Perhaps a bit of magic touched TAAS’ ATM Workshop at Valley High School on 15 November. Under the leadership of Ray Collins and Mike Pendley things seemed to gel. Anthony Benavidez placed his hands on a blank eight inch mirror for the first time. Under the watchful eye of Ray Collins, Anthony beveled the edge of the tool and mirror, eventually pushing away with 60 grit toward first light. He never looked up.

Meantime Eric Olson set up a Foucault device to evaluate his ten-inch mirror in its final stages. Eric fitted his Couder screen to the mirror and Mike Pendley guided his use of the Foucault to quantify four zones. After carefully recording the data and checking it, Eric consulted with Mike who entered the data points into the computer program “Tex” and turned it loose. The result: 1/10 wave error on the surface. This meant Eric had finished an almost year-long project of grinding, polishing and figuring his first mirror with excellent results. Eric’s Dobsonian is also completed. Now he’s searching for a good company for the final step of aluminizing.

While Eric and Mike were gathering data, Ray Collins and Neil Goldberg were viewing a short film on collimation. Neil had purchased a finished ten-inch mirror from University Optics some time ago, and with yeoman support from Ray, constructed a beautiful Dobsonian with Birch baltic plywood gleaming under glossy varnish. It was time for final collimation before first light. Ray and Neil, along with help from Mike Pendley, collimated the telescope and carried it outside into the cold, dark evening just before moonrise. The first light was Saturn, rings clear, and Jupiter, bright with banded clouds and tiny moons.

We began to realize under a dark clear sky, that we had seen a beginning, a middle and a rewarding first light — in the span of one evening. Mike’s sentiments: “It won’t get any better than this.”

The ATM group meets in Ray Collins Physics Lab, at Valley High School on first and third Wednesdays. To join the ATM group, simply show up, or contact Ray Collins at ray@rinzai.com or Mike Pendley at mycall@rt66.com.
The November Board of Directors meeting minutes required a great deal of editing this month. I simply ran out of time so I pulled them at the last moment. I apologize for any inconvenience this may cause. The minutes will be published in the next newsletter.

- editor
Remember when?
by Carl Frisch

If you’ve joined TAAS in the last couple of years you probably don’t remember those out of town field trips we used to take. Some of you may remember trips to Sunspot, the VLA, and McDonald Observatory among other places and the memorable time had by all. Many of you who used to organize these trips have moved on, gotten burned out, or simply don’t have the time. From the limited number of TAAS members I’ve talked to, the overwhelming response is that we should organize more of these adventures. Again the age-old problem: lack of organizers. If you have any ideas or would like to help, talk to your event coordinator or any board member to get things rolling.

Father / Son Leonid Observers Report
by Sammy Lockwood

On November 18th, the Earth Passed through some very old debris trails from Comet Tempel-Tuttle that dated back hundreds of years. The result was the annual Leonid Meteor Shower, which my son Lanny and I watched from the Oak Flat Picnic grounds.

I’m not a meteor expert, not even close. But the Leonids have become a regular father-son event for Lanny and me. We started watching Leonids in 1998, when we were lucky enough to catch the most spectacular meteor show that either of us had ever seen. This year was much colder, with snow cover, high clouds, and an unfavorable quarter moon in the radiant, but we hoped for the best. We arrived at the picnic grounds just before midnight prepared with chase lounges, blankets, hot chocolate, and a my homebuilt 10" to watch the trails. About a half dozen cold spectators were there already, bundled and watching. Within minutes we were doing the same.

For UNM nights, ATM workshops, Post 110 meetings, Sidewalk Astronomy events, and Astronomy 101 classes see The Sidereal Times.

The clouds made it hard to see the radiant, so we pretty much counted anything that came from the vicinity of the Moon as a Leonid. From midnight till 1 am, we bagged 41 Leonids, 3 Geminids, and 3 strays. 2 of the Leonids could be counted as fireballs, and one broke-up mid trail. Considering the clouds and moon, it was not a bad show.

Around 1 o’clock the breeze started picking up, and our cheeks went from numb to number, which of course meant that our number was up, and we went home. But we’ll be back.

TAAS 2001 CALENDAR
Proposed November 9, 2000. Schools in bold.

JANUARY
NM 23
4 THU GNTO mtg
6 SAT General mtg
11 THU Board mtg
12 FRI Astronomy 101
13 SAT GNTO
20 SAT GNTO
23 TUE Roosevelt Ele.
25 THU GNTO Mtg
27 SAT GNTO
27 SAT R. Grande Nature Ctr.

