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## Un mensaje del Presidente (A message from the President)



#### Howdy!

I don't know about anyone else, but I was glued to NASA TV during the Hubble Servicing mission. I even had a streaming window open on my computer at work, where other biological-folk that I work with would what was going on with the mission. My heart skipped a beat when Mike was contending with the stripped bolt – every mechanic in the world could relate to that one! In changing topics, our star party at the Haak winery was a resounding success and the skies turned up better than expected. As we slide into June our speaker will be our own Matt Hommel who will be speaking about "Inferometry". I'm told it will be more of a demonstration/presentation so if you have a mirror you want tested, by all means bring it to the meeting. I try to make sure that I make every meeting but June's meeting will be the exception as Connie and I will be out of town in Florida where we hope to see the STS-127 launch. An old friend, John Erickson, and a new friend, Jim Wessel will be running the show for June, so try to be nice!!!! Clear skies!

David Haviland

#### LETTER FROM THE EDITOR By Connie Haviland

#### Hi Everyone!!

This month there are a lot of pictures from around the club and I thought it would be nice to show off what everyone sends me. Dave , John and I will be leaving for Florida, hopefully to see the launch of Endeavour, STS-127. I am sure there will be articles coming from that trip. In the meantime....

Enjoy.....Connie



## LETTER TO THE EDITOR



The Administaff Observatory in Humble ISD, located behind the Jack Fields Elementary School in Humble, has installed its premier telescope a Planewave CDK 20-inch. Great thanks to the NHAC astronomers who came out to lift it into place atop its pier last night. Over the next few weeks we will be aligning and training the telescope in anticipation of our grand openings.

The observatory has these telescopes currently in the collection:

- 20 inch Planewave CDK (pier mounted)
- 16 inch Meade LX-200 (pier mounted, German equatorial mount)
- 16 inch Meade Lightbridge Dobsonian
- 90 mm Coronado H-Alpha Telescope (tripod mounted)

If you would like to be on the observatory's email distribution list, please go to the Humble ISD website and sign up. http://www.humble.k12.tx.us/observatory.htm This will put you on this for our grand openings and other happenings at the observatory. We look forward to seeing you at the observatory.

Aaron Clevenson

Observatory Director-NHAC Al-Cor and Outreach Coordinator

#### \*\*\*\*\*

We're going to be doing a night viewing on August 15th, if you would like to include that in your newsletter. I'll be contacting David about have some of you guys come out with your scopes that night.

Katy Buckaloo Department of Education and Public Outreach Lunar and Planetary Institute

### **Star Parties for 2009**

Bob Taylor JUNE—AUGUST SEPTEMBER 12 OCTOBER 15-18 NOVEMBER 6 DECEMBER

OPEN MOODY GARDENS FORT McKAVETT HAAK WINERY OPEN







#### SOME STARPARTY PICTURES FROM HAAK WINERY







#### With New Launch, Space Station Becomes Truly International

By Clara Moskowitz -Staff Writer (posted: 26 May 2009-From: http://www.space.com/missionlaunches/090526-iss-international.html

After a decade of construction, the International Space Station will finally live up to its name this week when the first six-person crew takes up residence with astronauts from five different countries. The second half of the station's inaugural six-member crew is poised to launch Wednesday at 6:34 a.m. EDT (1034 GMT) aboard a Russian Soyuz rocket from Kazakhstan's Baikonur Cosmodrome. They will arrive on Friday to join the first wave of their crew already aboard the station. When the new Soyuz crew joins the three astronauts already waiting on the orbiting laboratory, it will be the first time, ever, that all five of the station's international partner agencies (NASA, the Russian Federal Space Agency (Roscosmos), the Japan Aerospace Exploration Agency (JAXA), the European Space Agency (ESA) and the Canadian Space Agency (CSA)) – will be represented on orbit at once. It's fitting the cosmic line-up coincided with the station's first six-person crew. "At this time we will have Canadian, Russian, American, European and Japanese guy on board space station, and I would say it's [an] outstanding event," Expedition 20 space station commander Gennady Padalka, a Russian cosmonaut, said in a preflight interview. "You know that all these countries have been participating in ISS project for 10 years as a minimum, and now it's pretty high time to have all these astronauts and cosmonauts together working in space." Construction on the International Space Station began in 1998, with the first three-man tenants setting up shop in 2000, once living quarters arrived. Today, the station is home to Padalka, American astronaut Michael Barratt and Japanese astronaut Koichi Wakata. On Wednesday, Rrussian cosmonaut Roman Romanenko will command the Soyuz TMA-15 spacecraft that will launch himself, Belgian astronaut Frank De Winne of ESA, and Canadian astronaut Robert Thirsk. The three spaceflyers are due to dock at the space station Friday morning. "When we all get together at the table we will see that we are people from all corners of the world, working together as a single team to execute our mission program, and I want to believe that we will be able to find a common language and that we will all be happy to be part of this family," Romanenko said in a NASA interview. The astronauts will have more to drink at their dinner table. Last week, the station crew officially began consuming water recycled from their own urine and sweat, part of vital life support gear designed specifically to support a full six-person crew.

