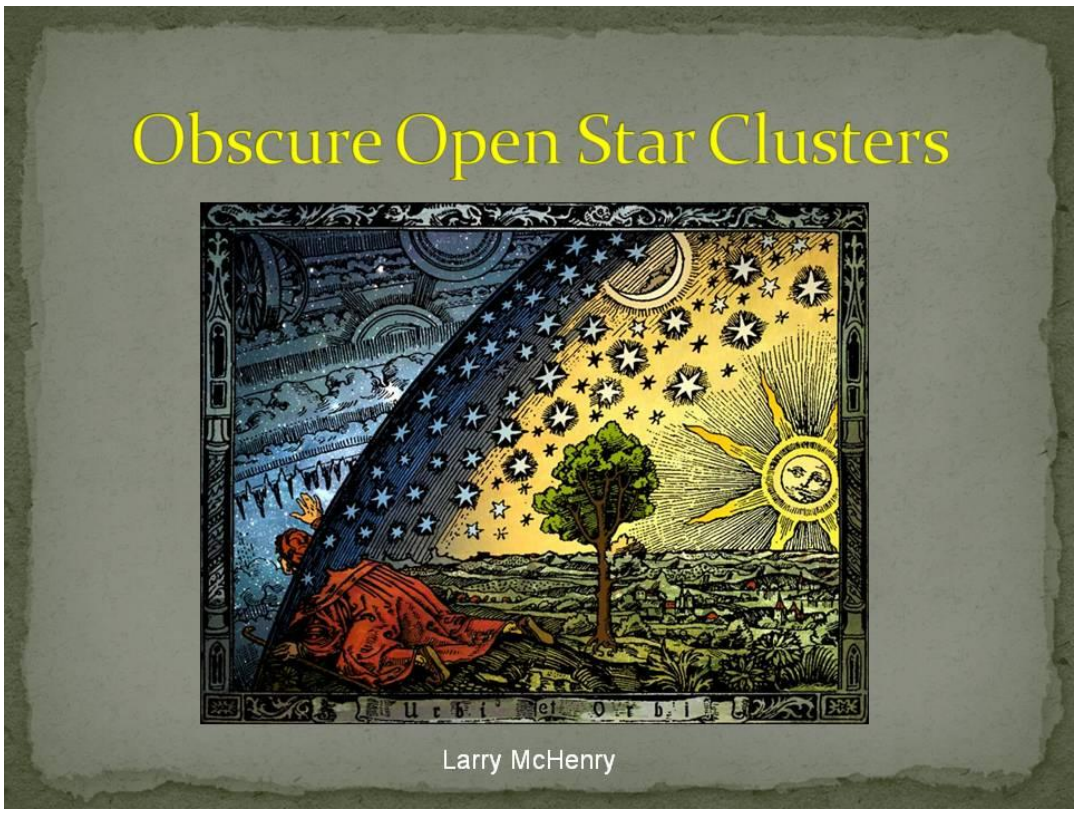


Good Afternoon.
Today we are going to review my favorite category of deep-sky objects: Open Star Clusters.
Regardless of the type of telescope you use, Binoculars, small refractor, SCT, or large dobsonian, there are open star clusters that your equipment will give great views of. Unlike nebula and galaxies, they can be observed thru nearly any type of sky condition, such as haze, thin clouds, or light pollution.
Specifically today, we are going to 'focus' on the more obscurely named objects, and not the brighter Messier and NGC open clusters that most of us are familiar with. These are the odd sounding cluster names you run across when reading a magazine article or flipping thru the pages of your favorite star atlas or browsing your PC's planetarium program. Trumpler, Stock, King, Berkeley, and others.
Most are faint and sparse, and not very appealing visually, but each catalog has a number of gems that are worth looking for.

Back in the December 2012 issue of 'Sky & Tel', they had a nice article on 'Exploring odd Named Star Clusters' that inspired me to pursue observing all of the Collinder objects. Also mentioned in the article was references to the other well-known clusters that we've all run across in our observing - Stock, King, Ruprecht, Dolidze, etc. Then recently 'Astronomy' magazine had a good article on the Trumpler clusters in their Feb 2014 issue. After a review my past observations, I realized that I had the majority of the members in the Trumpler catalog, missing only a few. I then expanded my review to the other major catalogs, using a great online observing list resource: **deepskypedia** and discovered I had a good start or was close on a number of other catalogs. So, after a couple of good years of observing, I've completed close to a dozen of the major open star cluster catalogs that are visible from my Pittsburgh, PA latitude of +40.

**Outline**

- What are Star Clusters:
- OB Associations:
- Messier Objects:
- NGC (Herschel) Objects:
- Equipment and techniques:
- My examples from 12 different catalogs:
- Conclusion:

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**Star Clusters**

There are over 1,150 known open clusters in our galaxy.
Open clusters are often bright and easily observable with small telescopes.

**What Are Star Clusters?**

Open Star Clusters are physically related groups of stars held together by mutual gravitational attraction. They are loose collections of anywhere from a few dozen to several thousand stars covering large expanses of space. Having formed together from the same cloud of gas and dust, the stars in a cluster are all of similar age, and about the same distance from us.


**How do Star Clusters form?**

They originate from large cosmic gas and dust clouds in our Milky Way galaxy that slowly collapse.
Open cluster stars have evolved through many cycles of starbirth and supernovae, which enrich the heavy element concentration in star-forming clouds.
Currently, in many clouds visible as bright diffuse nebulae within our galaxy, Star formation still takes place at this moment, allowing us to observe the formation of new young star clusters, in various stages.


**Where are Star Clusters Located?**
Most of the open star clusters that we can visually observe are located within our own Milky-Way galaxy. After star clusters form, they continue to orbit our galaxy scattered throughout its arms and disk.
Most open clusters have only a short life as stellar swarms. As they drift along their orbits, some of their members escape from the cluster and become field stars within the galaxy.

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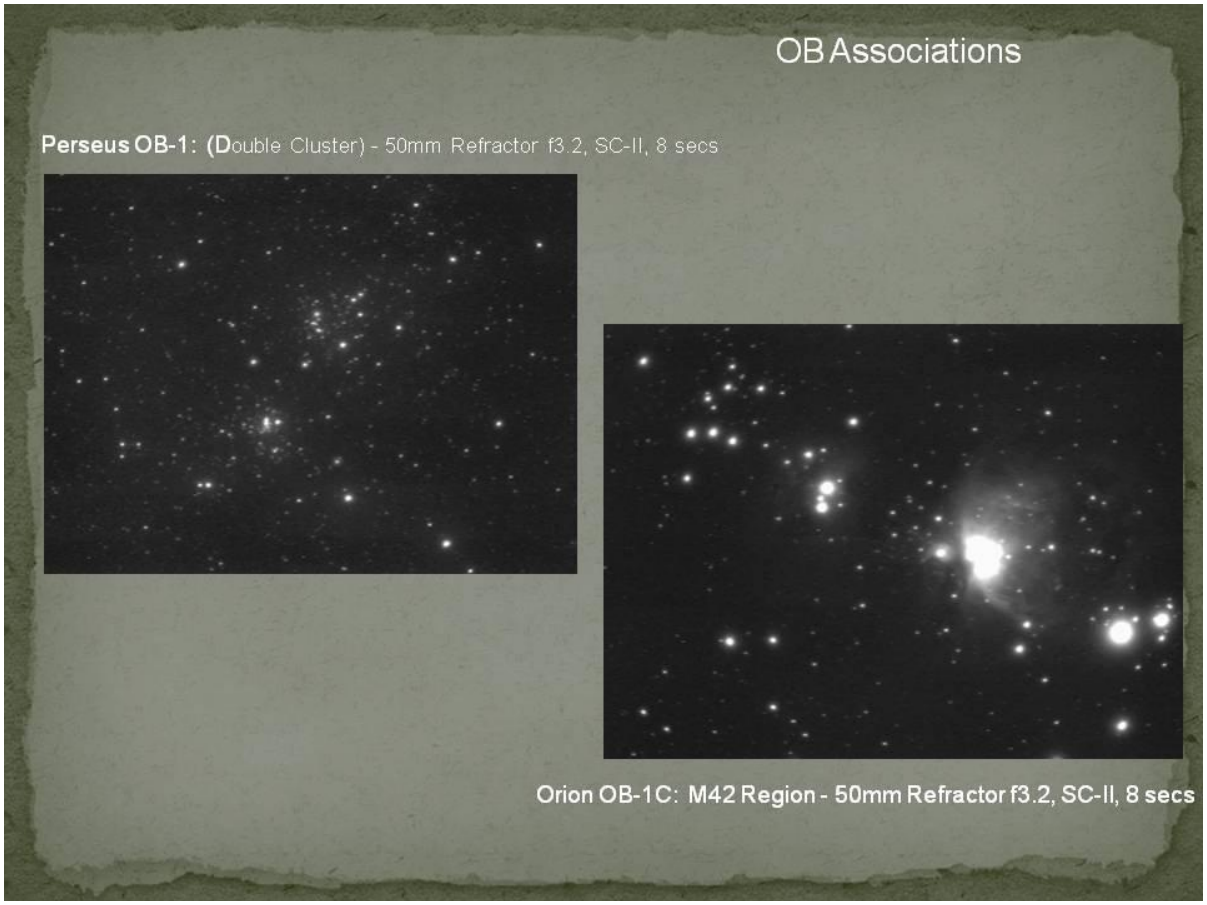
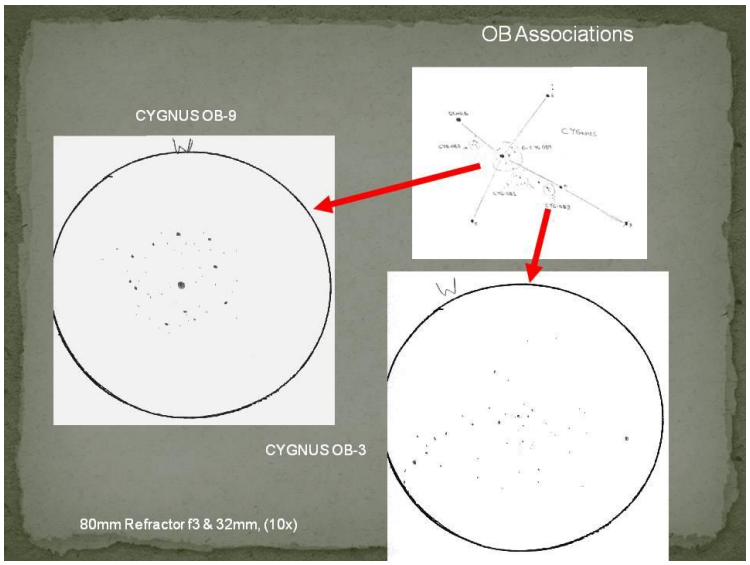
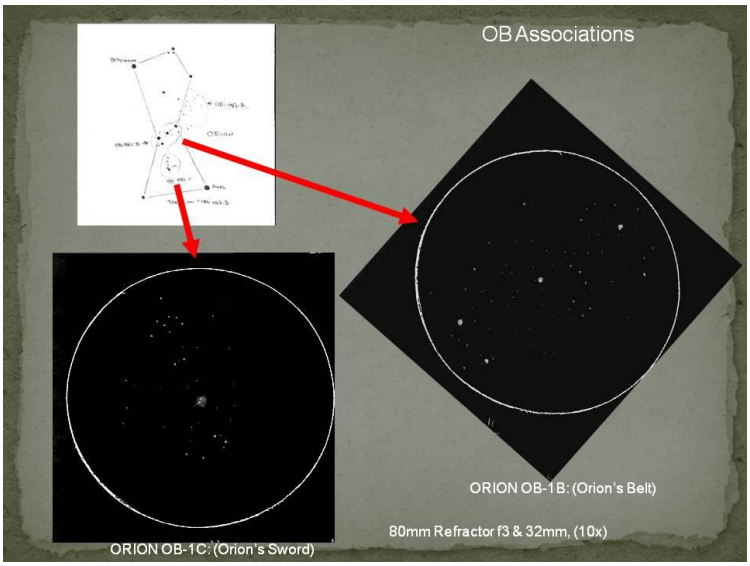
There is a somewhat neglected category of Deep-Sky object that is overlooked by many amateurs.
That is the "OB Association". An OB Association is a large, very loose form of an open star Cluster consisting of young spectral type "O" and "B" stars. They cover large volumes of space, generally between 30 – 100 parsecs, (1 parsec = 3.26 lightyears), are loosely held together by gravity and have short lifetimes (a few million years) as a distinct object. They are found scattered along the Milky-Way's spiral arms. While OB Associations are considered a separate Deep-Sky category from open clusters, both types can be found together, with an open cluster forming the core region of a larger OB Association. OB Associations may also still contain clouds of interstellar gas and dust showing as bright glowing emission nebula, reflection nebula, or dark nebula.
In time, the unstable outlying OB Association will drift apart, merging with the other field stars in the region, leaving the more gravitationally bound open cluster as a still observable object. The remnants of some OB Associations, called Stellar Streams, can still be seen. The easiest of these to find is the Ursa Major Stream, with its core consisting of the stars of the Big Dipper.




