The OBSERVER

The Newsletter of the Twin City Amateur Astronomers, Inc.

June 2001 Volume 26, Number 6

In This Issue:

TCAA News

— Sandy McNamara

ASTRONOMY DAY, as you may have heard by now, was a rousing success at Eastland Mall and especially at Sugar Grove Observatory (SGO), with over 100 visitors showing up Saturday evening. I can't thank everyone who showed up with display materials, setup/takedown help, or just moral support but if you came, even for a little while, know that it was greatly appreciated! A special thanks to radio host Jim Brown for emceeing the quiz show, Joe DeHoff for wooing passers-by with his mirror grinding, and Mike Rogers for operating the C14 in the observatory while the rest of us were too busy handling the unexpected crowd to give him any assistance.

POS sessions are taking off at SGO as people discover our monthly presentations there. If you can spare two hours on these Saturday evenings, your help is desperately needed. You don't need a telescope or any knowledge of the night sky although extra telescopes are

continued on next page

Don't Observe Naked!

See pp. 8-9 to order TCAA Garb

TCAA Calendar

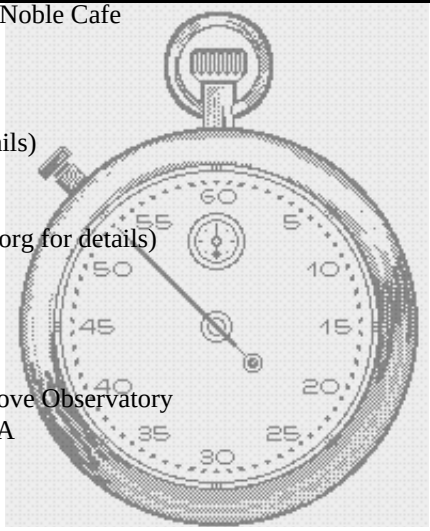
Monday, 2 July, 7:30 - 9:00 PM, Barnes and Noble Cafe
TCAA Reading Group. Selection: TBD

14-15 July, 2001, St. Paul, MN
Universe 2001 (See www.aspsky.org for details)

15-20 July, 2001, Merrit Reservoir, NE
Nebraska Star Party (See NebraskaStarParty.org for details)

Saturday, 21 July, 2001, Sundown, SGO
Members Only Observing Session (MOOS).

Saturday, 26 July, 9:00- 11:30 PM, Sugar Grove Observatory
Public Observing Session. Coordinator: TBA



The Observer
The Newsletter of the TCAA, Inc.

The Observer is a monthly publication of the Twin City Amateur Astronomers, Inc., a non-profit organization of amateur astronomers interested in studying astronomy and sharing their hobby with the public.

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Articles, ads, etc., are due by the 1st weekend of each month. Items may be e-mailed to: mprogers@mail.millikin.edu, or jmemken@ilstu.edu

Dues

$25.00 per household, per year
$15.00 for members over 60
$12.00 for newsletter only
$ 1.25 for a single newsletter copy

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always welcome in the viewing field. Assistance is needed for welcoming visitors, directing them from the parking area to the observatory building, lighting the path over the still somewhat uneven ground, answering questions about TCAA, SGNC, and SGO (or directing them to those who can), etc.

SGO construction is still progressing. The Funks Grove Association and Sugar Grove Nature Center (SGNC) have cut the siding for the one uncovered corner of the building, stained it, and stacked it next to SGO. As soon as our construction foreman (Dan) returns from vacation the first week in July, we will be asking for volunteers to assist in nailing it in place. SGNC will be pouring a few concrete projects in the next month; at that time, they have also offered to install a sidewalk from the parking lot to the SGO building for us. The C14 has had its polar alignment roughly corrected and three new eyepieces have arrived for use with it. While the dec motor still needs a little work, the telescope is being used by several members for private viewing as well as the POS. The computer station is up and running with GUIDE installed; if you have any astronomy related programs you would like to donate, please contact me. We have also had some interest expressed by some benefactors that may result with a CCD system donated in the future.

KEY HOLDER training at SGO for private use of the C14 and other equipment in the building is progressing with 6 people (counting the teachers) now completing the 1-hr session. If you would like to have the training, please contact any board member for information. There is a $10 key holder fee to cover SGO expenses.

Reports from the Field

— Observer Staff

UNDER ALMOST perfect summer skies, a small band of TCAA members gathered in the new Picnic Shelter at the Sugar Grove Nature Center to partake of food and fellowship at the annual picnic. In attendance were Sandy McNamara, Brian Barling, Al Timke, Jay Freeman, Kaila Walstrom and family, and the Memken-Rogers clan. After a generous potluck meal, the attendees engaged in some lively discussions, mostly while sitting around the SGO, waiting for night to arrive. Upon dusk, those who remained (Sandy, Al, Brian, Kaila and Kent, Michael and Jay) had a short observing session — cut short by clouds — during which the telescope in the SGO performed quite well. In all, it was a great beginning of what promises to be a terrific observing season this summer.

