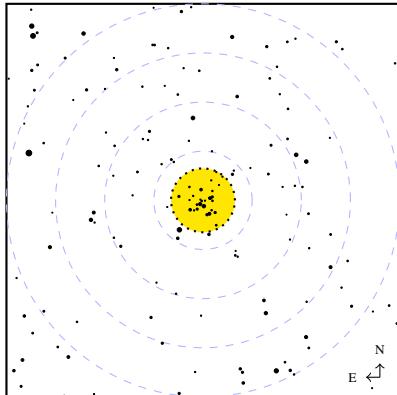
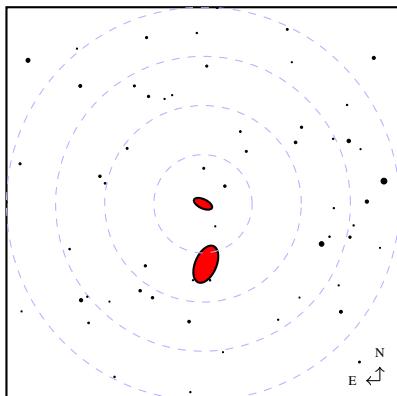


# Pocket Finder-Chart Atlas

M41 = U33 = NGC 2287



M82 = U42 = NGC 3034



Correct-Image Version

*Alan Watson Forster*



# **Pocket Finder-Chart Atlas**

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alanwatsonforster@gmail.com

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USA.

Correct-image version of 2022-03-26

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# Preface

This is an atlas of finder charts for the Messier, Caldwell, and Astronomical League Urban Observing Program deep-sky objects.

The charts have a field of 4 degrees at a scale of 13 mm per degree. Circles show fields with diameters of 1, 2, 3, and 4 degrees. The charts show stars to magnitude 9.5, and represent deep-sky objects following the current convention. The correspondence between the magnitude of a star and its size on the charts is designed to better match the view in a telescope eyepiece.

There are versions of the atlas with inverted-image and correct-image charts. This version has correct-image charts, with north up and east to the left, corresponding to the view through a refractor or Cassegrain telescope either without a diagonal or with a correct-image diagonal.

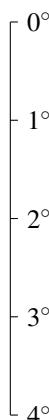
The size and binding of this atlas are designed for convenience at the telescope.

## Chart Legend

### Stars

- 1 mag
- 2 mag
- 3 mag
- 4 mag
- 5 mag
- 6 mag
- 7 mag
- 8 mag
- 9 mag

-  Open Cluster
-  Globular Cluster
-  Star Cloud or Asterism
-  Bright Nebula
-  Planetary Nebula
-  Dark Nebula
-  Galaxy



I created this atlas to assist me as I observed under the light-polluted skies of Mexico City with a 70 mm f/6 refractor. I don't use a conventional finder with this telescope, but instead star-hop using a 32 mm eyepiece with a true field of about 4 degrees. Under my usual observing conditions, very few objects are immediately obvious, and the charts tell me when I've successfully reached the desired field and where to focus my efforts.

The obvious question is, but why not just use an all-sky atlas? I do indeed use the *Pocket Sky Atlas* for star-hopping, but I find that for confirming a field none of my all-sky atlases combine adequate depth with convenience at the telescope, and none really give me the sense of what I see through the eyepiece.

To some degree, the relation between these charts and the *Pocket Sky Atlas* is similar to the relation between the larger-scale and smaller-scale charts in *The Observer's Sky Atlas*. The smaller-scale charts are for star-hopping to the field and the larger-scale charts are to confirm the field and locate the object. I don't use *The Observer's Sky Atlas* at the telescope, because the smaller-scale charts are too shallow and too narrow for my needs, the large-scale charts aren't inverted, and the binding is inconvenient.

The positions and magnitudes of stars are taken from the Tycho-2 catalog, supplemented by the Hipparcos catalog for the very brightest stars. The positions, types, and sizes of deep sky objects are taken from the CDS SIMBAD database, supplemented by information from the NASA/IPAC Extragalactic Database (NED), O'Meara's *Deep-Sky Companions* volumes, and the Astronomical League's Urban Observing Program list.

One flaw of these charts is that all deep-sky objects are drawn as either ellipses (galaxies and star clouds) or circles (everything else). This means, for example, that they do not correctly show the shapes of irregular nebulae such as M42 and M43.

# **Chapter 1**

## **The Messier Objects**

The Messier objects are probably the most famous deep-sky objects. I find O'Meara's *Deep-Sky Companion: The Messier Objects* to be excellent on the origin of the catalog, the appearance of the objects, and their nature.

The following table lists the objects with their J2000 positions (decimal hours of right ascension and degrees of declination), the charts on which they appear in the *Pocket Sky Atlas*, their types, and other names. I follow O'Meara in identifying M102 as NGC 5866.

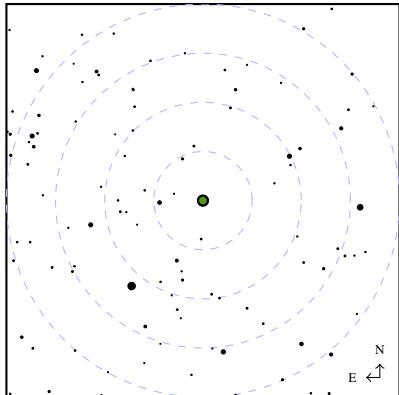
For completeness, I include finder charts for all of the Messier objects, even bright ones like M45.

| Name | Position | PSA   | Type | Other Names                         |
|------|----------|-------|------|-------------------------------------|
| M1   | 05.6 +22 | 14    | BN   | NGC 1952 = Crab Nebula              |
| M2   | 21.6 -01 | 75/77 | GC   | U81 = NGC 7089                      |
| M3   | 13.7 +28 | 43/44 | GC   | U51 = NGC 5272                      |
| M4   | 16.4 -27 | 56/58 | GC   | U53 = NGC 6121                      |
| M5   | 15.3 +02 | 55/57 | GC   | U52 = NGC 5904                      |
| M6   | 17.7 -32 | 58/69 | OC   | U60 = NGC 6405 = Butterfly Nebula   |
| M7   | 17.9 -35 | 58/69 | OC   | U62 = NGC 6475                      |
| M8   | 18.1 -24 | 67    | BN   | U64 = NGC 6523/6530 = Lagoon Nebula |
| M9   | 17.3 -19 | 56    | GC   | NGC 6333                            |
| M10  | 17.0 -04 | 54/56 | GC   | U57 = NGC 6254                      |
| M11  | 18.9 -06 | 65/67 | OC   | U69 = NGC 6705 = Wild Duck Cluster  |
| M12  | 16.8 -02 | 54/56 | GC   | U56 = NGC 6218                      |
| M13  | 16.7 +36 | 52    | GC   | U54 = NGC 6205 = Hercules Cluster   |
| M14  | 17.6 -03 | 54    | GC   | NGC 6402                            |
| M15  | 21.5 +12 | 75    | GC   | U80 = NGC 7078                      |
| M16  | 18.3 -14 | 67    | BN   | NGC 6611 = Eagle Nebula             |
| M17  | 18.3 -16 | 67    | BN   | U65 = NGC 6618 = Omega Nebula       |
| M18  | 18.3 -17 | 67    | OC   | NGC 6613                            |
| M19  | 17.0 -26 | 56    | GC   | NGC 6273                            |
| M20  | 18.0 -23 | 67    | BN   | NGC 6514 = Trifid Nebula            |
| M21  | 18.1 -23 | 67    | OC   | NGC 6531                            |
| M22  | 18.6 -24 | 67    | GC   | U67 = NGC 6656                      |
| M23  | 17.9 -19 | 67    | OC   | NGC 6494                            |
| M24  | 18.3 -19 | 67    | SC   | IC 4715                             |
| M25  | 18.5 -19 | 67    | OC   | IC 4725                             |
| M26  | 18.8 -09 | 67    | OC   | NGC 6694                            |
| M27  | 20.0 +23 | 64    | PN   | U75 = NGC 6853 = Dumbell Nebula     |
| M28  | 18.4 -25 | 67/I  | GC   | NGC 6626                            |
| M29  | 20.4 +38 | 62    | OC   | NGC 6913                            |
| M30  | 21.7 -23 | 77    | GC   | NGC 7099                            |
| M31  | 00.7 +41 | 3     | Gal  | U3 = NGC 224 = Andromeda Galaxy     |
| M32  | 00.7 +41 | 3     | Gal  | U2 = NGC 221                        |
| M33  | 01.6 +31 | 3     | Gal  | NGC 598                             |
| M34  | 02.7 +43 | 2     | OC   | NGC 1039                            |
| M35  | 06.2 +24 | 14    | OC   | U27 = NGC 2168                      |
| M36  | 05.6 +34 | 12    | OC   | U23 = NGC 1960                      |
| M37  | 05.9 +33 | 12    | OC   | U26 = NGC 2099                      |
| M38  | 05.5 +36 | 12    | OC   | U22 = NGC 1912                      |
| M39  | 21.5 +48 | 73    | OC   | U82 = NGC 7092                      |
| M40  | 12.4 +58 | 32    | DS   |                                     |

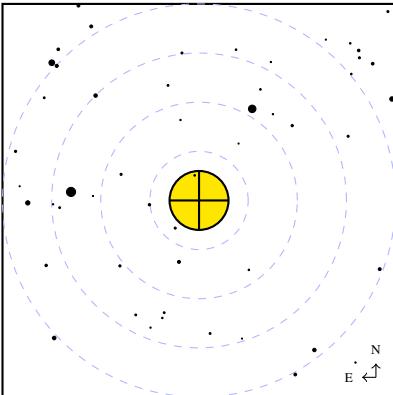
| Name | Position | PSA   | Type | Other Names                       |
|------|----------|-------|------|-----------------------------------|
| M41  | 06.8 -21 | 27    | OC   | U33 = NGC 2287                    |
| M42  | 05.6 -05 | 16/B  | BN   | U24 = NGC 1976 = Orion Nebula     |
| M43  | 05.6 -05 | 16/B  | BN   | NGC 1982                          |
| M44  | 08.7 +20 | 24    | OC   | U39 = NGC 2632 = Beehive Cluster  |
| M45  | 03.8 +24 | 15/A  | OC   | U17 = Mel 22 = Pleiades           |
| M46  | 07.7 -15 | 26    | OC   | NGC 2437                          |
| M47  | 07.6 -14 | 27    | OC   | NGC 2422                          |
| M48  | 08.2 -06 | 26    | OC   | U38 = NGC 2548                    |
| M49  | 12.5 +08 | 45/C  | Gal  | NGC 4472                          |
| M50  | 07.0 -08 | 27    | OC   | U35 = NGC 2323                    |
| M51  | 13.5 +47 | 43    | Gal  | NGC 5194 = Whirlpool Galaxy       |
| M52  | 23.4 +62 | 72    | OC   | NGC 7654                          |
| M53  | 13.2 +18 | 45    | GC   | NGC 5024                          |
| M54  | 18.9 -30 | 69    | GC   | NGC 6715                          |
| M55  | 19.7 -31 | 68    | GC   | NGC 6809                          |
| M56  | 19.3 +30 | 63    | GC   | NGC 6779                          |
| M57  | 18.9 +33 | 63    | PN   | U71 = NGC 6720 = Ring Nebula      |
| M58  | 12.6 +12 | 45/C  | Gal  | NGC 4579                          |
| M59  | 12.7 +12 | 45/C  | Gal  | NGC 4621                          |
| M60  | 12.7 +12 | 45/C  | Gal  | NGC 4649                          |
| M61  | 12.4 +04 | 45    | Gal  | NGC 4303                          |
| M62  | 17.0 -30 | 58    | GC   | U58 = NGC 6266                    |
| M63  | 13.3 +42 | 43    | Gal  | NGC 5055 = Sunflower Galaxy       |
| M64  | 12.9 +22 | 45    | Gal  | U50 = NGC 4826 = Black-Eye Galaxy |
| M65  | 11.3 +13 | 34    | Gal  | NGC 3623                          |
| M66  | 11.3 +13 | 34    | Gal  | NGC 3627                          |
| M67  | 08.9 +12 | 24    | OC   | U40 = NGC 2682                    |
| M68  | 12.7 -27 | 47    | GC   | NGC 4590                          |
| M69  | 18.5 -32 | 67    | GC   | NGC 6637                          |
| M70  | 18.7 -32 | 67    | GC   | NGC 6681                          |
| M71  | 19.9 +19 | 64    | GC   | NGC 6838                          |
| M72  | 20.9 -13 | 66/77 | GC   | NGC 6981                          |
| M73  | 21.0 -13 | 66/77 | AST  | NGC 6994                          |
| M74  | 01.6 +16 | 4/5   | Gal  | NGC 628                           |
| M75  | 20.1 -22 | 66    | GC   | NGC 6864                          |
| M76  | 01.7 +52 | 2     | PN   | NGC 651/650 = Little Dumbell      |
| M77  | 02.7 -00 | 4     | Gal  | U12 = NGC 1068                    |
| M78  | 05.8 +00 | 16    | BN   | NGC 2068                          |
| M79  | 05.4 -25 | 16    | GC   | NGC 1904                          |
| M80  | 16.3 -23 | 56    | GC   | NGC 6093                          |

| Name | Position | PSA   | Type | Other Names                      |
|------|----------|-------|------|----------------------------------|
| M81  | 09.9 +69 | 31    | Gal  | U41 = NGC 3031                   |
| M82  | 09.9 +70 | 31    | Gal  | U42 = NGC 3034                   |
| M83  | 13.6 –30 | 47/48 | Gal  | NGC 5236                         |
| M84  | 12.4 +13 | 45/C  | Gal  | U45 = NGC 4374                   |
| M85  | 12.4 +18 | 45/C  | Gal  | NGC 4382                         |
| M86  | 12.4 +13 | 45/C  | Gal  | U46 = NGC 4406                   |
| M87  | 12.5 +12 | 45/C  | Gal  | U47 = NGC 4486                   |
| M88  | 12.5 +14 | 45/C  | Gal  | NGC 4501                         |
| M89  | 12.6 +13 | 45/C  | Gal  | NGC 4552                         |
| M90  | 12.6 +13 | 45/C  | Gal  | NGC 4569                         |
| M91  | 12.6 +14 | 45/C  | Gal  | NGC 4548                         |
| M92  | 17.3 +43 | 52    | GC   | U59 = NGC 6341                   |
| M93  | 07.7 –24 | 26    | OC   | NGC 2447                         |
| M94  | 12.8 +41 | 43    | Gal  | U49 = NGC 4736                   |
| M95  | 10.7 +12 | 34    | Gal  | NGC 3351                         |
| M96  | 10.8 +12 | 34    | Gal  | NGC 3368                         |
| M97  | 11.2 +55 | 32    | PN   | NGC 3587                         |
| M98  | 12.2 +15 | 45/C  | Gal  | NGC 4192                         |
| M99  | 12.3 +14 | 45/C  | Gal  | NGC 4254                         |
| M100 | 12.4 +16 | 45/C  | Gal  | NGC 4321                         |
| M101 | 14.1 +54 | 42    | Gal  | NGC 5457                         |
| M102 | 15.1 +56 | 42    | Gal  | NGC 5866                         |
| M103 | 01.6 +61 | 3     | OC   | NGC 581                          |
| M104 | 12.7 –12 | 47    | Gal  | U48 = NGC 4594 = Sombrero Galaxy |
| M105 | 10.8 +13 | 34    | Gal  | NGC 3379                         |
| M106 | 12.3 +47 | 34    | Gal  | NGC 4258                         |
| M107 | 16.5 –13 | 56    | GC   | NGC 6171                         |
| M108 | 11.2 +56 | 32/33 | Gal  | NGC 3556                         |
| M109 | 12.0 +53 | 32    | Gal  | NGC 3992                         |
| M110 | 00.7 +42 | 3     | Gal  | NGC 205                          |

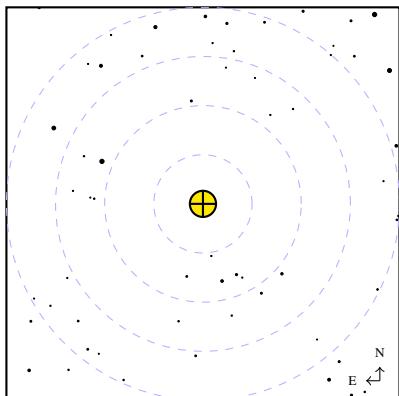
M1 = NGC 1952 = Crab Nebula



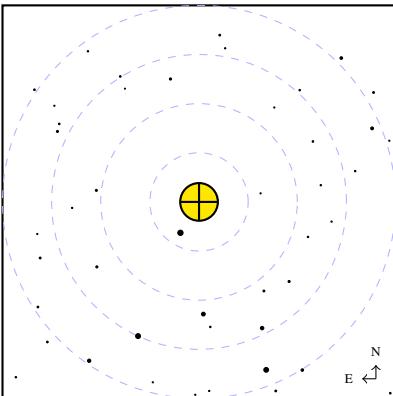
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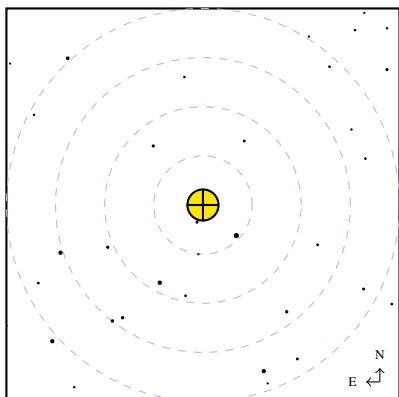
M2 = U81 = NGC 7089



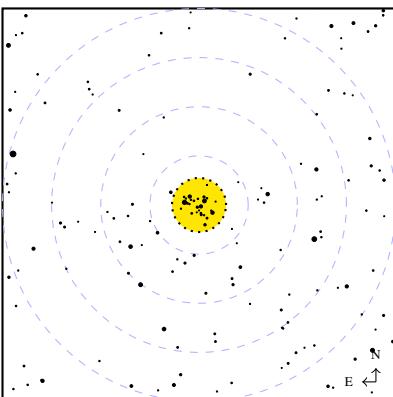
M5 = U52 = NGC 5904



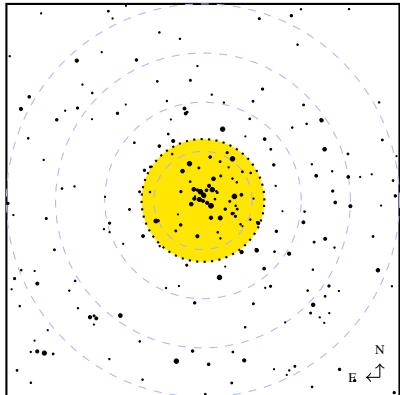
M3 = U51 = NGC 5272



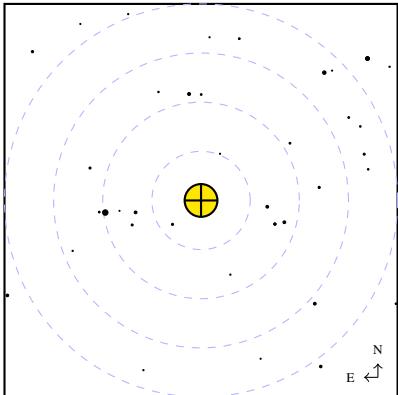
M6 = U60 = NGC 6405 = Butterfly Nebula



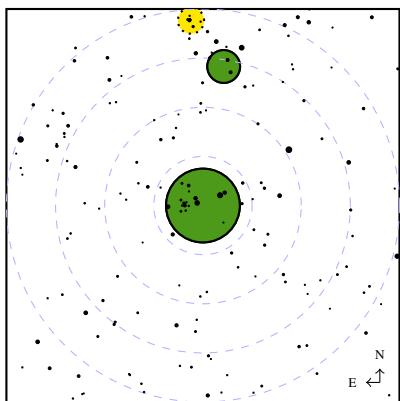
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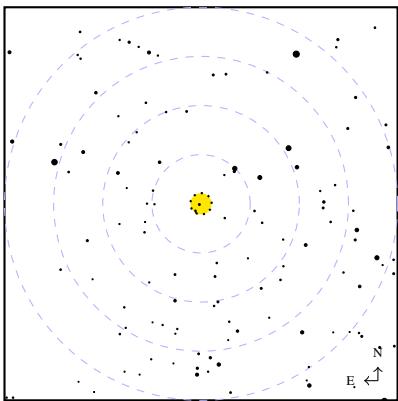
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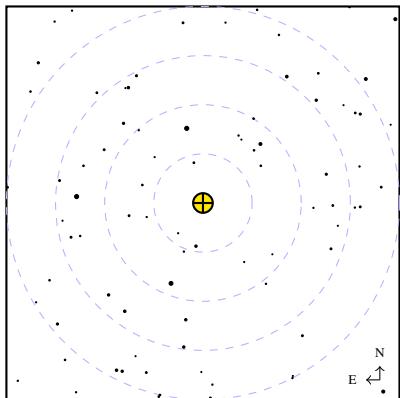
M8 = U64 = NGC 6523/6530 = Lagoon Nebula



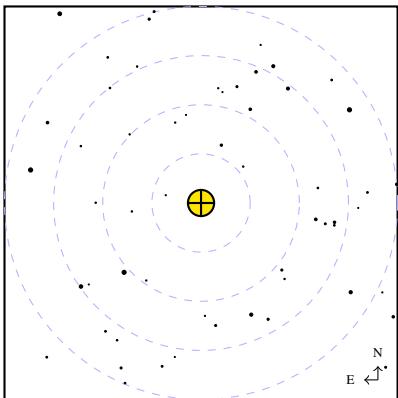
M11 = U69 = NGC 6705 = Wild Duck Cluster



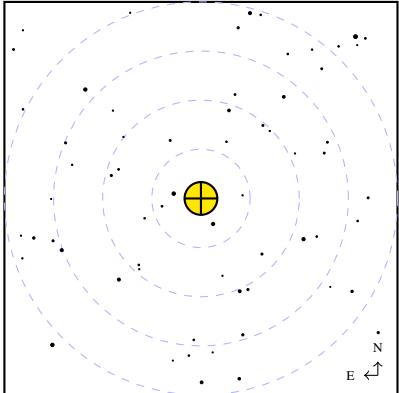
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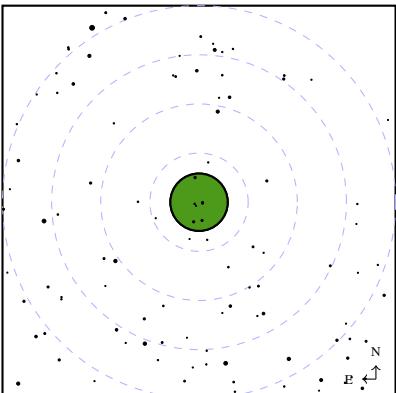
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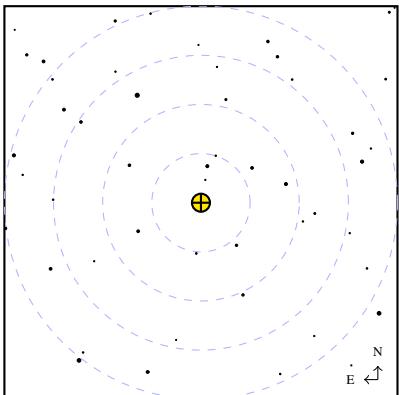
M13 = U54 = NGC 6205 = Hercules Cluster



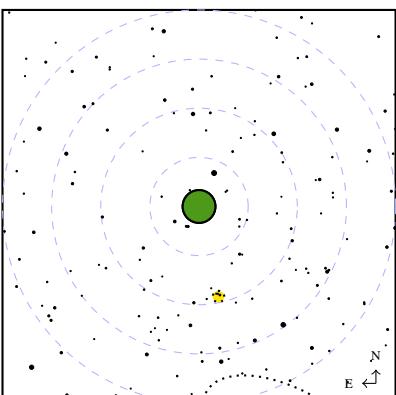
M16 = NGC 6611 = Eagle Nebula



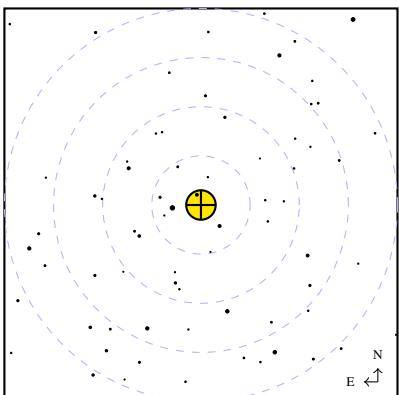
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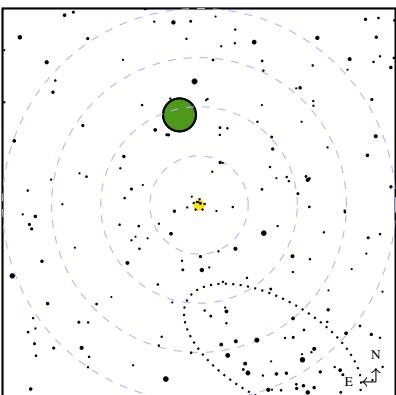
M17 = U65 = NGC 6618 = Omega Nebula



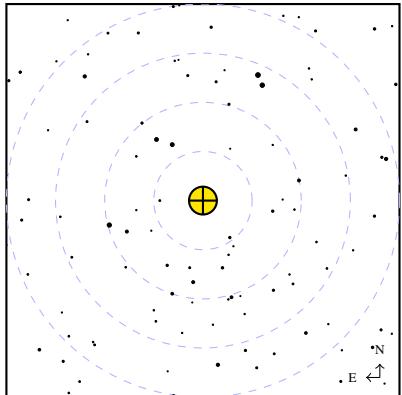
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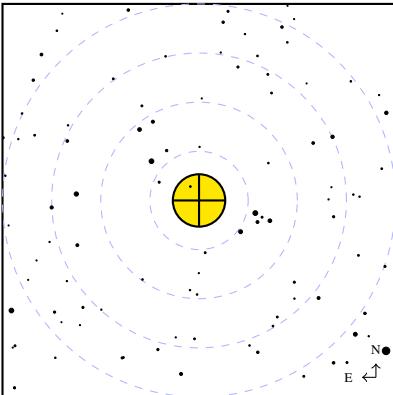
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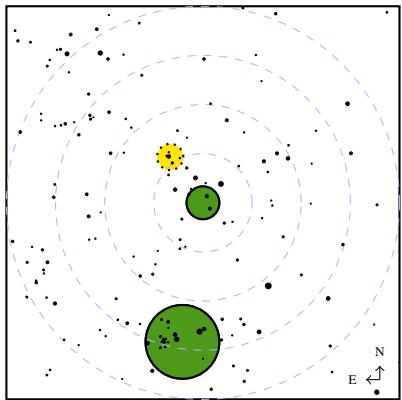
M19 = NGC 6273