Very few star charts actually plot OB Associations as objects. But many can be found in "SKY ATLAS 2000" and "URANOMETRIA" because of the number of their individual stars that are plotted.
A good example of this is "CYGNUS OB9", found around Gamma Cygni (Sadr), and "CYGNUS OB3", nearby. And "ORION OB1-B", surrounding the "Belt" stars of Orion, and "ORION OB1-C", consisting of Orion's "Sword". Because of their large size OB Associations, are best observed with binoculars or small telescopes using low power magnifications.




There's currently about 70 known OB Associations within our Milky-Way galaxy, of which I've sketched 19. But, you can also observe bright OB Associations in a few nearby galaxies, such as M33, where I've video-captured several.

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As I mentioned earlier, while we're not really going to focus on Messier and NGC (Herschel) open star clusters, I will briefly mention both:

Messier –
The 18th century French Astronomer Charles Messier (the "Ferret of Comets") is best known for his catalog of nebulae and clusters, 1st published in 1771. This list of 110 deep-sky objects is known to today's astronomers as the 'Messier Catalog'. As an astronomer, Messier's primary job was to hunt for comets.
During his comet searches, he kept running into these diffuse non-comet objects that would frustrate him.
So Messier began a list to help comet hunters avoid these false comets.
He ended up with a number of open clusters (30). Over the centuries, Messier's list became popular targets for amateurs because these 'M-objects' could be easily visually observed with small-aperture telescopes.


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NGC (Herschel)-
After the Messier List, the Herschel's are the next most observed deep-sky objects.
Most amateur astronomers know them by their NGC or IC numbers, but they started out as a list created by British astronomer William Herschel and his sister Caroline. From 1782 to 1790, the Herschel's conducted systematic surveys of the night sky, in search of "deep sky" objects, and discovered over 2400.
William's son John later added another 1700+ entries to the list. Eventually, all of the Herschel objects, along with discoveries from other astronomers were combined and published in 1888 as the New General Catalogue (abbreviated NGC). In addition to his deep-sky surveys, William Herschel also discovered the planet Uranus and two of its moons - Titania and Oberon, along with Saturn's moons Mimas and Enceladus.
He also discovered over 800 double & multiple stars.
Caroline discovered 8 comets and was honoured by the Royal Astronomical Society.

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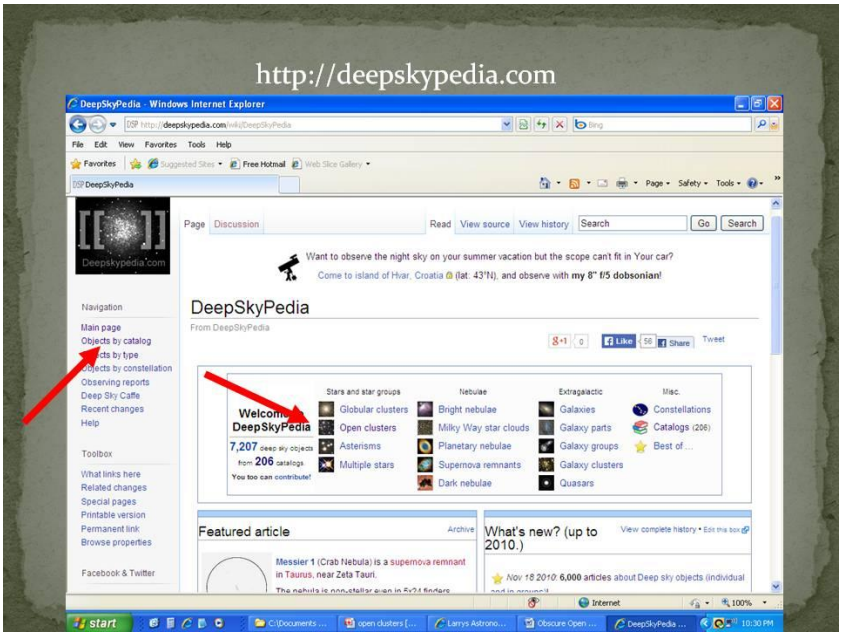
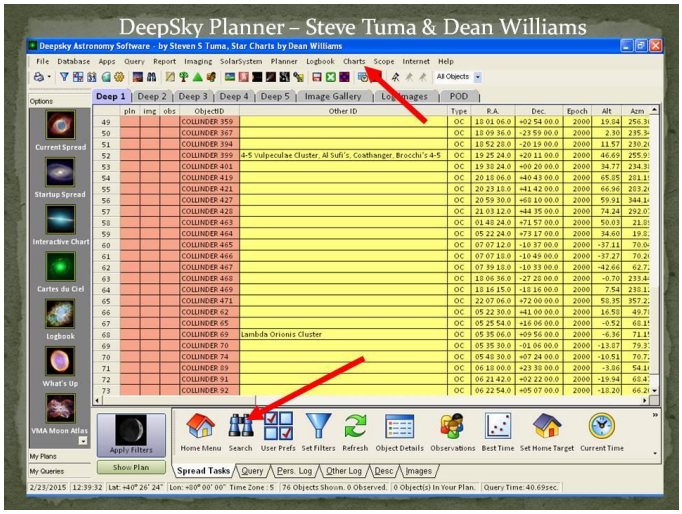
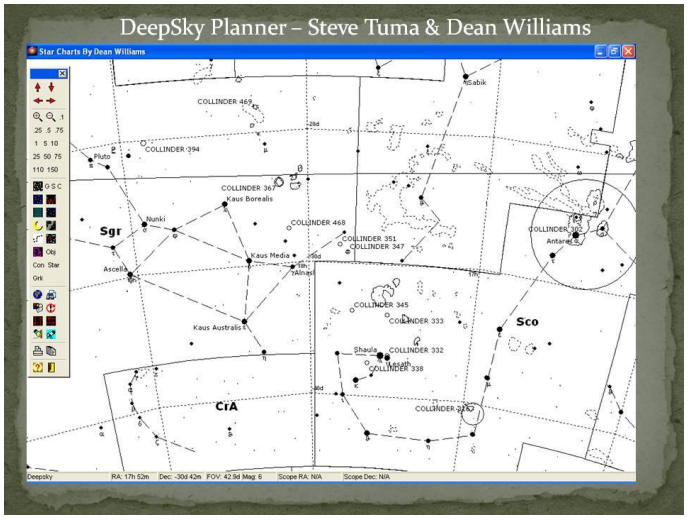
So, where can you find Obscure open star clusters or OB associations?
The same place you would find Messier or NGC clusters, along the Milky-Way!
It helps to have a list of the cluster catalog. One of my favorite online resources for generating these lists is A website called **deepskypedia**. Once in the site, there's several ways to generate a list, either by using the 'objects by catalog' link or selecting the Open Cluster icon.
You can then drill down thru the site to get to the catalog you're interested in.
This particular example is for the King Star Cluster Catalog.




You can get a computer software program to help: "DeepSky Planner" – Steve Tuma & Dean Williams
Do a search for your favorite catalog and generate a star chart.




Or, if you're using a planetarium program, you can utilize its settings to show the clusters that you are interested in finding. My favorite program – "Earth Centered Universe"

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Ingredients to successfully observe Obscure Open Star Clusters:

**Visually:**

Any sized telescope – 4” to 10”+ or greater reflector
or 60mm+ or greater refractor

Wide-field / low-power eyepiece ~ 30mm with good eye relief.

Red Zone (locally shielded area) or Dark Sky location – Cherry Springs

**Electronically aided:**

Deep-Sky Video Camera

CCD Camera or DSLR

Equatorially mounted Telescope 50mm or greater

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Deep Star Chart or Planetarium Software

Observing Plan / Star Cluster Catalog list



Now let's run thru the dozen most common 'obscure' star cluster catalogs:

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Tombaugh Cluster Tour
Collinder Cluster Tour
Trumpler Cluster Tour
Haffner Cluster Tour
Stock Cluster Tour
Harvard Cluster Tour
King Cluster Tour
Dolidze Cluster Tour
Berkeley Cluster Tour
Ruprecht Cluster Tour
Czernik Cluster Tour
Melotte Cluster Tour