A week later, on 23 June, a *much* larger group gathered at our public observing session. In spite of almost no publicity, a crowd of at least 75 gathered at numerous telescopes to savor the early summer constellations. The weather, and even the moon was perfect. Clouds that had blanketed the area during the day dissipated as sunset approached; and the moon dutifully set just as darkness fell, giving us something to show the visitors until astronomical twilight.

Thanks to all the TCAAers who showed up with telescopes and kept the crowds from becoming too long. And if you weren't among those this month, well, there's always July, and August, and...

Beginner's Corner

Variable Stars II

— Michael P. Rogers

WHEN WE last left our hero and heroine, they were trapped on a precipice fending off a horde of angry..., no wait a moment, wrong story. But this *is* a sequel. What follows will make much more sense if you have already read Variable Stars I (in last month's issue, or on the web site).

In his preface to *A Brief History of Time*, Stephen Hawking jokes about including equations in popular writing, explaining that each equation would reduce his audience by a half. So it is with great trepidation that I present this equation

$$d = 10^{\frac{m - M + 5}{5}}$$

where

m = apparent magnitude,
M = absolute magnitude,
5 = a digit between 4 and 6, and
d = distance in parsecs (a parsec, you will recall, is approximately 3.26 light years).

We will spare you the derivation, which you may find in any first year astronomy text. Its presence there correctly implies two points: first, as equations go, it is not particularly complicated; and second, it is absolutely critical, because it lets us get closer to answering the fundamental poser:

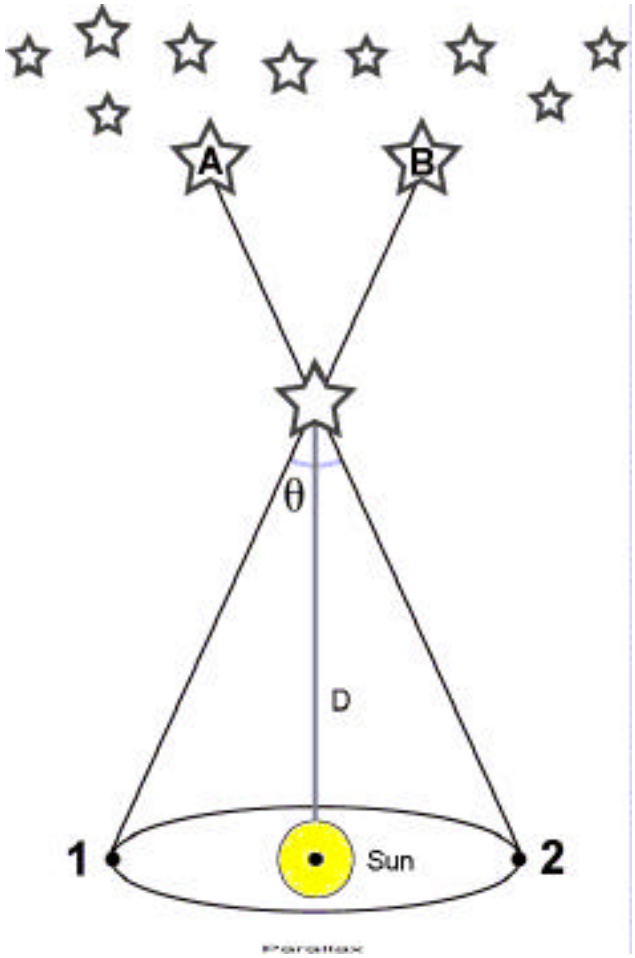
How Big Is The Universe?

Amazingly, at the beginning of the 21st century, we still cannot definitively answer what must surely be the "first" question in astronomy. In defense of those astronomers who have toiled over the centuries and still have not answered this completely, you cannot merely head down to the local Menard's and buy a cosmos-sized tape measure. (Perhaps if there is one on Proxima Centauri, but the shipping costs are horrendous).

To see how this equation helps us gauge the size of the universe, let us first ponder how we measure nearby objects — nearby in a relative term.

Here is a fun exercise you can do at home. Extend your arm, raise your index finger, and close one eye. Pay attention both to your finger, and to the background. Now close one eye and open the other; repeat several times. As you do this, you will see your finger appear to jump from one position to another relative to the background. This phenomenon, the apparent change in position of a nearby object with respect to a more distant background, is known as *parallax.*

This same principle is fundamental to measuring nearby stars. Obviously the stars are much, much further away, but fortunately the two positions from which we view are much, much further apart than your eyes!



Consider the illustration at right. Astronomers can determine the angle θ, and by definition the distance between position 1 and the Sun is exactly 1 AU (Astronomical Unit). You will undoubtedly recall from high school trigonometry that the the tangent of θ is "opposite over adjacent", i.e., 1AU/D. Since θ is exceedingly small, we can reasonably approximate tangent of θ by θ. i.e., θ = 1/D, or to put it another way, D = 1/θ. In short, given the angle, we can determine the distance.

