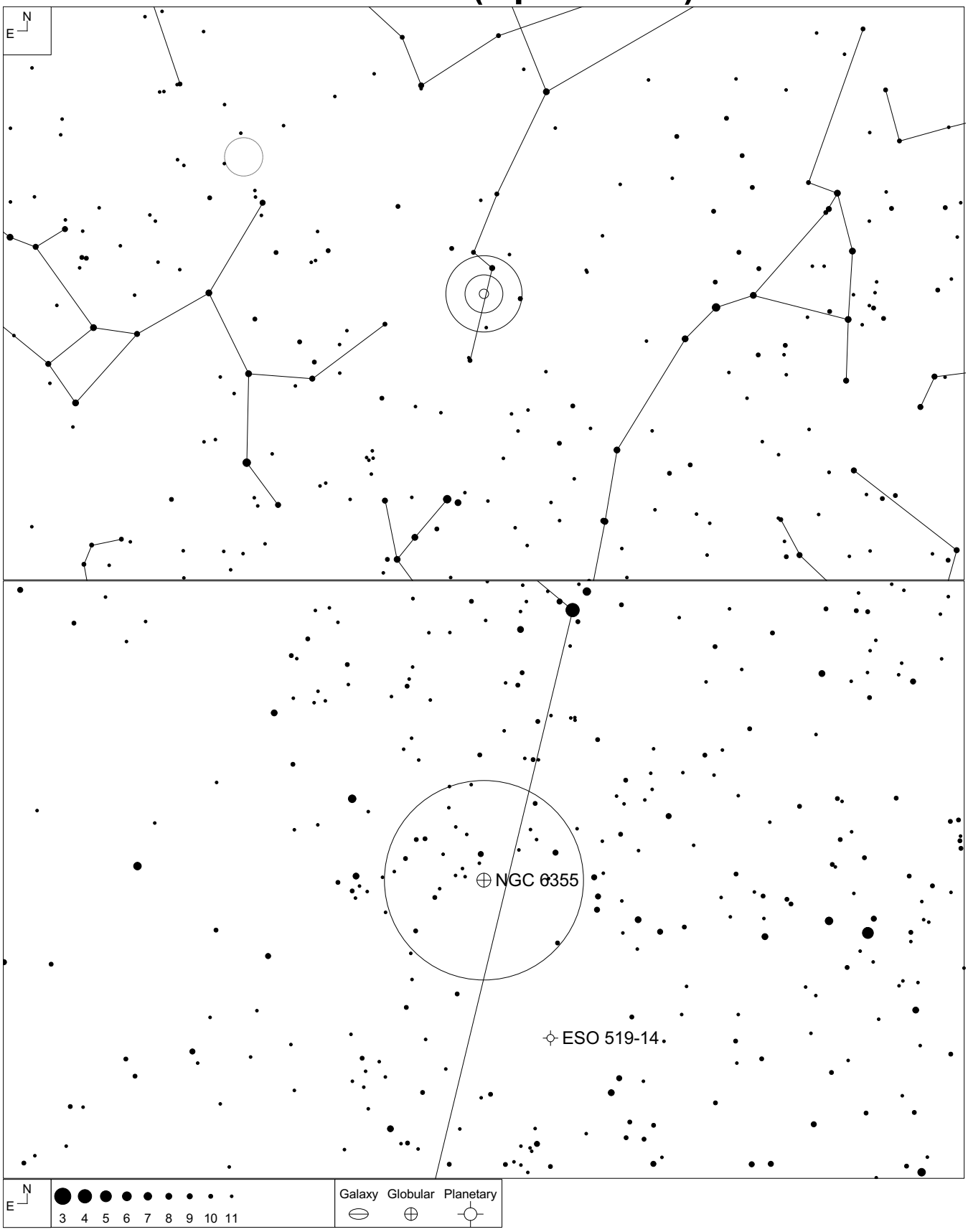
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
18 03 50.7	-00 17 49	9.3	15.8	12.8	12	3.4’

M19 and NGC 6293 (Ophiuchus)



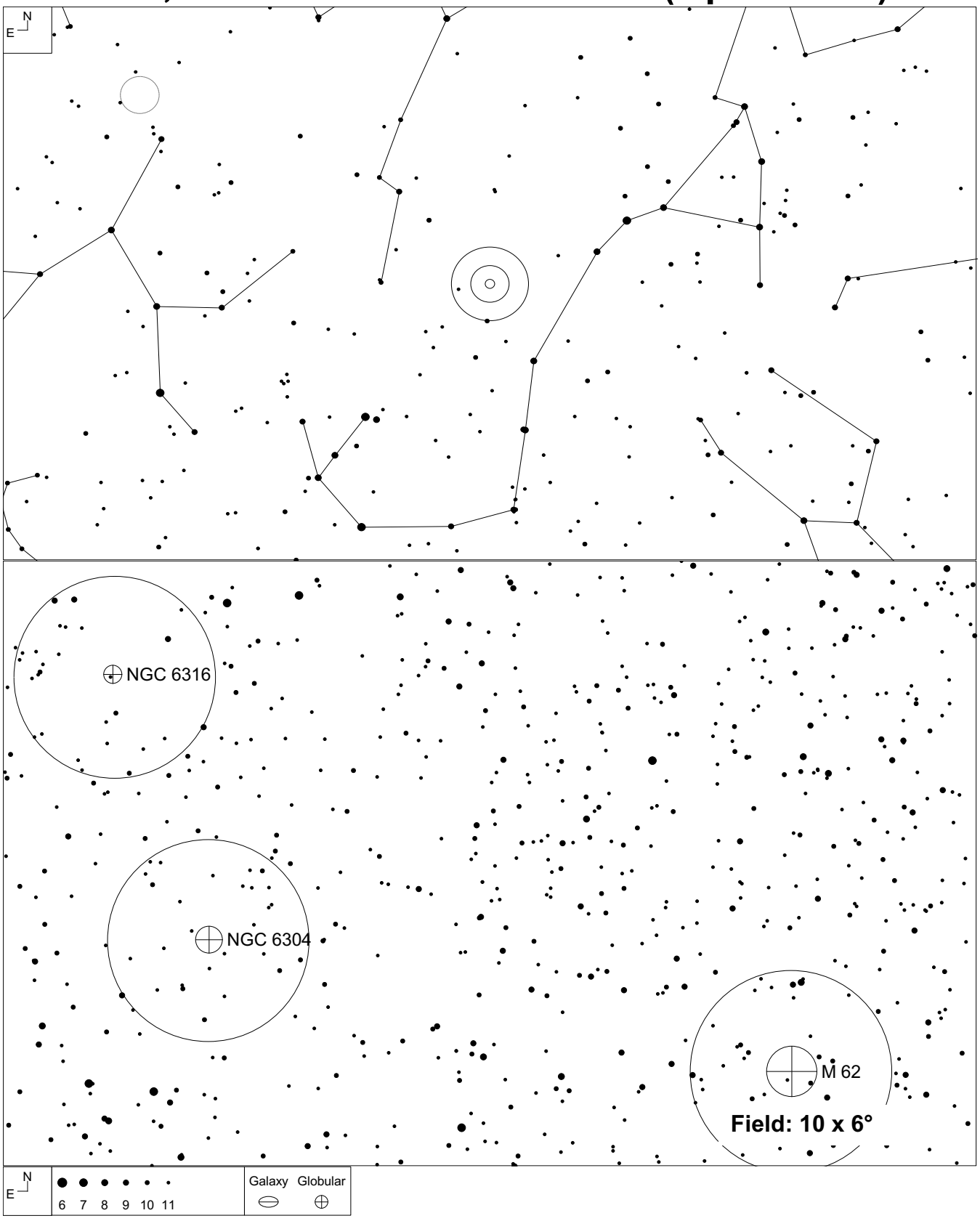
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M19	17 02 37.7	-26 16 05	6.8	17	14	13	17’
NGC 6293	17 10 10.4	-26 34 54	8.3	16.5	14.3	12.9	8.2’

NGC 6355 (Ophiuchus)



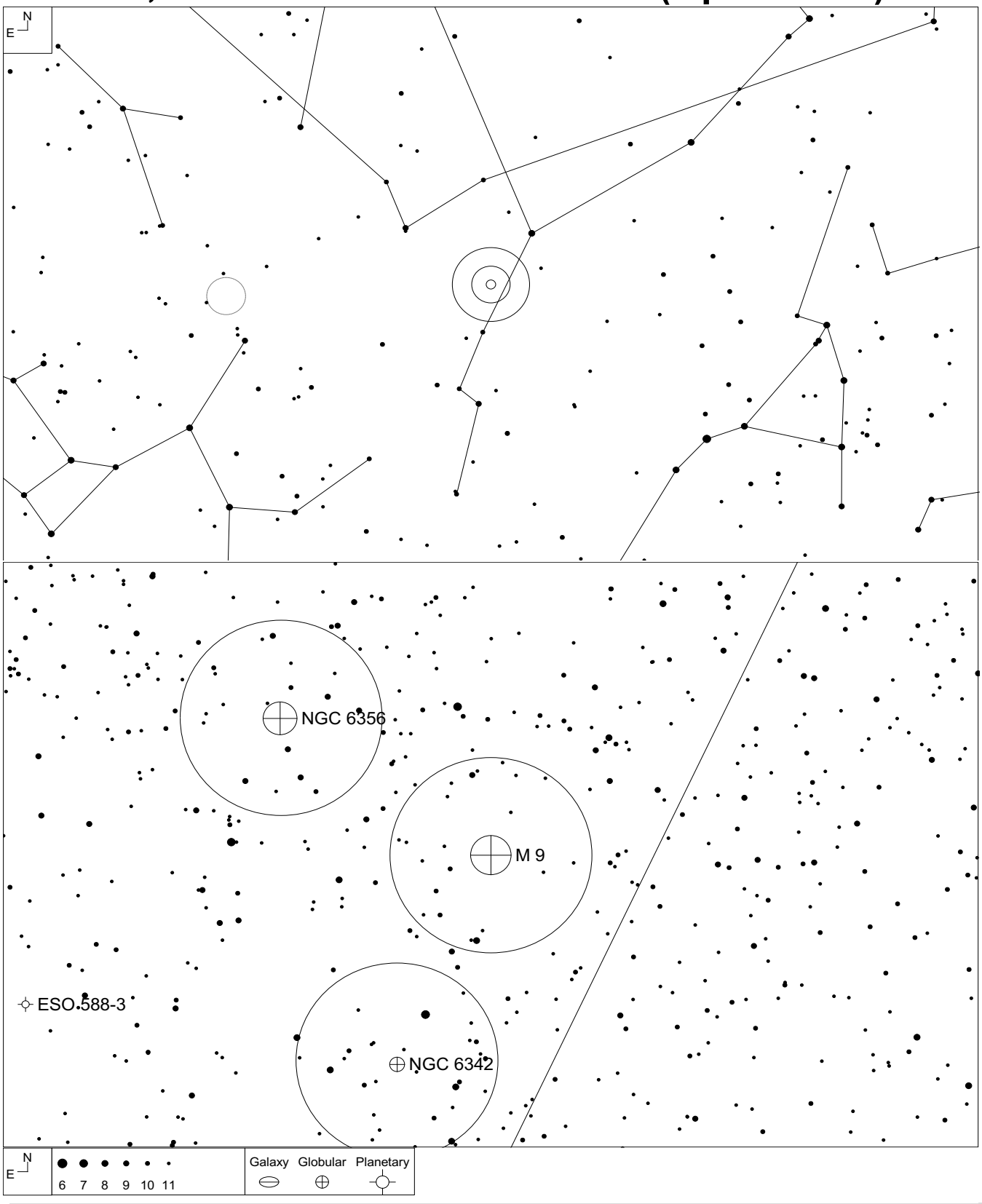
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6355	17 23 58.6	-26 21 13	8.6	17.2	-	11.7	4.2’

M62, NGC 6304 and NGC 6316 (Ophiuchus)



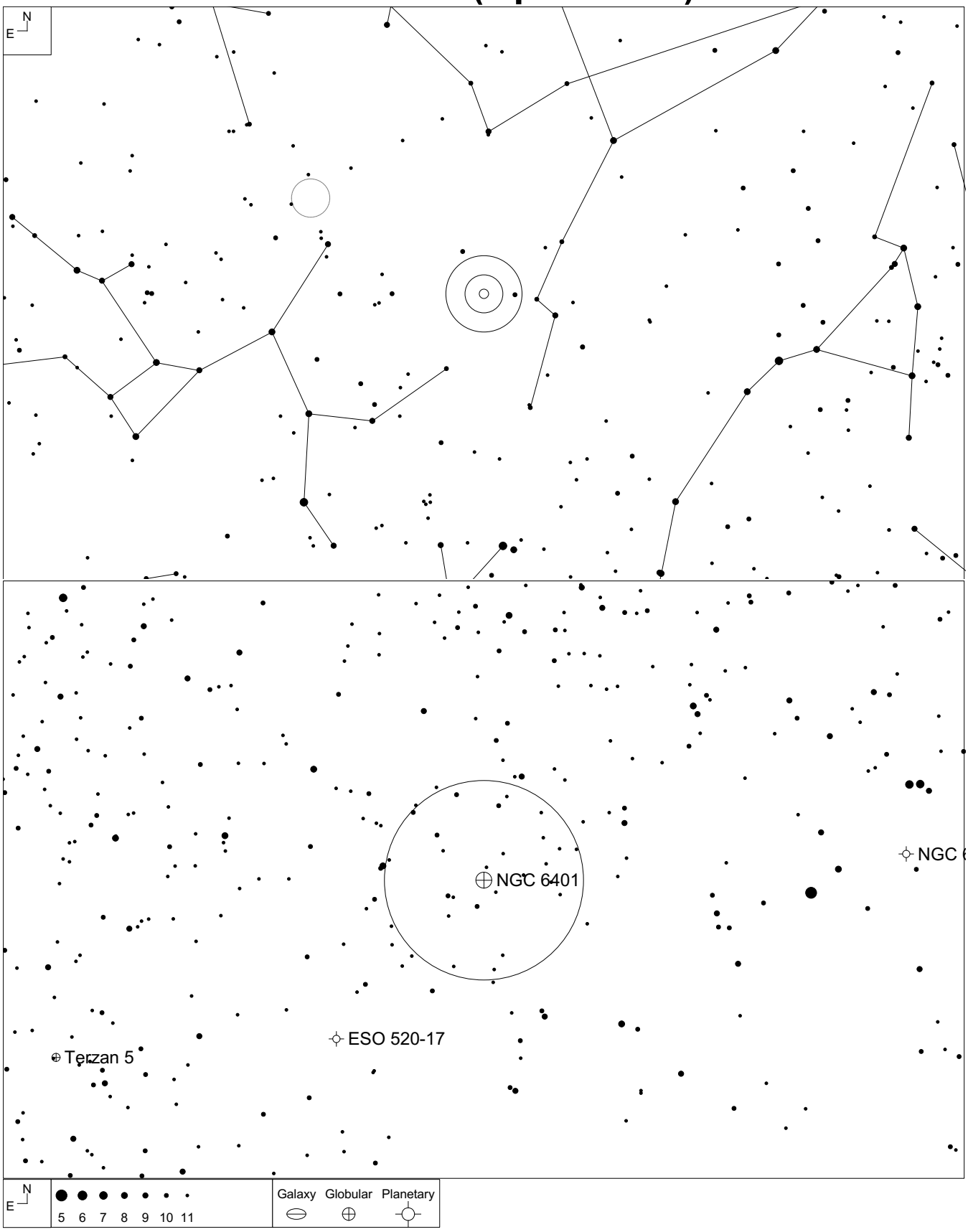
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M62	17 01 12.6	-30 06 44	6.4	16.3	13.2	12.3	15’
NGC 6304	17 14 32.5	-29 27 44	8.3	16.2	14.5	12.8	8’
NGC 6316	17 16 37.4	-28 08 24	8.1	17.8	15	11.8	5.4’

M9, NGC 6342 and NGC 6356 (Ophiuchus)



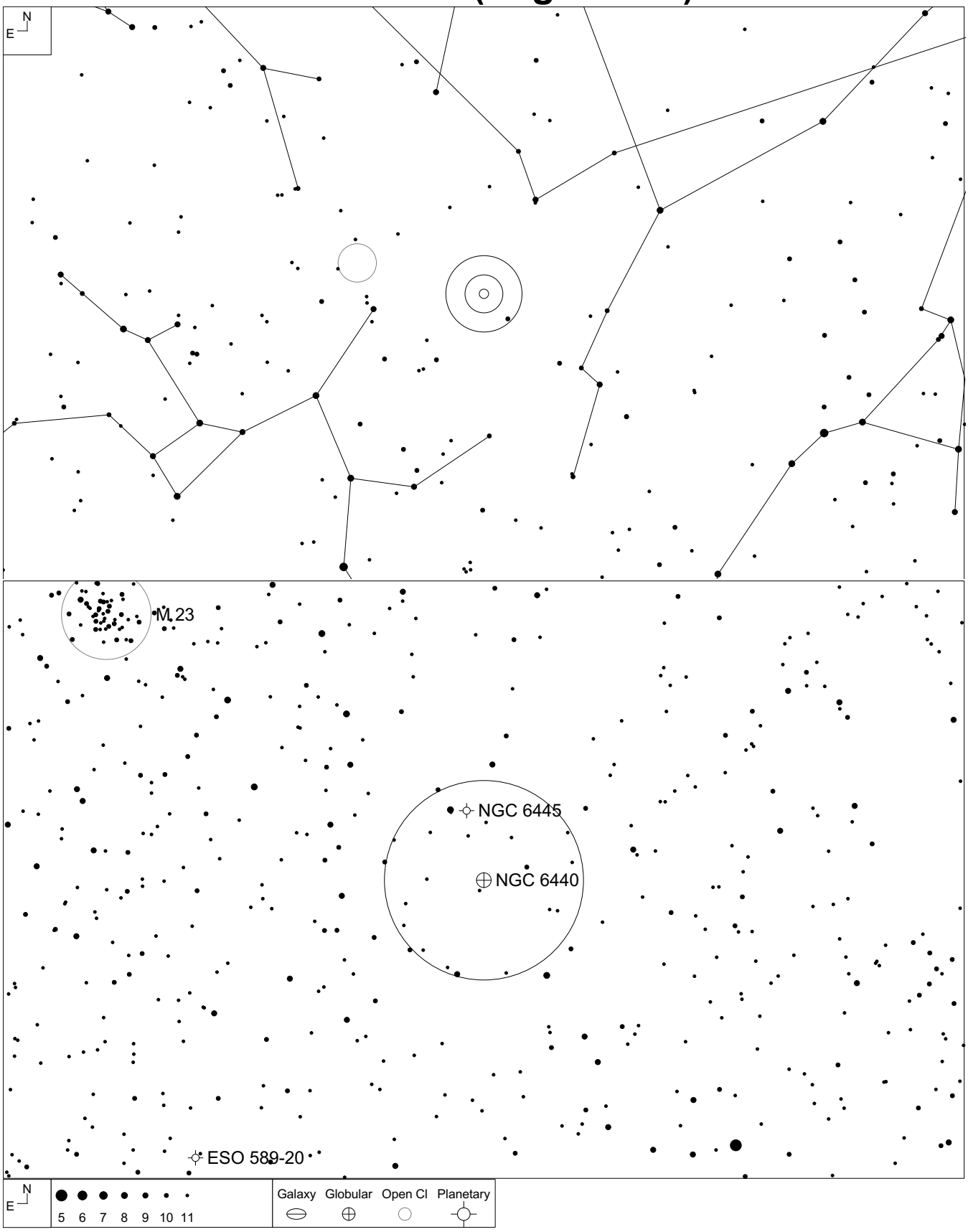
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M9	17 19 11.8	-18 30 59	7.8	16.2	13.5	13.2	12’
NGC 6342	17 21 10.2	-19 35 14	9.5	16.9	15	12.7	4.4’
NGC 6356	17 23 35.0	-17 48 47	8.2	17.7	15.1	13.2	10’

NGC 6401 (Ophiuchus)



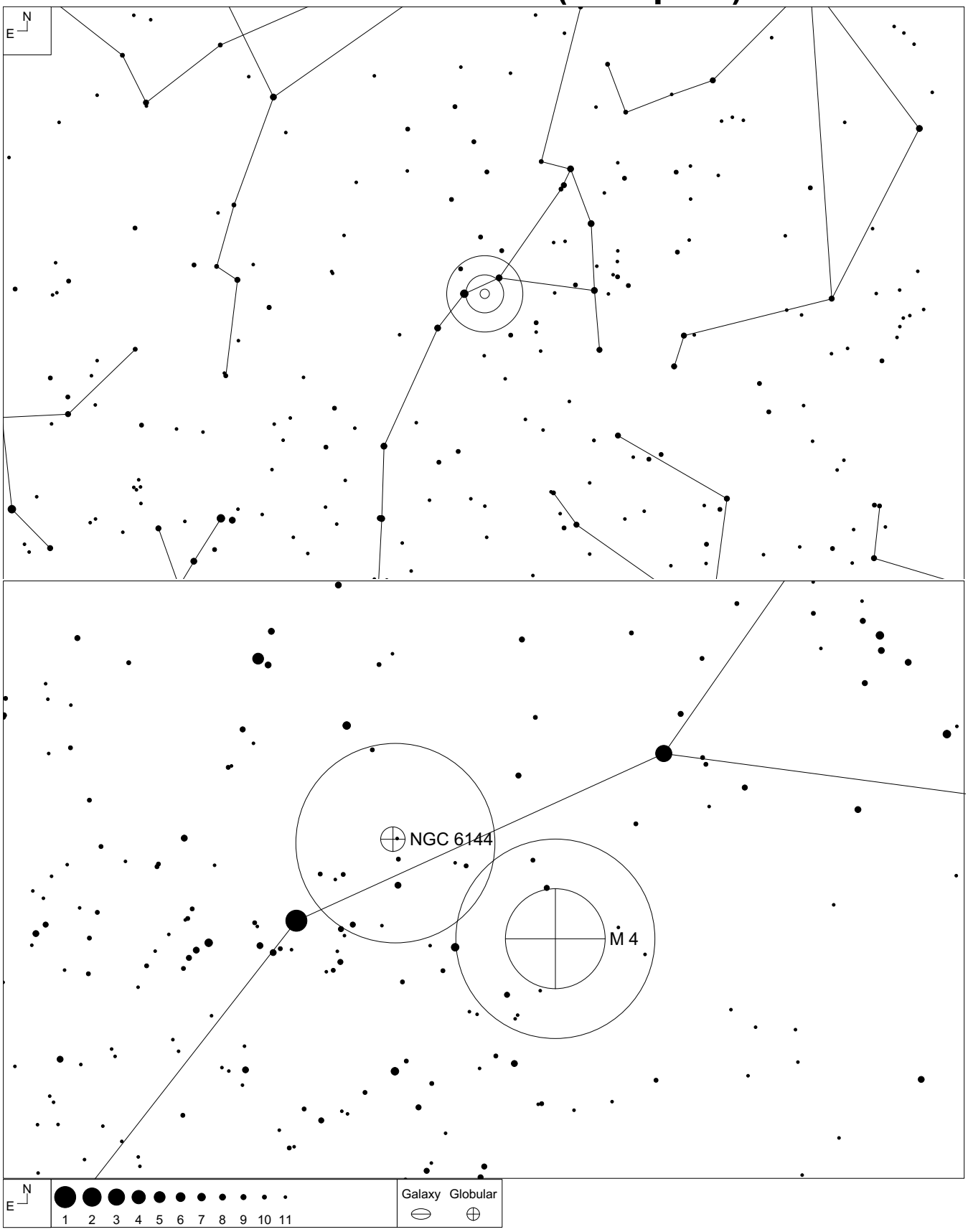
	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6401	17 38 36.9	-23 54 32	7.4	18	15.5	8.7	1.8’

NGC 6440 (Sagittarius)



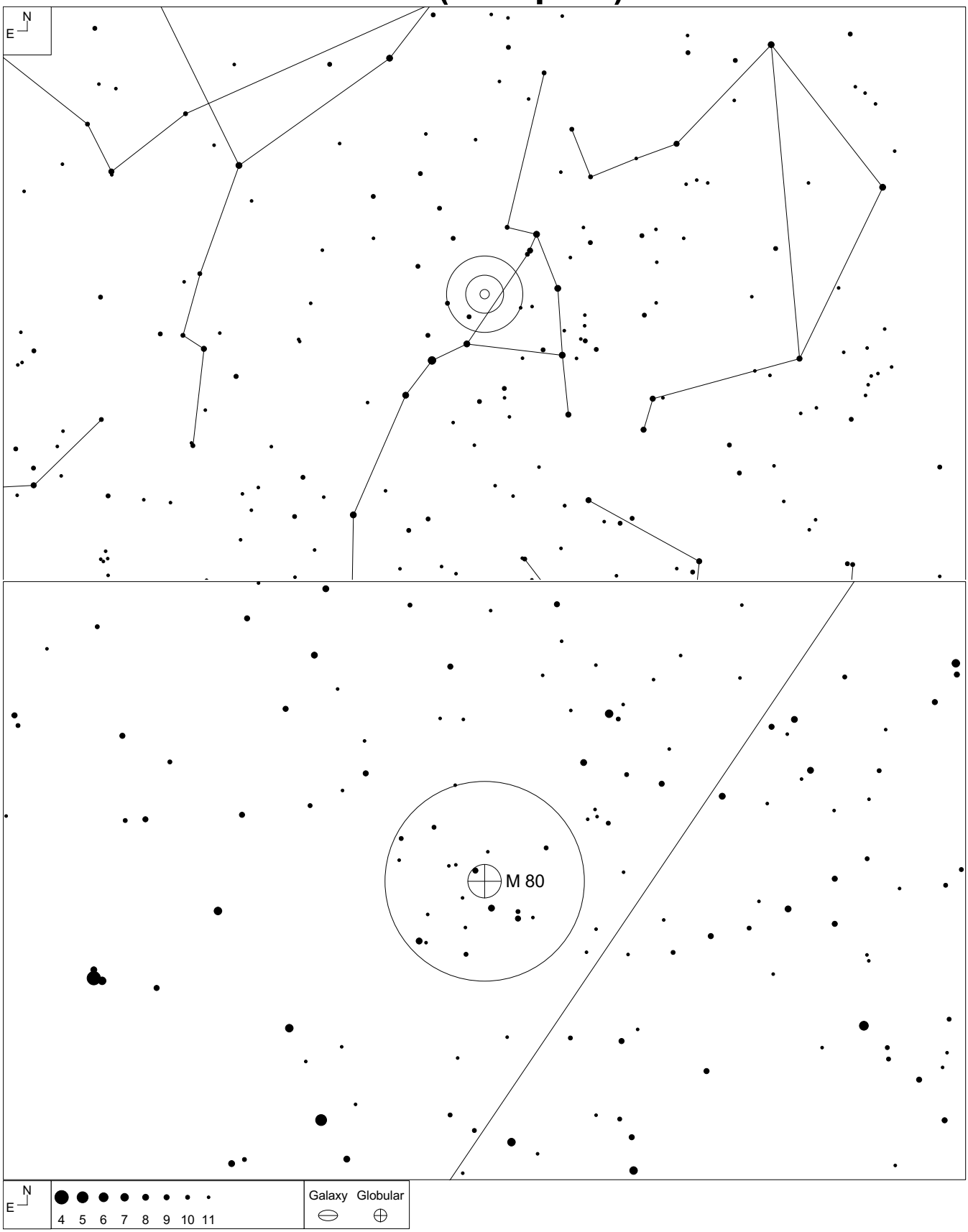
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6440	17 48 52.6	-20 21 34	9.3	18.7	16.7	12.5	4.4’

M4 and NGC 6144 (Scorpius)



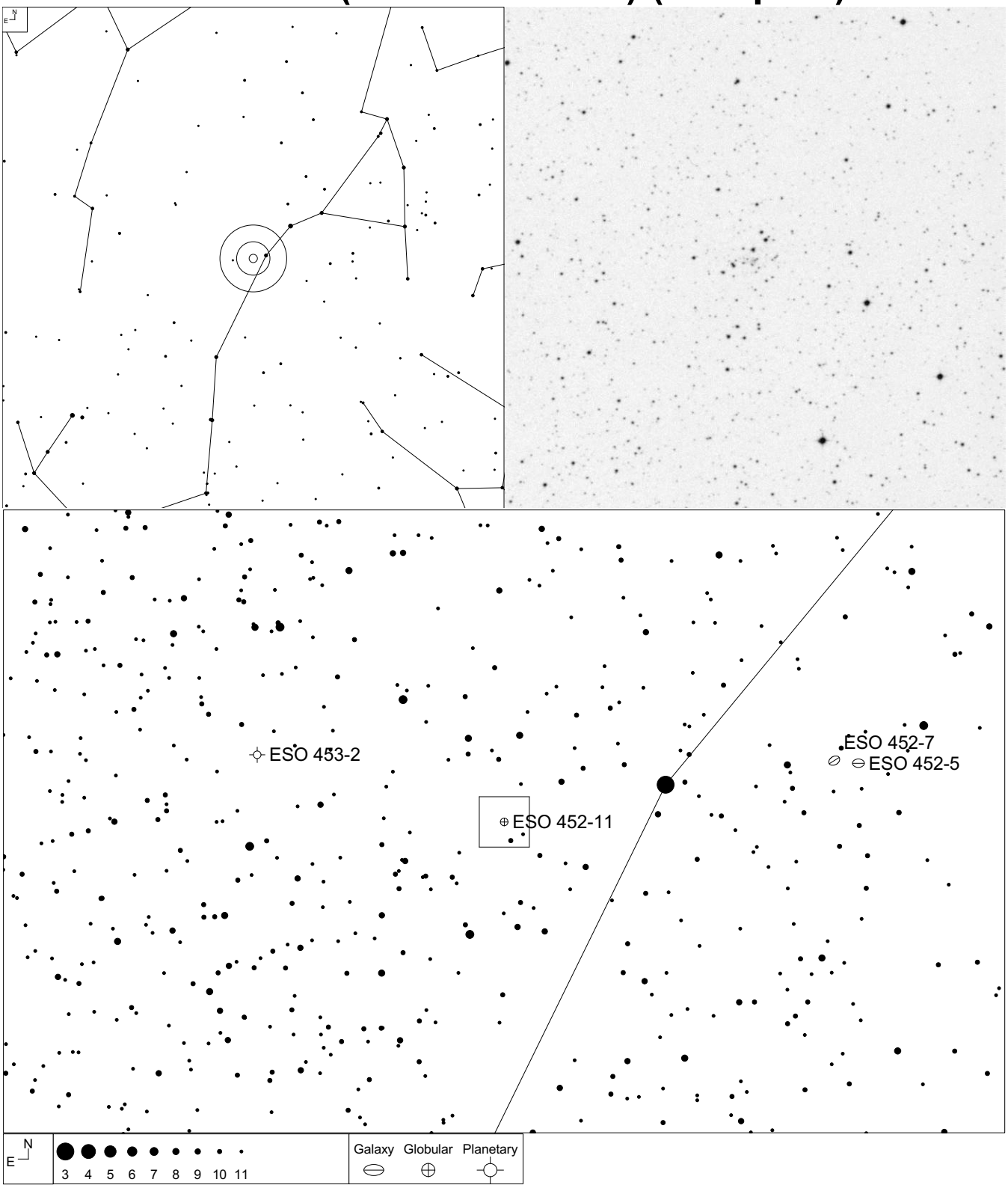
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M4	16 23 35.5	-26 31 31	5.4	13.4	10.8	13.2	36’
NGC 6144	16 27 14.1	-26 01 29	9	16.5	13.4	13.3	7.4’

M80 (Scorpius)



	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M80	16 17 02.5	-22 58 30	7.3	16.2	12.5	12.3	10’

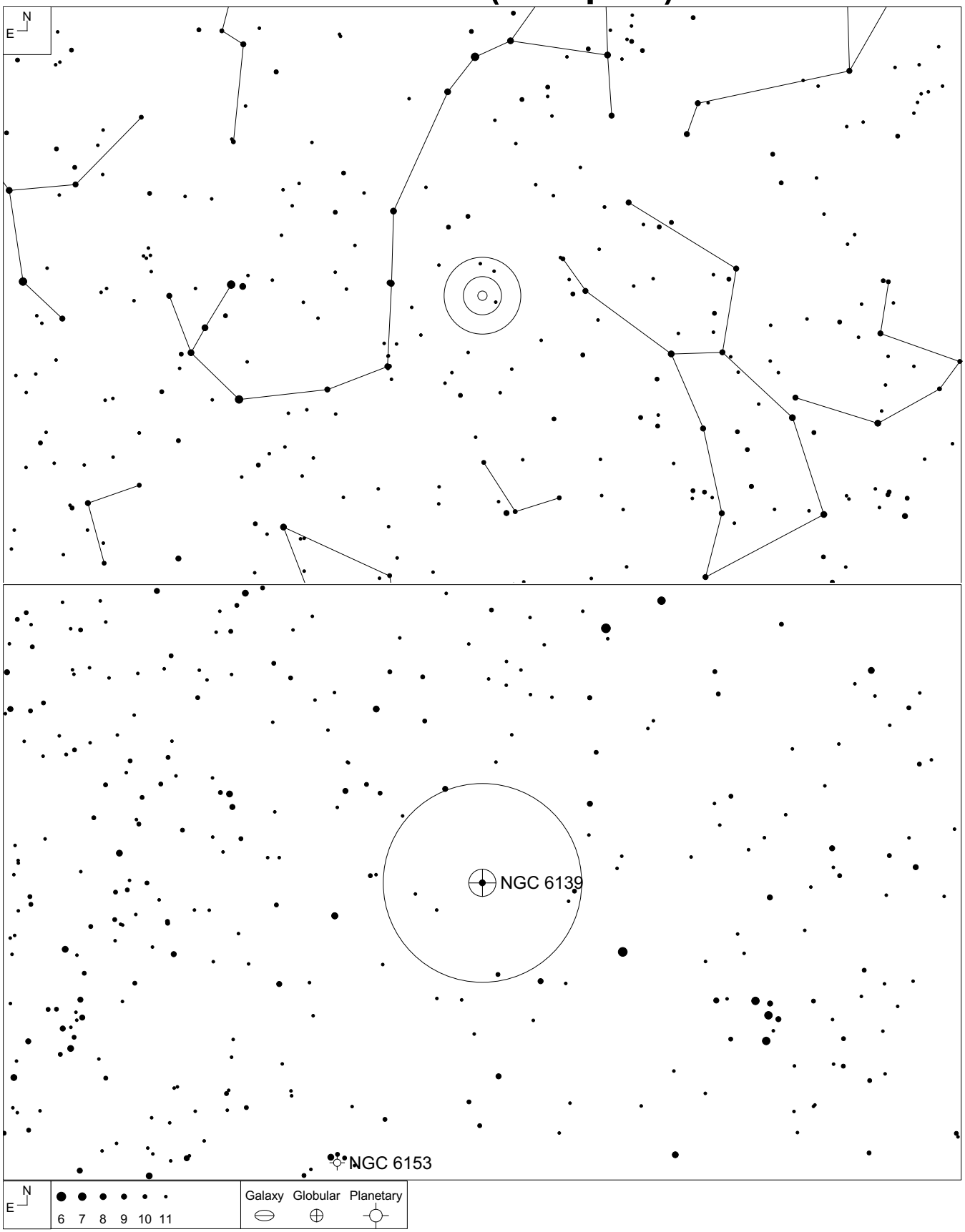
1636-283 (ESO 452-SC11) (Scorpius)



RA	Dec	V_{mag}	HB_{Mag}	$Bt*_{Mag}$	SB	Size
16 39 25.0	-28 23 54	12	16.6	15.3	12.4	1.2’

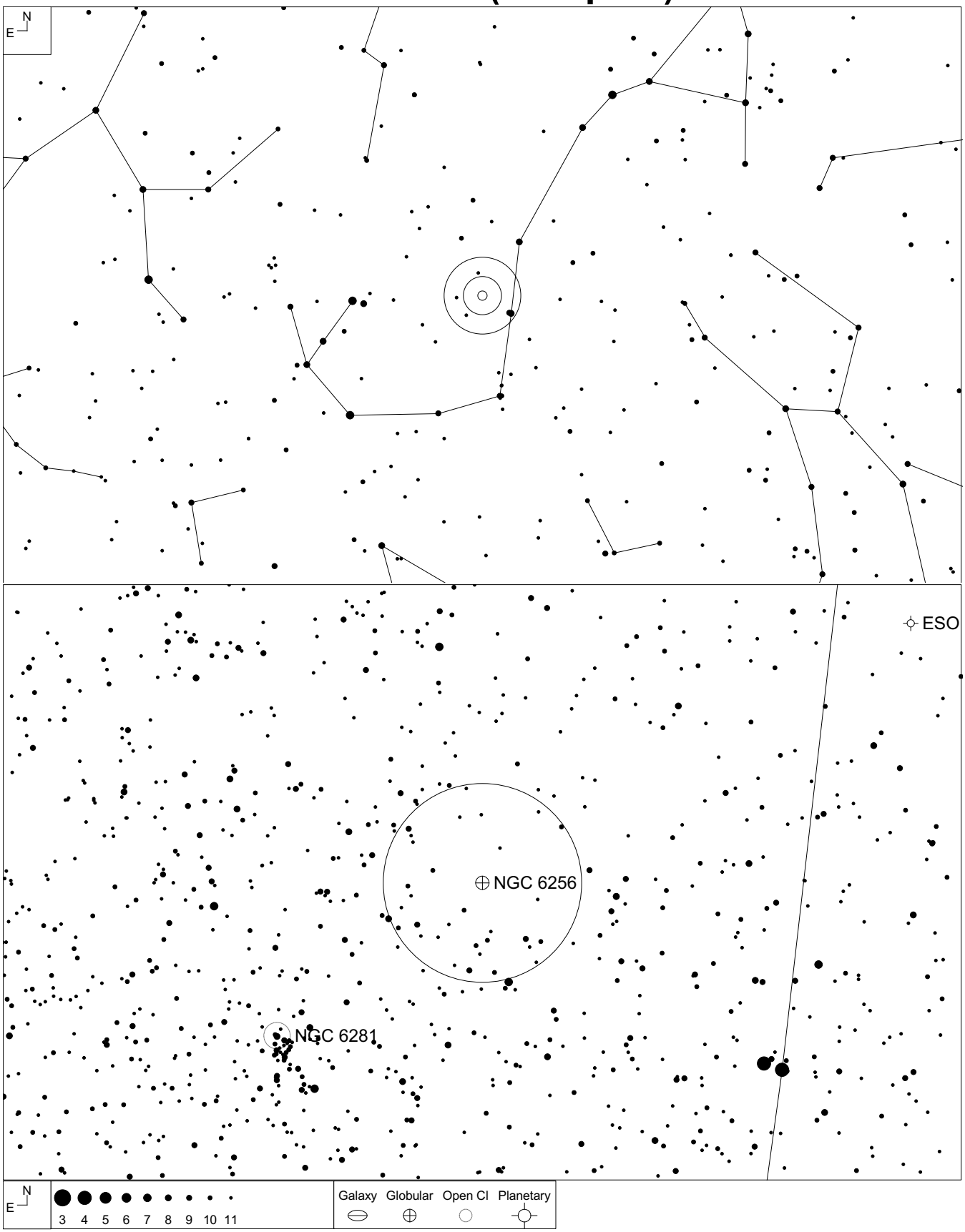
Discovered in 1982 by Lauberts.