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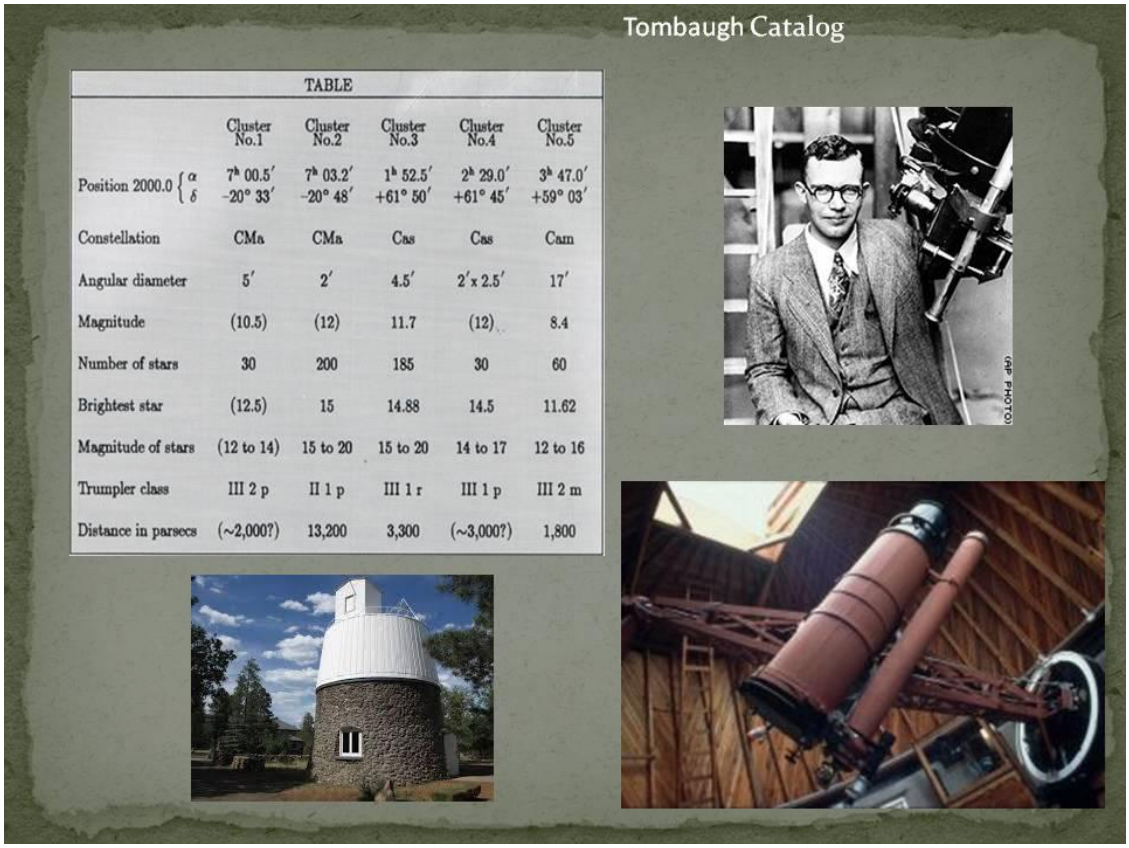
**Tombaugh Cluster Tour**

American astronomer Clyde Tombaugh (1907 – 1997), is best known for his discovery of the plant Pluto while working at Lowell Observatory in Flagstaff Arizona. But, during Tombaugh's search for trans-Neptunian planets, he ran across a number of unknown open star clusters. Of the five clusters 'discovered' by Tombaugh, four were first observed by him, with a fifth star cluster, Tombaugh-3, being a re-observation of little-known cluster IC166, which at that time, was not included on any of the usual catalogs.

Tombaugh didn't directly discover his clusters visually thru the telescope, but by examining negative photographic plates taken by him between 1938 - 1941, using a 13" astrograph located at Lowell Observatory in Arizona. (13" Lawrence Lowell Telescope).



With the exception of Tombaugh-5, the 1st-four star clusters are small, faint, and can be difficult to find. Three are located by Cassiopeia, and the last two in Canis Major. A visual observer will need a moderate size telescope with a mirror 10" or greater, and a dark-sky location. Video-observers and CCD imagers will be able to use smaller scopes with exposures of 25 seconds or more. For detailed descriptions and additional 'finder' photos, see the "Deep Sky" magazine article "Tracking Down the Tombaugh Clusters, by Max Radloff, 'Deep Sky' magazine, page-12, Winter 1990/91 issue. I currently have all 5 objects visible.

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**Collinder Cluster Tour**

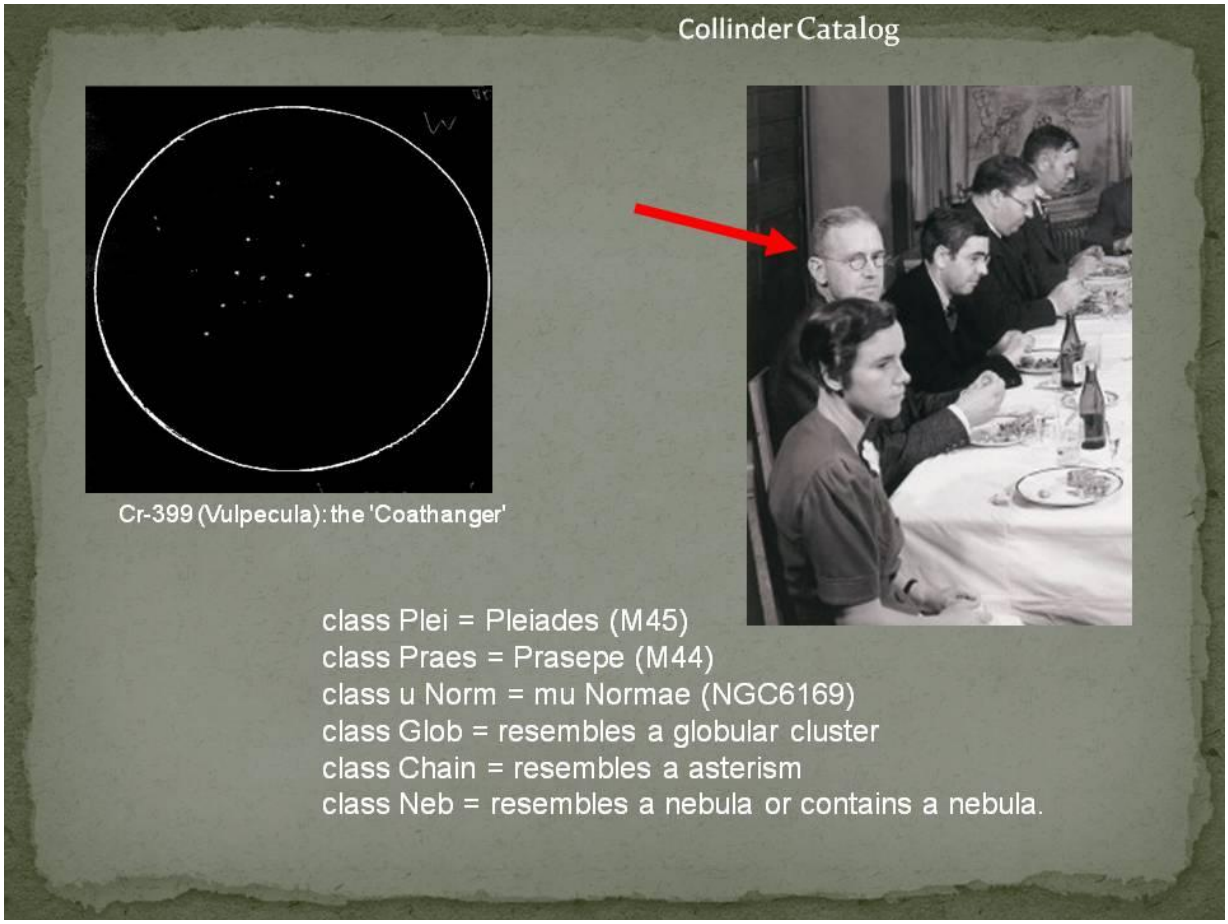
In 1931, Swedish astronomer Per Collinder (1890 - 1974, born in Sundsvall, Sweden), created a catalog of the known galactic open star clusters as part of his graduate student thesis: "*On structural properties of open galactic clusters and their spatial distribution*". His list contains 471 entries, of which a large number are already cataloged Messier and NGC objects. Most, of his work was based on using photographic plates taken from a variety of observatories, and Collinder actually observed very few of the objects himself. This graduate survey work of Collinder's appears to be the highlight of his astronomical career, as he is more noted for his work in navigation.

The amateur astronomer will find many of his 'Cr' objects listed on star atlases and observing guides.

While some of the 'CR' objects are asterisms or even globular cluster, the majority of objects are open star clusters. A fair number are unique objects, not listed in any other prior catalog.

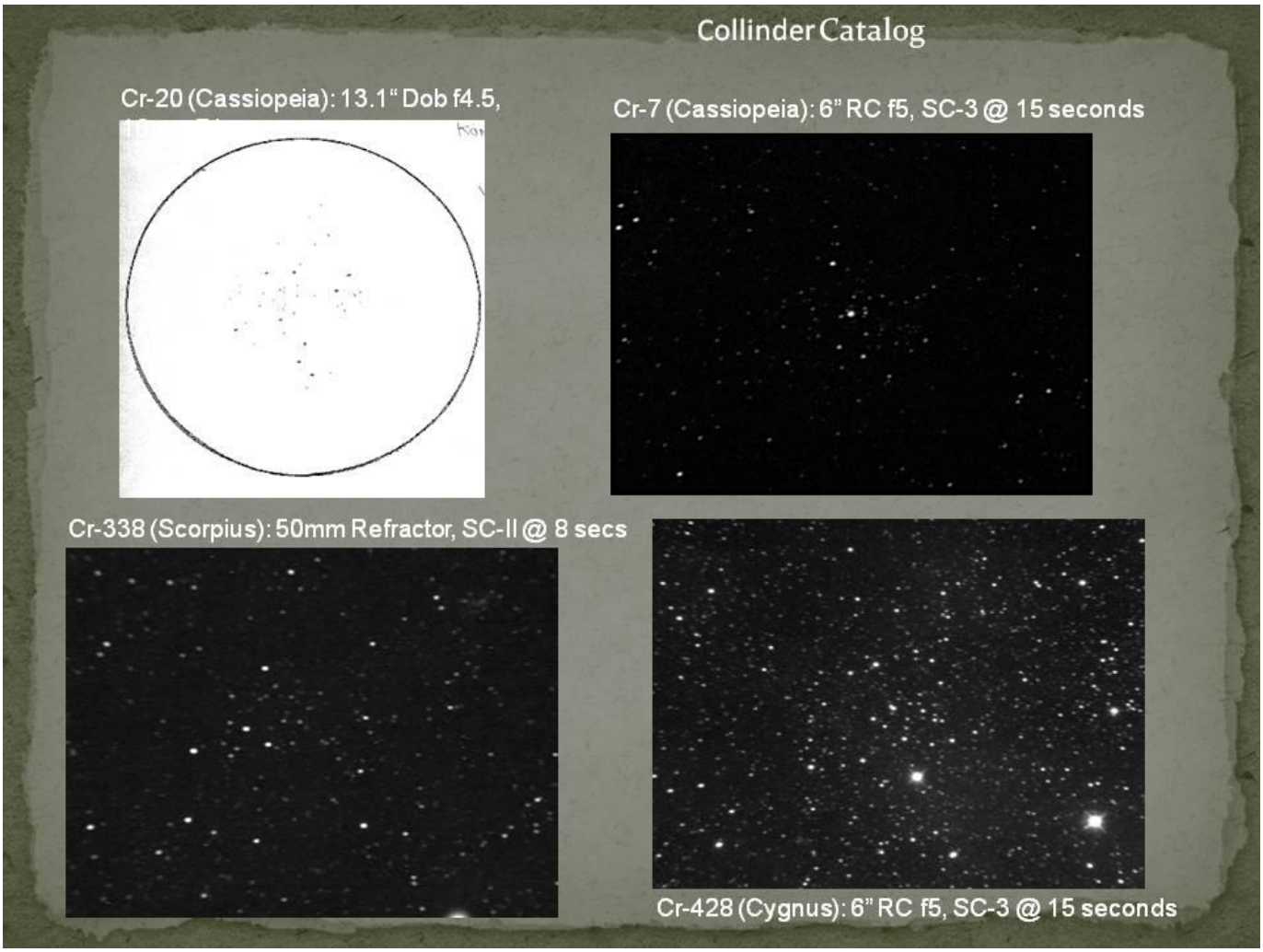
Per Collinder classified his list into six unique sub-categories based on using three known star-clusters as class types, along with three additional general descriptive classes:

class Plei = Pleiades (M45)
class Praes = Prasepe (M44)
class u Norm = mu Normae (NGC6169)
class Glob = resembles a globular cluster
class Chain = resembles a asterism
class Neb = resembles a nebula or contains a nebula.