FEBRUARY
NM 22
1 THU Board Mtg
3 SAT General Mtg
16 FRI Astronomy 101
17 SAT GNTO
20 TUE Sandia Prep
22 THU GNTO mtg
24 SAT GNTO

MARCH
NM 23
1 THU Board mtg
3 SAT General mtg
17 SAT GNTO
17 SAT Astronomy 101
20 TUE Emerson Ele.
24 SAT Messier @ GNTO
24 SAT Equinox Picnic
29 THU GNTO mtg

APRIL
NM 22
5 THU Board mtg
7 SAT General mtg
13 FRI Astronomy 101
14 SAT GNTO
17 TUE Tomasita Ele
21 SAT GNTO
26 THU GNTO Mtg
28 SAT Astro-Day

The Official Newsletter of The Albuquerque Astronomical Society—
December 2000

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### Year 2000 Annual Winter Solstice Pot Luck Dinner

**by Bruce Levin**

Even if you have not been to any meetings this year, this is one activity you do not want to miss!!! By tradition, our December general meeting has been our annual pot luck dinner. The dinner starts at 6:00 p.m. on Saturday, December 16th. The kitchen will be available at 4:00 p.m. when several of our members will be setting up. As it has been for the last couple of years, our activity is being held at Heights Cumberland Presbyterian Church, 8600 Academy Blvd., N.E., in Albuquerque. The church is located on the southeast corner of Moon and Academy (east of Wyoming Blvd.). Ample parking is available at the east end of the church’s north parking lot (south side of Academy). We will be meeting in the Gym, which is at the east end of the facility with entry doors located on the north side of the building. We have use of the kitchen which opens up to the gym.

Admission to dinner is a favorite gastronomical dish of your making. We are looking for casseroles, salads, main dishes, and some desserts. Drinks, napkins, plates, bowls, cups, and eating utensils will be provided. In addition to sharing food, everyone is invited to bring interesting astronomical items—your favorite photos, accessories, ATM projects, etc. for show-n-tell. We hope to have our inflatable planetarium set up for children of all ages. We are also looking forward to multi-question astronomy trivia contest. This party is open to members, family, friends, and anyone interested in astronomy. It will be a great time to meet everyone in the least formal manner that the Society can provide. See you there!
# January 2000

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## Planet Rise / Set (01/15/2000)

(Rounded to 15 minutes, MST)

- Mercury: 08:00/18:15
- Venus: 09:45/21:00
- Mars: 01:45/12:30
- Jupiter: 13:15/03:30
- Saturn: 13:00/02:45
- Uranus: 08:45/19:15
- Neptune: 07:45/18:00
- Pluto: 03:45/14:45

## TAAS Potluck
Saturday December 16

**Heights Cumberland Presbyterian Church**  
8600 Academy NE

**Christmas Trivia**  
*by Kevin McKeown*

I’ll be writing the Christmas Trivia again this year. With regards to astronomy and TAAS, it’ll be all expansive. In addition to some of the usual Trivia Contest gifts we have such as old books, tapes, and calendars, I thought I would provide, as one of the prizes, one of my homemade 20 mm Symmetrical eyepieces. This eyepiece design is one of the cleanest, sharpest, and color free, and has great eye relief also! With my 10 inch, it was this eyepiece in which I first spotted Mimas, the tough innermost satellite of Saturn. Hope to see you all there December 16th.

## NOTES:

- **TAAS** = The Albuquerque Astronomical Society
- **GNTO** = General Nathan Twinning Observatory. Call Gordon Pegue @ 332-2591 to confirm.
- **UNM** = University of New Mexico Observatory. Call the TAAS hotline @ 296-0549, or the UNM hotline @ 277-1446 to confirm.
- **ATM** = Amateur Telescope Making. Call Michael Pendley for information @ 296-0549.
- **PandA** = UNM Physics and Astronomy. Corner of Lomas and Yale.
**Dark Sky News**

*by Lisa Wood*

**Email Campaign**

Victory has fallen in our laps! I was very pleased to learn from David Penasa, that Albuquerque’s Night Sky Protection Task Force is busily drafting a city lighting ordinance that will be presented to the city council for consideration. Our 3 month plan to flood the task force with suggestions that they do just that suddenly seemed a little superfluous, so our strategy has been modified. Each week until December 18th, we will email messages to surrounding cities and neighborhoods informing them of the light pollution issue and what might be done to ameliorate the problem. Here are the people and organizations we have “buzzed” so far:

- **Robert Romero**, Chair of Night Sky Protection Task Force; **Cynthia Tidwell**, Ordinance Officer, Los Ranchos; **LUPZ Committee**, Alb.; **Julie Baca**, Planning and Zoning, Belen; **Albuquerque City Council; Mayor Baca**

**Petition Campaign**

Dan Richey continues to collect signatures for presentation to the city council regarding the interest the citizenry has in the issue of light pollution work. These signatures will be presented near the end of the year. Many thanks for his hard work!

**Docent News**

*by Lisa Wood*

Did you know you can access our entire calendar to the school star parties at our website at www.taas.org? Go to the educational outreach link to find dates and directions. Please join us at our monthly events as we bring our love of the stars to the school kids of Albuquerque. We’ll teach you whatever you need to know! Here’s what we’re up to:

- Jan. 23, 2001
  - Roosevelt Middle School (Tijeras)

- Feb. 20, 2001
  - Sandia Prep School (Albuquerque)

- March 20, 2001
  - Emerson Elementary (Albuquerque)

- April 17, 2001
  - Tomasita Elementary (Albuquerque)

- May 8, 2001
  - Bosque Prep (Albuquerque)

Above: Eric “runs” the data on his mirror at the ATM workshop.

Below: The images of NGC 253 (below left) and NGC 891 (below right) were taken by Jeff Asner of the Westminster Astronomical Society with help from Carl Frisch at GNTO during his 10-1-00 visit. They used the Astro-Physics 6” and the ST-9E camera.
Successful GNTO Open House
by Pete Eschman

Nearly fifty TAAS members enjoyed themselves at the Nov. 18th GNTO open house. Some folks came down to the observatory for the first time, while others renewed their GNTO experience after a several year lapse. Those who had been away from GNTO for the last few years were able to evaluate a whole host of recent improvements. Major changes in just the last 3 years include a graded, graveled observing area with concrete pads, a lecture area with nearby picnic area, a photovoltaic power system, a computer room on the first floor of the dome building, renovated dome shutter and rotation systems, a refurbished Isengard 16” reflector, a newly donated 6” Astrophysics refractor, a new ST-9E CCD camera, and of course, the new 16x28’ warm-up building. The latest construction project is the new site perimeter fence, and lines of newly installed fence posts could be seen on all sides of the GNTO property.

Folks arriving before sundown could view sunspots using a solar filter equipped 5” refractor provided by Pete Eschman. Paulette Christopher provided 2 dozen bagels and some cream cheese, courtesy of Einstein Bagels. Refreshments were welcome as folks checked out the various highlights of the GNTO facility. As sun-down approached, the observing field filled up quickly, and by sundown every observing pad was occupied, with scopes set up on all sides. Lots of refractors were present, which gave a good challenge to the usual reflector dominant telescope mix.

Once the sun had set, Carl Frisch began a detailed training session for the Astronomy 101 class. The initial focus was on the operating procedures for the Isengard 16”, including correct procedures for opening the dome and preparing the scope for use. Later on, Carl gave training sessions on CCD imaging. Carl had his ST-6 CCD camera installed on the 6” Astrophysics with the control software running on the TAAS-1 computer situated in the warm-up building. Carl also had the TAAS ST-9E installed on his f4.5 16” truss tube scope, which was running on a polar aligned equatorial platform. The ST-9E was cabled to Carl’s laptop, which was also located in the warm-up building. A variety of other folks helped out with the Astronomy 101 class, including Judy Stanley who organized the event, and Barry Spletzer, who provided an entertaining lecture on the history of astronomy.

The Isengard 16” provided stunning views of Jupiter, Saturn, and many other objects throughout the evening. As temperatures dipped into the mid-twenties, the warmth of the new warm-up building was appreciated by all that attended the event. I noticed how nice it was to have a warm room to use while putting on additional clothing layers throughout the course of the evening. After a few minutes in the new building, it was much easier to return to the excellent viewing conditions for more photons. I’m sure the good attendance for Carl’s CCD training sessions was due in part to the fact that both image-monitoring computers were located in the warm conditions of our new building.