NGC 6139 (Scorpius)



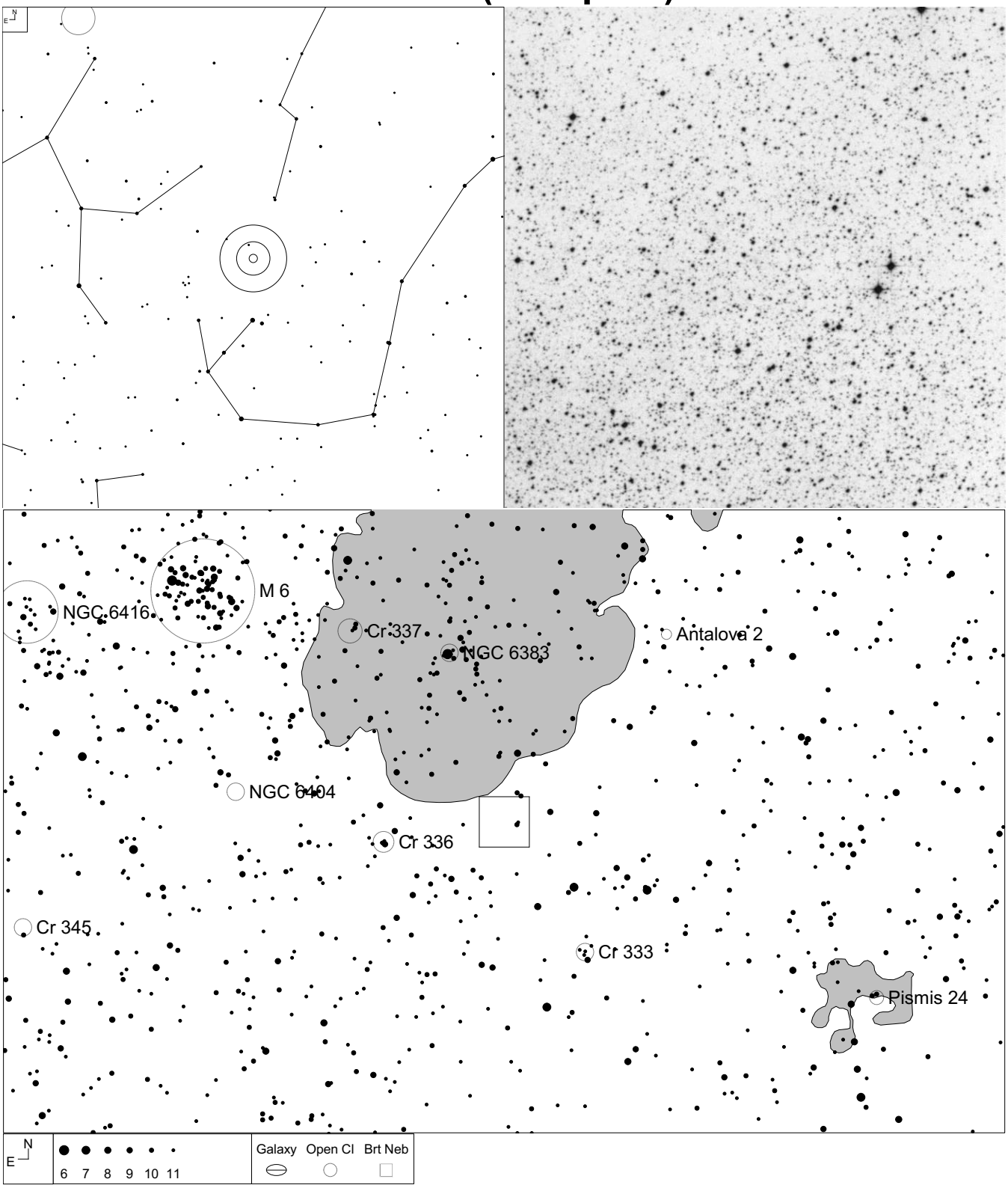
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
16 27 40.4	-38 50 56	9.1	17.9	15	13.7	8.2’

NGC 6256 (Scorpius)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
16 59 32.6	-37 07 17	11.3	18.2	15.3	14.4	4.1’

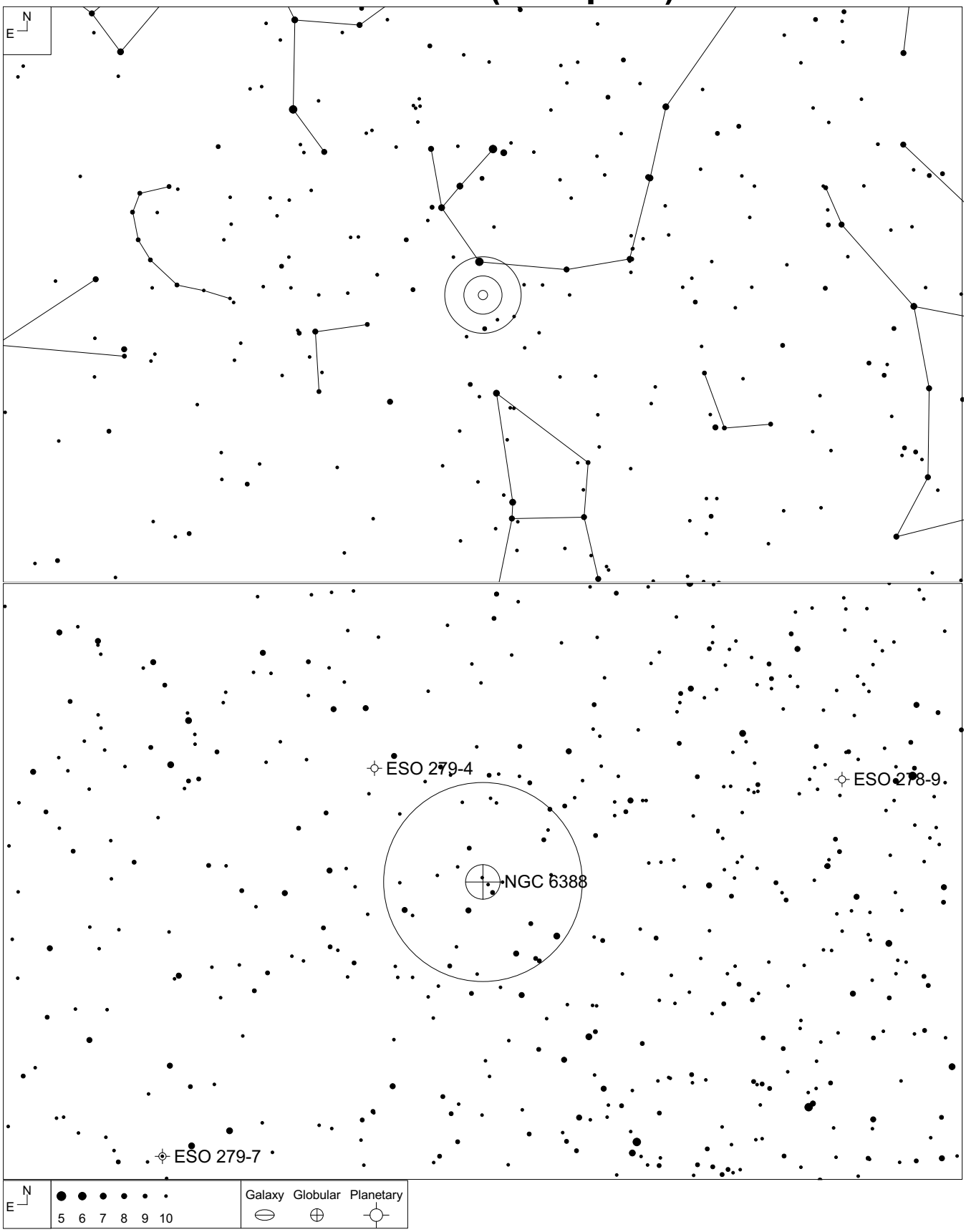
Liller 1 (Scorpius)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
17 33 24.5	-33 23 24	15.8	24.4	20.5	13.2	0.3’

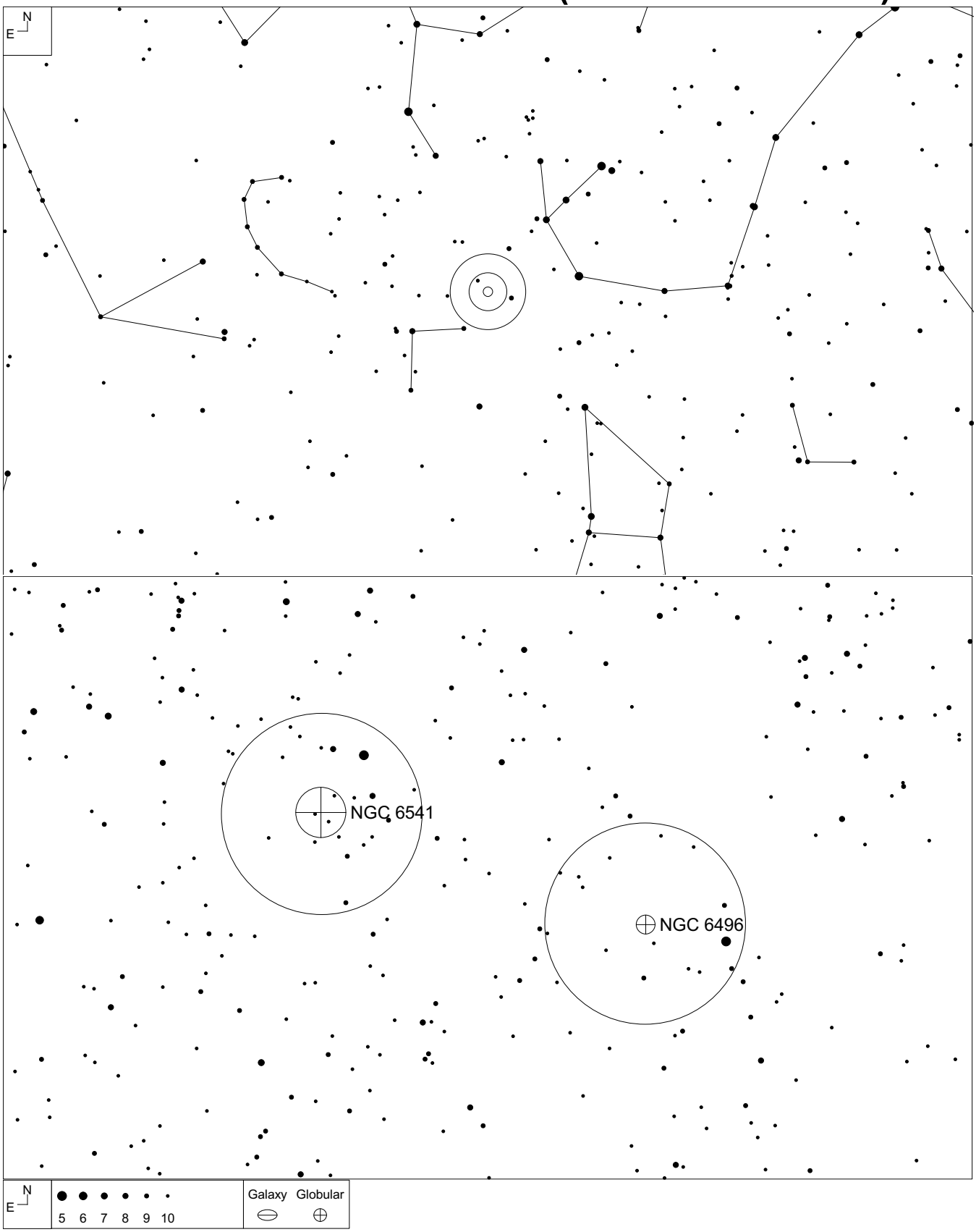
Discovered in 1977 by Liller.

NGC 6388 (Scorpius)



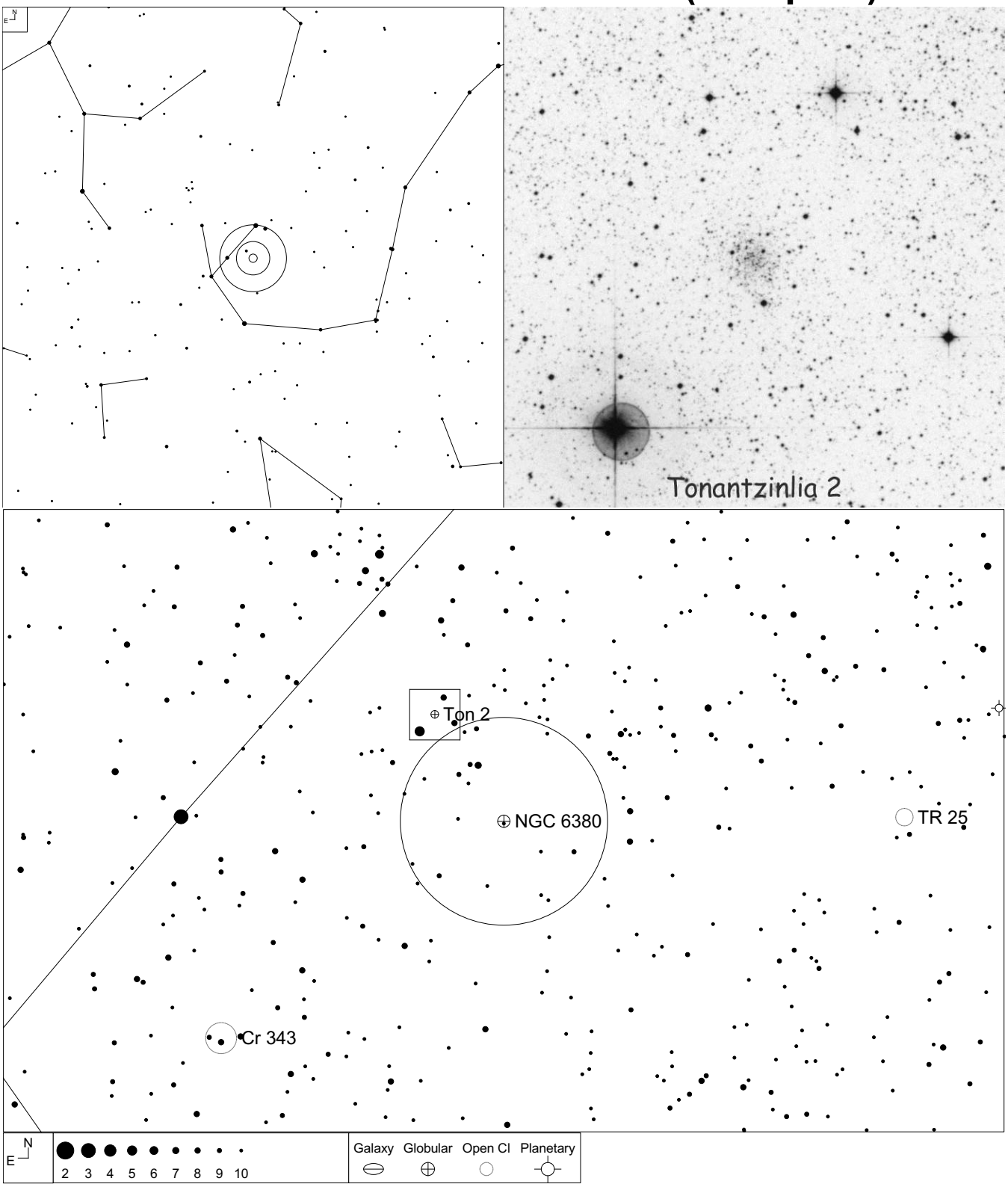
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6388	17 36 17.0	-44 44 06	6.8	17.2	14.8	11.9	10.4’

NGC 6496 and NGC 6541 (Corona Australis)



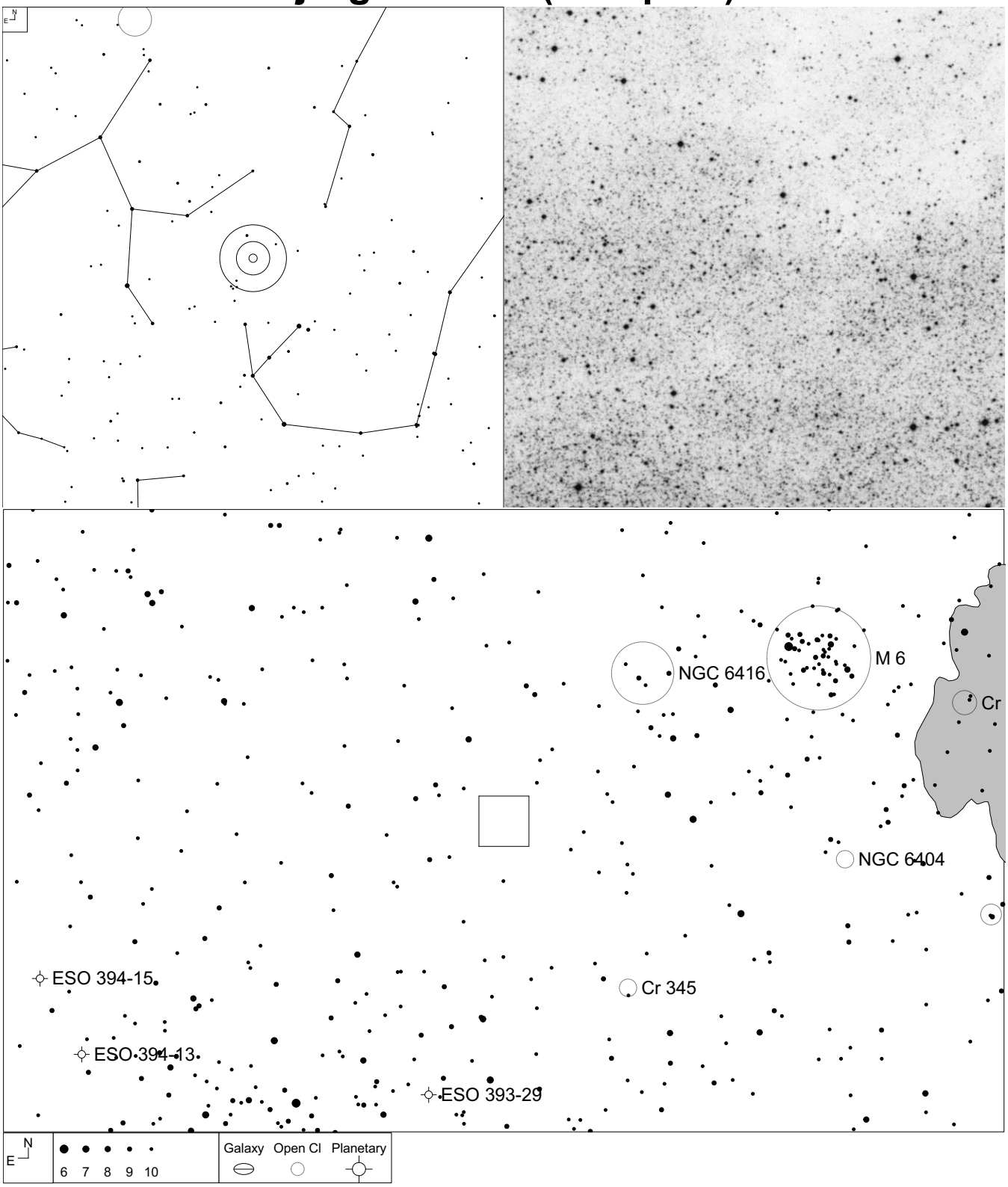
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6388	17 36 17.0	-44 44 06	6.8	17.2	14.8	11.9	10.4’
NGC 6541	18 08 02.2	-43 42 20	6.3	15.3	12.1	12.2	15’

NGC 6380 and Tonantzinlia 2 (Scorpius)



Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6380	17 34 28.0	-39 04 09	11.5	19.5	17	14.3	3.6’
Ton 2	17 36 10.5	-38 33 12	12.2	18.2	-	-	2.2’

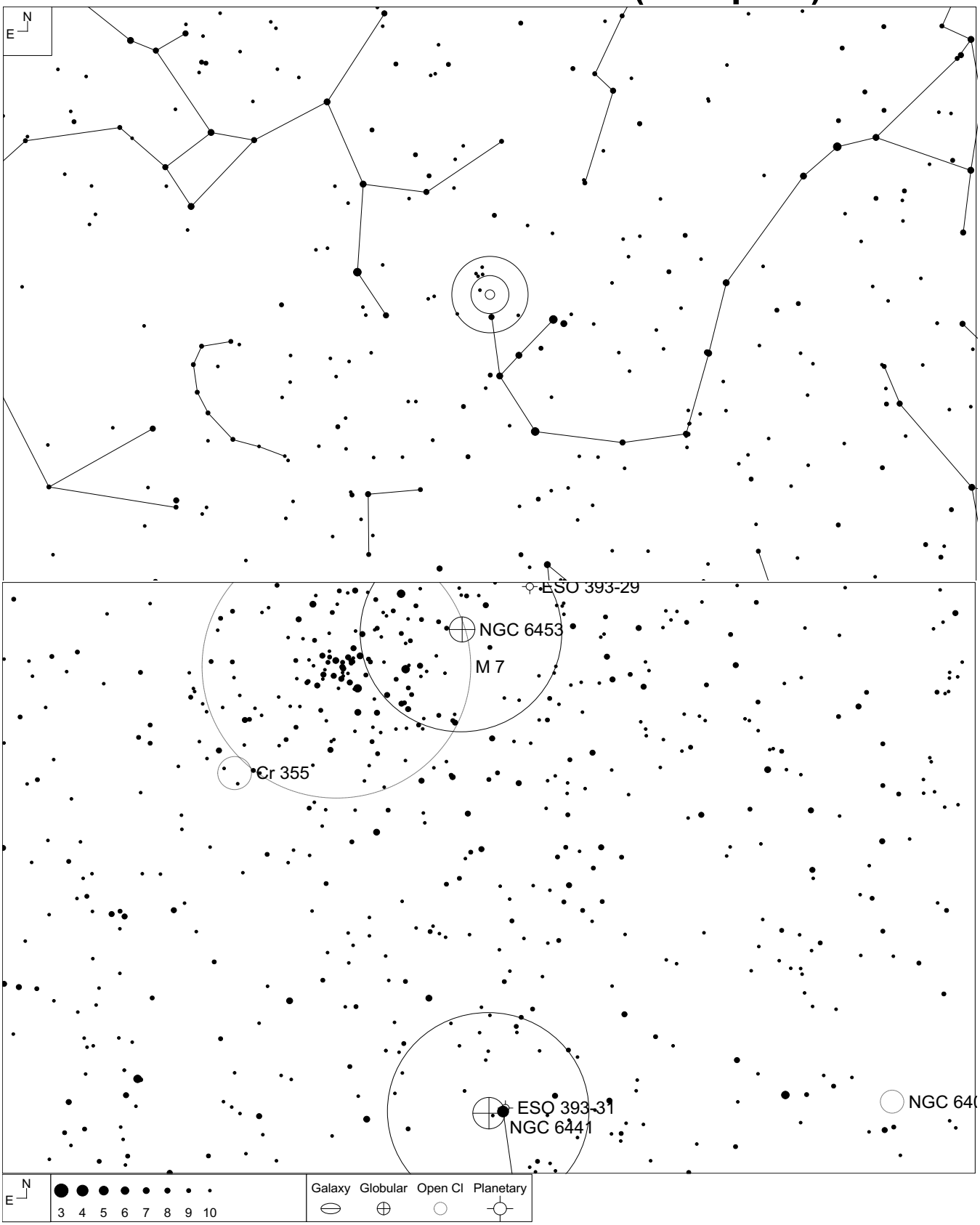
Djorgovski 1 (Scorpius)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
17 47 28.3	-33 03 56	13.6	20.8	-	13.1	0.8’

Discovered in 1986 by S. Djorgovski.

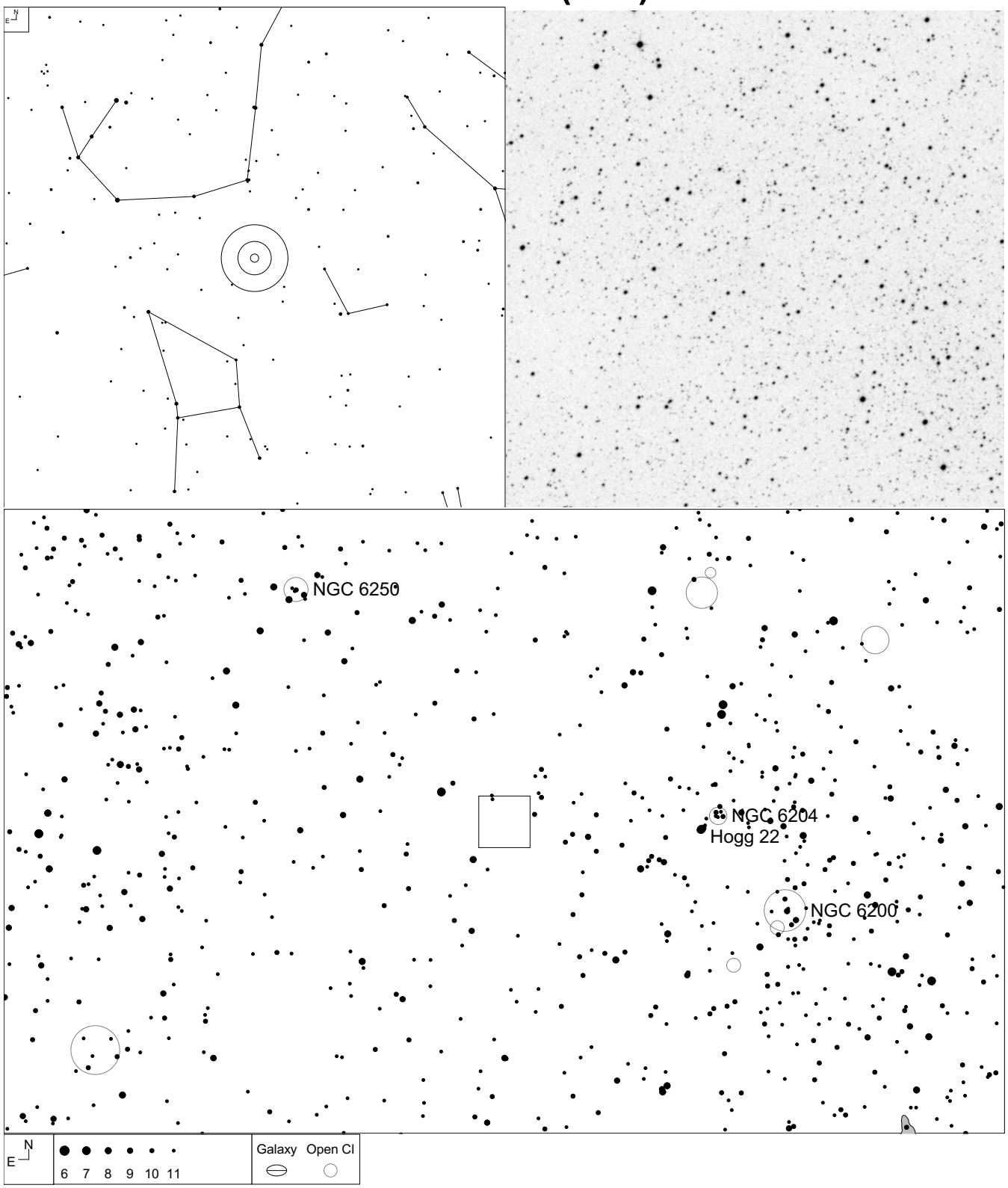
NGC 6441 and NGC 6453 (Scorpius)



Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6441	17 50 12.9	-37 03 04	7.2	17.5	15.4	12.1	9.6’
NGC 6453	17 50 51.8	-34 35 55	10.2	17.5	14.3	14.6	7.6’

Look for JaFu2, a planetary nebula, in NGC 6441. See page 125.

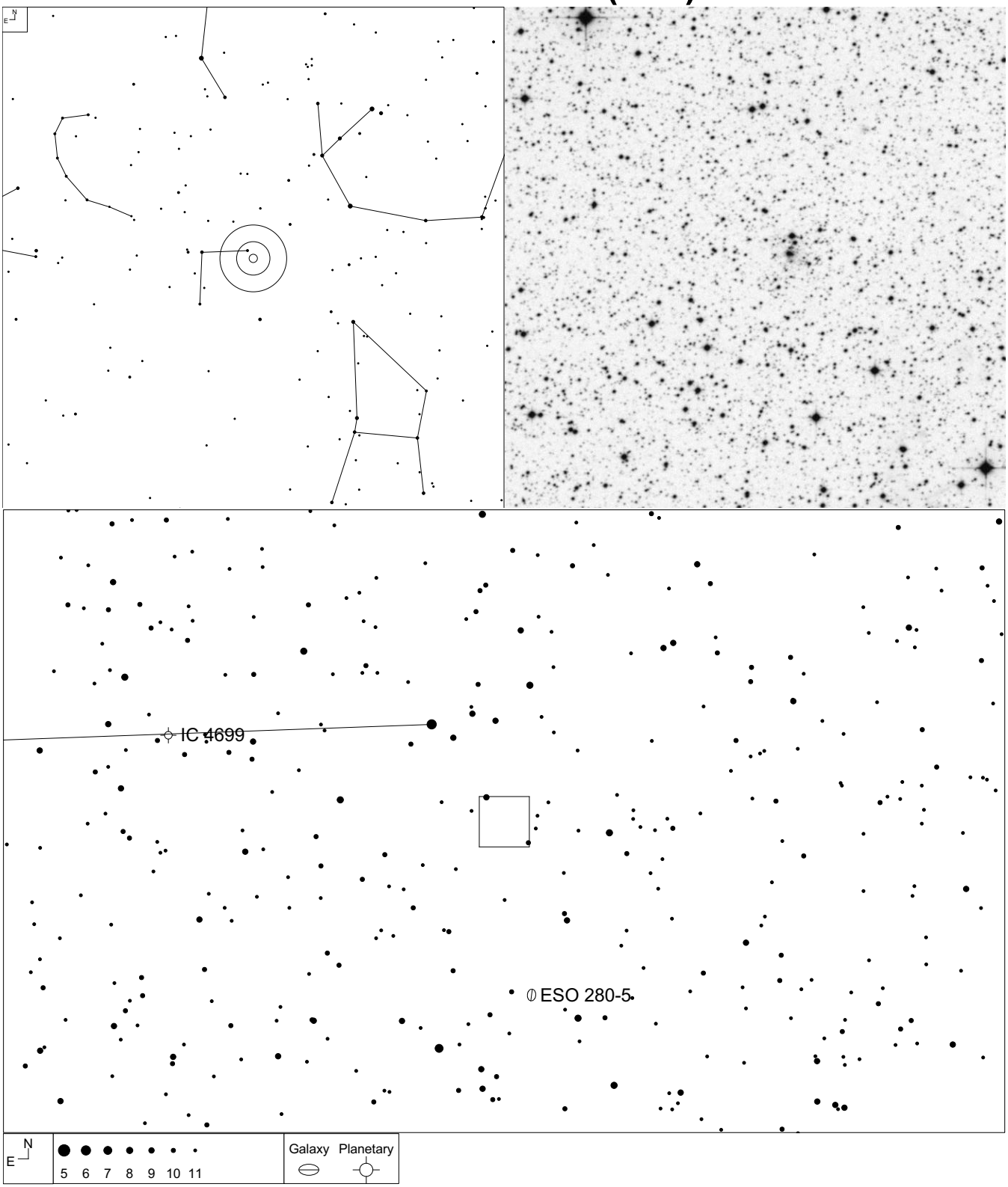
FSR 1735 (Ara)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
16 52 10.6	-47 03 29	12.9	-	-	-	0.8’

Discovered in 2006 using the 2MASS IR telescope.

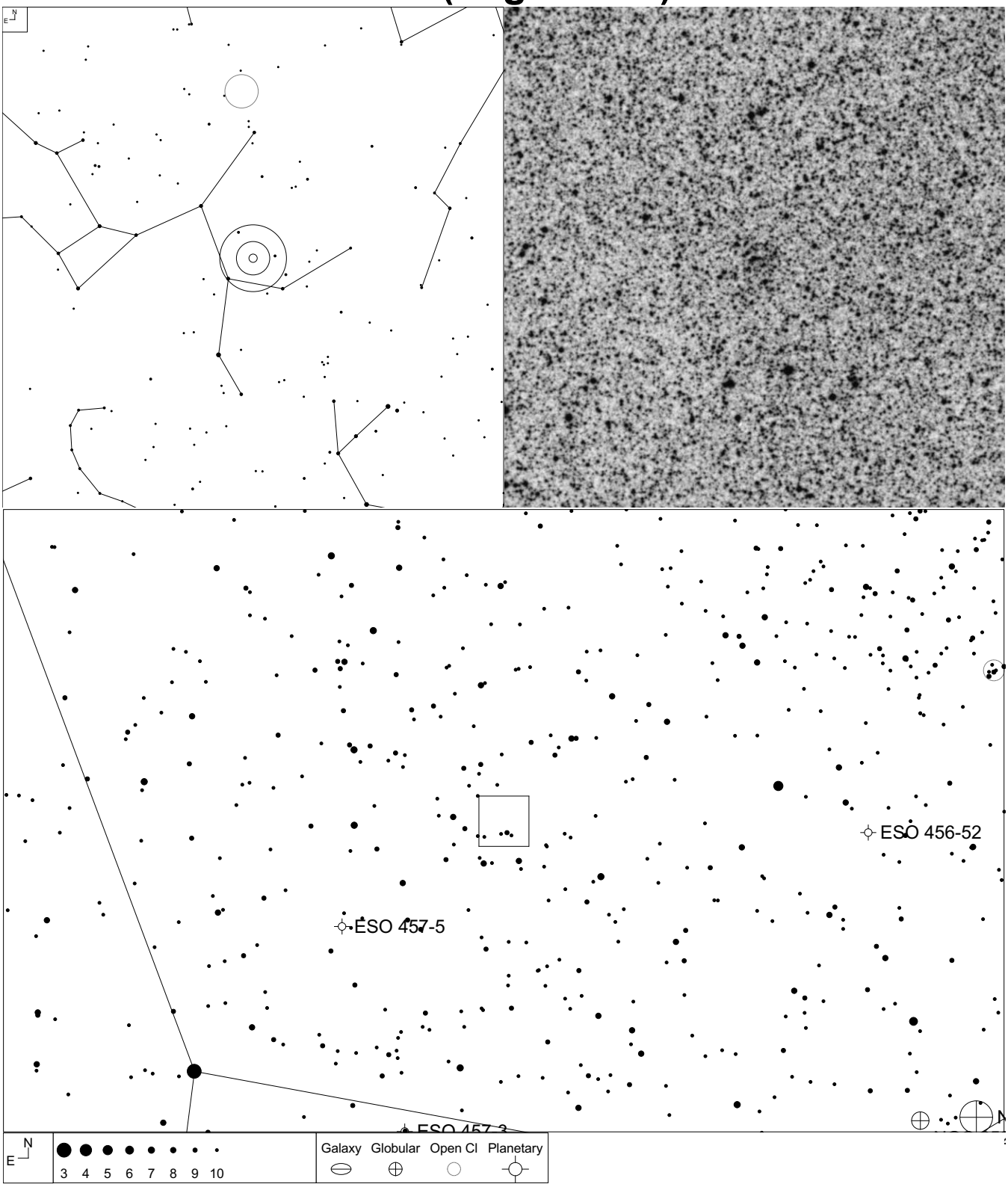
ESO 280-SC06 (Ara)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
18 09 12.7	-46 25 26	12.0	17.4	14	-	1.4’

Discovered in 2000 by S. Ortolani, E. Bica and B. Barbuy from ESO observations. This is the 150th Milky Way Clusters to be discovered.

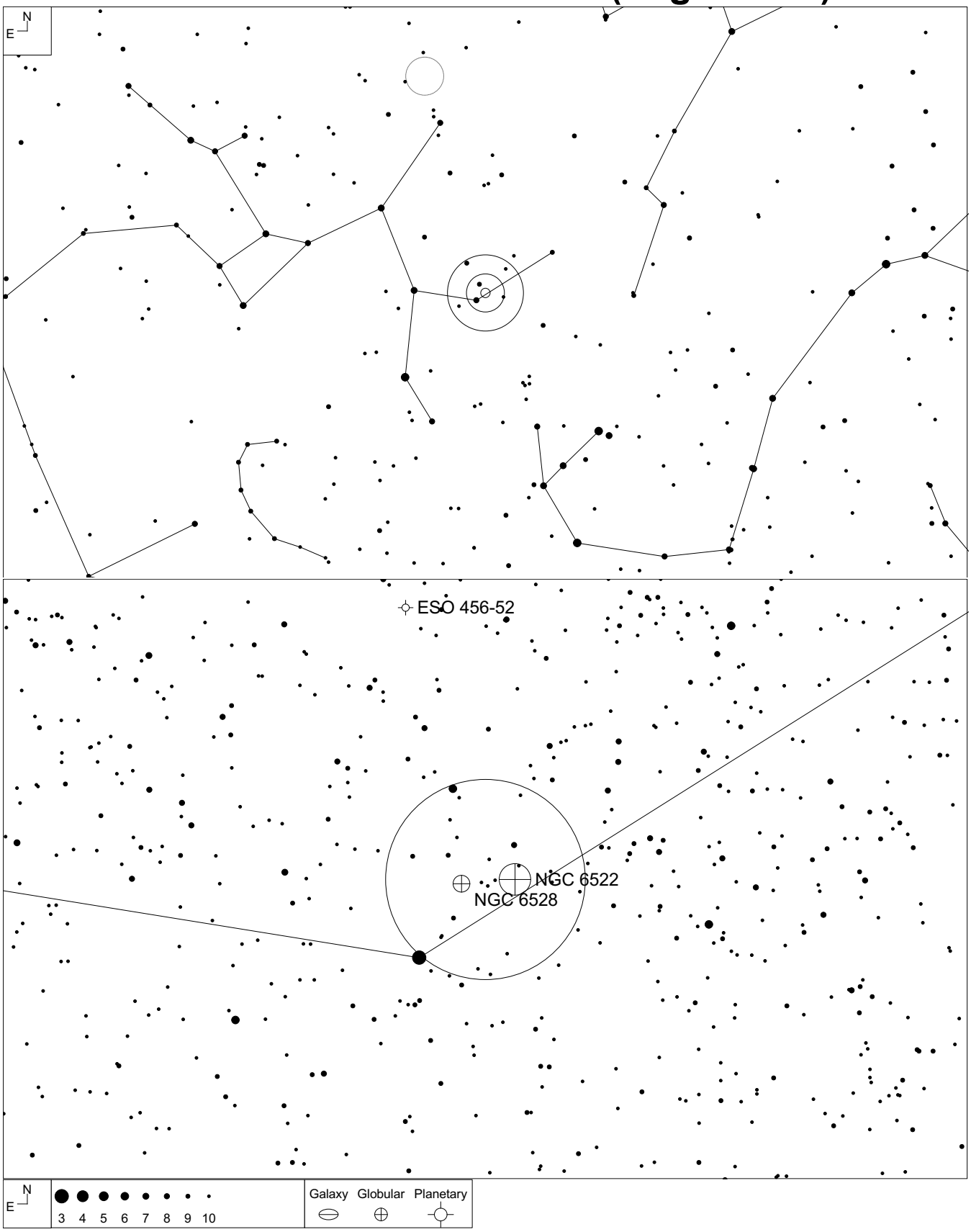
AL 3 (Sagittarius)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
18 14 06.6	-28 38 06	14.0	-	-	-	1.3’

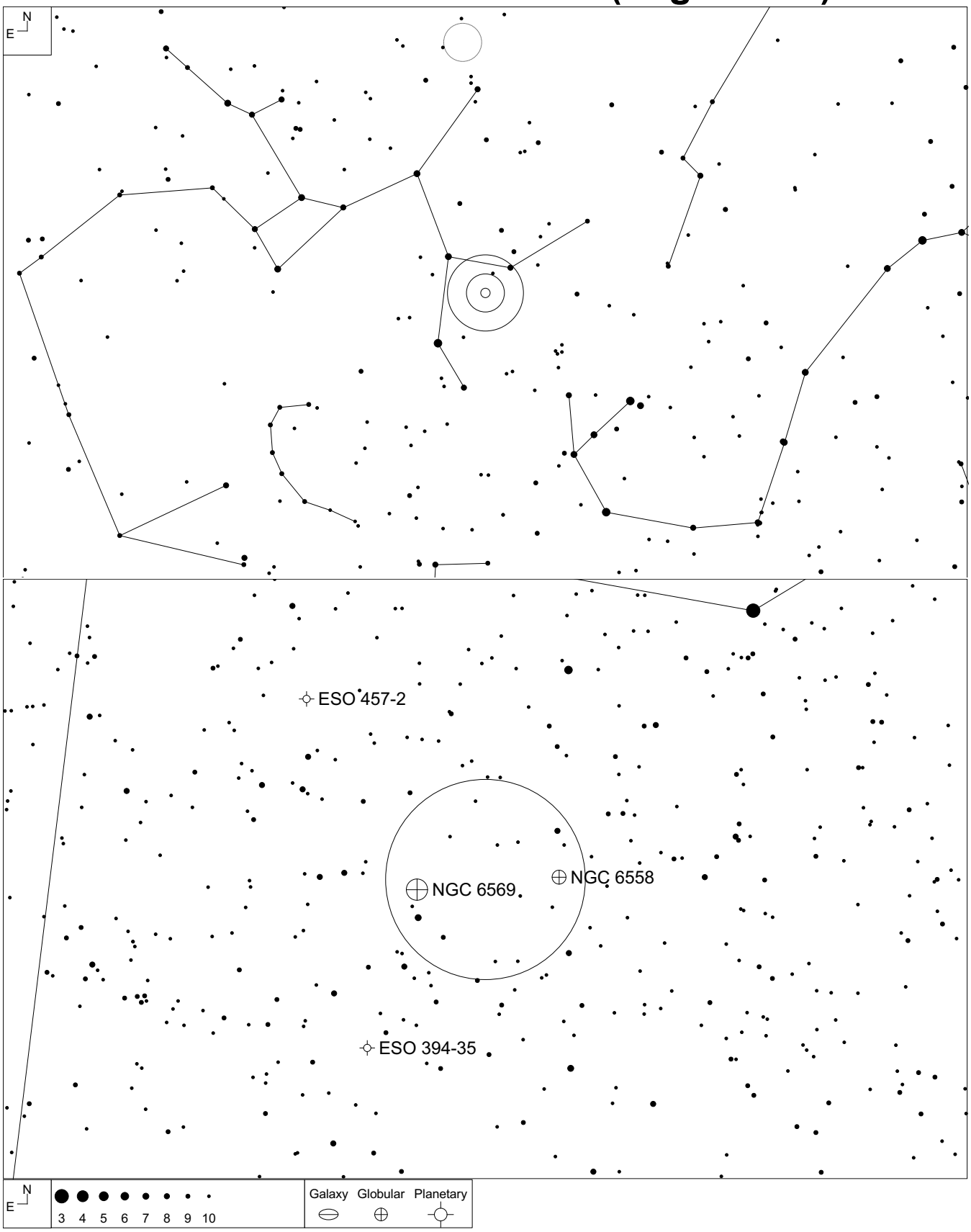
Discovered in 1967 by Andrews and Lindsay and identified as a globular cluster by Ortolani, Bica and Batbuy in 2005.