Unfortunately, this is only useful for nearby stars, because those are the only stars for which θ is large enough to be accurately measured. To keep things in perspective, the entire galaxy is about 100,000 light years across. The most distant star that we can measure by this method is roughly 1630 light years (see http://redshift.stanford.edu/P15/PS2_ans/PS2_ans.html for the details of this calculation).

So, at first blush, parallax is not particularly useful: it can only get us a tiny fraction of the way across our own galaxy, and be of no help whatsoever with other galaxies (Andromeda, for instance, is 25 million light years away).

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However, parallax does help, indirectly, even with more distant objects. To see how, first recall Cepheids — variable stars that, over a period of several days, show a periodic rise and fall in magnitude. This repeats with almost clocklike precision, and has been known for centuries.

Next. it is my pleasure to introduce one of the unsung astronomers of the 20th century — Henrietta Leavitt — a rather unprepossessing looking woman who discovered that Cepheids had another, and extremely valuable, secret. Leavitt was employed at Harvard College Observatory. The head of the observatory, Pickering, assigned her the unenviable task of cataloging variable stars. She studied photographs of the Magellanic Clouds, two small companion galaxies that orbit our own (and unfortunately can be only seen in the southern hemisphere). Studying these, Leavitt found 1,777 new variable stars, including 20 Cepheids.

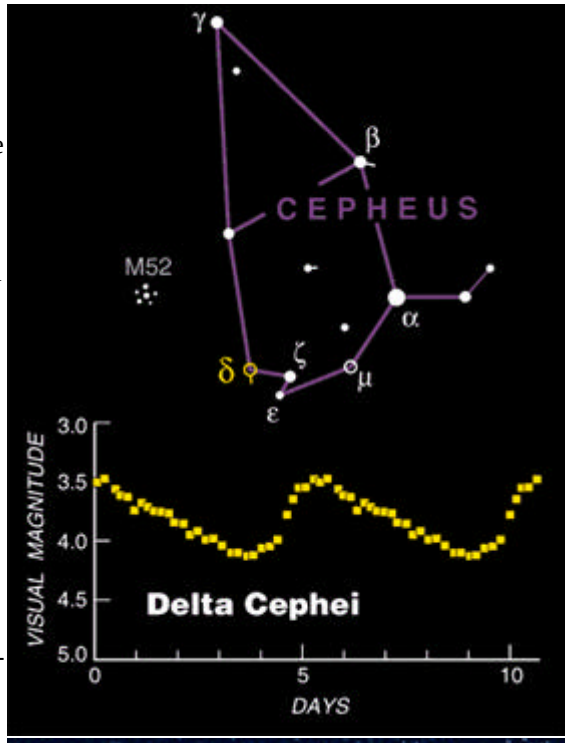
Henrietta Leavitt, hard at work

Graphing the Magellanic Cloud cepheids, Leavitt found that the longer the period (that is, between troughs), the brighter the star (in apparent magnitude). And of course, since these stars were all in the same cloud, they were at approximately the same distance. Hence, the longer the period, the brighter the star in *absolute* magnitude. Now if only we knew what the absolute magnitude of one star was... but we do! There are some cepheids close enough to measure using parallax; so we know their distances, and thence absolute magnitudes, as well as their periods. That is enough to establish the Period-Luminosity for Cepheid variables: by measuring their periods, we determine their absolute magnitude M; and then substituting in the equation above, we can determine their distance! The Cepheid can be next door (although we hope not) or in the most distant galaxy — as long as we can measure its variability, we can determine its distance from Earth.

There was a slight complication — it turns out that there are two kinds of Cepheids — but that has been all sorted out; and Cepheids remain a fundamental tool in the astronomer's quest to measure the size of space.

A question that must surely rank as number in the FAQ for variable stars is, why do they vary? What is the underlying mechanism that causes these stars to brighten and dim, in some cases with almost machine-like precision?

If you want to know, stay tuned for the next installment!



The Lesser and Greater Magellanic Clouds

Who Wants To Be An Astronomaire?

— Jim Swindler, Michael P. Rogers

ASTRONOMY DAY has come and gone, and still I have people approach me on the street, congratulating Jim and myself for our clever script. OK, no, not really; but since so few people actually *heard* the show — the majority of TCAAers present were for some bizarre reason more concerned that telescopes and computers didn't suddenly sprout legs — as a public service here is the script of WWTBAA.

Welcome to Who Wants to be an Astronomaire, the show that promises you the sun, the moon, and the stars (and delivers!). The rules are roughly the same as those of that famous television show, except...our prizes are much classier — TCAA Garb, much sought after and never sold in stores — and a year's membership in a really great astronomy club.

You have 3 lifelines, and can ask the audience — although since many of these people want the TCAA Garb for themselves, don't believe them!