I would like to extend a heart-felt thanks to all who worked so hard to bring all the wonderful improvements to GNTO, with a special thanks to Robert Ortega. Robert has served as Observatory Director for the last three years, and he provides the inspiration for all who work alongside him. I’d also like to thank those who’s financial generosity also helped to bring these amazing improvements to our observatory.

First Snow for the Warmup Room! Carl awoke to this winter landscape on November 7. Photo by Carl Frisch.

A great “star trails” image of GNTO taken by Keith Bauer. A color version will be placed on the web.
There’s been a lot of talk about the Leonid Meteor Shower last month, but another great meteor shower is the Perseid Meteor Shower that comes every August. I tend to think about this one more, because we are studying Perseus now in my Literature class at Eldorado High School.

In Greek mythology Perseus is the son of Danak and Zeus. In the most famous tale, Persius’s stepfather, Polyeuctes, ordered Perseus to kill Medusa and bring back her head. Having no clue how to do this, Perseus begged the Gods to help. Athena and Hermes heard his cries, and told him to go to the Grey Ones, three old woman who were said to choose if people lived or died by cutting hair. The Grey Ones shared one eye between them. (UCH). Perseus went to the Atlas Mountains to see the Grey Ones, three old woman who were said to choose if people lived or died by cutting hair. The Grey Ones shared one eye between them. (UCH).

Perseus went to the Atlas Mountains to see the Grey Ones and stole the eye they shared to learn where the Stygian Nymphs lived. From the nymphs, he obtained items to battle Medusa, including Hades’ helmet of invisibility, a pair of winged sandals, and a magic pouch to Medusa’s head in.

Perseus put on the sandals and, with Hermes, flew to put Medusa’s castle, where she was surrounded by Centaurs, half man, half horse creatures with a bad attitude. Lucky for him, they were all sleeping. Medusa too was sleeping when he arrived, and he crept up to her, watching her in his shield, and cut her head off with his sword. He put it in the magic pouch, put on the helmet of invisibility so as not to be seen, and headed home.

Along the way, he passed through Ethiopia, where a princess named Andromeda was chained to a rock to be sacrificed to a sea monster because of her mother’s boasts. He rescued her and beheaded the monster, then promised to marry her. Perseus and Andromeda now live side-by-side in the evening sky.

Look for the Constellation Perseus this month above and slightly north of the bright planet Jupiter in the eastern evening sky.
November’s Telescope Forum  
by Bruce Levin

The Telescope Forum held at the November general meeting was a great success. This was the first time that TAAS has held this type activity. Bruce Levin started things off with a brief history of telescopes, basic optics, and binoculars. This was followed by several members who talked about the positive and negative aspects of the telescopes they had on display. Barry Gordon showed off one of his refractors and explained the type of observing he enjoys. He mentioned portability and ease of set up as well as optical quality as important factors for his choice. Stephen Snider explained the workings his 8-inch Schmitt Cassegrain. Steve gets good quality viewing with a decent size optical system in a compact package with reasonable set up time. Mark Nagrodsky brought a 3-1/2 inch Maksutov Cassegrain. Advantages of the Maksutov design are very good contrast images without the need for collimation. Gordon Pegue impressed everyone with his 20-inch truss frame Dobsonian. You can’t beat aperture to collect light from those distant and obscure objects. Gordon did mention that it takes him 35 to 45 minutes to set up.

Kevin McKeown followed with a presentation on the optical qualities and costs of different types of eyepieces and the use of barlows. Barry Gordon continued with a summary of cost per aperture for the different telescope types. Barry pointed out that each person’s needs are unique and that those wishing to get a telescope should consider what is important to them. An excellent way to make this determination is for people to attend our observing sessions and look through members’ scopes. A few homemade instruments were then presented. Sammy Lockwood briefly explained how he ground and polished his own mirrors and constructed the tube assemblies and platforms to complete his Dobsonian scopes. Sammy pointed out that these were the only scopes that he ever owned. A unique feature in the larger of Sam’s scope is that the upper part of the tube assembly rotates to position the eyepiece at a comfortable height for the observer without a change in collimation. Sammy should be very proud, since the quality of his instruments meet or exceed the optical quality of commercial telescopes.

