

OBSERVER



MESSIER MONTH!

M42 - THE SWORD OF ORION

M42/43, the royalty of Messiers, and their attendant, The Running Man, are seen here as a vast explosion of light in a kingdom of dust. Taken at the EGK Dark Site on December 26th, 2011 with a modified Canon 450D DSLR and a 72mm f/6 refractor. 94 minutes of 120-360 sec RGB exposures, plus 10 minutes of 15-60 sec exposures for M42 core area.

Image © Darrell Dodge

Calendar

- 8..... Full moon
- 11..... Daylight Saving Time begins
- 14..... Last quarter moon
- 22..... New moon
- 30..... First quarter moon

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MARCH SKIES

by Dennis Cochran

Springtime is Gas Giant time: as Jupiter rolls down the celestial dome in the west, Saturn is rising in the east. The best-looking planets—also the biggest—will be available in the cold evening sky for your viewing pleasure. All four of the gas giants have rings—this is a fairly recent astronomical discovery—but only Saturn has visible rings, making it the pretty boy of the solar system. Closer and larger Jupiter has a wealth of atmospheric colors and curlicues in its well-defined horizontal bands. A whole lotta weather is going on there, carefully contained within its belt-and-zone system, where some zones exhibit curlicues and others do not. Additionally, Jupiter has its well-known, well-watched four Galilean moons, discovered by the famous Renaissance scientist, Galileo. Check into the astro magazines for monthly charts showing the

positions of the moons crossing the face of the King of Planets like the workings of some medieval clock set in some European tower. Keep an eye out for the Great Red Spot, not always so red but always great, in the South Tropical Zone of Jupiter. Also watch for a couple of smaller, darker ovals. One of them is actually shaped like a kidney bean and is in the northern hemisphere of the planet. The Red Spot is thought to be a gigantic whirling storm rather like a hurricane that simply won't die out. Will we ever find out why? We will only if we keep exploring.

March is full of interesting conjunctions and line-ups this year. On the 3rd when Mars reaches opposition (closest pass of Earth to Mars), one can see it along with Jupiter, Venus and Mercury spread across the evening sky—a parade of planets. In

Continued on Page 3

PRESIDENT'S CORNER

by Ron Pearson

Last month I made note of the strange times we have coming in February, and I was not proven wrong. By the time of our Annual Meeting, February 3rd, which normally includes our election of officers and board members, a record snow storm hit our Denver area which forced us to cancel the meeting and delay the election to our banquet on March 10th. Let's hope we don't have one of those huge March up-slope storms on that day! February continued with a long string of cold, cloudy weather keeping many of us inside with the caps on our telescopes. But as I write this, the first of a few brave hardy souls have made it out the our dark sky site to shovel snow off the pads and collect at least a few photons in



their scopes from depths of deep-space. We are hopeful for warmer weather in March as we hold the Messier Marathon later in the month at our dark sky site.

March is also our chance to have dinner together at our Annual Banquet and look back briefly at what has been accomplished the previous year, such as building and dedicating our own Brooks Observatory, and cost-sharing with DU major renovation work on the Clark-Saegmuller telescope in Chamberlin. The banquet is also a time to thank the many volunteers who participate in our bringing the joys of astronomy in our various outreach efforts; the Chamberlin Observatory Public Night teams, and those that have done programs at schools or other institutions. In particular we have to thank Keith Pool for his leadership as Outreach Coordinator these past couple years and also remember his great service as VP previously! Keith will be giv-

ing up that role as he moves farther from Denver but to darker skies in the near future.

The DAS will take on what promises to be a very exciting year as we anticipate several major and rare astronomical events over Denver—a partial solar eclipse and a historic transit of Venus coming up in just a couple of months. These are both opportunities for DAS members to observe something that happens rarely in our sky but we can also share the wonder of these events with the public. Not to be forgotten is the close approach of Mars that happens every couple of years and always draws intense public interest—this year even more so with the planned landing of the NASA roving science laboratory named “Curiosity” in August. With these events we may have extra opportunities in the coming year to also share our talents and telescopes with our friends at the Denver Museum of Nature & Science—watch for further developments and announcements. I know many of us are figuring out where to go to each of these events to catch the best view, and may not stay in Denver for them. But in a society of more than 300 people I'm sure that not everyone will leave town and will want to share these sky-events with the public and other members. Just be sure to get ahead of and know how to use a solar filter early!