1. The telescope was invented by:

a. Edwin Hubble
b. Galileo Galilei
c. Jean Luc Picard, during that really great episode when he goes back in time with Q...
d. Clyde Tombaugh

2. The Milky Way consists of:

a. Milk
b. Whey
c. A hundred billion or so stars (give or take a few 10's of billions)
d. Dust

3. The farthest planet from the sun is:
a. Venus
b. Earth
c. Saturn
d. California

4. A telescope that uses mirrors to gather light is called a:
a. deflector
b. refractor
c. parabaloid
d. reflector

5. The person who *first* proposed that the Earth orbited around the sun was:
a. Aristarchus
b. Plato
c. Copernicus
d. Gulducat

6. Stars glow because of:
a. fission
b. fishin'
c. fuscia
d. fusion

7. The brightest star visible in the northern hemisphere is:
a. spica
b. mizar
c. serius
d. kidding

8. The planets with detectable rings are:

a. Venus, Jupiter, Saturn, Pluto
b. Earth, Mars, Jupiter, Saturn
c. Jupiter, Saturn, Uranus, Neptune
d. Saturn, Uranus, Neptune, Pluto

9. Objects that are moving away from us at a high rate of speed:

a. appear bluer than normal
b. appear bluer than blue (to be sung)
c. appear redder than normal
d. appear more paisley than usual

10. The number of stars visible to the naked eye on a dark, moonless, cloudless night are, approximately,

a. 500
b. 5,000
c. 50,000
d. oodles and oodles

11. Which of the following animal is not represented by a constellation:

a. Hare
b. Crab
c. Flying Horse
d. Flying Squirrel

12. Which of the following instruments (musical and/or optical) are not represented by a constellation:

a. Flute
b. Triangle
c. Harp
d. Microscope

13. Which of the following is not a galaxy?

a. Andromeda
b. Cepheus
c. Sombrero
d. Milky Way

14. Pluto's Moon is called:

a. Sharon
b. Sharin'
c. Charon
d. Chevron

15. The cloud from which comets originate is called the:

a. Jan Cloud
b. Ooort Cloud
c. ProctorGamble Cloud (hey, they make Comet)
d. Lowell Cloud

Game II (slightly harder, and if we need it...)

-3. Auroras on Earth are caused by

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a. General Motors
b. Meteors burning up in the atmosphere
c. Solar flares
d. Neutrinos

-2. Who believed the Sun orbits about the Earth?

a. Copernicus
b. Galileo
c. Ptolemy
d. Joe Dirt

-1. The densest stars in the universe are
a. red dwarfs
b. black holes
c. supernovae
d. currently living in Hollywood

1. How wide is the Milky Way Galaxy?
a. About 100,000 light years across
b. Exactly one parsec.
c. About 5 light years across.
d. About 5 heavy years across.

2. What is a cloud of interstellar gas and dust called?
a. A pulsar.
b. A nebula.
c. A black hole.
d. A bad omen.

3. Comets are composed of...?
a. Ice and dust particles.
b. Molten rock.
c. Solid rock, like an asteroid.
d. Green cheese.

4. Which astronomical distance is the longest?
a. An astronomical unit.
b. A parsec.
c. A light year.
d. How far a cow has to jump to get over the moon.

5. Who first used the telescope to view the planets?
a. Hubble.
b. Newton.
c. Galileo.
d. Obi-Wan Kenobi.

6. What does equinox mean?
a. The half-way point in a star's life.
b. The average distance between a planet and the sun.
c. A time when days and nights are of equal length.
d. Equally obnoxious astronomers.

7. An "Event Horizon" goes with which type of astronomical body?
a. White dwarf star.
b. Nebula.
c. Black Hole.
d. A Hollywood starlet.

8. What is a solar prominence?
a. An active region of sun spots.
b. A relatively cool area on the sun's surface.
c. A huge burst of fiery hydrogen gas from the sun's photosphere.
d. A really good suntan.

9. Where is our spiral arm of the galaxy?
a. The Cygnus arm.
b. The Perseus arm.
c. The Norma arm.
d. The Bloomington-Normal arm.

10. When a star collapses into a singularity, what is created?
a. A quasar.
b. A black hole.
c. A neutron star.
d. The Land of Oz.

11. What does the famous Hertzspring-Russell (H-R) diagram classify?
a. Galaxies.
b. Stars.
c. Comets.
d. The carrying capacity of rental cars.

12. What are the brightest known objects in the universe?
a. Quasars.
b. Galaxies.
c. Pulsars.
d. The winners of Who Wants to be an Astronomaire?.

Who Wants To Be An Astronomaire, Jr?