NGC 6522 and NGC 6528 (Sagittarius)



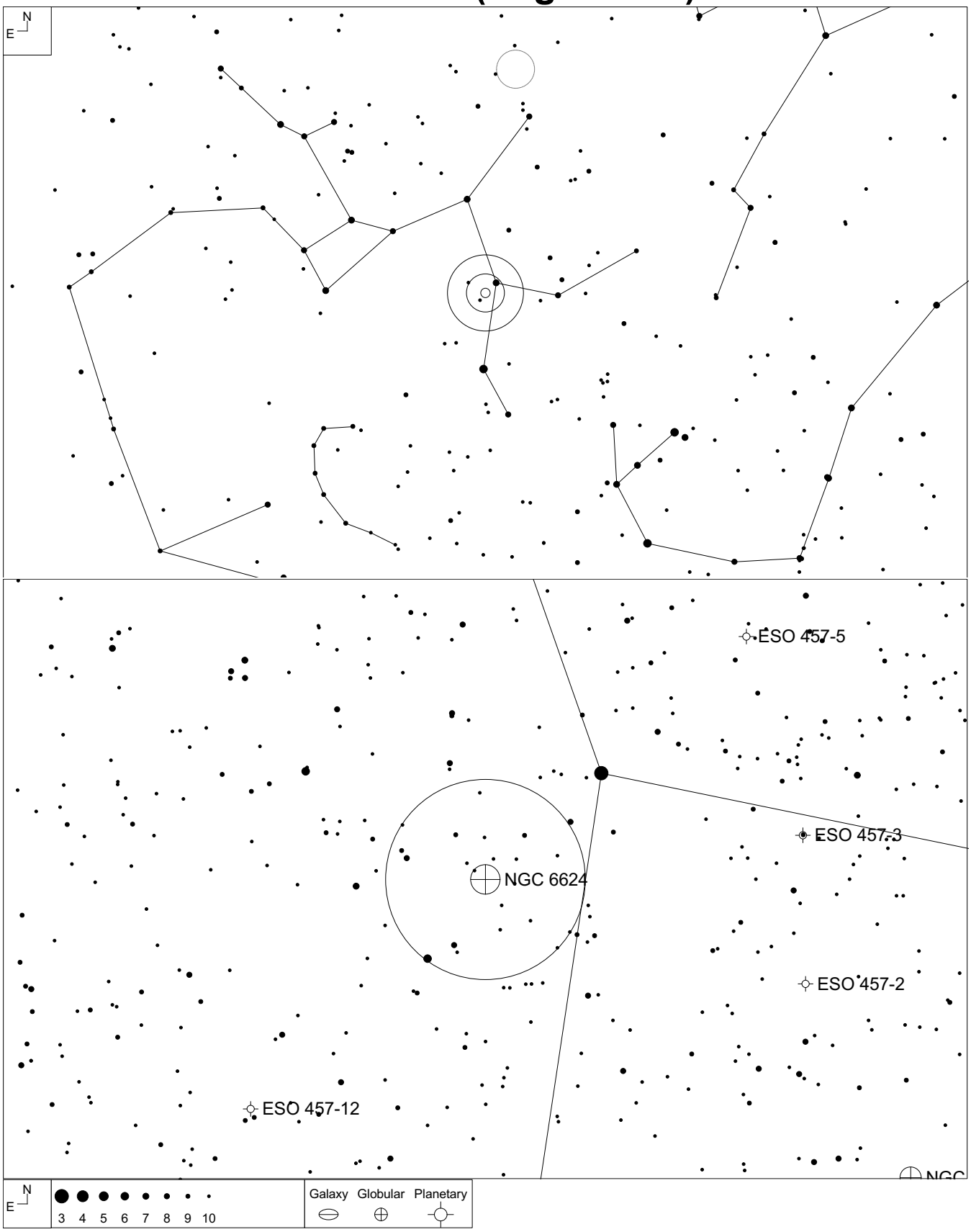
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6522	18 03 35.0	-30 02 02	9.9	16.9	14.1	14.8	9.4’
NGC 6528	18 04 49.6	-30 03 21	9.6	17.1	15.5	13.1	5’

NGC 6558 and NGC 6569 (Sagittarius)



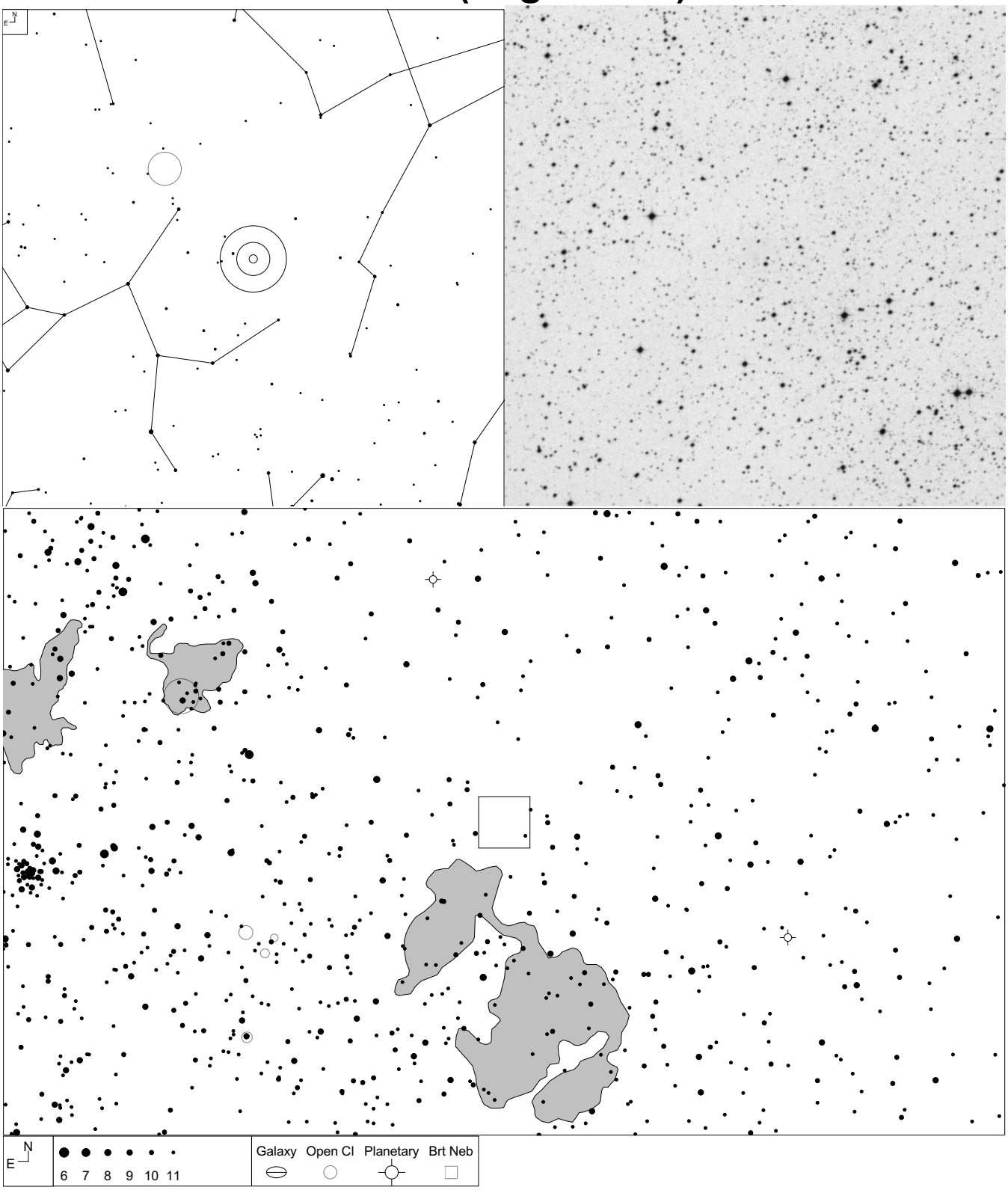
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6558	18 10 17.6	-31 45 47	8.6	16.7	-	-	4.2’
NGC 6569	18 13 38.9	-31 49 35	8.4	17.5	14.9	12.4	6.4’

NGC 6624 (Sagittarius)



	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6624	18 23 40.5	-30 21 40	7.6	16.1	14	12.3	8.8’

UKS 1 (Sagittarius)

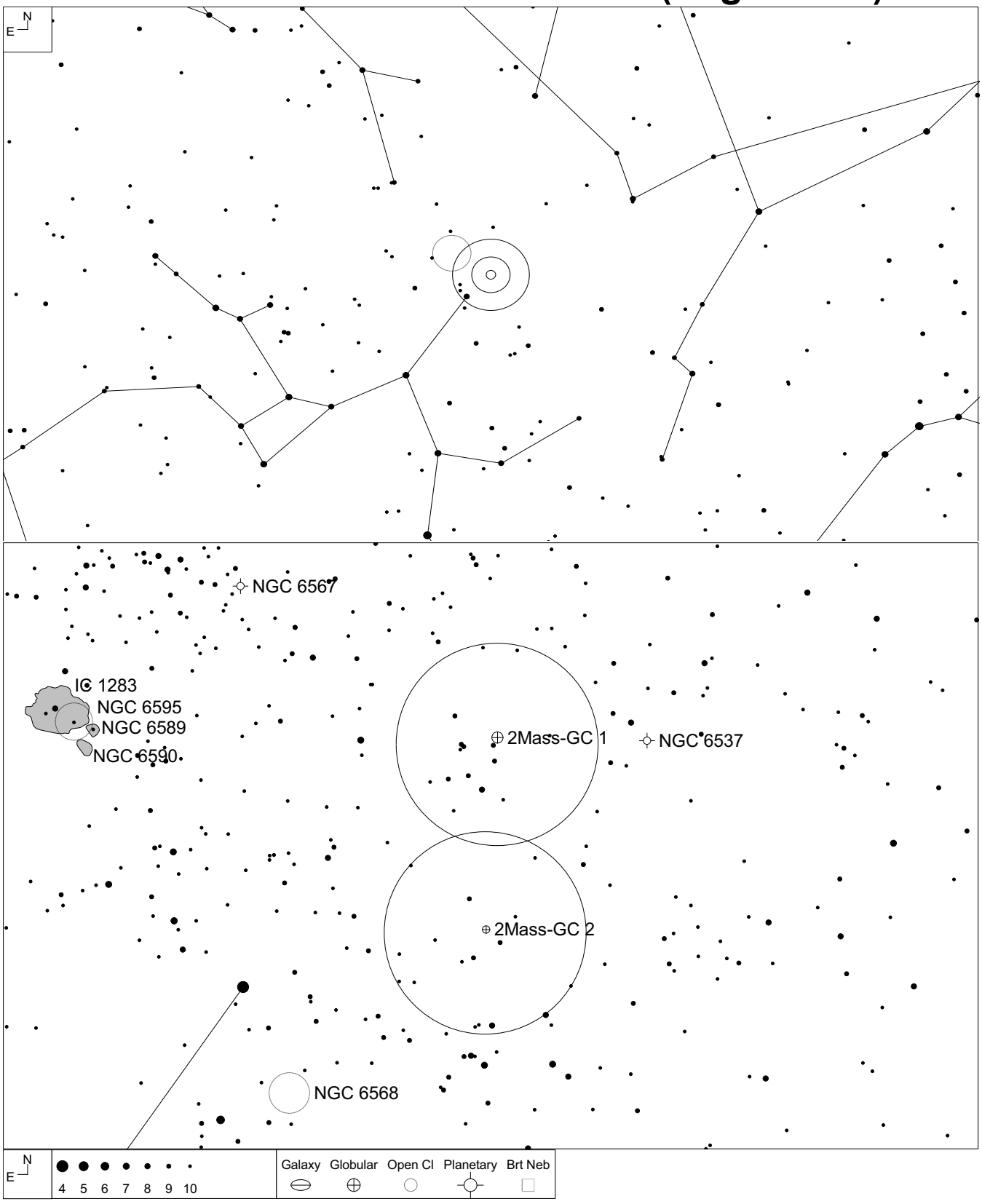


RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
17 54 27.2	-24 08 43	17.3	25.5	22	18.8	2’

Discovered in 1980 by Malkan, Kleinmann and Apt. This was one of the very toughest globular clusters to be observed visually. Barbara Wilson is probably the first one to see it with her 20” reflector.

http://www.astronomy-mall.com/Adventures.In.Deep.Space/obscure.htm

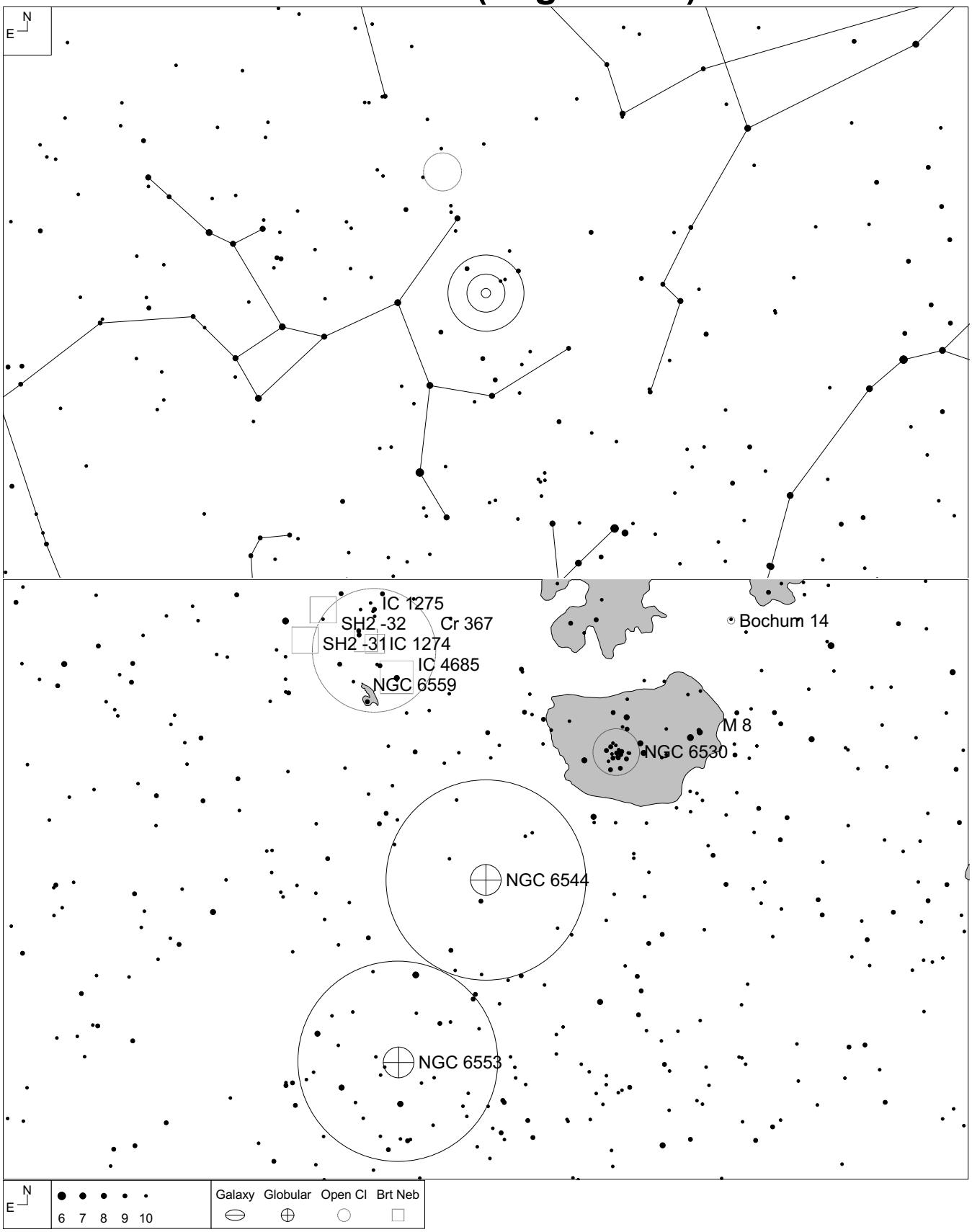
2MASS-GC1 and 2MASS-GC2 (Sagittarius)



Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
GC1	18 08 21.8	-19 49 47	27.7v	-	-	-	3.3’
GC2	18 08 36.5	-20 46 44	24.6v	-	-	-	1.9’

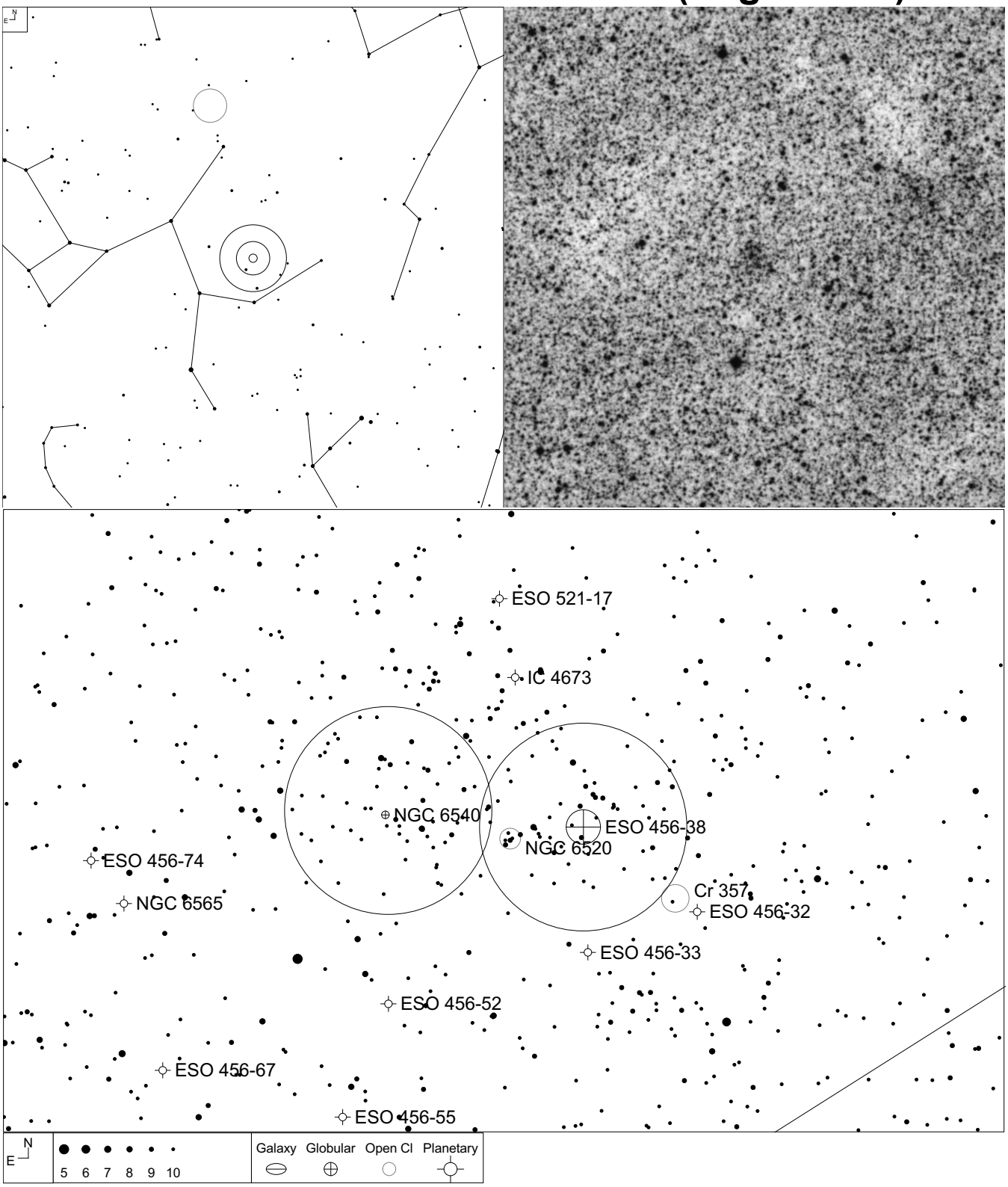
Both of these were discovered using the 2MASS IR telescope, it is most likely not observable visually. We tried it with a 48” reflector with no success

NGC 6544 and NGC 6553 (Sagittarius)



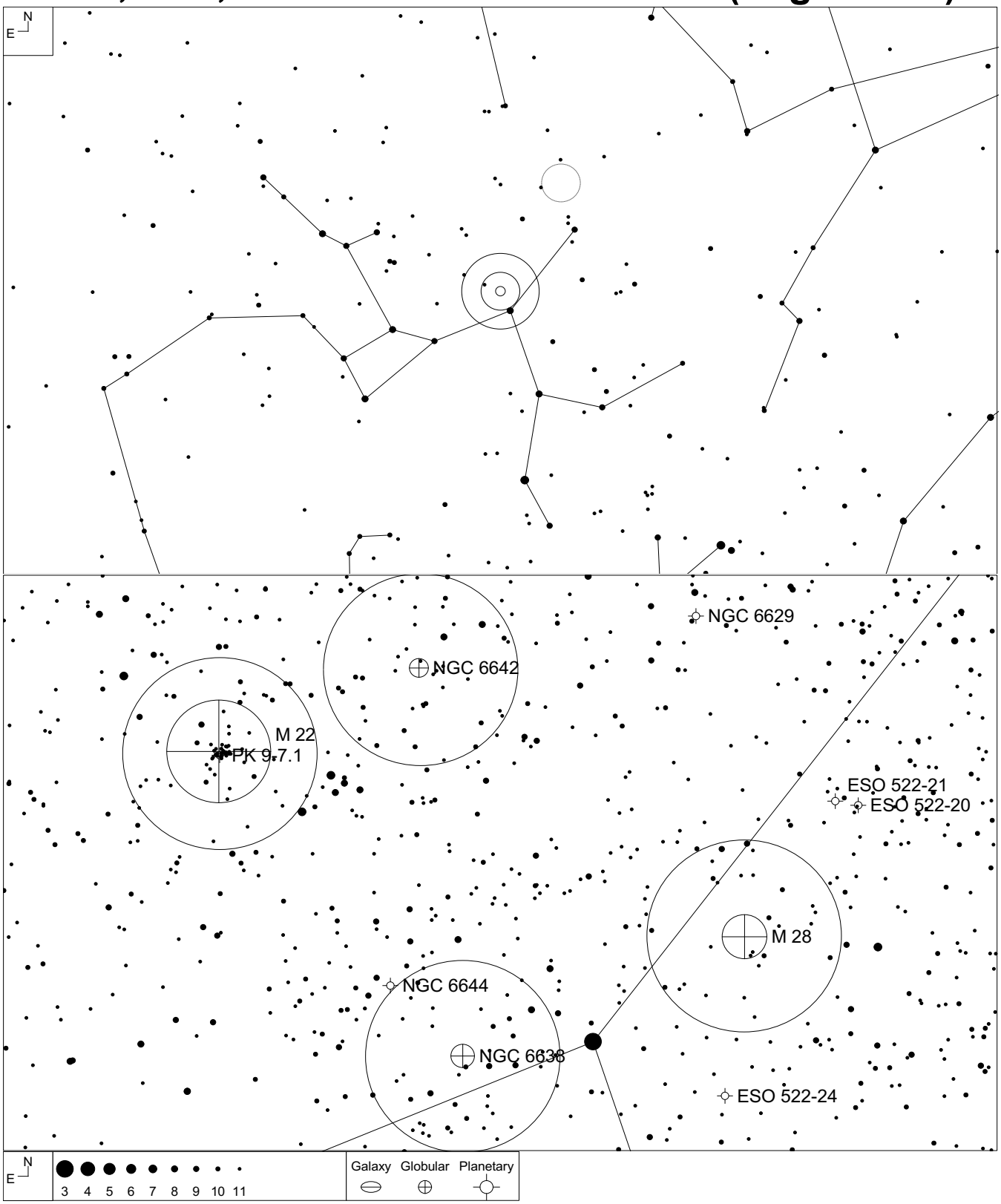
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6544	18 07 20.6	-24 59 51	7.5	14.9	12.8	12.3	9.2’
NGC 6553	18 09 17.3	-25 54 28	8.3	15.3	16.9	13.1	9.2’

NGC 6540 and ESO 456-SC38 (Sagittarius)



Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6540	18 06 08.6	-27 45 44	14.6	15.30	-	15.5	1.5’
ESO 456-38	18 01 49.1	-27 49 33	9.9	17.6	15.5	14.9	9.9’

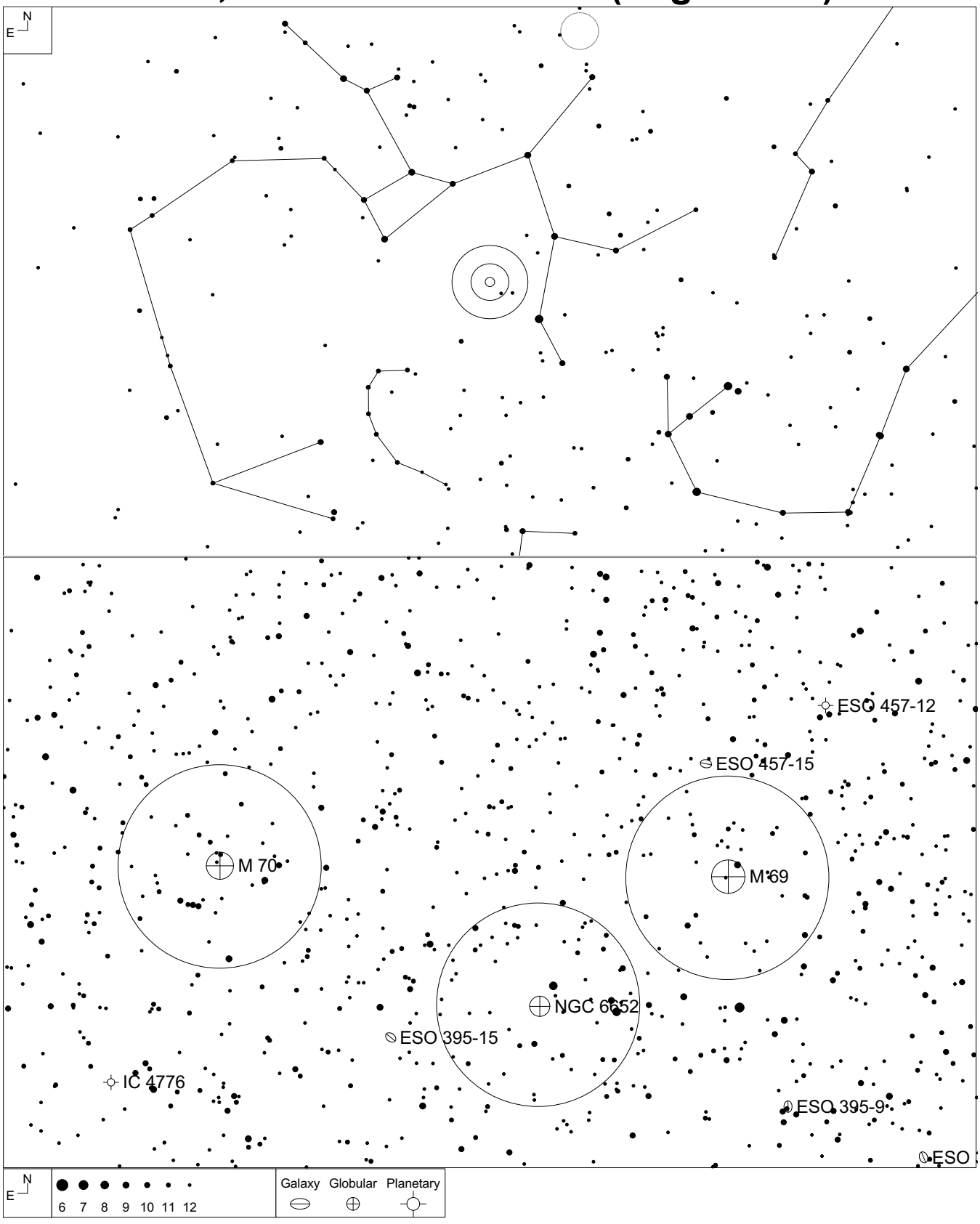
M22, M28, NGC 6638 and NGC 6642 (Sagittarius)



Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M22	18 36 24.2	-23 54 12	5.2	14.2	10.7	12.7	32’
M28	18 24 32.9	-24 52 12	6.9	15.7	12	12.6	13.8’
NGC 6638	18 30 56.2	-25 29 47	9.2	16.5	14.2	13.5	7.3’
NGC 6642	18 31 54.3	-23 28 35	8.9	16.3	-	12.7	5.8’

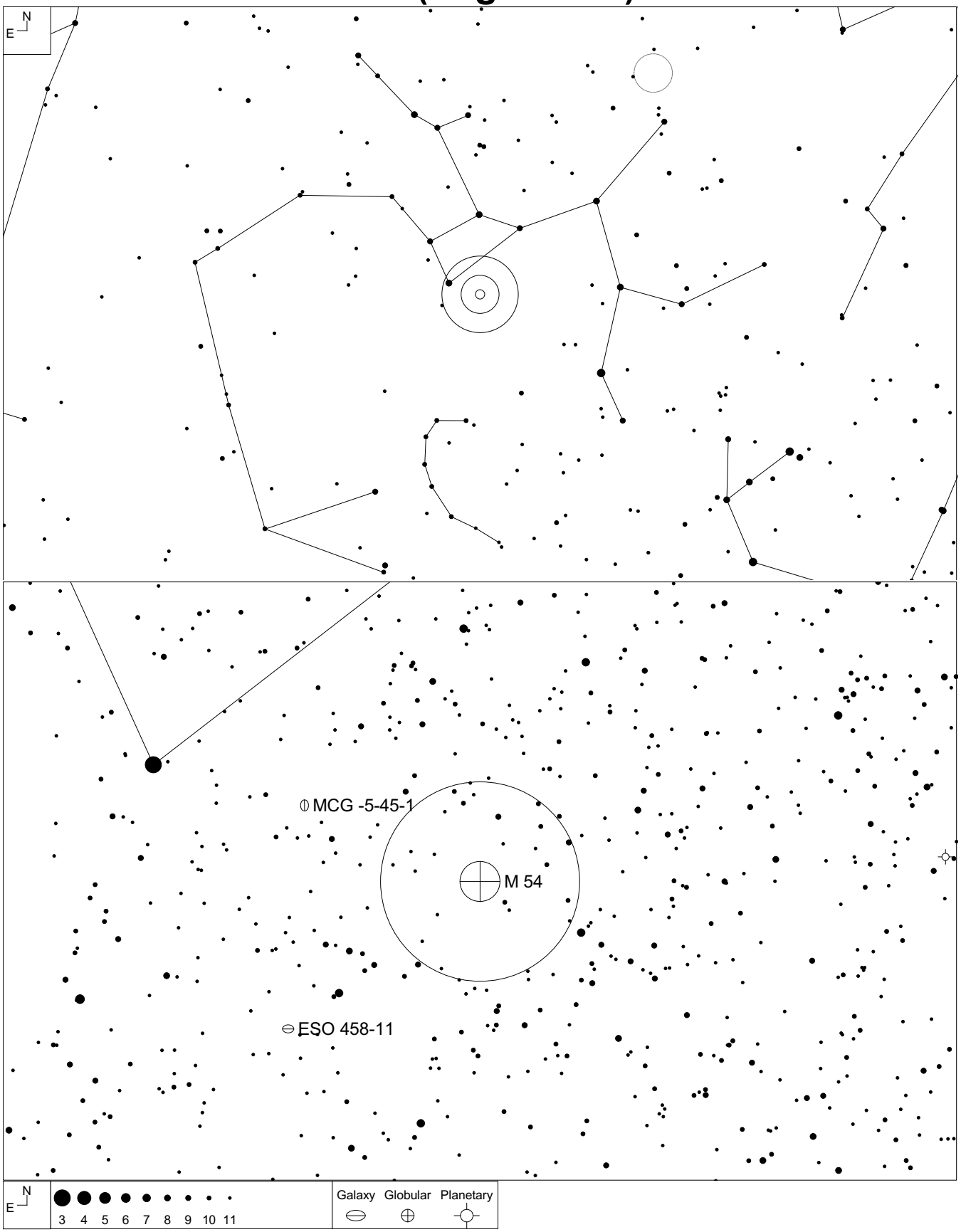
Look for planetary nebula, GJJC1, in M-22. See page 123.

M69, M70 and NGC 6652 (Sagittarius)



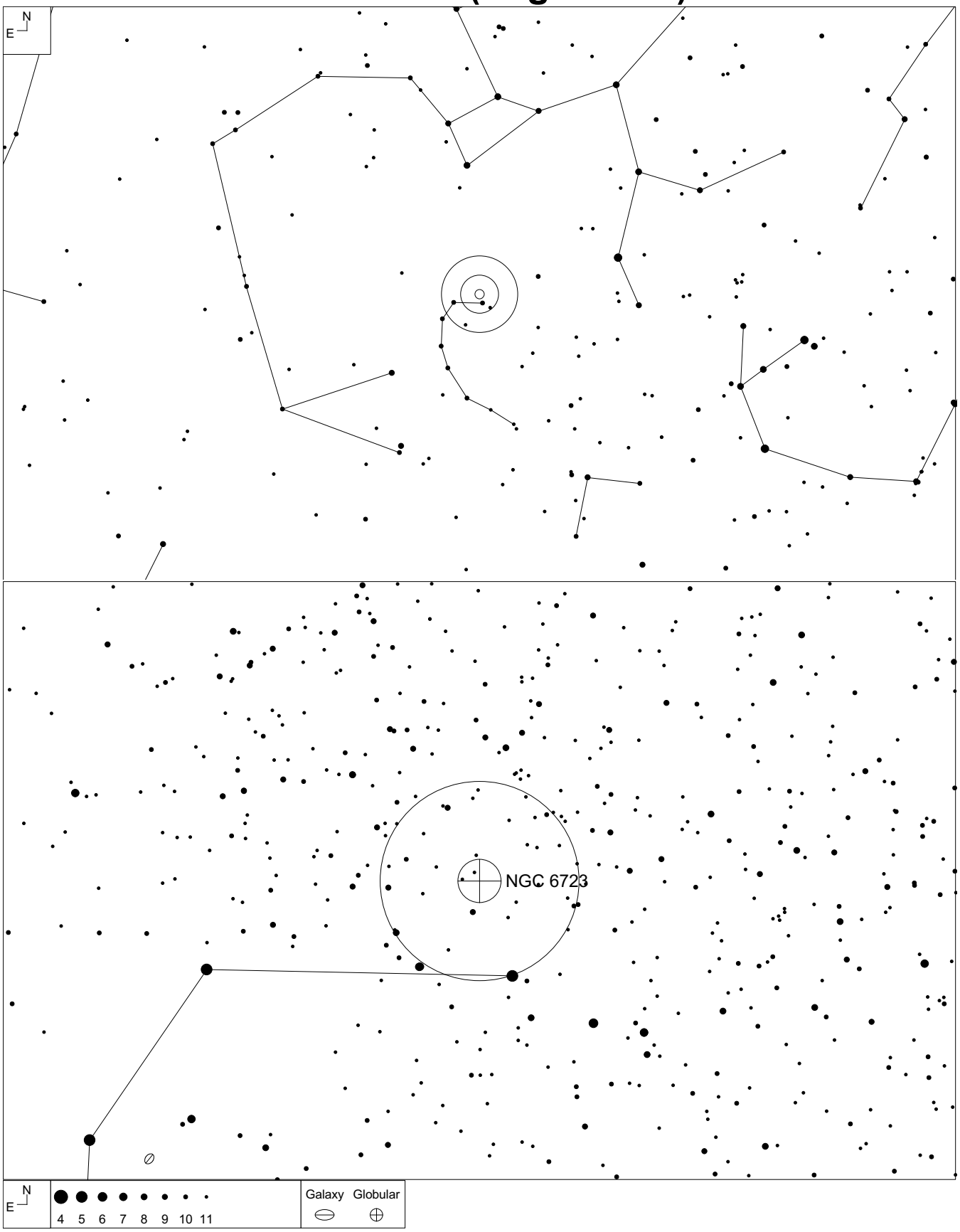
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M69	18 31 23.2	-32 20 53	7.7	15.9	13.7	12.7	9.8’
M70	18 43 12.7	-32 17 31	7.8	15.6	13	12.3	8’
NGC 6652	18 35 45.7	-32 59 25	8.5	16	13.3	12.4	6’

M54 (Sagittarius)



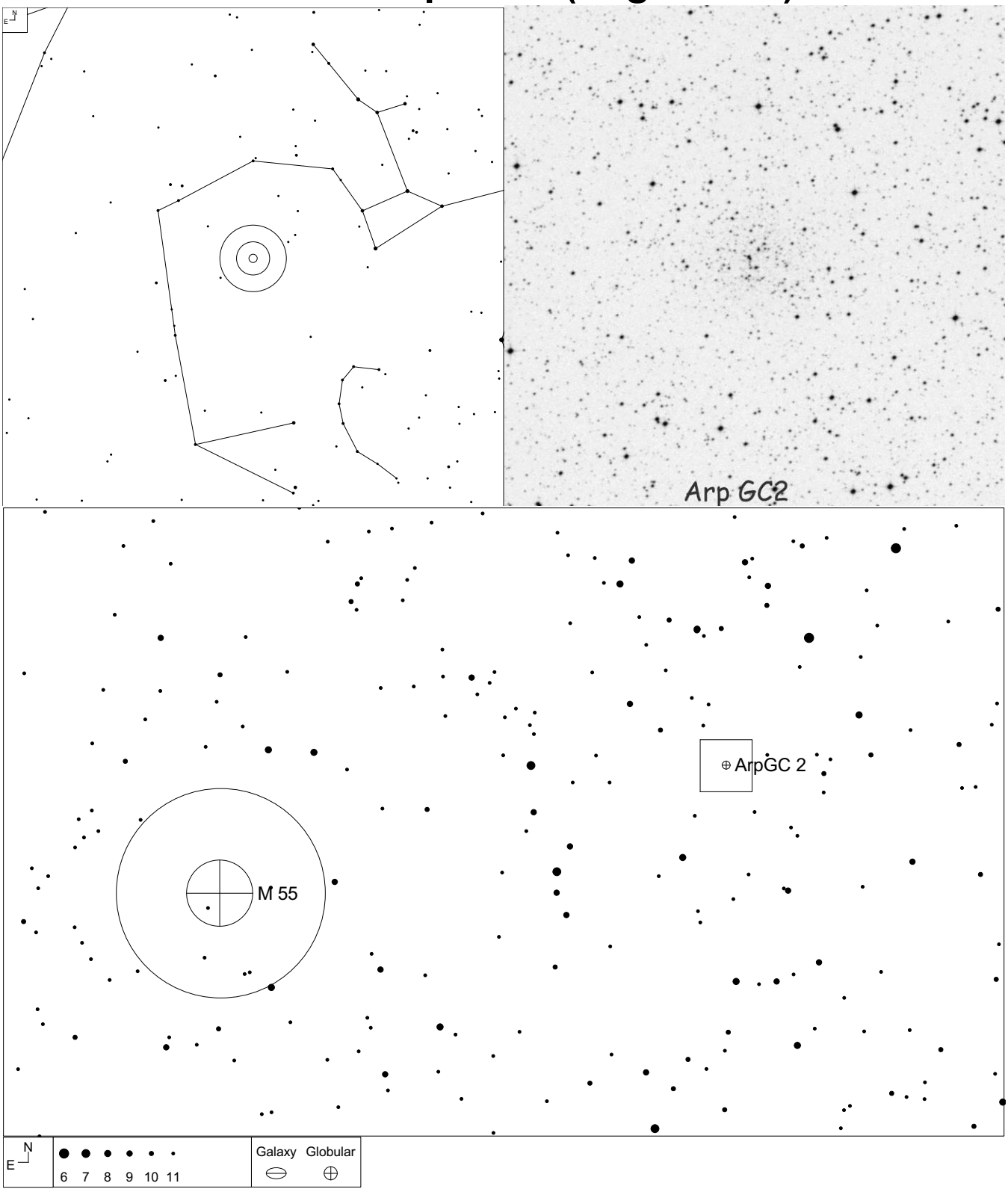
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M54	18 55 03.3	-30 28 42	7.7	18.2	15.2	13.1	12’

NGC 6723 (Sagittarius)



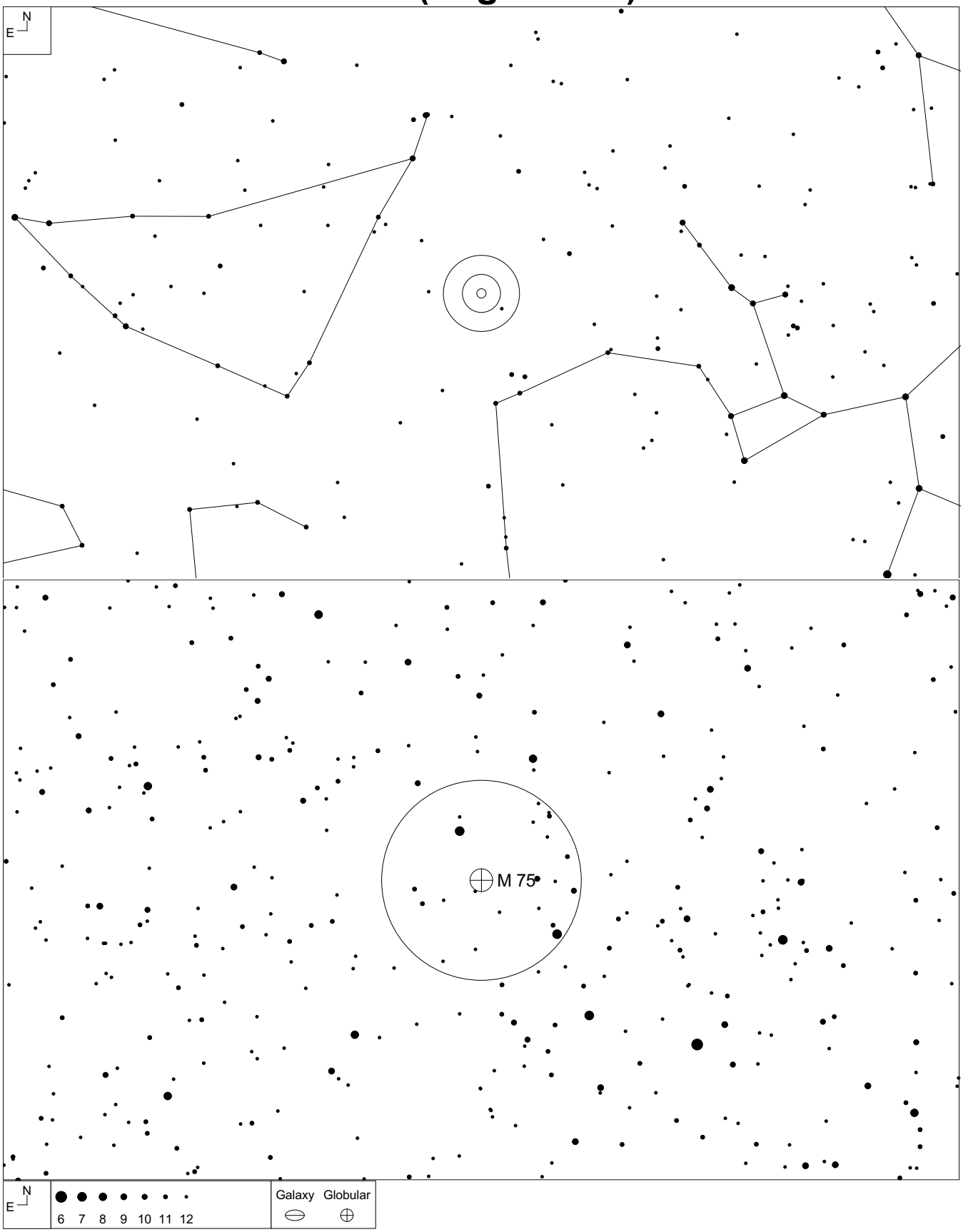
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
18 59 33.2	-36 37 54	6.8	15.5	12.8	12.4	13’

M55 and Arp GC2 (Sagittarius)