At our DAS Banquet we like to recognize all of you who have given extra time to our outreach efforts and also recognize the many other jobs that keep the wheels of this society turning in order to provide opportunities for all the members to share knowledge, whether it's an observing list or a look through a newer, older, bigger or just different telescope, and to get help or guide others in their quest to enjoy the night sky and universe. The DAS can't exist without a number of volunteers seeing to the details of keeping our engine running and as people

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The Executive Board conducts the business of the DAS at 7:30 p.m. at Chamberlin Observatory. Please see the Schedule of Events for meeting dates. All members are welcome.

www.denverastro.org

DAS SCHEDULE

MARCH

- 3 Open House at Chamberlin Observatory (Begins at 6:00 P.M.) Mars!
- 9 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
- 10 DAS Banquet, Election and Installation of Officers (6-9 P.M.)
- 23-25 EGK Dark Sky weekend (Messier Marathon)
- 31 Open House at Chamberlin Observatory (Begins at 7:30 P.M.)

APRIL

- 6 DAS General Membership meeting at D.U.'s Olin Hall: Speaker: CU Associate Professor Dr. Jason Glenn—Recent Herschel Space Observatory results (Begins at 7:30 P.M.)
- 7 Passover begins
- 8 Easter Sunday
- 13 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
- 20-22 EGK Dark Sky weekend
- 28 Open House at Chamberlin Observatory (Begins at 8:00 P.M.)

Public nights are held at Chamberlin Observatory every Tuesday and Thursday evenings beginning at the following times:

March 15- April 14 at 8:00 P.M.

April 15 - August 31 at 8:30 P.M.

September 1 - September 30 at 8:00 P.M.

October 1 - March 10 at 7:00 P.M.

Costs to non-members are: \$3.00 adults, \$2.00 children.

Please make reservations via our website (www.denverastro.org) or call (303) 871-5172.

MARCH SKIES (CONTINUED FROM PAGE 1)

between Mars and Jupiter is the moon and below-right of that will be Orion. Below-left of him will be Sirius in Canis Major, possibly twinkling like a disco ball as it often does. Then on Monday the 12th Venus and Jupiter conjoin, and who knows what that might mean to followers of the old Roman religion, if there are any. Near the end of the month on Monday the 26th we get a close grouping of those two plus the Pleiades (Seven Sisters/Subaru) and the moon. As we move into April we'll see Venus nestle into the Pleiades (photo at right), making a very bright seventh sister on the third. We can only see six bright stars in that cluster today, but in the past one of the dim stars was apparently much brighter.

To the east of the Pleiades is another nearby star cluster called the Hyades—the Vee-shape of Taurus the Bull—Aldebaran, the brightest star in the V, is actually a foreground object. The other V stars, which make up the actual cluster, are 140 light-years away. By this time of year the Winter Milky Way is tilted almost perpendicular to the horizon; look for it if you can get to dark skies. The WMW is the outer region of our side of the galaxy, the part one sees when looking away from the center, and it stretches from Cepheus and Lacerta in the polar region down to Monoceros and Canis Major in the south.

One of the smallest zodiac constellations is around the meridian this month, just south of the zenith: Cancer the Crab, home of the star cluster M44, the Beehive. Beneath the Beehive, just to the right of the Alpha (lower-left) star of Cancer is a fainter cluster that nevertheless made Messier's list, M67. Right below that is the little five-star circle that marks the head of Hydra the Water-Snake. Hercules had a heck of time killing Hydra (his Second Labor) because it grew two heads whenever he cut one off! Hydra



M45 - THE PLEIADES WAITING FOR VENUS

For marathoners, you can see this Messier object naked eye, although photography brings out its spectacular nature and colors. Brian worked on this image for several months. 150 minutes of luminance with the Tak FSQ106ED on a 10-inch Ritchey and 60 minutes in each color with the FSQ106.

Image © Brian Kimball

started off with nine heads—ick! Anyway, there is one of those heads. Just above the Delta star of Hydra's head (the upper right star of the circle) is the pulsar CPO834. I'm not sure there's anything visible there. Perhaps someone with a big scope who goes to a dark sky site like the DAS's EGK Site will please tell me. Jocelyne Bell discovered pulsars in 1968 and her boss Anthony

Hewish got the Nobel Prize. Her grad-student radio telescope was a simple antenna setup rather like a clothesline. Finally, farther east Leo is chasing Cancer while Mars is rubbing the lion's belly. Saturn is east of Leo, below Virgo, while Jupiter is over with Venus doing heaven-knows-what in the west.