New arrivals: Romanenko, a former Russian air force pilot, will be making his first trip to space after joining the Russian Space Agency in 1997. He is married and has one son. De Winne is a former test pilot for the Belgian air force, and joined ESA in 2000. He is married and has three children. De Winne is a veteran of a 2002 Soyuz trip to the space station and is set to assume command of the Expedition 21 mission after Padalka flies home in October. When he takes the helm he will become the first European station commander. "This is the first for Europe that there will be an ESA astronaut commanding the International Space Station, and that's of course very important for ESA, our European agency, which has invested a lot in the International Space Station," De Winne said. Thirsk was a medical doctor before he joined the CSA in 1983. In 1996 he flew on the space shuttle science mission STS-78, which was devoted to materials and life science research. He is Canada's first long-duration astronaut.

Getting crowded: Padalka, Barratt and Wakata on the station now are currently serving as the station's Expedition 19 crew. They will shift to Expedition 20, with Padalka still in charge, when their new crewmates arrive Friday. "I think for us to expand our frontiers in space, international cooperation is essential," Wakata said in a preflight interview. "The ISS project has demonstrated that it's possible." The members of the double-sized crew will have their work cut out for them, with a full schedule of research and space station maintenance planned. The international nature of the crew should also provide some fun chances for cross-cultural learning. "We look at each other as much more as colleagues than ambassadors but at the same time we're well aware that we represent nations and agencies and we want to serve the best interests of all of those as well," Barratt said in an interview before his flight. "We enjoy one another's food and company and we just have a great time together." The astronauts are prepared for some wrangling to take place as they try to adjust to a more crowded space station than they've been used to. "The ground is doing a great job, and they try to take into account on all details, and they try to envisage all problems," Padalka said. "But at the same time we are ready to put up with some tiny problems and ready to work with the ground as one team to resolve them."

More science: With the start of large crews, the space station is entering a new phase where spaceflyers hope to move beyond the basics of building the station, which has been the focus of most missions so far. A major goal of the Expedition 20 mission is to "help transition the space station program from a phase that has been dominated by assembly, to one of utilization to help the station fulfill its new responsibility as a world-class facility for doing research and development," Thirsk said. And if the space station starts to feel crowded when the first sixperson crew arrives, wait till the space shuttle Endeavour visits during its June STS-127 flight. "If you consider that the permanent crew will be six, a visiting shuttle will be seven, now we'll have up to 13 on the space station," Barratt said. "As far as I know, that's the most we've ever had on a single platform in space in history, so we'll look forward to seeing how all that works."

## The June Sky and Observing Hernán Contreras

The coming of summer and subsequently the longest day of the year is announced by the rising of the Milky Way in the southeast. High over head is the Bootes, the Herdsman, looks more like a kite with fourth brightest star in our sky at the point. To the left of Bootes lies Northern Crown, Corona Borealis. This was the wedding crown of Ariadne, the daughter of King Minos. Below Corona Borealis is the head of the Serpent. Unlike the Judeo-Christian tradition, in Greek mythology, the serpent is not evil, it revealed the secrets of healing the sick.

Arcturus is a red giant and has an interesting modern connection as the star that opened the Century of Progress World's Fair in Chicago in 1933. Light from Arcturus was gathered by a telescope and directed to a photocell that triggered the switch to start the world's fair. The previous world's fair in Chicago occurred forty years earlier in 1893. At that time, Arcturus was thought to be 40 light years away and having light from that time gave a sense of continuity.