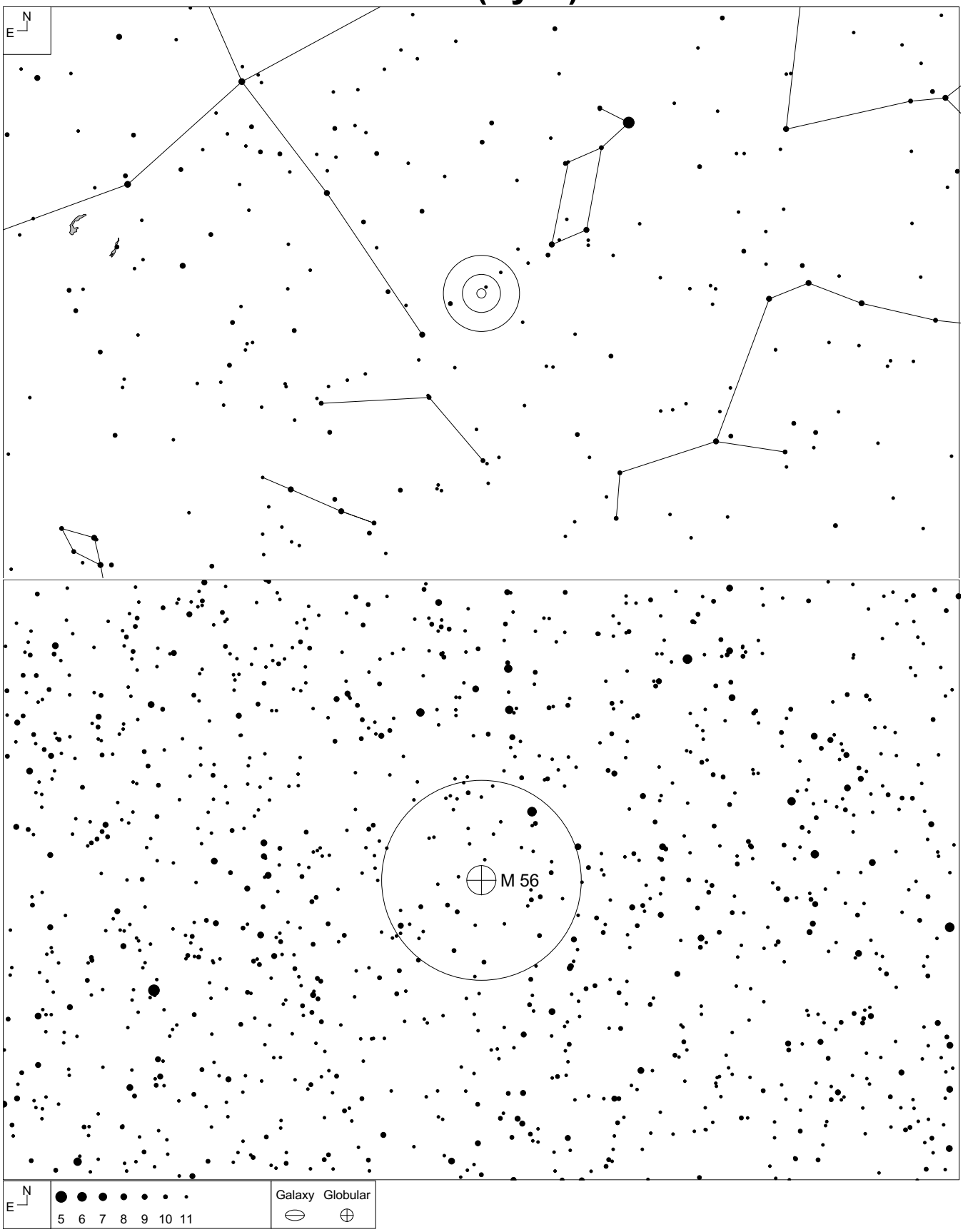
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
M55	19 39 59.4	-30 57 44	6.3	14.4	11.2	12.7	19’
Arp GC 2	19 28 44.1	-30 21 14	13	18.2	15.5	14.8	2.3’

M75 (Sagittarius)



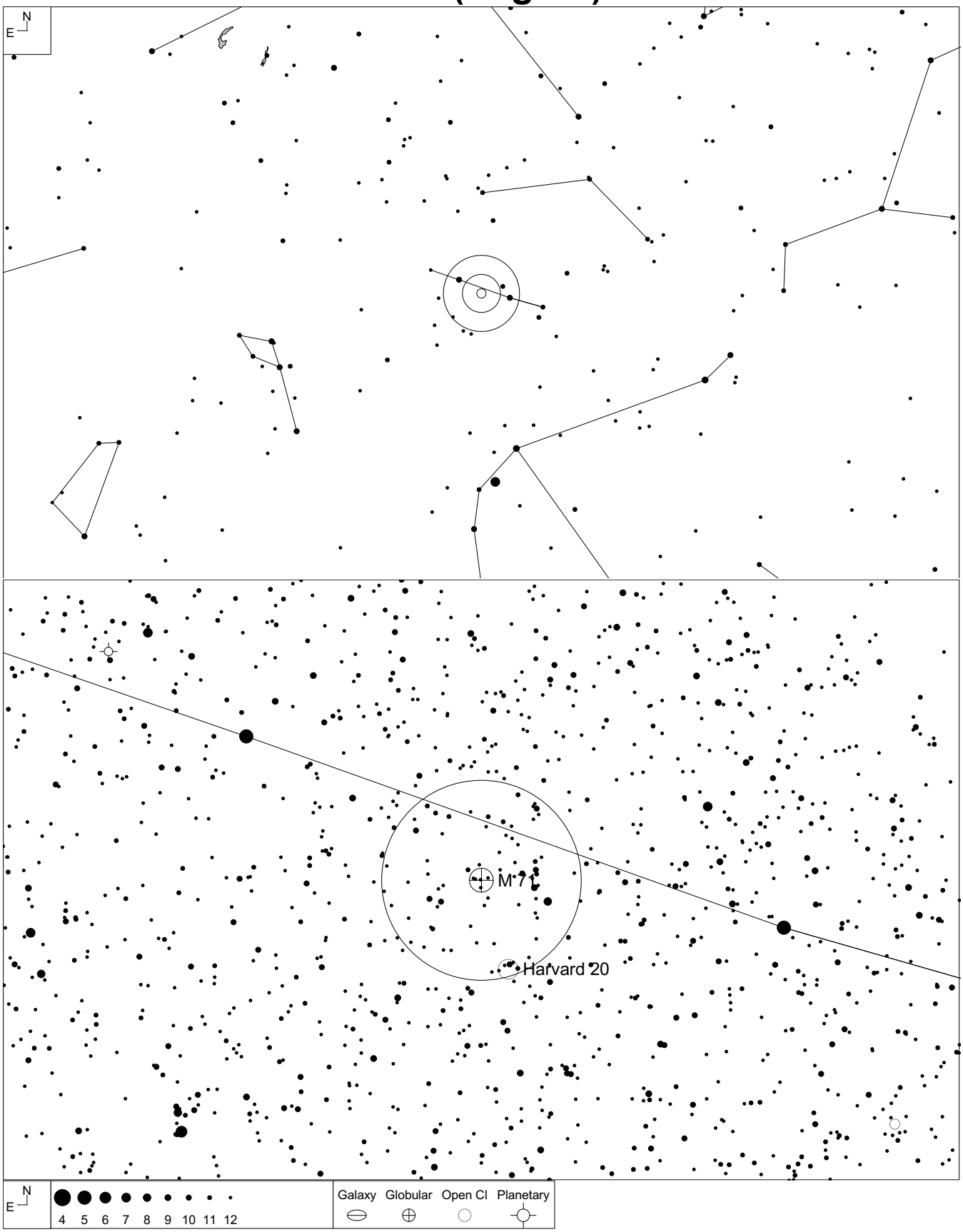
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
20 06 04.8	-21 55 17	8.6	17.5	14.6	12.8	6.8’

M56 (Lyra)



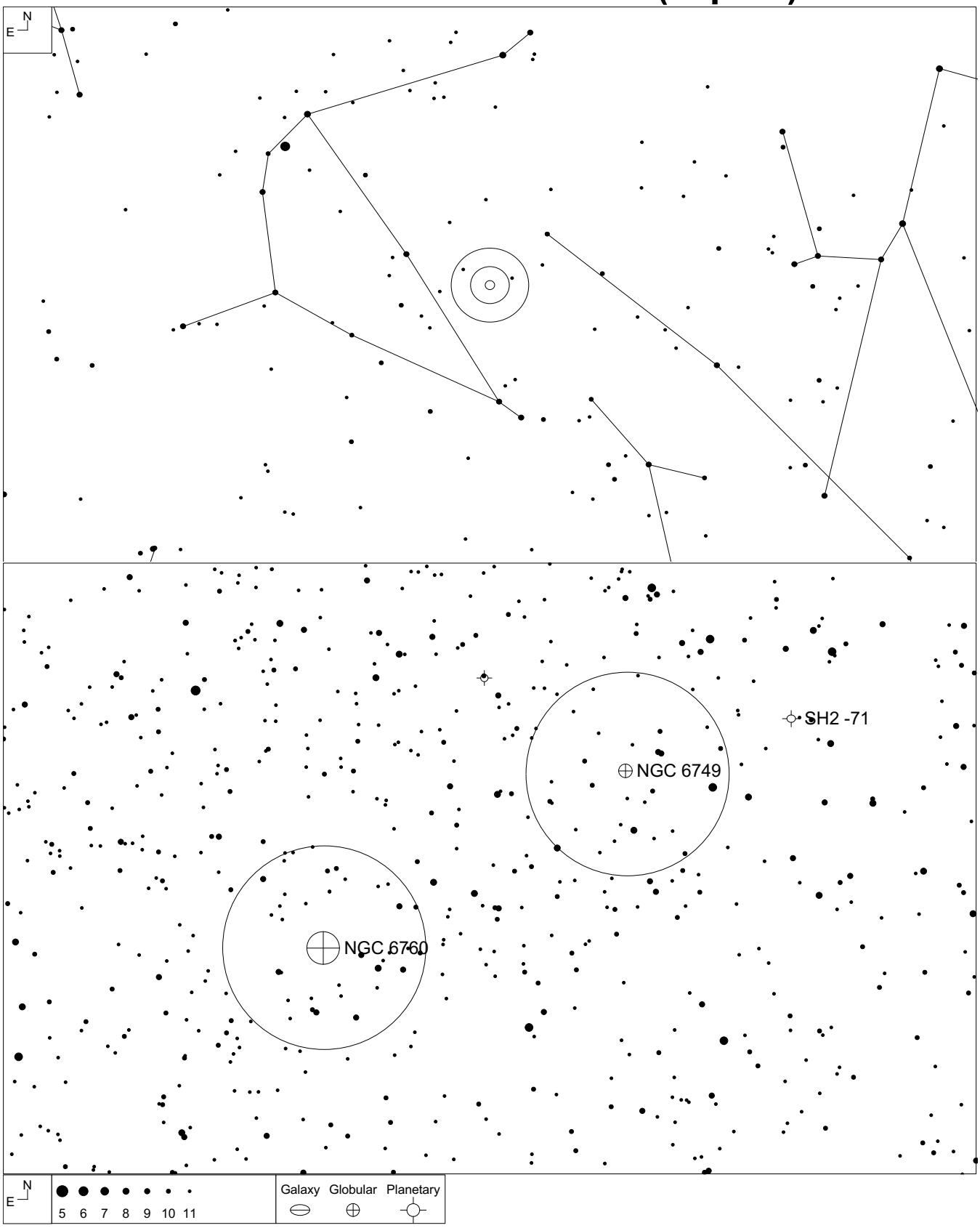
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
19 16 35.5	+30 11 05	8.4	16.3	13.2	13.1	8.8’

M71 (Sagitta)



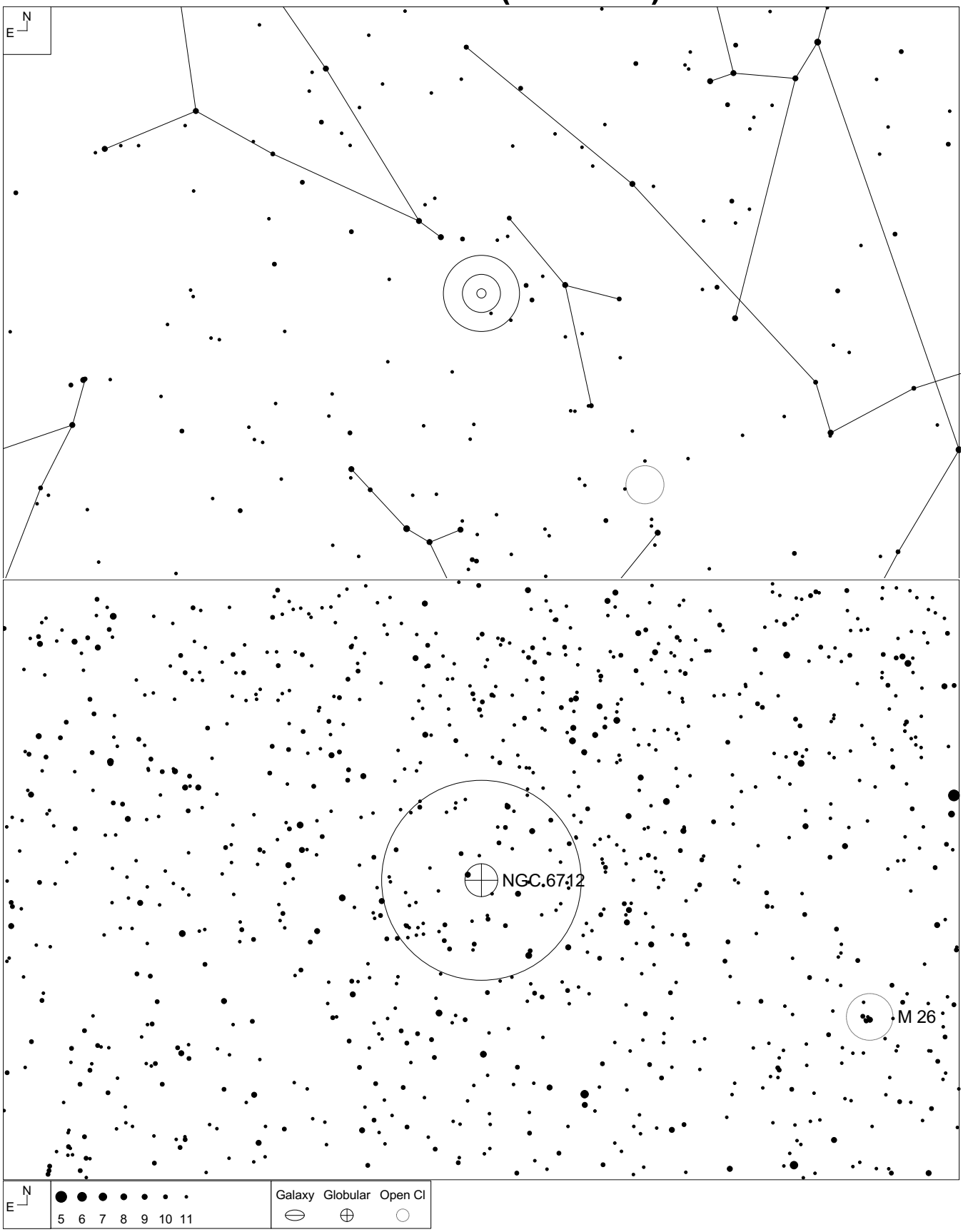
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
19 53 46.1	+18 46 42	8.4	14.5	12.1	-	7.2

NGC 6749 and NGC 6760 (Aquila)



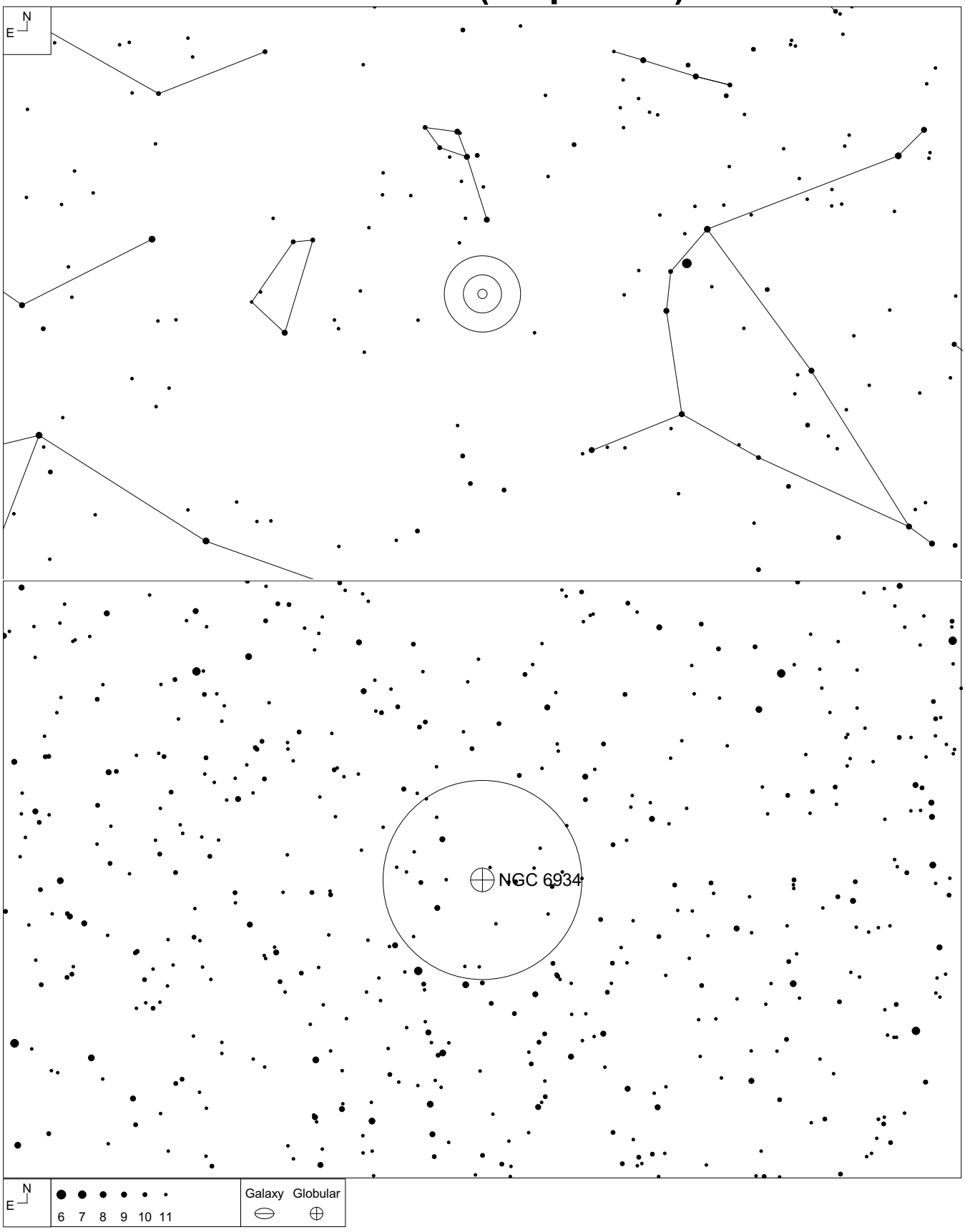
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
NGC 6749	19 05 15.3	+01 54 03	12.4	19.7	16.5	15.4	4’
NGC 6760	19 11 12.1	+01 01 50	9	17.5	15.6	13.8	9’

NGC 6712 (Scutum)



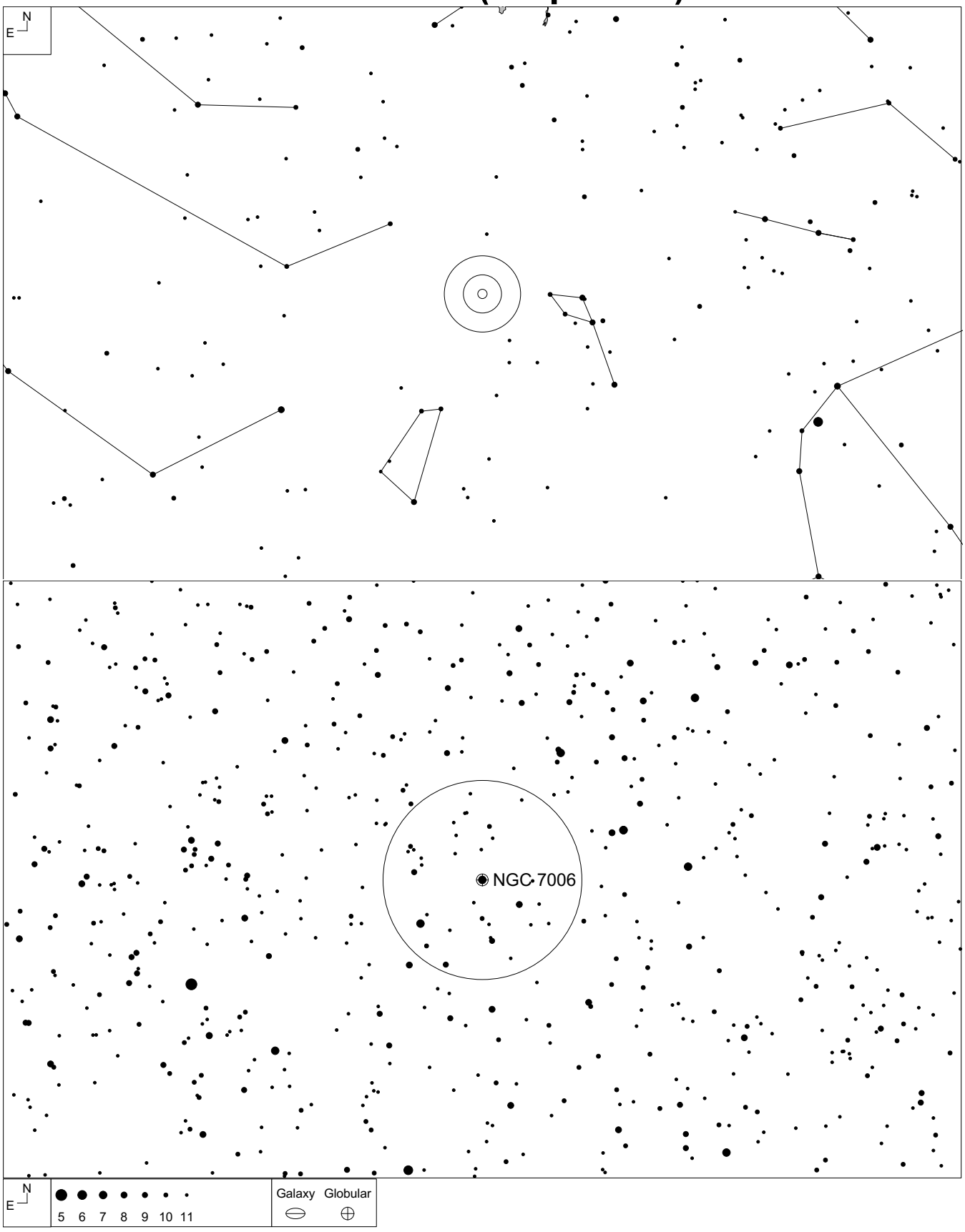
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
18 53 04.3	-08 42 22	8.1	16.3	13.3	13.1	9.8’

NGC 6934 (Delphinus)



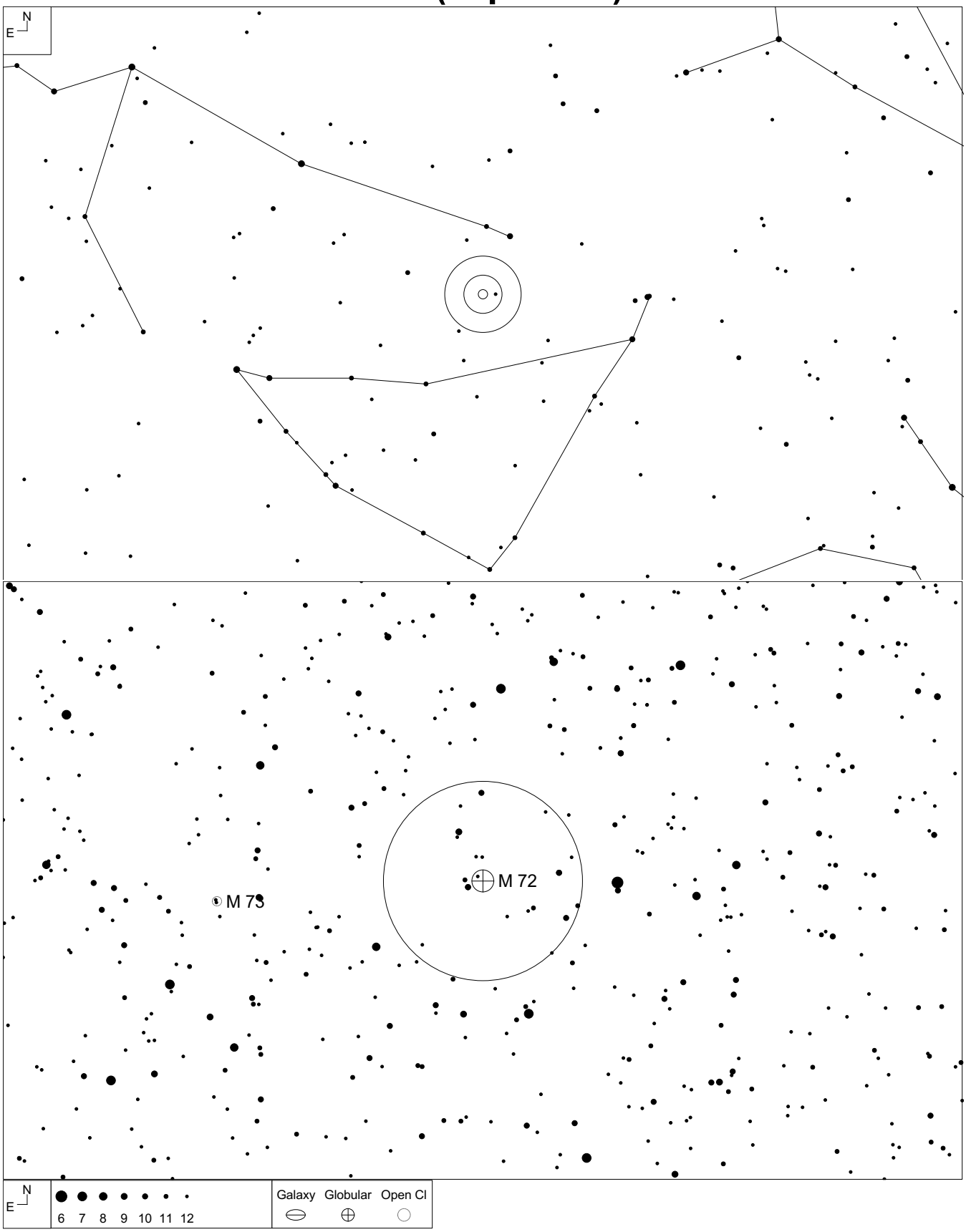
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
20 34 11.6	+07 24 15	8.9	17.1	13.8	13.2	7.1’

NGC 7006 (Delphinus)



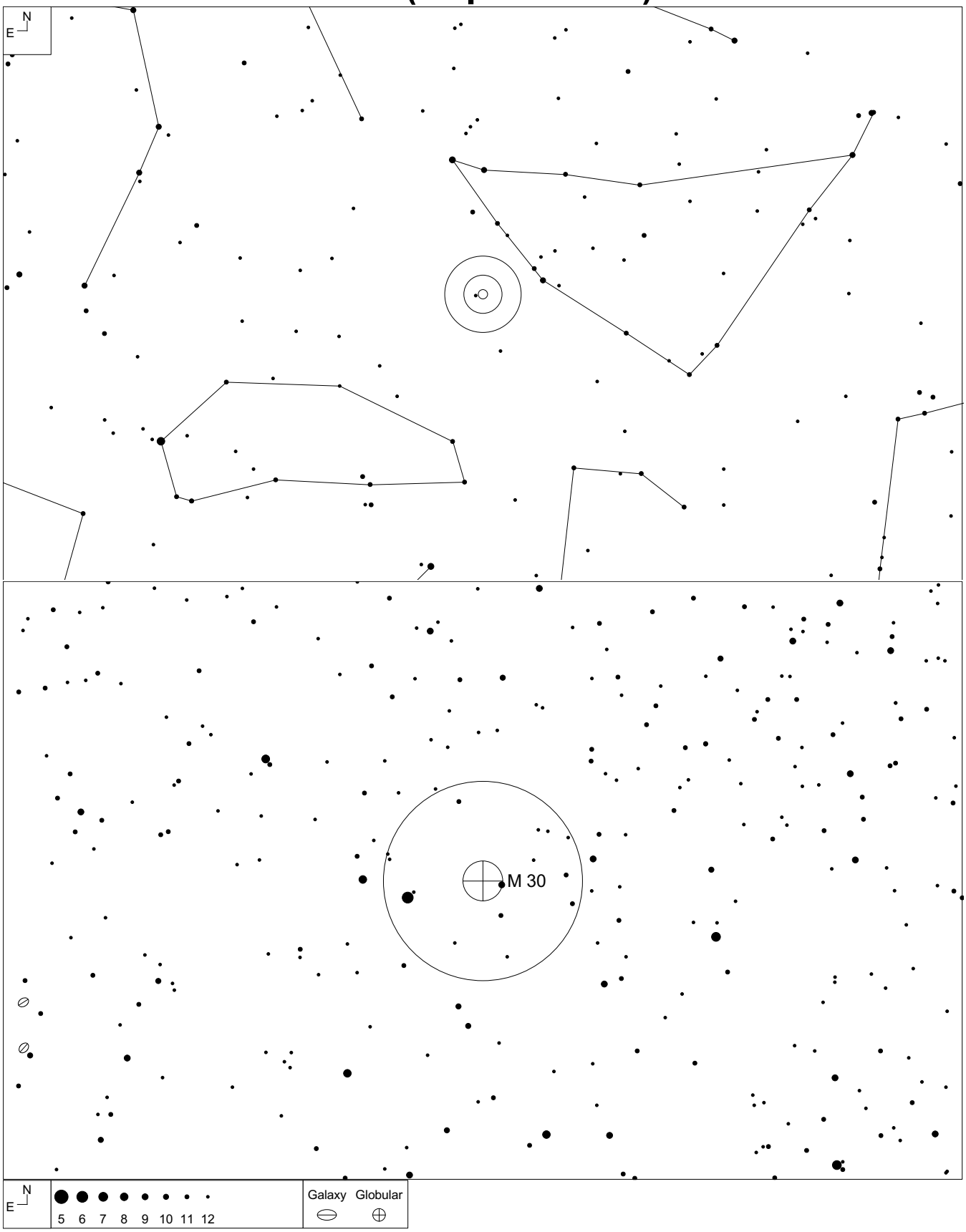
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
21 01 29.5	+16 11 15	10.6	18.8	15.6	13.4	3.6’

M72 (Aquarius)



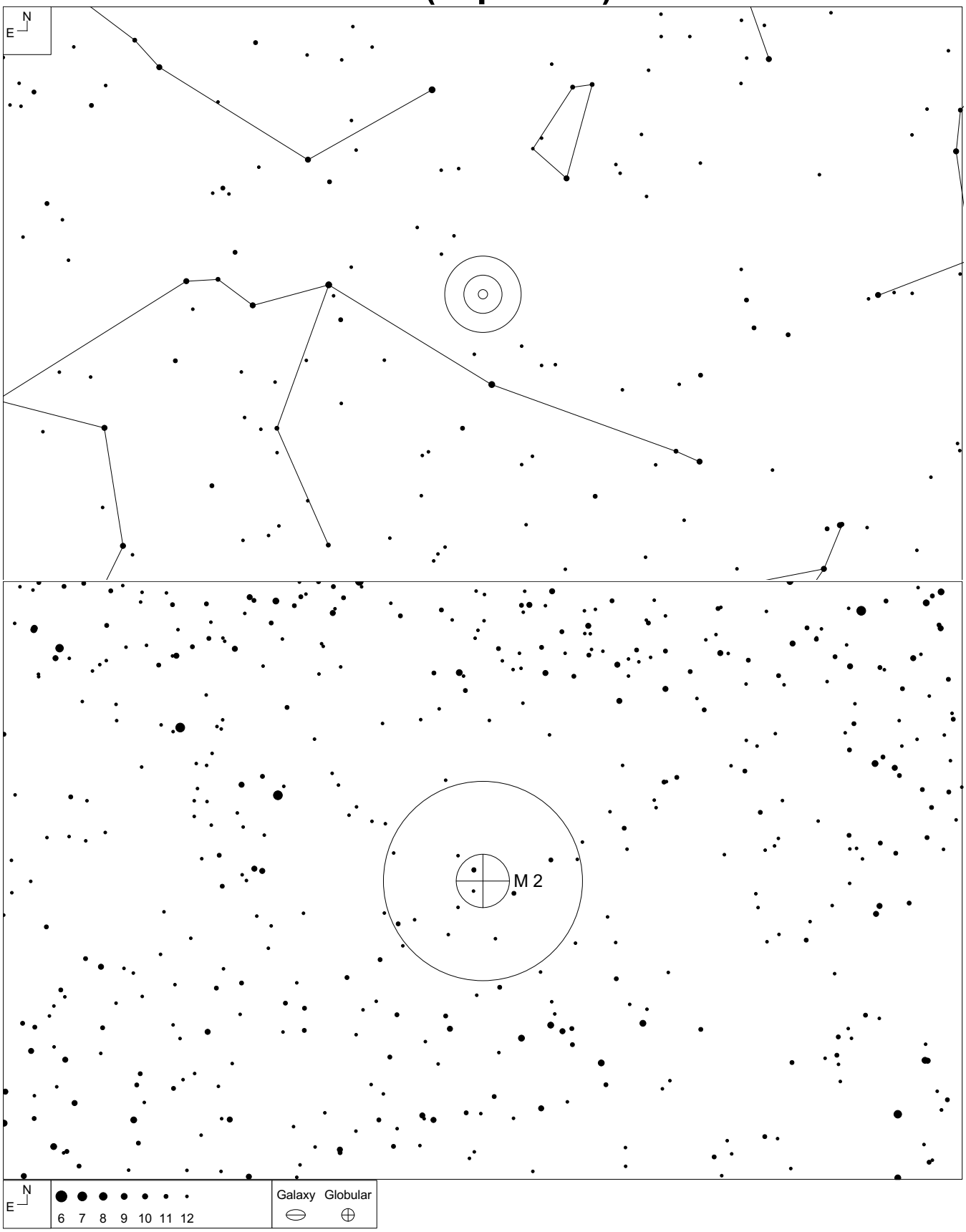
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
20 53 27.9	-12 32 13	9.2	16.9	14.2	13.3	6.6’

M30 (Capricornus)



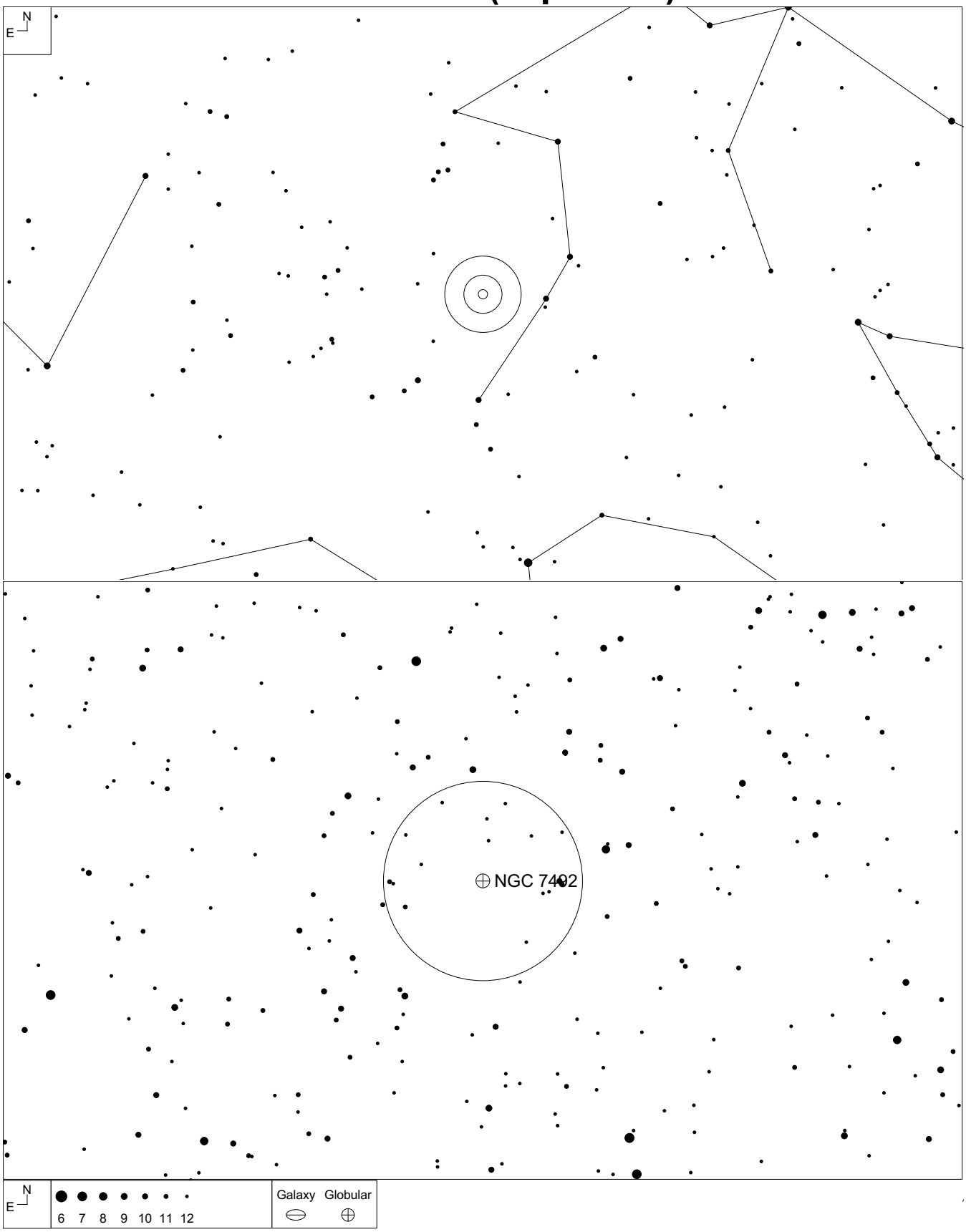
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
21 40 22.0	-23 10 45	6.9	15.1	12.1	12.3	12’

M2 (Aquarius)



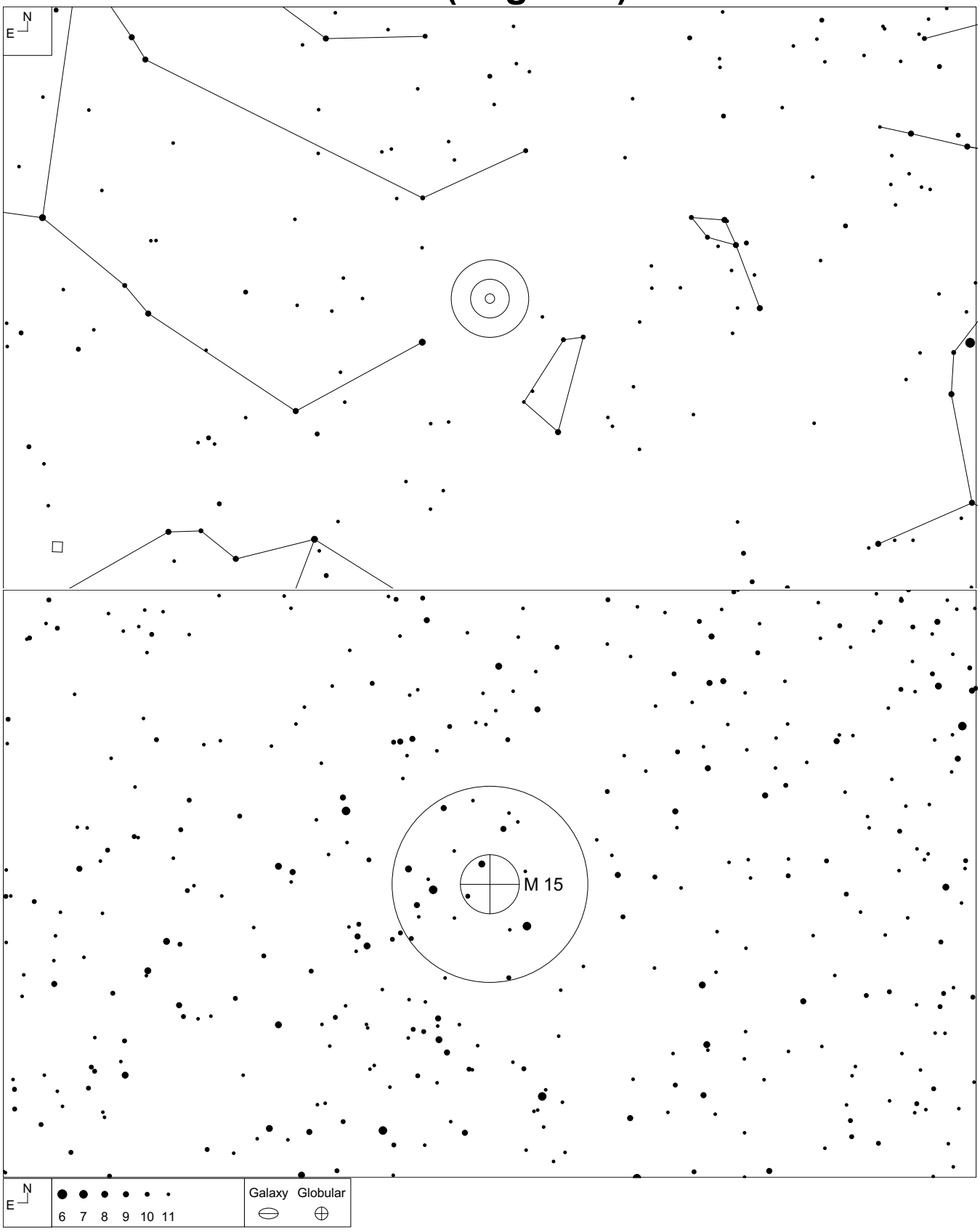
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
21 33 27.0	-00 49 12	6.6	16.1	13.1	12.6	16’

NGC 7492 (Aquarius)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
23 08 26.7	-15 36 41	11.2	17.6	15.5	14.3	4.2’

M15 (Pegasus)