PRESIDENT'S CORNER (CONTINUED FROM PAGE 2)

move on or need a change in role, we ask all of you to consider what you can do for DAS. To that end, VP Lisa will be running a new feature in our newsletter called the "Job Jar." Lisa will be putting notes in the job jar asking you to take a note from the jar and step up to take a turn at some important task that needs to be done. The role of Outreach Coordinator for programs at schools and other organizations that Keith is giving up, is one of those in the "most important" category.

VP Lisa also has a great line-up of speakers at our General Meetings for the year and I hope we'll be seeing you there every month. The variety of topics in astronomy is as wide as the universe. We'll be starting out with a great one at the banquet with astronaut Bruce McCandless talking about the future of space telescopes. We hope you've got your reservation and payment in by now as this will be a great way to kick off a year of observing and sharing astronomy in DAS!

ABOUT THE DAS



Membership in the Denver Astronomical Society is open to anyone wishing to join. The DAS provides trained volunteers who host educational and public outreach events at the **University of Denver's Historic Chamberlin Observatory**, which the DAS helped place on the National Register of Historic

Places. First light at Chamberlin in 1894 was a public night of viewing, a tradition the DAS has helped maintain since its founding in 1952.

The DAS is a long-time member in good standing of the **Astronomical League** and the **International Dark Sky Association**. The DAS' mission is to provide its members a forum for increasing and sharing their knowledge of astronomy, to promote astronomical education to the public, and to preserve Historic Cham-

berlin Observatory and its telescope in cooperation with the University of Denver.

The DAS is 501 (c)(3) tax-exempt corporation and has established three tax-deductible funds: the Van Nattan-Hansen Scholarship Fund, the DAS-General Fund and the Edmund G. Kline Dark Site Fund.

More information about the DAS, its activities and the special tax-deductible funds is available on the DAS website at www.denverastro.org.

BEGINNERS BITS—MESSIER OBJECTS

by Lisa Judd

When you're first starting in astronomy and know some basic constellations, you'll feel the need to point a telescope at some of the brighter objects right away. If you don't have a telescope yet, that's okay—there are many bright objects you can find with binoculars. Of course telescopes will give a better view of these objects (the more aperture, the more detail), but there's nothing to stop you from locating them amongst the constellations. The collection of clusters, nebulae and galaxies that everyone starts with are called "Messiers," denoted by the letter "M" on star maps.

GALACTIC TRACTOR PULL

It's astounding to think that gravity can exert influence, not just millions of miles away, but hundreds of thousands, if not millions, of light-years. Such is the case with NGC 3034, Messier's 82nd object. Its larger menace, M81, is tearing this system asunder, creating almost two hundred star-forming regions in the process; the galaxy would be unrecognizable as a spiral if viewed face-on. Located 12 million light-years away in Ursa Major, the Ms 81 and 82 make a beautiful pair in a wide-field scope. Details: ST-8e CCD camera on a 12.5-inch reflector, 3.7 hours total LRGB data.

Image © Steve Solon



Messier was an 18th century French comet hunter. His favorite telescope is said to have been a 7.5-inch Newtonian with the effective light collection area of a 3.5-inch refractor (Owen Gingrich). To aid himself in comet-hunting, he made a "nuisance list" of fuzzy things in the night sky that weren't comets and got his friends to put all their fuzzies into the list. Skies were much darker in the 18th century, so from today's modern-day city, binoculars will show maybe half of those fuzzies. There are 109 total Messier objects; due to a double-cataloging error there's no M102. They appear randomly all over the sky, rather than being ordered by Right Ascension like the much larger NGC catalog. Messiers are a subset of the NGCs, so each (except the Pleiades) has an NGC number as well.

The most famous ones have names, such as the Crab Nebula (M1), Butterfly Cluster (M6), Lagoon Nebula (M8), Wild Duck Cluster (M11), Eagle Nebula (M16), Swan or Omega Nebula (M17), Trifid Nebula (M20), Dumbbell Nebula (M27), Andromeda Galaxy and companions (M31, 32, 110), Whirlpool Galaxy (M51), Orion Nebula and companion (M42, 43), Beehive Cluster (M44), Pleiades (M45), Ring Nebula (M57), Sunflower Galaxy (M63), Black Eye Galaxy (M64), Cork or Little Dumbbell nebula (M76), Cigar galaxy (M82), Owl Nebula (M97), Pinwheel Galaxy (either M33 or M101 depending on who you ask) and the Sombrero Galaxy (M104).