### Mythology

In Greek legend, Bootes is Icarius, a wine maker. The Athenian was taught the secret of winemaking by the god Dionysius. He allowed some peasants to sample his produce, but his kindness back-fired. The men became extremely drunk and were convinced that they had been poisoned, so they killed Icarius and buried him. His daughter Erigone and was so overcome with grief when she found his body that she hanged herself. Icarius became Bootes, and Maera, the dog who had led Erigone to her father's grave, became one of the dogs of Canes Venatici.



## Deep Sky

Challenge Object: M101. Pierre Mechain discovered this galaxy

in 1781 and suggested Charles Messier include it in his famed catalog. While it was discovered with a modest telescope by today's standards, M101 is hard for most modern stargazers to find. It shines at magnitude 7.7, which is quite bright, but its light is spread over an area as large as the full moon. So its

surface brightness is quite low. If you live in the city, you may not see M101 at all, no matter how big your telescope, because the background sky is brighter than the galaxy itself. The good news, if you see M101, you've also seen M102. A duplicate observation of M101 led to an incorrect entry in Messier's catalog. They are really the same galaxy.

The position of M101 is easy enough to locate: it makes an equilateral triangle with Mizar and Alkaid, the last two stars in the Dipper's handle. M101 is OVER the Dipper's handle, but it's a fine object and a good test of your observing skills.



Object: M5 is a spectacular globular cluster in Serpens. It was discovered by Gottfried Kirch in 1702. It is easy to locate just opposite the head of the serpent.





## Solar System

**Saturn** is the bright planet in the western sky; it sets late in the evening. **Jupiter** rises around midnight. **Mercury** barely rises over the horizon near dawn with **Mars** and **Venus** nearby. these two planets form a close pair just before dawn on June 20.

## **June Events**

The summer solstice, the longest day of the year marks the beginning of summer. The sun reaches its highest point in the northern sky on June 21





What's Happening at the George!!! Cynthia Gustava



#### JUNE EVENTS

<u>Friday Night Groups</u> (all times are 19:30 to 22:30)...Volunteers for domes and deck scopes are needed. Bring those laser pointers and instruct the visitors on the constellations and bright objects! Contact Cynthia Gustava at cynm31@att.net to volunteer.

Jun 05 – Sky Search Overnight (Full)

Jun 19 – Aerospace Overnight (Full)

Saturday Night Public Viewing (dusk to 23:00)...Volunteers for domes and deck scopes are needed. Contact the building manager teams below.

Jun 06 - Barbara Wilson and Buster Wilson gobserve@consolidated.net or retsub@ix.netcom.net

Jun 13 – Jessica Kingsley and Cynthia Gustava gnkingsley@att.net or cynm31@att.net

Jun 20 - Carl Sexton and Jack McKaye carlsexton@hotmail.com or jemckaye@comcast.net

Lunar and Planetary Institute

June 20, 10 a.m. – 1 p.m. – Can an Astronaut Stay Healthy in Space? July 18th, 10am – 1pm – Rediscover Apollo August 15, 8 p.m. – Night Viewing of Saturn and Globular Clusters September 19, 10 a.m. – 1 p.m. – Solar System Extremes October 17, 7 p.m. – Night Viewing of the Moon November 21, 10 a.m. – 1 p.m. – Near Earth Objects December – No Family Space Day Scheduled. Enjoy your holidays! Please note: Each child must be accompanied by a responsible parent or adult the entire time they are visiting the LPI.

For more 2106. For more http://ww Or call Ka

For more information e-mail Spaceday@lpi.usra.edu or call 281-486-2106.

For more information, go to http://www.lpi.usra.edu/education/space\_days/ Or call Katy at (281) 486-2106

3600 Bay Area Boulevard, Houston, Texas

# Lunar and Planetary Institute

## ATTENTION ALL ADULTS!!!

The Lunar and Planetary Institute invites all inquisitive adults to attend Dr. Catherine Pilachowski's presentation Star Cities of the Milky Way. This free public presentation on June 18 is part of the Cosmic Exploration Speaker Series at the Lunar and Planetary Institute (LPI), celebrating the International Year of Astronomy. As we celebrate the 400th anniversary of Galileo's first use of the telescope, Dr. Pilachowski shares our current understanding of the star cities of the Milky Way - the glorious globular star clusters that surround our galaxy.

Just as the telescopes of the 17th century opened the sky for discoveries of star clusters and nebulae, 21st century telescopes examining these star cities give us a glimpse of early star formation in the Universe, and of the origin of the basic elements of the periodic table. Some globular clusters harbor black holes, while others may be the remnants of galaxies shredded by the tidal forces of the Milky Way. And above all, globular clusters are magnificent sentinels in the night sky, shining with the power of hundred thousand suns.

