The Valley Skywatcher

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More information can be found on our web site: www.chagrinvalleyastronomy.org

Editor: Dan Rothstein

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Extragalactic Planets. By Russ Swaney

There's been a lot of news lately on extrasolar planet discoveries (over 300 so far) and looking at an NGC 7331 image I took got me thinking about extra-*galactic* planets NGC 7331 is a spiral Galaxy in the constellation Pegasus

A long time ago, a stream of photons made their escape (after spending a million years bouncing around in their birthplace stars), spreading out into nearly empty space. From our perspective, nearly 50 million years pass until a minuscule percentage of them fall onto our Earth (whether any time passes for the photon's is, apparently, debatable).

As seen from that galaxy the Earth is a tiny spot, intercepting less than 10^{-12} of the photons produced by that galaxy. But the galaxy creates a prodigious number of photons and about 10^{15} of its visual and NIR photons fall onto the Earth every second. Not every

Earth-bound photon makes it to the surface due to atmospheric absorption and scatter, but when NGC7331 is high in the night sky, my 10” telescope intercepts approximately one million visible and NIR photons/sec from that distant place. If my scope and camera had a combined efficiency (note 1) near 45%, then a one second exposure would register about 450,000 photons.

A single sun-like star in NGC 7331 contributes less than 1 billionth of the total number of photons from the galaxy. This means that my scope will receive less than 1 photon per hour from that star. Any planet of that star will contribute less than one photon every CENTURY! So even if my telescope could potentially "resolve" such planets, I would still never be able to image them (note 2).

Note 1:
Not all of the photons intercepted by the scope make it to the image plane. Each reflective surface loses about 12% of the visible & NIR photons and each glass transmission losses another 1-2%. This can add up. My system has 2 mirrors and 2 glass plates, which results in an overall transmission of about 72%. Furthermore, my camera does not detect all the photons delivered to it. It’s Quantum Efficiency is about 60%, so it detects less than 45% of the photons intercepted by the scope.

Note 2:
I’m aware of the Pixel-lensing (gravitational microlensing) work being done by the National Institute of Nuclear Physics in Italy, but the objects they are “detecting” all have masses 6X greater than Jupiter, so you can’t rule out they are “seeing” a Brown Dwarf.

Forty Years Ago This Winter in CVAS History compiled by the editor

This is the first of four columns which will recall past events forty, thirty, twenty, and ten years ago in the history of CVAS. Some of these can still be remembered by your editor or other members and some were found in the old editions of the Sky watcher. The following date from the late fall and winter of 1973. Only two volumes of volume 6 of the Skywatcher are in the club archives, and the meeting minutes from that era vanished long ago, so some extrapolating from previous and later volumes was done in conjunction with our imperfect memories, so bare with me.

The membership list includes 26 members.
A common theme is “as usual Cleveland weather was again terrible.”
Meetings are still being held at members’ homes.
George Gliba departs for the air force in July of 69, first assigned to an air base in Mississippi, and then to the DEW Line in Alaska. It is here that he earns his nickname Polar Bear Gliba.

The previous August, the most successful meteor watch in CVAS history is held for the Perseids in the turn-around at the editor's house. Seven members stay all night, more than 500 meteors are recorded, 70 brighter than -1 magnitude.

The CVAS annual star party at Riverside Park in downtown Chagrin Falls is finally held on the fourth try after being postponed 3 times because of bad weather.

OTAA meetings (sponsored by CAA and Black River) were being held at Western Reserve Academy in Hudson.

Five members, including your editor, attend February's Case Lecture titled "Serendipities in Astronomy," at the Warner and Swasey Observatory. The Taylor Road Observatory was still in use at that time, but now at the lectures are held at the Natural History Museum.

Comet Bennet is the observing highlight of the winter, an easy naked-eye object low in the predawn eastern sky during late March, April and early May. It shows a tail as much as 10 degrees long and is as bright as 1st Magnitude in late March, to 2nd in mid-April, fading rapidly to 5th magnitude by the end of April. It was located between Pegasus and Cygnus during that time. I observed it naked-eye, with binoculars and with Andy Jackson's 4 inch Edmund refractor out of the back door of my dorm at KSU.

Planning is under way for several events. First, a May, 1970 transit of Mercury (which I think was clouded out). A trip to Newport News, Virginia was planned for the total solar eclipse that summer (June?). This trip was cancelled since none of us had a car to drive there and the mother who volunteered to drive us chickened out the day before due to a marginal forecast (it turned out to be perfectly clear there). Very long-distance planning was begun for the July, 1972 total solar eclipse on the Gaspe Peninsula of Canada. Steve Forbes and I drove there only to have the rain move in two hours before totality. The Cleveland weather jinx always seems to travel with us.

Constellation Quiz from the editor

This is a continuation of a column I started years ago to test your knowledge of the constellations and to highlight some of the obscure constellations and asterisms which have gone out of use. The references to these groupings come from old astronomy books I have accumulated over the years such as *The Expanse of Heaven by* Proctor; 1876, *Astronomy with the Naked Eye,* 1908, and *Astronomy with an Opera Glass,* 1888, and *Curiosities of the* Sky, 1909, by Garrett Service; *In Starland with a Three Inch Telescope,* by William Tyler Olcot, 1909; *The Geography of the Heavens,* 1856, and *Elementary* Astronomy, 1847, by H. Mattison; *Uranography*, by C. A. Young, 1897; and *A Guide to the* Stars, by E. Agar Beet. Some of these questions are as obscure as the asterisms. See if you can answer the questions. Answers will be in the next issue.