Ray Collins talked about the Amateur Telescope Makers program that he and Mike Pendley facilitate for the Society. People have an opportunity to grind, polish, and figure mirrors and construct optical tube assemblies and mounts for their own telescopes under the guidance of experienced telescope makers. Randy Gauntt completed the formal presentations by explaining the Society Loaner Telescope Program. Basically, all of our members can select a telescope to borrow from a wide selection of scopes. A few questions were fielded during a brief Q & A period.

The Social session followed with audience interaction with everyone that brought telescopes. Other telescopes were brought by Eric Bucheit, Linda Hixon, David Brown, and Bruce Levin. Participation by everyone was greatly appreciated and was the key to the success of this forum.
Leonids, 2000

A good shower was observed from GNTO on the night of November 16-17, 2000. However, nearly all of the activity occurred between the time of radiant rise (about 11:30 PM), and about 2 AM. Peak activity seemed to occur around 12:30 AM Nov. 17th. I didn’t make an hourly count- it was bitter cold- but (unofficially) I recorded 25 meteors on my counter from 12 AM to 1:30 AM- a very good rate considering the very low altitude of the radiant! The ZHR for this activity would have been in the 150 to 200 per hour range, I would guess. There were some very fine fireballs. By 2:30 AM, activity really tapered off. It was at this time that I had hoped activity would really start to pick up- recall- it was at this exact (sidereal) time last year that the Earth encountered the outburst with a ZHR of about 3400! Alas, nothing was to lurk in this part of space this year. Gordon Pegue and Alejandra Valderrama, Kevin McKeown, Shelby Worley, and Carl Frisch observed from GNTO.

On the night of November 17-18th, 2000, the Earth encountered the 1866 meteoroid ribbon (as modeled by Asher and McNaught) just after midnight. For the next hour and a half, a vibrant meteor display was observed! The peak seemed to come at 1:16 AM MST, when I observed 8 Leonids in about 2 minutes. I made a 49 minute count from 1:11 AM to 2 AM, and observed 27 Leonids (unofficial- I’ve yet to sort through the data). Seven or eight bright to brilliant fireballs were observed, especially just after 1 AM- it seems this is when the Earth started to enter the densest part of the filament. It seems Zenith Hourly Rates for this period probably reached 400 to 500! However, moonlight, and a low radiant cut the numbers down considerably. If observed in a dark sky, just before dawn, this outburst would have been fabulous! After 2:30 AM, little Leonid activity was observed, despite the high radiant!

So it would seem that Asher and McNaught’s model for the Leonid stream was remarkably proved this year. It’s true: the Leonid stream consists of narrow dense filaments or trails of meteoroids, of which the Earth grazed three this year (two visible from USA). For more details of the 2000 display, refer to the NASA web site: http://science.nasa.gov/press/2000/ast21nov.

This now sets up the year 2001 when Asher and McNaught call for three Leonid storms- that’s right- storms, on November 18th: one for N. America, and two for eastern Asia! See the June 2000 issue of Sky and Telescope.

The Sulamitis Debacle

The Sulamitis-mu Geminorum occultation was, upon final path analysis in the weeks before the event, shifted 1000 miles BACK to the northeast, into exactly the same position called for in the February, 2000 issue of Sky and Telescope! It went right over Chicago, IL (where it snowed that night). So somebody dropped the ball, and got us all excited here in the desert southwest. Here, it was even clear that morning.

GNTO, November 18-19th:

An enormous group gathered for stargazing following the dedication of the new warm-up room! While cold, skies were generally of very high quality. The zodiacal band, and the gegenschein were easy to detect. We had very good looks at many fine winter objects. I mostly observed with Larry Cash and Nancy Davis, along with Dave Blair. Among the objects we recovered were open clusters M 36, M 37, and M 38, the Pleiades and its enshrouding nebula, the Great Nebula (M 42), and the Andromeda Galaxy (M 31) and its companions. M 31 really looked magical in Dave Blair’s 6 inch, f/5 with a 27 Panoptic!!

Planets Jupiter and Saturn were well presented, but the seeing wasn’t first rate. With the 16 inch scope, we could detect many Moons of Saturn, including Titian, Rhea, Dione, Tethys, and Enceladus.

