

Open Clusters in Orion

An Observing List

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Almost all observing lists are of objects the author has already seen, but in this series of articles I thought it would be more fun to describe the objects on my observing list that I have NOT necessarily seen, or in my case photographed. I'm doing this for a couple of reasons.

1. It shows part of my process to generate such lists.
2. It shows how I determine which objects are worth observing.
3. It gives everyone something to aim for.

To generate such lists, I use two things. The first is Starry Night Pro, which includes the entire NGC/IC list. The second is the Virtual Colony's database located at <http://www.virtualcolony.com/sac/>. The object list generator contains many other catalogs than the NGC/IC catalog. I used to use the NGC/IC project list, but the object list generator isn't working anymore, because the site has not been maintained since its creator died in 2016.

With Starry Night Pro, I type down the objects as they appear on the charts. With the Virtual Colony site, I copy and paste the list, then go through a lot of editing to eliminate the extraneous data and put it in a form I can use as a list. It's about the same amount of work no matter which method I choose.

Then comes the most time consuming portion, trying to determine how the objects might look and whether they might be worth observing. Some are obvious. Even on a DSS red plate, you can see that nothing is there, or the objects is too faint to bother unless you have a very large scope at a dark site. Of course this determination is subjective, since I don't know how faint the plate goes, but it is suggestive.

So I use my third database to determine this, the STScI DSS image generator at http://archive.stsci.edu/cgi-bin/dss_form. Although perhaps harder to use than others, it has enough parameters to tweak that I can get pretty good impressions of what I might see.

You might ask why I would then bother to image if I can generate good quality images. Well, they're not MY images. Second, the DSS does not include any photos taken in green light, only red and blue, so I really don't know what colors I might see, and curiosity takes over. A third reason is that it's not clear to me how the exposure times were determined for the two colors, and depending on what "corrections" were applied to the exposure times, might shift the color balance. And finally, these were photographic plates, and a CCD sensor responds to light much more linearly, so the brightness of the stars relative to one another is an open question, so the eye, and the CCD, will probably see something different than what the plates did.

OK. To generate my lists, I do the following:

Step 1 – Generate the list using Starry Night Pro or Virtual Colony.

Step 2 – Look at the DSS plates to see if the object is worth a look through the scope. A lot of objects are rejected at this stage because they're too faint, too small, or simply not interesting. If it is interesting, then I move to the next step.

Step 3 – Generate color images using the DSS plates to further determine if the object is worth a look. This means the following:

1. Generate the red and blue DSS plates, and copy them into an image processing program.
2. I increase the number of colors to 16 million on both the red and blue plates for further color processing.
3. Generate a third image which is the average of the red and blue images. This is the pseudo-green plate, needed because if you mix red and blue, you get magenta, not white. But this is a guesstimate, and I don't trust the final product, but it gives some indication of what colors might be there.
4. Color the red, blue and pseudo-green plate the corresponding color.
5. Add the three plates together. You SHOULD see mostly white stars. I usually enhance the colors a bit as a final step, to help judge the colors better, at least for open AND Globular clusters.

Then the final process of elimination is whether I think the object is bright enough, and interesting enough. As I usually do imaging, my magnitude limits are fainter than if I did visual observing.

This particular list is of open clusters in Orion. Now, when everyone thinks of Orion, they think of the great Orion nebula M42. Some also remember M43 in the same field of view, then on the east side of the Belt the Horsehead, and the Flame. But I was curious, so I generated a list of Orion's open clusters. Now half of the original list was a wash. The opens were too something – too faint, too small, too sparse. My main requirement is that the cluster looks “interesting”, so this is a highly subjective list. All images are 18x14 arc-minutes, which matches the field of view of my Orion G3 camera through my 10-inch f/4.5 Newt. They're listed in increasing RA, which means the list goes from furthest west to east.



The first object is NGC-1662

RA 4h 48m 24s

Dec +10° 57'.

This open contains about 35 stars, with the brightest at mag 8.3. The colors look very nice. The mix of red and blue stars might make this a keeper. It reminds me of M-103 in Cassiopeia, which also has relatively bright stars of reds and blues. This one is closer to Aldebaran in Taurus than any bright star in Orion ! It's 6° southeast of that bright star.