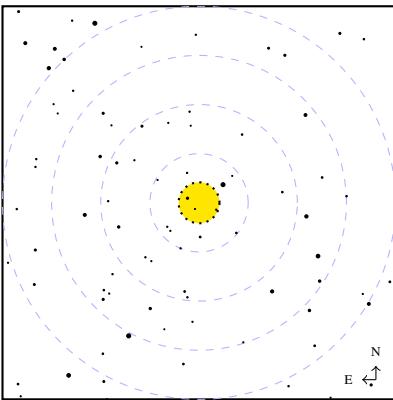
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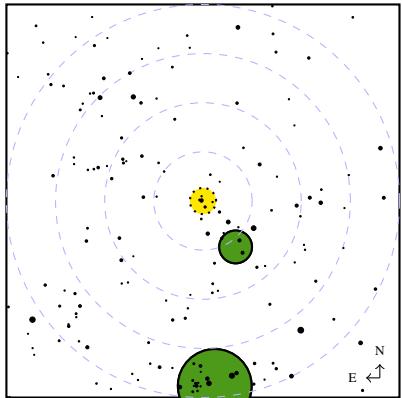
M20 = NGC 6514 = Trifid Nebula



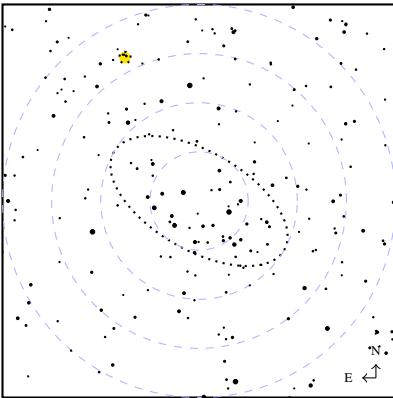
M23 = NGC 6494



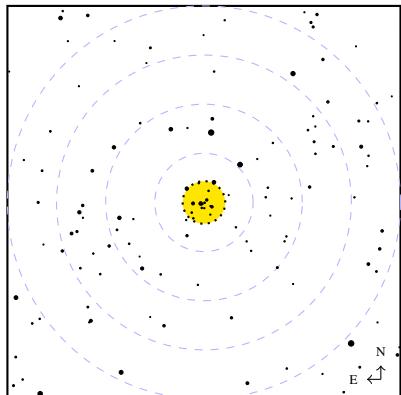
M21 = NGC 6531



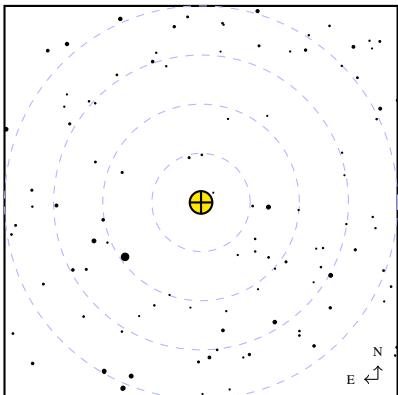
M24 = IC 4715



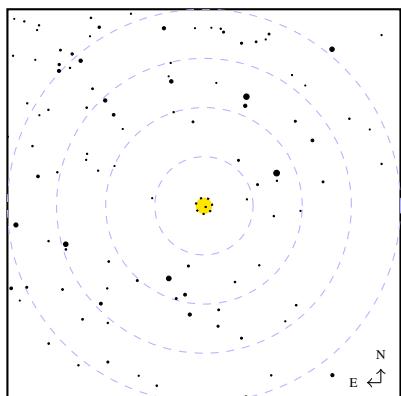
M25 = IC 4725



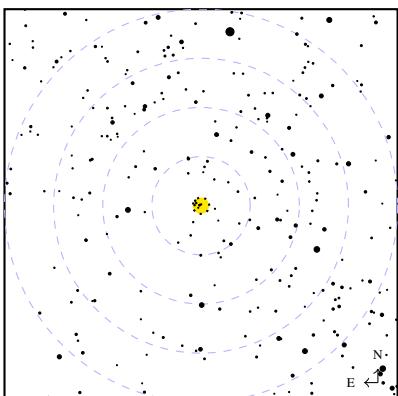
M28 = NGC 6626



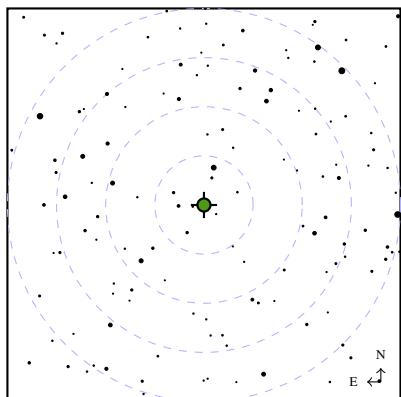
M26 = NGC 6694



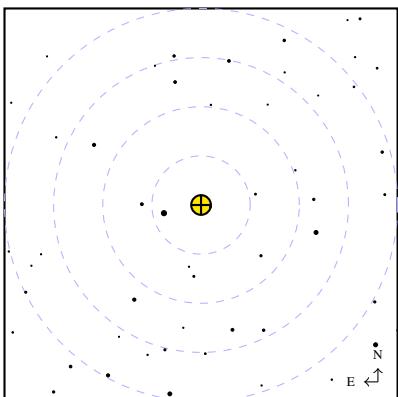
M29 = NGC 6913



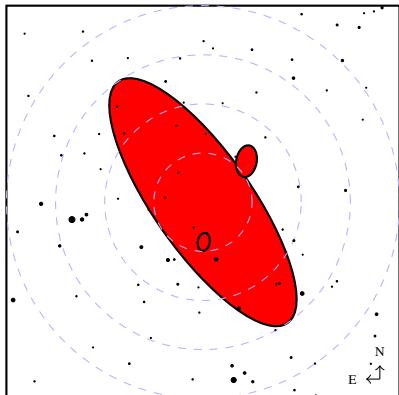
M27 = U75 = NGC 6853 = Dumbbell Nebula



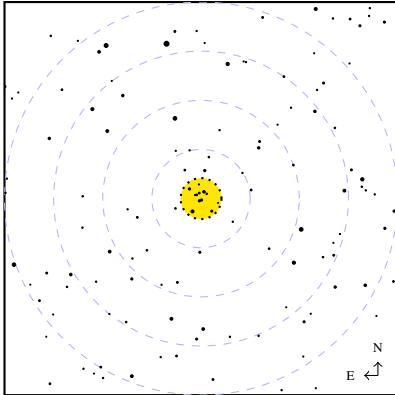
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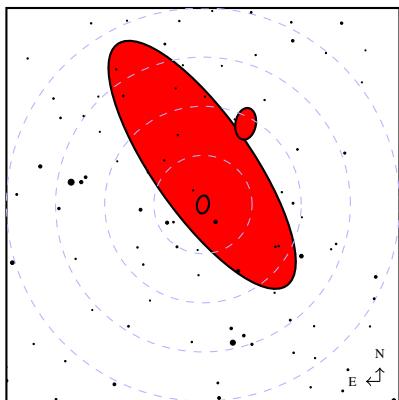
M31 = U3 = NGC 224 = Andromeda Galaxy



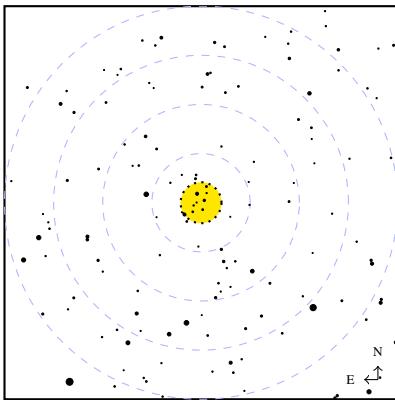
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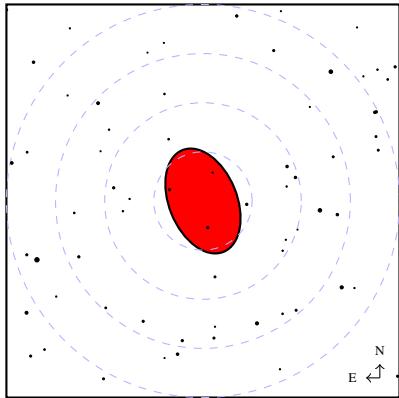
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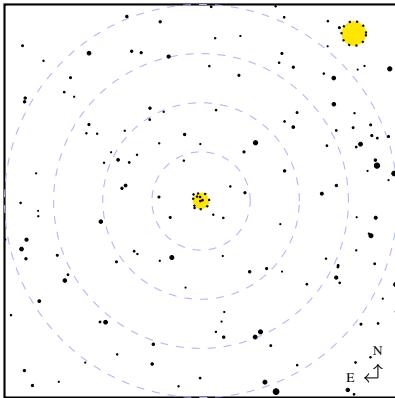
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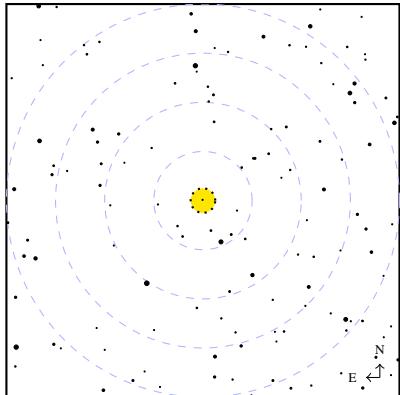
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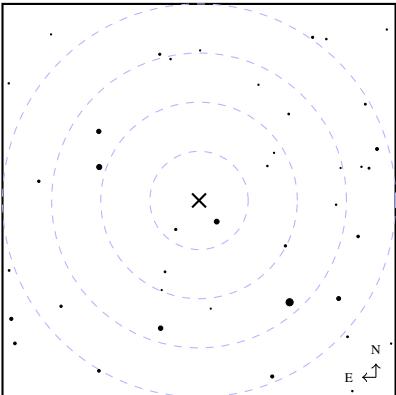
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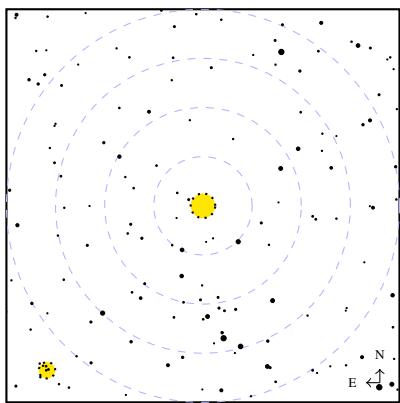
M37 = U26 = NGC 2099