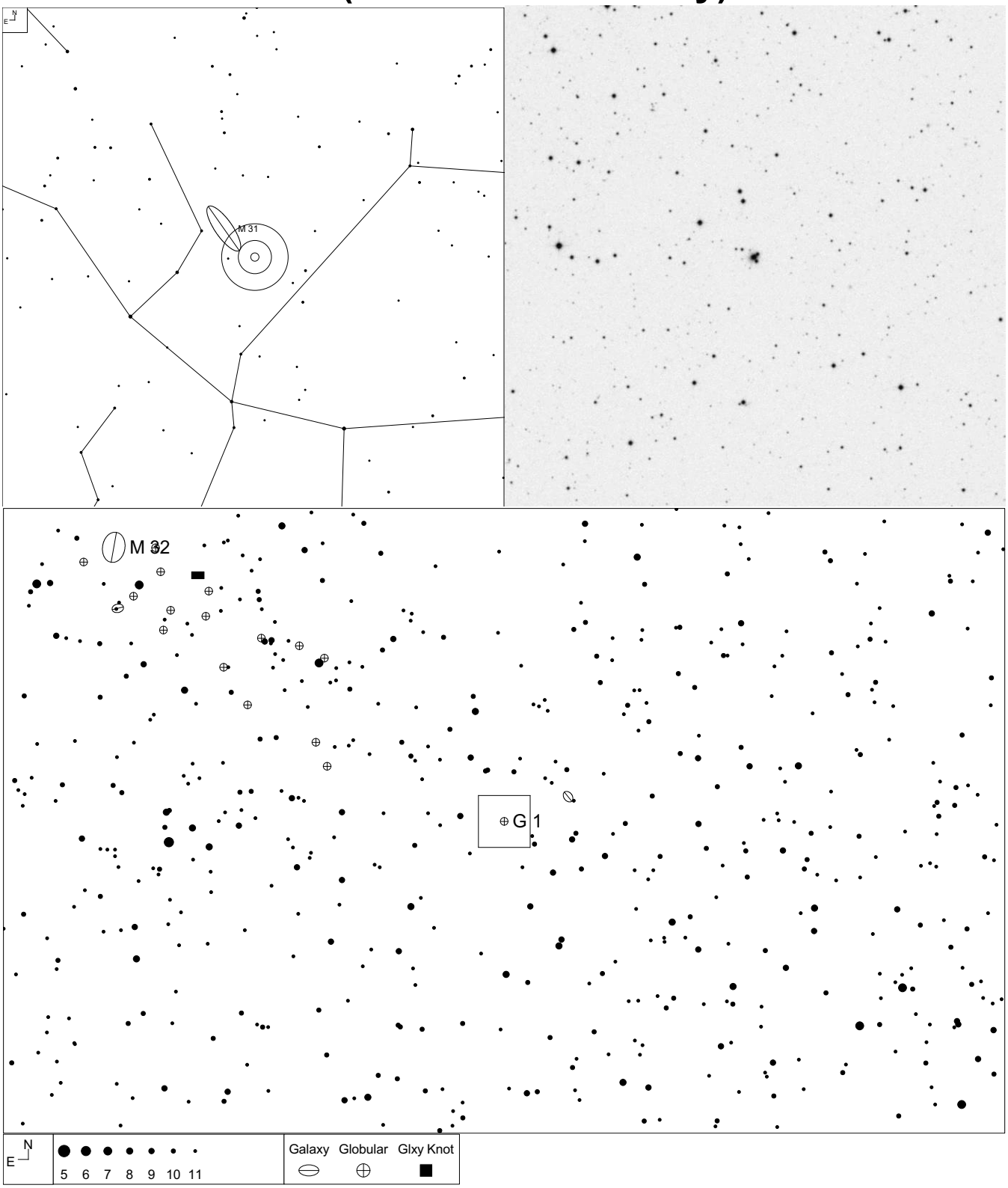


Look for Pease 1, a planetary nebula. **See page 122.**

RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
21 29 58.3	+12 10 01	6.3	15.9	12.6	12.6	18’

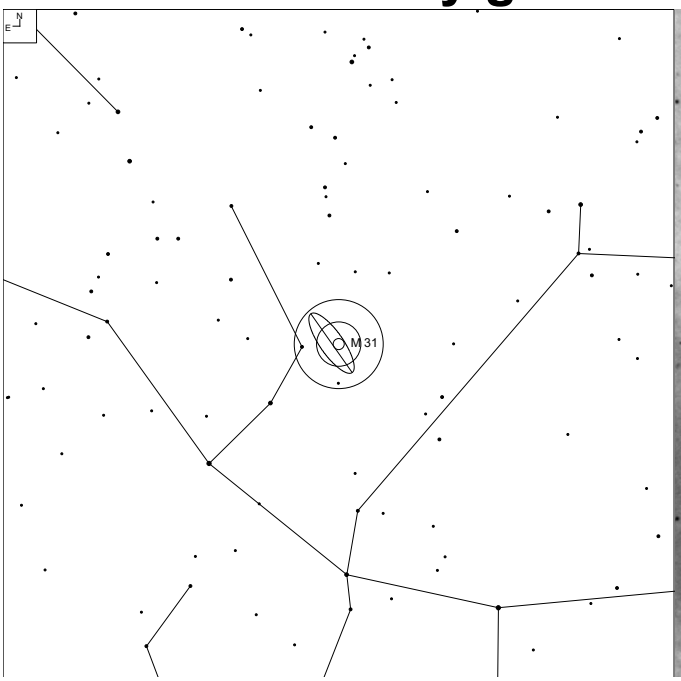
A few M-31 Globular Clusters

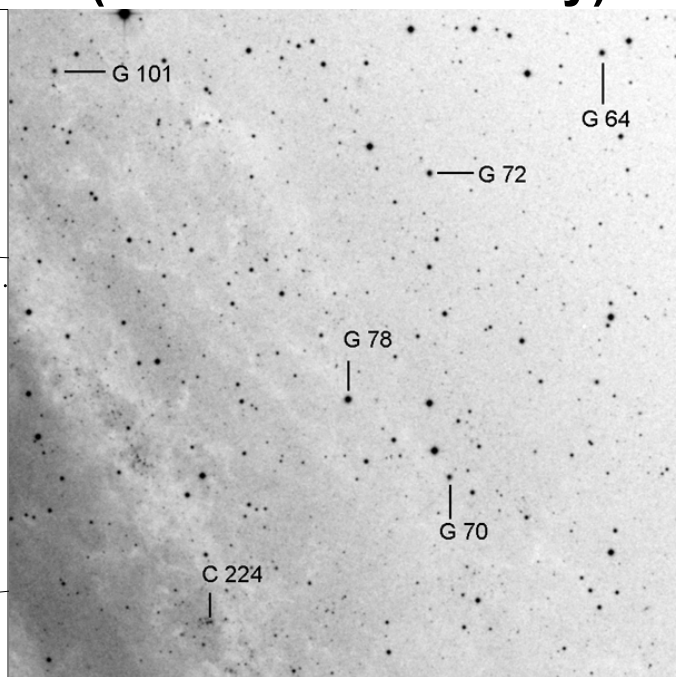
G1 (Andromeda Galaxy)

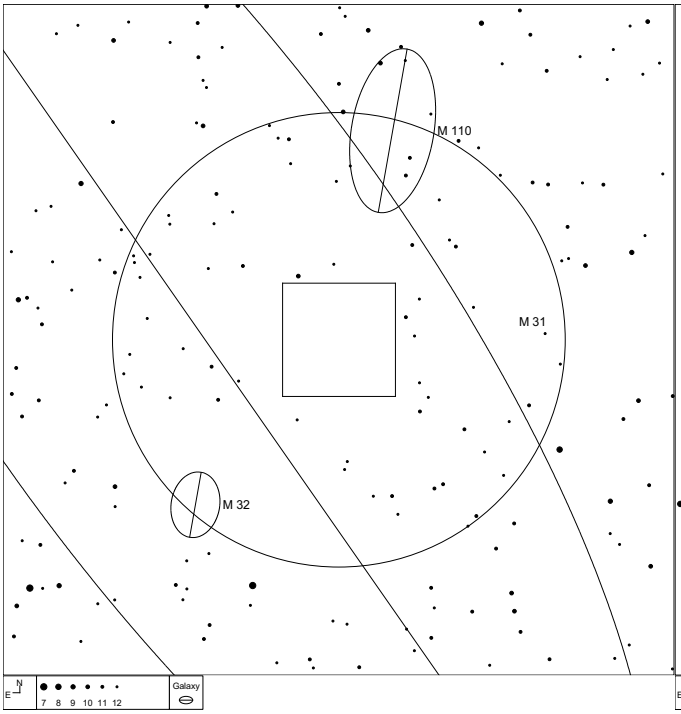


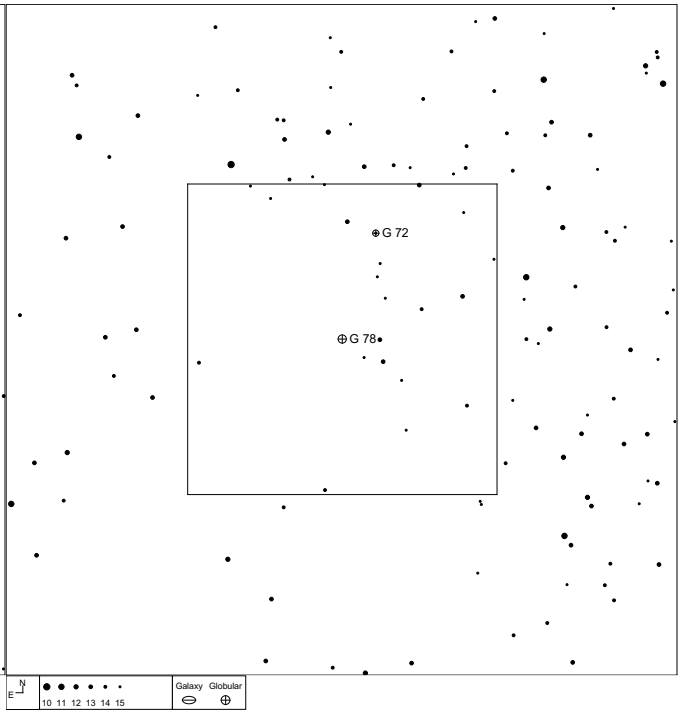
RA	Dec	V_{mag}	HB_{Mag}	$Bt*_{Mag}$	SB	Size
00 32 46.3	+39 34 41	13.7	-	-	12.2	0.5’

G78 and nearby globulars (Andromeda Galaxy)





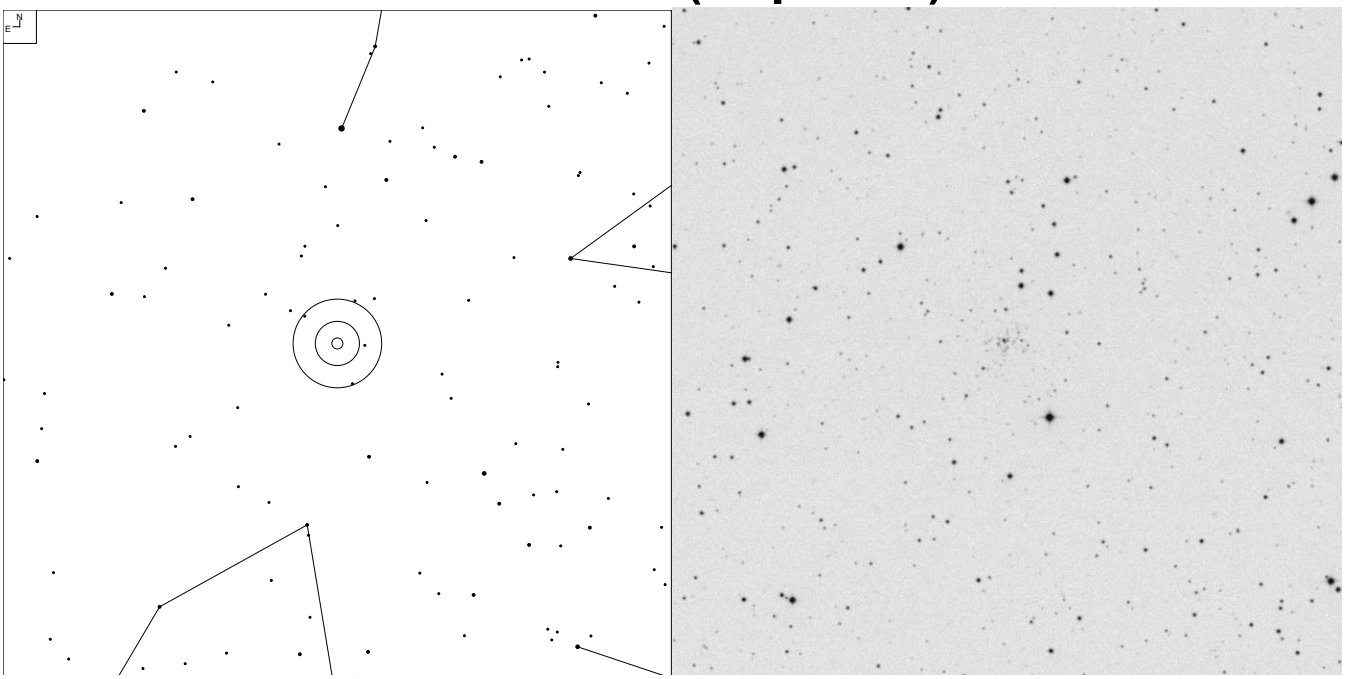


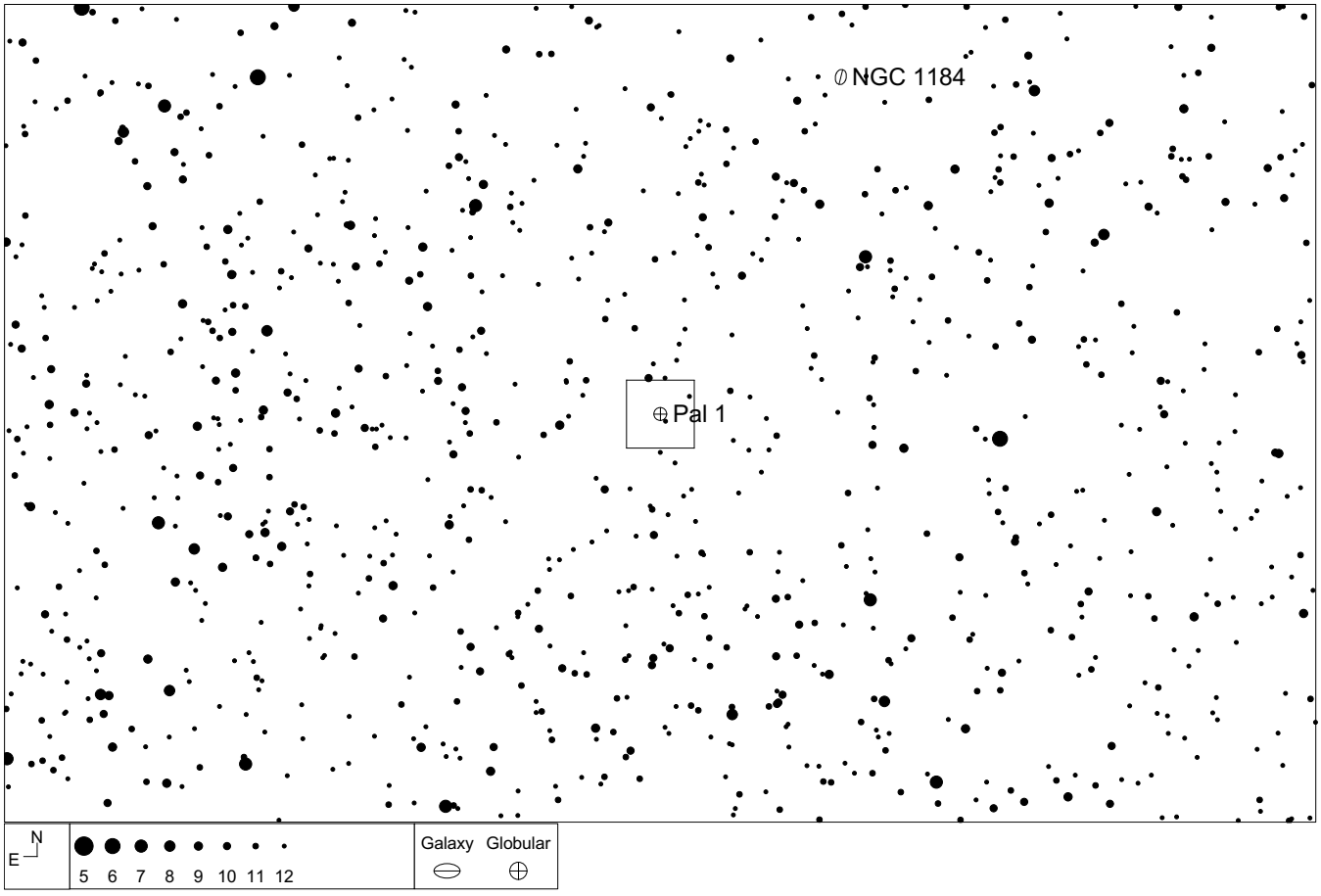


Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
G 78	00 41 01.1	+41 13 47	14.2	-	-	12.2	0.4’
G 64	00 40 32.4	+41 21 42	15.1	-	-	-	0.3’
G 70	00 40 48.5	+41 12 09	16.0v	-	-	-	0.2’
G 72	00 40 52.5	+41 18 53	15.0	-	-	-	0.3’
G 101	00 41 37.8	+41 20 49	15.9	-	-	-	0.3’
C 224	00 41 16.8	+41 08 42	15.5	-	-	-	0.6’

The Palomar Globular Clusters

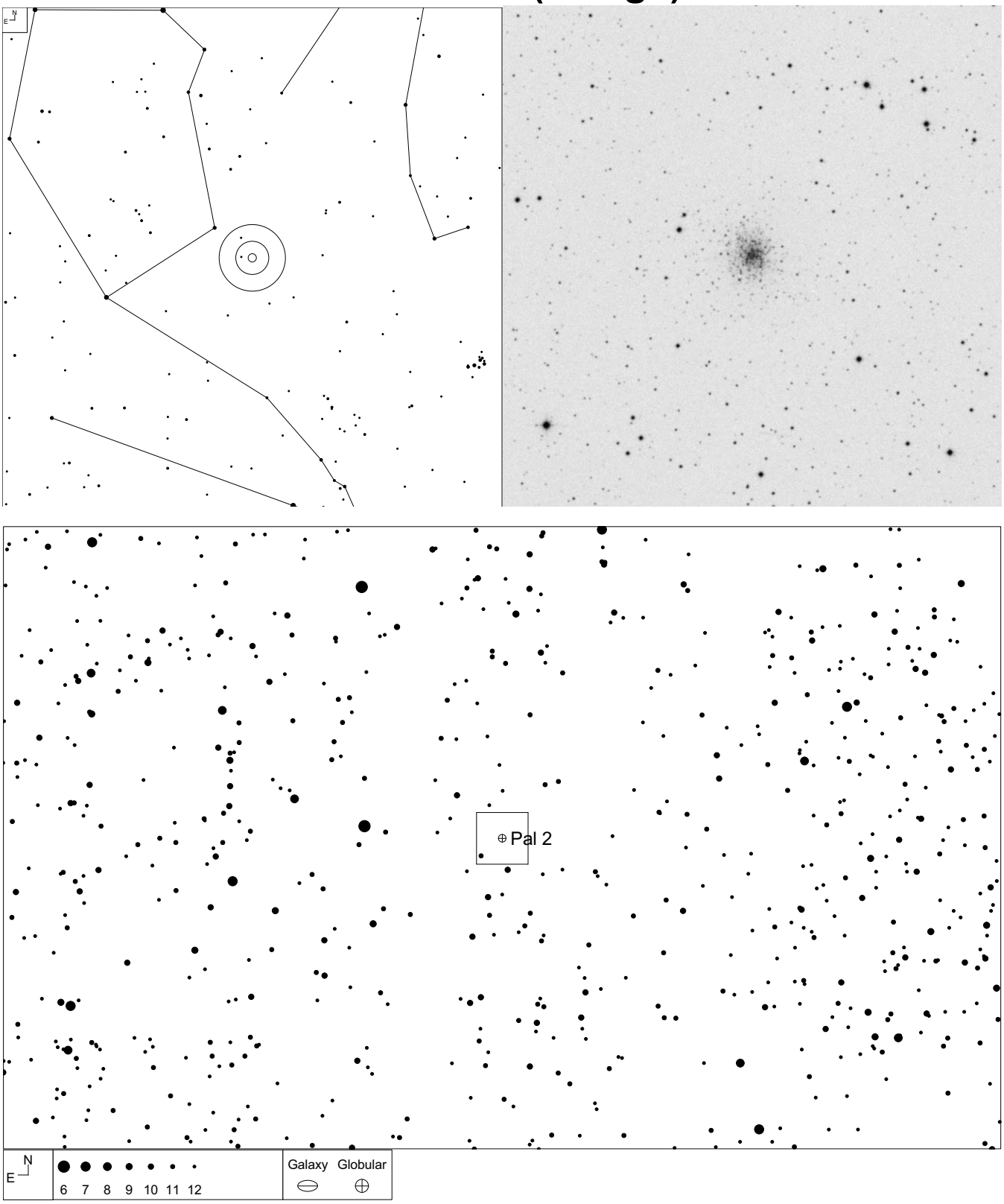
Palomar 1 (Cepheus)





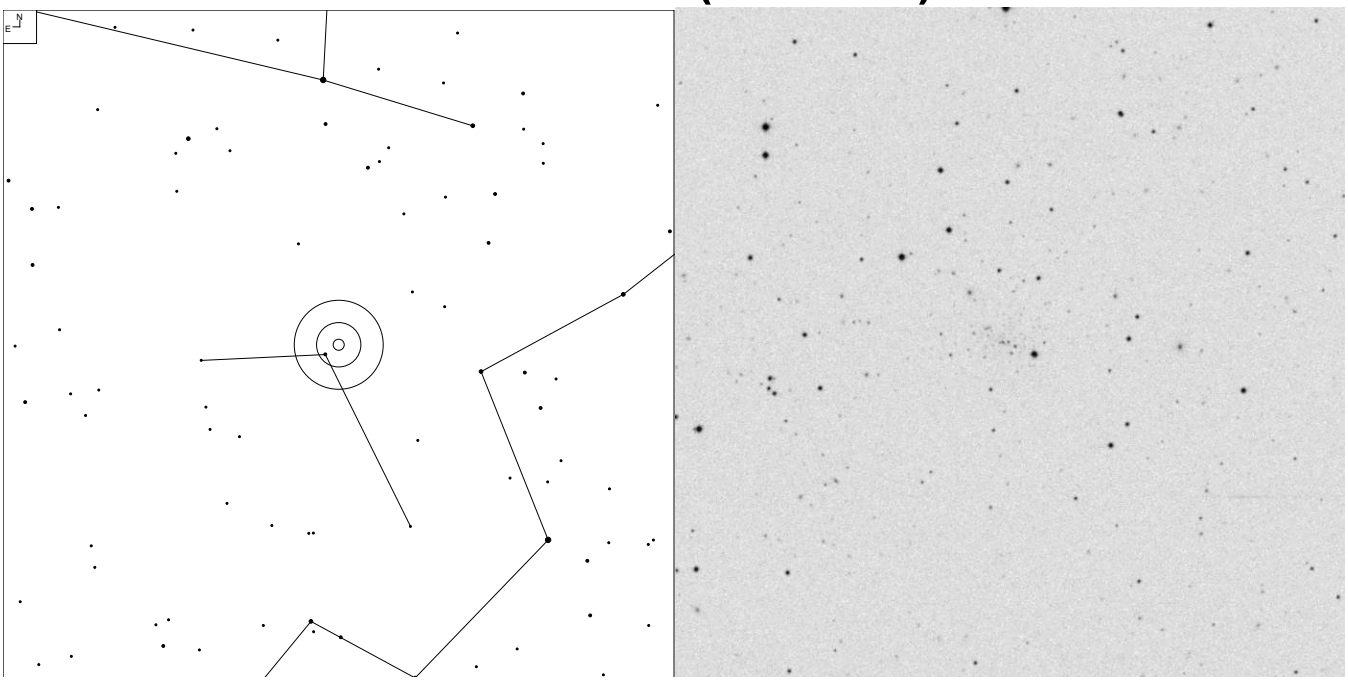
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
03 33 20.8	+79 34 57	13.6	16.8	16.3	15.8	2.8’

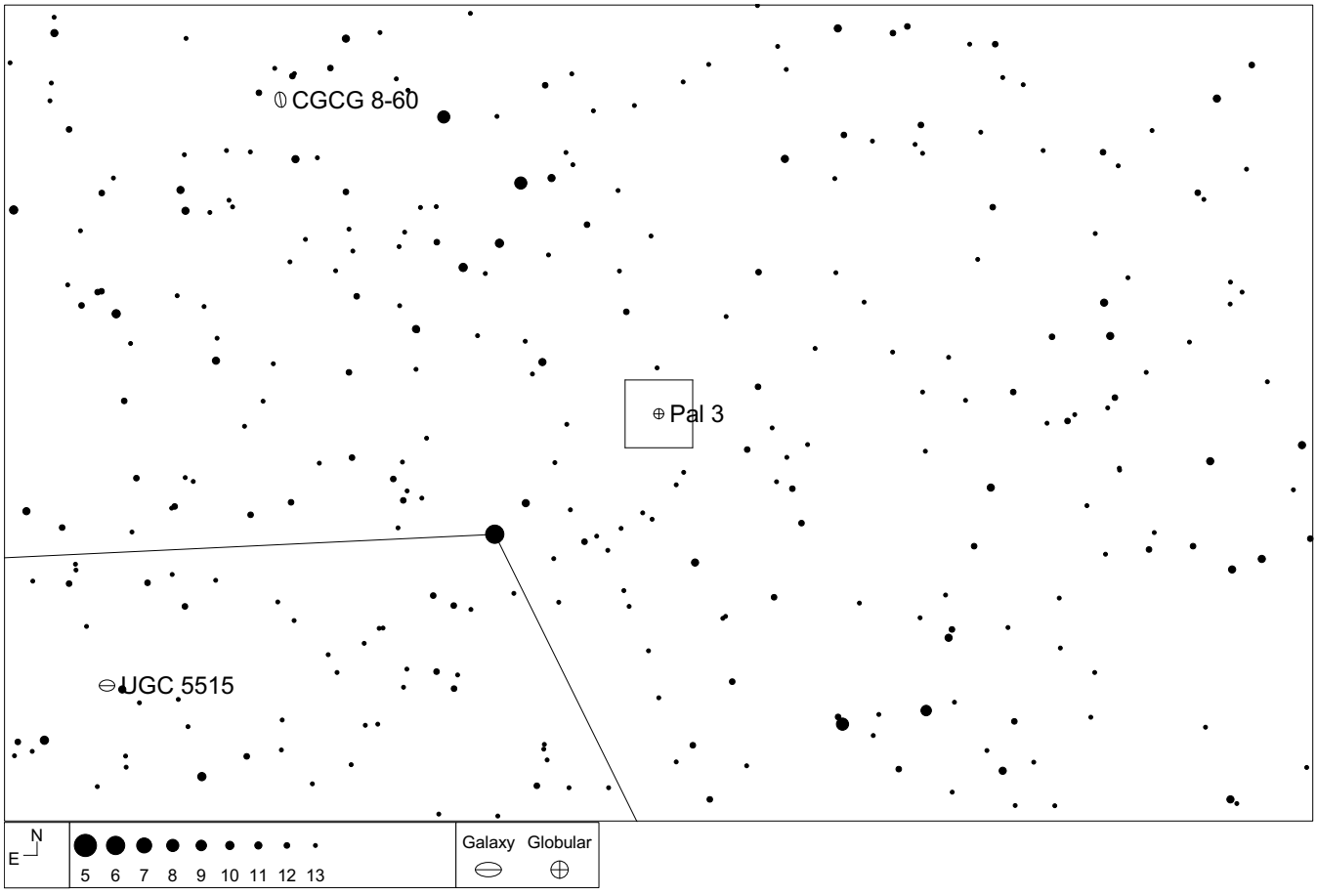
Palomar 2 (Auriga)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
04 46 05.9	+31 22 51	13	21.7	18.8	14.7	2.2’

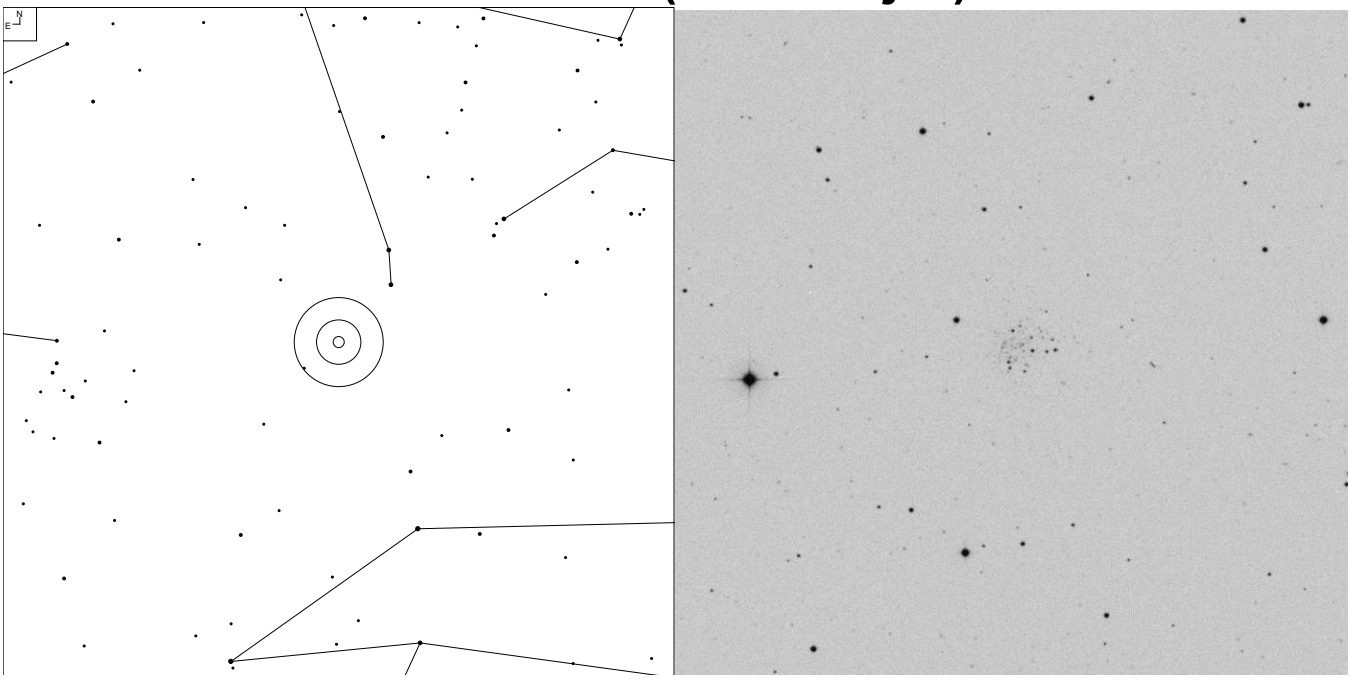
Palomar 3 (Sextans)

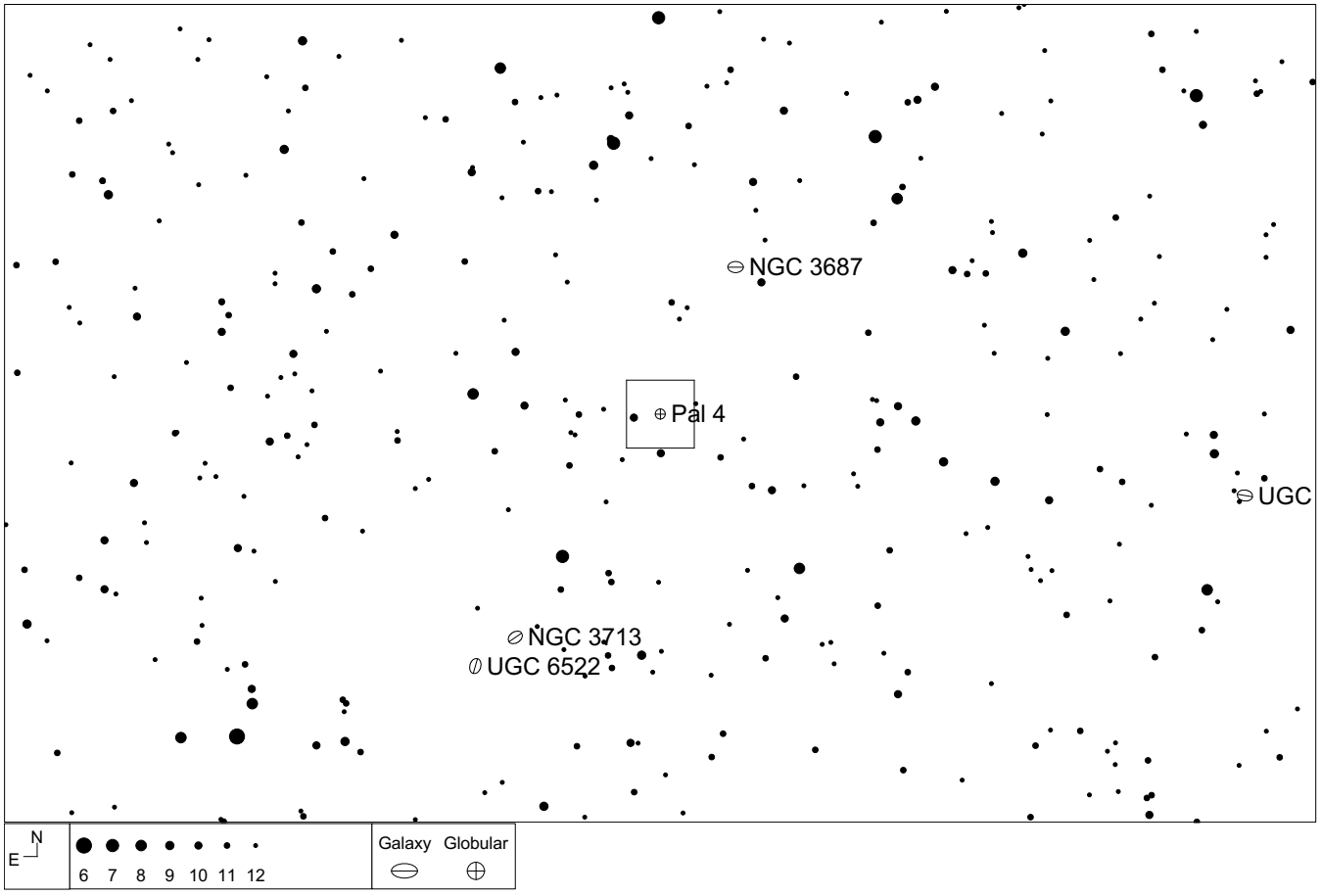




RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
10 05 31.4	+00 04 17	13.9	20.5	18	14.9	1.6’

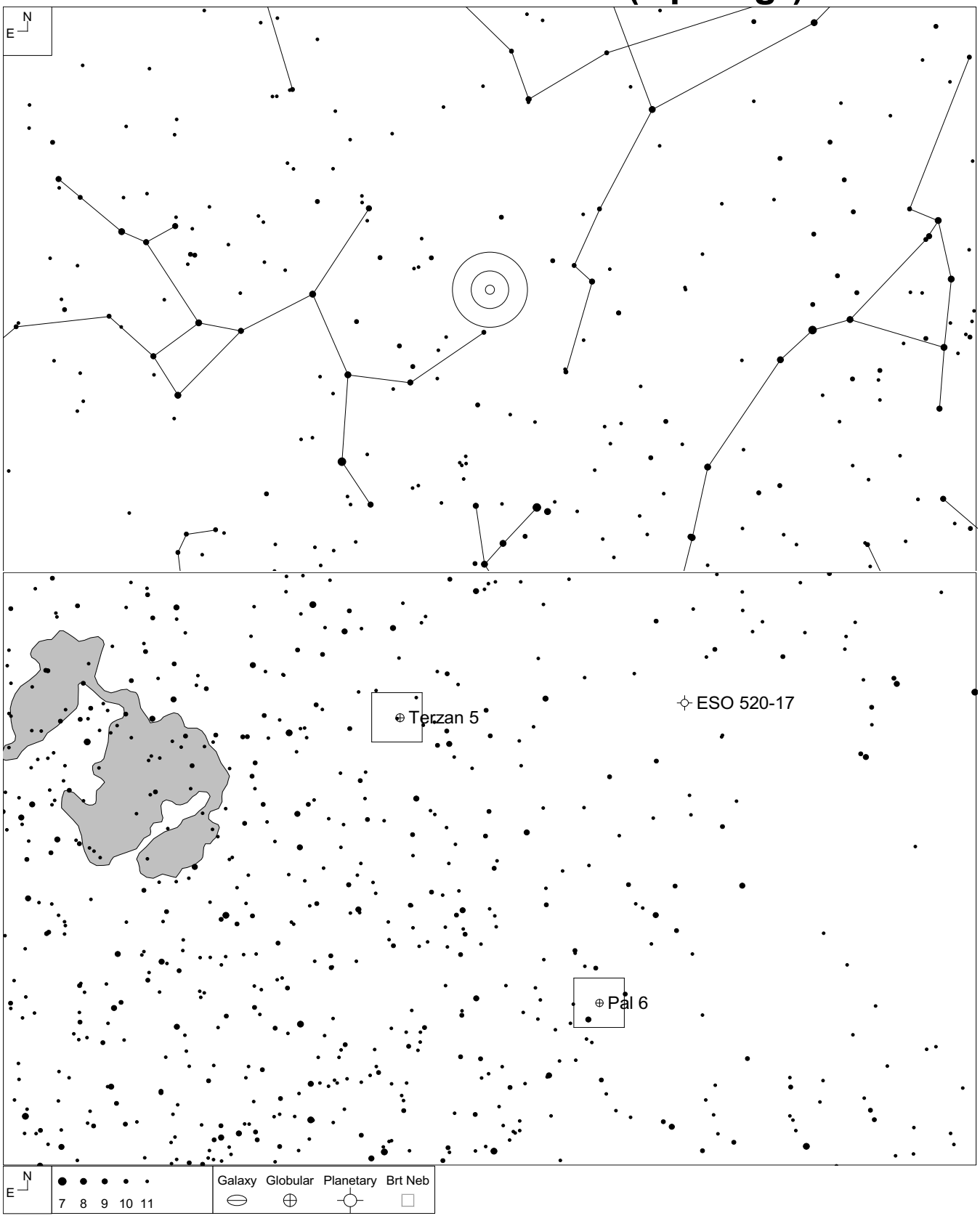
Palomar 4 (Ursa Major)





RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
11 29 16.8	+28 58 25	14.2	20.8	18	14.8	1.3’

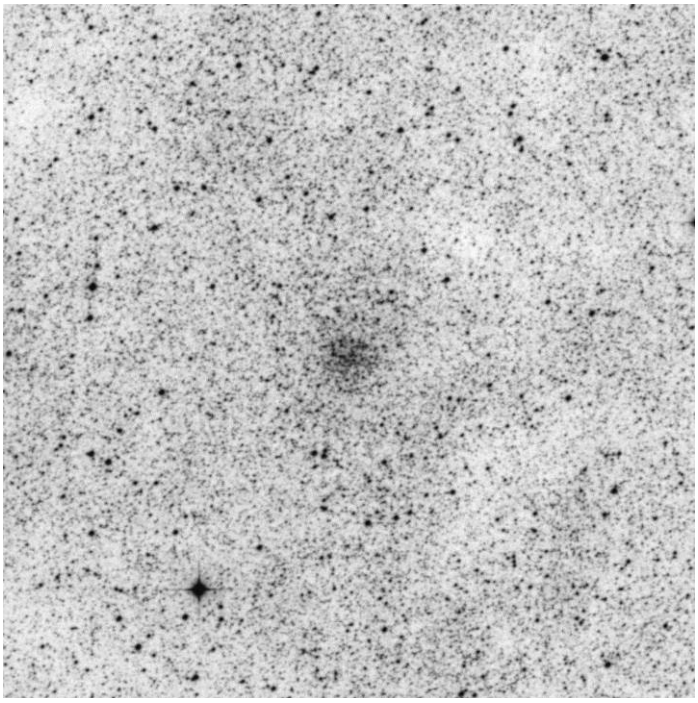
Palomar 6 and Terzan 5 (Oph/Sgr)



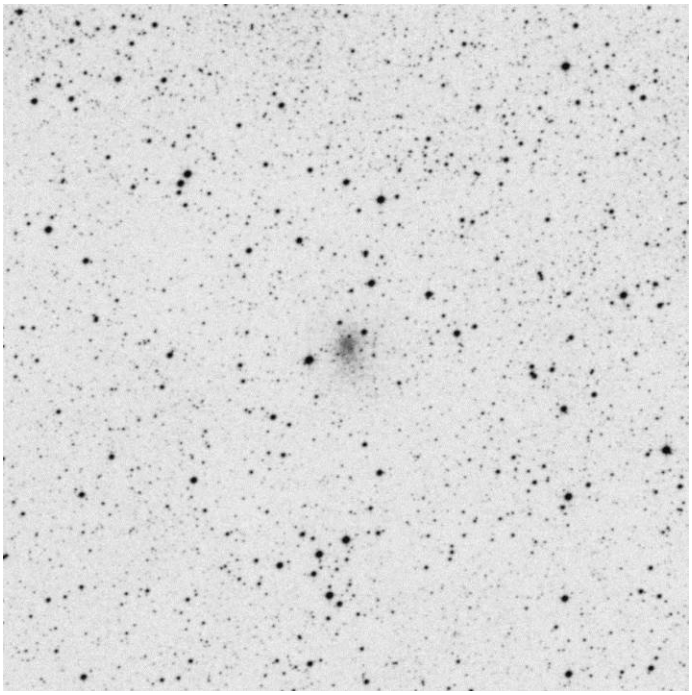
Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
Palomar 6	17 43 42.2	-26 13 21	11.6	19.1	-	12	1.2’
Terzan 5	17 48 04.9	-24 46 47	13.9	22.5	20.5	15.8	2.4’

Look for JaFu1, a planetary nebula, in Palomar 6. See page 124.