1. The five planets visible to the naked eye are:

a. Mercury, Venus, The Moon, Jupiter, Neptune
b. Venus, Mars, Saturn, Uranus, Pluto
c. Mercury, Venus, Mars, Jupiter, Saturn
d. Jupiter, Saturn, Uranus, Naboo, Pluto

2. Astronomers mainly use which of the following instruments?

a. Televisions
b. Telescopes
c. Teletubbies
d. Tell, William

3. A light year is a measure of:

a. distance
b. time
c. color
d. weight

4. Which of the following cannot travel through space:

a. Light
b. Sound
c. Radio
d. Bad news

5. A solar eclipse happens because:

a. The Sun is covered by Earth's Shadow
b. The Earth is covered by the Sun's Shadow
c. The moon blocks out the Sun
d. Clouds blot out the Sun

6. Which of the following are not alternative names for the Big Dipper:

continued from previous page

a. Ursa Major
b. The Plough
c. Big Bear
d. Big Bertha

7. A rock that falls to Earth from outer space is called:

a. a comet
b. a meteor
c. a meteorite
d. a meteorologist

8. Mars' moons are called:

a. Io and Europa
b. Phobos and Deimos
c. Barnes and Noble
d. Ganymede and Callisto

9. The first man on the moon was:

a. Louis Armstrong
b. Neil Young
c. Neil Armstrong
d. Captain Ann Tenille

10. The hottest stars are:

a. red
b. blue
c. yellow
d. green

11. Which of the following are *not* constellations:

a. the Great Bear
b. Leo the Lion
c. Pegasus the Flying Horse
d. Rocky the Flying Squirrel

12. Planets orbit the Sun in:

a. a circle
b. a parabola
c. an ellipse
d. an octagon

13. Asteroids are chunks of rock floating between

a. Mars and Jupiter
b. Jupiter and Saturn
c. Earth and Mars
d. Hither and yon

14. The most expensive telescope in history, the Hubble Space Telescope, suffered from initial problems because it's designers:

a. neglected to take temperature into account
b. forgot the film
c. misconfigured the primary mirror
d. ... what do you mean initial problems? The HST was and is perfect!

15. What are the brightest known objects in the universe?
a. Quasars.
b. Galaxies.
c. Pulsars.
d. The winners of Who Wants to be an Astronomaire?.

Letters to the Editor

— Observer Readers

Need to get something off your chest? Drop us a line!

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Bloomington, IL 61701-1474

or mprogers@mail.millikin.edu

TCAA Garb Order Form

Instructions:

1. Read the article on the next page. None of this will make any sense until you have done so.
2. Boy you're a fast reader!
3. Fill out this form, and return it, along with a check, to:

Michael Rogers
2206 Case Drive
Bloomington, IL 61701-1474

Make your check payable to me. I promise not to abscond with the funds to my secret hideaway in the Caribbean. Oh drat, so much for secrecy...

4. T-shirts are available in Black, Red, Royal (blue), Burgundy, Evergreen, Forest, Navy, Purple, Earth (dark brown), Moss (dark green with yellow), Shale (dark gray), and Denim (dark blue, lighter than navy); Sweatshirts are available in all of the preceding colors except Earth, Moss, Shale, and Denim; Polo shirts are available in all of the preceding colors except Evergreen, Earth, Moss, Shale, and Denim

Name: _____

Phone #: _____**(W)** _____**(H)**

Item	Size	Color	Unit Cost	# of Items	Total Cost

Subtotal: _____

Sales Tax (7.25%) _____

Grand Total: _____

T-Shirts & More

— Michael P. Rogers

AS MENTIONED elsewhere in the last issue, we inadvertently gave away too many t-shirts during the WWTBAA contest. So, in the interests of accommodating those people who had ordered but were stiffed, not to mention the many new members who have joined since the club last produced t-shirts and sweatshirts, we present this splendid opportunity in sartorial splendor — a chance to order TCAA Garb!

Our customized clothing vendor of choice, C Tees, offers a very nice price on t-shirts, polo shirts, and sweatshirts:

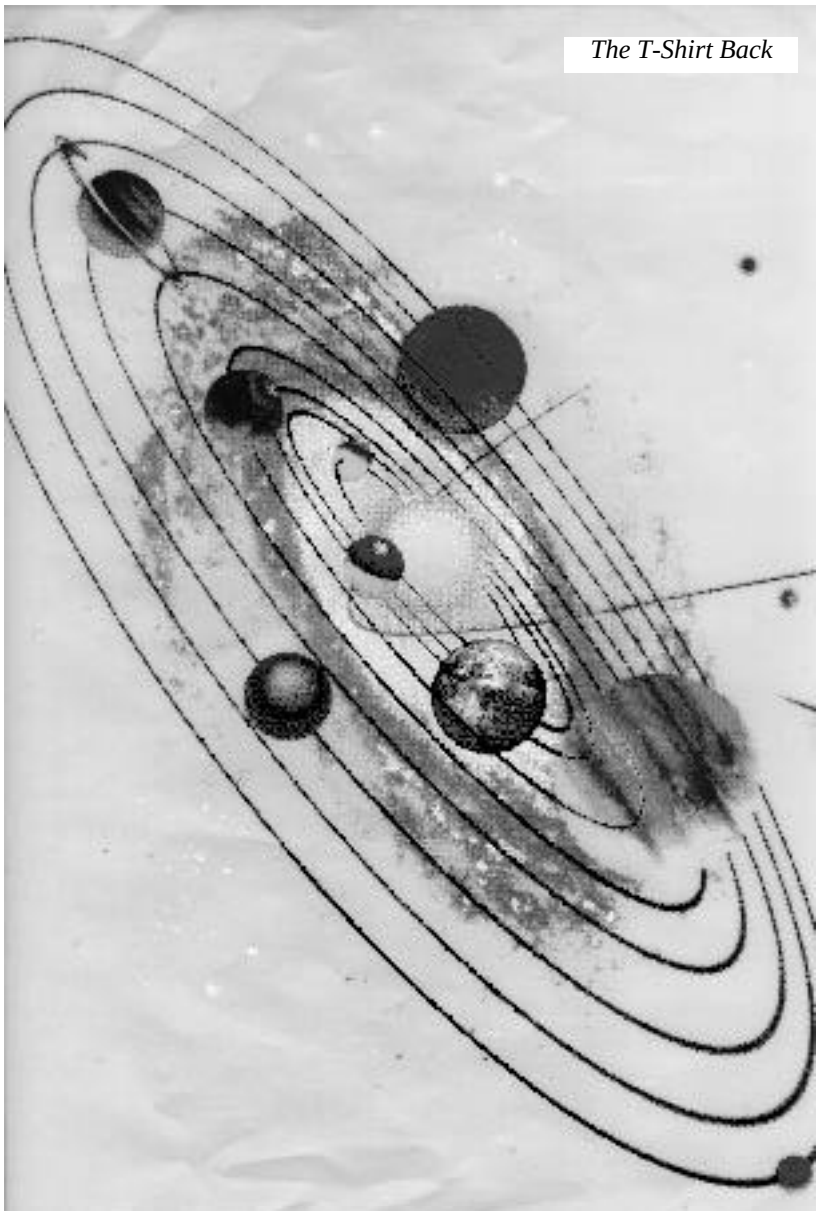
Item	Size	Cost
T-shirt		
	SM-Xl	$10.55
	XX	$11.85
	XXX	$12.70
Polo Shirts		
	SM-XL	$16.00
	XX	$17.40
	XXX	$18.60
Sweatshirt		
	SM-XL	$18.20
	XX	$18.90
	XXX	$19.15

Prices include a silk screen of the TCAA logo (the web site version) over the left breast on the front, and a museum-quality transfer of the solar system (superimposed over a spiral galaxy) on the back. The transfer probably looks best on black, but any dark color should do.

If you are interested in the above, then all you need to do is return the enclosed order form, with a check payable to me; I'll put all the checks together and pay CTees.

The deadline for ordering is 30 June, 2001. We will need a minimum of 12 orders, otherwise I'll just return the checks.

Questions: mprogers@mail.millikin.edu.