There are other bright objects that aren't Messiers, and it's unclear why Messier missed them (such as the Double Cluster). Sir Patrick Caldwell Moore—still living at the time of this writing—has run a British astronomy radio program for decades. He made his own list of Messier-like things that aren't Messiers, and unlike Messier he's not restricted to French latitudes. This allowed him to list the magnificent Silver Coin Galaxy (C65) and the great cluster Omega Centauri (C80). He used his middle name to mark the Caldwell objects since the letter "M" was taken. They're ordered by declination from the north celestial pole to the south celestial pole. Some are photographic nebulae—tough to see



CHARLES MESSIER

June 26, 1730 – April 12, 1817

visually. The North America, Cocoon, Cave and Rosette nebulae come to mind.

You may ask whether Messiers can all be observed in one night. This introduces a high-powered event called a Messier Marathon, which is difficult and only for the most insane types of astronomers. This event is an all-nighter done in late March or sometimes early April. This timing allows an observer to fight the sunset twilight for the first couple of targets and the dawn twilight for the last ones. Many folks take a napping break around midnight while waiting for Sagittarius to rise. This mad dash involves finding an object, logging it, and immediately going on to the next one—a marathon is not the time to learn Messiers—it's better to actively participate in one when you already know where they are. This year's DAS marathon will be held during the Dark Sky weekend of March 23-25 at the EGK Dark Site.

MESSIER MADNESS

by Darrell Dodge

The nights of March 23-24 and March 24-25 this year should be busy ones at the DAS Ed G. Kline Dark Site which is east of Deer Trail. The new moon will be barely a sliver on those nights, which means those are the official DAS Messier Marathon nights for 2012. March-April is the only time during the year when observers at perfect sites at our latitude can hope to accomplish the feat of observing all of the 110 objects in the modern version of Charles Messier's famous catalog of non-comets. For a lot of reasons, however, it's probably better to have a goal of trying to observe as many as you can, but not the entire list (see box on Page 6).

Because of the importance of starting to observe as soon as possible after sundown, it's absolutely imperative that participants arrive at the dark site early—5:30 P.M. or so (remember we'll be on daylight time this year). Late

arrivers will not only imperil their chances of seeing the early objects, but may also make it difficult for other observers. Arriving early is also a good idea because the dark site has only 14 observing pads. While there is a lot of cleared space for other setups, it can be more difficult without a pad. We will have Messier Marathon forms at the site, which provide a check list of objects in one of the preferred marathon sequences (also available online at http://www.denverastro.org/marathon_messier_card.pdf). There will also be a sign-up sheet for those who want to make a competition out of it, as well as separate lists for star-hoppers and go-to-ers.

A new feature at the Dark Site this year is the Brooks Observatory. The 14-inch Schmidt-Cassegrain "toaster" (Go-To) in the observatory will be doing the

Continued on Page 5

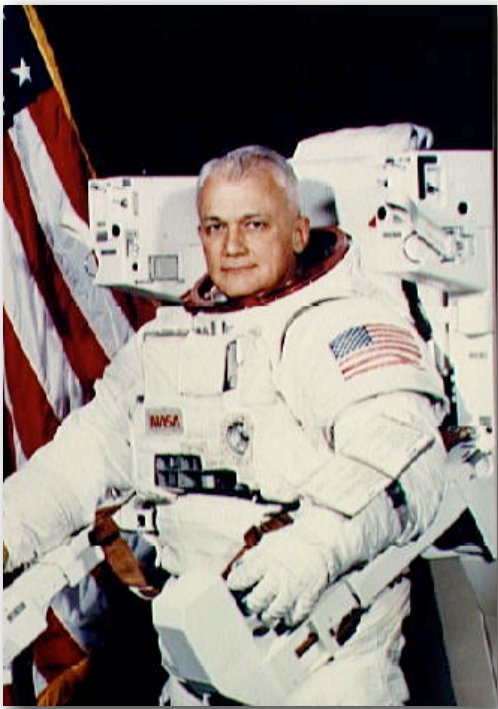
BANQUET SPEAKER: BRUCE MCCANDLESS II: "SPACE TELESCOPES: WHERE THEY ARE HEADED, AND WHY."