Usually the other open cluster lists don't amount to much for amateurs. This is because the bright ones were more or less taken by the Messier and NGC/IC lists. By the way, the NGC list is based on visual discoveries, not photographic ones. But occasionally you can be surprised, so my method of generating observing lists is a good method for generating surprising finds.

One of these catalogs is the Berkeley catalog of open clusters, generated by the university's astronomy department. Another was generated by Robert Julius Trumpler in the 1920s. His study of opens determined that the more distant the cluster, the redder it looks. Later it was determined that this was due to intervening clouds of dust within the Milky Way. Clyde Tombaugh, who discovered Pluto, catalogued and published a list of a dozen or so open clusters.

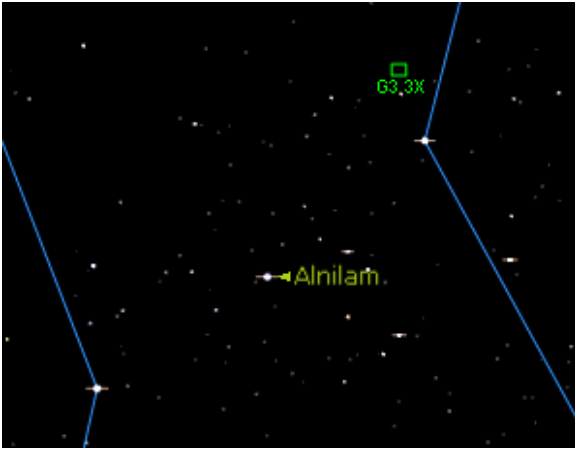


Berkeley-20

RA 5h 33m 36s

Dec +0° 11'.

A typical Berkeley open cluster, distant, faint, but unusually bluish instead of red. As Trumpler found out, distant opens are typically reddened by interstellar dust. This alone makes me suspicious and curious as to how it might really appear, so I included it on my list. It might be a better target for those in relatively dark skies and large scopes, but have a look and let me know what you see. This might be a case of an over-exposure on the blue plate, or an under-exposure on the red one, shifting the color balance.



It's about 25 arc-minutes north-northeast of the western-most (right) Belt star. Below is the Starry Night Pro (SNP) chart, with Berk-20 marked by "G3.3X".



NGC-1981
RA 5h 35m 12s
Dec -4° 2'

This one is relatively sparse with only 20 stars known to be members, but also apparently very bright. Talk about being overshadowed – this cluster is 1° north of M-42 ! The brightest star is about 6.3 mag, but for some reason it's listed at mag 4. Go figure. It reminds me of the Pleiades. Notice the faint reflection nebula among the stars, again like the Pleiades.