Visually, the Collinder catalog clusters cover a wide range, from naked-eye objects to those requiring binoculars or a small rich-field telescope, all the way up to needing a 20” or larger telescope.
Collinder clusters can be found along the entire length of the Milky-Way, with the easiest to find being Cr399, the “Coathanger”, in Sagitta.
Trumpler clusters also cover a wide range in brightness, and can be found along sections of the Milky-Way, with several nice ones lying between Scutum, Sagittarius, and Scorpius.

I currently have observed all possible 348 objects visible from my Pittsburgh, PA latitude of +40.
(123 of the 'Cr' objects are not observable from my location).



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**Trumpler Cluster Tour**

Robert Trumpler, (1886 - 1956), was born in Zurich Switzerland. He received his PH.D. in astronomy in 1910. In 1915, he took a position at Allegheny Observatory, and later in 1918 went to Lick Observatory. Trumpler studied the brightness of distant open star clusters in order to determine the size of the Milky Way galaxy. In 1930, he published a catalogue of open clusters titled: "Preliminary results on the distances, dimensions and space distribution of open star clusters". His investigation of distances, dimensions, and space distribution of galactic open star clusters was a significant contribution to astronomy,

Trumpler's work contains a table of 37 new open star clusters, now known as the Trumpler catalog. The amateur astronomer will find many of his 'Tr' objects listed on star atlases and observing guides.

While cataloguing open clusters, Trumpler also devised a classification system according to the number of stars observed within them, how concentrated these stars are in the center of the cluster and the range of their apparent brightness. This system, known as the "Trumpler classification", is still used today. While some of the 'Tr' objects are already listed under other catalog designations such as 'NGC', the majority are unique objects, not listed in any other prior catalog.

Trumpler classified his list into four categories, which are further broken down by brightness and concentration.

A Roman numeral from I to IV indicates its concentration and detachment from the surrounding star field (from strongly to weakly concentrated)

class I = Detached cluster with strong central condensation.
class II = Detached cluster with little central condensation.
class III = Detached cluster with no noticeable condensation.
class IV = Appears as a star-field

A whole number from 1 to 3 indicating the range in brightness of cluster stars (from small to large range)

1 = Small range in brightness. (most stars look about the same)
2 = Medium range in brightness. (equally bright and faint stars)
3 = Large range in brightness. (large gap between a few very bright stars and remainder of cluster stars mostly faint).

A lower-case 'p', 'm', or 'r' indicates whether the cluster is 'poor', 'medium' or 'rich' in stars.

p = Poor. (star clusters with less than 50 stars)
m = Medium. (moderately rich star clusters with 50 to 100 stars)
r = Rich. (rich star clusters with more than 100 stars)

Finally, an 'N' is appended if the star cluster lies within nebulosity.

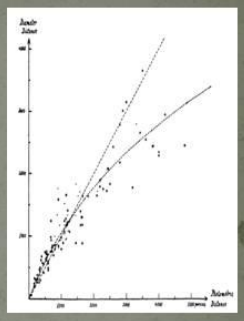
For example the Double Cluster is classified as a "IV3r". The Pleaides is a "II3rN'.

Trumpler clusters also cover a wide range in brightness, and can be found along sections of the Milky-Way, with several nice ones lying between Scutum, Sagittarius, and Scorpius.

Of the 37 Trumpler open clusters, I have all 23 objects visible from my Pittsburgh, PA latitude of around +40. (14 of the 'Trumpler' objects are not observable from latitude +40).

## Trumpler Catalog

Tr-37 (II 3 m)



(Cepheus) 50mm Refractor & Stellacam-II @ 8 seconds

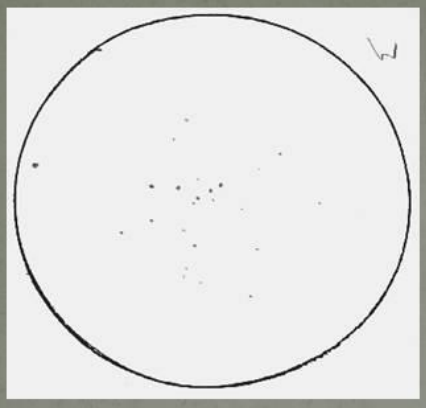
class I = Detached cluster with strong central condensation.
class II = Detached cluster with little central condensation.
class III = Detached cluster with no noticeable condensation.
class IV = Appears as a star-field

1 = Small range in brightness.
2 = Medium range in brightness.
3 = Large range in brightness.

p = Poor.
m = Medium.
r = Rich.

## Trumpler Catalog

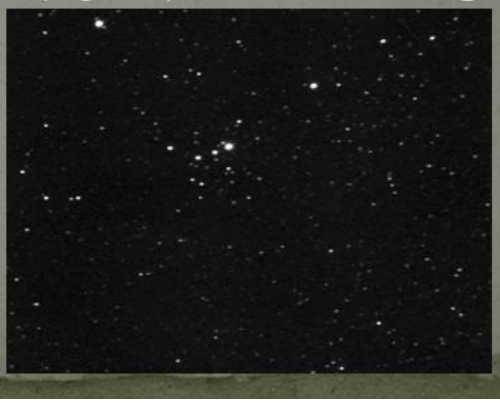
Tr-2 (Perseus): 8" Dob f4.5, 32mm 28x



Tr-7 (Puppis): 8" SCT f6.3, StellaCam-3 @ 15 secs

Tr-9 (Puppis): 80mm Refractor & SC-II, @ 8 secs

Tr-33 (Sagittarius): 50mm Refractor & SC-II @ 8 secs



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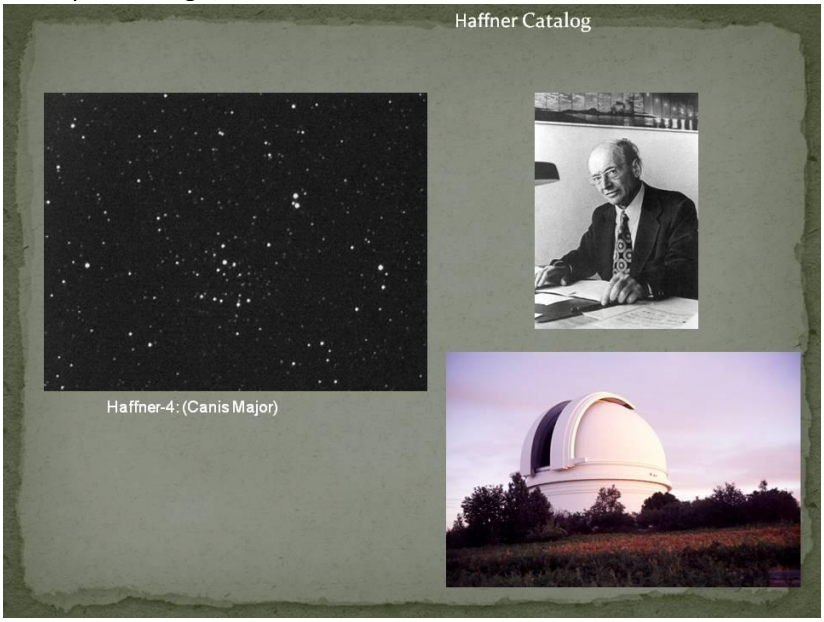
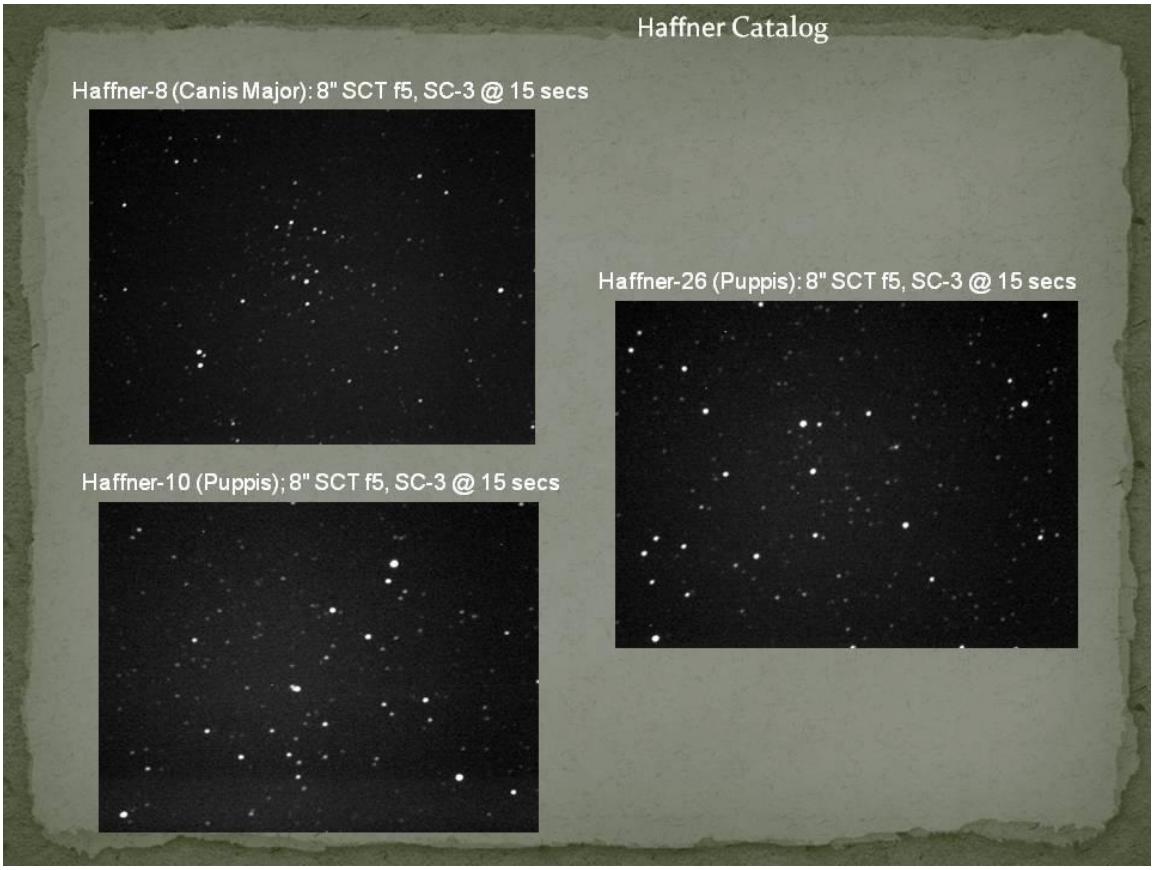
**Haffner Cluster Tour**

In 1957, German astronomer Hans Haffner (1912 - 1977), working at Boyden Observatory in South Africa, (which he later became the Director of), created a catalog of "New Galactic Star Clusters in the Southern Milky Way", containing 26 open clusters. Additionally, during the 1960's, Haffner served as chairman of the open clusters section of the IAU. The amateur astronomer will find many of his 'Haffner' objects listed on star atlases and observing guides. While some of the 'Haffner' objects are already listed under other catalog designations such as 'NGC', the majority are unique objects, not listed in any other prior catalog. Haffner clusters can be found along the Winter Milky-Way in Canis Major and Puppis. I currently have all possible 26 objects visible from my Pittsburgh, PA latitude of around +40.