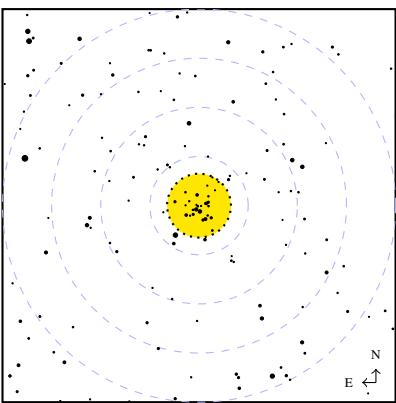
M40



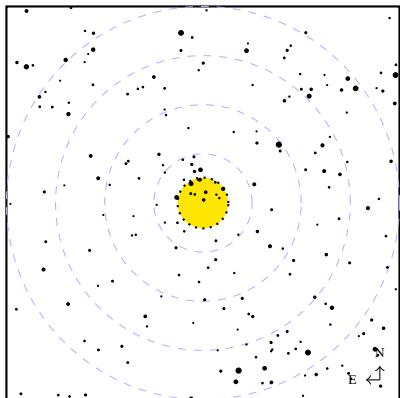
M38 = U22 = NGC 1912



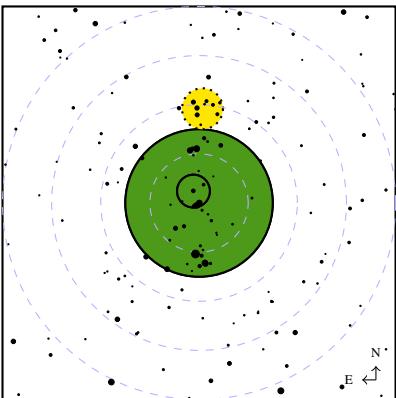
M41 = U33 = NGC 2287



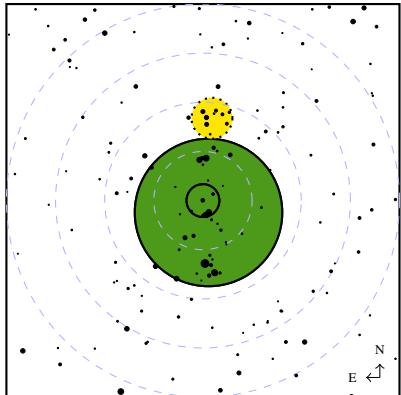
M39 = U82 = NGC 7092



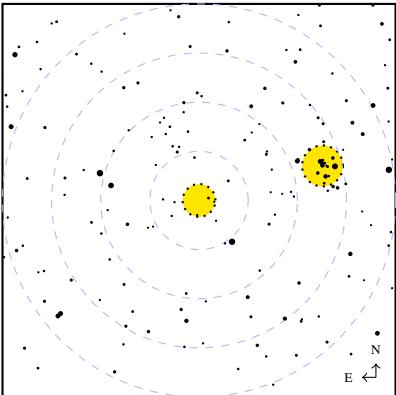
M42 = U24 = NGC 1976 = Orion Nebula



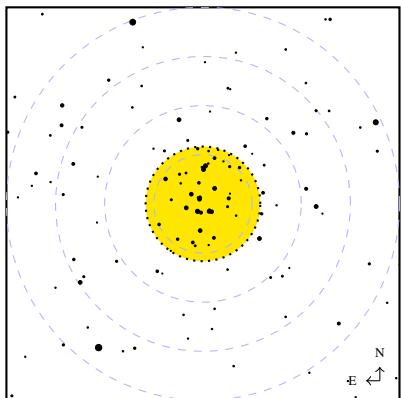
M43 = NGC 1982



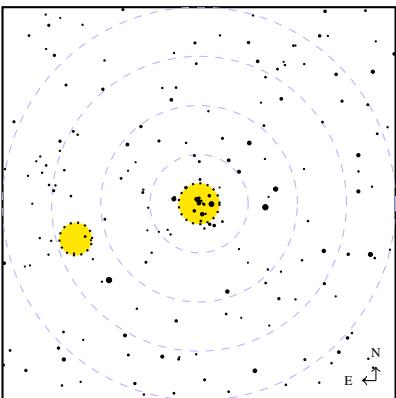
M46 = NGC 2437



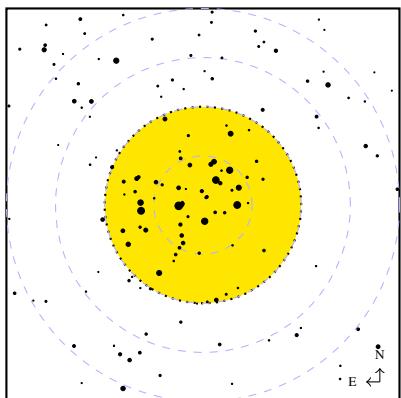
M44 = U39 = NGC 2632 = Beehive Cluster



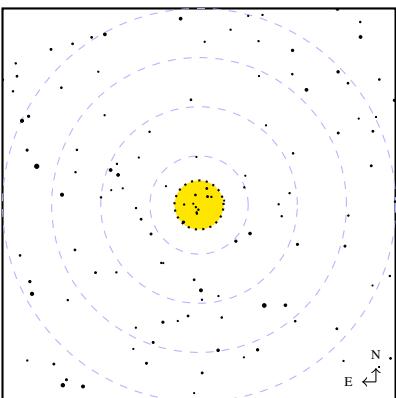
M47 = NGC 2422



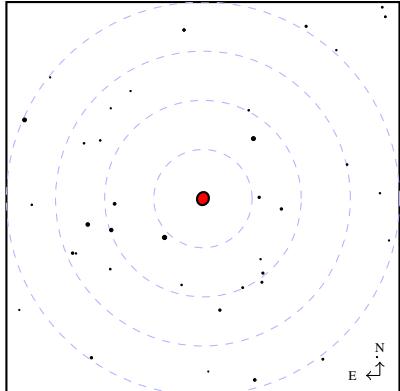
M45 = U17 = Mel 22 = Pleiades



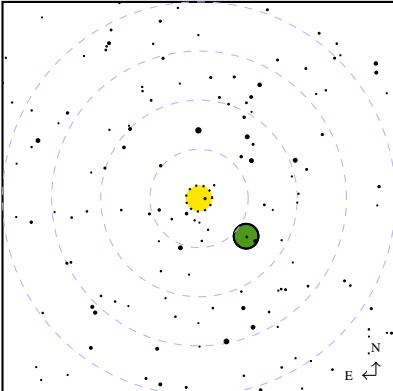
M48 = U38 = NGC 2548



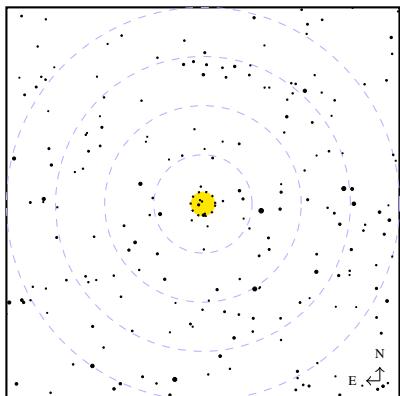
M49 = NGC 4472



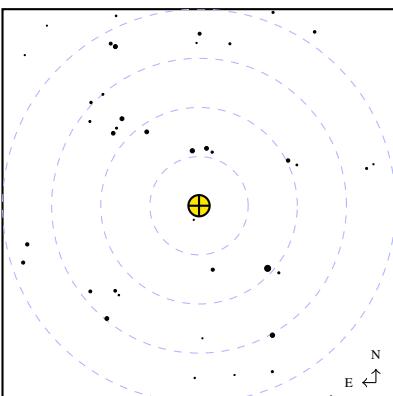
M52 = NGC 7654



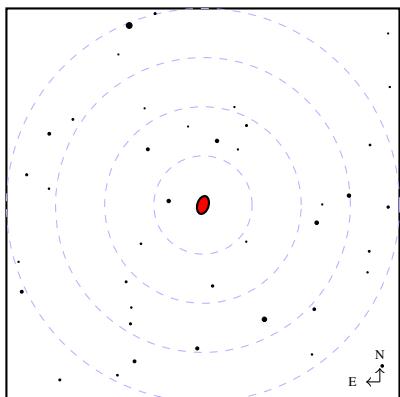
M50 = U35 = NGC 2323



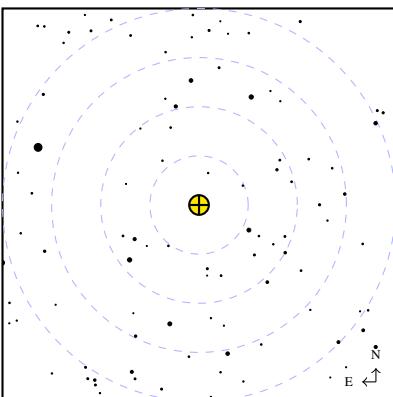
M53 = NGC 5024



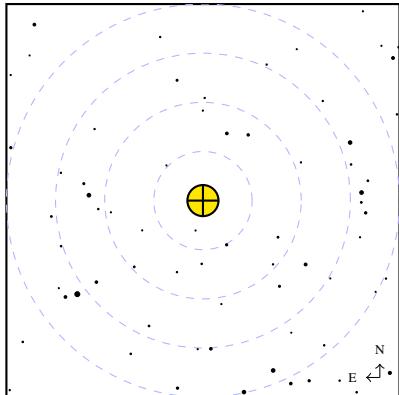
M51 = NGC 5194 = Whirlpool Galaxy



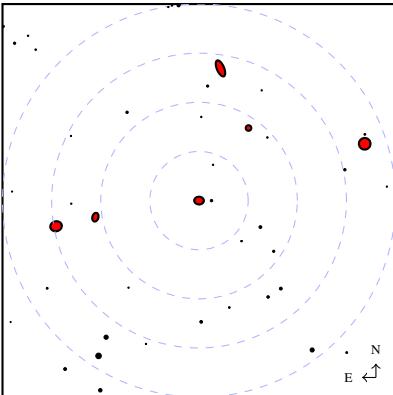
M54 = NGC 6715



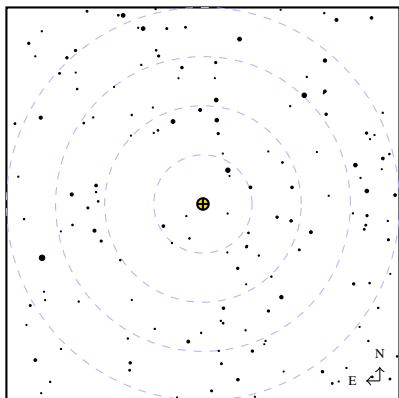
M55 = NGC 6809



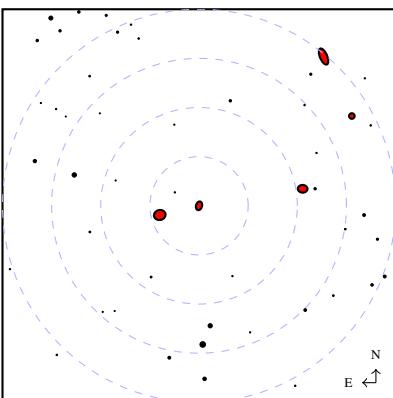
M58 = NGC 4579



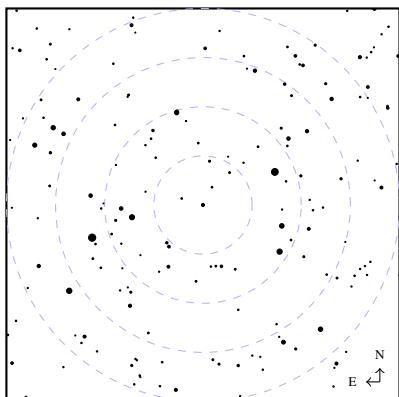
M56 = NGC 6779



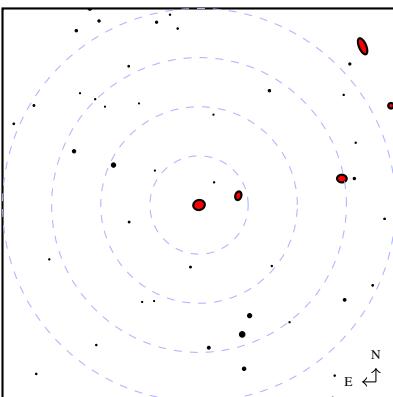
M59 = NGC 4621



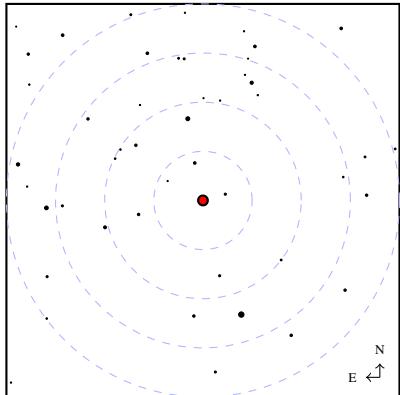
M57 = U71 = NGC 6720 = Ring Nebula



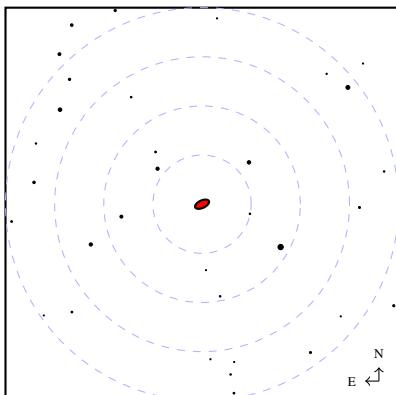
M60 = NGC 4649



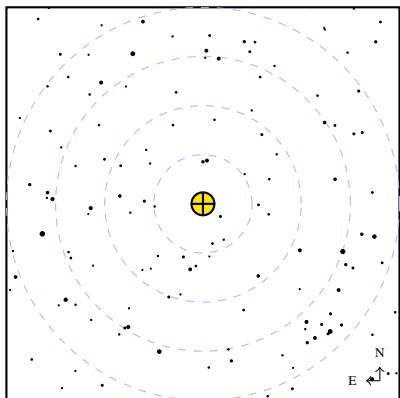
M61 = NGC 4303



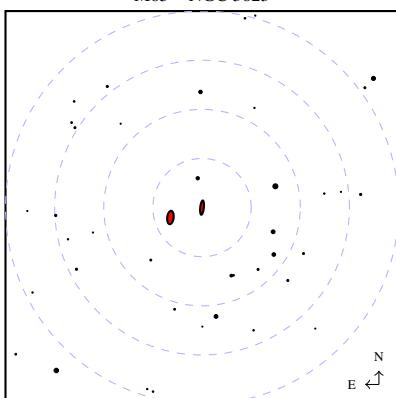
M64 = U50 = NGC 4826 = Black-Eye Galaxy



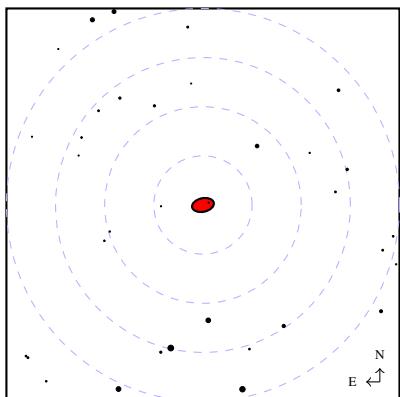
M62 = U58 = NGC 6266



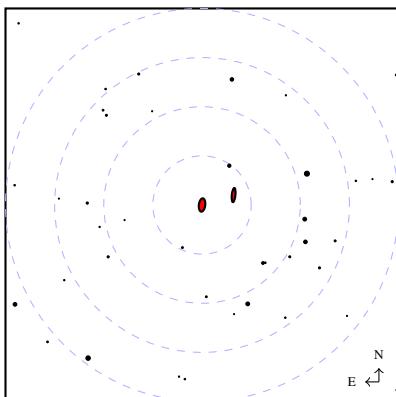
M65 = NGC 3623



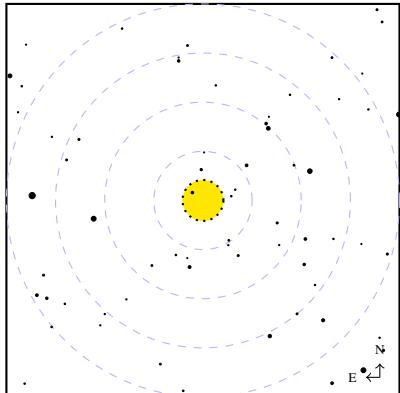
M63 = NGC 5055 = Sunflower Galaxy



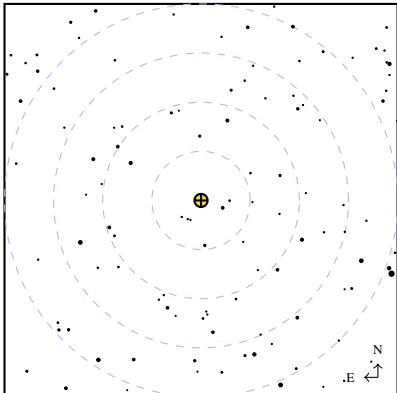
M66 = NGC 3627



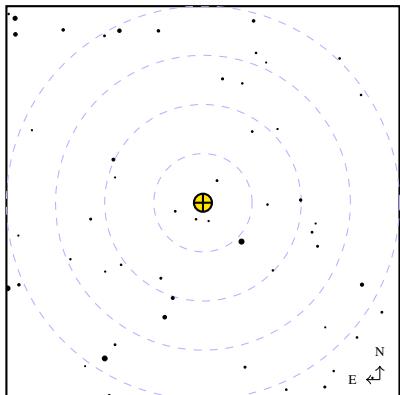
M67 = U40 = NGC 2682



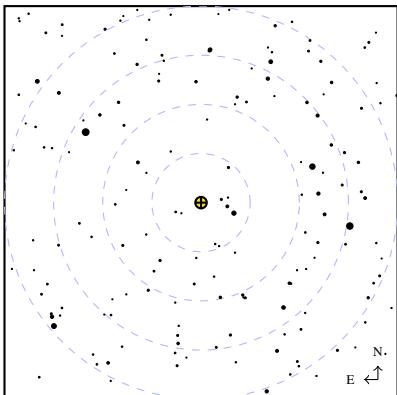
M70 = NGC 6681



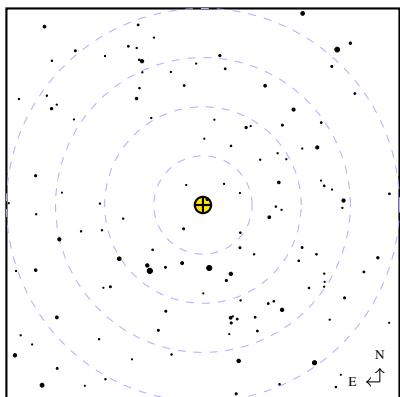
M68 = NGC 4590



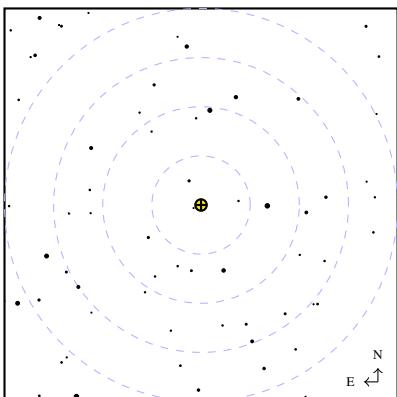
M71 = NGC 6838



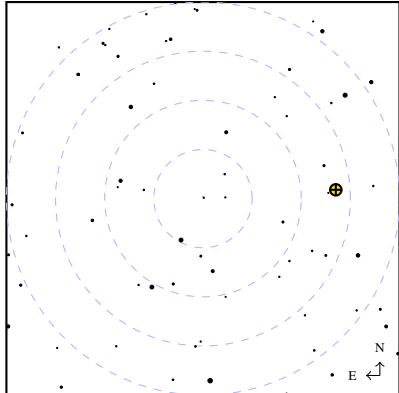
M69 = NGC 6637



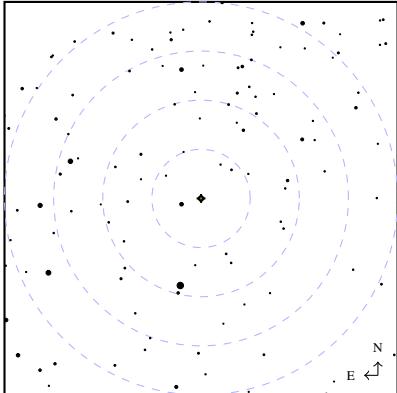
M72 = NGC 6981



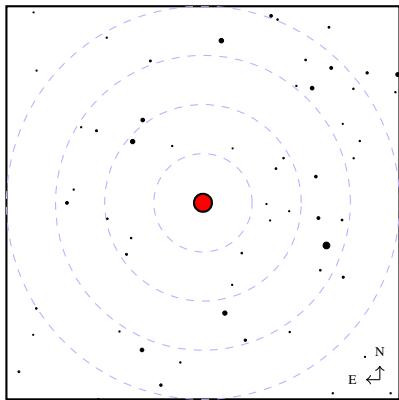
M73 = NGC 6994



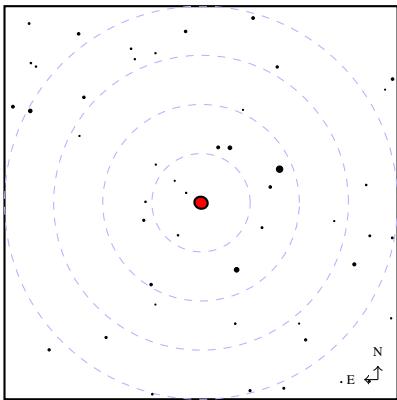
M76 = NGC 651/650 = Little Dumbbell



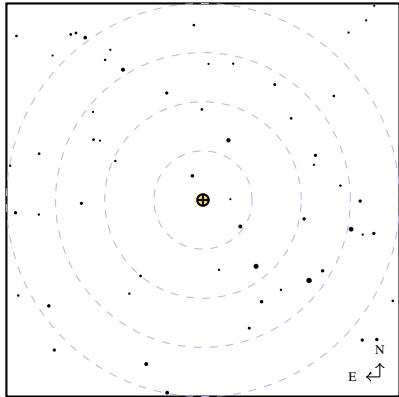
M74 = NGC 628



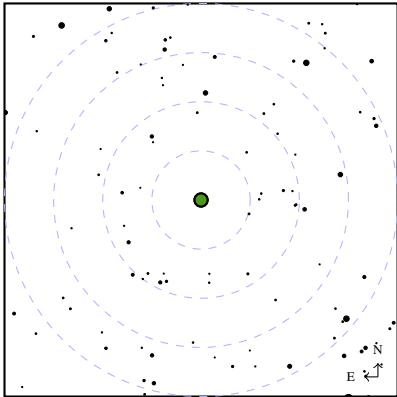
M77 = U12 = NGC 1068



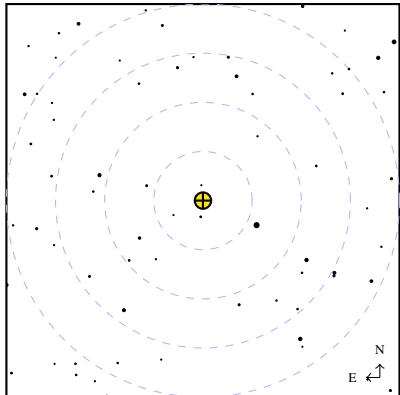
M75 = NGC 6864



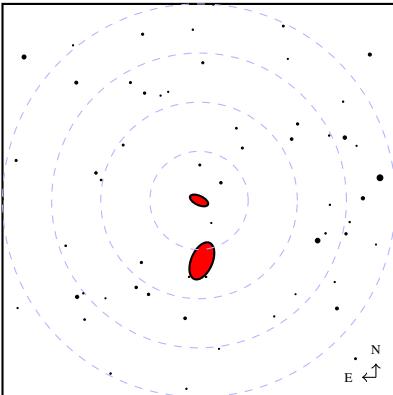
M78 = NGC 2068



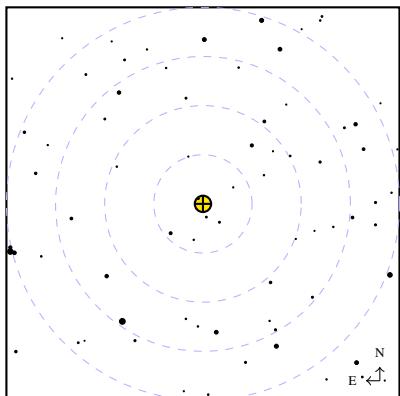
M79 = NGC 1904



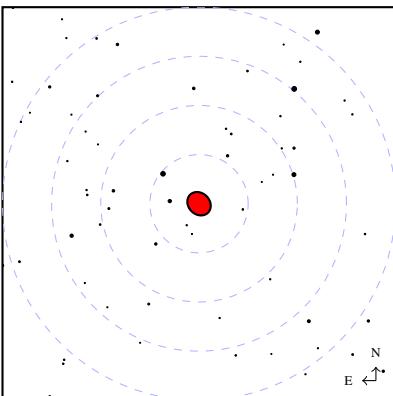
M82 = U42 = NGC 3034



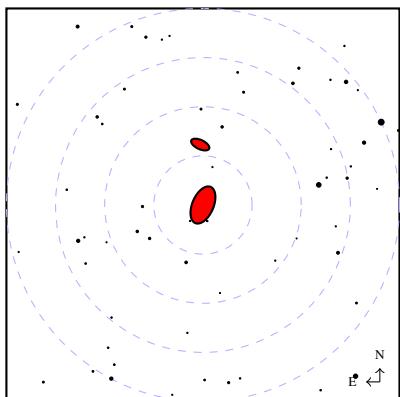
M80 = NGC 6093



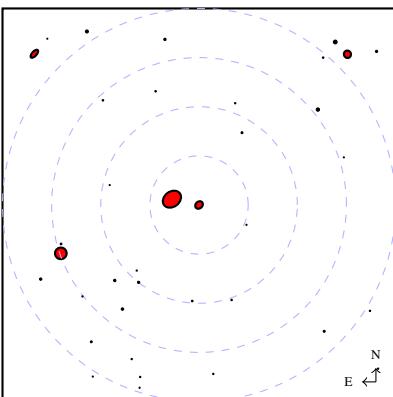
M83 = NGC 5236



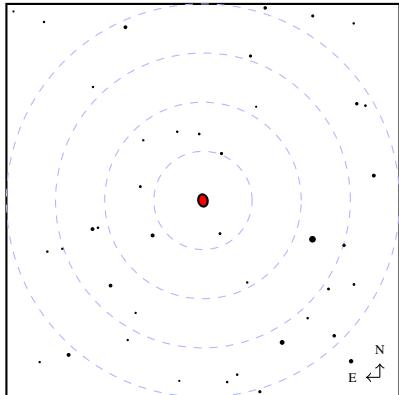
M81 = U41 = NGC 3031



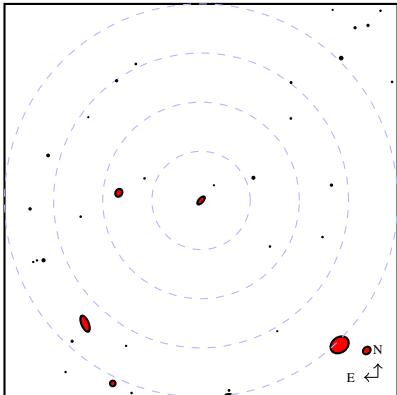
M84 = U45 = NGC 4374



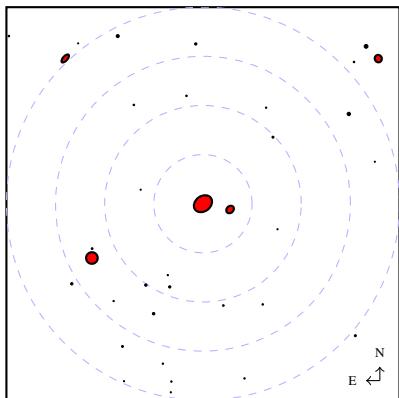
M85 = NGC 4382



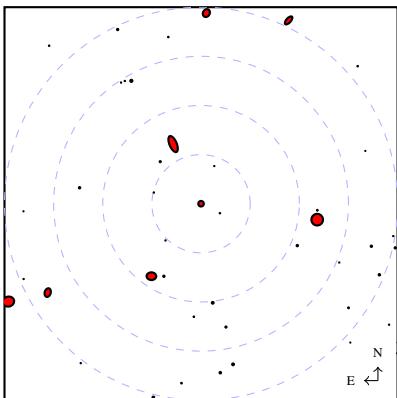
M88 = NGC 4501



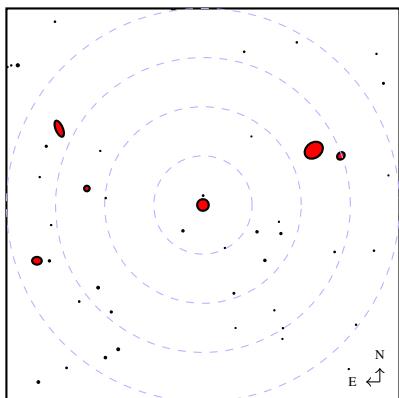
M86 = U46 = NGC 4406



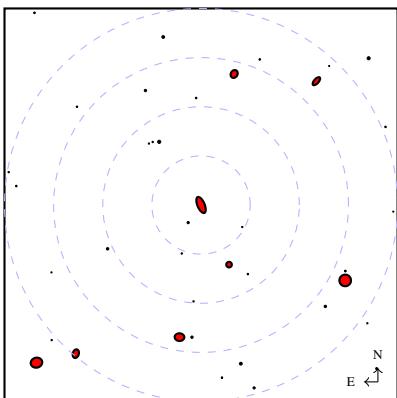
M89 = NGC 4552



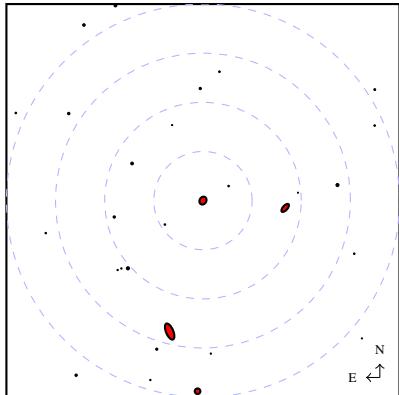
M87 = U47 = NGC 4486



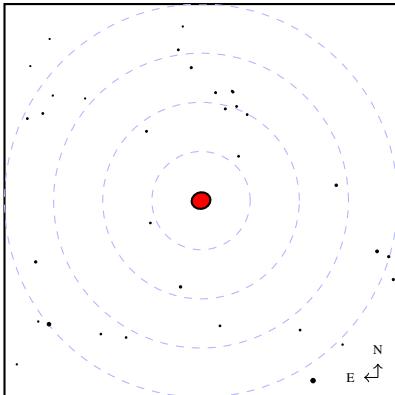
M90 = NGC 4569



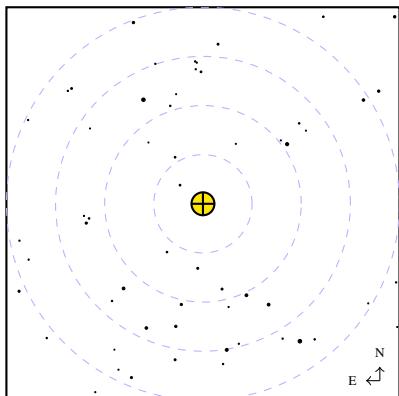
M91 = NGC 4548



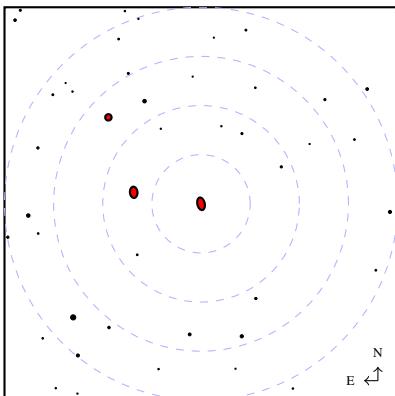
M94 = U49 = NGC 4736



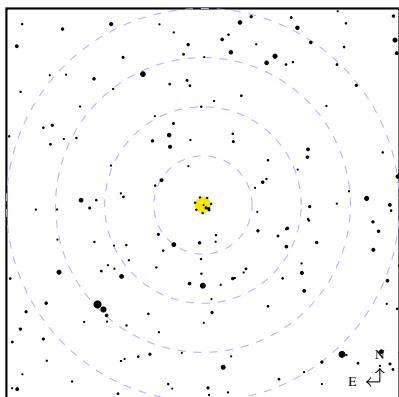
M92 = U59 = NGC 6341



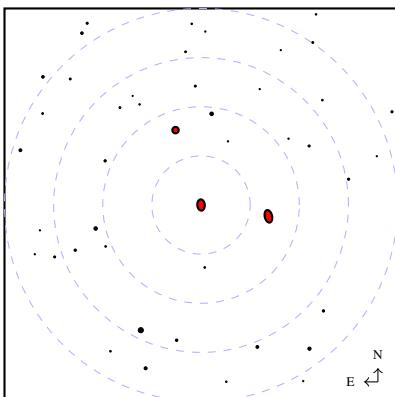
M95 = NGC 3351



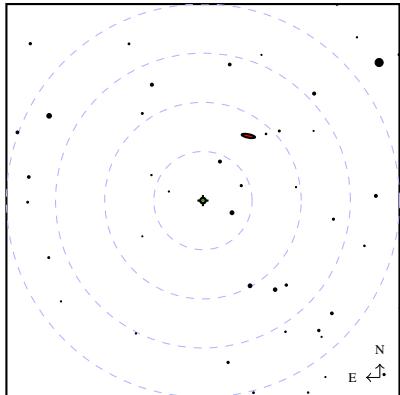
M93 = NGC 2447



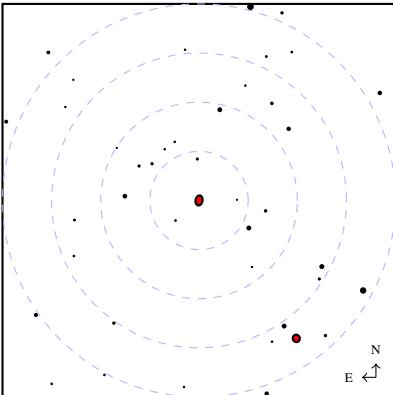
M96 = NGC 3368



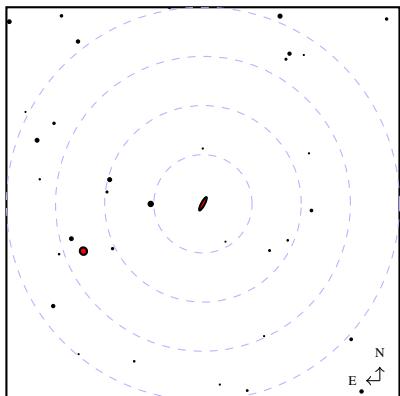
M97 = NGC 3587



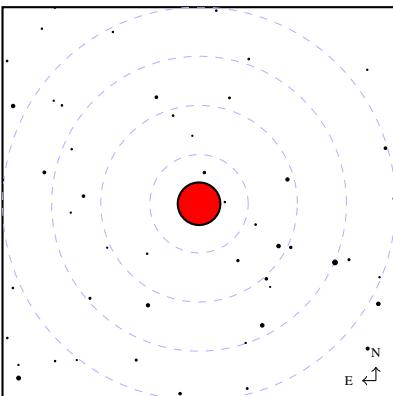
M100 = NGC 4321



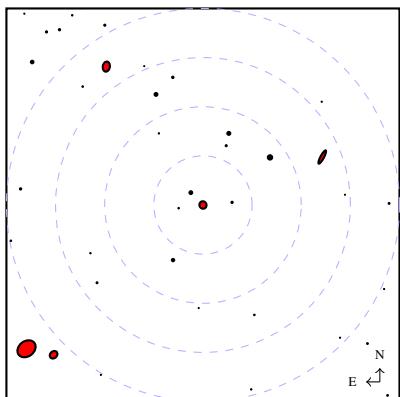
M98 = NGC 4192



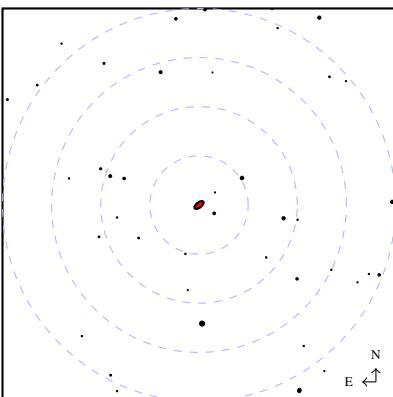
M101 = NGC 5457



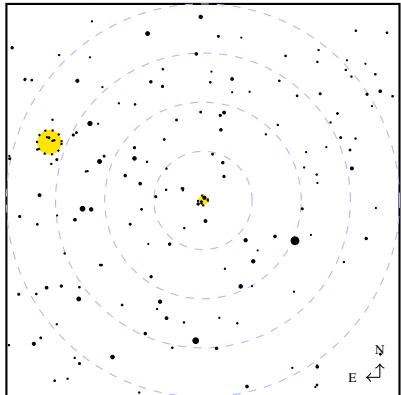
M99 = NGC 4254



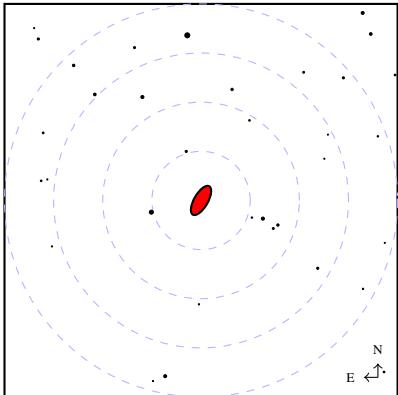
M102 = NGC 5866



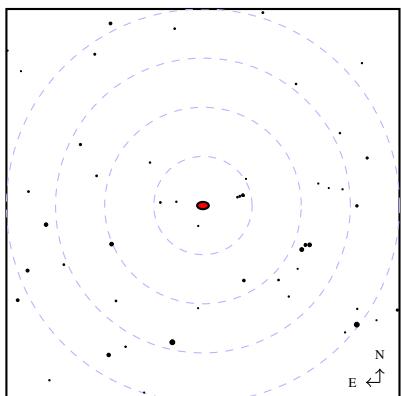
M103 = NGC 581



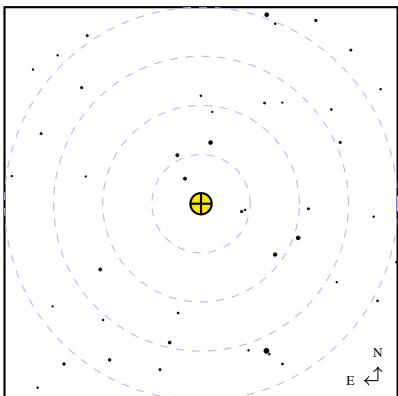
M106 = NGC 4258



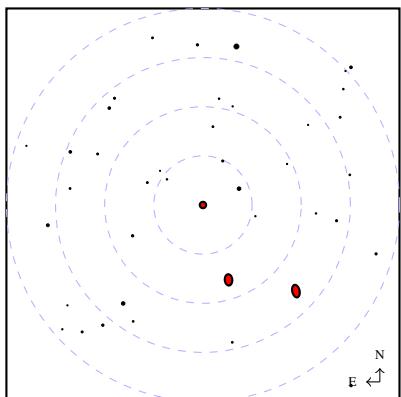
M104 = U48 = NGC 4594 = Sombrero Galaxy



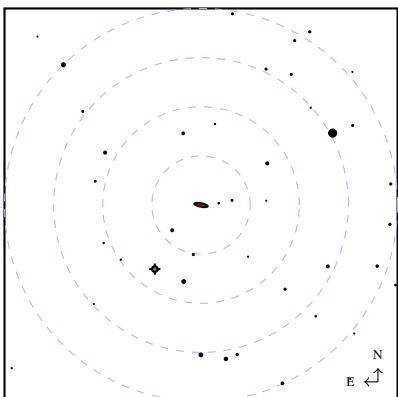
M107 = NGC 6171



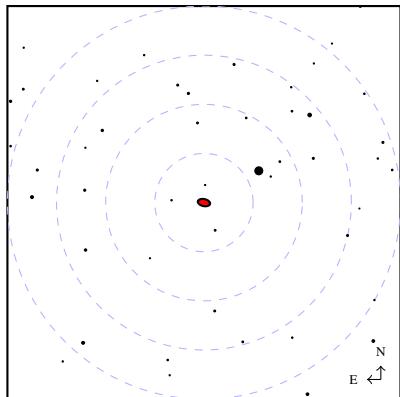
M105 = NGC 3379



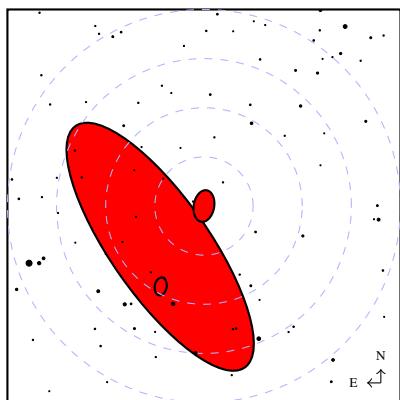
M108 = NGC 3556



M109 = NGC 3992



M110 = NGC 205





## Chapter 2

# The Caldwell Objects

The Caldwell objects were selected by Patrick Moore as a complement to the Messier objects. Again, I find O'Meara's *Deep-Sky Companion: The Caldwell Objects* to be excellent on the origin of the catalog, the appearance of the objects, and their nature.

I use C1 to C109 to label the Caldwell objects. This is common practice, but does not confirm to the IAU's recommendation on nomenclature, as O'Meara rightly notes (pp. 14–15).

The following table lists the objects with their J2000 positions (decimal hours of right ascension and degrees of declination), the charts on which they appear in the *Pocket Sky Atlas*, their types, and other names. I follow the corrections given by O'Meara (p. 15) with regards to C37, C49, C89, and C100.

For completeness, I include finder charts for all of the Caldwell objects, even bright ones like C41 (the Hyades).