The T-Shirt Back

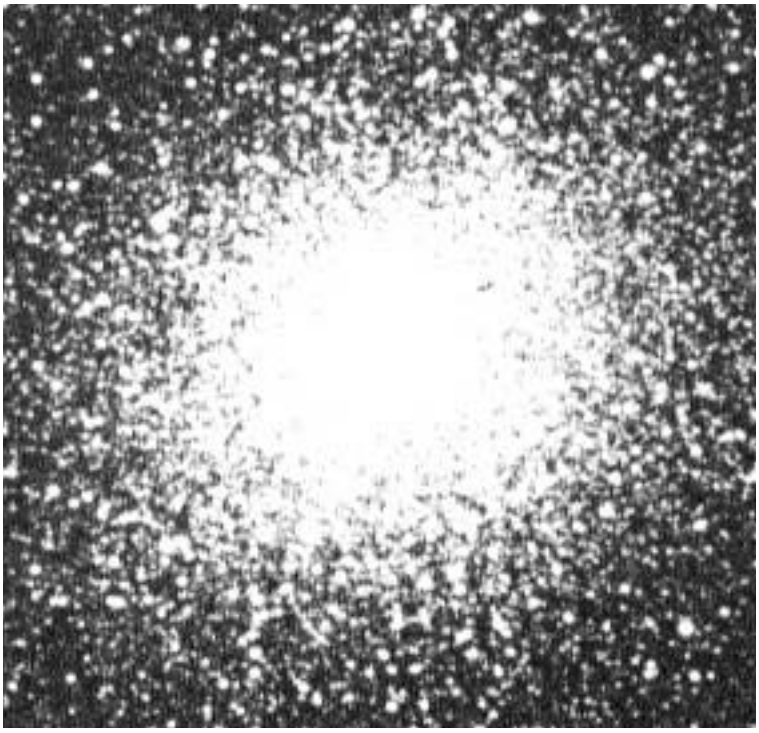
The T-Shirt Front

Observing Globular Clusters

— Sandy McNamara

Each season has its premier type of deep sky object to observe. Autumn displays many planetary nebulas to hunt for, winter abounds with bright open clusters, spring is galaxy season, and summer is the best time to hunt for globular clusters (GC). Why are GCs best in the summer? During our summers, the southern view is inward toward the center of our galaxy (located beyond the stars of Sagittarius). Globular star clusters are groups of hundreds of thousands of stars bound together by gravity in a densely-packed spherical swarm of stars orbiting about the center of our Milky Way galaxy (other galaxies have globular clusters, too). They seem to be concentrated near the Milky Way, both north and south of the plane of our galaxy; there are few right at the center of the sweep of the Milky Way due to their placement around the outside edges of our galaxy's hub. GC involve hundreds of thousands (and in the case of the largest clusters, a million or more) stars. They contain some of the oldest stars in the galaxy and may have been one of the first parts of the galaxy to form. In contrast, open clusters (sometimes referred to as "galactic clusters") are usually scattered along the spiral arms of our galaxy and contain from a few dozen to several hundred much younger stars.

One of the first deep sky objects many beginners learn to find is M13, easily located with any binocular on the western edge of the Hercules keystone, about 1/3 of the way from eta to zeta HER. This great GC contains more than 100,000 stars to 21st magnitude; the true stellar population may be close to half a million. Try to imagine a night sky from a planet orbiting a star in such a cluster! Stars at the center of a cluster might be separated by just a few light months instead of the four light years to the closest star where we are. The sky would be lit by many first magnitude stars, not a daylight sky but perhaps a late twilit one. An alien astronomer learning science inside a globular cluster would have little of our concerns about dark adaptation — and difficulty finding the dim galaxies I personally enjoy challenging myself with!



The Incomparable M13

While less than 200 GC are included in the 7000+ objects in the New General Catalog of deep sky objects (NGC), over 1/4 (29 of 110) of the objects on Messier's list of "non-comets" are GC, which may give you some idea of what these objects look like through smaller telescopes. I've included the GC class in parenthesis after each to perhaps help in what you should expect to see. My early notes, using an 80mm refractor, describe many GC (in highly scientific terminology <g>) as "fuzz balls" [interpretation: unresolved round glow with non-sharp edges, brightening toward the center], very much how many comets appear through the telescope. In binoculars or finderscopes, many of the smaller GC can be detected as an apparently slightly out of focus star which stubbornly refuses to come to sharper focus as the rest of the stars in the field do.

Globular clusters are classically grouped into classes by their concentration. In a method used by Harlow Shapley in the early 1900s, the groups range from class I (stars tightly packed in center) to Class XII (stars arranged loosely). Before advanced techniques allowed astronomers to measure both the age and distance of various star clusters, it was sometimes difficult to decide whether an object was a small, tightly packed open cluster or a very loose GC and several NGC objects have been reclassified over the years. M71 in Sagitta has been called both an open and a globular cluster but is now known to be a very loose GC. Make it a habit to examine any globular cluster you find with all the eyepieces you have available; nebula filters of various types usually are of little help (and often make the cluster harder to see). As you increase magnification, what shows at first as only a small, round, softly hazy spot often reveals a grainy texture with perhaps some stars resolved around the edges or (my favorite view) as a delicate sprinkling of star dust over the glow of unresolved stars in the background. The "showpiece" clusters (M13, M22, M5, M3) are beautiful sights with hundreds of stars resolved in small/mod telescopes and countless more showing up across the entire cluster as you increase the size of the telescope being used. You will notice that the "big four" are all of middle classification GC

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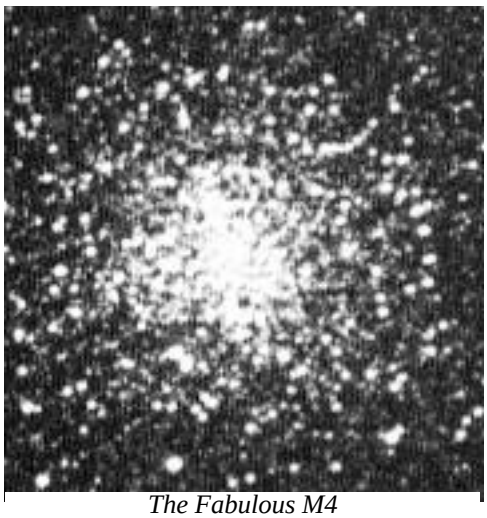
(class V, VI, VII): packed close enough to be impressive yet loose enough to resolve many individual stars in the cluster.

For completeness, our object list this month includes all of the spring and summer Messier GC [and as an added, website bonus, the Herschel 400 list for those of you who prefer a challenge]. Obviously, I don't have room here to direct you to all of them; however, the selections described below will give you a taste of the various types that can be found. After you've become accustomed to how these fuzzies look in your telescope/binoculars, grab your favorite star atlas and have fun finding the rest of the GC on the list :-).