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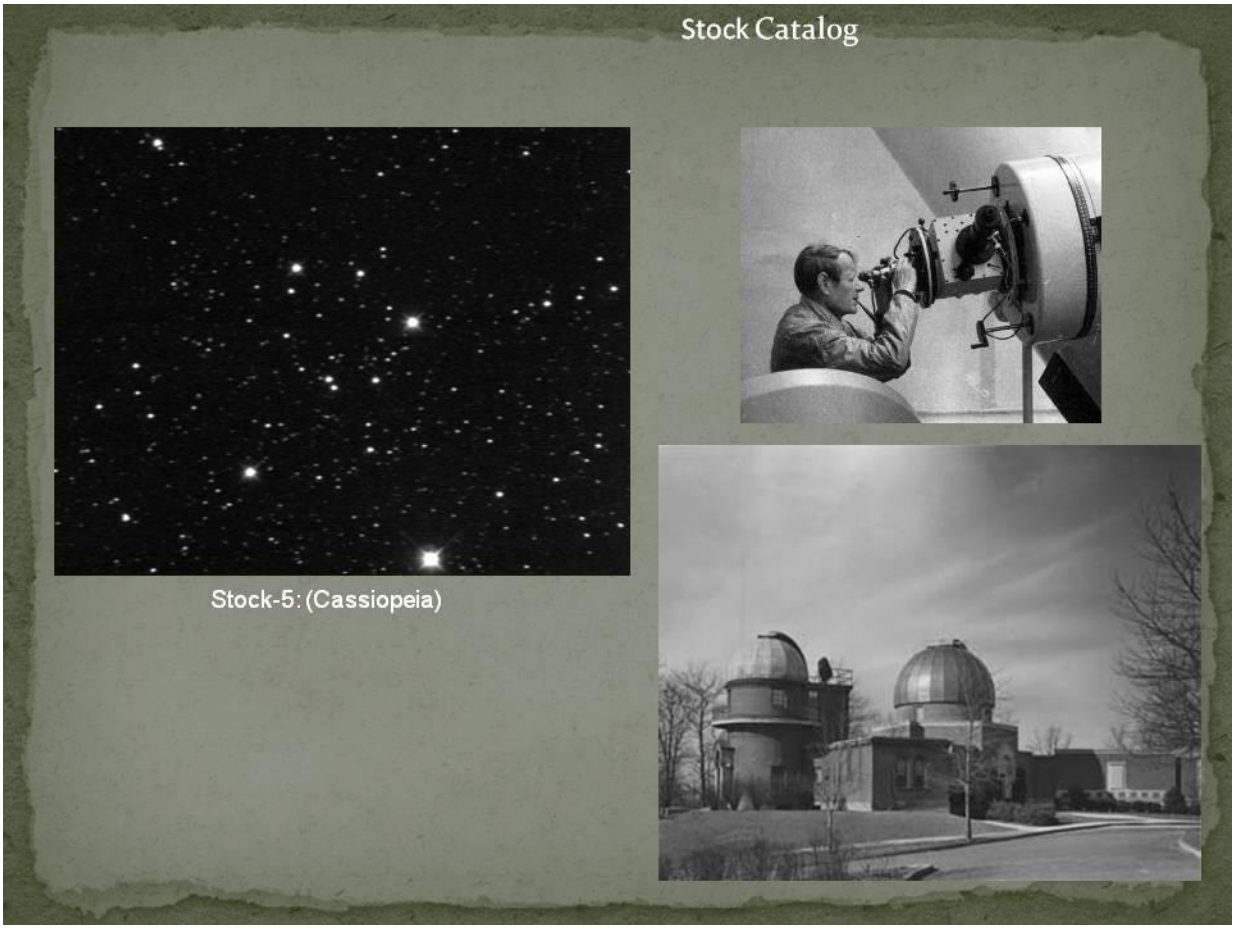
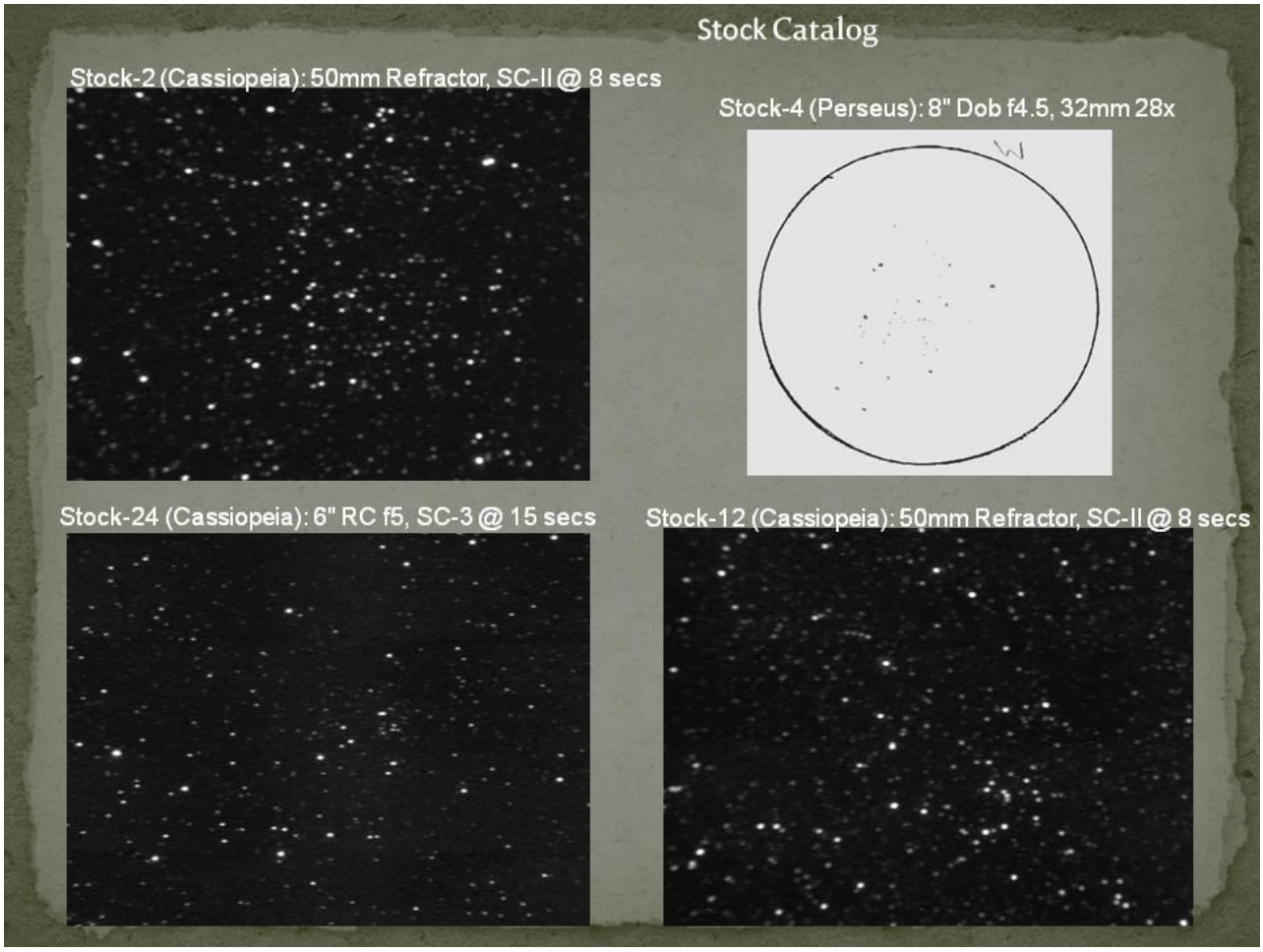
**Stock Cluster Tour**

Jurgen Stock, (1923 - 2004), was born in Hamburg, Germany, where he received his PH.D. in astronomy in 1951 from Hamburg University. In the early 1950's, Stock, worked at Case Western Reserve University in Cleveland, OH, at the Warner and Swasey Observatory. While there he conducted a photographic photometry study of open clusters, which led to the discovery of two dozen previously unknown sparse clusters in the northern Milky-Way. Stock was the first director of the Cerro Tololo Inter-American Observatory in Chile. He was instrumental in selecting the observatory site, spending nearly three years in the region, exploring and surveying the nearby mountains, accessible only by horseback. After finally selecting Cerro Tololo, Stock overseen construction of the road to the sumit and the first installations of the observatory itself.
His contributions to many areas of astronomy and other sciences played a key role in the development of astronomy in Latin America.

The amateur astronomer will find a number of his 'Stock' Star Clusters listed on star atlases and observing guides. While some of the 'Stock' objects are already listed under other catalog designations such as 'NGC', the majority are unique objects, not listed in any other prior catalog. Stock clusters are generally large, sparse, and very faint. Many are not plotted on star atlases. But, they can be found along the Fall Milky-Way in Cassiopeia, Perseus, and Auriga.
I currently have all 20 possible objects (from the list of 24) visible from my Pittsburgh, PA latitude of around +40. (4 of the 'Stock' objects are not observable from latitude +40: Stock13, 14, 15 & 16).



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**Harvard Cluster Tour**

American astronomer Harlow Shapely, (1885 - 1972), born in the small town of Nashville Missouri, studied astronomy at the University of Missouri, and earned his PH.D from Princeton University.
One of the lesser known catalogs of open star clusters is the Harvard catalogue, of 21 open clusters.
It was compiled in 1930 by Shapely, whose many accomplishments include correctly estimating the size of the Milky-Way Galaxy and the sun's position within it. Shapley also served as director of the Harvard College Observatory from 1921 to 1952, and published a number of books on astronomy. In 1953, he came up with the “Liquid Water Belt” habitable zone theory of planetary formation around stars.

While most of the 'Harvard' objects are already listed under other catalog designations such as 'Trumpler', or 'NGC', about half are unique objects, not listed in any other prior catalog. These clusters are generally faint and sparse, and are sporadically listed in star charts & observing guides.
A number of faint clusters can be found in Scoprius, but an interesting one, H20, can be found in the Sagitta.

I currently have all 11 of a possible 11 objects visible from my Pittsburgh, PA latitude of around +40. (9 of the 'Harvard' objects are not observable from latitude +40. Also, Harvard-3 has gone missing).