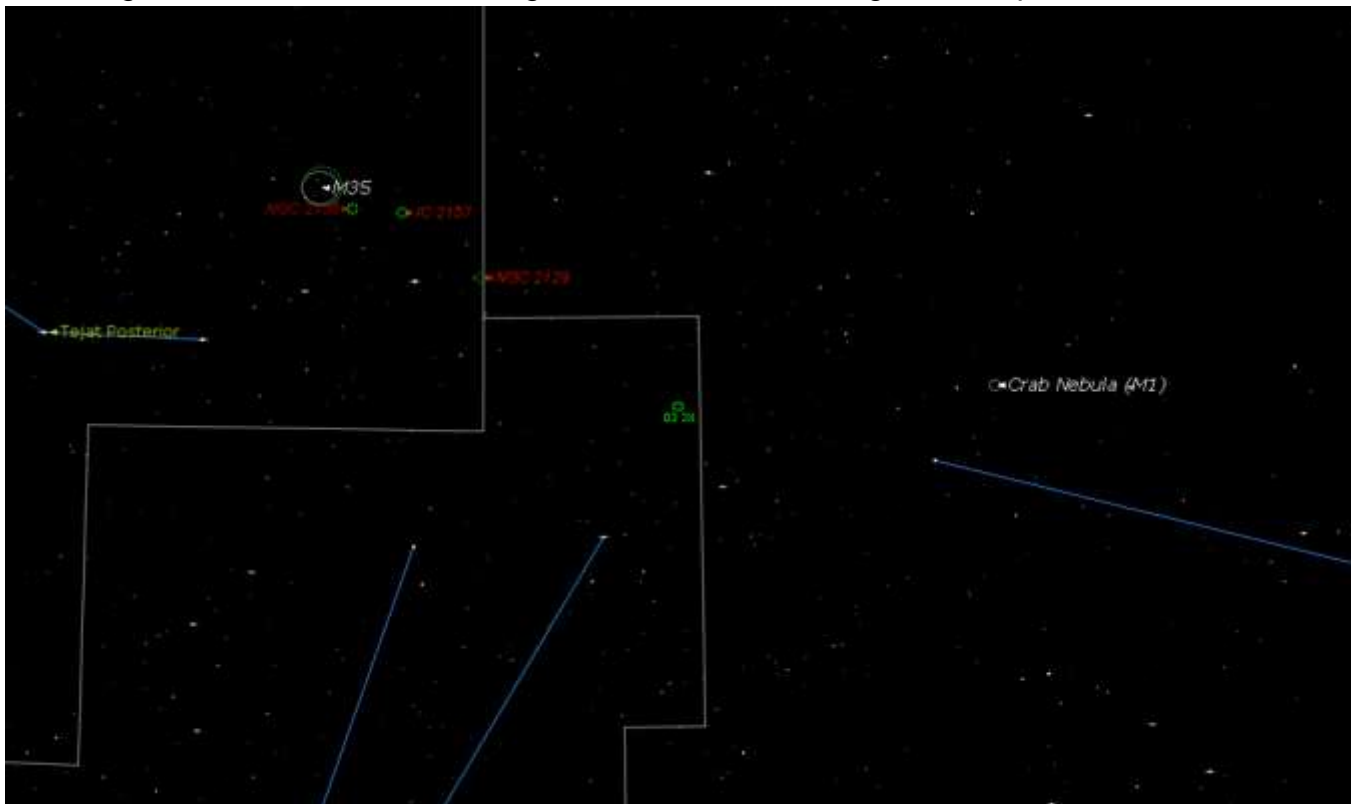
Now we run into a couple of more objects from the Berkeley list, with a surprise, for me, in-between.



Berkeley-21
RA 5h 51 42s
Dec 21° 49'

This one is listed at 11th mag, with the brightest member at 14th mag. Again, go figure how these magnitudes are determined. The faintness of Berkeley clusters is evident in the photo, so this might be a better target for photographers, but with a large scope at a dark sky, who knows? I included it on my list due to the various star colors, although this faint, it might not peek above the urban sky glow, even without a moon in the sky.

It turns out that this open is in the FAR northern regions of Orion. You've got a shorter star hop if you use the guide star near M-35, or the guide star near M-1 !! Again, the open is marked with "G3.3X".



Another institute that catalogued open clusters was the Basel Astronomical Institute in Switzerland. Again, like a lot of the other lists, these were discovered on photographic plates, and hence are small and faint.



Basel-11b
RA 5h 58m 12s
Dec +21° 58'

This one is sparse but colorful. Notice the impression of an arrow pointing to the lower right corner, but photographic plates respond differently to various faint light levels than the eye or even digital sensors, so what you'll see is the intriguing part of lists like this. Take a look and tell me what you see !

It turns out that Basel-11b and Berk-21 are right next door to one another, as you can see from the SNP chart at left !