Dr. Catherine Pilachowski holds the Kirkwood Chair in Astronomy at Indiana University Bloomington, where she teaches and conducts research on the evolution of stars and the chemical history of the Milky Way Galaxy from studies of chemical composition of stars and star clusters. She served for more than 20 years on the scientific staff of the National Optical Astronomy Observatory

in Tucson. She has served on numerous national and international boards and committees and as President of the American Astronomical Society

from 2002-2004.

LPI's Cosmic Exploration presentation begins at 7:30 p.m., and will be followed by a light reception. No reservation is necessary. All inquisitive adults are welcome. LPI is located in the USRA building at 3600 Bay Area Boulevard in the Clear Lake region of Houston; the entrance is located on Middlebrook Drive. The Lunar and Planetary Institute is part of the Universities Space Research Association (USRA).

Please feel free to pass along this information to anyone who may be interested. Further information, a flyer and a map are available at http://www.lpi.usra.edu/education/lectures

. For further information about the Cosmic Exploration Speaker Series, please contact LPI at 281-486-2135 (CosmicLecture@lpi.usra.edu).

Christine Shupla Education Specialist Lunar and Planetary Institute 3600 Bay Area Blvd Houston, TX 77058 (281) 486-2135 shupla@lpi.usra.edu



In times past, people that have wanted to take advantage of the club discount have had to write their check, put it in with the renewal slip, and then either mail it to me at my home or chase me down at a meeting. In most cases, within a week, I have sent out the renewal. Sometimes, and I don't really mind, the renewals have gone out at my expense for the postage. Without hesitation, question, or fail, it is not the most efficient means to

maintain club subscriptions. So as secretary, I'd like to try something new...

You get all your stuff ready for the subscription, whether it be Astronomy or Sky & Telescope, you keep it - you hang on to it. Email (most reliable) or tell me when you see me that you want to take advantage of the club discount for either or both of these publications and that you need a supporting letter. What I'll do is get the letter together and email the "letter from the treasurer/secretary" back to you as a PDF. You print it off, and enclose it with your renewal. For this to work your computer must have Adobe Reader (which is free) and a means to print it. I would like this procedure to become the "Standard Operating Procedure" for Astronomy/S&T discounts through JSCAS. For

"Standard Operating Procedure" for Astronomy/S&T discounts through JSCAS. those still not in the computer age, we can process things as we have in the past.

Clear skies, David Haviland

Meade LX200 EMC 8" SmartDrive, hardly used 4 eyepieces:

Televue 32 Plossl Meade SuperPlossl 26 Meade SuperPlossl 15 Orion UltraScopic 10

Televue 2x Barlow 8x50 finder Meade Variable Projection Tele-extender AC->DC converter box with long extension cord from box to telescope Tripod and wedge.

Cable to laptop

Canvas carrying bag and original Meade cardboard box and foam. http://www.stevegoldberg.net/album/TelescopeForSale/index.html Reduced Price \$1300, Please contact Crystal Wolfe at <u>art-ist@crystalwolfe.com</u> or 281.685.0516





#### Members' Gallery—JUNE 2009

**Glenn Schaeffer** Date & Location: May 20th, 2009, Santa Fe, Texas. Scope: Obsession 20" f/5 on a Tom Osypowski Dual Axis Equatorial Platform, Orion 100mm f/6 Guidescope. Autoguider: Orion Starshoot Autoguider and PHD Guider software. Camera: Canon XS DSLR (self-modified), Canon's own capture software. Filters: IDAS LPR Filter Conditions: Temp 68F, Humidity 78%, Winds calm, Transparency 8/10, Seeing 6/10. Exposures: 47 x 60sec @ 1600 ISO Sub Frames, 19 Darks average combined for master dark. Post-processing: 3904x2900 Raw files converted to Lossless 16-bit FITS, calibrated, aligned, and combined with Image-Plus 3.75. Final processing Adobe Photo-

shop CS.





By Chris Wells Hyperstar lens (f2) and Canon XTi. Rosette Nebula and NGC 2244 OC - Ft McKavett, TX October 24,2008 Scope: Celestron C11 at f2 on PM1 Equatorial Mount Image Camera: Canon XTi (non modified) Processing: AIP4WIN and PS2 Autoguiding: DSI, ETX125 and MaxIm DL Rosette Nebula - 72 minutes total stacked I owe Richard Berry thanks for undertaking the processing of this image. He used my RAW data from my Canon DSLR to test out the AIP4WIN 2.3.0 software prior to general release.