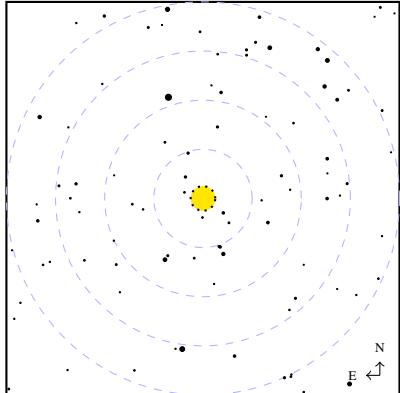
I note that C41 (the Hyades) and C99 (the Coalsack Nebula) are much bigger than the finder charts. They are really binocular objects and are better located using a small-scale all-sky atlas.

| Name | Position | PSA   | Type | Other Names                     |
|------|----------|-------|------|---------------------------------|
| C1   | 00.8 +85 | 1     | OC   | NGC 188                         |
| C2   | 00.2 +73 | 1/71  | PN   | NGC 40 = Bow-Tie Nebula         |
| C3   | 12.3 +69 | 31/41 | Gal  | NGC 4236                        |
| C4   | 21.0 +68 | 61/71 | BN   | NGC 7023 = Iris Nebula          |
| C5   | 03.8 +68 | 1/11  | Gal  | IC 342 = Hidden Galaxy          |
| C6   | 18.0 +67 | 51/61 | PN   | NGC 6543 = Cat's Eye Nebula     |
| C7   | 07.6 +66 | 21    | Gal  | NGC 2403                        |
| C8   | 01.5 +63 | 1/3   | OC   | NGC 559                         |
| C9   | 23.0 +63 | 71/72 | BN   | Cave Nebula                     |
| C10  | 01.8 +61 | 1/2   | OC   | NGC 663                         |
| C11  | 23.3 +61 | 71/72 | BN   | NGC 7635 = Bubble Nebula        |
| C12  | 20.6 +60 | 61/62 | Gal  | NGC 6946 = Firecracker Galaxy   |
| C13  | 01.3 +58 | 1/3   | OC   | NGC 457 = Owl Cluster           |
| C14  | 02.3 +57 | 1/2   | FC   | NGC 869/884 = Double Cluster    |
| C15  | 19.7 +51 | 62    | PN   | NGC 6826 = Blinking Planetary   |
| C16  | 22.3 +50 | 73    | OC   | NGC 7243                        |
| C17  | 00.6 +49 | 3     | Gal  | NGC 147                         |
| C18  | 00.6 +48 | 3     | Gal  | NGC 185                         |
| C19  | 21.9 +47 | 73    | BN   | IC 5146 = Cocoon Nebula         |
| C20  | 21.0 +44 | 62    | BN   | NGC 7000 = North America Nebula |
| C21  | 12.5 +44 | 32/43 | Gal  | NGC 4449                        |
| C22  | 23.4 +43 | 72    | PN   | NGC 7662 = Light Blue Snowball  |
| C23  | 02.4 +42 | 2     | Gal  | NGC 891                         |
| C24  | 03.3 +42 | 13    | Gal  | NGC 1275 = Per A                |
| C25  | 07.6 +39 | 23    | GC   | NGC 2419                        |
| C26  | 12.3 +38 | 32/43 | Gal  | NGC 4244                        |
| C27  | 20.2 +38 | 62    | BN   | NGC 6888 = Crescent Nebula      |
| C28  | 01.9 +38 | 2     | OC   | NGC 752                         |
| C29  | 13.2 +37 | 43    | Gal  | NGC 5005                        |
| C30  | 22.6 +34 | 72/74 | Gal  | NGC 7331                        |
| C31  | 05.3 +34 | 12    | BN   | IC 405 = Flaming Star Nebula    |
| C32  | 12.7 +33 | 43/45 | Gal  | NGC 4631 = Whale Galaxy         |
| C33  | 20.9 +32 | 62    | BN   | NGC 6992 = Eastern Veil Nebula  |
| C34  | 20.8 +31 | 62    | BN   | NGC 6960 = Western Veil Nebula  |
| C35  | 13.0 +28 | 43/45 | Gal  | NGC 4889                        |
| C36  | 12.6 +28 | 43/45 | Gal  | NGC 4559                        |
| C37  | 20.2 +26 | 62/64 | OC   | NGC 6885                        |
| C38  | 12.6 +26 | 43/45 | Gal  | NGC 4565 = Needle Galaxy        |
| C39  | 07.5 +21 | 25    | PN   | NGC 2392 = Eskimo Nebula        |
| C40  | 11.3 +18 | 34    | Gal  | NGC 3626                        |

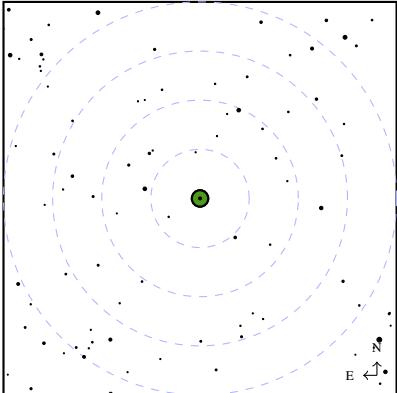
| Name | Position | PSA   | Type | Other Names                         |
|------|----------|-------|------|-------------------------------------|
| C41  | 04.4 +16 | 15    | OC   | Mel 25 = Hyades                     |
| C42  | 21.0 +16 | 64/75 | GC   | NGC 7006                            |
| C43  | 00.1 +16 | 5/74  | Gal  | NGC 7814                            |
| C44  | 23.1 +12 | 74    | Gal  | NGC 7479                            |
| C45  | 13.6 +09 | 44    | Gal  | NGC 5248                            |
| C46  | 06.7 +09 | 25/E  | BN   | NGC 2261 = Hubble's Variable Nebula |
| C47  | 20.6 +07 | 64    | GC   | NGC 6934                            |
| C48  | 09.2 +07 | 24/35 | Gal  | NGC 2775                            |
| C49  | 06.5 +05 | 25/E  | BN   | NGC 2237/38/46 = Rosette Nebula     |
| C50  | 06.5 +05 | 25/E  | OC   | NGC 2244                            |
| C51  | 01.1 +02 | 5/7   | Gal  | IC 1613                             |
| C52  | 12.8 -06 | 47    | Gal  | NGC 4697                            |
| C53  | 10.1 -08 | 37    | Gal  | NGC 3115 = The Spindle              |
| C54  | 08.0 -11 | 26    | OC   | NGC 2506                            |
| C55  | 21.1 -11 | 77    | PN   | NGC 7009 = Saturn Nebula            |
| C56  | 00.8 -12 | 7     | PN   | NGC 246                             |
| C57  | 19.7 -15 | 66    | Gal  | NGC 6822 = Barnard's Galaxy         |
| C58  | 07.3 -16 | 27    | OC   | NGC 2360 = Caroline's Cluster       |
| C59  | 10.4 -19 | 36/37 | PN   | NGC 3242 = Ghost of Jupiter         |
| C60  | 12.0 -19 | 36/47 | Gal  | NGC 4038 = NW Antennae Galaxy       |
| C61  | 12.0 -19 | 36/47 | Gal  | NGC 4039 = SE Antennae Galaxy       |
| C62  | 00.8 -21 | 7     | Gal  | NGC 247                             |
| C63  | 22.5 -21 | 76/77 | PN   | NGC 7293 = Helix Nebula             |
| C64  | 07.3 -25 | 27    | OC   | NGC 2362 = $\tau$ CMa Cluster       |
| C65  | 00.8 -25 | 7/9   | Gal  | NGC 253 = Sculptor Galaxy           |
| C66  | 14.7 -27 | 46    | GC   | NGC 5694                            |
| C67  | 02.8 -30 | 6/8   | Gal  | NGC 1097                            |
| C68  | 19.0 -37 | 69    | BN   | NGC 6729 = R CrA Nebula             |
| C69  | 17.2 -37 | 58    | PN   | NGC 6302 = Bug Nebula               |
| C70  | 00.9 -38 | 9     | Gal  | NGC 300                             |
| C71  | 07.9 -39 | 28    | OC   | NGC 2477                            |
| C72  | 00.2 -39 | 9     | Gal  | NGC 55                              |
| C73  | 05.2 -40 | 18    | GC   | NGC 1851                            |
| C74  | 10.1 -40 | 39    | PN   | NGC 3132                            |
| C75  | 16.4 -41 | 58    | OC   | NGC 6124                            |
| C76  | 16.9 -42 | 58    | OC   | NGC 6231                            |
| C77  | 13.4 -43 | 48/49 | Gal  | NGC 5128 = Cen A                    |
| C78  | 18.1 -44 | 69    | GC   | NGC 6541                            |
| C79  | 10.3 -46 | 39    | GC   | NGC 3201                            |
| C80  | 13.4 -47 | 48/49 | GC   | NGC 5139 = $\omega$ Cen             |

| Name | Position | PSA     | Type | Other Names                         |
|------|----------|---------|------|-------------------------------------|
| C81  | 17.4 –48 | 58      | GC   | NGC 6352                            |
| C82  | 16.7 –49 | 58      | OC   | NGC 6193                            |
| C83  | 13.1 –49 | 49      | Gal  | NGC 4945                            |
| C84  | 13.8 –51 | 48      | GC   | NGC 5286                            |
| C85  | 08.7 –53 | 28      | OC   | IC 2391 = o Vel Cluster             |
| C86  | 17.7 –54 | 58      | GC   | NGC 6397                            |
| C87  | 03.2 –55 | 19      | GC   | NGC 1261                            |
| C88  | 15.1 –56 | 59      | OC   | NGC 5823                            |
| C89  | 16.3 –58 | 58/60   | OC   | NGC 6087 = S Nor Cluster            |
| C90  | 09.4 –58 | 39      | PN   | NGC 2867                            |
| C91  | 11.1 –59 | 38/40   | OC   | NGC 3532                            |
| C92  | 10.8 –60 | 38/40   | BN   | NGC 3372 = $\eta$ Car Nebula        |
| C93  | 19.2 –60 | 69/70   | GC   | NGC 6752                            |
| C94  | 12.9 –60 | 49/50   | OC   | NGC 4755 = Jewel Box                |
| C95  | 16.1 –60 | 59/60   | OC   | NGC 6025                            |
| C96  | 08.0 –61 | 28/30   | OC   | NGC 2516 = Southern Beehive Cluster |
| C97  | 11.6 –62 | 38/40   | OC   | NGC 3766                            |
| C98  | 12.7 –63 | 49/50   | OC   | NGC 4609                            |
| C99  | 12.5 –64 | 49/50   | DN   | Coalsack                            |
| C100 | 11.6 –63 | 38/40   | OC   | Cr 249 = $\lambda$ Cen Cluster      |
| C101 | 19.2 –64 | 70      | Gal  | NGC 6744                            |
| C102 | 10.7 –64 | 38/40   | OC   | IC 2602 = $\theta$ Car Cluster      |
| C103 | 05.6 –69 | 20/30/D | BN   | NGC 2070 = Tarantula Nebula         |
| C104 | 01.1 –71 | 10/80   | GC   | NGC 362                             |
| C105 | 13.0 –71 | 50      | GC   | NGC 4833                            |
| C106 | 00.4 –72 | 10/80   | GC   | NGC 104 = 47 Tuc                    |
| C107 | 16.4 –72 | 60      | GC   | NGC 6101                            |
| C108 | 12.4 –73 | 40/50   | GC   | NGC 4372                            |
| C109 | 10.2 –81 | 40      | PN   | NGC 3195                            |

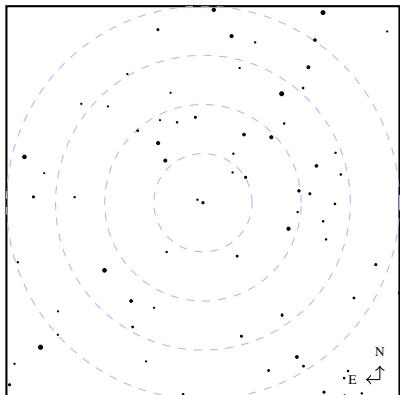
C1 = NGC 188



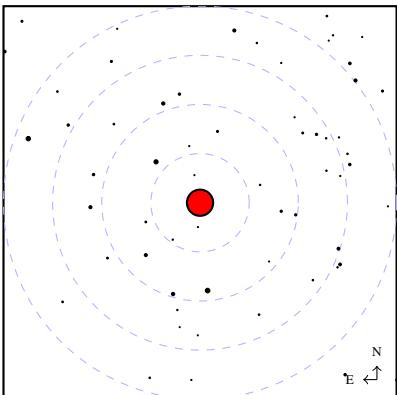
C4 = NGC 7023 = Iris Nebula



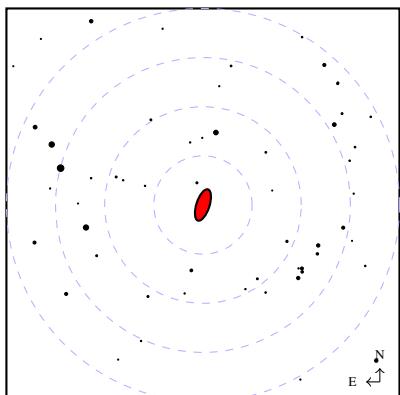
C2 = NGC 40 = Bow-Tie Nebula



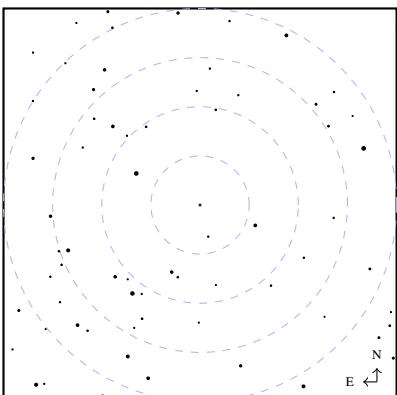
C5 = IC 342 = Hidden Galaxy



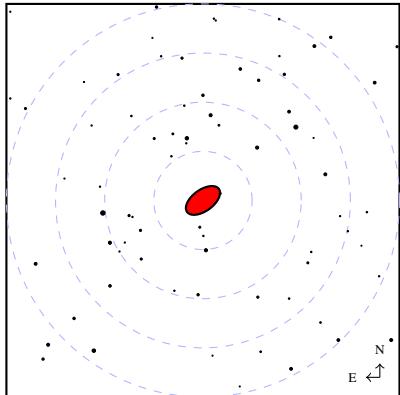
C3 = NGC 4236



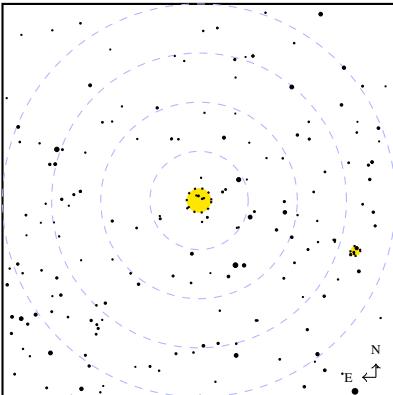
C6 = NGC 6543 = Cat's Eye Nebula



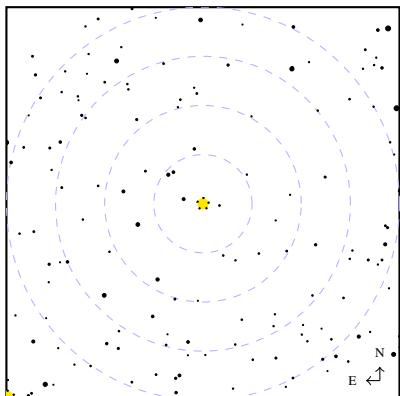
C7 = NGC 2403



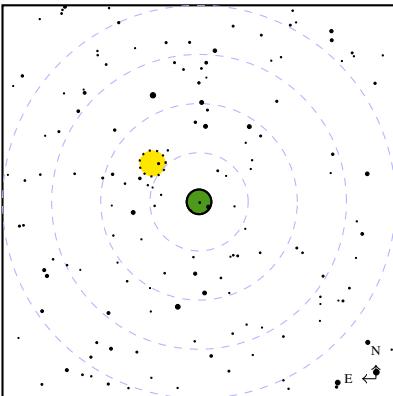
C10 = U5 = NGC 663



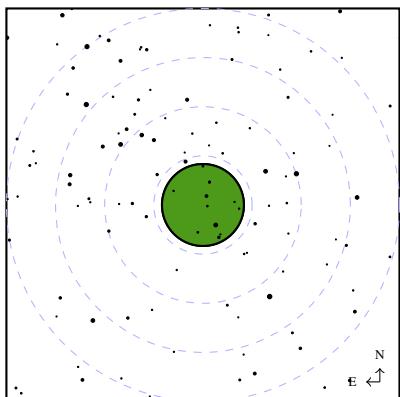
C8 = NGC 559



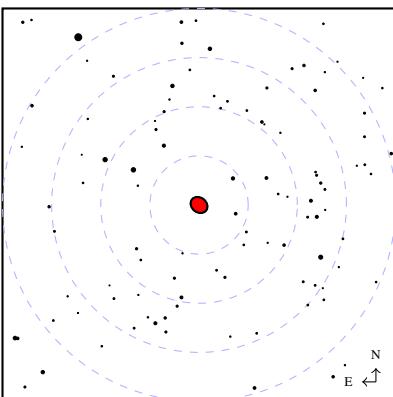
C11 = NGC 7635 = Bubble Nebula



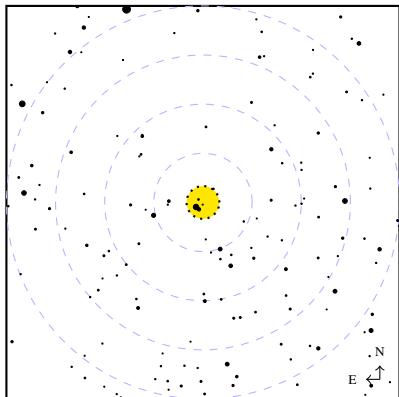
C9 = Cave Nebula



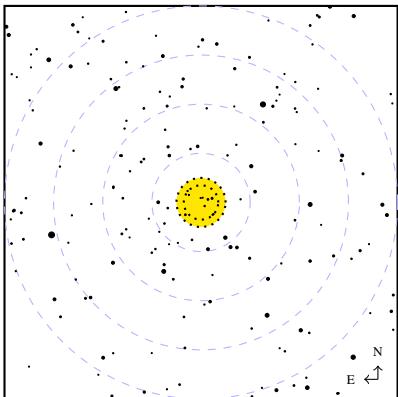
C12 = NGC 6946 = Firecracker Galaxy



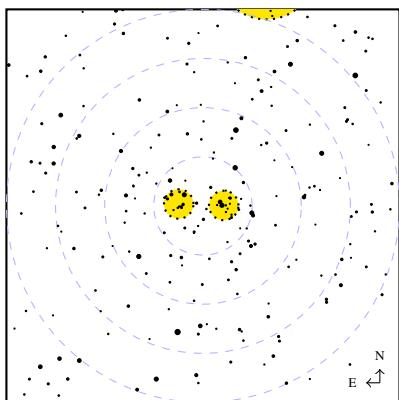
C13 = U4 = NGC 457 = Owl Cluster



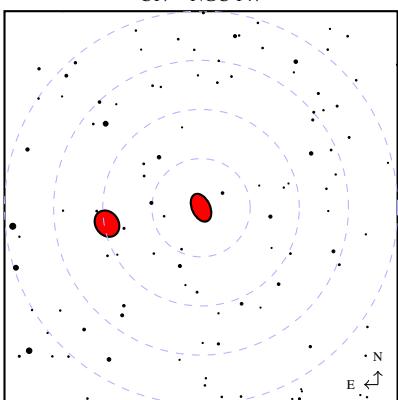
C16 = NGC 7243



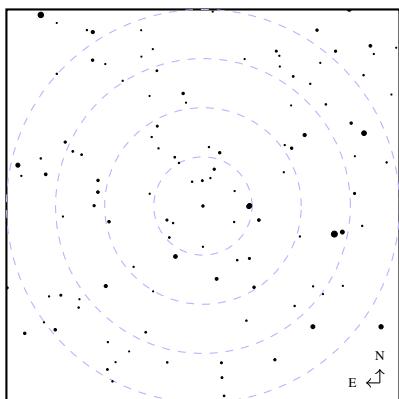
C14 = U9/10 = NGC 869/884 = Double Cluster