GNTO, November 25-26th:

Another enormous group gathered tonight for some of the cleanest, finest skies, especially early to mid evening when it was yet warmish. Carl Frisch again served as a great host. At 8 PM the zodiacal band and the Milky Way cut the sky into a large sliced (pumpkin?) pie- the hallmark of a really black, transparent sky! Mostly tonight we concentrated on planets Jupiter and Saturn, and different eyepiece/Barlow combinations. Certainly, the hallmark observation of the night was a shadow-satellite transit of Jovian satellite Ganymede across the south polar region of Jupiter. Wow!!! First we saw the shadow come on board, with Ganymede not quite touching Jupiter. Then, Ganymede merged with Jupiter, and “followed” the shadow across Jupiter. The view in Jeff Bender’s large Dob was beautiful. With excellent seeing, some of us thought that detail could be seen on Ganymede! Since Jupiter was yet close to opposition, the shadow, and its culprit satellite were lay very nearly on top of each other.

I first lighted a “new” used thrift shop 60 mm f/11 refractor tonight. Aware of the views in 16 to 20 inch scopes of the Jupiter moon-shadow transit, I thought I would try this scope on Jupiter. It didn’t disappoint! At high power, there was the tiny black shadow, and with care, Ganymede itself, looking like a pearl fused just inside the limb of Jupiter! Amazing. I tried this scope on Saturn, and it even revealed the Cassini division! This telescope, which cost all of $7, showed no spherical aberration, color, astigmatism, and flare (a hallmark of “cheapy” 60 mm achromats). So don’t sell those small scopes short!

Through much of the night, we also closely observed Saturn. The seeing
was generally excellent. Much ball detail was observed, and there was great ring detail. Saturn’s ball itself was a grayish yellow, fainter than the bright yellow white to ivory ring system. Very pretty. The crepe ring was clearly seen, and its muddy trail, where it crossed the ball, was vivid! Intensity changes across the A and B rings were very clear! The “Encke” minimum of the A ring was pretty obvious, although it seems that the A ring was not seen-in any scope, with any optics-to be divided by any true dark gap.

With the 16 inch, Jody Forster and I checked various combinations of eyepieces/Barlows on Saturn. Initially, we used a 9 mm Nagler and a Barlow combination. While this afforded great power (about 600X), Saturn really looked like a bowl of mud. Better was the removal of the Barlow. Saturn showed overall excellent gross detail (such as the Crepe ring), but this was misleading. Next, I observed Saturn with simple orthoscopic, and achromatic Ramsden eyepieces, both of 7 mm focal length. These “archaic”, lens designs yielded really critically sharp views of Saturn! Whereas the moon Enceladus was invisible with the Naglers, there it was- and clearly seen no less- in an old 7 mm Criterion achromatic Ramsden! It seems that the great many lenses used in the Barlow-Nagler designs scatters much light, and also destroys fine detail.

John Sefick also did some excellent CCD imaging with an ST-8 camera and a 180 mm focal length lens. He recovered a number of what seemed like asteroid streaks- but we are not sure. Pete Eschman had his fine 5 inch rich field refractor set up, and we sensational views of the Veil nebula! The entire object could fit inside his field! Jeff Bender tracked down some faint galaxies in Pegasus, and Gordon Pegue and I tried to split Sirius in his 20 inch, to no avail. It only ruined our night vision, and sent us packing at 2 AM.

Christmas Solar Eclipse!

On Christmas morning, a fine partial solar eclipse occurs for North America (see the December Sky and Telescope for details). The farther northeast you are, the deeper the eclipse, and New York gets nearly two thirds of the Sun covered. Albuquerque still sees one third of the Sun covered, early to mid morning. In any event, be very cautious as to how you observe this event: this is a partial eclipse, and not total- so eye damage can occur if you look directly at the Sun!!! Why not simply project the Sun, or better yet, get with an experienced TAAS member to observe the event? Call me at 254-9117, or the TAAS hotline at 296-0549.

November Trivia
by Barry Spletzer

Who was the first to conclude that Mars had two moons?

a) Galileo Galilei
b) Johannes Kepler
c) Christaan Huygens
d) Asaph Hall
e) Percival Lowell

Answer

All of the names listed here have connections with Mars. Perhaps Percival Lowell connection is best known since he made the “canals” of Mars world-famous. His idea was based on observations by Giovanni Virginio Schiaparelli, an Italian who called the markings he saw on Mars canali (Italian for channel). It is said that the mistranslation of canali to canal is what got Percival Lowell started in his belief that there were Martians building canals. In spite of his wonderful imagination, Percival (1855-1916) was born much too late to be our winner here.