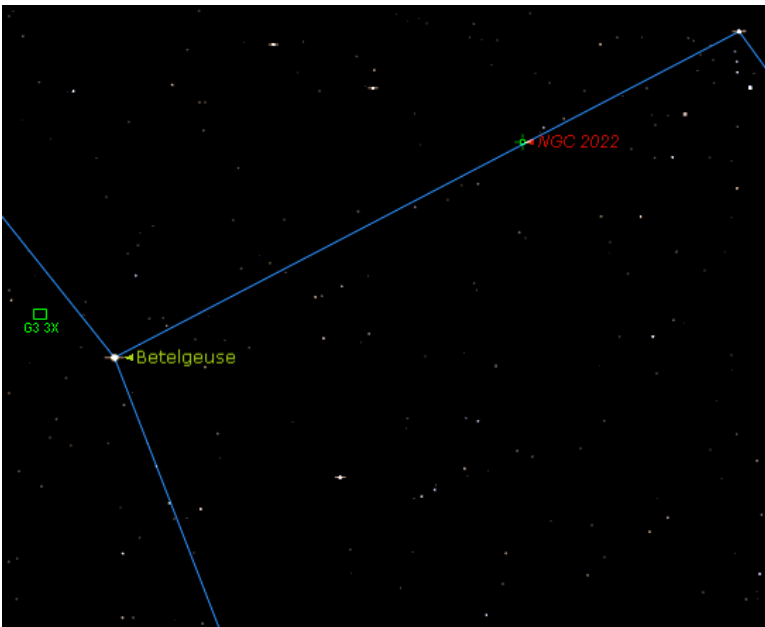


Berk-22

RA 5h 58m 30s

Dec 7° 45'

Again to the Berkeley list, and another faint, red cluster. It's listed at mag 15. Again, judge for yourself by observing this faint little smudge. For visual observers this is probably a dark sky, large scope cluster. A curious note. I noticed that for the published location, the Dec is listed as 7° 49', Why, I don't know, as the cluster is obvious on the DSS plates.



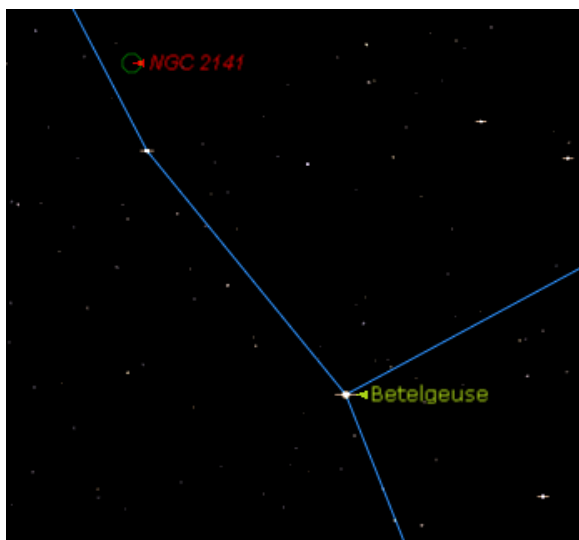
Although faint, we finally got one that's easy to find. It's only 2/3rd of a degree to the east-northeast from Betelgeuse.

Now we return for good to the NGC list. There were other clusters, but an examination of the DSS plates showed them to be very small and faint, or in some cases they're too large for my imager !



NGC-2141
RA 6h 2m 54s
Dec 10° 27'

This is a faint open but with lots of members, at least on the DSS plates. It is also young, judging by the blueness of the members. But perhaps the actual cluster are the brighter red stars scattered loosely in the field of view.



This one is 3 ½ degrees north-northeast from Betelgeuse, or 2/3rd of a degree north of mu Orionis, which is an interesting object in and of itself, but observe it and see !