Former astronaut **Bruce McCandless II** (Captain, USN, Ret.) needs little introduction in the space community. After flight training from the Naval Aviation Training Command, he was part of the class of 19 astronauts selected by NASA in April 1966. He served on the astronaut support crew for Apollo 14 and as backup pilot for Skylab. His chance to fly came in 1984 with the 10th shuttle mission, STS-41B Challenger, where he earned fame for the development and first, untethered, four-hour free flight of the Manned Maneuvering Unit (MMU). Then in 1990, he served on STS-31 Discovery (with current

NASA administrator Col. Charlie Bolden) for the initial deployment of the Hubble Space Telescope. He also holds a patent for a tool tethering system used on spacewalks.

He will speak about, "Space Telescopes: Where They are Headed, and Why."

—DAS Vice-President,
Lisa Judd



FLOATING FREE

In February 1984, Mission Specialist Bruce McCandless II went farther away from the confines and safety of his ship than any previous astronaut had ever been. This space first was made possible by the Manned Maneuvering Unit or MMU, a nitrogen jet propelled backpack. After a series of test maneuvers inside and above Challenger's payload bay, McCandless went "free-flying" to a distance of 320 feet away from the Orbiter. This stunning orbital panorama view shows McCandless out there amongst the black and blue of Earth and space.

Photo at left: The official Space Shuttle portrait of Astronaut Bruce McCandless, II., attired in the Shuttle Extra Vehicular activity (EVA) suit with the manned maneuvering unit (MMU) attached.

Captions and image credits: NASA

marathon for those without telescopes or people wanting to verify what they're seeing with their own scopes.

Because of evening and early morning challenges, absolutely perfect observing conditions are required to complete a Marathon at latitude 40 degrees north (lower latitudes are better.) The toughest object in the early evening is M74, the low surface-brightness face-on Sc galaxy in Pisces. It is often easier to see with large binoculars. On March 23rd, M74 will be in a straight East-to-West line with the moon and sun, setting at about 9:00 p.m. MDT, following the Sun (6:50 P.M. MDT) and sliver Moon (8:15 P.M. MDT). But it will be lost in the twilight and then the Denver skyglow well before then. On the 24th, M74 will be about three lunar diameters west of the moon. The late morning challenge is the globular cluster M30 in Capricorn, which, on the morning of the 23rd, rises about 60 minutes before the sun. Unfortunately, the hills to the southeast of our dark site are just high enough to block our view of M30 until the sun is starting to turn the sky to neon blue, which makes the cluster virtually impossible to see. If you miss M30, a consolation prize is blue Neptune, which might be visible just to the north.

For those who've tried a Messier Marathon, the feat seems impossible to complete without a lot of luck. A more realistic goal and a little planning will

help make your marathon an enjoyable experience. **See the 12 hints for a successful Messier Marathon on Page 6.**

Let's all hope for clear skies, low winds, and clear roads this year!



RESOLVING GLOBULAR CLUSTERS WITH THE COLLINS I³ EYEPIECE

by Edward Mihelich

As I see it, nothing quite matches the real-time observation of fully resolved globular star clusters. Regrettably, only the largest and brightest of these distant objects yield to the modest apertures of most amateur telescopes. While unresolved globs can be fun to find, only when the individual stars are brought out does one perceive the true beauty and incredible variety of these clusters. I have found that the simple combination of the Collins I³ eyepiece with a 10-inch reflector provides remarkably detailed views of literally dozens of these ancient and remarkable objects.

On my first outings with the electronic eyepiece I viewed well-known globulars from pretty to jaw-dropping. It was not until I looked at M14 that I found something special occurring. This cluster, normally a poorly resolved blur even in much larger instruments, was a glowing



M14

Image © Joe Gafford

ball of hundreds of similar magnitude stars fully 10 arcmin across. A number of years passed before it occurred to me that maybe, just maybe, some of the NGC clusters might also succumb to this magic. On a whim one night I slid over from M14 to NGC 6366. I couldn't believe my eyes. It was a large (13') and fully resolved scattered cluster with a few brighter stars overlaying a background of many tiny dim specks. I was seeing in real-time one of the least concentrated of globulars (Class XI) with detail that I found surprising. From that point forward, I was on a mission.