Messier Summer Globular Clusters

NGC	AKA	CON	RA	DEC	Size	Mag	Class
5272	M3	CVn	13h 42m	+28d 23m	10'	6.4	VI
5904	M5	Ser	15h 18m	+02d 05m	13'	6.2	V
6093	M80	Sco	16h 17m	-22d 59m	5'	7.5	I
6121	M4	Sco	16h 24m	-26d 31m	14'	6.2	IX
6171	M107	Oph	16h 33m	+13d 03m	10'	8.1	X
6205	M13	Her	16h 42m	+36d 27m	10'	5.7	V
6218	M12	Oph	16h 47m	-01d 57m	9'	6.6	IX
6254	M10	Oph	16h 57m	-04d 07m	8'	6.7	VII
6266	M62	Oph	17h 01m	-30d 07m	5'	6.6	IV
6273	M19	Oph	17h 03m	-26d 15m	4'	6.6	VII
6341	M92	Her	17h 17m	+43d 09m	9'	6.3	IV
6333	M9	Oph	17h 19m	-18d 31m	9'	7.6	VIII
6402	M14	Oph	17h 38m	-03d 15m	12'	7.6	VIII
6626	M28	Sgr	18h 25m	-24d 52m	5'	7.4	IV
6637	M69	Sgr	18h 31m	-32d 21m	4'	7.6	V
6656	M22	Sgr	18h 36m	-23d 55m	18'	5.9	VII
6681	M70	Sgr	18h 43m	-31d 18m	4'	8.0	V
6715	M54	Sgr	18h 55m	-30d 28m	3'	7.3	II
6779	M56	Lyr	19h 17m	+30d 10m	2'	8.2	X
6809	M55	Sgr	19h 40m	-30d 56m	10'	7.4	IX
6838	M71	Sge	19h 54m	+18d 47m	6'	8.3	???
6864	M75	Sgr	20h 06m	-21d 55m	3'	8.5	I

While M13 (V) may be the most famous GC, in my personal opinion, the best GC in the summer skies has to be M22 (VII) in Sagittarius. This sparkling beauty is easily located just over 2 degrees NE of gamma Sgr (the top star of the teapot's "lid"). This cluster seems to have an almost 3D look in any size of telescope but increasing aperture and magnification make the effect more apparent. Compare it with the less impressive M28 (IV), found 1d NW of gamma Sgr and the even smaller NGC 6638 (VI) just 1/2 d E of gamma Sgr to see how size and magnitude can influence being able to observe and resolve GC, even though they may be of similar star concentrations.



The Fabulous M4

Another easily located GC is M4 (IX), sl over 1 degree W of bright Antares in Scorpius; it is easily visible as a round fuzzy spot in binoculars or finderscope. Compare its loose, easily resolved structure with that of the smaller, more tightly concentrated M80 (II) which may be found halfway between Antares and beta SCO. Those of you wishing more of a challenge can examine NGC 6144 (XI), just 1/2 d NW of Antares. Make sure Antares is out of your field of view and see if you can resolve many stars in this very loose but not overly bright GC.

M19 in OPH is one of the few GC that is not circular in appearance (Omega Centauri, visible from more southerly locations, is another). To locate it, sweep 7.5 degrees E from bright Antares in Scorpius (or 2.5 d E and sl N of brilliant Mars in this summer's sky). Can you detect the N-S oval elongation? Does the brighter core look centered or slightly off to one side? GC abound in Ophiuchus and I enjoy "two for one" specials. For example, look first for M9 (VIII), appearing 2 d E and 3 d S of eta OPH as a "fuzzy star" in a finderscope; a 6-in telescope should begin to resolve stars around its edges. Half as big and half as bright, NGC 6356 (II) lies sl over 1 d NE of M9; while its soft fuzzy glow was easily found, I wasn't able to resolve it in an 8-in telescope. The even fainter NGC 6342 (IV) sl over 1 d SE of M9 makes a nice challenge for those of you bored (!) with Messiers.

If you prefer to wait until Oph/Sco/Sgr are higher in the summer skies, check out M92 (IV), 6 degrees N of pi HER (the NE corner of the "keystone"). Overshadowed by its more famous neighbor, M13 (V), M92 is a fine GC in its own right and begins to resolve into stars with as little as 60x.

The Welcome Mat

Each cherub, still sleepy from a late-night observing session, is dueling to wake up the other, while they welcome our newest members. A warm end-of-June welcome to...

Mary Kay Herrmann
Bloomington

Thomas & Lisa Banasik
Bloomington

The OBSERVER
The Newsletter of the Twin City Amateur Astronomers, Inc.

Michael Rogers & Jean Memken, Editors
2206 Case Drive
Bloomington, IL 61701

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As always, thank you for your support!!