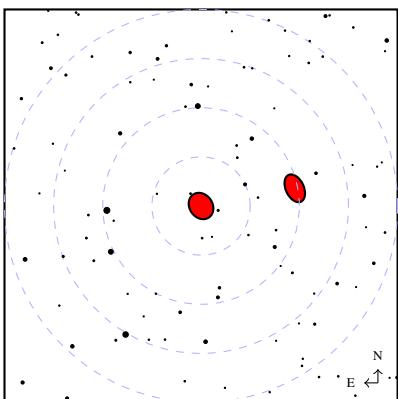
C17 = NGC 147



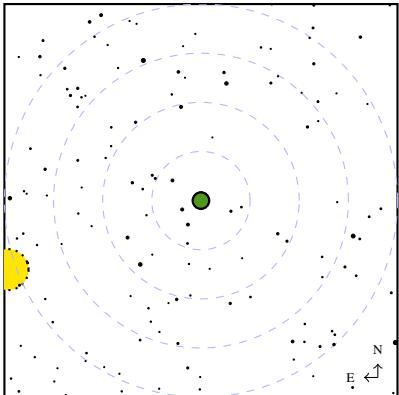
C15 = NGC 6826 = Blinking Planetary



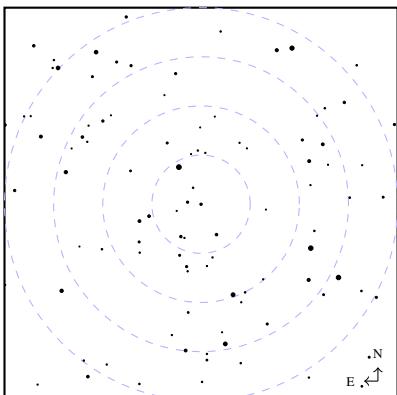
C18 = NGC 185



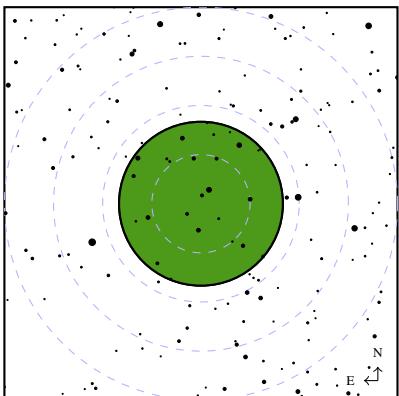
C19 = IC 5146 = Cocoon Nebula



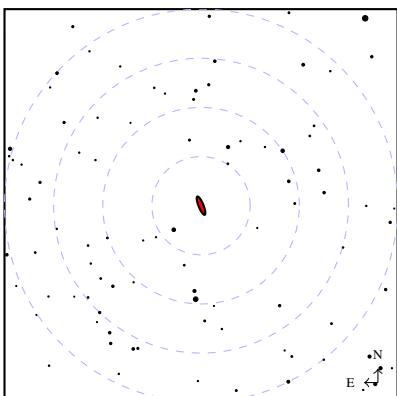
C22 = NGC 7662 = Light Blue Snowball



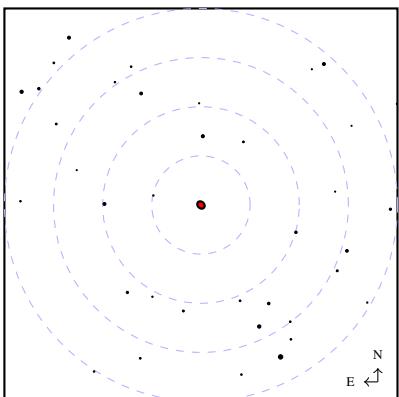
C20 = NGC 7000 = North America Nebula



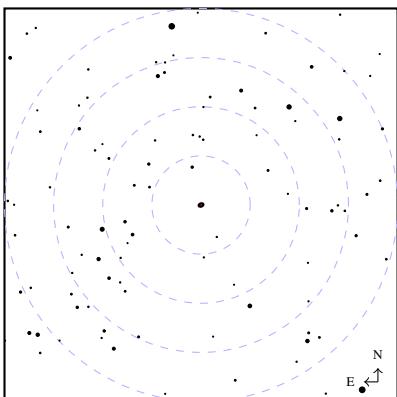
C23 = NGC 891



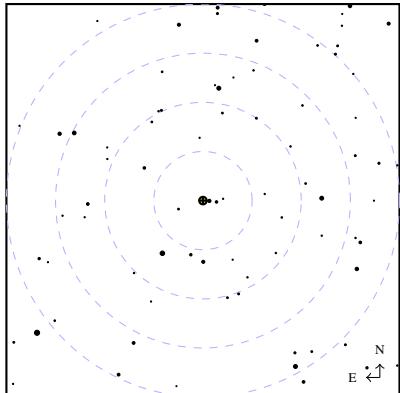
C21 = NGC 4449



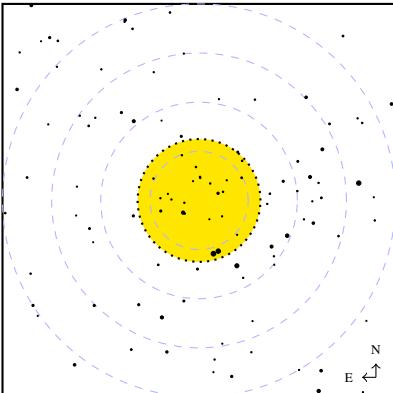
C24 = NGC 1275 = Per A



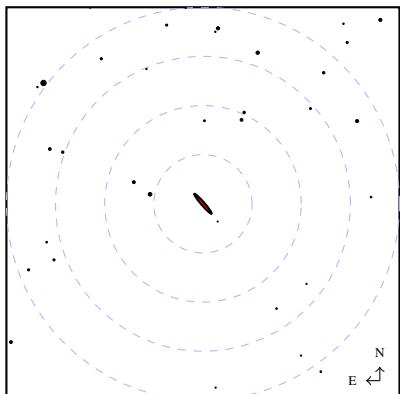
C25 = NGC 2419



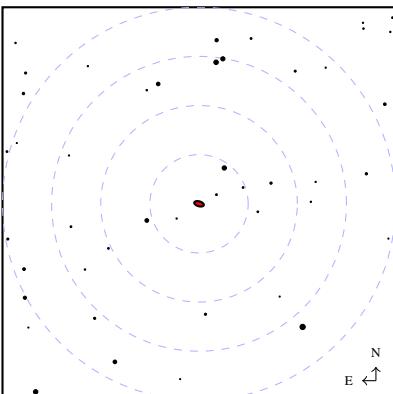
C28 = U7 = NGC 752



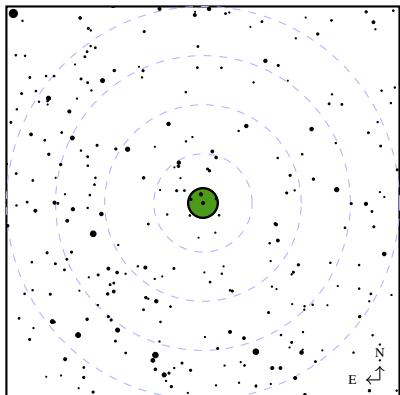
C26 = NGC 4244



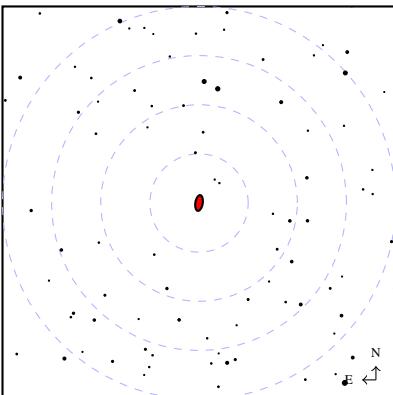
C29 = NGC 5005



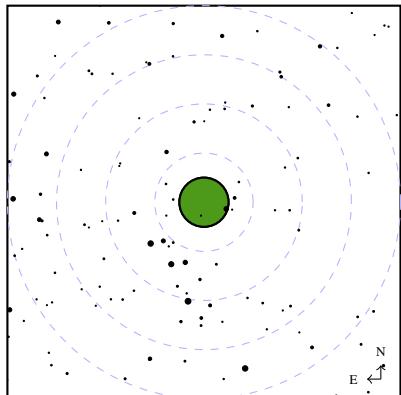
C27 = NGC 6888 = Crescent Nebula



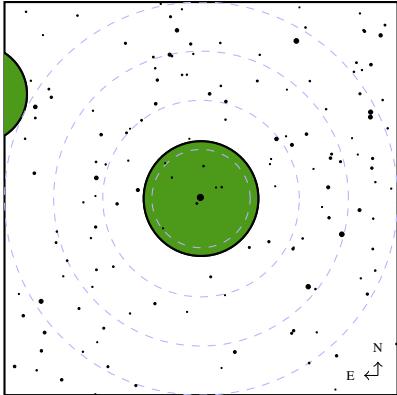
C30 = NGC 7331



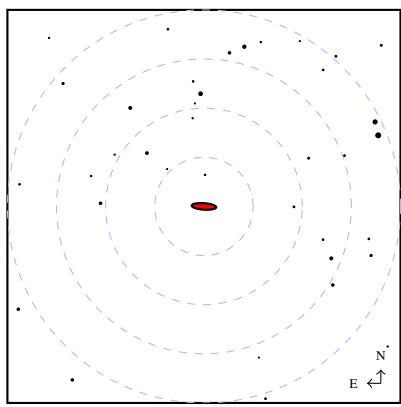
C31 = IC 405 = Flaming Star Nebula



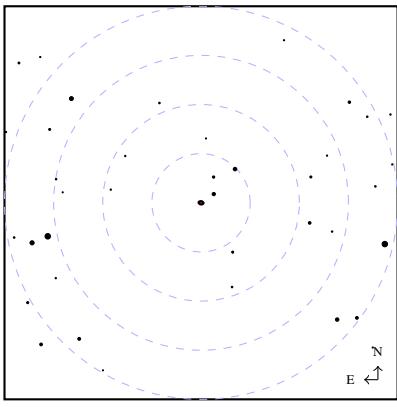
C34 = NGC 6960 = Western Veil Nebula



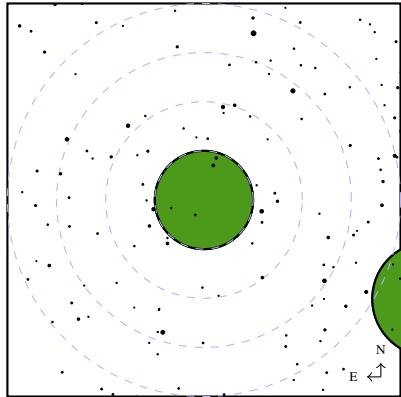
C32 = NGC 4631 = Whale Galaxy



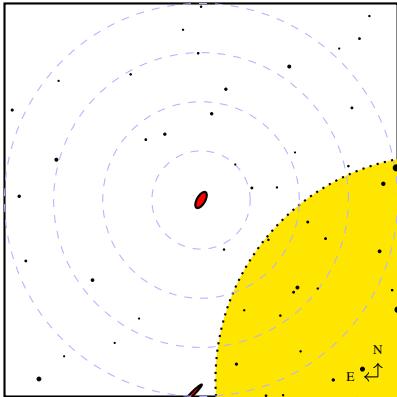
C35 = NGC 4889



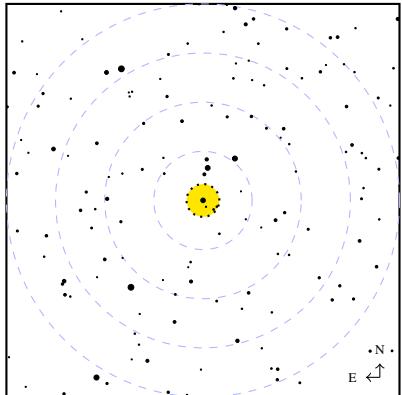
C33 = NGC 6992 = Eastern Veil Nebula



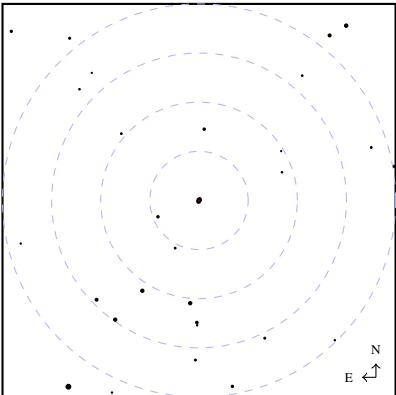
C36 = NGC 4559



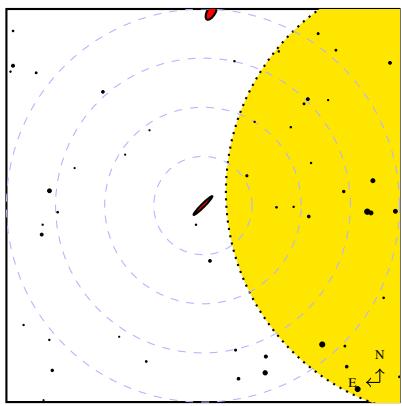
C37 = NGC 6885



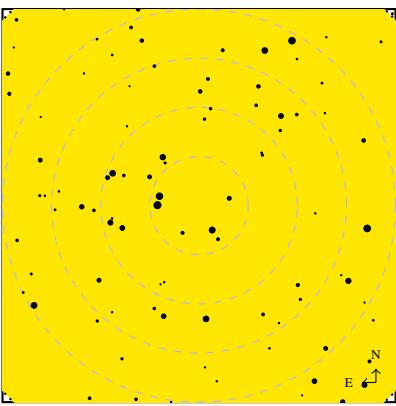
C40 = NGC 3626



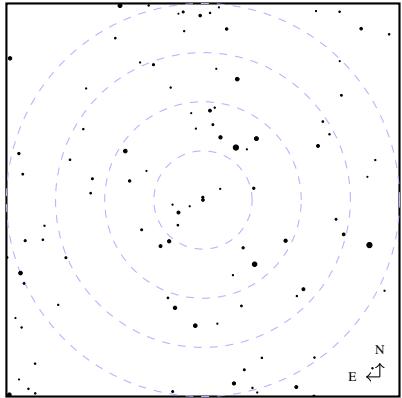
C38 = NGC 4565 = Needle Galaxy



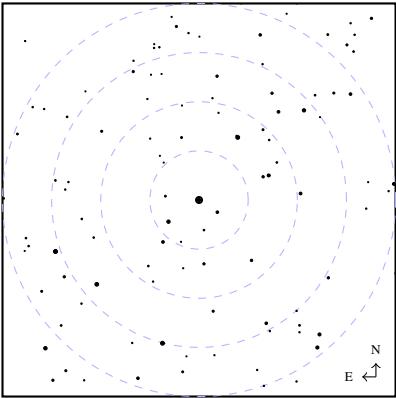
C41 = U18 = Mel 25 = Hyades



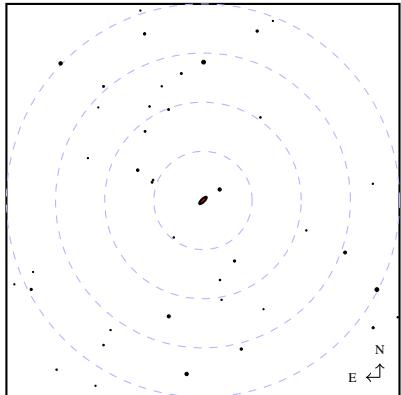
C39 = U36 = NGC 2392 = Eskimo Nebula



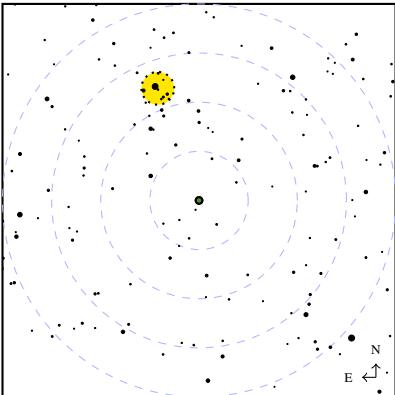
C42 = NGC 7006



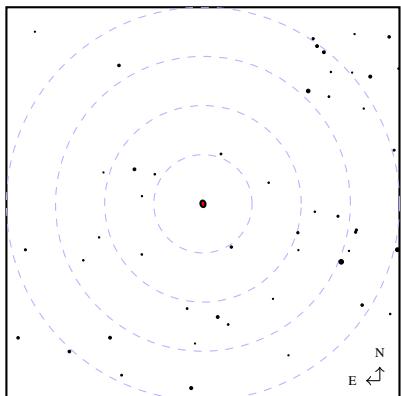
C43 = NGC 7814



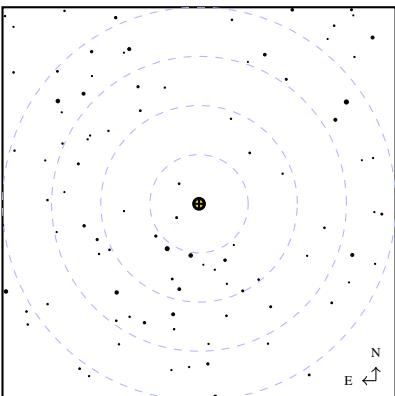
C46 = NGC 2261 = Hubble's Variable Nebula