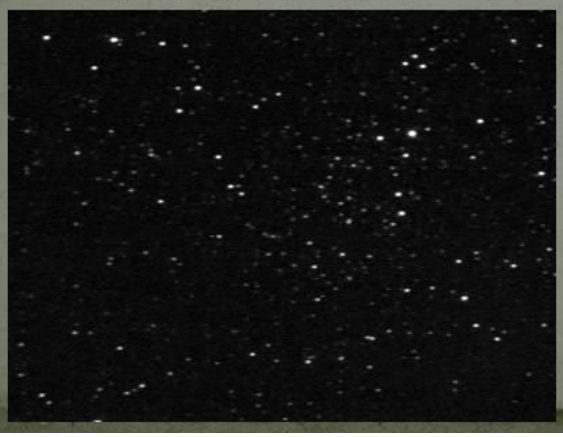
## Harvard Catalog

Harvard-21: (Cassiopeia)

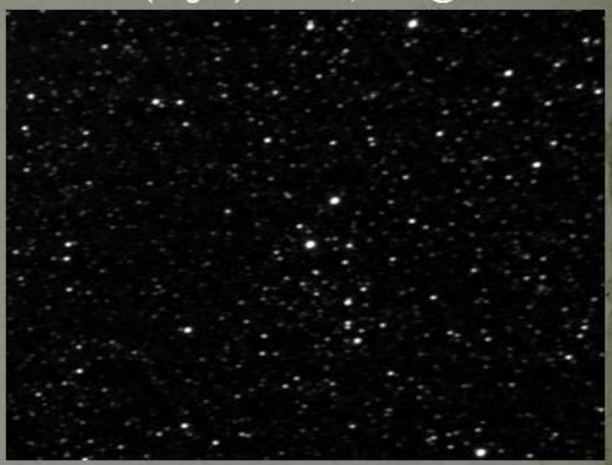
## Harvard Catalog

Harvard-1 (Cassiopeia): 50mm Refractor, SC-II, 8 secs

Harvard-16 (Scorpius): 6" RC f5, SC-3, 15 secs



Harvard-20 (Sagitta): 6" RC f5, SC-3 @ 20 sec



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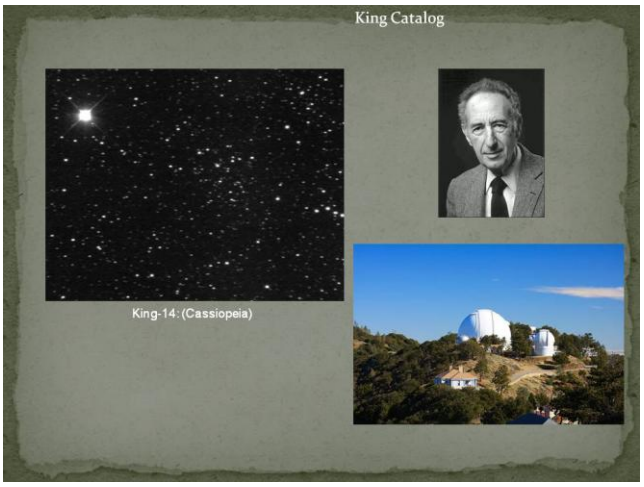
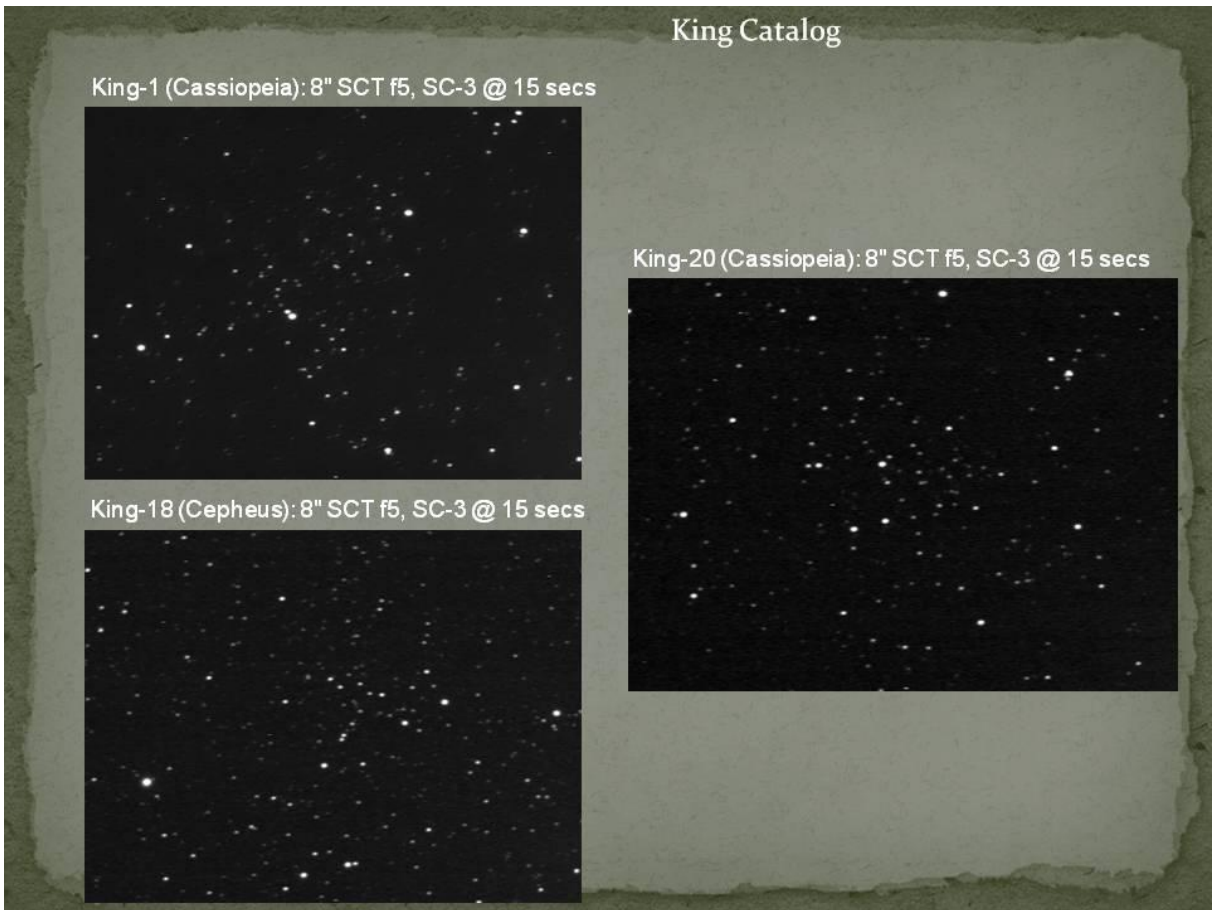
**King Cluster Tour**

American astronomer Ivan R. King, (1925?), graduated from Hamilton College in 1947 and received his doctorate from Harvard University in 1952. Starting in 1949, while at Harvard, and later in 1966, at the University of California, Berkeley, King created a catalog of 27 open star clusters, based on his study involving the dynamical modeling of star clusters (referred to as the "King model").
King's most recent research involved studies of the dynamical structure of globular clusters.

The amateur astronomer will find many of his 'King' objects listed on star atlases and observing guides. While a few of the 'King' objects are already listed under other catalog designations such as 'NGC', the majority are unique objects, not listed in any other prior catalog. The majority of King clusters can be found in the Fall Milky-Way region of Cassiopeia and Cepheus. I currently have observed all 27 King objects.



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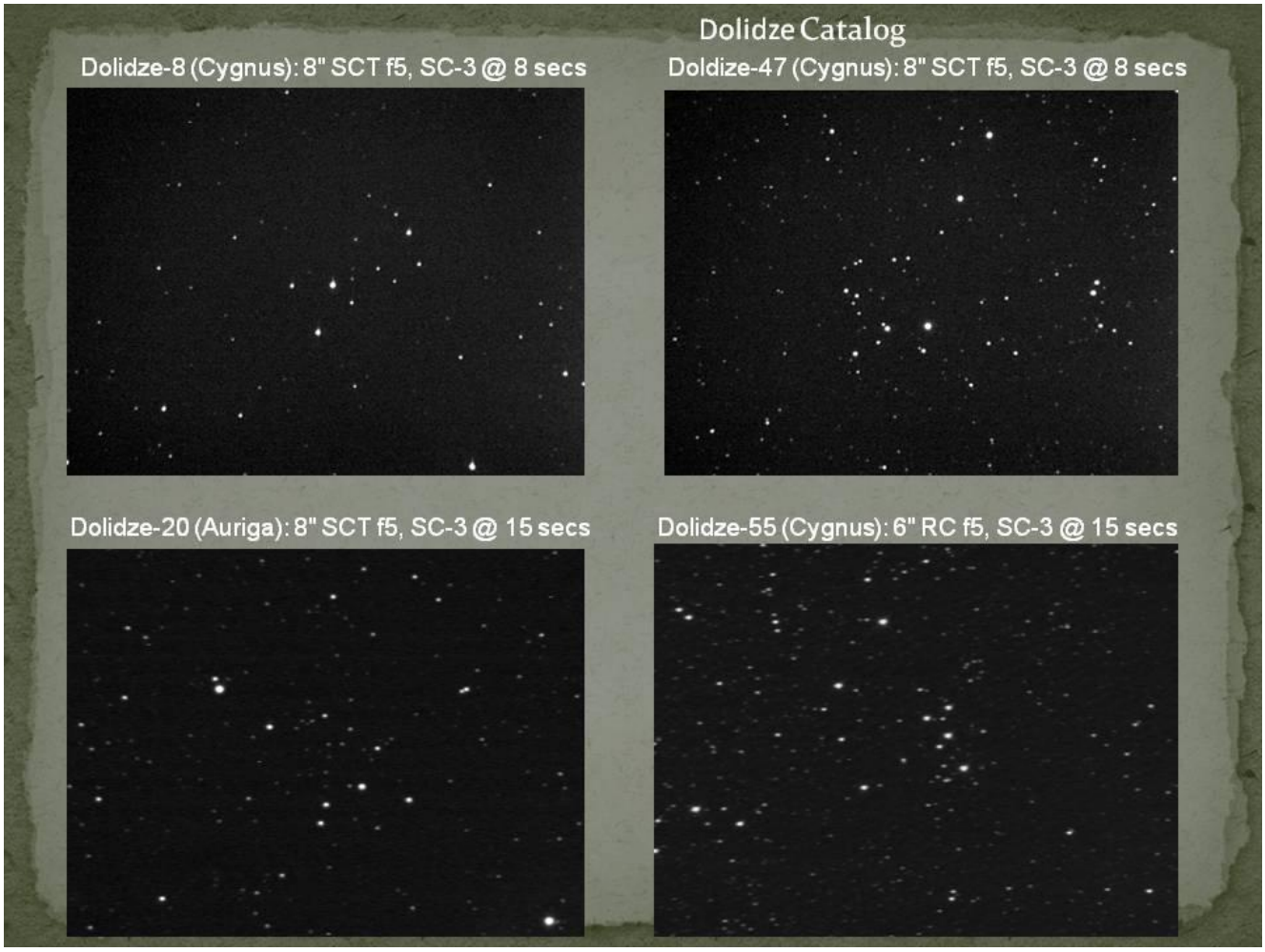
**Dolidze Cluster Tour**

In 1966, Russian astronomer Madona V. Dolidze at the Abastumani Astrophysical Observatory located in Georgia, created a catalog of 57 open star clusters based on his emission-line spectral surveys done with the observatory's 70cm f/3 Maksutov astrograph. Later, he was joined by astronomer G. N. Dzimselejsvili and together published a follow-up list of 11 additional clusters.