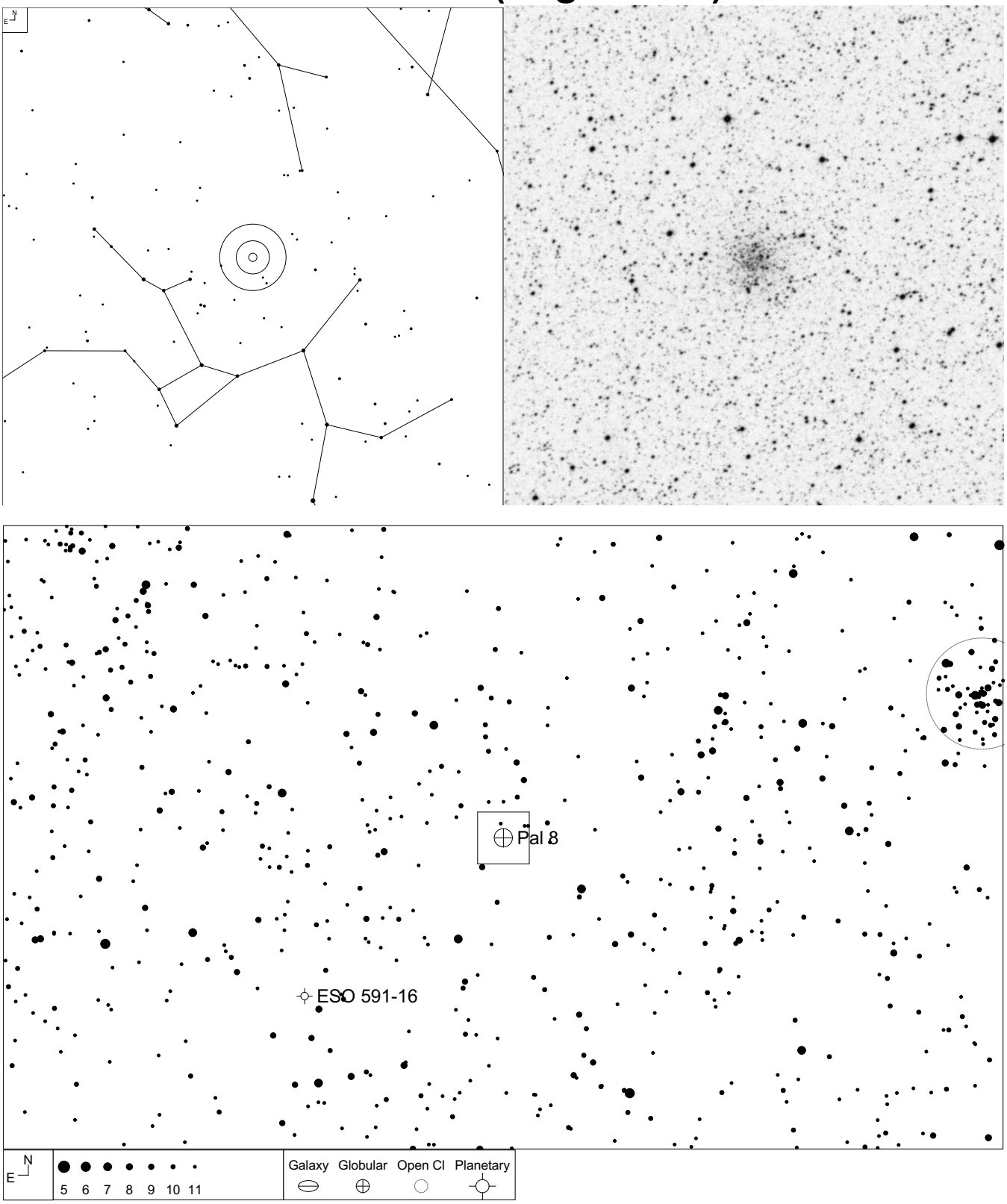
Palomar 6



Terzan 5

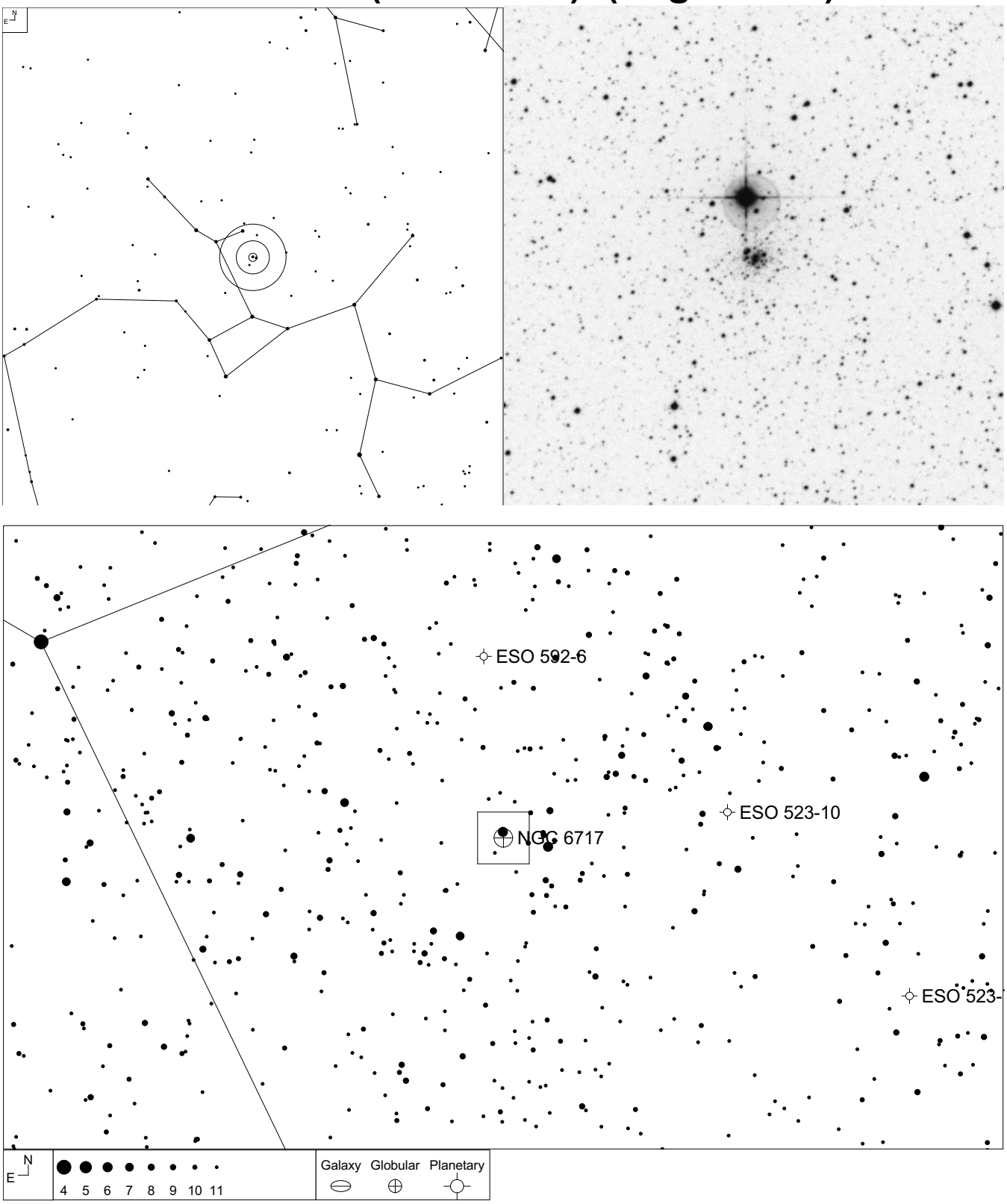


Palomar 8 (Sagittarius)



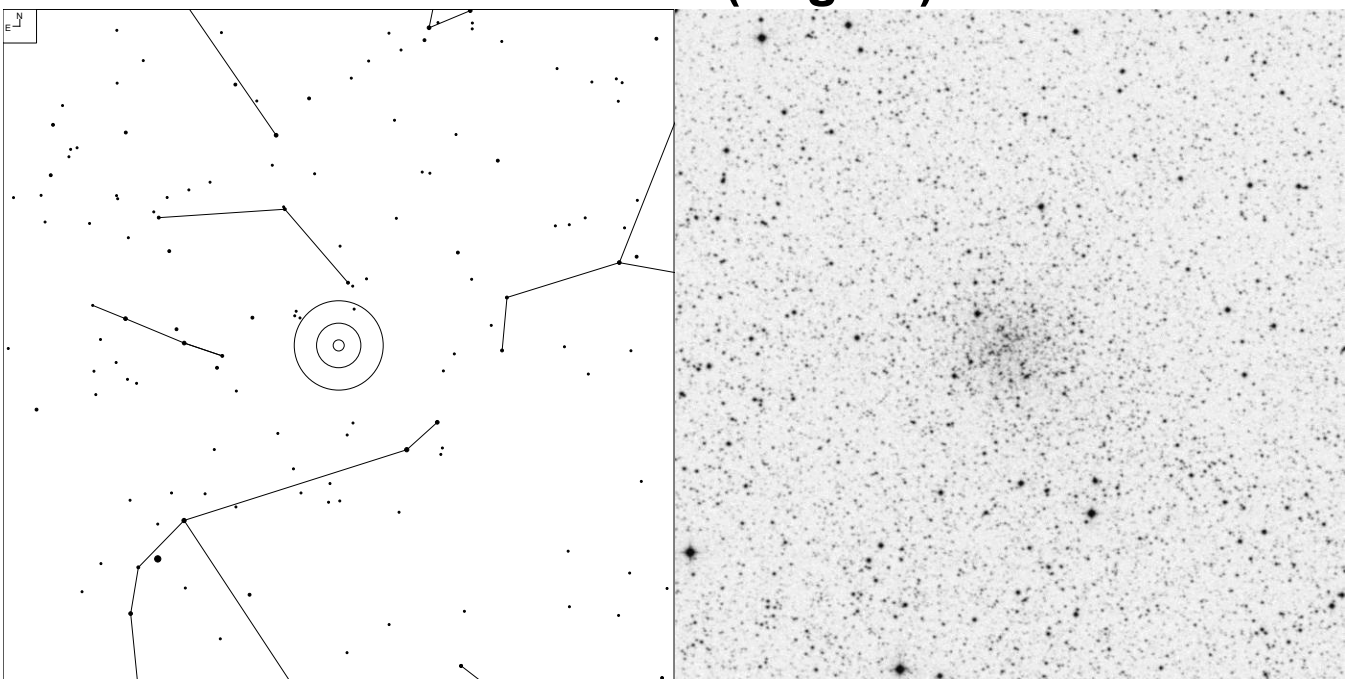
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
18 41 29.9	-19 49 33	10.9	17.3	15.4	14.5	5.2’

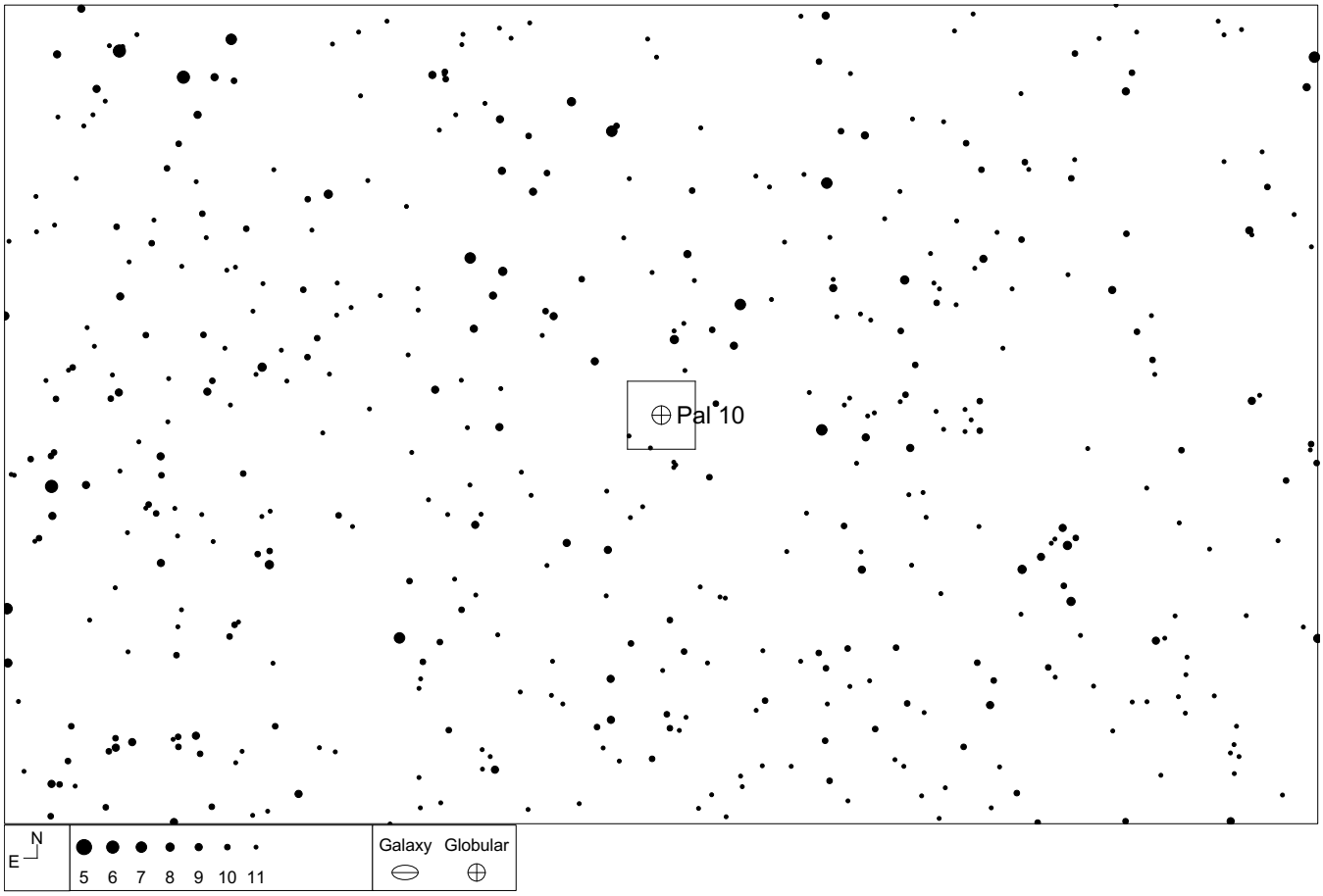
Palomar 9 (NGC 6717) (Sagittarius)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
18 55 06.2	-22 42 03	8.4	15.6	14	12.1	5.4’

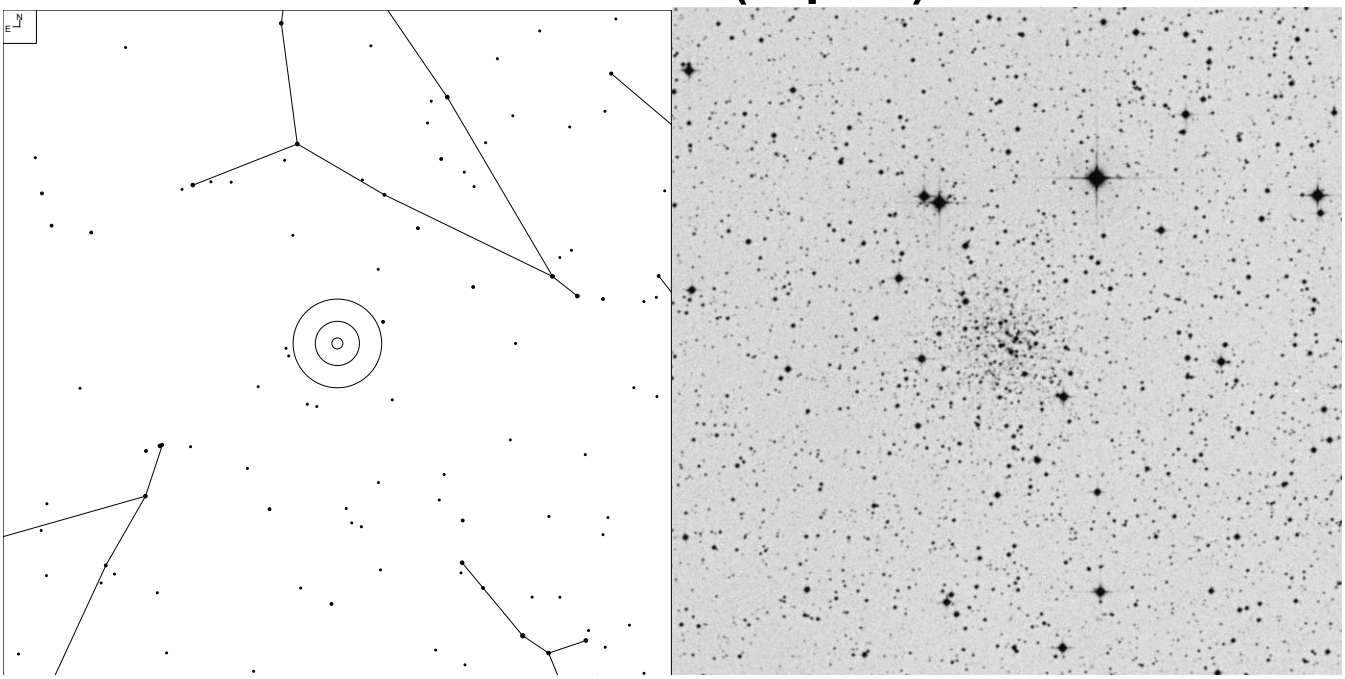
Palomar 10 (Sagitta)

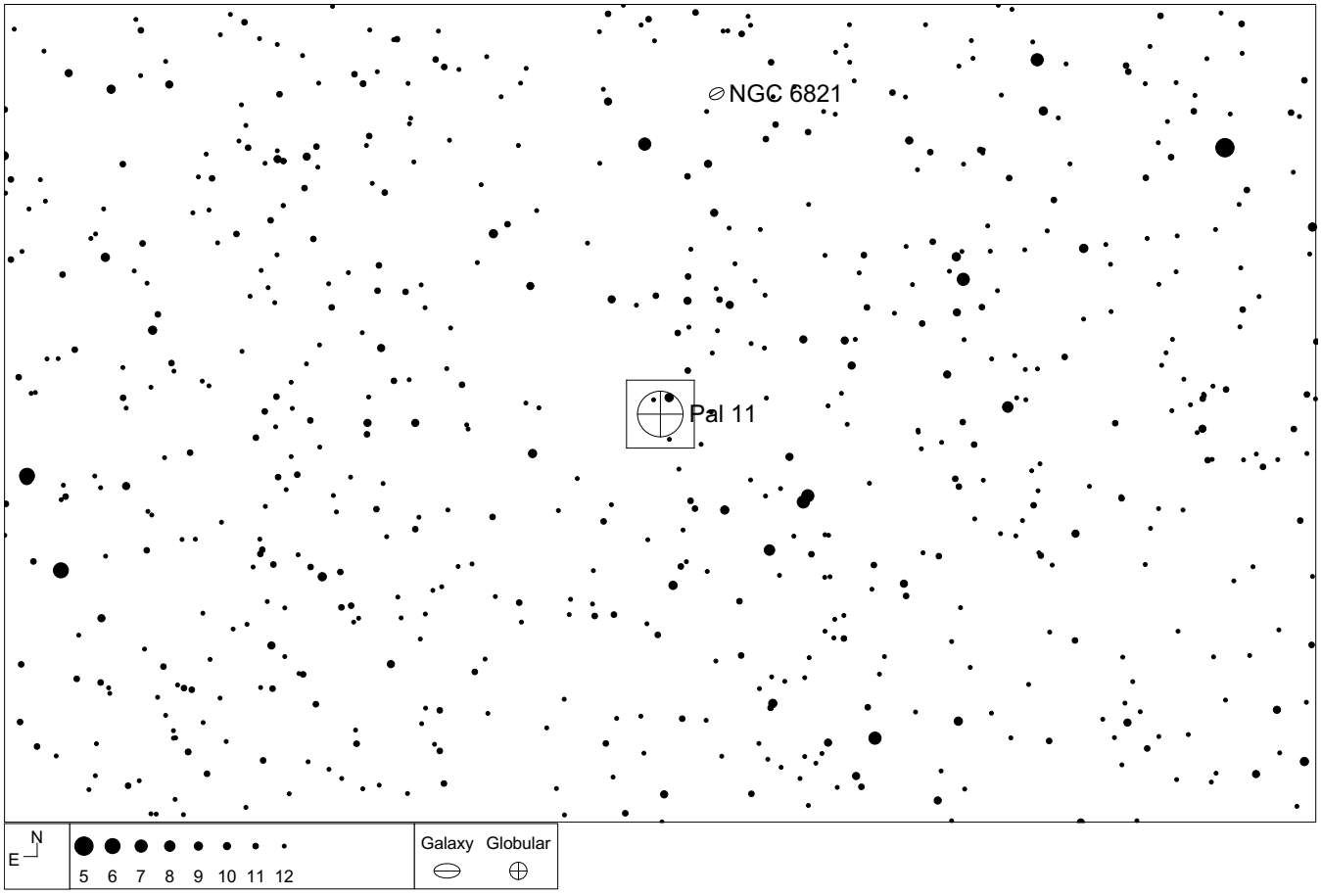




RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
19 18 02.1	+18 34 18	13.2	19.4	18	16.2	4’

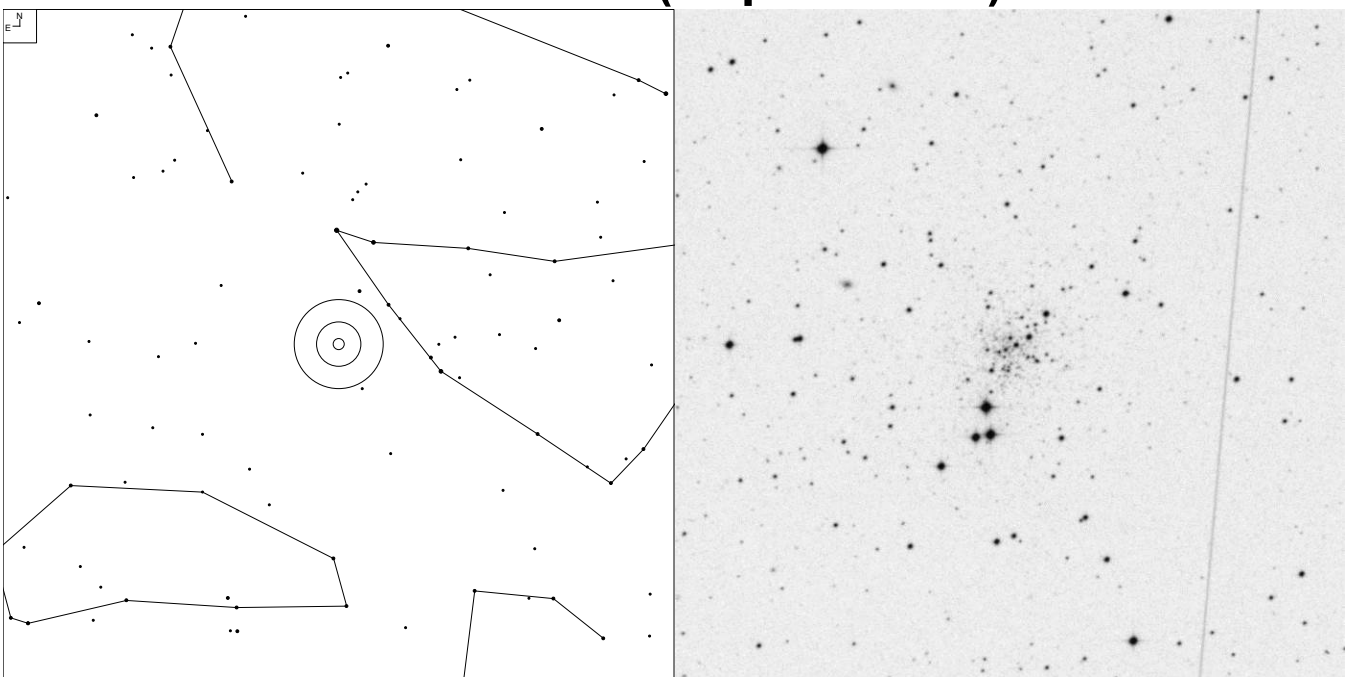
Palomar 11 (Aquila)

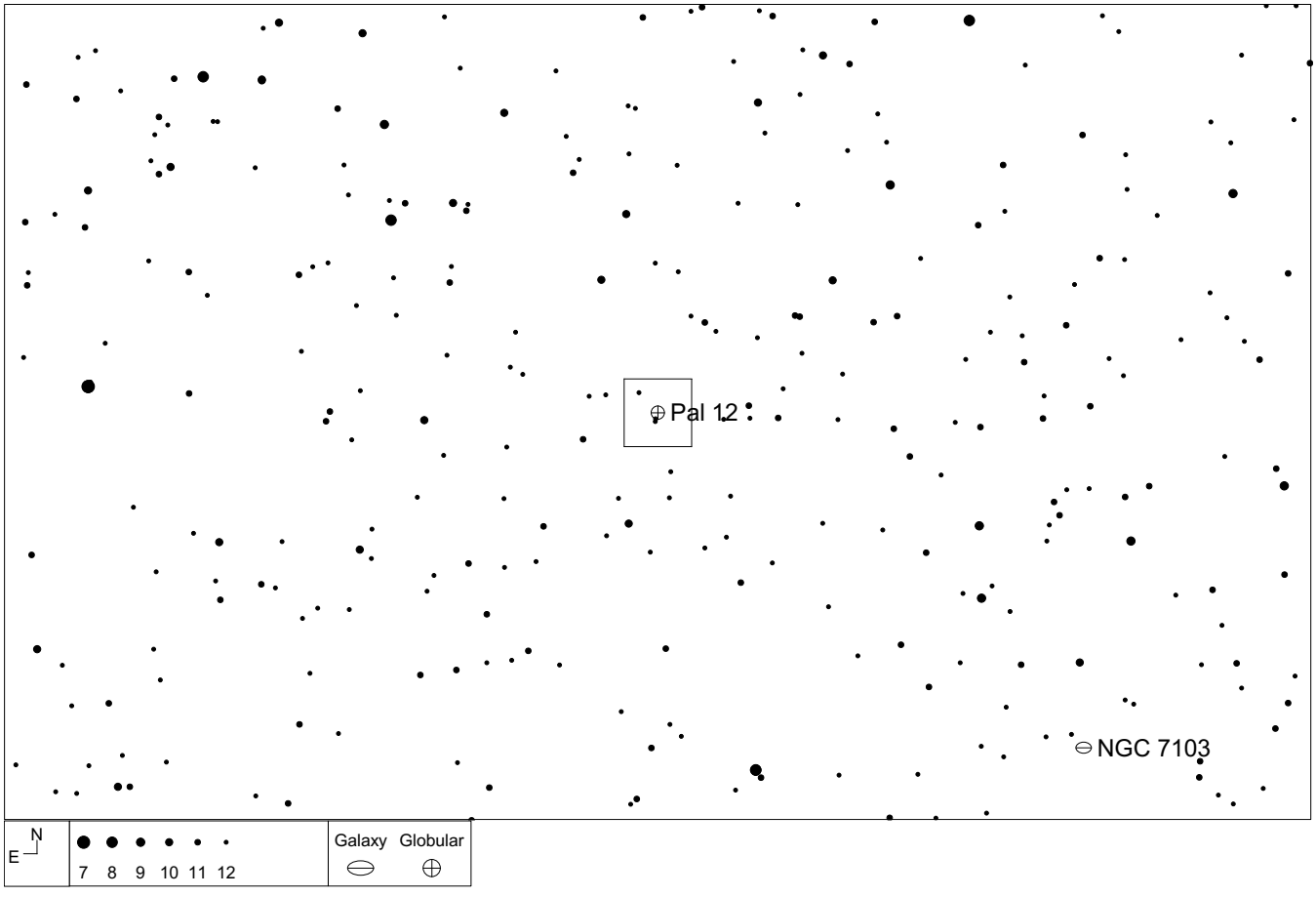




RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
19 45 14.4	-08 00 26	9.8	17.4	15.5	14.8	10’

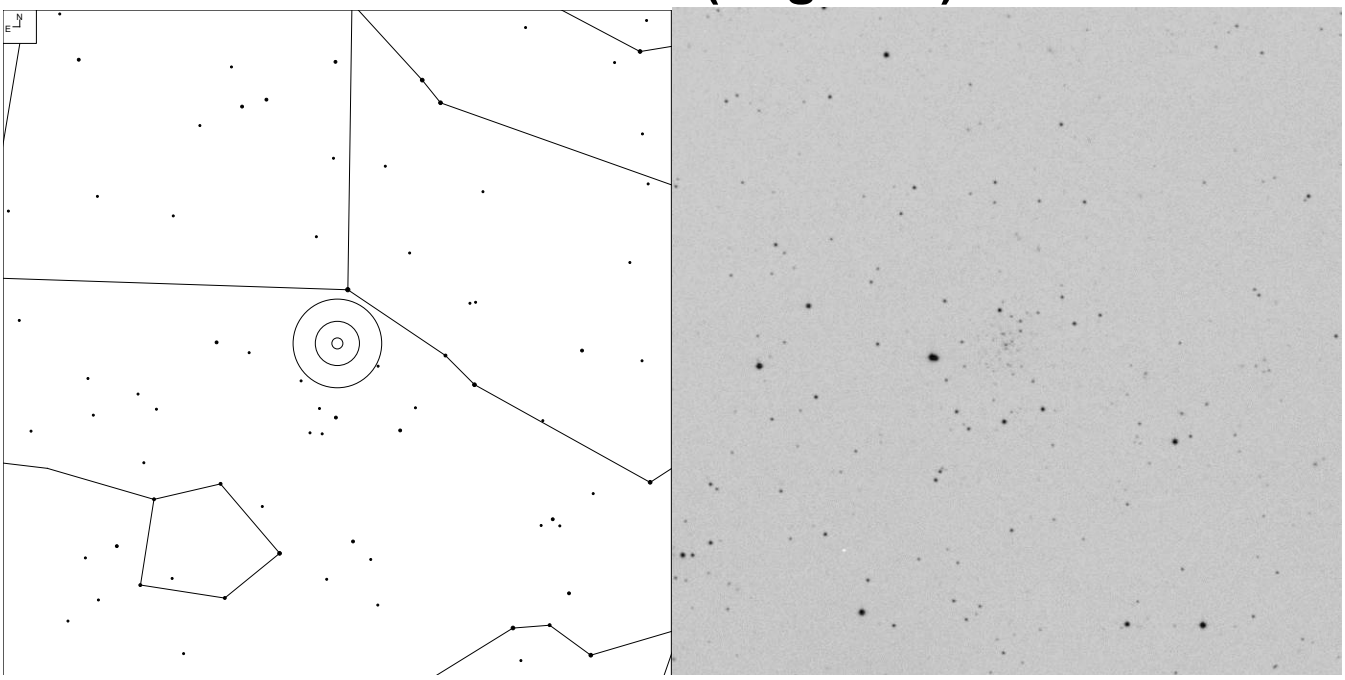
Palomar 12 (Capricornus)

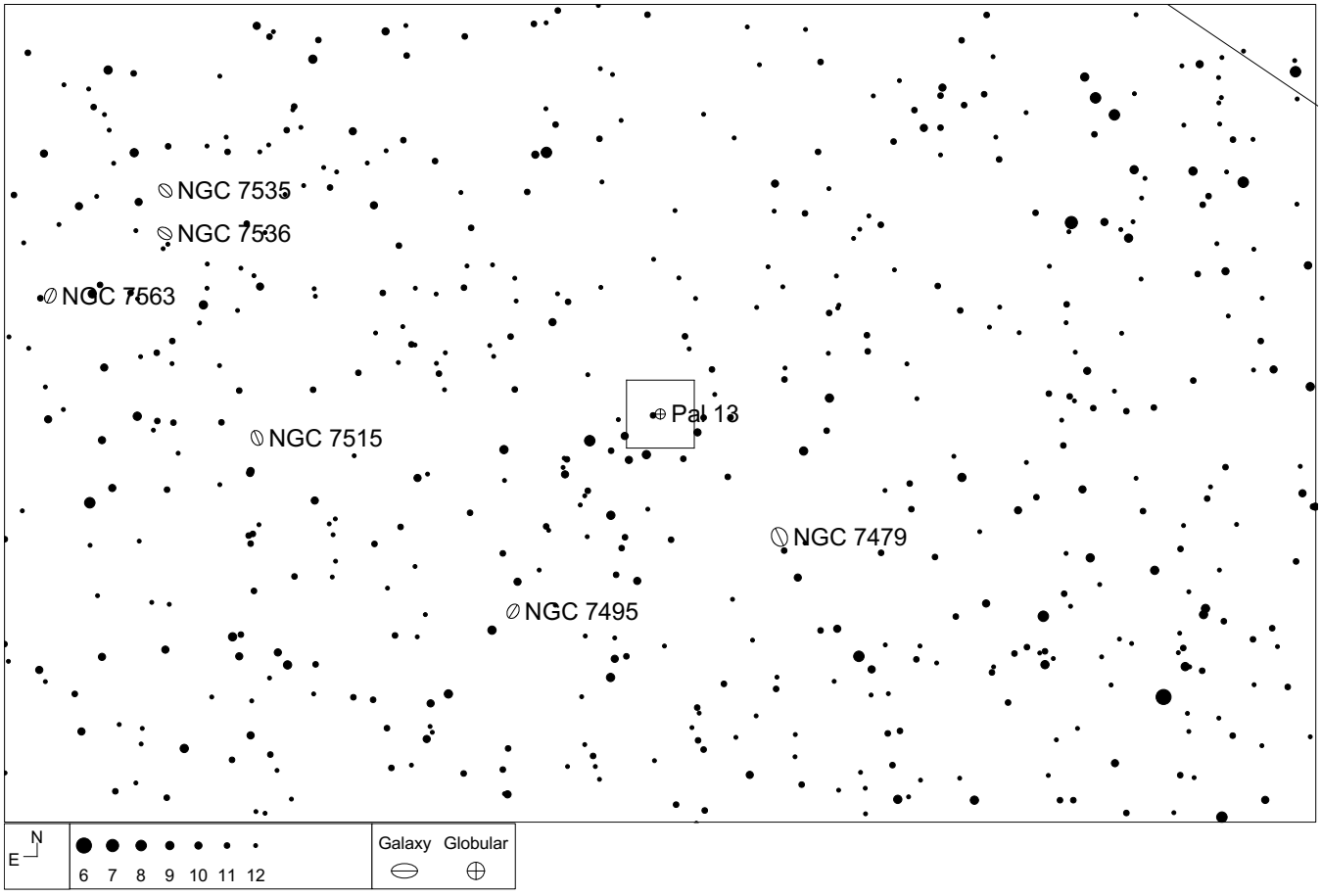




RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
21 46 38.8	-21 15 03	11.7	17.1	14.6	14	2.9’

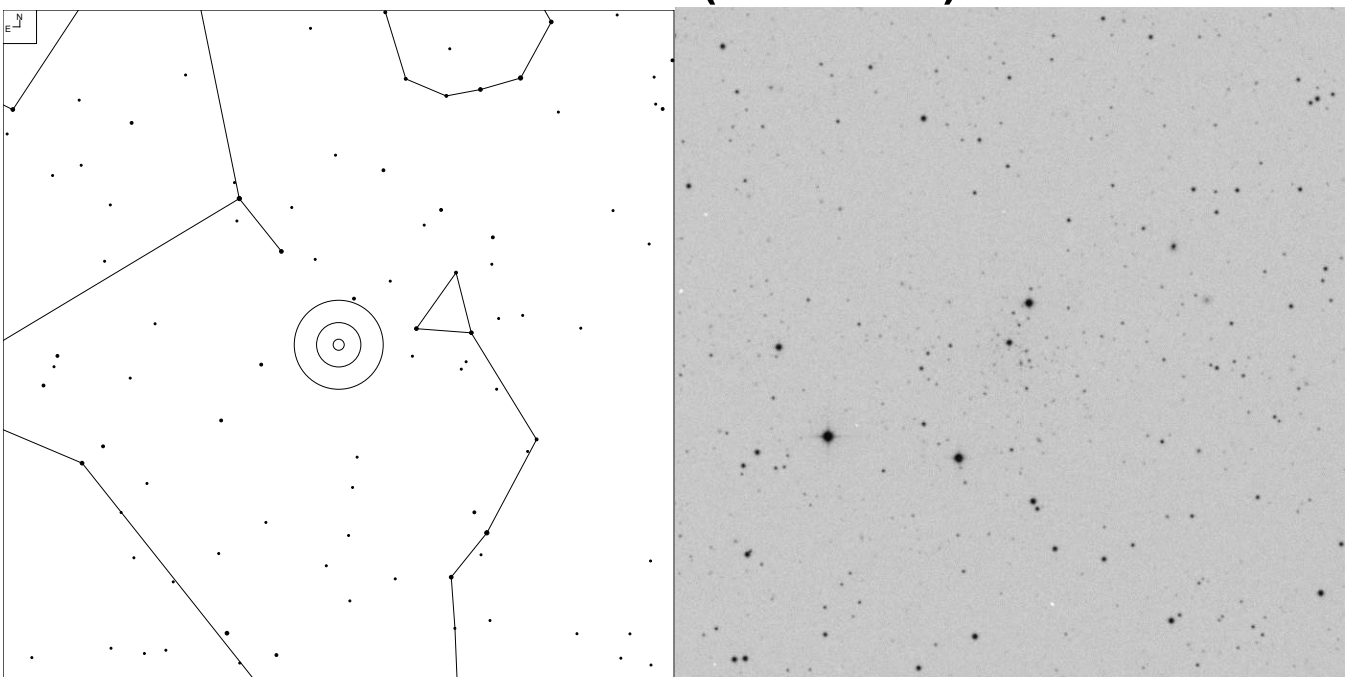
Palomar 13 (Pegasus)

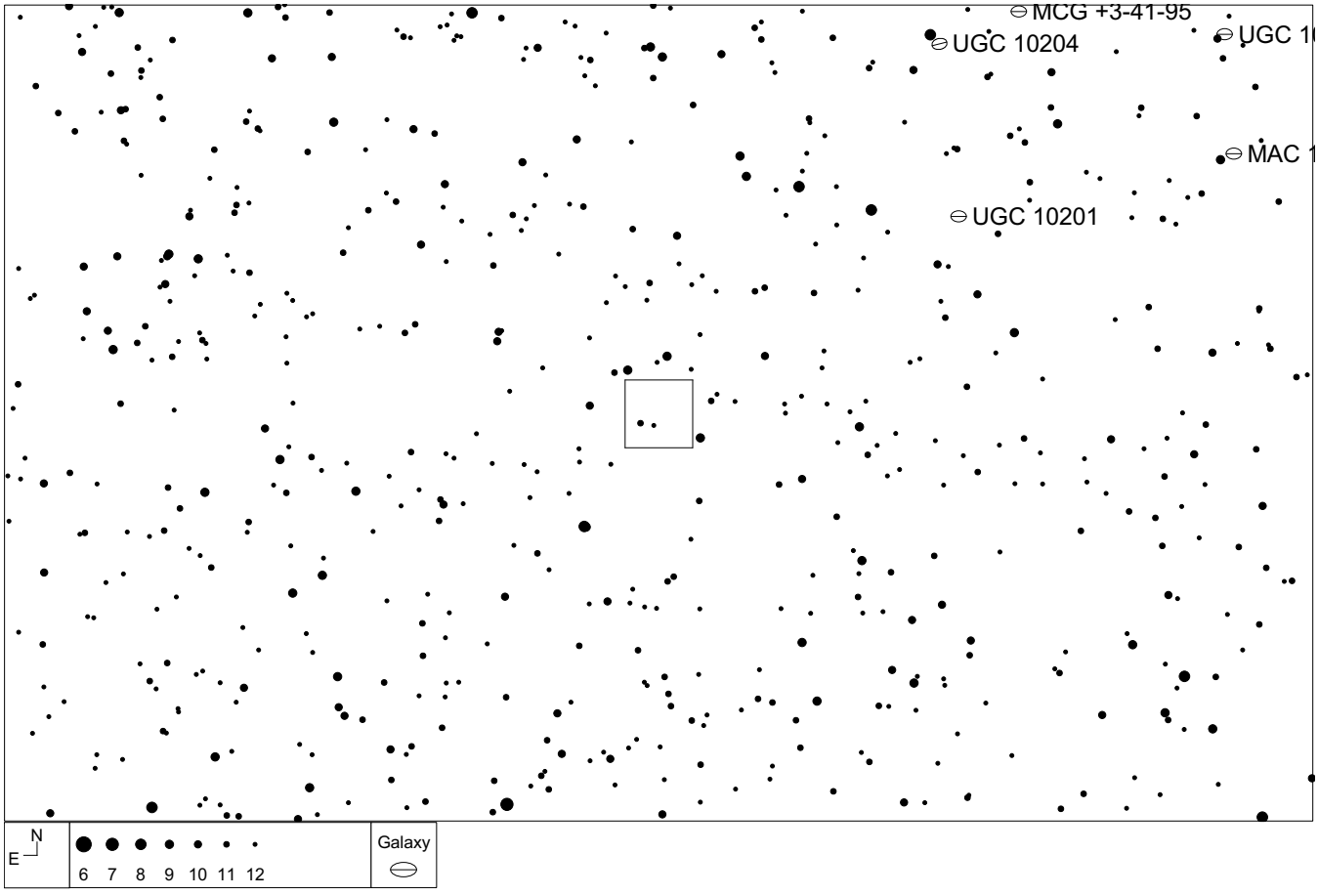




RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
23 06 44.4	+12 46 19	13.8	17.7	17	13	0.7’

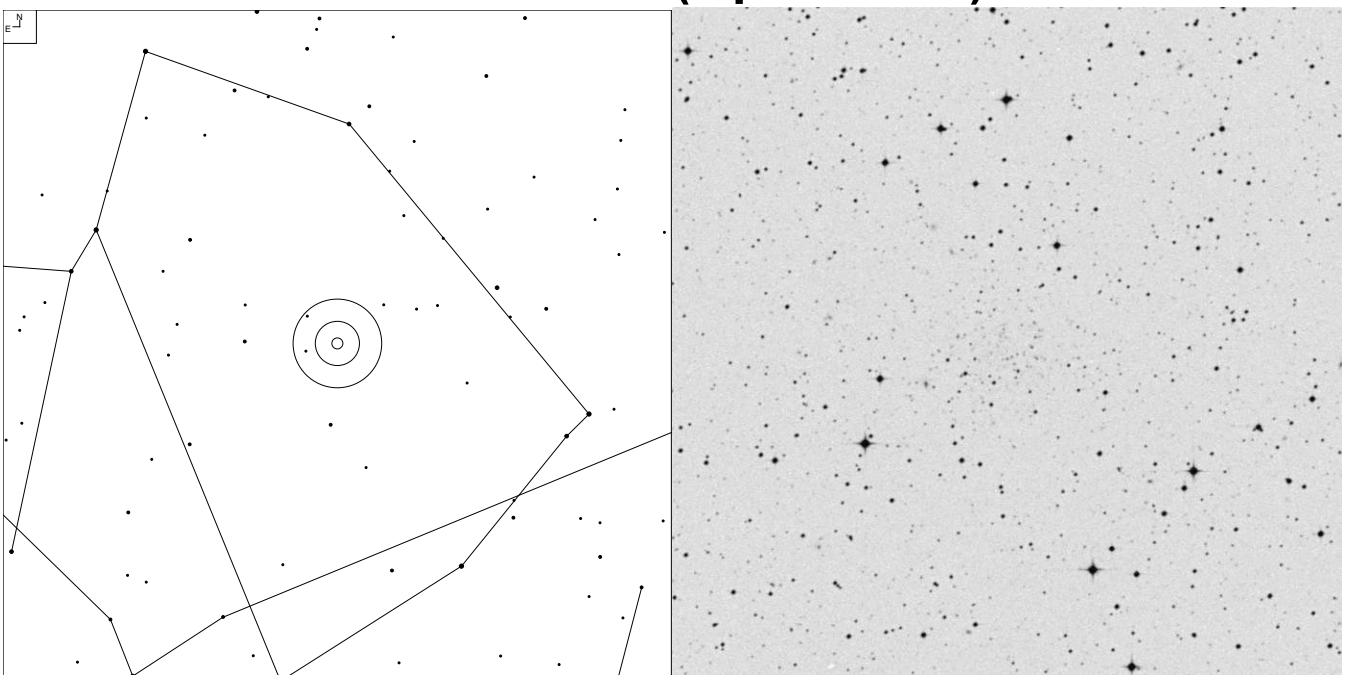
Palomar 14 (Hercules)