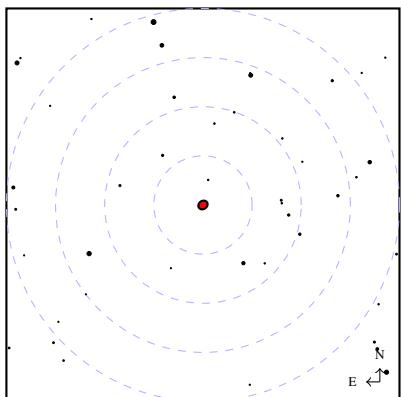
C44 = NGC 7479



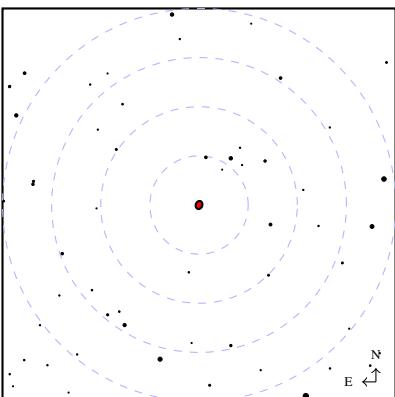
C47 = NGC 6934



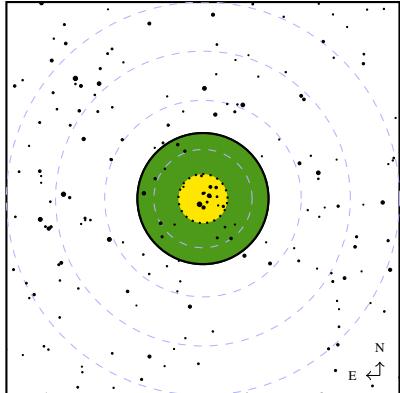
C45 = NGC 5248



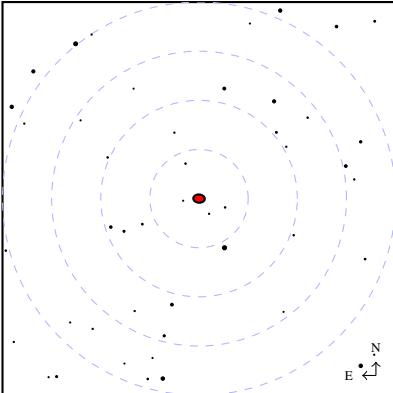
C48 = NGC 2775



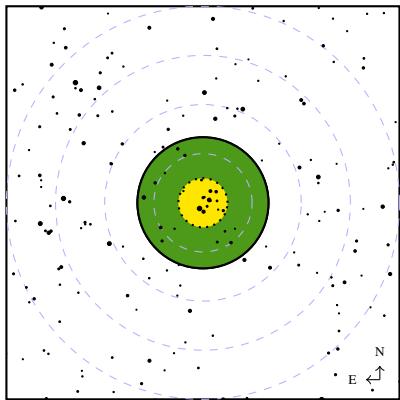
C49 = NGC 2237/38/46 = Rosette Nebula



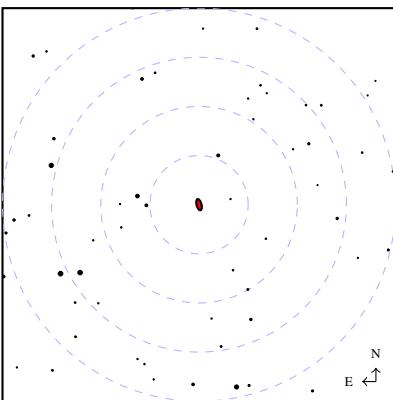
C52 = NGC 4697



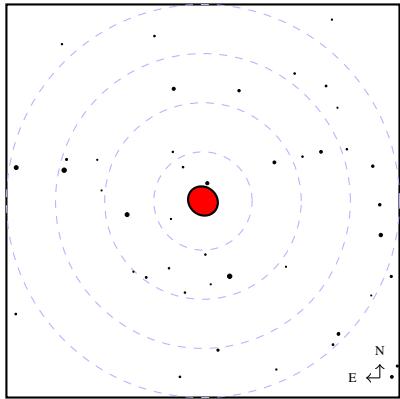
C50 = U30 = NGC 2244



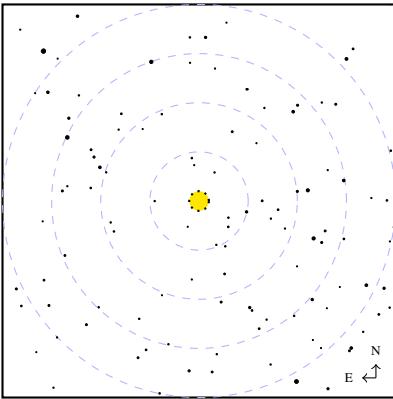
C53 = NGC 3115 = The Spindle



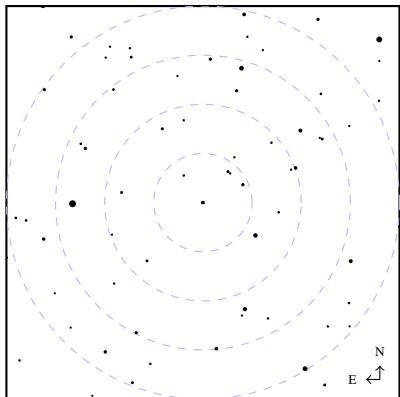
C51 = IC 1613



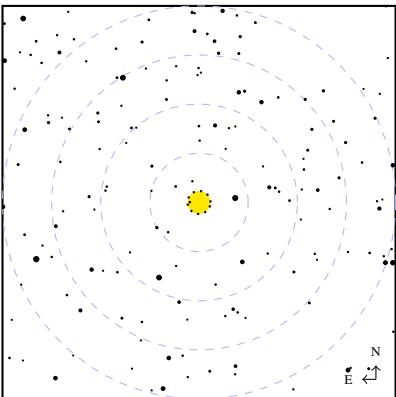
C54 = NGC 2506



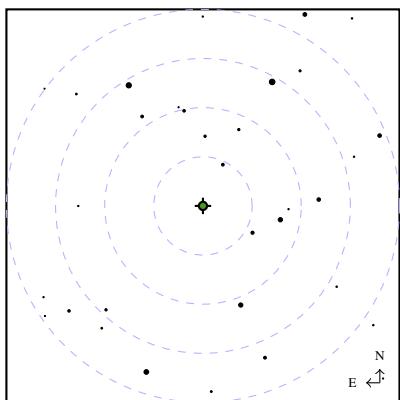
C55 = NGC 7009 = Saturn Nebula



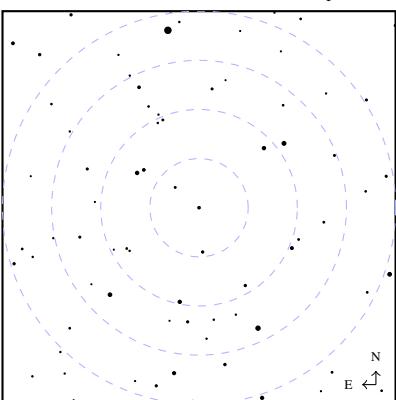
C58 = NGC 2360 = Caroline's Cluster



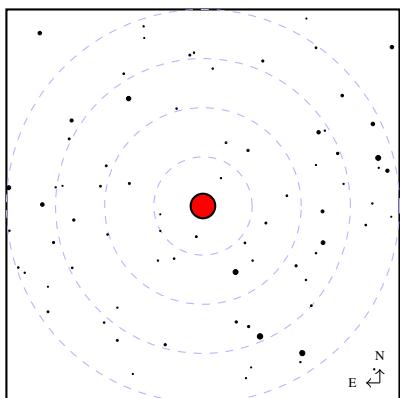
C56 = NGC 246



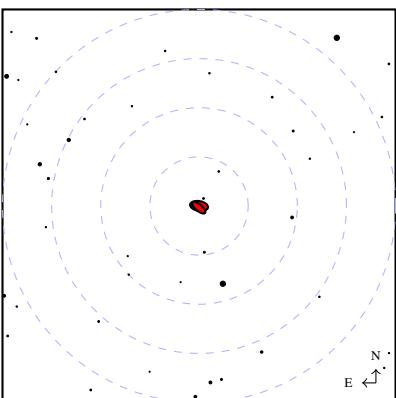
C59 = U43 = NGC 3242 = Ghost of Jupiter



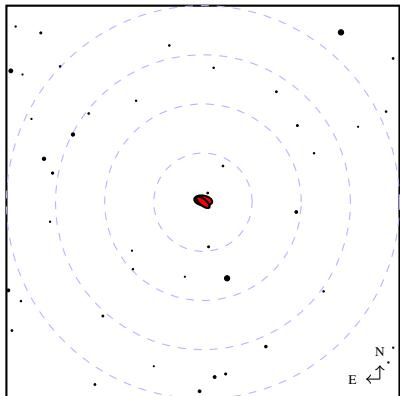
C57 = NGC 6822 = Barnard's Galaxy



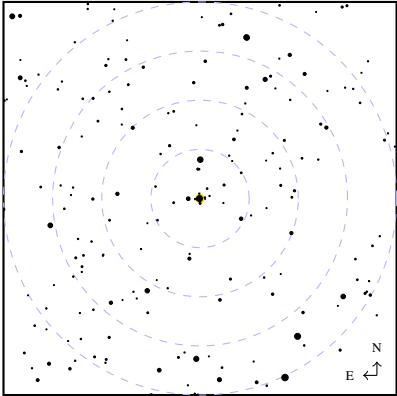
C60 = NGC 4038 = NW Antennae Galaxy



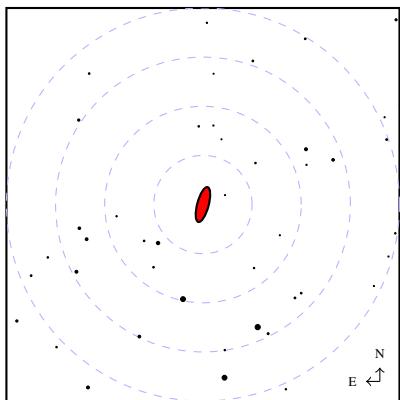
C61 = NGC 4039 = SE Antennae Galaxy



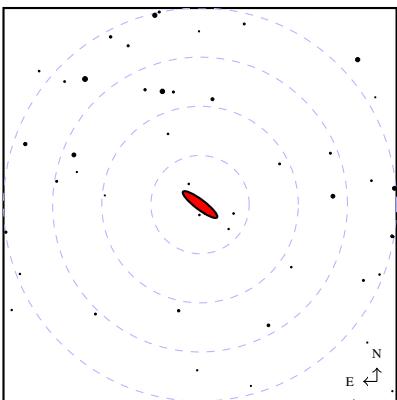
C64 = NGC 2362 =  $\tau$  CMa Cluster



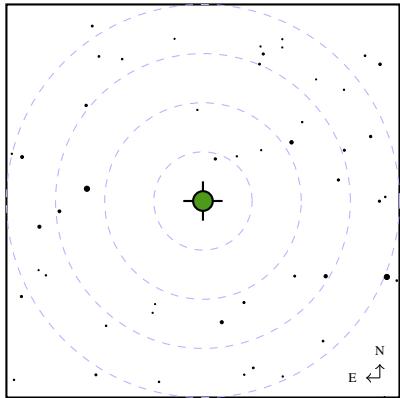
C62 = NGC 247



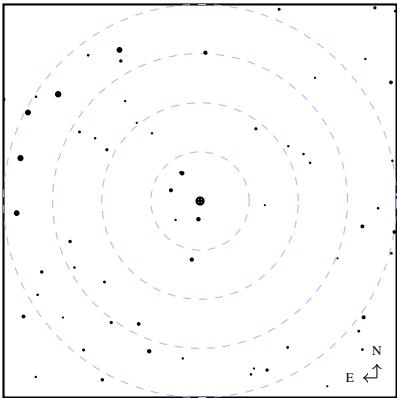
C65 = NGC 253 = Sculptor Galaxy



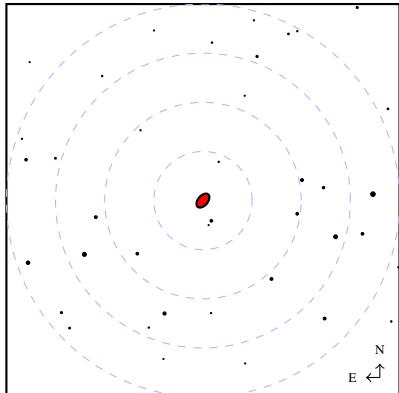
C63 = NGC 7293 = Helix Nebula



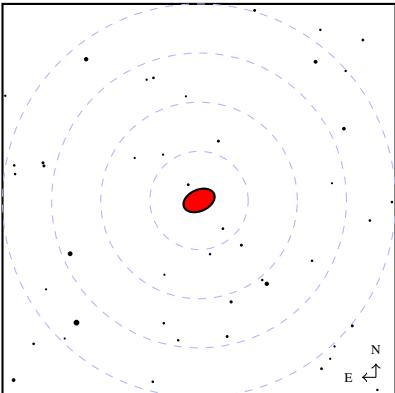
C66 = NGC 5694



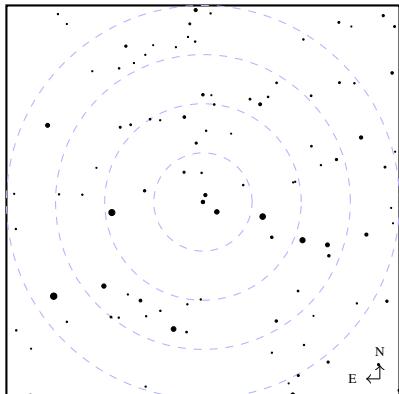
C67 = NGC 1097



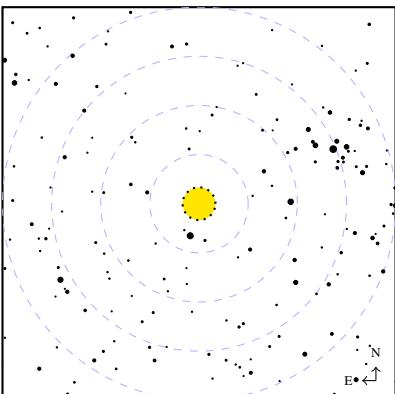
C70 = NGC 300



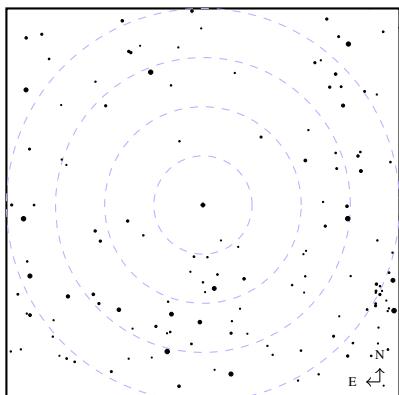
C68 = NGC 6729 = R CrA Nebula



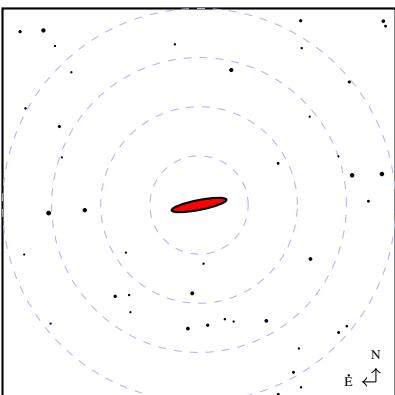
C71 = NGC 2477



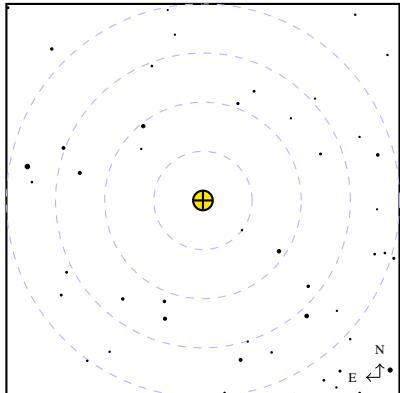
C69 = NGC 6302 = Bug Nebula



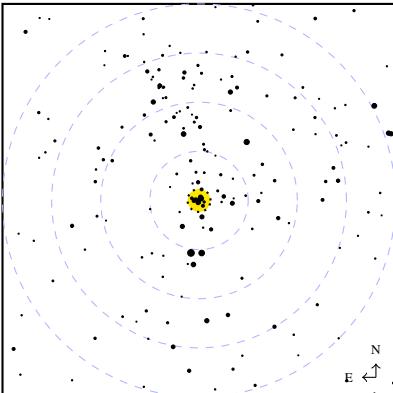
C72 = NGC 55



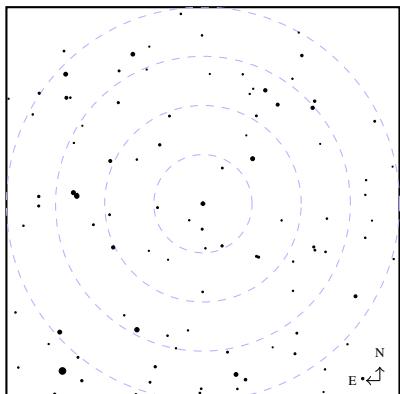
C73 = NGC 1851



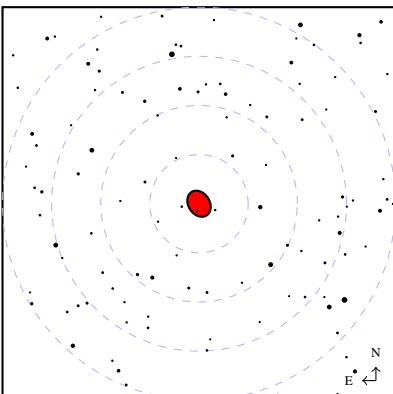
C76 = NGC 6231



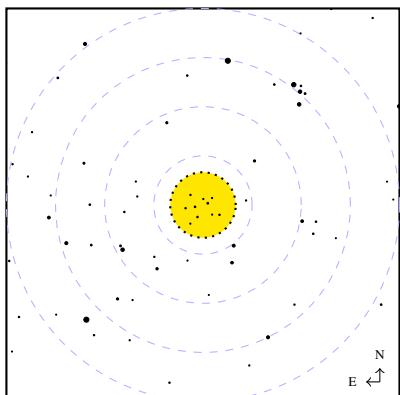
C74 = NGC 3132



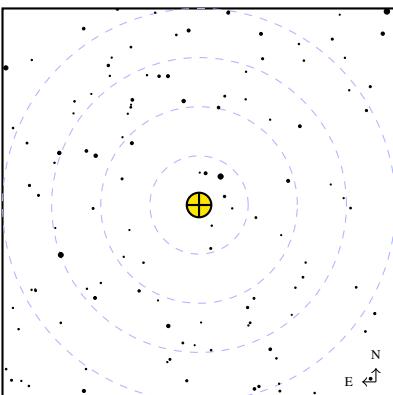
C77 = NGC 5128 = Cen A



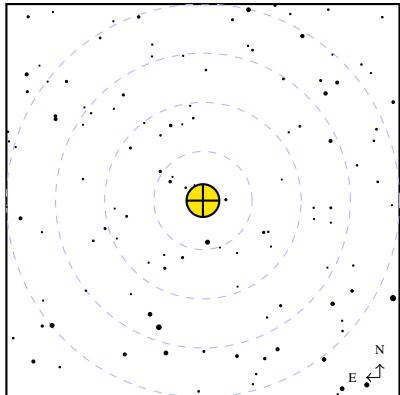
C75 = NGC 6124



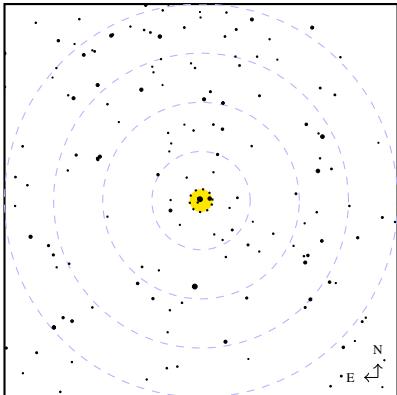
C78 = NGC 6541



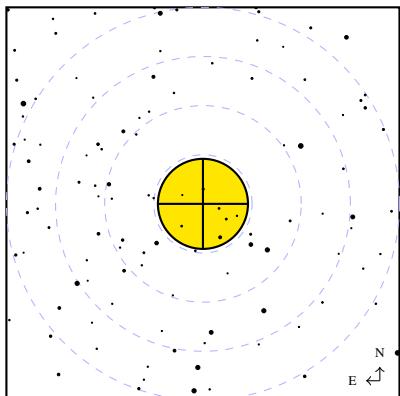
C79 = NGC 3201



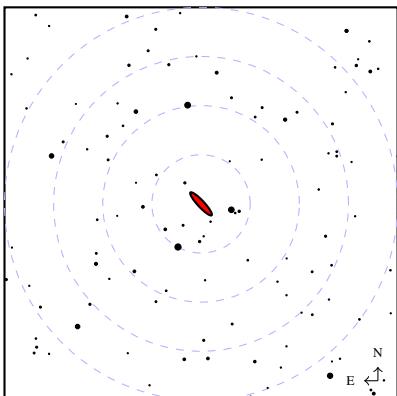
C82 = NGC 6193



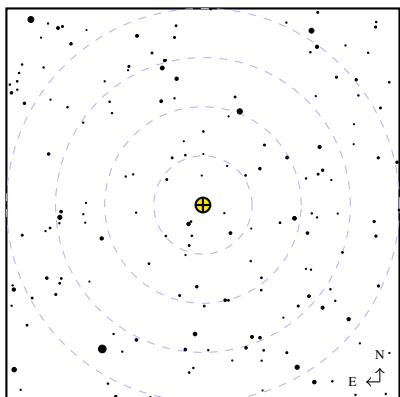
C80 = NGC 5139 =  $\omega$  Cen



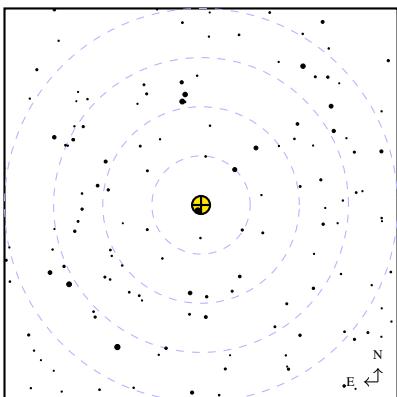
C83 = NGC 4945



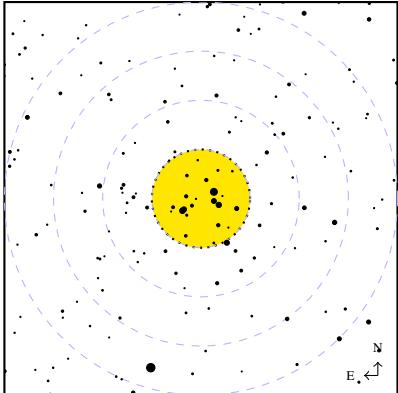
C81 = NGC 6352



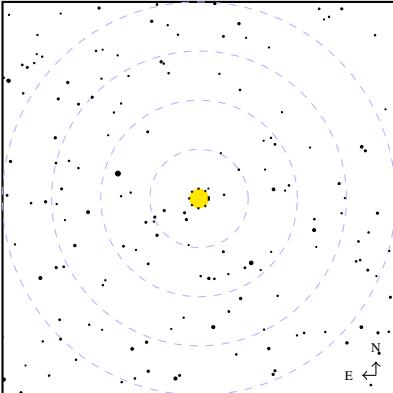
C84 = NGC 5286



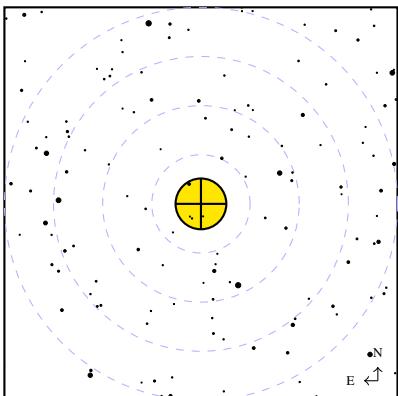
C85 = IC 2391 =  $\sigma$  Vel Cluster



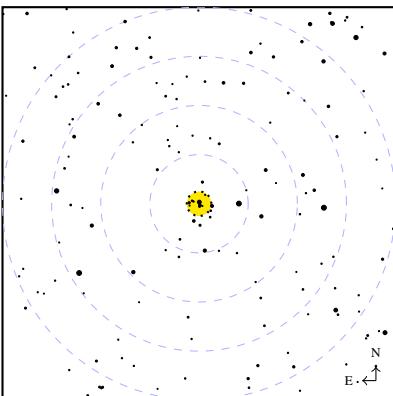
C88 = NGC 5823



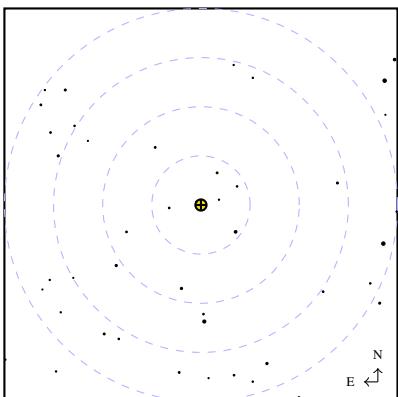
C86 = NGC 6397



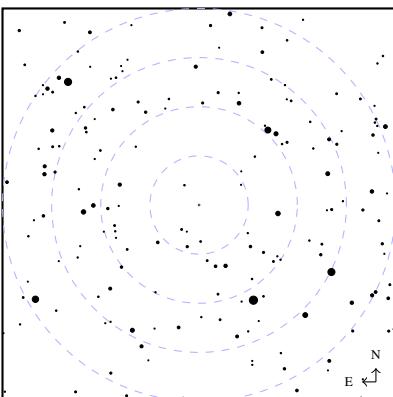
C89 = NGC 6087 = S Nor Cluster



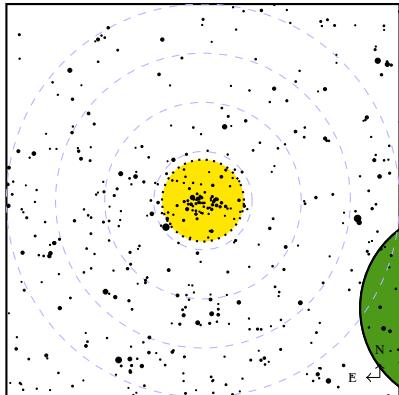
C87 = NGC 1261



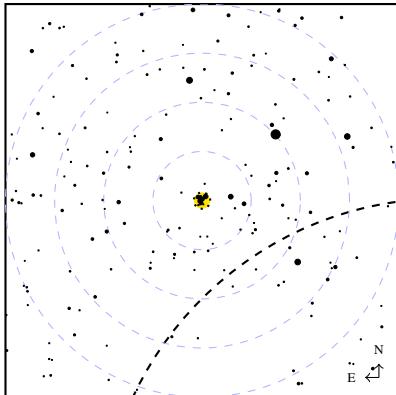
C90 = NGC 2867



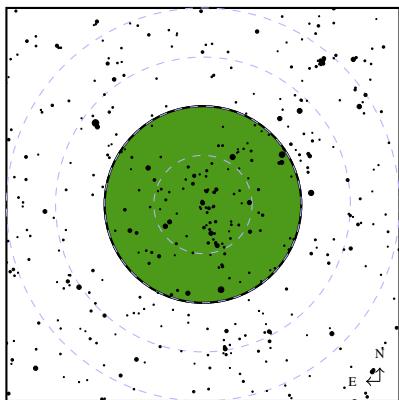
C91 = NGC 3532



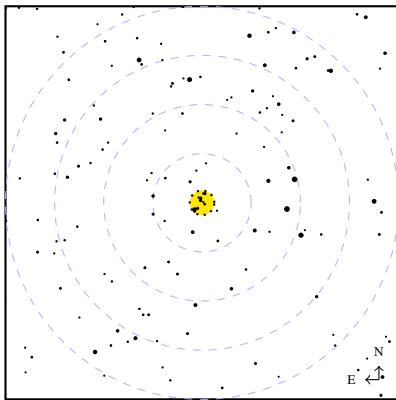
C94 = NGC 4755 = Jewel Box



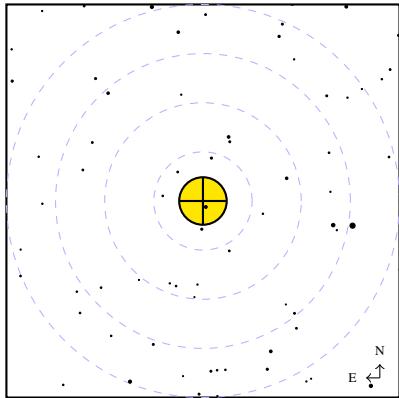
C92 = NGC 3372 =  $\eta$  Car Nebula



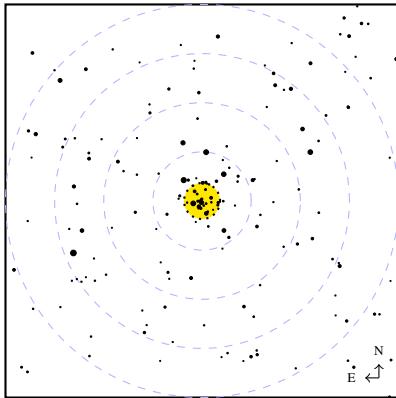
C95 = NGC 6025



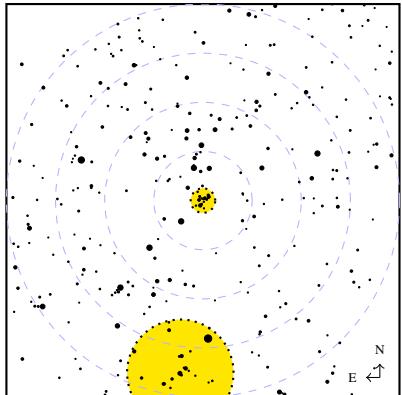
C93 = NGC 6752



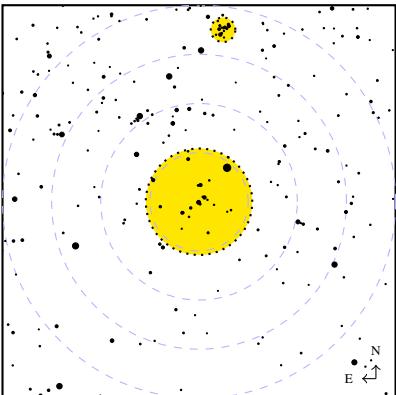
C96 = NGC 2516 = Southern Beehive Cluster



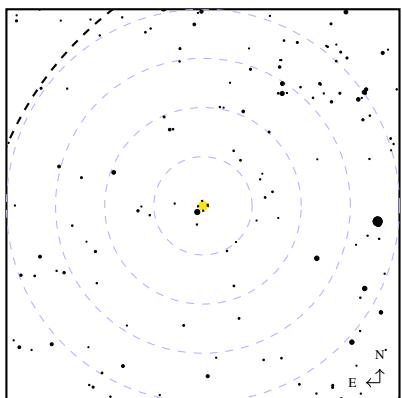
C97 = NGC 3766



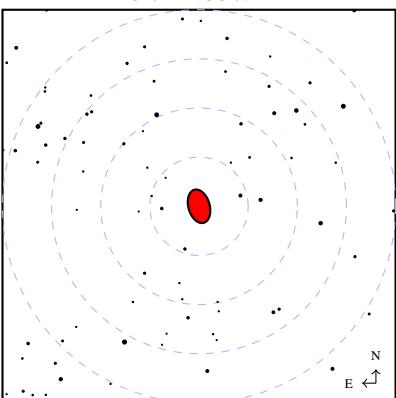
C100 = Cr 249 =  $\lambda$  Cen Cluster



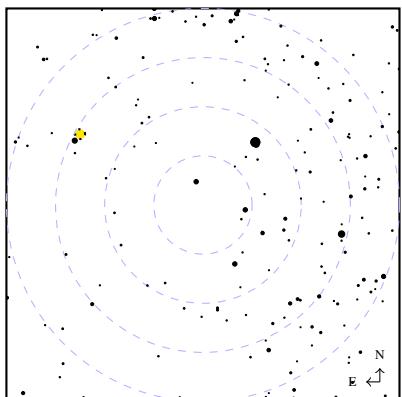
C98 = NGC 4609



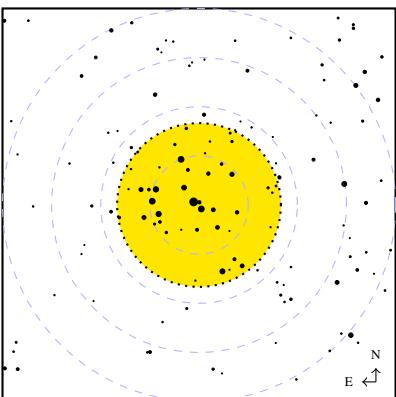
C101 = NGC 6744



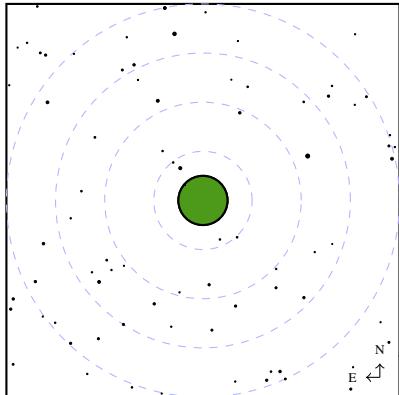
C99 = Coalsack



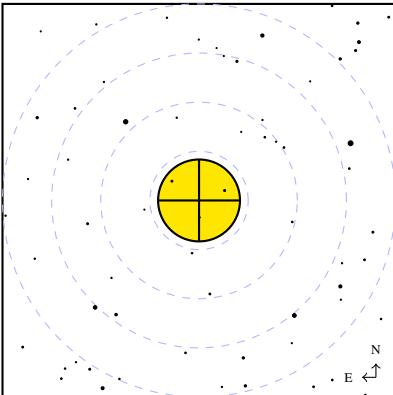
C102 = IC 2602 =  $\theta$  Car Cluster



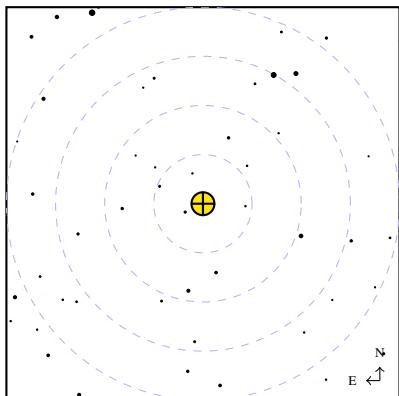
C103 = NGC 2070 = Tarantula Nebula



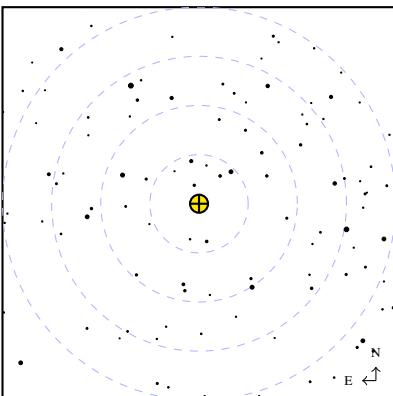
C106 = NGC 104 = 47 Tuc



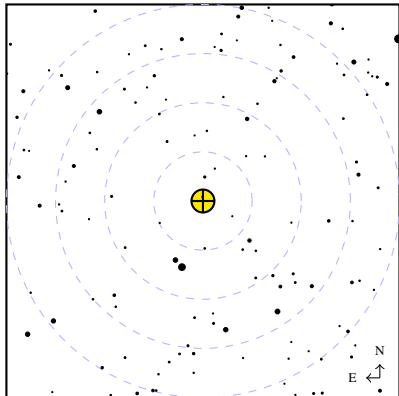
C104 = NGC 362



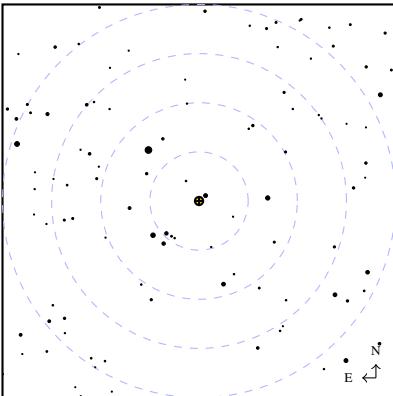
C107 = NGC 6101



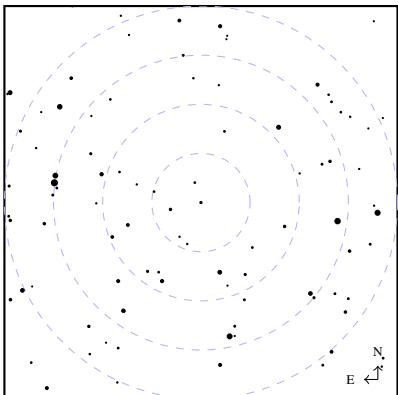
C105 = NGC 4833



C108 = NGC 4372



C109 = NGC 3195





## Chapter 3

# The Urban Observing Program Objects

The Astronomical League Urban Observing Program consists of bright objects selected by Terry Trees for northern observers under light-polluted skies. There are 87 deep-sky objects, 12 double stars, and 1 variable star. The deep-sky objects range in declination from  $-35$  to  $+72$  degrees, cover all seasons, and include 41 Messier objects and 14 Caldwell objects.

I give finder charts for the deep-sky objects only; the stars are all no fainter than magnitude 5.2 and have Bayer designations, and so a standard all-sky atlas is adequate. I use U1 to U87 to label the deep-sky objects, following the order in right ascension given by Trees, but this is not a standard designation. For completeness, I include all of the deep-sky objects, even bright ones like the Hyades (U18).

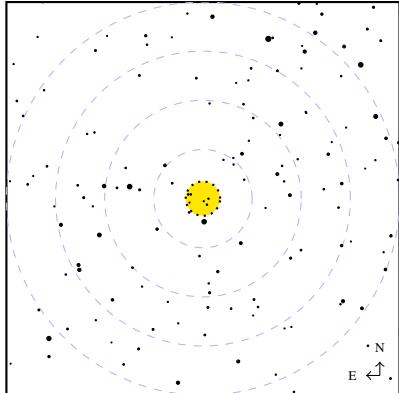
The following table lists the deep-sky objects with their J2000 positions (decimal hours of right ascension and degrees of declination), the charts on which they appear in the *Pocket Sky Atlas*, their types, other names, and references to O'Meara's *Deep-Sky Companions* volumes (*The Messier Objects*, *The Caldwell Objects*, *The Secret Deep*, and *Hidden Treasures*).

I note that the Hyades (U18) and Coma Star Cluster (U44) are much bigger than the finder charts. They are really binocular objects and better located using a small-scale all-sky atlas. That said, be aware that the  $\alpha$  Per Cluster (U15) and Coma Star Cluster (U44) are not labelled in the *Pocket Sky Atlas*.

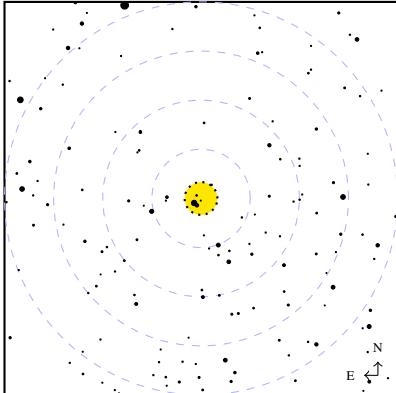
| Name | Position | PSA   | Type | Other Names                       | DSC     |
|------|----------|-------|------|-----------------------------------|---------|
| U1   | 00.5 +60 | 3     | OC   | NGC 129                           | TSD     |
| U2   | 00.7 +41 | 3     | Gal  | M32 = NGC 221                     | TMO     |
| U3   | 00.7 +41 | 3     | Gal  | M31 = NGC 224 = Andromeda Galaxy  | TMO     |
| U4   | 01.3 +58 | 1/3   | OC   | C13 = NGC 457 = Owl Cluster       | TCO     |
| U5   | 01.8 +61 | 1/2   | OC   | C10 = NGC 663                     | TCO     |
| U6   | 01.8 +72 | 1     | OC   | Cr 463                            | TSD     |
| U7   | 01.9 +38 | 2     | OC   | C28 = NGC 752                     | TCO     |
| U8   | 02.3 +60 | 2     | OC   | Stock 2                           | TSD     |
| U9   | 02.3 +57 | 2     | OC   | NGC 869 = h Persei Cluster        | TMO/TCO |
| U10  | 02.4 +57 | 2     | OC   | NGC 884 = $\chi$ Persei Cluster   | TMO/TCO |
| U11  | 02.6 +56 | 2     | OC   | Tr 2                              |         |
| U12  | 02.7 -00 | 4     | Gal  | M77 = NGC 1068                    | TMO     |
| U13  | 03.2 +63 | 11/13 | OC   | Tr 3                              |         |
| U14  | 03.3 +60 | 11/13 | OC   | Stock 23 = Pazmino's Cluster      |         |
| U15  | 03.4 +49 | 3     | OC   | Mel 20 = $\alpha$ Per Cluster     |         |
| U16  | 03.5 +37 | 13    | OC   | NGC 1342                          | TSD     |
| U17  | 03.8 +24 | 15/A  | OC   | M45 = Mel 22 = Pleiades           | TMO     |
| U18  | 04.4 +16 | 15    | OC   | C41 = Mel 25 = Hyades             | TCO     |
| U19  | 04.8 +19 | 15    | OC   | NGC 1647                          | TCO/HT  |
| U20  | 05.2 +17 | 14    | OC   | NGC 1807                          | TSD     |
| U21  | 05.2 +17 | 14    | OC   | NGC 1817                          | TSD     |
| U22  | 05.5 +36 | 12    | OC   | M38 = NGC 1912                    | TMO     |
| U23  | 05.6 +34 | 12    | OC   | M36 = NGC 1960                    | TMO     |
| U24  | 05.6 -05 | 16/B  | BN   | M42 = NGC 1976 = Orion Nebula     | TMO     |
| U25  | 05.6 -04 | 16/B  | OC   | NGC 1981                          | HT      |
| U26  | 05.9 +33 | 12    | OC   | M37 = NGC 2099                    | TMO     |
| U27  | 06.2 +24 | 14    | OC   | M35 = NGC 2168                    | TMO     |
| U28  | 06.1 +14 | 14/25 | OC   | NGC 2169                          | HT      |
| U29  | 06.5 -05 | 25/27 | OC   | NGC 2232                          | TSD     |
| U30  | 06.5 +05 | 25/E  | OC   | C50 = NGC 2244                    | TCO     |
| U31  | 06.7 +10 | 25/E  | OC   | NGC 2264                          | HT      |
| U32  | 06.8 +41 | 23    | OC   | NGC 2281                          | TSD     |
| U33  | 06.8 -21 | 27    | OC   | M41 = NGC 2287                    | TMO     |
| U34  | 06.9 +00 | 25/27 | OC   | NGC 2301                          | HT      |
| U35  | 07.0 -08 | 27    | OC   | M50 = NGC 2323                    | TMO     |
| U36  | 07.5 +21 | 25    | PN   | C39 = NGC 2392 = Eskimo Nebula    | TMO/TCO |
| U37  | 08.2 -13 | 26    | OC   | NGC 2539                          | HT      |
| U38  | 08.2 -06 | 26    | OC   | M48 = NGC 2548                    | TMO     |
| U39  | 08.7 +20 | 24    | OC   | M44 = NGC 2632 = Beehive Cluster  | TMO     |
| U40  | 08.9 +12 | 24    | OC   | M67 = NGC 2682                    | TMO     |
| U41  | 09.9 +69 | 31    | Gal  | M81 = NGC 3031                    | TMO     |
| U42  | 09.9 +70 | 31    | Gal  | M82 = NGC 3034                    | TMO     |
| U43  | 10.4 -19 | 36/37 | PN   | C59 = NGC 3242 = Ghost of Jupiter | TMO/TCO |
| U44  | 12.4 +26 | 45    | OC   | Mel 111 = Coma Star Cluster       | HT      |

| Name | Position | PSA   | Type | Other Names                        | DSC    |
|------|----------|-------|------|------------------------------------|--------|
| U45  | 12.4 +13 | 45/C  | Gal  | M84 = NGC 4374                     | TMO    |
| U46  | 12.4 +13 | 45/C  | Gal  | M86 = NGC 4406                     | TMO    |
| U47  | 12.5 +12 | 45/C  | Gal  | M87 = NGC 4486                     | TMO    |
| U48  | 12.7 -12 | 47    | Gal  | M104 = NGC 4594 = Sombrero Galaxy  | TMO    |
| U49  | 12.8 +41 | 43    | Gal  | M94 = NGC 4736                     | TMO    |
| U50  | 12.9 +22 | 45    | Gal  | M64 = NGC 4826 = Black-Eye Galaxy  | TMO    |
| U51  | 13.7 +28 | 43/44 | GC   | M3 = NGC 5272                      | TMO    |
| U52  | 15.3 +02 | 55/57 | GC   | M5 = NGC 5904                      | TMO    |
| U53  | 16.4 -27 | 56/58 | GC   | M4 = NGC 6121                      | TMO    |
| U54  | 16.7 +36 | 52    | GC   | M13 = NGC 6205 = Hercules Cluster  | TMO    |
| U55  | 16.7 +24 | 54    | PN   | NGC 6210                           | HT     |
| U56  | 16.8 -02 | 54/56 | GC   | M12 = NGC 6218                     | TMO    |
| U57  | 17.0 -04 | 54/56 | GC   | M10 = NGC 6254                     | TMO    |
| U58  | 17.0 -30 | 58    | GC   | M62 = NGC 6266                     | TMO    |
| U59  | 17.3 +43 | 52    | GC   | M92 = NGC 6341                     | TMO    |
| U60  | 17.7 -32 | 58/69 | OC   | M6 = NGC 6405 = Butterfly Nebula   | TMO    |
| U61  | 17.8 +06 | 54    | OC   | IC 4665                            | HT     |
| U62  | 17.9 -35 | 58/69 | OC   | M7 = NGC 6475                      | TMO    |
| U63  | 18.1 -28 | 67    | OC   | NGC 6520                           | HT     |
| U64  | 18.1 -24 | 67    | BN   | M8 = NGC 6523/6530 = Lagoon Nebula | TMO    |
| U65  | 18.3 -16 | 67    | BN   | M17 = NGC 6618 = Omega Nebula      | TMO    |
| U66  | 18.5 +07 | 65    | OC   | NGC 6633                           | HT     |
| U67  | 18.6 -24 | 67    | GC   | M22 = NGC 6656                     | TMO    |
| U68  | 18.6 +05 | 65    | OC   | IC 4756                            | HT     |
| U69  | 18.9 -06 | 65/67 | OC   | M11 = NGC 6705 = Wild Duck Cluster | TMO    |
| U70  | 18.9 +10 | 65    | OC   | NGC 6709                           | HT     |
| U71  | 18.9 +33 | 63    | PN   | M57 = NGC 6720 = Ring Nebula       | TMO    |
| U72  | 19.4 +20 | 64/65 | OC   | Cr 399 = Brocchi's Cluster         | TMO/HT |
| U73  | 19.7 -14 | 66    | PN   | NGC 6818                           | HT     |
| U74  | 19.7 +51 | 62    | PN   | NGC 6826                           |        |
| U75  | 20.0 +23 | 64    | PN   | M27 = NGC 6853 = Dumbbell Nebula   | TMO    |
| U76  | 20.4 +41 | 62    | OC   | NGC 6910                           | TSD    |
| U77  | 20.6 +07 | 64    | GC   | NGC 6934                           |        |
| U78  | 20.6 +28 | 62    | OC   | NGC 6940                           | HT     |
| U79  | 21.1 -11 | 77    | PN   | NGC 7009                           |        |
| U80  | 21.5 +12 | 75    | GC   | M15 = NGC 7078                     | TMO    |
| U81  | 21.6 -01 | 75/77 | GC   | M2 = NGC 7089                      | TMO    |
| U82  | 21.5 +48 | 73    | OC   | M39 = NGC 7092                     | TMO    |
| U83  | 21.9 +63 | 71    | OC   | NGC 7160                           | TSD    |
| U84  | 22.1 +47 | 73    | OC   | NGC 7209                           | TSD    |
| U85  | 22.3 +50 | 73    | OC   | NGC 7243                           |        |
| U86  | 23.4 +43 | 72    | PN   | NGC 7662                           |        |
| U87  | 23.9 +57 | 72    | OC   | NGC 7789                           | TCO/HT |