72 mins Total comprising of 60 @ 1mins and 6 @ 2mins.

## Members' Gallery-2009



Space Shuttle Atlantis STS-125 lifts off from launch pad 39A at Kennedy Space Center May 11, 2009. (Matt Stroshane/Getty Images)courtesy of Andy Saulietis.



A STA FLYOVER WITH CHARLIE JUSTIZ AND OUR OWN TRIPLE NICKEL WHAT A GREAT BACKDROP!!!

CHARLIE JUSTIZ AND TRIPLE NICKEL AND A FLYOVER WITH ENDEAVOUR ON PAD 39B



#### Light pollution:

Any adverse effect of artificial light including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste.

.Do you have a question about light pollution, protecting the night sky, or IDA's resources? Get Help from IDA http://www.darksky.org/mc/page.do?sitePageId=56399



#### **Starscan Submission Procedures**

Original articles of some relation to astronomy will be accepted up to 6 p. m. (18:00 hrs) on the 25th of each month. THE most convenient way to submit articles or a Calendar of Events is by email and is preferred, but hard copies (CD, disk) are also accepted. All articles must include author's name and phone number. Also include any picture credits. Word, WordPerfect, and text files will be accepted. I have set up a special email account so that I can keep all of the Starscan articles, pictures, information, etc, separate from all of the other email I get. This makes is much easier to edit and set up the Starscan

## Please send all submissions to: conniesstarscanaccount@gmail.com

The author of individual articles bears all responsibility for publishing any e-mail addresses in the article on the World Wide Web

## Johnson Space Center Astronomical Society

#### 2008-Club Officers

President – David Haviland Vice President – Chris Randall Secretary – David Haviland Starscan Editor – Connie Haviland Star Party Chairperson – Librarian – Bob and Karen Taylor Historian – Chris Randall Scientific Expeditions – Paul Maley Web Master—Chris Randall

#### SIGS

Observing Awards – Triple Nickel Astronomy 101 — Triple Nickel CCD Imaging – Al Kelly Binocular Observing – "OPEN" Telescope Making – Bob Taylor Deep Sky Observing – Hernan Contreras



"I wonder if there's life as we know it on other planets."



This is the section strictly for kids (or kids at heart). We will be including information, stories, ideas, puzzles or anything that has to do with astronomy. The only difference here is, it will be directed for children. We don't discourage parents or any other adult to get involved. In fact, we encourage it strongly. So we hope you enjoy this section and if it touches a child's interest in astronomy, our goal has been achieved. Enjoy!!



## **PTOLEMY**



PTOLEMY (about ad 100-70), astronomer and mathematician, whose synthesis of the geocentric theory that the earth is the center of the universe dominated astronomical thought until the 17th century. He is also remembered for his contributions to the fields of mathematics, optics, and geography. Ptolemy was probably born in Greece, but his actual name, Claudius Ptolemaeus, reflects all that is really known of him: "Ptolemaeus" indicates that he was a resident of Egypt, and "Claudius" signifies Roman citizenship. In fact, ancient sources report that he lived and worked in Alexandria, Egypt, for the greater part of his life.

#### The Almagest

Ptolemy's earliest and most famous treatise, originally written in Greek, was translated into Arabic as al-Majisti (Great Work). In Europe, medieval Latin translations reproduced the title as

Almagesti, and it has since become known simply as the Almagest. It into 13 books. In this work, Ptolemy proposed a geometric theory to mathematically for the apparent motions and positions of the planets, moon against the background of fixed stars. He began by accepting the held theory that the earth did not move but was at the center of the sysplanets and stars, moving eternally, were considered (for philosophical move in perfectly circular orbits. He then elaborated on the theory in an account for such astronomical puzzles as the periodically retrograde motions of the planets and periodic variations in size or brightness of planets. The Almagest also included a star catalog containing 48 conusing the names we still use today.



was divided account sun. and generally The tem. reasons) to attempt to (backward) the moon and stellations,

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Ptolemy's abilities as an observational astronomer have been queshis complex system seemed to account for celestial motions. Anoma-

lies in planet's motion were accounted for by the use of the epicycle, a circle centered on the circumference of a larger circle called the deferent. The planets, sun, and moon were regarded as located on the rims of rotating epicycles, and the earth itself was placed eccentrically to the center of the deferent. By adjusting the radii of



the circles and their speeds of rotation, Ptolemy made the system fit most of the observed facts.