I assembled lists of all the globs visible from 400 N in order of easiest to most difficult. On a calm, clear July evening I started with NGC 6144. Just like NGC 6366 it presented as a fully resolved poorly-concentrated cluster with about a dozen brighter stars overlaying a backdrop of many pinpoint background stars. At 8' it was smaller but still lovely. At the other end of globular cluster types is NGC 1851 in Columba. This Class II cluster has an incredibly intense 1' nucleus surrounded by a 5' core of individual tiny stars. Most interesting, it has two curves of larger stars streaming out to a total extent of nearly 10'. Since this cluster resides deep in the southern sky it must be observed at maximum elevation.

I have resolved many other globular clusters using this approach. As my last example I would like to mention Palomar 8. This cluster, not far from majestic M22, is a very pretty 4' oval of tiny stars. The cluster is inherently dim and is



M54

Image © Joe Gafford

quite a distance away at 42,000 light-years. The Collins I³ is able to amplify the signal of the red giant stars in globulars since its peak sensitivity is in the near infra-red which coincides with the peak output of the most luminous stars of the clusters. I estimate that for these targets my 10-inch scope has been performing at the level of a 36-inch instrument. I have found support for this in Steve Coe's published notes on observing NGC 6144 with a 36-inch reflector. They parallel almost exactly my comments in this article.

HINTS FOR HAPPY MESSIER MARATHONING

1. Practice difficult or unfamiliar areas of the sky a week or so before, using the telescope and observing aids you intend to use for the marathon.
2. Arrive at the site well before sundown.
3. Use a checklist that lists the objects in the approximate order you will be viewing them.
4. Don't try to use the marathon as a way to do or complete the AL Messier Observing Program. The program requires descriptive comments and there's not much time for that.
5. Do take the time to scribble some notable things about some of the objects. You'll appreciate having these later, especially when you're trying to remember if you really discriminated between easy-to-confuse objects like M86 and M84.
6. Aim for as many objects as possible, not necessarily ALL of the objects, and you may see more of them.
7. View easier objects first! Don't spend 30 minutes trying to see M74 while the other objects in the West are sinking out of sight (see #6). Observe M77, 31, 110, 32, and maybe M33 first.

8. If you miss M110 (an M31 companion galaxy), you may be able to see it in the morning.
9. Try not to panic when you start going through the Virgo/Coma Galaxy Clusters. These are all bright galaxies (except maybe for M90) and you should have plenty of time because there's a break in available objects to observe when you're done.
10. When you're out of objects to view, try to get off your feet and get something to eat and drink. You'll probably be busy from 7:30 P.M. (MDT) to around midnight, but a few short breaks in the middle of that period and a longer break (even a nap) sometime between 11 P.M. and 1:30 A.M. is a good idea.
11. Keep reviewing your checklist to make sure you've not forgotten an object. Common ones to overlook are M83 and M68.
12. Remember that all 110 objects were not seen in one night until 1985. Seeing more than 90 is a great achievement.

M65 and M66 (Photo: Lower Right Page 5): Which one of these galaxies is M66? M65? Marathoners will have to know in order to count them in their checklist.

Image © Darrell Dodge

DAS 2012 Spring Banquet Invitation

Election and Installation of Officers, and Recognition of Volunteers

You are cordially invited to the Denver Astronomical Society's Annual Banquet on Saturday, March 10th from 6 to 9 pm at Columbine Unitarian-Universalist Church, 6724 S. Webster St., Littleton (see map). Our featured speaker this year is **former astronaut Bruce McCandless II (Captain, USN, Ret.)**, known for developing and flying the Manned Maneuvering Unit (MMU) in 1984 and deploying the Hubble Space Telescope (HST) in 1990. Cpt. McCandless will be speaking to us on **"Space Telescopes—Where they are headed and Why"**.



Due to space considerations, seating is limited to 75, so **get your reservations in ASAP**. An online reservation form may be found at www.denverastro.org/banquet.html. The form can also be printed to send in with your payment. This year's banquet will feature a Deluxe Mexican Taco Buffet catered by Taco Mojo Mexican Catering in Littleton. Cost per person is \$18.00 and includes beer, wine, juices and soft drinks.