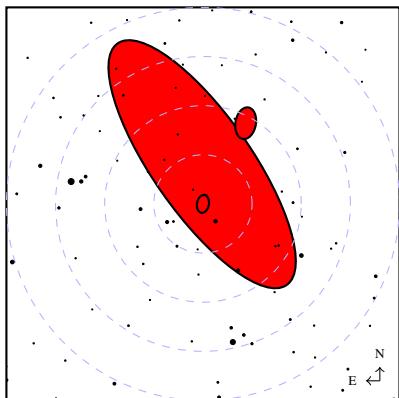
U1 = NGC 129



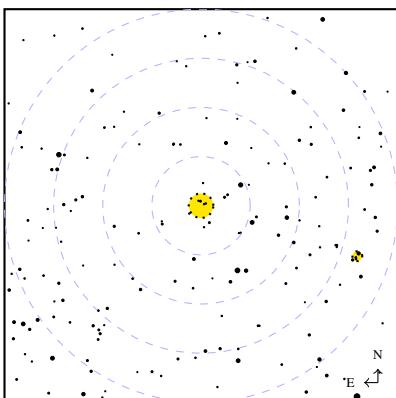
U4 = C13 = NGC 457 = Owl Cluster



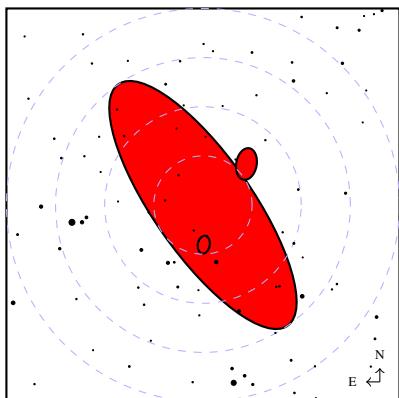
U2 = M32 = NGC 221



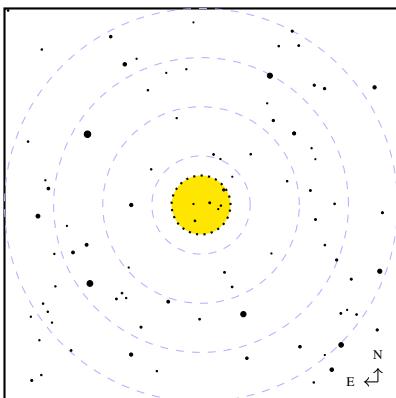
U5 = C10 = NGC 663



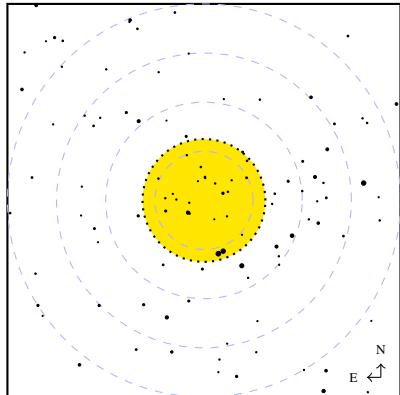
U3 = M31 = NGC 224 = Andromeda Galaxy



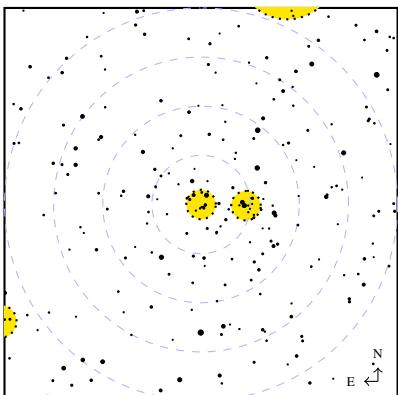
U6 = Cr 463



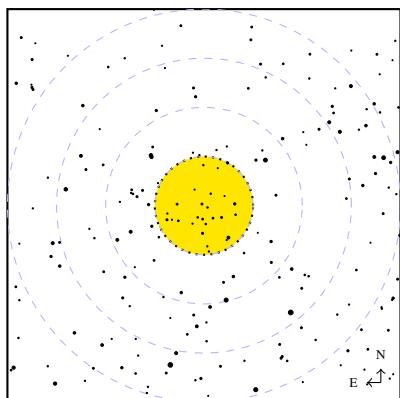
U7 = C28 = NGC 752



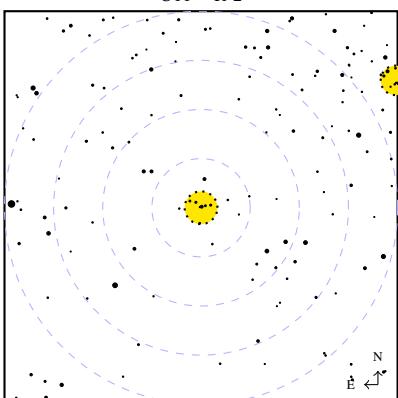
U10 = NGC 884 =  $\chi$  Persei Cluster



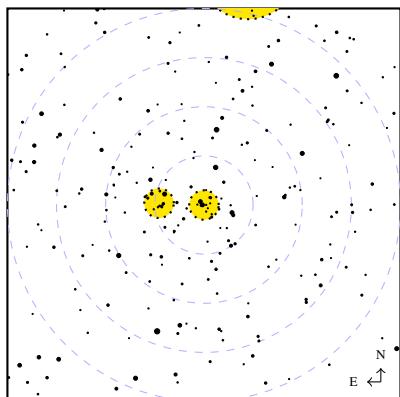
U8 = Stock 2



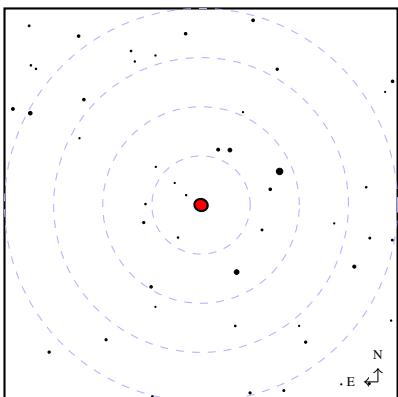
U11 = Tr 2



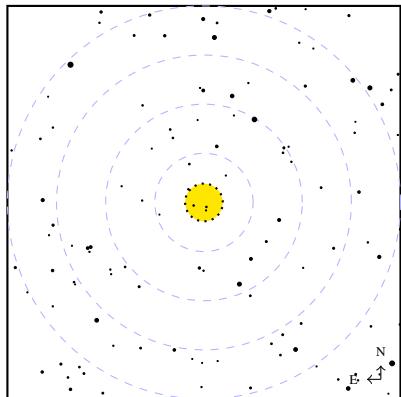
U9 = NGC 869 = h Persei Cluster



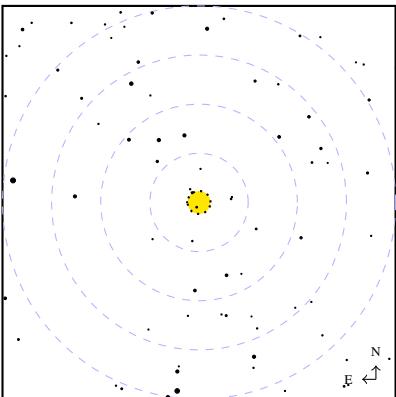
U12 = M77 = NGC 1068



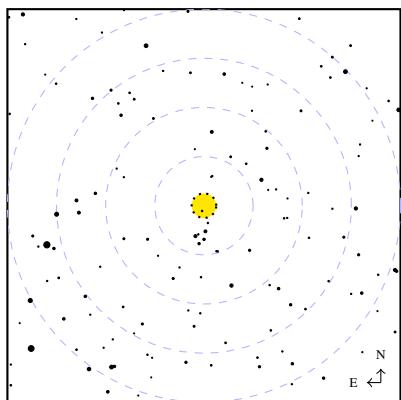
U13 = Tr 3



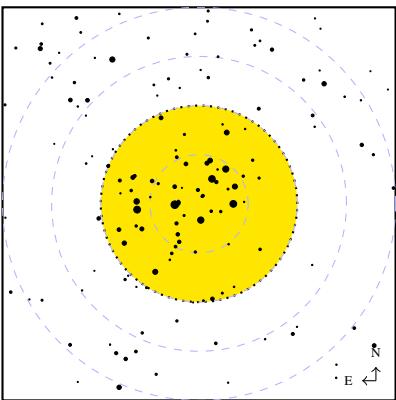
U16 = NGC 1342



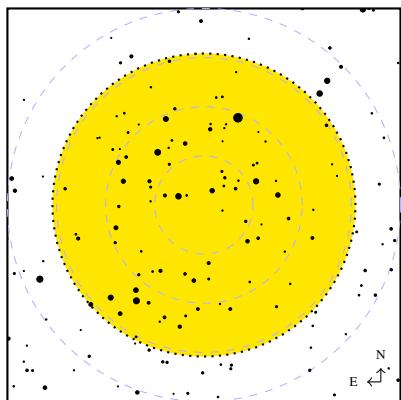
U14 = Stock 23 = Pazmino's Cluster



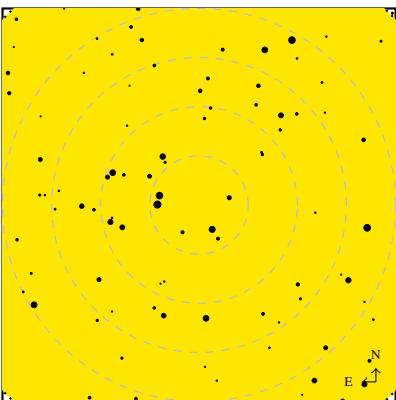
U17 = M45 = Mel 22 = Pleiades



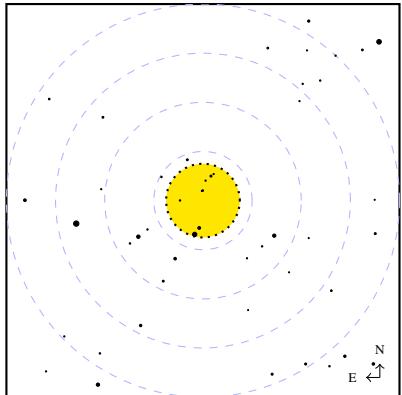
U15 = Mel 20 =  $\alpha$  Per Cluster



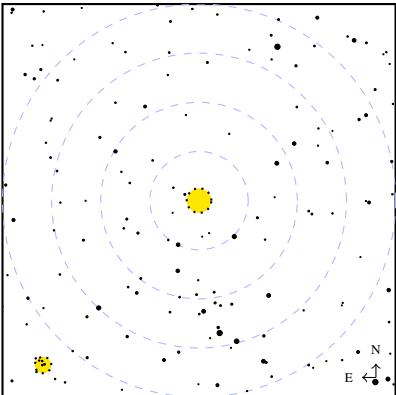
U18 = C41 = Mel 25 = Hyades



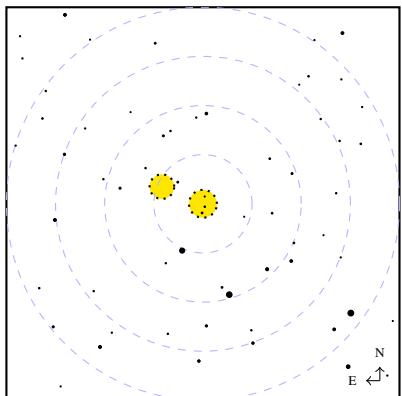
U19 = NGC 1647



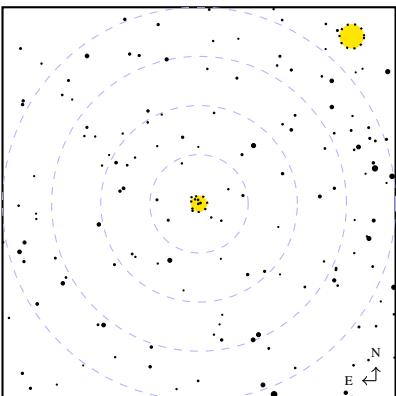
U22 = M38 = NGC 1912



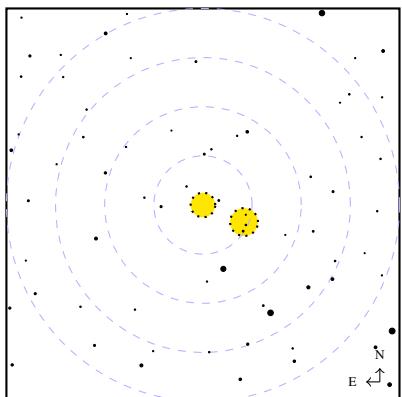
U20 = NGC 1807



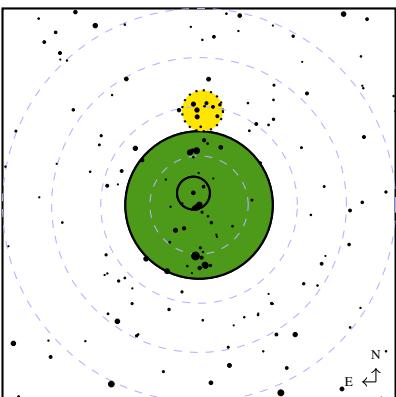
U23 = M36 = NGC 1960



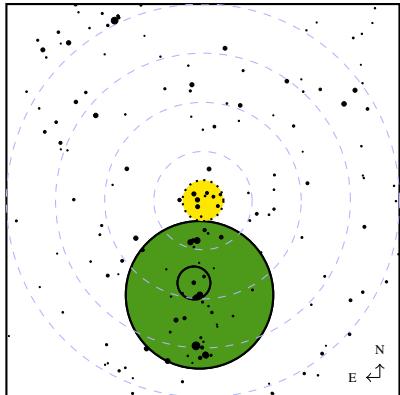
U21 = NGC 1817



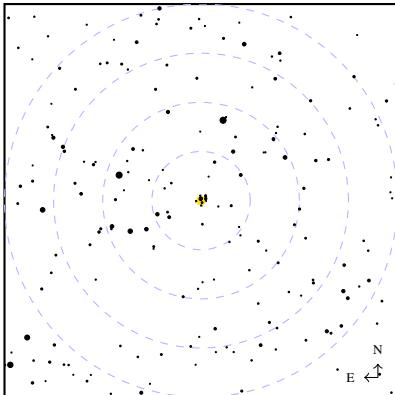
U24 = M42 = NGC 1976 = Orion Nebula



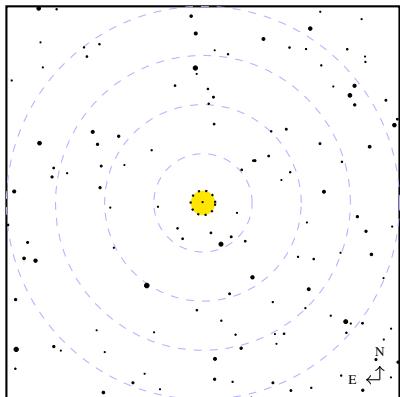
U25 = NGC 1981



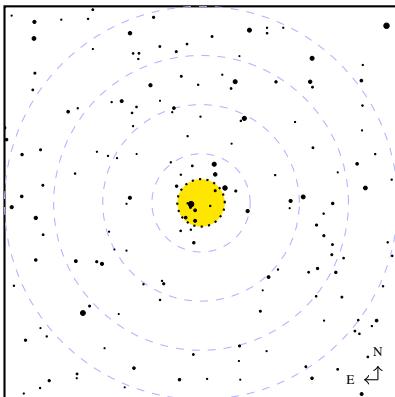
U28 = NGC 2169



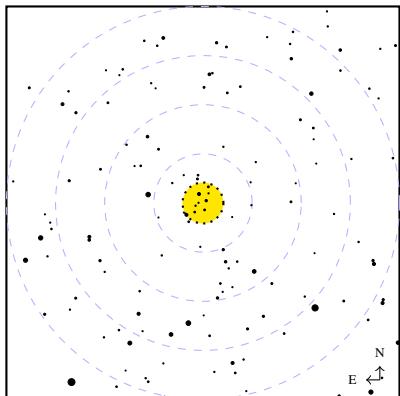
U26 = M37 = NGC 2099



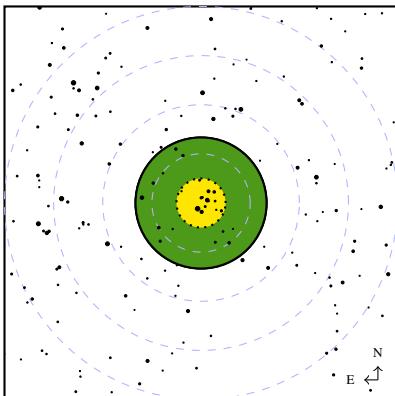
U29 = NGC 2232



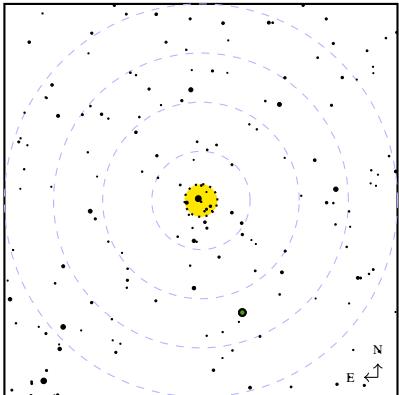
U27 = M35 = NGC 2168



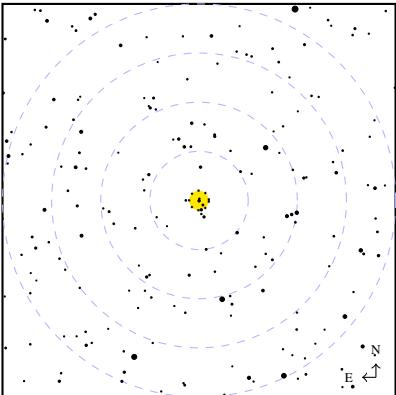
U30 = C50 = NGC 2244



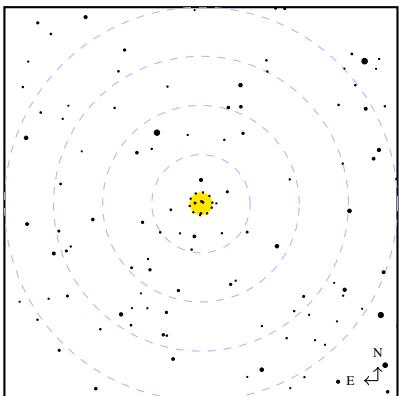
U31 = NGC 2264



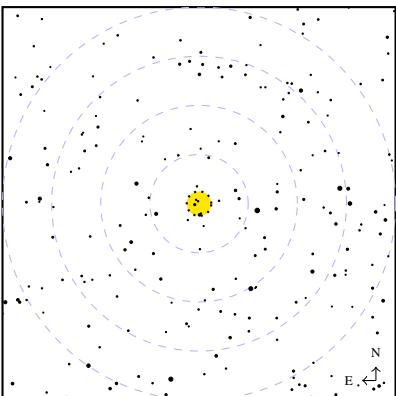
U34 = NGC 2301



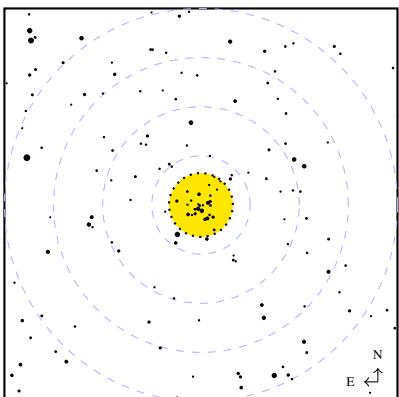
U32 = NGC 2281



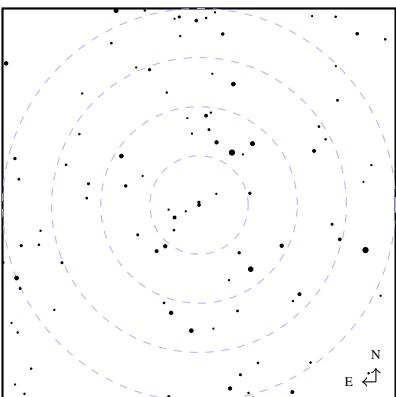
U35 = M50 = NGC 2323



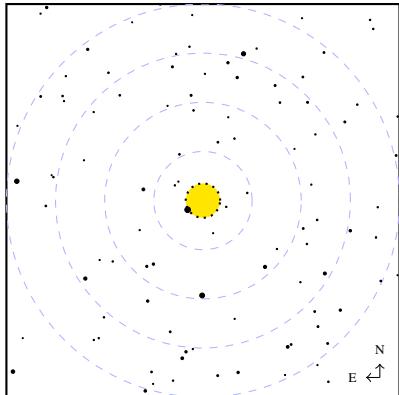
U33 = M41 = NGC 2287



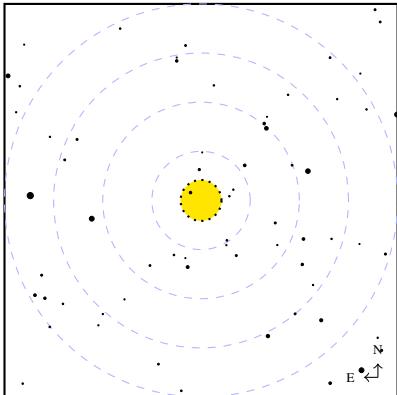
U36 = C39 = NGC 2392 = Eskimo Nebula



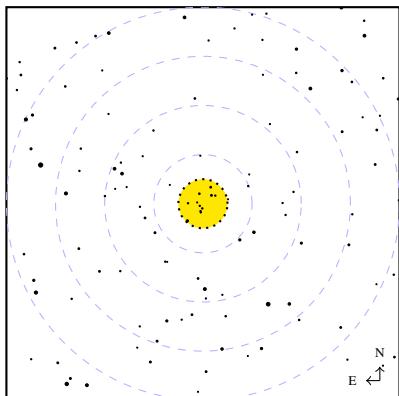
U37 = NGC 2539



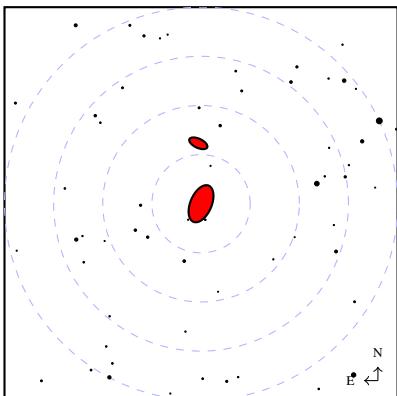
U40 = M67 = NGC 2682



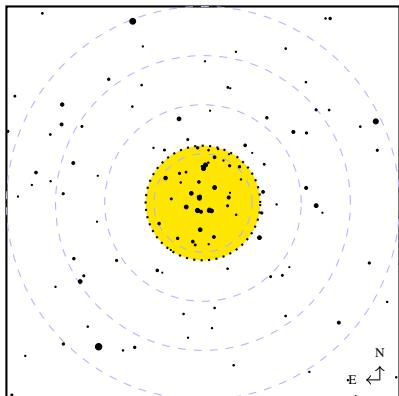
U38 = M48 = NGC 2548



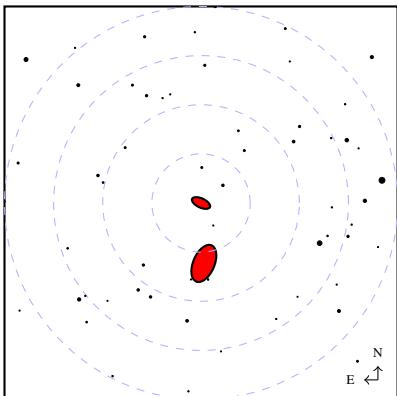
U41 = M81 = NGC 3031



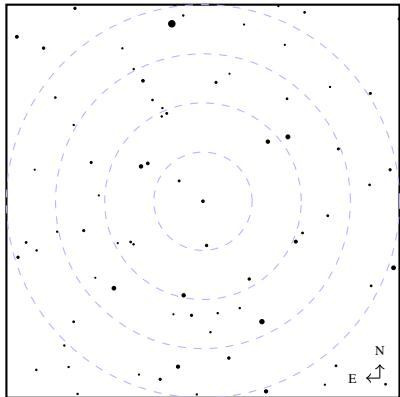
U39 = M44 = NGC 2632 = Beehive Cluster



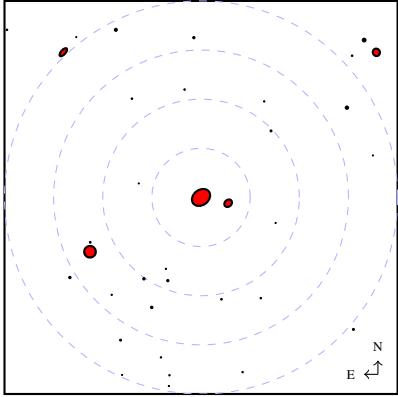
U42 = M82 = NGC 3034



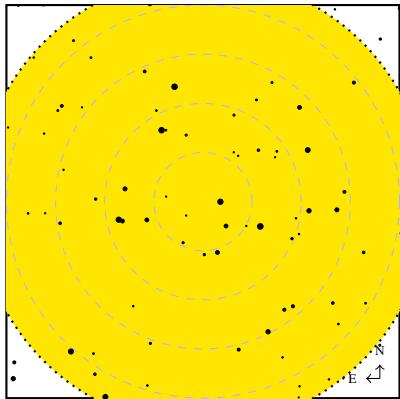
U43 = C59 = NGC 3242 = Ghost of Jupiter



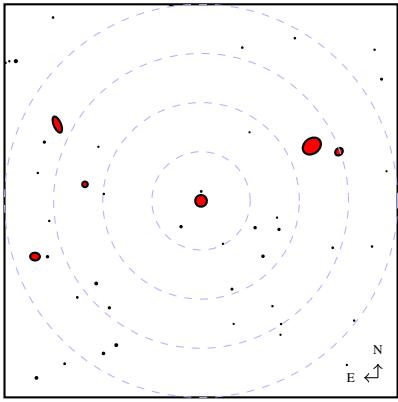
U46 = M86 = NGC 4406



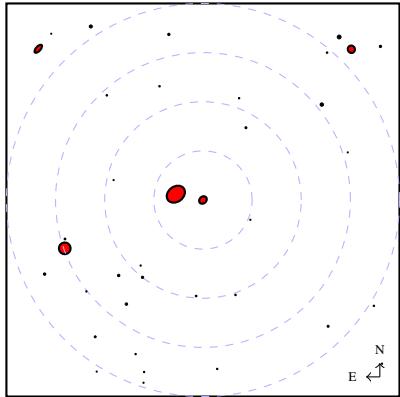
U44 = Mel 111 = Coma Star Cluster



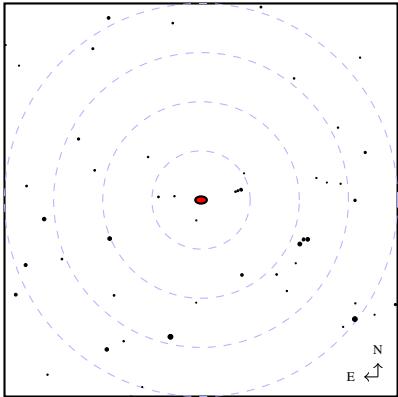
U47 = M87 = NGC 4486



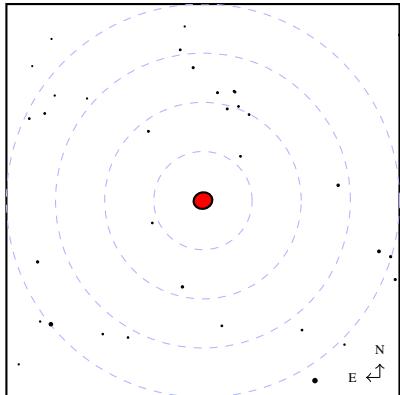
U45 = M84 = NGC 4374



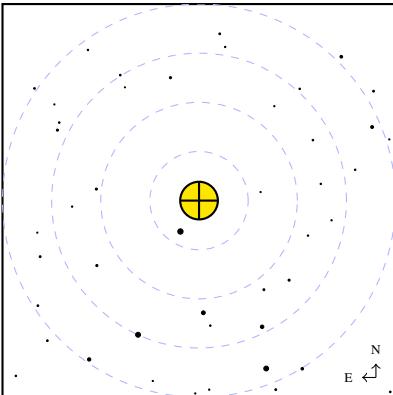
U48 = M104 = NGC 4594 = Sombrero Galaxy



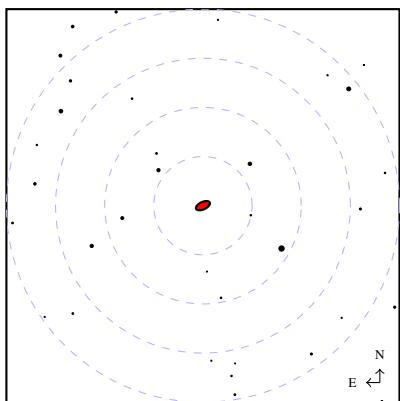
U49 = M94 = NGC 4736



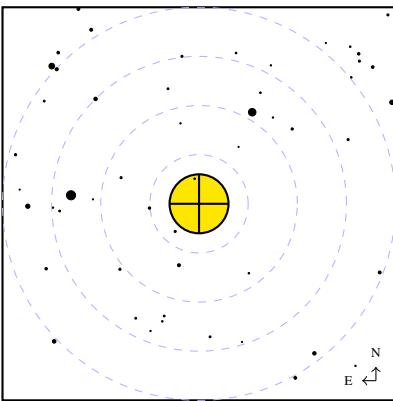
U52 = M5 = NGC 5904



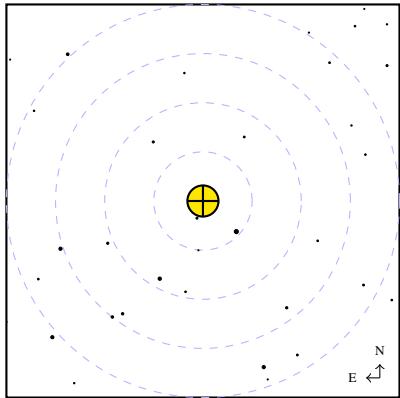
U50 = M64 = NGC 4826 = Black-Eye Galaxy



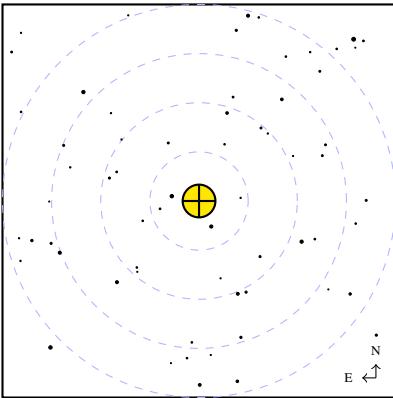
U53 = M4 = NGC 6121



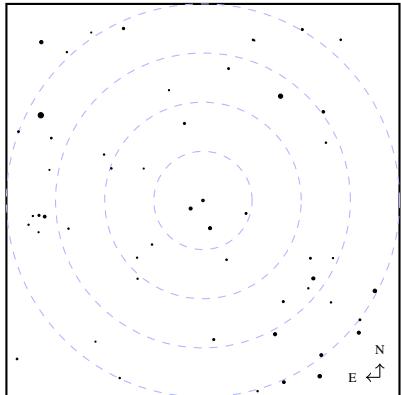