Ptolemy also had to introduce, however, another mathematical device known as the equant: an imaginary point halfway between the center

of the deferent and the eccentric point representing the earth's position. Rather than maintain the constant, uniform motion of all circles in the system (deferents and epicycles), as had been required in all previous models of ancient astronomy, he assumed that the deferent moved uniformly with respect to the equant. (Thus the deferent's motion would not be uniform with respect to its own center.) This major departure from



traditional assumptions was one reason the Polish astronomer Nicolaus Copernicus rejected Ptolemy's system in the 16th century and developed his own heliocentric world view of a sun-centered system. Even so, Copernicus retained an elaborate system of epicycles.

#### **Other Works**

Ptolemy also contributed substantially to mathematics by advancing the study of trigonometry, and he applied his theories to the construction of astrolabes and sundials. In his Tetrabiblos, he applied astronomy to astrology and the casting of horoscopes. Of considerable historical importance, despite considerable factual inaccuracies, is Ptolem's Geography, which charts the then-known world. This work, which employs a system of longitude and latitude, influenced mapmakers of the Renaissance, but it suffered from a lack of reliable information. Ptolemy also devoted a treatise, Harmonica, to music theory, and in Optics he explored the properties of light, especially refraction and reflection. This latter work, known only from an Arabic version, is of special interest for its combination of experiment and the construction of apparatus to promote the study of light and to develop a mathematical theory of its properties.



## Geographia

Ptolemy (c.100-178) was a hugely important geographer and astronomer, and this map takes valuable information from Ptolemy's famous book Geographia. The main characteristic of Ptolemaic maps is their mathematical construction. Ptolemy's work informed the mapmakers on the size of the Earth, and the co-ordinates for the positions of all the places and features indicated on the map.

All knowledge of these co-ordinates had been lost in the West, until a copy of the Geographia was translated from

Greek into Latin in 1407. The book created a sensation, as it challenged the very basis of medieval mapmaking – mapmakers before this had based the proportions of countries, not on mathematical calculations, but on the importance of different places - the more important a country was, the bigger it appeared on the map.

In fact, many of Ptolemy's calculations were later proved to be incorrect. However, the introduction of mathematics and the idea of accurate measurement were to change the nature of European mapmaking forever.

Ptolemy also prepared a calendar that gave, in addition to weather indications, the risings and settings of the stars in the morning and evening twilight. Other mathematical publications include a work, in two books, entitled Hypotheseis ton planomenon ("Planetary Hypothesis") and two separate geometrical works, one of which is concerned with proving that there cannot be more than three dimensions of space; the other contains an attempted proof for a postulate on parallel lines that had been devised by Euclid. According to one authority, Ptolemy wrote three books on mechanics; another authority, however, credits him with only one mechanical work, Peri ropon ("On Balancing").

In addition to his well known works in astronomy, Ptolemy was very important in the history of geography and cartography. Ptolemy of course knew that the Earth is a sphere. Ptolemy's is the first known projection of the sphere onto a plane. His Geography remained the principal work on the subject until the time of Columbus. But he had Asia extending much too far east, which may have been a factor in Columbus's decision to sail west for the Indies.

Ptolemy's work on optical phenomena appeared in Optica, the original edition of which consisted of five books. In the last book, he deals with a theory of refraction (the change in direction of light and other energy waves when they pass obliquely from a medium of one density into a medium of different density), and he discusses the refraction suffered by light from celestial bodies at various altitudes. This is the first recorded attempt at a solution of this observational problem. Ptolemy also wrote a three-book treatise on music known as the Harmonica.

As a geographer, Ptolemy's reputation rests mainly on his Geographike hyphegesis (Guide to Geography), which was divided into eight books; it included information on how to construct maps and lists of places in Europe, Africa, and Asia tabulated according to latitude and longitude. There were, however, many errors in the Guide--e.g., the Equator was placed too far north, and the value used for the circumference of the Earth was nearly 30 percent less than a more accurate value that had already been determined--as well as some contradictions between the text and maps. Moreover, as a whole, the Guide cannot be considered "good geography"; it does not mention anything about the climate, natural products, inhabitants, or peculiar features of the countries with which it deals, and Ptolemy's treatment of the geographical importance of such factors as rivers and mountain ranges is careless and of little use.