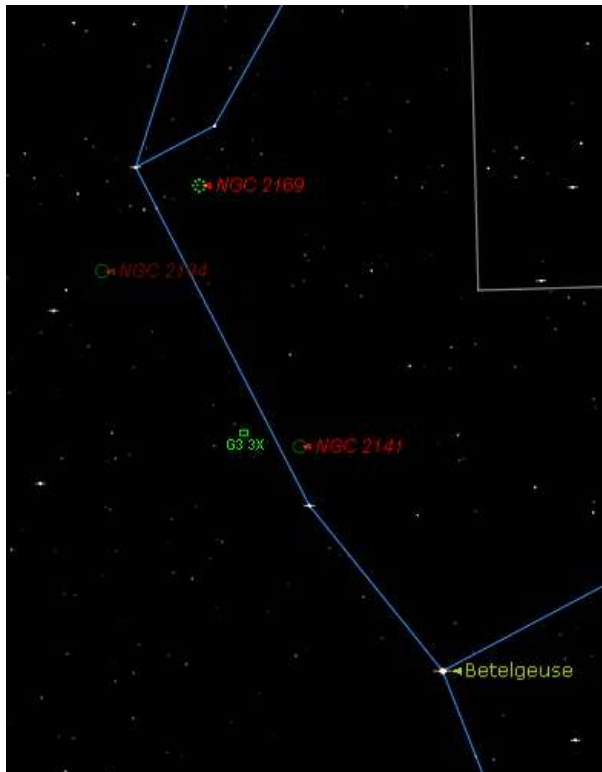


NGC-2169

RA 6h 8m 24s

Dec 13° 58'

Finally, a spectacular looking cluster ! It's listed at magnitude 7. Now remember, this is a guesstimate photo. What you'll see or image is up to your telescope, skies, eyes, or camera

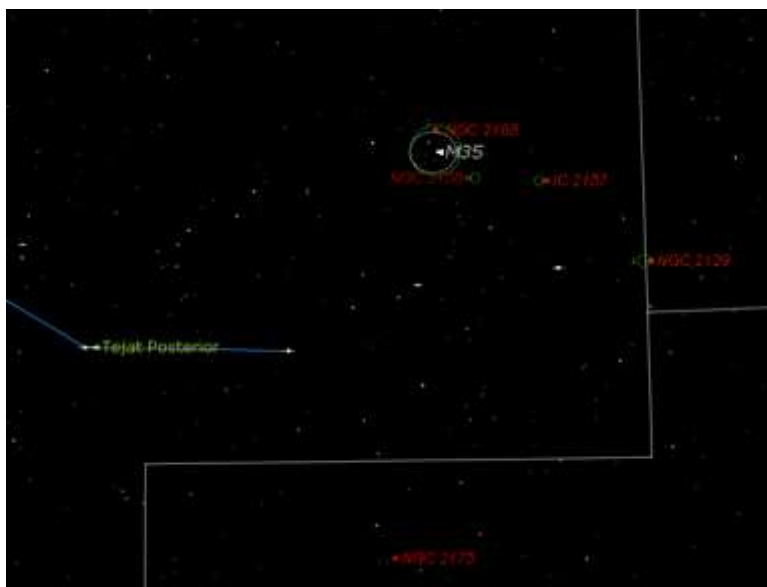


This one is near the upper arm of Orion, jumping off of Xi Orionis that's east of 2169.



NGC-2175S (also known as Lund-1182)
RA 6h 10m 54s
Dec 20° 36'
Lund is for the Swedish observatory, Gösta Lyngâ Lund Observatory. I don't know why the "s" is appended to the NGC listing. Perhaps the nebula you see in the image is the main body of 2175, and this cluster is a small part. Notice that the DSS plates seem to indicate that there is a faint blue reflection nebula around the cluster, while the part extending to the west is a red emission nebula. Hopefully someone from a dark site can image this and confirm this, but from urban locations of any sort, I doubt anyone can visually see the

nebula, let alone photograph it, but who knows?



As with some of the Berkeley opens, 2175 is so far north that you're better off using the same stars to hop to it as you would with M-35 in Gemini !



NGC-2186
RA 6h 12m 6s
Dec 5° 28'
This open is listed as 9.8 mag. Whether the stars are this blue is debateable. Remember, I did some color enhancement.

This one is 2/3rd of the way from Betelgeuse to 8 Monocerus.



NGC-2194

RA 6h 13m 48s

Dec 12° 4'

Our last open cluster for “the night”. It is well populated with 80 counted members, but faint, at 12th mag. But how they get these estimates is beyond me, and as a rule, the individual stars tend to appear brighter than the estimated magnitudes. Stars, if they can be resolved, register easier in the eye than faint nebula, so who knows, this might be worth a look, but the darker your skies and the larger your telescope the better your chances.

For this one we go back to the star chart for NGC-2169 and nearby, on the other side to Xi Orionis, is NGC-2194.

Happy Observing !