U51 = M3 = NGC 5272



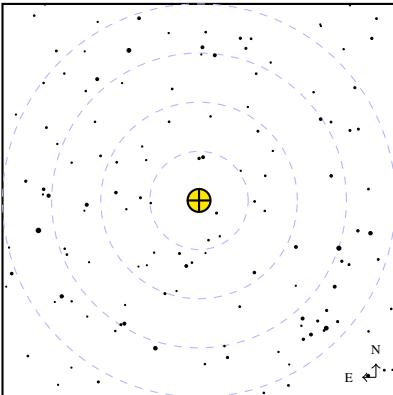
U54 = M13 = NGC 6205 = Hercules Cluster



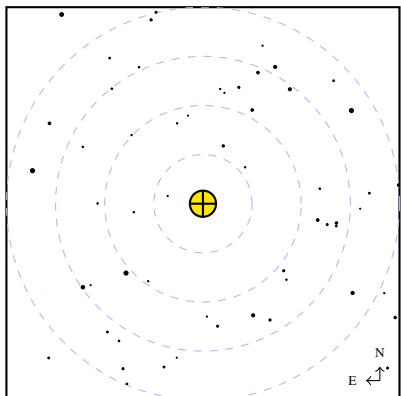
U55 = NGC 6210



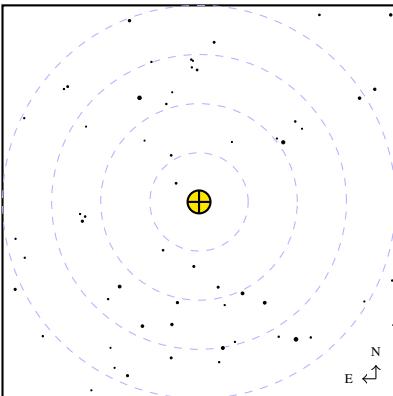
U58 = M62 = NGC 6266



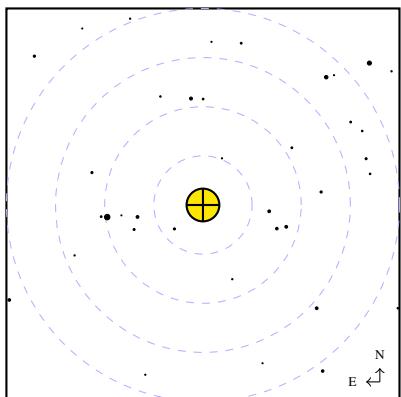
U56 = M12 = NGC 6218



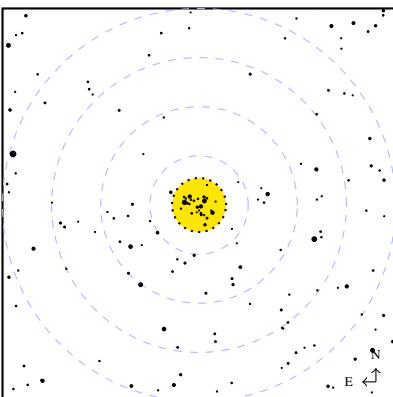
U59 = M92 = NGC 6341



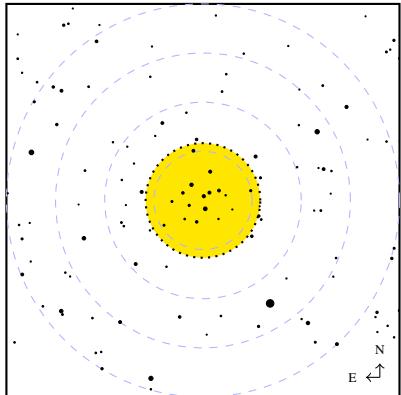
U57 = M10 = NGC 6254



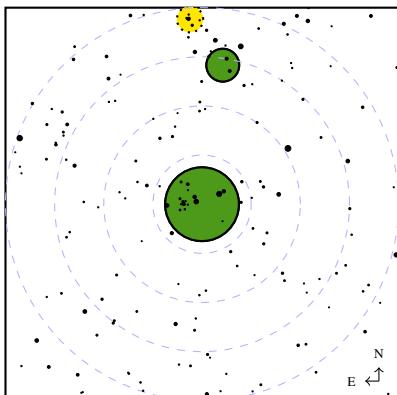
U60 = M6 = NGC 6405 = Butterfly Nebula



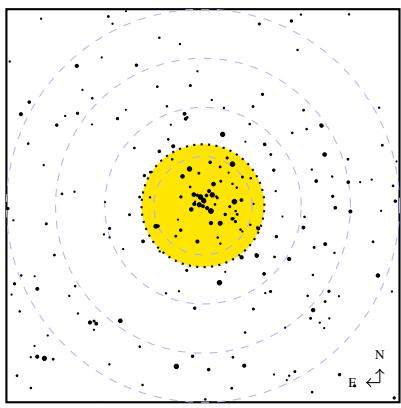
U61 = IC 4665



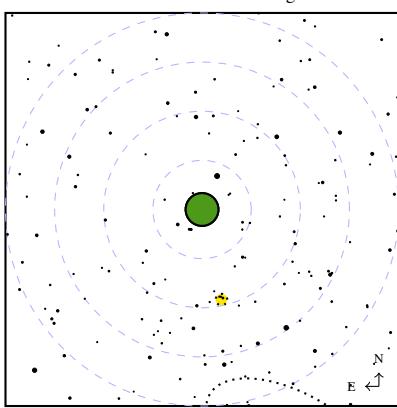
U64 = M8 = NGC 6523/6530 = Lagoon Nebula



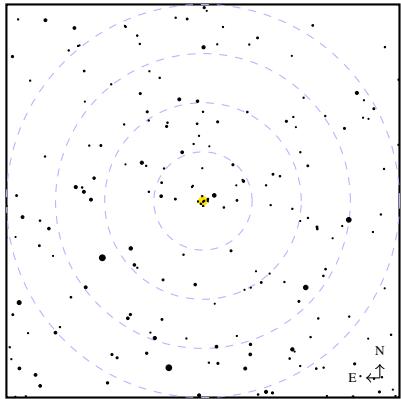
U62 = M7 = NGC 6475



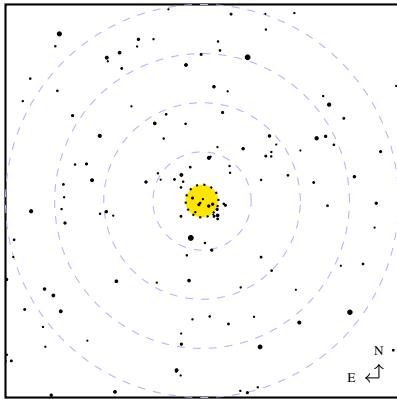
U65 = M17 = NGC 6618 = Omega Nebula



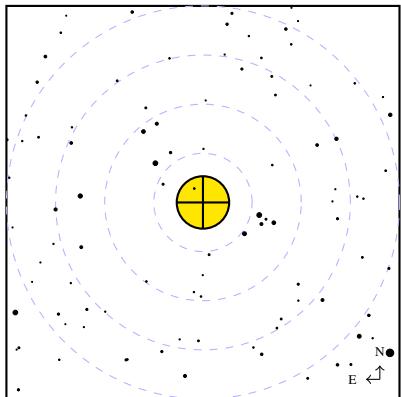
U63 = NGC 6520



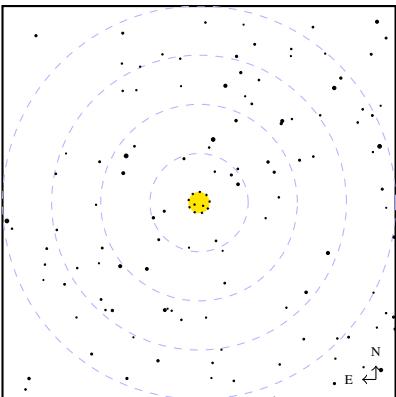
U66 = NGC 6633



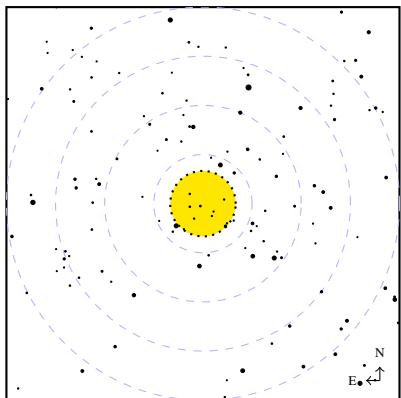
U67 = M22 = NGC 6656



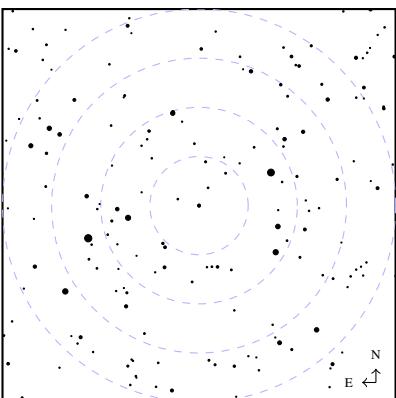
U70 = NGC 6709



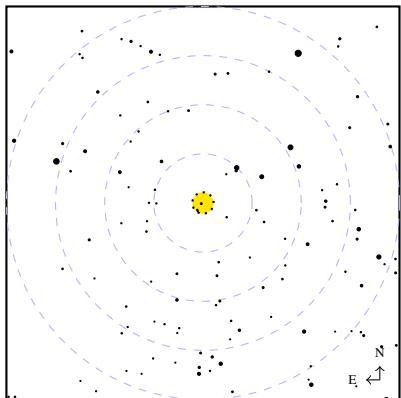
U68 = IC 4756



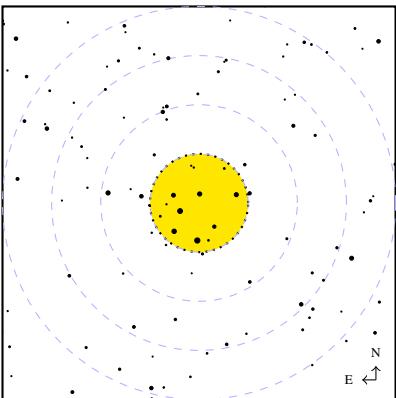
U71 = M57 = NGC 6720 = Ring Nebula



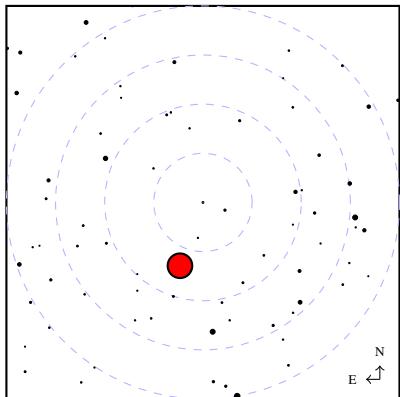
U69 = M11 = NGC 6705 = Wild Duck Cluster



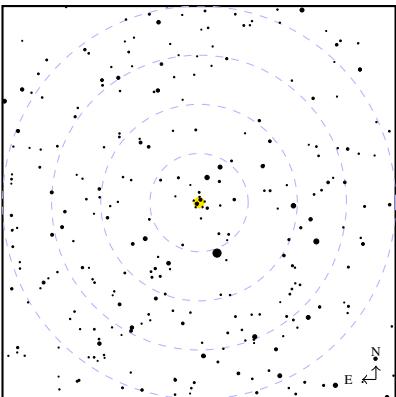
U72 = Cr 399 = Brocchi's Cluster



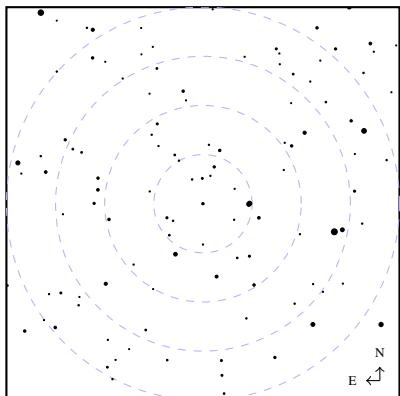
U73 = NGC 6818



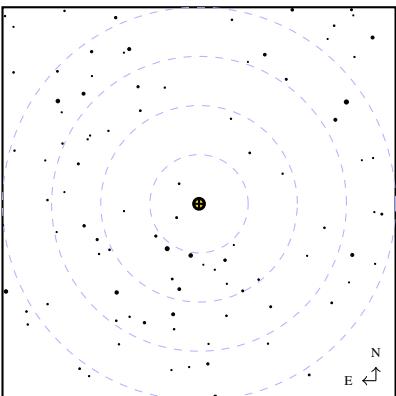
U76 = NGC 6910



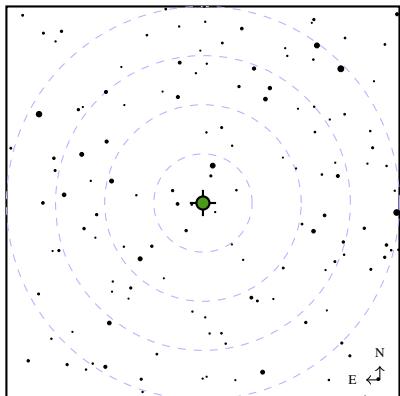
U74 = NGC 6826



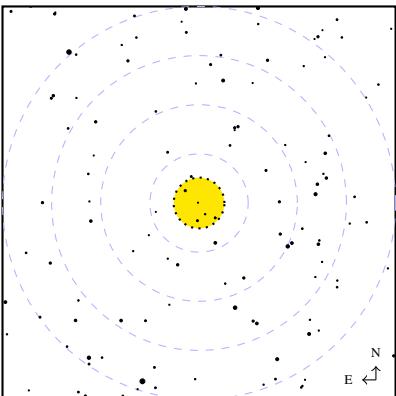
U77 = NGC 6934



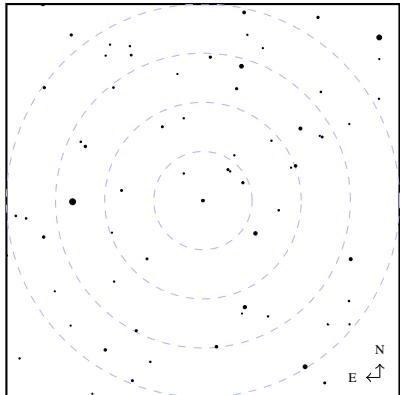
U75 = M27 = NGC 6853 = Dumbbell Nebula



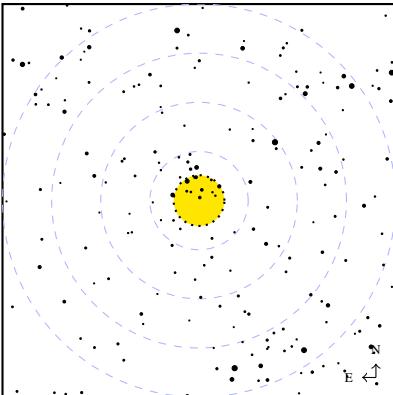
U78 = NGC 6940



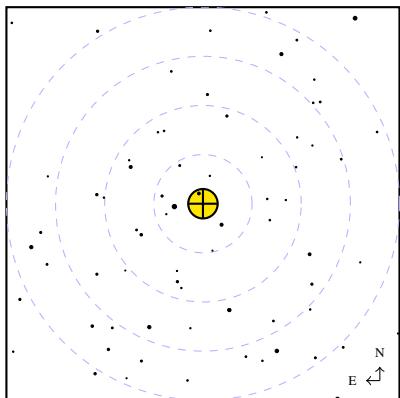
U79 = NGC 7009



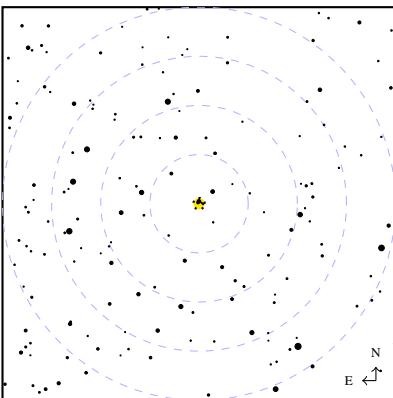
U82 = M39 = NGC 7092



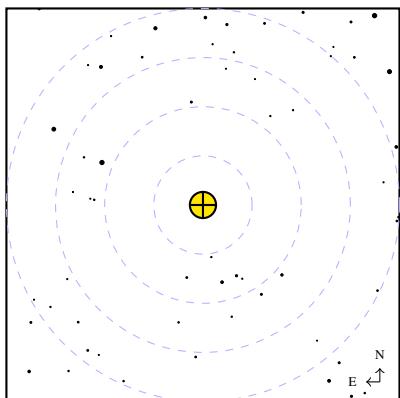
U80 = M15 = NGC 7078



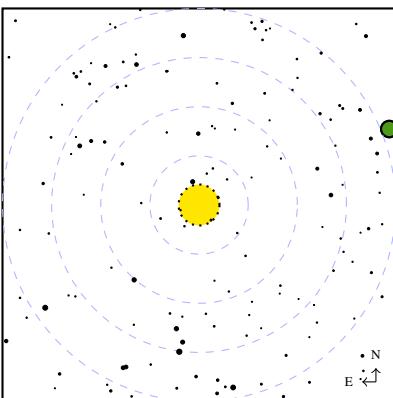
U83 = NGC 7160



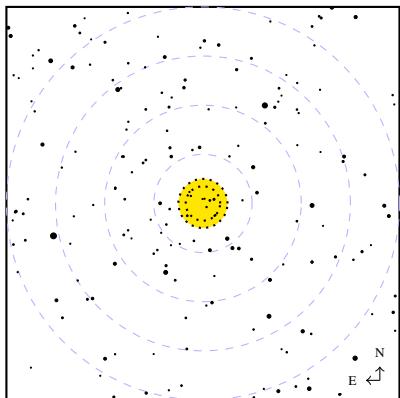
U81 = M2 = NGC 7089



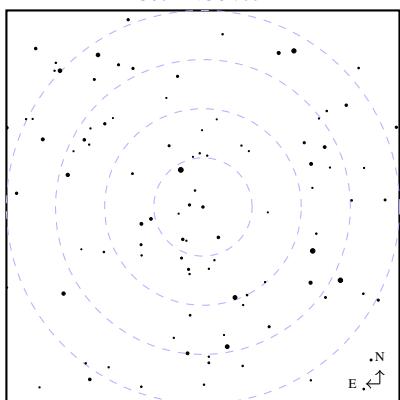
U84 = NGC 7209



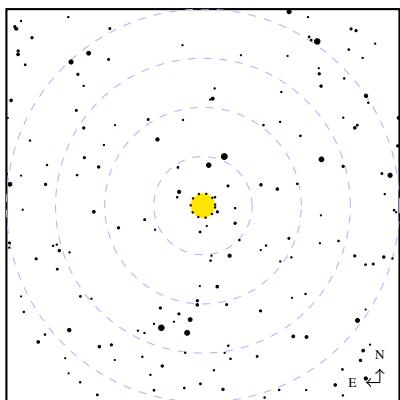
U85 = NGC 7243



U86 = NGC 7662



U87 = NGC 7789



# Bibliography

Helou, G., Madore, B. F., Schmitz, M., Wu, X., Corwin, H. G., Jr., Lague, C., Bennett, J., & Sun, H., *The NASA/IPAC Extragalactic Database*, 1995, Astrophysics and Space Science Library, 203, 95

Høg, E., Fabricius, C., Makarov, V. V., Urban, S., Corbin, T., Wycoff, G., Bastian, U., Schwekendiek, P., & Wicenec, A., *The Tycho-2 Catalogue of the 2.5 million brightest stars*, 2000, *Astronomy & Astrophysics*, 355, L27

Karkoschka, E., *The Observer's Sky Atlas*, 2007, Springer, 3rd edition.

O'Meara, S. J., *Deep-Sky Companions: Hidden Gems*, 2007, Cambridge University Press.

O'Meara, S. J., *Deep-Sky Companions: The Caldwell Objects*, 2016, Cambridge University Press, 2nd edition.

O'Meara, S. J., *Deep-Sky Companions: The Messier Objects*, 2014, Cambridge University Press, 2nd edition.

O'Meara, S. J., *Deep-Sky Companions: The Secret Deep*, 2011, Cambridge University Press.

Perryman, M. A. C., et al., *The Hipparcos Catalogue*, 1997, *Astronomy & Astrophysics*, 323, L49

Sinnott, R. W., *Sky & Telescope's Pocket Sky Atlas*, 2020, AAS Sky Publishing, 2nd edition.

Trees, T., *Urban Observing Program*,  
<https://www.astroleague.org/al/obsclubs/urban/urban.html>

Wenger, M., et al., *The SIMBAD astronomical database: The CDS reference database for astronomical objects*, 2000, *Astronomy & Astrophysics Supplement*, 143, 9