The amateur astronomer will find many of his 'Dolidze' objects listed on star atlases and observing guides. While a very few of the 'Dolidze' objects are already listed under other catalog designations such as 'NGC', the vast majority are unique objects, not listed in any other prior catalog. These clusters generally consist of very loosely-arranged, sparse stars. Most lie within the more rich areas of the Milky-Way, which tends to make them difficult to find and distinguish from the surrounding field stars.
Only a few of the Dolidze / Dzimshelishvili clusters are true physical clusters.
One good area to search for these clusters is in the central portion of Cygnus.

I currently have observed all 57 Dolidze objects, along with all 11 of the Dolidze-Dzimselejsvili objects.

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**Berkeley Cluster Tour**

In 1958, Berkeley astronomers Gosta Lynga (Sweden), and Jiri Alter (Czechoslovakia, 1891 – 1972) published a catalog of Star Clusters and Associations, compiled in CCD photometry studies by various astronomers at the University of California at Berkeley. The catalog is a collection of 104 extremely old open star clusters identified from the Palomar Observatory Sky Survey (POSS) plates.

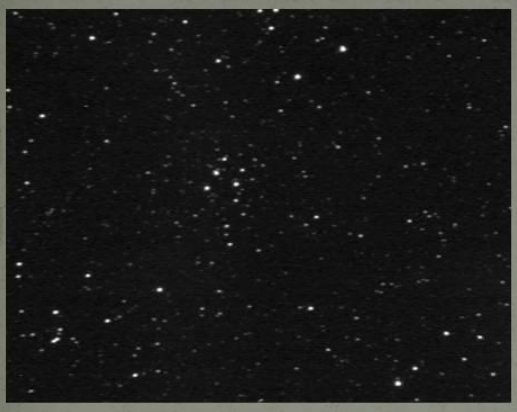
It includes the currently oldest known open star cluster in the Milky-Way, Berkeley-17, estimated at around 10.7 billion years old. Lynga went on to the Mt Stromlo Observatory in Australia to research star formation in the southern Milky-Way.

The amateur astronomer will find many of the 'Berkeley' objects listed on star atlases and observing guides. While some of the 'Berkeley' objects are already listed under other catalog designations such as 'NGC', the majority are unique objects, not listed in any other prior catalog.

Berkeley clusters can be found along the entire length of the Milky-Way, with a number of nice ones located in Cygnus and Sagitta.

I've currently completed observing about 75% of the Berkeley catalog of 104 objects, and hope to finish it sometime this year.

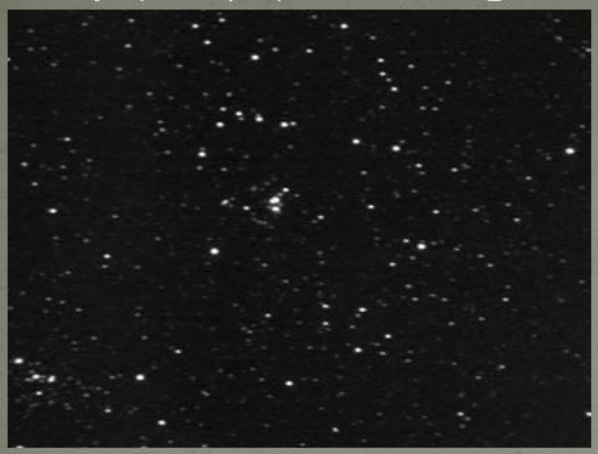
## Berkeley Catalog



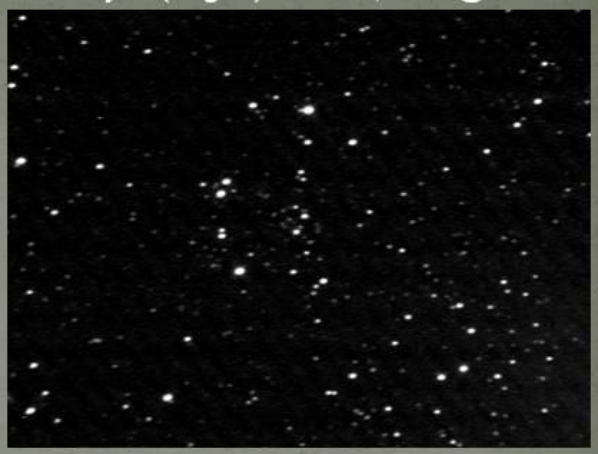
Berkeley-62: (Cassiopeia)

## Berkeley Catalog

Berkeley-4 (Cassiopeia): 6" RC f5, SC-3 @ 15 secs



Berkeley-47 (Sagitta): 6" RC f5, SC-3 @ 30 secs



Berkeley-36 (Canis Major): 8" SCT f5, SC-3 @ 20 secs

Berkeley-90 (Cygnus): 8" SCT f5, SC-3 @ 20 secs

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**Ruprecht Cluster Tour**

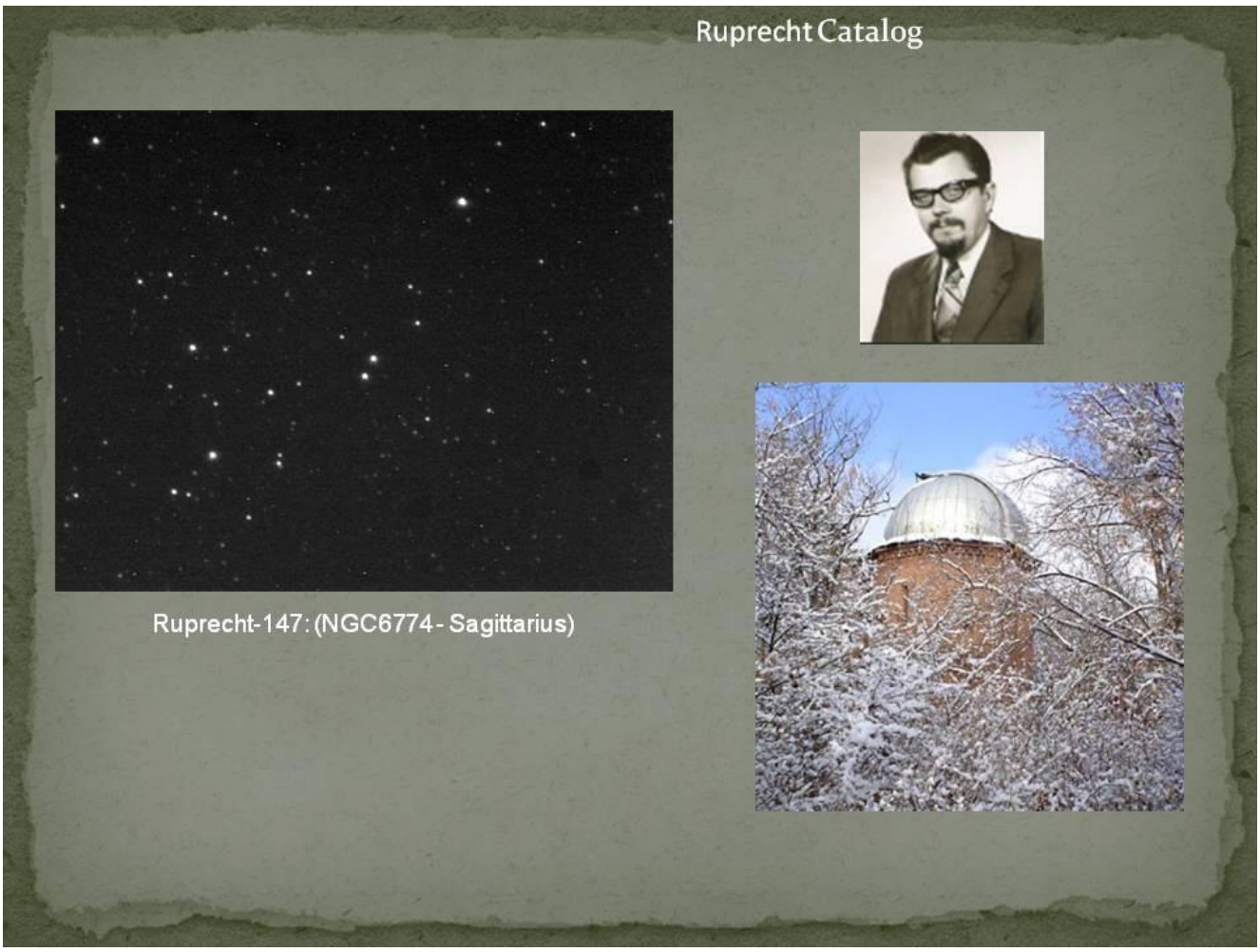
In 1958, Czech astronomer Jaroslav Ruprecht, (1931 - 2011), published a paper, (of which he was one of the main compilers), of all known stellar associations, open star clusters, and globular clusters called "Catalogue of Star Clusters and Associations". Within this catalog, there are a total of 176 new open clusters.

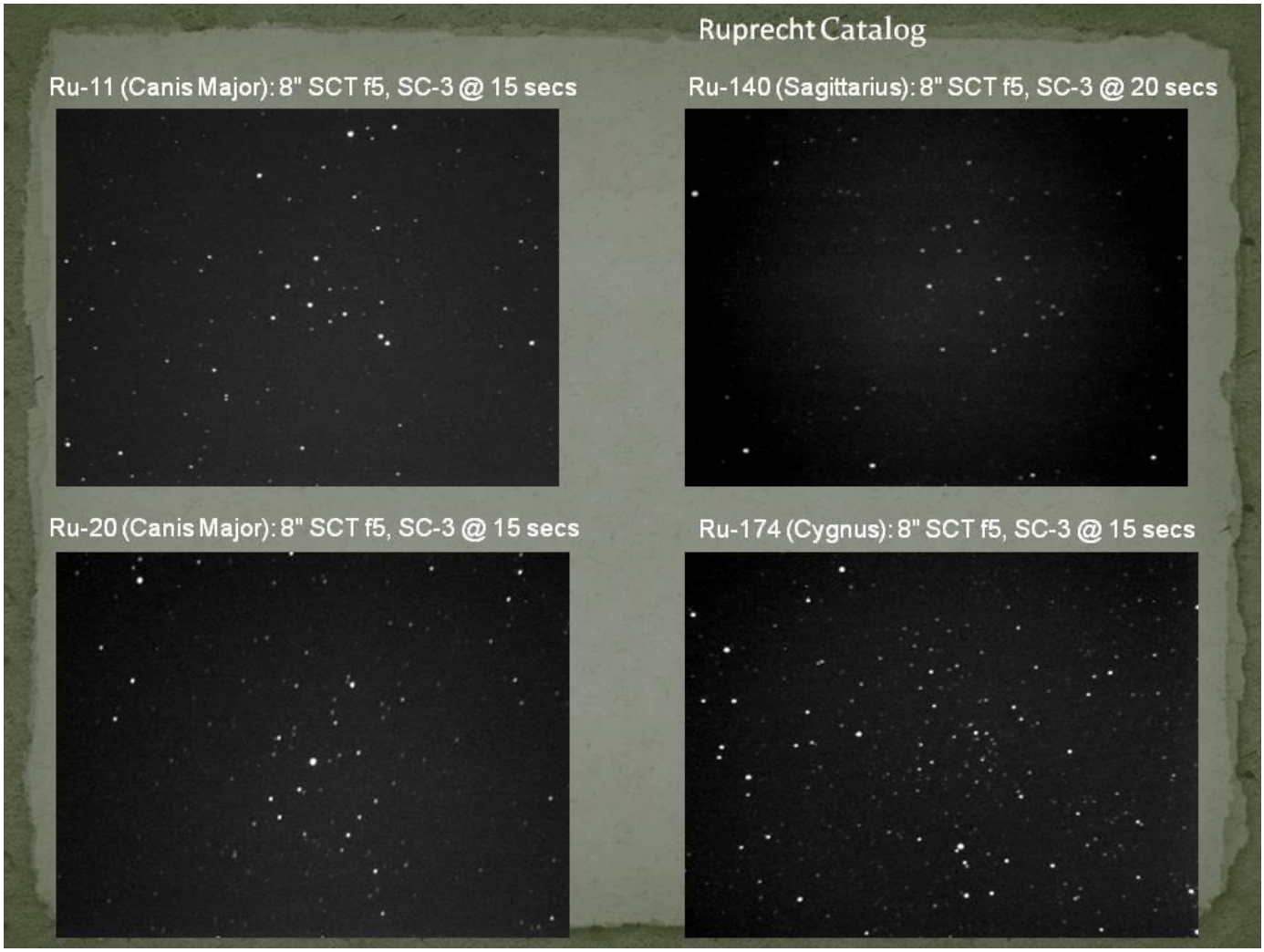
Ruprecht 147 (NGC 6774), is particularly interesting in that it is only 800 to 1,000 light-years from Earth, and it's component stars, which were born out of the same cloud of gas and dust, are approximately 2-billion years old, making it the closest star cluster to Earth that have member stars similar to the Sun's mass and age than those in all the other nearby clusters. Astronomers have identified this cluster as a potentially important new reference gauge for fundamental stellar astrophysics, and will become very useful in understanding the evolution of stars like the Sun, and in the search for Earth-like planets orbiting around Sun-like stars.