In spite of its faults, the Guide is an important work from a historical point of view because, like the Almagest, it exerted a great influence on later generations. Christopher Columbus, for example, used it to strengthen his belief that Asia could be reached by travelling westward because Ptolemy had indicated that Asia extended much farther east than it actually does. Even as late as 1775, it was believed that the Indian Ocean was bounded by a southern continent, as Ptolemy had suggested; the return voyage from the Southern Hemisphere of Capt. James Cook in July of that year proved otherwise.

The Ptolemaic explanation of the motions of the planets remained the accepted wisdom until the Polish scholar Copernicus proposed a heliocentric view in 1543. It should be noted, too, that Ptolemy's system is actually more accurate than Copernicus's. The heliocentric formulation does not improve on Ptolemy's until Kepler's Laws are also added.

It is doubtful that Ptolemy actually believed in the reality of his system. He may have thought of it only as a method of calculating positions.

Ptolemy also wrote *Tetrabiblos*, a work on astrology. (In those days, astrology was a reputable field of study.)

[Note: There were also a number of Egyptian rulers known as Ptolemy who ruled Egypt from 323BC to 30BC. Though they lived in Egypt, the Ptolemys were Greek.]

# SOLUTIONS TO MAY'S PUZZLES

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w	g	е	С	h	q	g	t	k	e	m	q	t	d	h	С	t	n	j	С	e	0	z	u	r	v	h	r.	e	е
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k	v	0	h	u	1	t	С	u	d	С	У	1	g	e	z	b	w	k	р	w	0	v	У	d	g	i	q	h	С

pinholecameras

- stephenhawking
- hubble
- milliarcseconds
- theoreticalphysics
  dualorbiters

- solargraph
- mathematician
- occultation
- galileogalilei
  payload

- astrophotography
  lougehrigdisease
  astrometric

- cambridge
   orbiter

# **SOLUTIONS cont'd**



**QUESTION: How well do you know about the Hubble telescope?** 

Launch date? 24 April 1990

What space shuttle carried the Hubble telescope into orbit? Discovery

Type of orbit? circular low Earth orbit

Orbit height? 559 km (347 mi)

Orbit period(time)? 96–97 minutes

**Orbit velocity?** 7,500 m/s (17,000 mph)

Acceleration due to gravity? (this is a challenging one) 8.169 m/s<sup>2</sup> (26.80 ft/s<sup>2</sup>)

Telescope style? <u>Ritchey-Chretien</u> reflector

Was the Hubble the first "space" telescope proposed?

Who was this space telescope named after? The American astronomer Edwin Hubble The HST is a collaboration between what main organizations and/or countries? The HST is a collaboration between NASA and the European Space Agency, and is one of NASA's Great Observatories, along with the Compton Gamma Ray Observatory, the Chandra X-ray Observatory, and the Spitzer Space Telescope.[3]

NAME\_

DATE \_\_\_\_\_

## WORD SEARCH

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MERCURY	JUPITER	GALAXY
BLACKHOLE	<ul> <li>MILKYWAY</li> </ul>	<ul> <li>CONSTELLATION</li> </ul>
PLUTO	<ul> <li>WHITEDWARF</li> </ul>	<ul> <li>ECLIPSE</li> </ul>
NEPTUNE	COMET	<ul> <li>REDGIANT</li> </ul>
UNIVERSE	METEOR	URANUS
MARS	SATURN	VENUS
ASTEROID	ORBIT	

NAME \_\_\_\_\_

DATE \_\_\_\_\_

# **SOLAR SYSTEM**



#### Across:

- 1. The faint white star
- 3. A blocking of light from another object
- 7. A gathering of stars, gas and dust
- 8. A cool red star
- 10. A small dense object that circles the sun
- 11. The hottest planet and surrounded by gas
- 13. a cold planet which the days last 42 years
- 14. A gaseous mass that orbits the sun
- 5. our galaxy
- 16. Everything that exists
- 18. no longer a planet

#### Down:

- What remains when a star dies
- 4. Named after the Roman god of water
- 5. The red planet
- 6. Surrounded by rings
- 9. The closest planet to the sun
- 12. Largest planet of the solar system
- 15. A piece of space debris that is burning
- 17. a pattern of stars







Snoopy says, never stop looking up..reach for the stars and may you always have clear skies!!!!