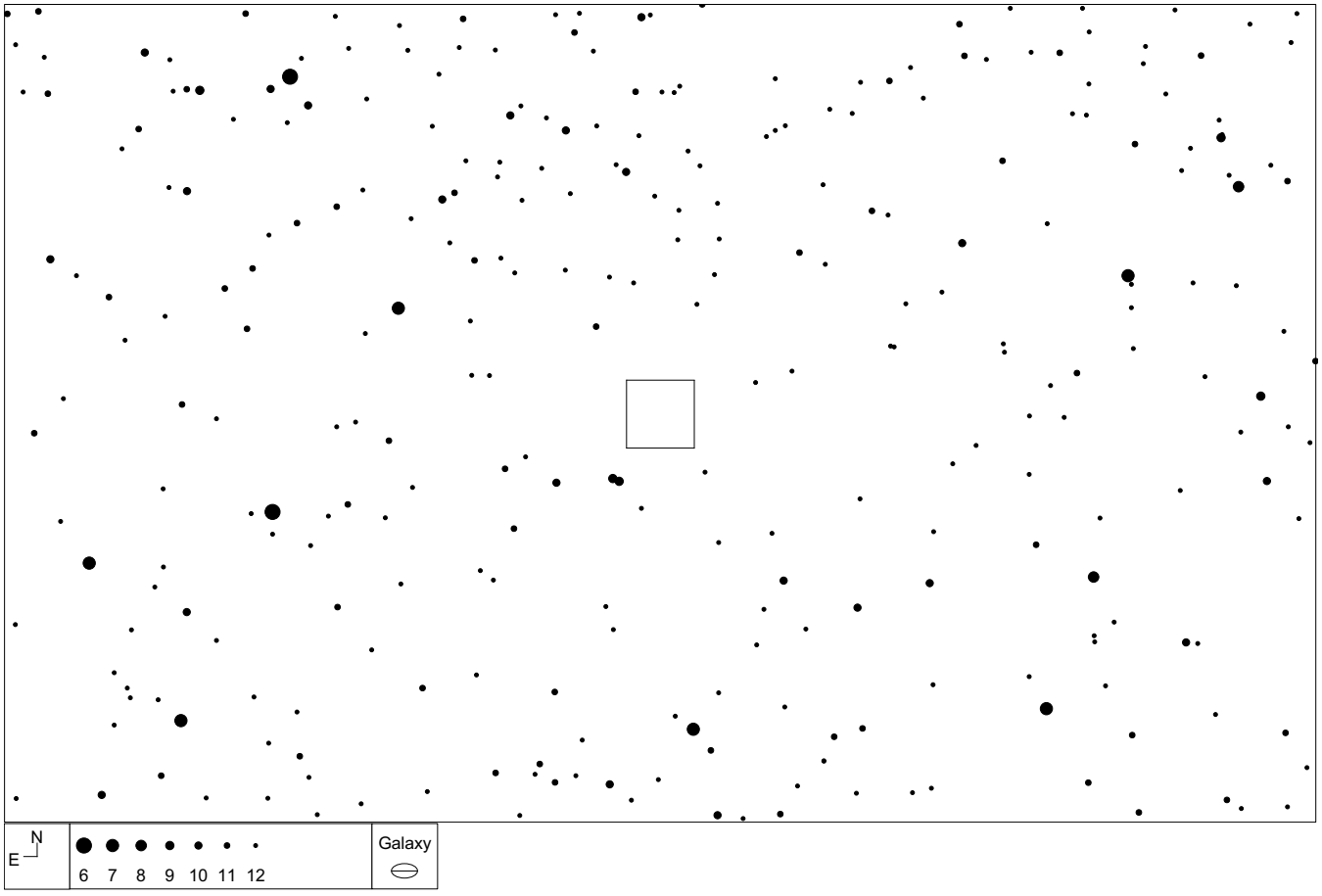




RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
16 11 00.3	+14 57 49	14.7	20	17.6	16.7	2.5’

Palomar 15 (Ophiuchus)

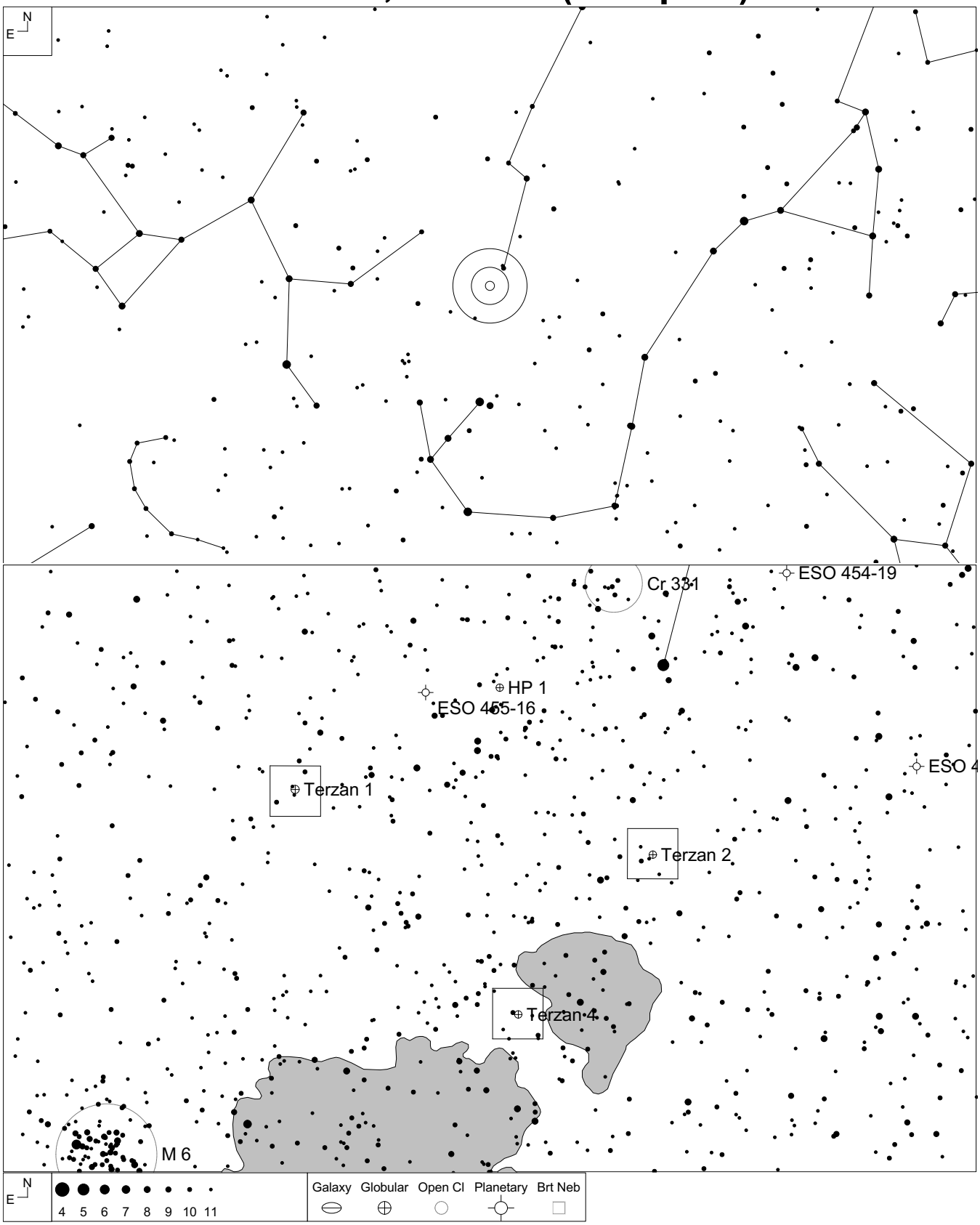




RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
16 59 50.7	-00 31 59	14.2	19.9	17.1	-	3.0’

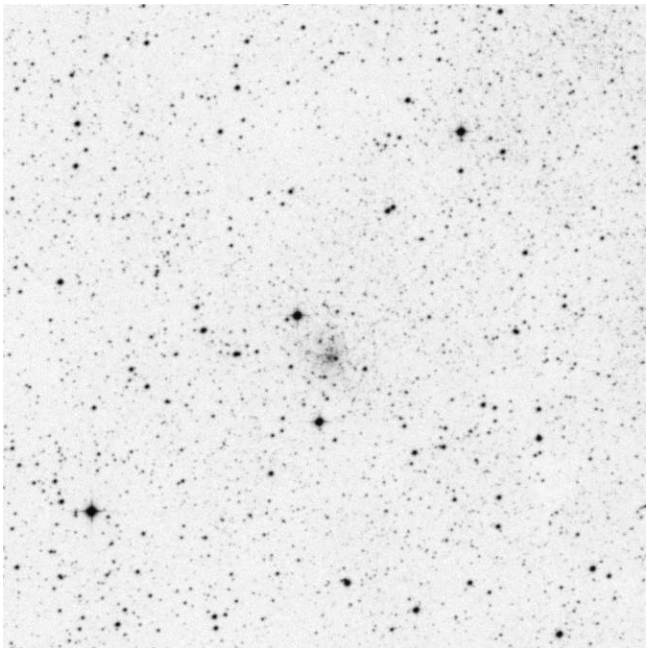
Terzan Globular Clusters

Terzan 1, 2 and 4 (Scorpius)

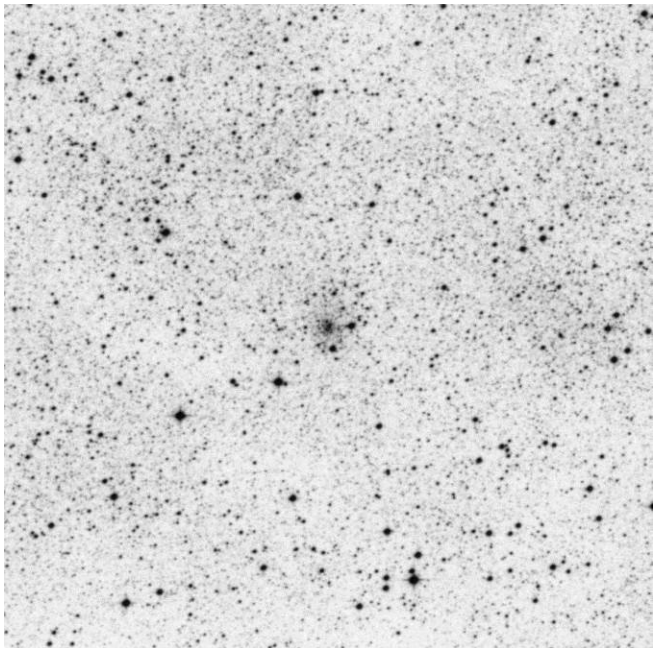


Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
Terzan 1	17 35 47.0	-30 28 46	15.9	21.4	18.5	-	2.4’
Terzan 2	17 27 33.4	-30 48 08	14.3	19.8	-	13.2	0.6’
Terzan 4	17 30 38.9	-31 35 44	16	21.6	-	-	0.7’

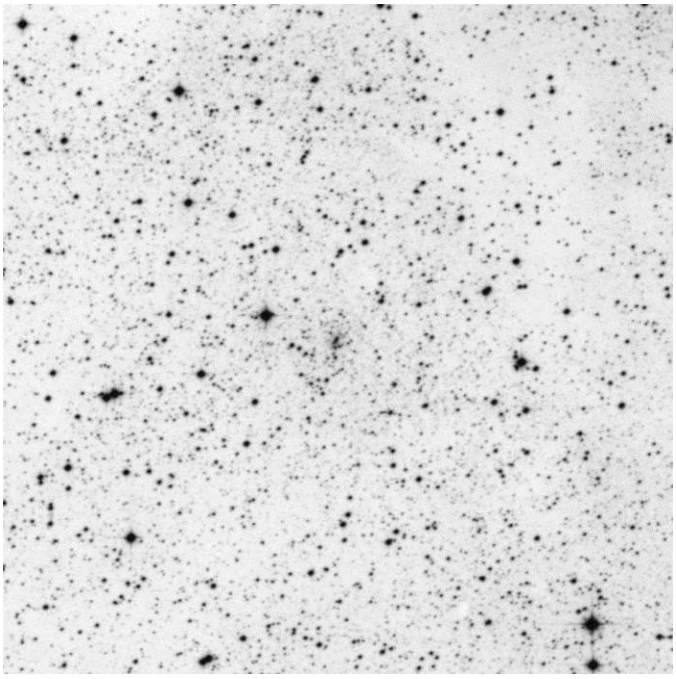
Terzan 1



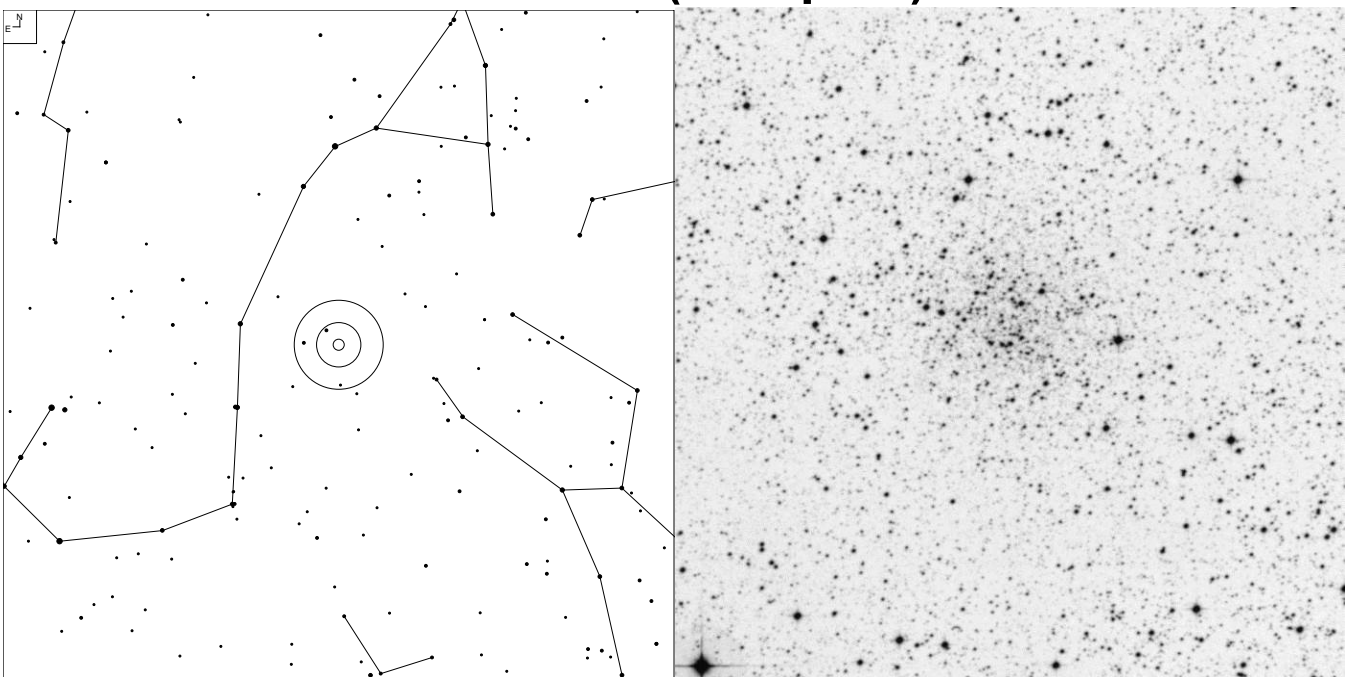
Terzan 2

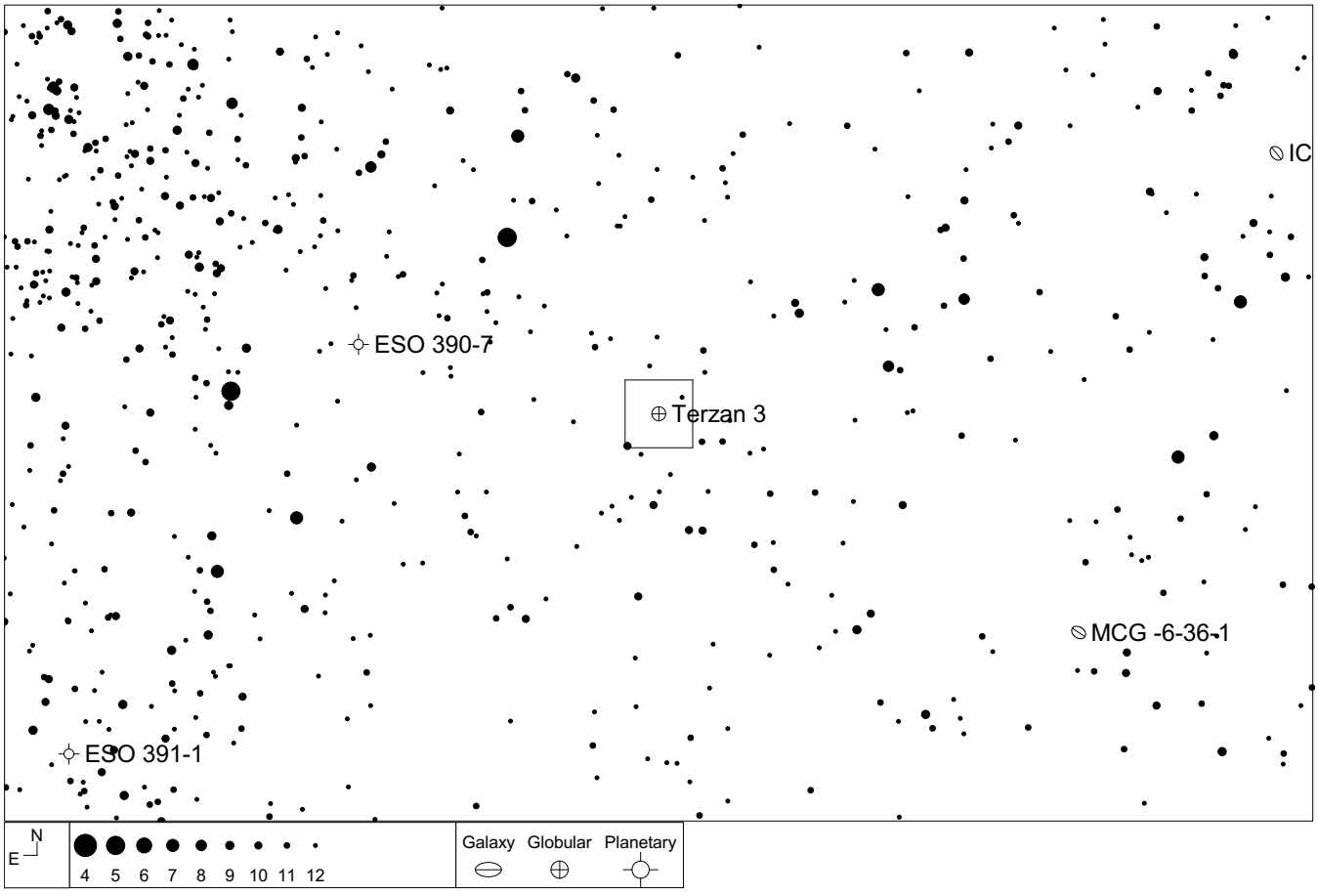


Terzan 4



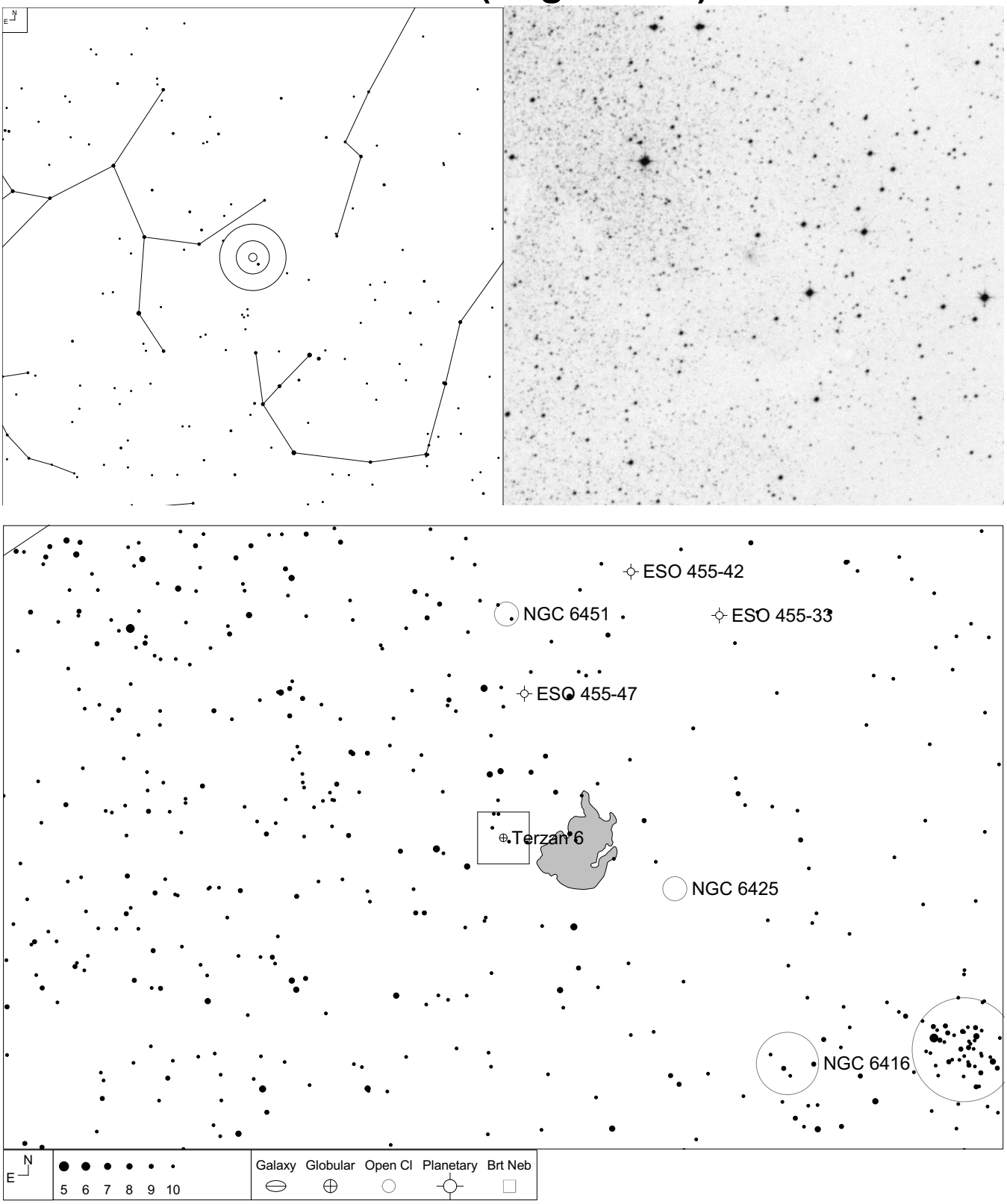
Terzan 3 (Scorpius)





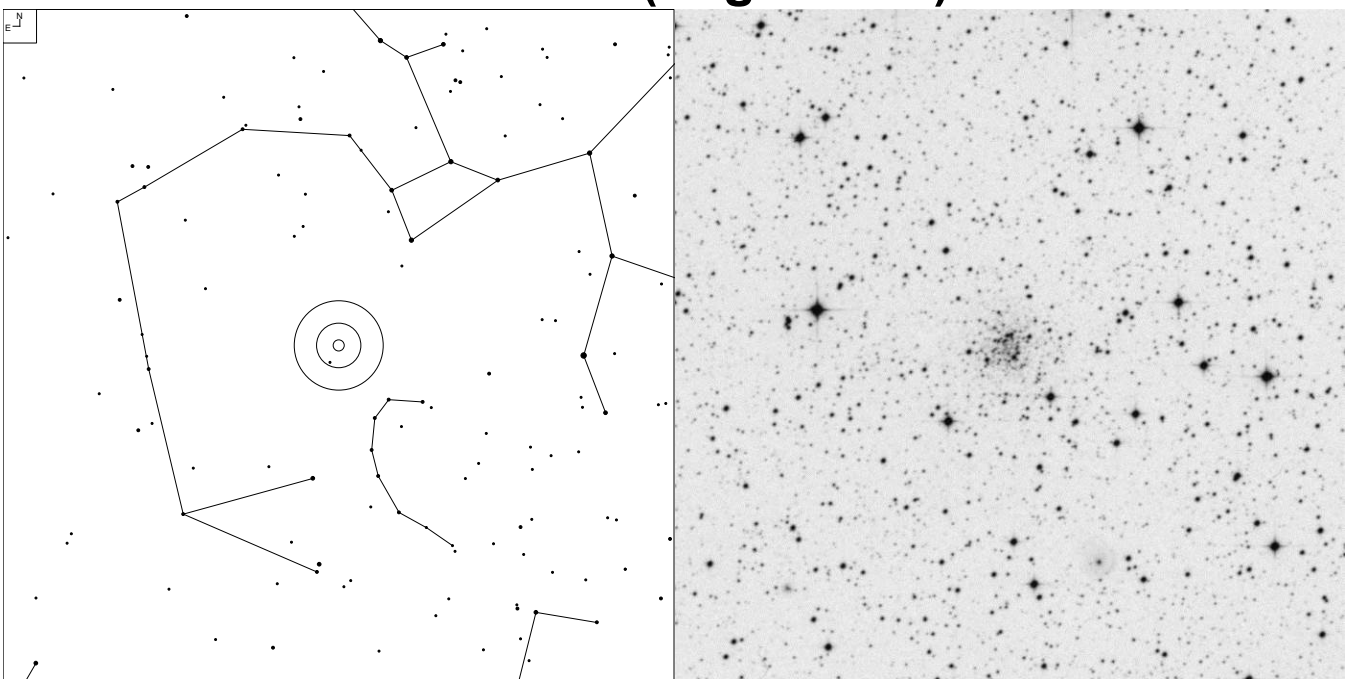
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
16 28 40.1	-35 21 13	12	17.3	15	-	3.0’

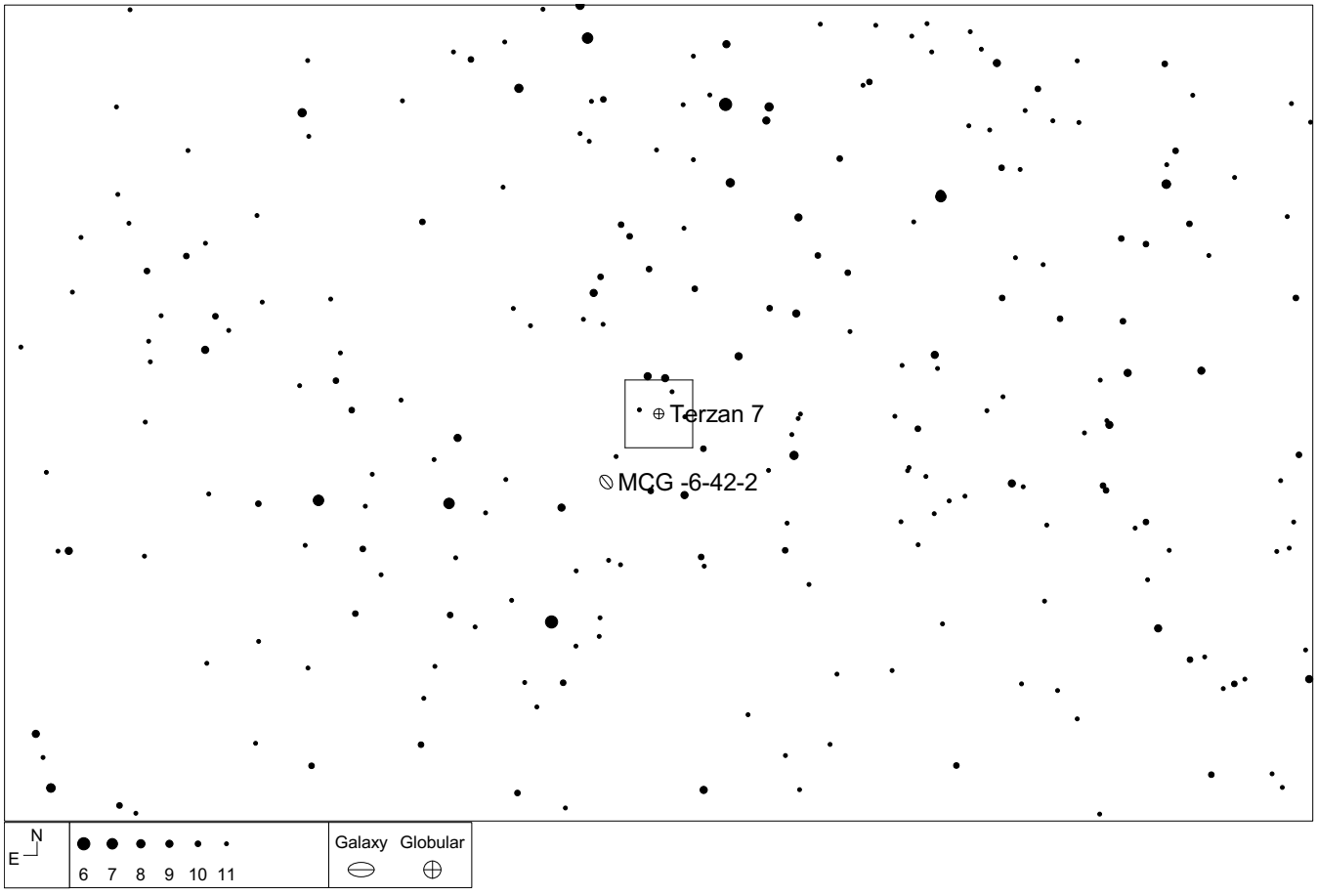
Terzan 6 (Sagittarius)



RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
17 50 46.4	-31 16 31	13.9	22.3	20.5	14.6	1.4’

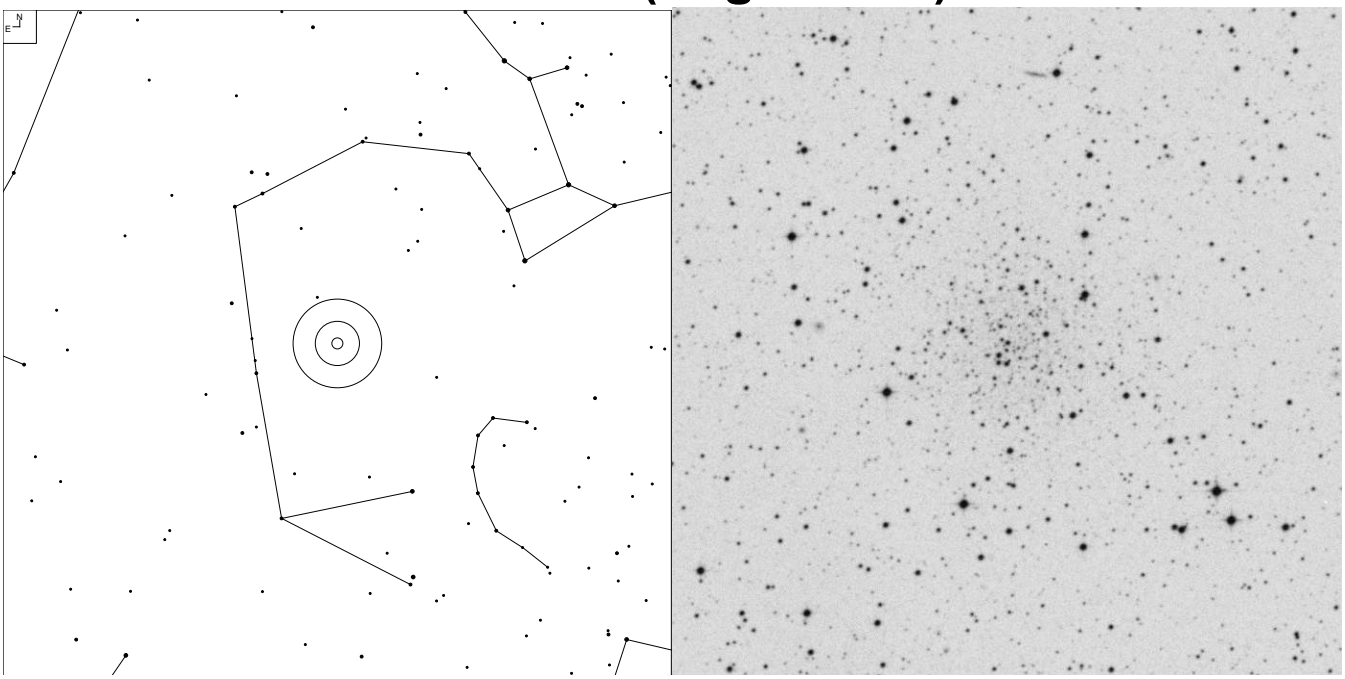
Terzan 7 (Sagittarius)

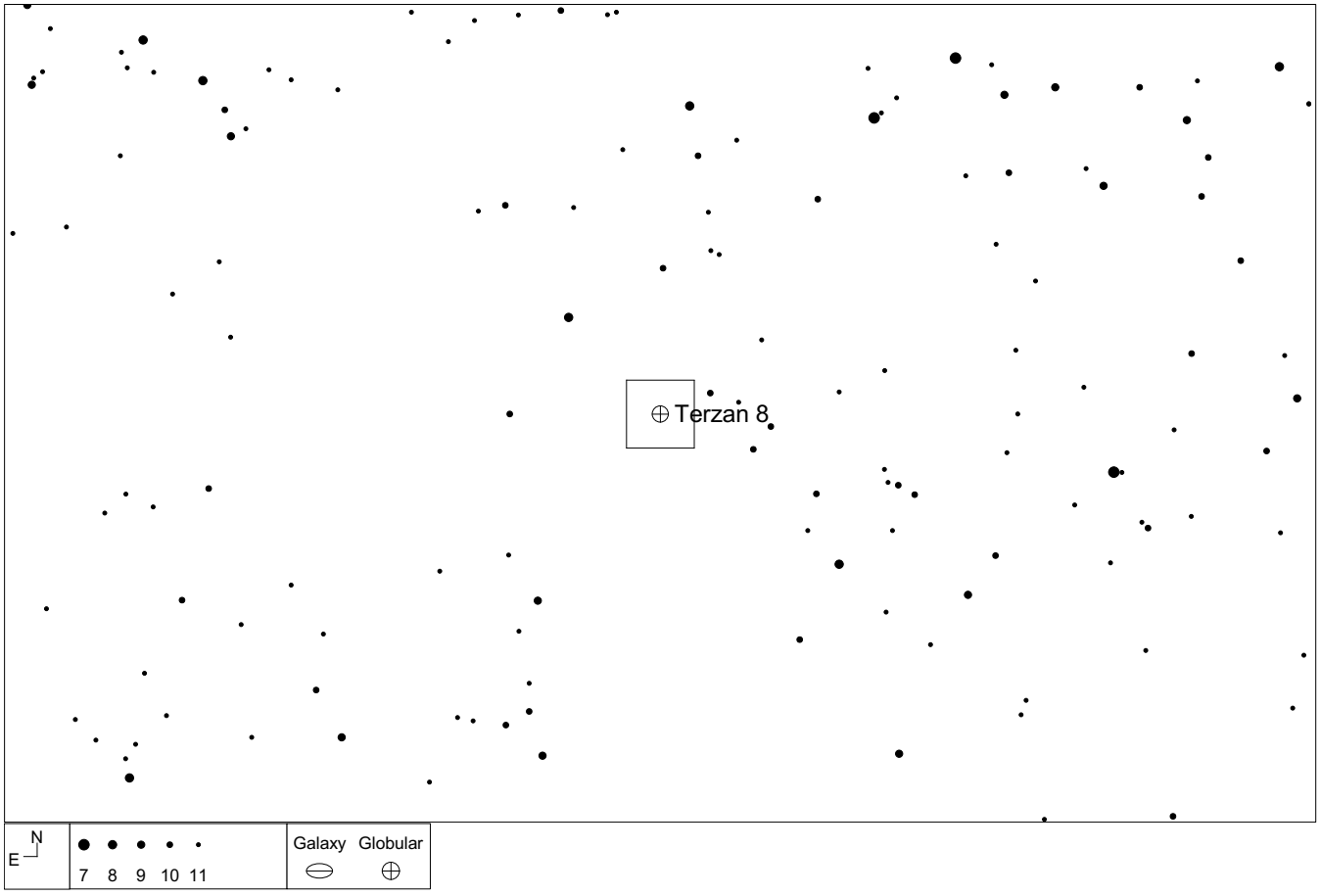




RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
19 17 43.7	-34 39 27	12	17.9	15	-	1.2

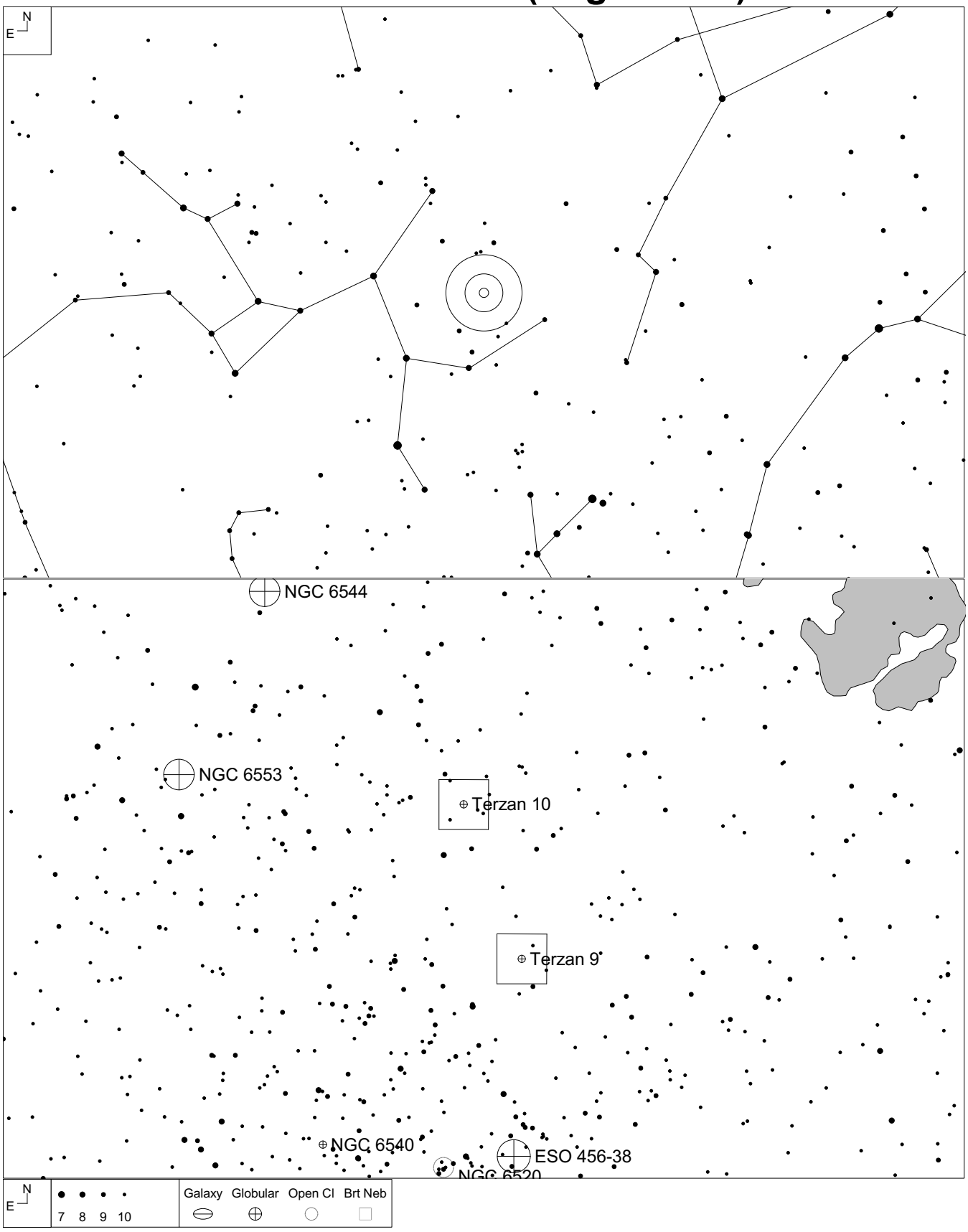
Terzan 8 (Sagittarius)





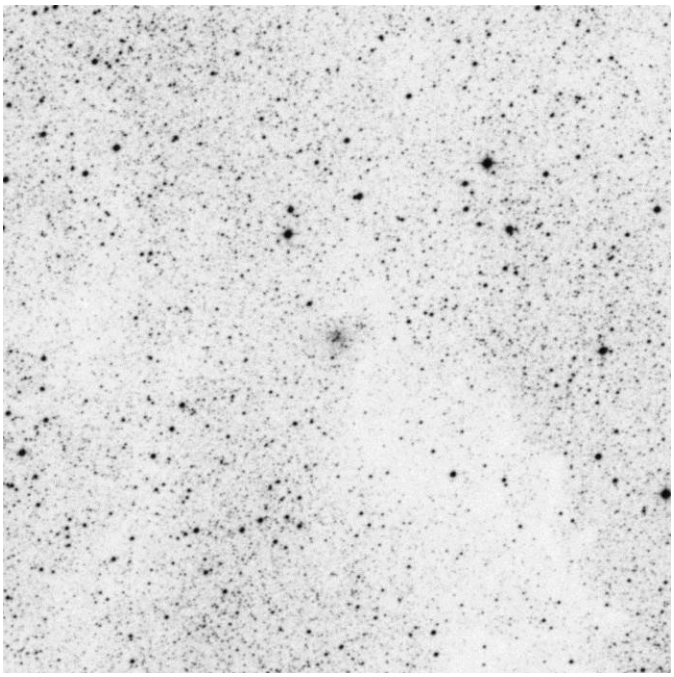
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
19 41 45.0	-34 00 01	12.4	18	15	-	3.5

Terzan 9 and 10 (Sagittarius)