Please indicate the number of people in your party on the form below. Clip off the form for mailing so you will have this sheet for reference. Please include a check payable to the "Denver Astronomical Society" or "DAS" and mail the form and check to Brad Gilman at the below address:

Brad Gilman
 DAS Treasurer
 ATTN: Spring Banquet
 7003 S. Cherry St
 Centennial, CO 80122-1179



 (cut here and keep top portion)

Name: _____

Deluxe Taco Mojo bar includes
 Shredded Beef Barbacoa, Grilled
 Citrus Chicken, Grilled Vegetables
 and Grilled Corn & Tomato Salad.

Phone: _____

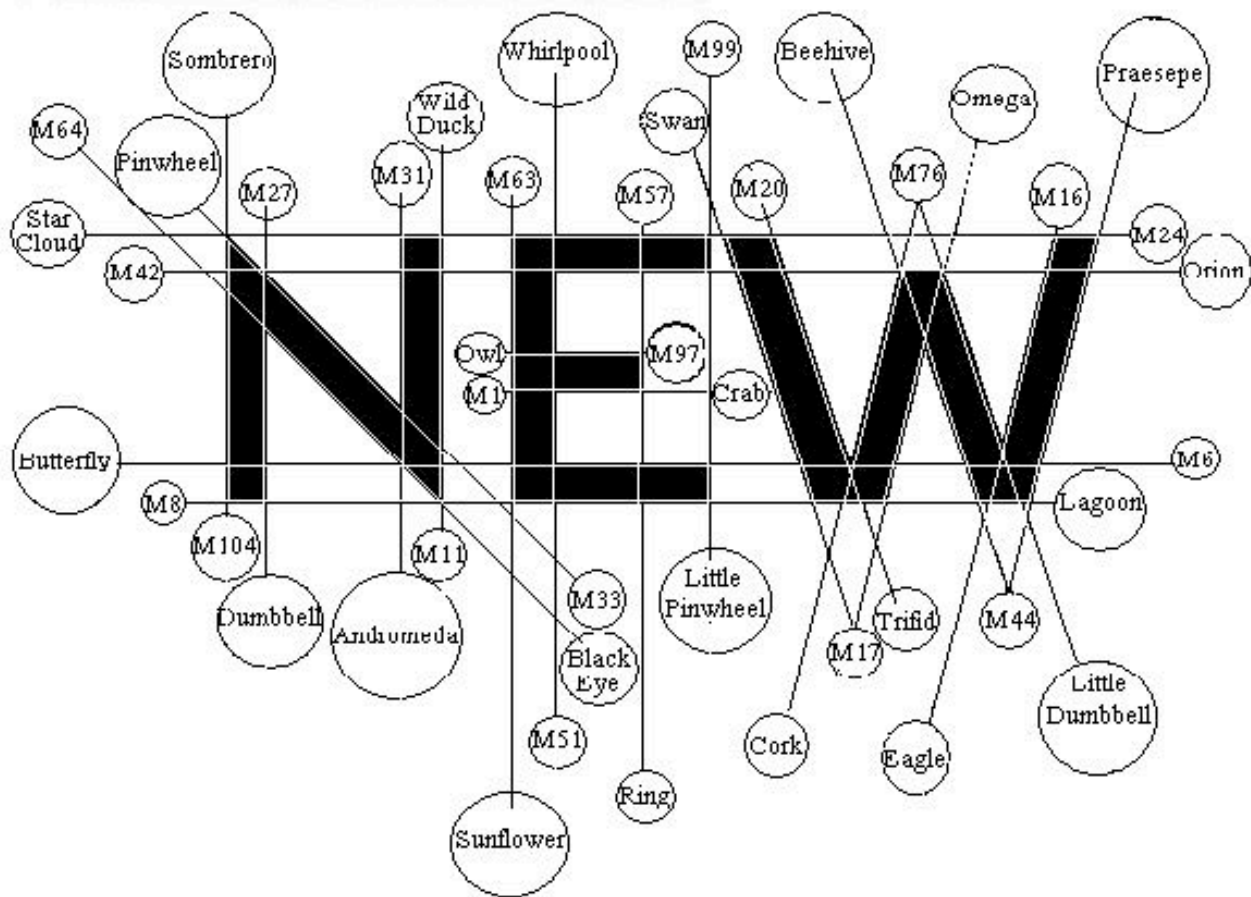
Email: _____

Total # Meals: ____ X \$18 = \$ ____

GRAND TOTAL = \$ _____

Answers

Messier Bubbler



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