Asaph Hall has a much stronger claim to the honor of first concluding that Mars had two moons. He is the Discover or both of Mars’ moons in 1877. They waited so long to be discovered because, compared to the more famous moons of the Earth, Jupiter, and Saturn they are very small. Phobos, Mars, largest moon is only 16 miles across at its widest point (compared to the 2160 mile diameter of our moon). He is not our winner either because, in spite of his discovery, others had concluded that Mars had two moons much earlier.

Christaan Huygens, the famous Dutch astronomer, never got involved with Martians moons so he is not the winner. His claim to fame is that he first noticed surface markings on the planet.

The first person to conclude that Mars had two moons was Johannes Kepler. He was always searching for harmony and geometric regularity among the planets. One of his great efforts was to use the five Platonic solids of geometry to predict the orbital radii of the planets. His conclusion about Mars, moons was based on the observations of Galileo who had discovered the four largest moons of Jupiter in 1610. Kepler, looking for geometry in the sky, immediately concluded that if the Earth has a single moon and Jupiter has four, then Mars, situated between the two, must have two moons. He further went on to speculate that Mercury and Venus should have zero or one moon and Saturn should have six or eight. He did not speculate about the moons around Uranus and Neptune. These outer planets had not yet been discovered. Even though his reasoning was completely erroneous, his conclusion was correct. Mars does have two moons.
I would like to respond to the August, 1998 Trivia Question written by Barry Gordon. (Sorry this has taken so long: the correct explanation only recently came to me). The question was: “For your best chance of success when photographing Jupiter and Saturn, you should be under: a) Country summer skies  b) Country winter skies c) City summer skies d) City winter skies e) Any of the above. The answer, as argued by Barry, is c) City summer skies. To quote Barry in the October 1998 Sidereal Times, “Hence, the name of the game here is ‘seeing’ - which is astro-jargon for the calmness of the air- and it turns out that ‘dirty’ air tends to be calmer than clean air. And adding summer’s ‘higher humidity’ to it will tend to make it even calmer.”

At the meeting, I objected to the answer, and suggested that country, summer skies would generally yield the best seeing. Here’s why. There are two mechanisms that come into play here: summer or winter skies, and country or urban skies. With regards to summer or winter skies, I think that we all can agree that cold winter nights when stars twinkle hard- are not good for planetary observation. In winter, humidities are low, and the jet stream is more than less commonly present high overhead. This makes for poor seeing in the city, AND the country. Choices b, d, and e are eliminated. Summer is best.

Now, with regards to clean country, summer air OR dirty urban, summer air, it occurred to me it’s not the dirty air itself that makes for better seeing, rather, it is the atmospheric mechanism called an inversion that causes both pollutants to accumulate over an urban area, AND calm skies at night, either in the city, or the country. These (miserable) inversions are usually associated with the sub-tropical Bermuda High. In July, August, and early September, the Bermuda High typically “digs in” over eastern USA, and produces hot, sticky, smelly, and breezeless days over large metro areas like Philadelphia, Washington, DC, and New York City (where Barry is from)! There are no upper level winds to speak of, and even though humidities can reach 60 percent or higher- in the city and country-convective systems can’t develop because of the very stable lapse rate (the rate the air cools with altitude) in the atmosphere. Air pollutants- nitric oxide, ozone, carbon monoxide, hydrocarbons, and particulates- which occur at only trace levels in the air of a large city have very little, or no effect- good or bad-on atmospheric seeing.

So really the question comes down to this: knowing that high humidities are best for good seeing, are summer humidities significantly higher in the city than in the country? No, they are not! Recall that swamp coolers are a phenomenon of western cities- not east coast cities. Swamp coolers do produce significantly higher humidities in cities like Phoenix, but not New York. In fact, the forested, and farmed areas outside of eastern cities are more humid, because of transpiration from trees and crops. Furthermore, urban areas are particularly destructive to good seeing because they act as heat sinks- high rise buildings sop up heat all day, and this heat de stabilizes the atmosphere at night. Concrete and asphalt are never conducive to good seeing! The heat sink idea was discovered by tornado experts: hotter daytime temperatures over large cities actually keep tornadoes away! Suburban areas, and the country, remain cooler, and more humid than nearby urban areas- all day long. Trees, crops, and grass are best for good seeing.

If you’ve lived in a big city, you know that summer is the best time to view planets, but not quite as good as the planetary views during summertime in the forested country- where I grew up, 35 miles east of New York City! The correct answer is “a”.

Kevin McKeown
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