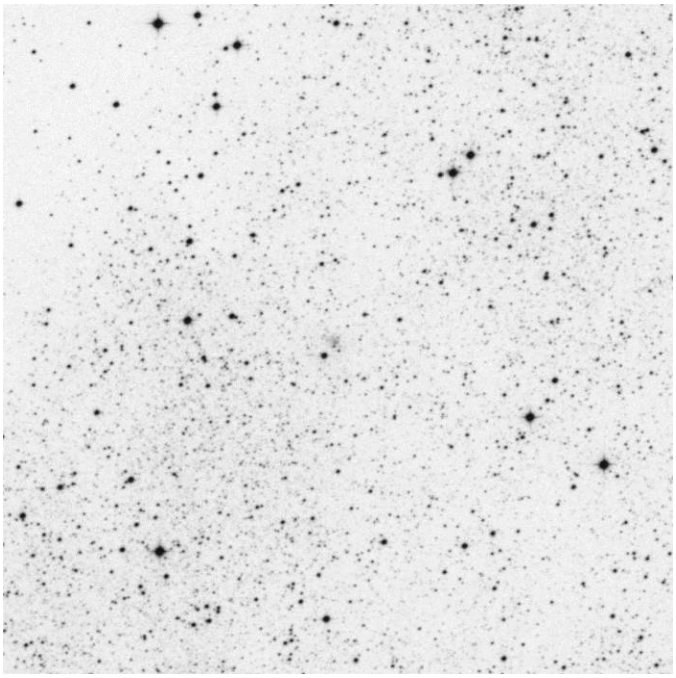


Object	RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
Terzan 9	18 01 38.8	-26 50 23	16	20.3	17.2	12.5	0.2’
Terzan 10	18 02 57.0	-26 04 00	14.9	21.9	19.7	15.8	1.5’

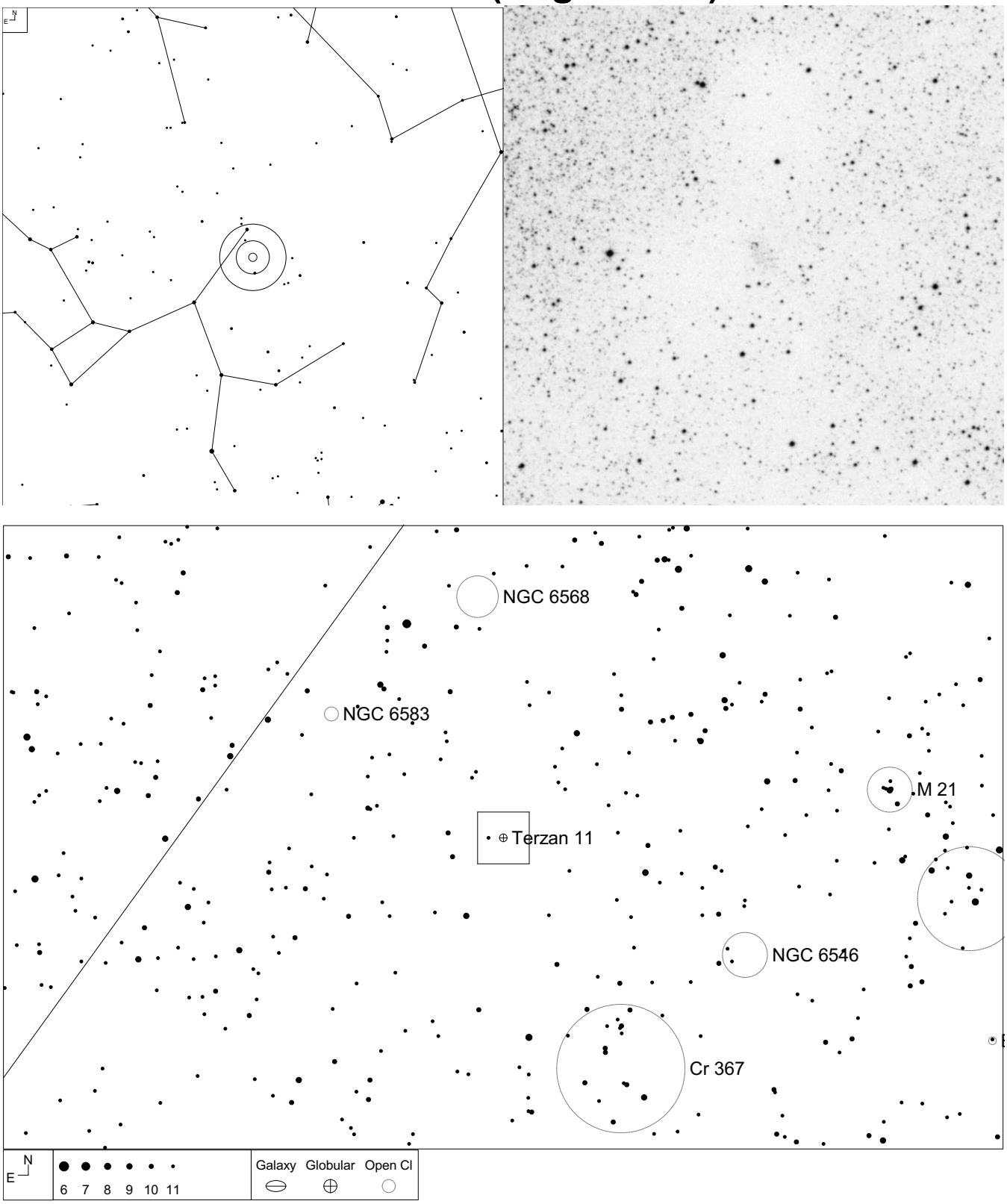
Terzan 9



Terzan 10



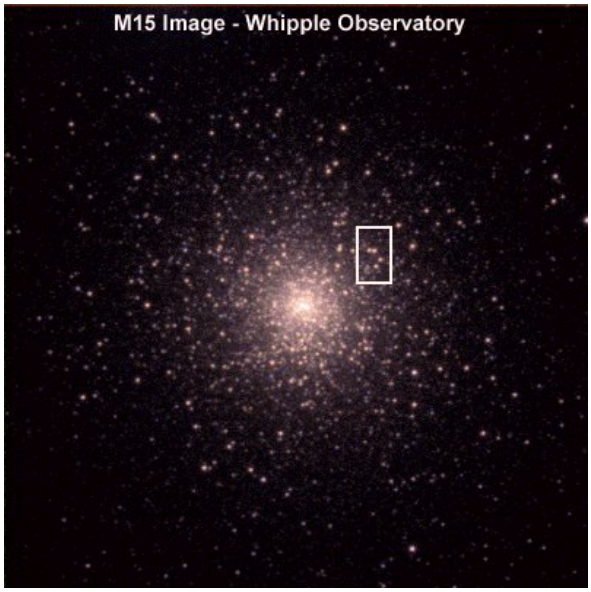
Terzan 11 (Sagittarius)



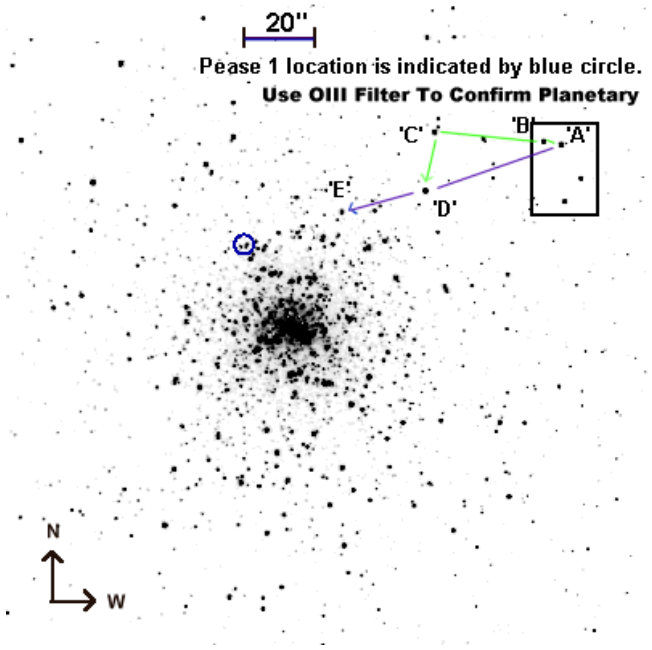
RA	Dec	V_{mag}	HB_{Mag}	Bt^*_{Mag}	SB	Size
18 12 15.8	-22 44 31	16.4	20.5	18.5	-	1.0’

Planetary Nebulae Within Globular Clusters

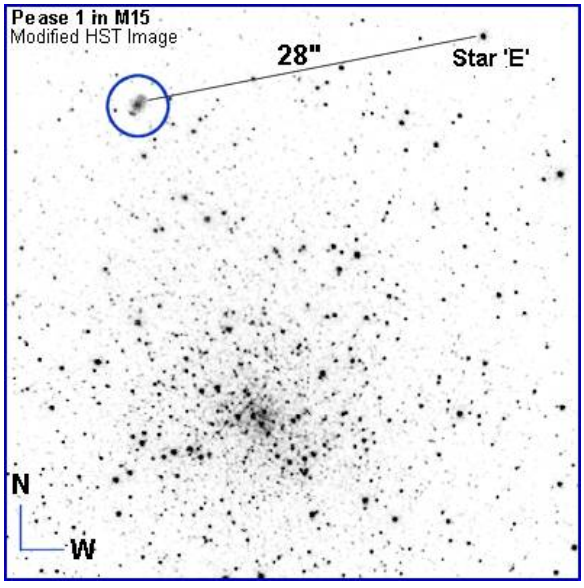
Pease 1 (M15)



Find the 4 trapezium stars inside the 'box', then proceed to the next finder chart. These stars are only the start of a grand star-hoppin' adventure. In these images, North is up, and West is to the right.



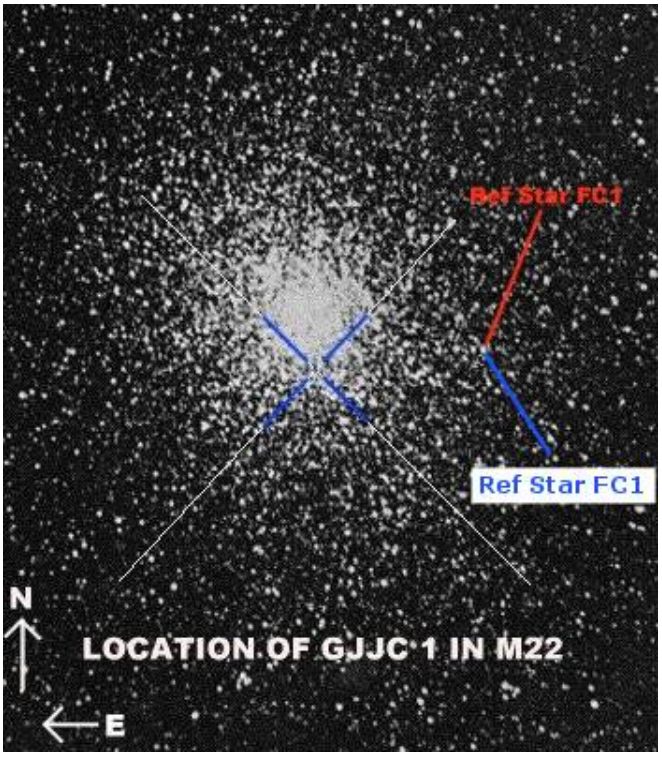
Use the 4 trapezium stars in the 'box' as starters; first you want to locate star 'D by star-hopping from 'A' to 'B' to 'C' and then to 'D' *(green lines)*. Stars A, B, C, and D have similar magnitudes, although B and C are slightly fainter. Once you have located 'D', then draw an imaginary line between stars 'A' and 'D'. Continue this line through to where star 'E' is (about 20 arc seconds SE). When you have located star 'E', then use Finder Chart 3 which is a modified Hubble image.



From star 'E' continue the line SE not quite half an arc minute until you can observe a small clump of stars. *(I know, everything in the field is a clump of stars!)* Notice that of the three stars circled, the PN is the object just slightly to the northwest.
PNe Mag.= 14.9, Surface Brightness = 6, and the angular size of the PN = 1" (arc second).

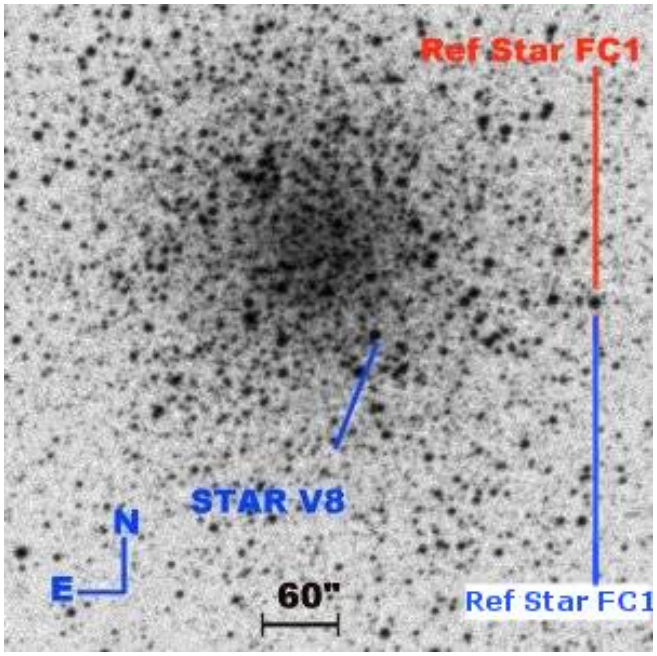
Finder charts and directions reproduced with permission from Doug Snyder www.blackskies.org

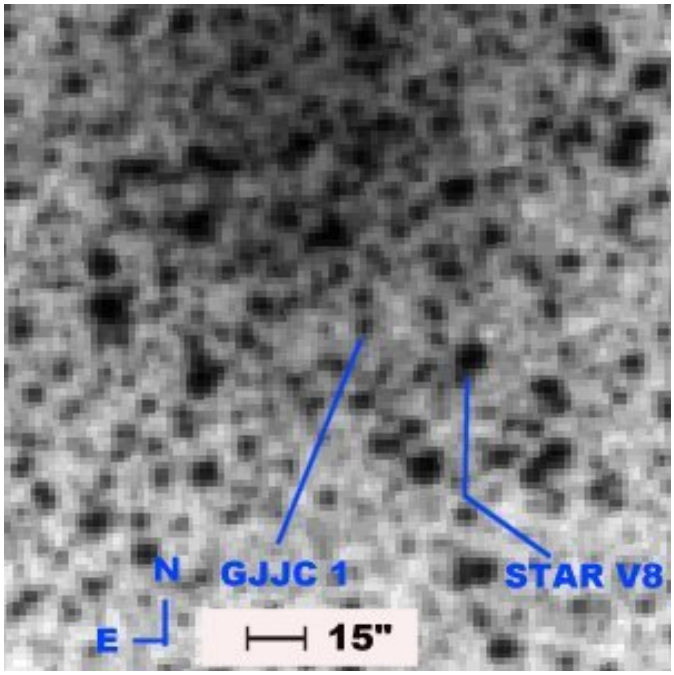
GJJC1 in M22 (Sagittarius)

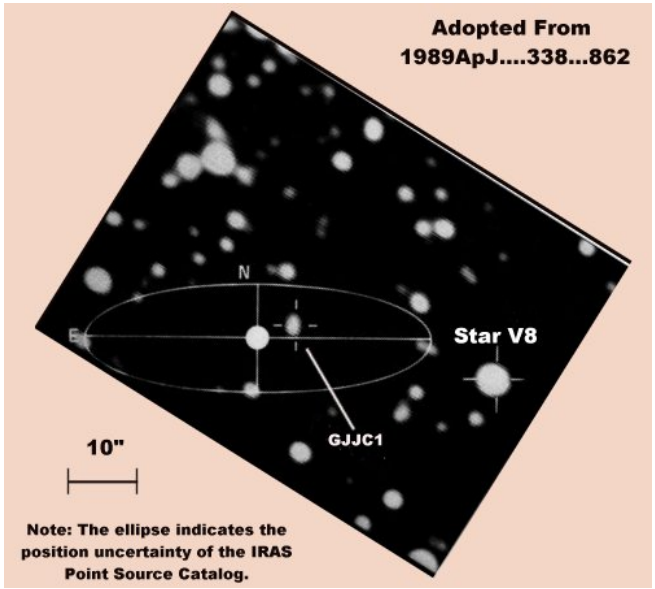


This image shows the overall view of M22 and in general the location of GJJC1. The Reference Star FC1 (arbitrarily chosen) can be a starting point for star hopping to the area of the PNe, but it is also used as a reference on the next image so that we don't lose our bearings. All of the images have North at the top and East to the left.

The reference star V8 on **Image2** (right) is a check point for **Image3** (bottom left), and a rough position is also shown for GJJC1. Now proceed to **Image4** (bottom right) for the final location. Also confirm with the Hubble image found on the next page.



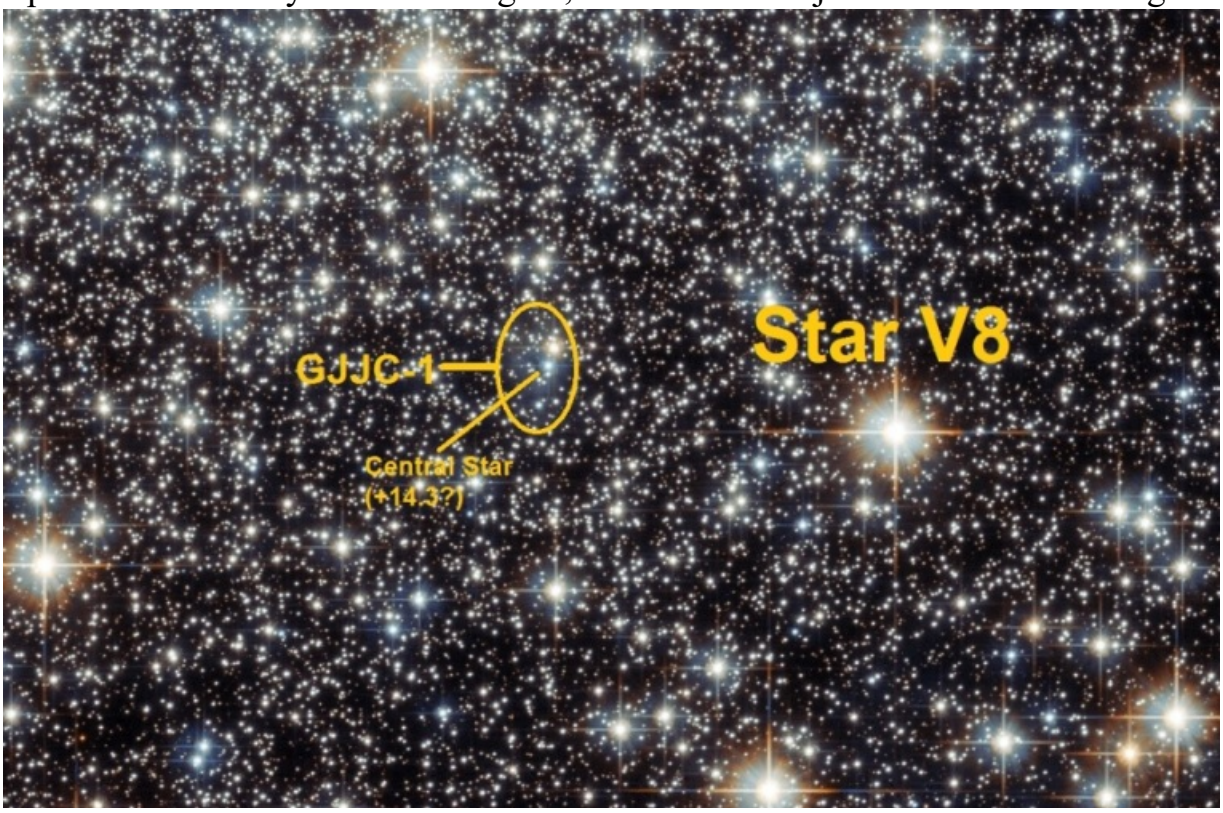




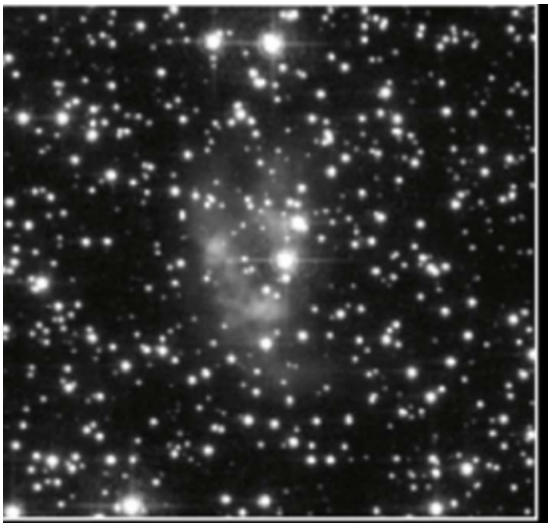
Finder charts and directions reproduced with permission from Doug Snyder
www.blackskies.org

GJJC1 in M22 (Sagittarius)

Upon closer look by Scott Harrington, he found the object in the Hubble image.

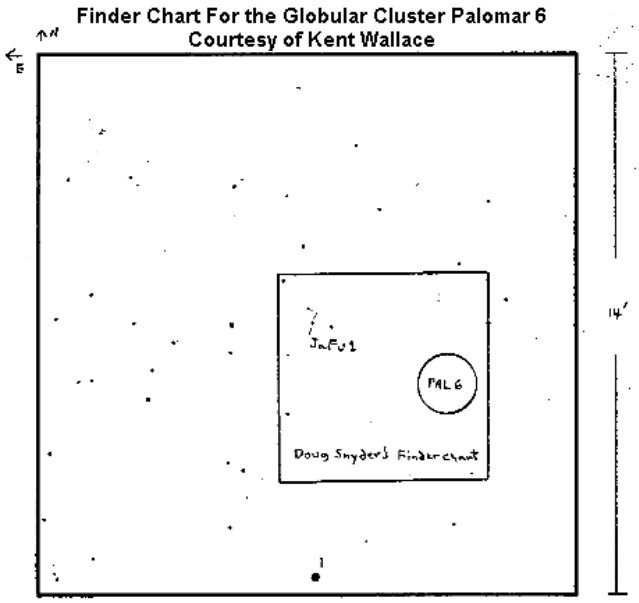


Annotated Hubble image by Scott Harrington

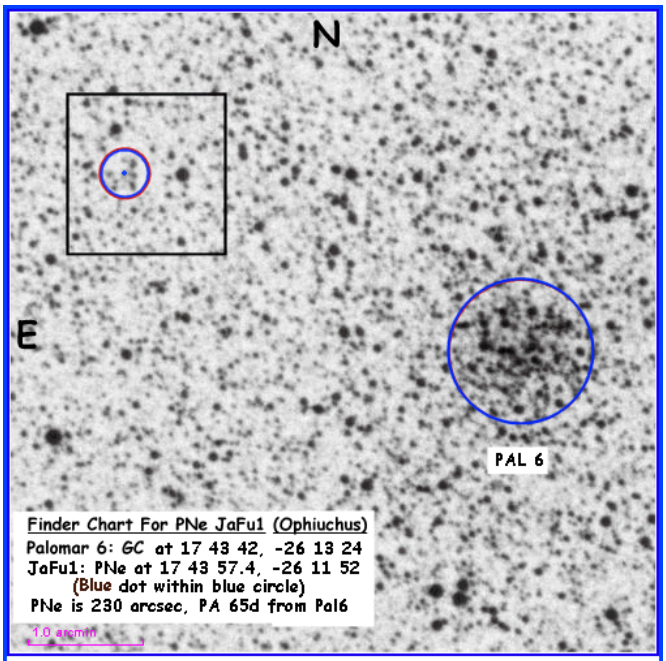


This photo was taken by the Hubble Space Telescope.

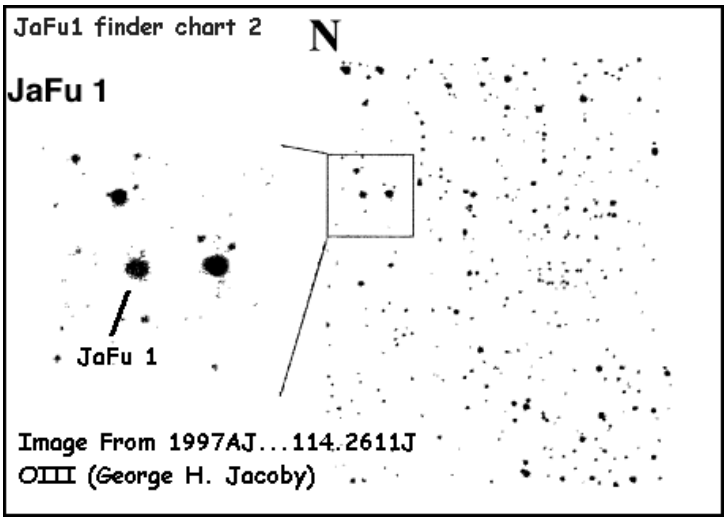
JaFu1 in Palomar 6 (Ophiuchus)



Star 1 is the 8th mag. star SE of PAL 6 shown in Sky Atlas 2000, chart 22 next to the Sagittarius / Ophiuchus border; shown in Uranometria 2000.0, chart 338 and shown in Millennium Atlas Chart 1393. Coordinates for Star 1 are RA 17h 43.9m, Dec -26d 18m (2000.0)

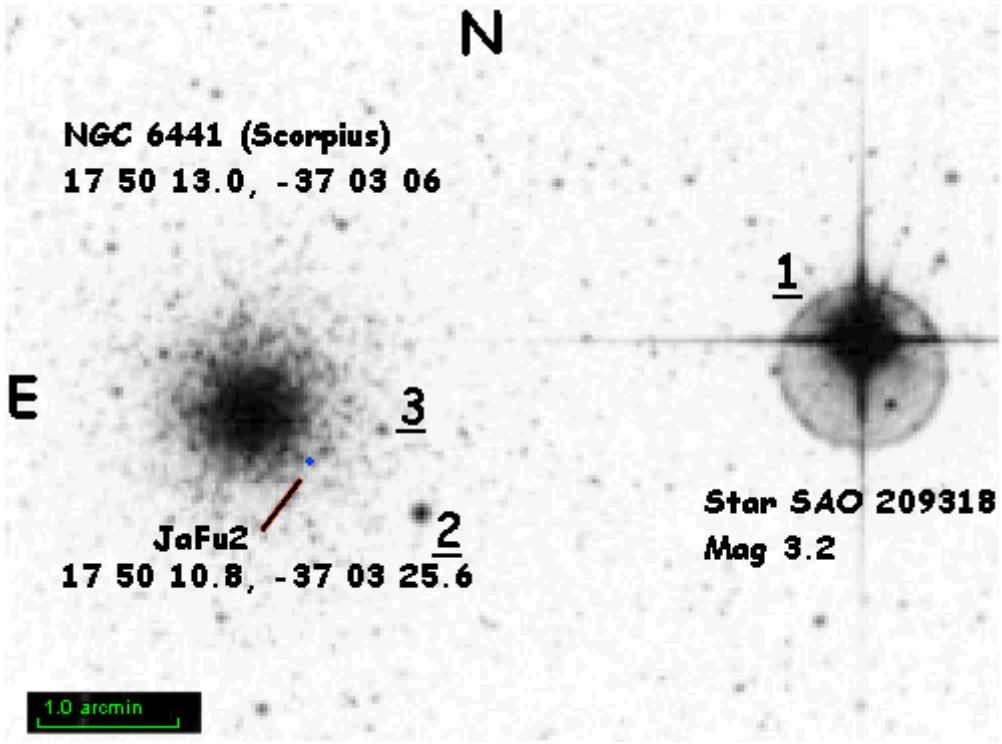


The outlined black rectangle indicates the area shown in finder chart 2 below.



Finder charts and directions reproduced with permission from Doug Snyder
www.blackskies.org

JaFu2 in NGC 6441 (Scorpius)



Finder charts and directions reproduced with permission from Doug Snyder
www.blackskies.org

Index sorted by Object Name

Page	Name	Const	Vmag	HBMag	Bt*Mag	SB	Size (‘)
48	[PWM78] 2	Oph	-	-	-	-	2
58	1636-283 (ESO 452-SCII)	Sco	12	16.6	15.3	12.4	1.2
74	2MASS-GC1	Sgr	27.7	-	-	-	3.3
74	2MASS-GC2	Sgr	24.6	-	-	-	1.9
69	AL 3	Sgr	14.0	-	-	-	1.3
32	AM 4	Hyd	15.9	21.6	20.5	18.3	3
81	Arp GC2	Sgr	13	18.2	15.5	14.8	2.3
65	Djorgovski 1	Sco	13.6	20.8	-	13.1	0.8
14	Eridanus Cluster	Eri	14.7	20.4	17.6	-	-
68	ESO 280-SC06	Ara	12.0	17.4	14	-	1.4
76	ESO 456-SC38	Sgr	9.9	17.6	15.5	14.9	9.9
67	FSR 1735	Ara	12.9	-	-	-	0.8
95	G1 (M31 GC)	And	13.7	-	-	12.2	0.5
96	G78, Vitesnik (M31 GC)	And	14.2	-	-	12.2	0.4
124	GJJC1 in M22	Sgr	-	-	-	-	-
45	Haute Provence 1	Oph	12.5	18.6	16	12.9	1.2
44	IC 1257	Oph	13.1	19.8	17	14.3	1.7
126	JaFu1 in Palomar 6	Oph	-	-	-	-	-
127	JaFu2 in NGC 6441	Sco	-	-	-	-	-
27	Koposov 1	Vir	14.2	-	-	-	-
19	Koposov 2	Gem	17.6	-	-	-	-
61	Liller 1	Sco	15.8	24.4	20.5	13.2	0.3
91	M2 (NGC 7089)	Aqr	6.6	16.1	13.1	12.6	16
24	M3 (NGC 5272)	CVn	6.3	15.6	12.7	12.6	18
56	M4 (NGC 6121)	Sco	5.4	13.4	10.8	13.2	36
38	M5 (NGC 5904)	Oph	5.7	15	12.2	12.5	23
53	M9 (NGC 6333)	Oph	7.8	16.2	13.5	13.2	12
40	M10 (NGC 6254)	Oph	6.6	15.1	12	13.1	20
40	M12 (NGC 6218)	Oph	6.1	14.7	12	12.1	16
30	M13 (NGC 6205)	Her	5.8	15	11.9	12.3	20
43	M14 (NGC 6402)	Oph	7.6	17.2	14	12.8	11
93	M15 (NGC 7078)	Peg	6.3	15.9	12.6	12.6	18
50	M19 (NGC 6273)	Oph	6.8	17	14	13	17
77	M22 (NGC 6656)	Sgr	5.2	14.2	10.7	12.7	32
77	M28 (NGC 6626)	Sgr	6.9	15.7	12	12.6	13.8
90	M30 (NGC 7099)	Cap	6.9	15.1	12.1	12.3	12
23	M53 (NGC 5024)	Com	7.7	16.9	13.8	13.3	13
79	M54 (NGC 6715)	Sgr	7.7	18.2	15.2	13.1	12
81	M55 (NGC 6809)	Sgr	6.3	14.4	11.2	12.7	19

Page	Name	Const	Vmag	HBMag	Bt*Mag	SB	Size (‘)
83	M56 (NGC 6779)	Cyg	8.4	16.3	13.2	13.1	8.8
52	M62 (NGC 6266)	Oph	6.4	16.3	13.2	12.3	15
33	M68 (NGC 4590)	Hyd	7.3	15.6	12.6	12.5	11
78	M69 (NGC 6637)	Sgr	7.7	15.9	13.7	12.7	9.8
78	M70 (NGC 6681)	Sgr	7.8	15.6	13	12.3	8
84	M71 (NGC 6838)	Sge	8.4	14.5	12.1	-	7.2
89	M72 (NGC 6981)	Aqr	9.2	16.9	14.2	13.3	6.6
82	M75 (NGC 6864)	Sgr	8.6	17.5	14.6	12.8	6.8
16	M79 (NGC 1904)	Lep	7.7	16.2	13.1	12.6	9.6
57	M80 (NGC 6093)	Sco	7.3	16.2	12.5	12.3	10
31	M92 (NGC 6341)	Her	6.5	15.2	12.1	12.2	14
39	M107 (NGC 6171)	Oph	7.8	15.6	13	13.4	13
12	NGC 288	Scl	8.1	15.3	12.6	13.7	13
15	NGC 1851	Col	7.1	16.1	13.2	12.5	12
17	NGC 2298	Pup	9.3	16.2	13.4	12.8	5
18	NGC 2419	Lyn	10.3	20.2	17.3	13.6	4.6
21	NGC 3201	Vel	6.9	14.8	11.7	13.4	20
22	NGC 4147	Com	10.4	16.9	14.5	13.6	4.4
23	NGC 5053	Com	9	16.7	13.8	14	10
25	NGC 5466	Boo	9.2	16.6	13.8	14	9
28	NGC 5634	Vir	9.5	17.8	-	13.2	5.5
34	NGC 5694	Hyd	10.2	18.5	15.5	13.4	4.3
36	NGC 5824	Lup	9.1	18.5	15.5	13.4	7.4
37	NGC 5897	Lib	8.4	16.3	13.3.	13.6	11
35	NGC 5986	Lup	7.6	16.5	13.2	12.5	9.6
59	NGC 6139	Sco	9.1	17.9	15	13.7	8.2
56	NGC 6144	Sco	9	16.5	13.4	13.3	7.4
29	NGC 6229	Her	9.4	18	15.5	12.7	4.5
41	NGC 6235	Oph	8.9	16.7	14	12.4	5
60	NGC 6256	Sco	11.3	18.2	15.3	14.4	4.1
42	NGC 6284	Oph	8.9	16.6	-	12.9	6.2
41	NGC 6287	Oph	9.3	17.1	14.5	12.7	4.8
50	NGC 6293	Oph	8.3	16.5	14.3	12.9	8.2
52	NGC 6304	Oph	8.3	16.2	14.5	12.8	8
52	NGC 6316	Oph	8.1	17.8	15	11.8	5.4
42	NGC 6325	Oph	10.2	17.3	14.7	13.3	4.1
53	NGC 6342	Oph	9.5	16.9	15	12.7	4.4
51	NGC 6355	Oph	8.6	17.2	-	11.7	4.2
53	NGC 6356	Oph	8.2	17.7	15.1	13.2	10
44	NGC 6366	Oph	9.5	15.7	13.6	15.1	13
64	NGC 6380	Sco	11.5	19.5	17	14.3	3.6
62	NGC 6388	Sco	6.8	17.2	14.8	11.9	10.4

Page	Name	Const	Vmag	HBMag	Bt*Mag	SB	Size (‘)
54	NGC 6401	Oph	7.4	18	15.5	8.7	1.8
46	NGC 6426	Oph	10.9	18.1	15.2	14	4.2
55	NGC 6440	Sgr	9.3	18.7	16.7	12.5	4.4
66	NGC 6441	Sco	7.2	17.5	15.4	12.1	9.6
66	NGC 6453	Sco	10.2	17.5	14.3	14.6	7.6
63	NGC 6496	CrA	8.6	16.5	14.3	12.3	5.6
47	NGC 6517	Oph	10.1	18	16	13.1	4
70	NGC 6522	Sgr	9.9	16.9	14.1	14.8	9.4
70	NGC 6528	Sgr	9.6	17.1	15.5	13.1	5
49	NGC 6535	Oph	9.3	15.8	12.8	12	3.4
47	NGC 6539	Oph	8.9	18.3	15.9	13.4	7.9
76	NGC 6540	Sgr	14.6	15.3	-	15.5	1.5
63	NGC 6541	CrA	6.3	15.3	12.1	12.2	15
75	NGC 6544	Sgr	7.5	14.9	12.8	12.3	9.2
75	NGC 6553	Sgr	8.3	16.9	15.3	13.1	9.2
71	NGC 6558	Sgr	8.6	16.7	-	-	4.2
71	NGC 6569	Sgr	8.4	17.5	14.9	12.4	6.4
72	NGC 6624	Sgr	7.6	16.1	14	12.3	8.8
77	NGC 6638	Sgr	9.2	16.5	14.2	13.5	7.3
77	NGC 6642	Sgr	8.9	16.3	-	12.7	5.8
78	NGC 6652	Sgr	8.5	16	13.3	12.4	6
86	NGC 6712	Scu	8.1	16.3	13.3	13.1	9.8
80	NGC 6723	Sgr	6.8	15.5	12.8	12.4	13
85	NGC 6749	Aql	12.4	19.7	16.5	15.4	4
85	NGC 6760	Aql	9	17.5	15.6	13.8	9
87	NGC 6934	Del	8.9	17.1	13.8	13.2	7.1
88	NGC 7006	Del	10.6	18.8	15.6	13.4	3.6
92	NGC 7492	Aqr	11.2	17.6	15.5	14.3	4.2
98	Palomar 1	Cep	13.6	16.8	16.3	15.8	2.8
99	Palomar 2	Aur	13	21.7	18.8	14.7	2.2
100	Palomar 3	Sex	13.9	20.5	18	14.9	1.6
101	Palomar 4	UMa	14.2	20.8	18	14.8	1.3
38	Palomar 5	Oph	11.8	17.4	15.5	16.3	8
38	Palomar 5	Oph	11.8	17.4	15.5	16.3	8
102	Palomar 6	Oph	11.6	19.1	-	12	1.2
47	Palomar 7	Oph	10.3	17.7	15.7	14.8	8
43	Palomar 7	Oph	10.3	17.7	15.7	14.8	8
104	Palomar 8	Sgr	10.9	17.3	15.4	14.5	5.2
105	Palomar 9 (NGC 6717)	Sgr	8.4	15.6	14	12.1	5.4
106	Palomar 10	Sag	13.2	19.4	18	16.2	4.0
107	Palomar 11	Aql	9.8	17.4	15.5	14.8	10
108	Palomar 12	Cap	11.7	17.1	14.6	14	2.9

Page	Name	Const	Vmag	HBMag	Bt*Mag	SB	Size (‘)
109	Palomar 13	Peg	13.8	17.7	17	13	0.7
110	Palomar 14	Her	14.7	20	17.6	16.7	2.5
111	Palomar 15	Oph	14.2	19.9	17.1	-	3.0
123	Pease 1 in M15	Peg	-	-	-	-	1.0"
26	PSO j174.0675-10.8774	Crt	~16	-	-	-	-
20	Pyxis Cluster	Pyx	12.9	18.7	15.2	15.9	4
113	Terzan 1	Sco	15.9	21.4	18.5	-	2.4
113	Terzan 2	Sco	14.3	19.8	-	13.2	0.6
115	Terzan 3	Sco	12	17.3	15	-	3.0
113	Terzan 4	Sco	16	21.6	-	-	0.7
102	Terzan 5	Sgr	13.9	22.5	20.5	15.8	2.4
102	Terzan 5	Sgr	13.9	22.5	20.5	15.8	2.4
116	Terzan 6	Sgr	13.9	22.3	20.5	14.6	1.4
117	Terzan 7	Sgr	12	17.9	15	-	1.2
118	Terzan 8	Sgr	12.4	18	15	-	3.5
119	Terzan 9	Sgr	16	20.3	17.2	12.5	0.2
119	Terzan 10	Sgr	14.9	21.9	19.7	15.8	1.5
121	Terzan 11	Sgr	16.4	20.5	18.5	-	1.0
64	Tonantzintlia 2 (Pismis 26)	Sco	12.2	18.2	-	-	2.2
73	UKS 1	Sgr	17.3	25.5	22	18.8	2
13	Whiting 1	Cet	15.0	-	-	-	1.2

Additional Resources

Books

Archinal, Brent A. and Hynes, Steven J. *Star Clusters.* Richmond, VA: Willmann-Bell, 2003.

Burnham, Robert. *Burnham's Celestial Handbook, Vol. 1 to 3.* New York: Dover Books, 1978.

Coe, Steven R. *Deep Sky Observing. The Astronomical Tourist.* New York: Springer Publishing Company, 2000.

Harrington, Philip S. *Cosmic Challenge: The Ultimate Observing List for Amateurs*, Cambridge: Cambridge University Press, 2010

Kepple, George R. and Sanner, Glen W. *The Night Sky Observer's Guide, Vol. 1 Autumn & Winter.* Richmond, VA: Willmann-Bell, 1998.

Kepple, George R. and Sanner, Glen W. *The Night Sky Observer's Guide, Vol. 2 Spring & Summer.* Richmond, VA: Willmann-Bell, 1998.

Luginbuhl, Christian B. and Skiff, Brian A. *Observing Handbook and Catalogue of Deep-Sky Objects.* New York: Cambridge University Press, 1989.

Stoyan, Ronald and Schurig, Stephan. *interstellarum Deep Sky Atlas*. Cambridge, MA: Cambridge University Press, 2015

Stoyan, Ronald and Glahn, Uwe. *interstellarum Deep Sky Guide*. Cambridge, MA: Cambridge University Press, 2018

Webb Society. *Webb Society Deep-Sky Observer's Handbook, Volume 3: Open and Globular Clusters.* Edited by Kenneth Glyn Jones. Hillside, NJ: Enslow Publishers, 1982.

Amateur Articles

Bunge, Robert. "Discover the Unknown Globulars of Sagittarius" *Deep Sky*, Vol 34 (1991): 24-29.

Higgens, David. Spring 1988. "Pushing to the Limit: The Palomar Clusters from Your Backyard" *Deep Sky* 6(1): 16-21.

Jakiel, Richard. "A Tour of Extragalactic Globulars" *Sky and Telescope,* Vol 102 (2001): 115-117.

Meketa, Jim. "The Ophiuchus Globulars" *Deep Sky*, Vol 7 (1984): 6-15.

Schur, Chris. "A Survey of Bright Globular Clusters for Backyard Telescopes" *Deep Sky,* Vol 26. (1989): 10-17.

Witkoski, Michael. "Off-Season Globular Clusters" *Deep Sky,* Vol 24 (1988): 10-17.

Websites

www.deepskyforum.com - The premier Deep Sky forum where advanced deep sky observers converge and discuss various aspects of deep sky observing.

www.cloudynights.com – Great resource for like-minded amateurs discussing most aspects of the hobby.

www.astronomy-mall.com/Adventures.In.Deep.Space/ - Great source of observing projects for all skill levels.

https://archive.stsci.edu/cgi-bin/dss_form - The STScI Digitized Sky Survey

Sources of charts and images

Charts by *Megastar version 5* Willmann-Bell Richmond, VA

DSS images (Digital Sky Survey) archive.stsci.edu/dss/acknowledging.html

Revision History

Date	Revision
Mar 31, 2009	New document
Sep 8, 2011	Correct typos in coordinates for NGC 4717, NGC 6426 and Palomar 8
Mar 26, 2013	Enhanced throughout to be consistent with other guides. Note: No new objects.
Mar 28, 2013	Added four new objects: • Koposov 1 • Koposov 2 • Whiting 1 • FSR 1735
Jun 17, 2013	Corrected table on page 75 for NGC 6540.
Mar 27, 2014	Added newly discovered globular cluster PSO j174.0675-10.8774. Correct constellation for M3 (Bootes -> Canes Venatici)
Jun 4, 2020	Corrected naked eye finder chart for NGC 4147 (page 22)
March 2024	Added additional images to help find GJJC1. Annotated images by Scott Harrington. Minor edits. No new objects.