The amateur astronomer will find many of his 'Ruprecht' objects listed on star atlases and observing guides. While a very few of the 'Ruprecht' objects are already listed under other catalog designations such as 'NGC', the majority are unique objects, not listed in any other prior catalog.

Ruprecht clusters can be found along the entire length of the Milky-Way, but there's a nice 'clustering' of them along the Winter Milky-Way in Canis Major and Puppis.

I'm currently about half-way thru observing the possible 92 objects visible from my Pittsburgh, PA latitude of around +40. (84 of the '176' total objects are not observable from latitude +40).



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**Czernik Cluster Tour**

In 1966, Polish astronomer Mieczyslaw Czernik, (1933 - 1991), of the Warsaw University Observatory and Astronomical Institute created a catalog of 45 open star clusters based on a study of the images of the Palomar Sky Atlas. The amateur astronomer will find many of his 'Czernik' objects listed on star atlases and observing guides. While a very few of the 'Czernik' objects are already listed under other catalog designations such as 'Basel' or 'King', the majority are unique objects, not listed in any other prior catalog.

Czernik clusters can be found along the entire length of the Milky-Way, but a large number can be found mostly along the Fall Milky-Way in Cassiopeia and Auriga. I currently have 38 out of a possible 41 objects visible from my Pittsburgh, PA latitude. (Clusters #33, 35, 36, & 37 are missing, and #34 is a galaxy).

## Czernik Catalog

Czernik-9: (Cassiopeia)

## Czernik Catalog

Czernik-3 (Cassiopeia): 6" RC f5, SC-3 @ 15 secs

Czernik-31 (Puppis): 8" SCT f5, SC-3 @ 15 secs

Czernik-23 (Auriga): 8" SCT f5, SC-3 @ 15 secs

Czernik-44 (Cassiopeia): 6" RC f5, SC-3 @ 8 secs

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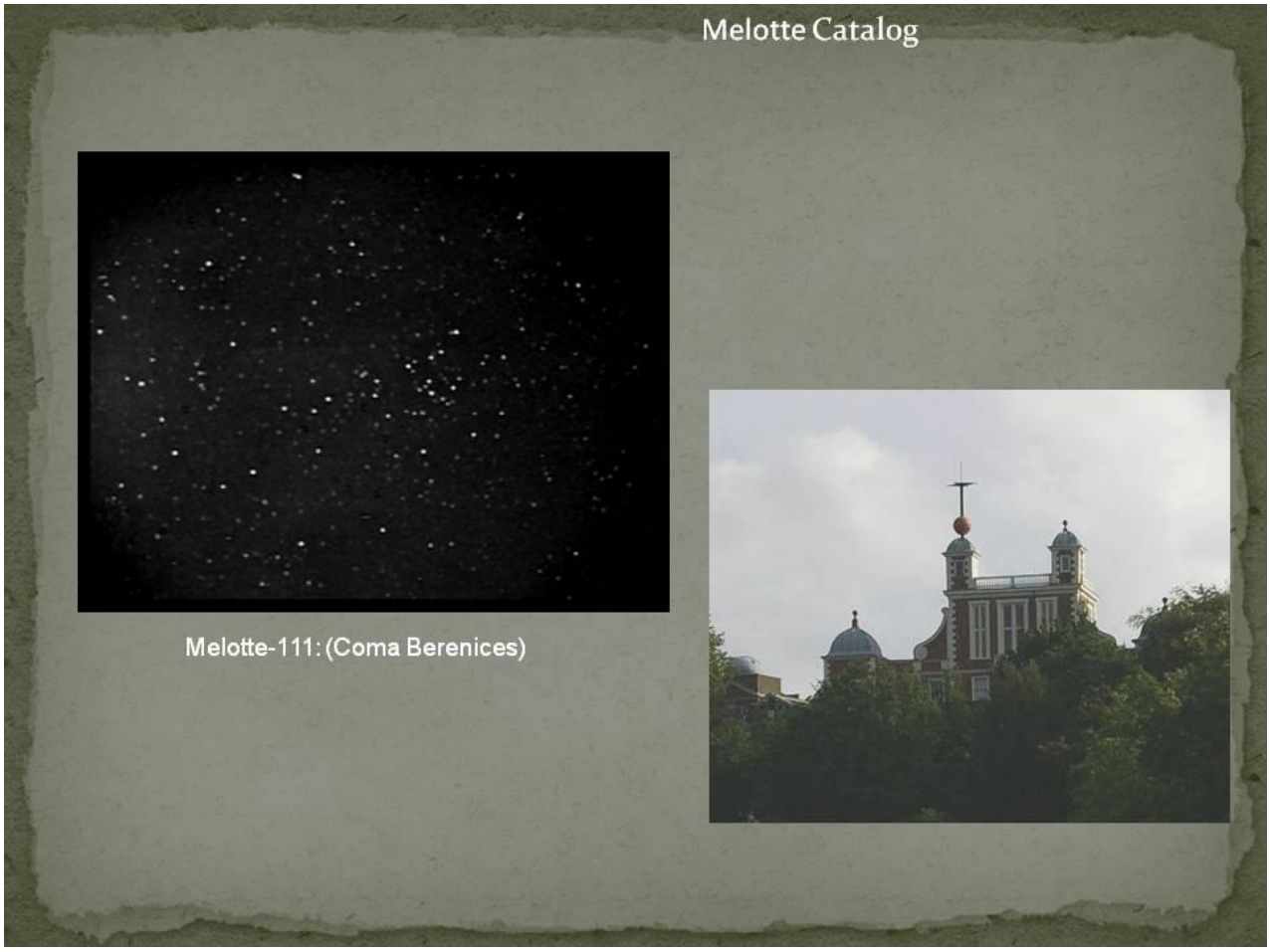
**Melotte Cluster Tour**

In 1915, British astronomer Philbert Jacques Melotte, (1880-1961), at the Royal Greenwich Observatory, created a catalog of 245 deep sky clusters as part of a astrographic study of a early photographic atlas of the sky (called the Franklin-Adams) based on plates taken at Johannesburg, South Africa, and Godalming, England. Mellotte also discovered in 1908 the 8$^{th}$ moon of Jupiter, today known as Pasiphae, and also asteroid 676 Melitta in 1909. The Melotte catalogue contains both open and globular clusters.
The distribution of these clusters around the sky was used in determining the overall structure of our Milky-Way galaxy.

The amateur astronomer will find many of his 'Melotte' objects listed on star atlases and observing guides. While some of the 'Melotte' objects are unique objects, such as Mel111 - the Coma Berenices cluster, the majority are already listed under other prior catalog designations such as 'M', 'NGC', or 'IC', Melotte clusters also cover a wide range in brightness and size, and can be found all along the Milky-Way,
with several large bright members located in Perseus and Taurus.

I currently have all 182 objects that are visible from my Pittsburgh, PA latitude of around +40.
(63 objects are not observable from latitude +40).

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Conclusion:

So today I introduced you to some of the more obscurely named open star cluster catalogs.
We learned a little about the individuals behind each catalog, and looked at sketches and video-capture image examples of various members of each catalog.
Hopefully this little presentation has inspired you to search-out and explore these often missed, but very rewarding celestial objects.

Thank you.

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Credits:

- “EXPLORING ODD-NAMED STAR CLUSTERS”:  Sky & Telescope Dec-2012, by David Rodger
- "IN PURSUIT OF O-B ASSOCIATIONS":  Sky & Telescope Jan-1986, by Dennis di Cicco
- “EXPLORE THE TRUMPLER CLASSES OF CLUSTERS”:  Astronomy Magazine Feb-2014, by Michael Bakich
- “THE COLLINDER CATALOG OF OPEN STAR CLUSTERS”:  CloudyNights, by Thomas Watson
- “TRACKING DOWN THE TOMBAUGH CLUSTERS””:  Deep Sky Magazine Winter 1990/1991, by Max Radloff

- STAR CLUSTERS – by Brent Archinal & Stephen Hynes
- BURNHAM'S CELESTIAL HANDBOOK  -  by Robert Burnham Jr
- WEBB SOCIETY DEEP-SKY OBSERVERS HANDBOOK  # 3 OPEN CLUSTERS  - by Kennth Glyn Jones
- THE NIGHT SKY OBSERVERS GUIDE and the OBSERVER'S GUIDE magazines  - by Bob Kepple & Glen Sanner
- THE MILKY-WAY – by Bark Bok

"Earth Centered Universe"  planetarium software by David Lane  http://www.nova-astro.com/
“DeepSky Planner” – Steve Tuma & Dean Williams

Internet:  Google & Wikipedia

Professional Images:
M45, M35, NGC2158, NGC5139, M101 - Adam Block/NOAO/AURA/NSF
NGC457 - Ken and Emilie Siarkiewicz/Adam Block/NOAO/AURA/NSF
NGC2266 - Peter Spokes/Adam Block/NOAO/AURA/NSF
NGC6520 - Fred Calvert/Adam Block/NOAO/AURA/NSF
NGC1662 - Erica and Dan Simpson/Adam Block/NOAO/AURA/NSF
M67 - Nigel Sharp, Mark Hanna/NOAO/AURA/NSF
M101 - Adam Block/NOAO/AURA/NSF
Amateur Images and Sketches:  Larry McHenry