1. Cassiopeia and Andromeda were mother and daughter. Name another close pair of constellations which were mother and son.
2. The obsolete constellation of Nocta lied between the feet of Virgo. Which bird did Nocta represent?

3. In one myth, these two stars were named after two characters who sailed on the Argo. In another they were the brothers of Helen of Troy. They were called the Dioscuri by the Romans. Lastly, sailors associated them with the lamps placed on their mast heads.
4. These two stars were stolen from one ecliptic constellation and given to another. One is the only naked eye star which shows a green color

The last constellation quiz was in October 2008, In that quiz, a number of typographical errors occurred which rendered two questions unanswerable. I will answer all them here.

1. The classic drawings of both Pegasus and Taurus only show the front parts of the animal.
2. Argo Navis, the ship, was later subdivided into Vela, Puppis, and Antilla.
3. The term “bagdei” is the Latinized version of the actual Greek designations for the Bayer Letters of the six brightest stars in Ursa Majoris, Virgo, and Corona. The brightest in each is beta, then alpha, gamma, delta, etc.
4. The four royal stars are Regulus, Folalhaut, Aldebaran, and Antares
5. The home of the Dumbell Nebula was actually known as Vulpecula et Anser, the fox and the goose

IYA, Forty Years Ago on the Moon, and 400 Years since Galileo -- by G.W. Gliba

We are just ending the International Year of Astronomy, and must remember that we are all one species on this planet. We are made of the elements made in the stars, and the Earth is our Mother. We should think past the differences we have, and focus on our similarites. We must get past our simple tribal, and national unities, and think globally. Because of climate change, pollution, and ecological crisis, we are all affected together as members of the biosphere.

It has been 40 years since Neil Armstrong became the first human being to walk on the moon during NASA's epoch Apollo 11 mission. I was a young man then, and was lucky to be looking at the moon when those famous words were spoken by Armstrong when he first stepped onto the lunar surface July 20, 1969. Although the USA was fighting a war in Viet Nam then, a proclamation was made by then US president Richard M. Nixon, that: "we came in peace for all mankind." NASA has done many wonderful things since then, but humans never returned to the moon after the Apollo Program ended in 1972 with the Apollo 17 mission.

The exploration of Space is something humans must do, so we can expand our horizons, and gain knowledge about the universe that we live in, and the planet that we live on. We are an important part of the universe, as we are an important part of Earth. "We" is everyone who is a member of our species, Homo Sapiens. We are made of stardust and evolved on this planet. We will still need robots and spacecraft for most of the missions, but whenever possible humans should explore. Instead of fighting wars so much, we should be fighting poverty and ignorance more. For we are capable of great things if we focus on the better part of our nature. The universe is evolving, and we are going along for the ride.

People must see themselves as being part of the Earth. It took us many years to evolve. Maybe our existence is more than just chance or luck, or maybe we were just lucky. Nobody really knows, but it is the advances made in science that has both enhanced and imperiled our lives, depending on how we apply our knowledge. Light pollution is a good example of misapplication, and unwise use of technology.

It is important to respect the rights of an individual, but also the other denizens of Earth. We are all Earthlings, and part of the ecosphere. We must have more wisdom as a species, and try to love the whole planet, because we may go extinct otherwise. The Earth is our Mother and we should treat her better anyway.

Besides being 40 years since humans landed on the moon, it has been 400 years since Galileo Galilei first turned his first good telescope to the skies and confirmed that Aristarchus, Democritus, and Copernicus were right; and that Aristotle, along with Catholic Church dogma was wrong. Poor Giordano Bruno paid a high price for being nearly correct nine years before Galileo looked through his telescope. We must believe more in science, while keeping in mind that science too has it's own biases and dogmas. We must create a better world for all, with tolerance, and explore the universe together as the diverse people of Earth. The IYA has been an opportunity to help more people feel a part of this wonderful cosmos that we are privileged to live in.

An Update on a Recent Controversy — from the Editor

This is a summary of an article which was published in the January 2010 issue of *Scientific American*, written by John D. Young and Jan Martel, both of Chang Gung University, Taiwan

New research seems to resolve the argument over the supposed “products of life” found in a meteorite that originated on Mars. Geologists have found what are being called nanobacteria from strata which predate the era of life on earth, These structures are significantly smaller than any previously known bacteria, from 10-200 nanometers in size. Similar carbonate spheres were found in a Martian meteorite that was collected in Antarctica, containing magnetite and iron sulfide particles and polycyclic aromatic hydrocarbons-all raw materials involved in biological processes. This discovery was heralded as proof of previous life on Mars. However, there was no actual proof that these structures were alive. Since DNA is typically 2 nanometers in diameter, it is questionable whether they could contain everything needed for life.

Later research has found both nucleic acids and proteins in these nanoparticles, which were found to be very common in most animal and human body fluids. They were also implicated in many common diseases. Since they are so primitive, and so ubiquitous, it is thought that they may explain the origins of life; however, many scientists remain unconvinced, labeling them the “cold fusion of microbiology.”

In 2007, it was found that simple minerals such as calcium carbonate (limestone) and calcium phosphate (apatite), when doped with proteins, grow and propagate as crystals, making them virtually identical to the nanobacteria, with cell-like walls, which appear to divide just like living bacteria. Mixtures of these nanometer size particles of calcium carbonate or calcium phosphate are sticky, binding avidly to any other charged

molecules such as ions, small organic compounds, lipids, or even nucleic acids and DNA.

Further research discovered that some of the proteins in the blood prevent these carbonate or phosphate compounds from crystallizing in the bloodstream, which could otherwise build up as stones in the tissues or cause hardening of artery walls. The early studies of nanobacteria in human tissue cultures were actually detecting the proteins, rather than the nanobacteria they were binding to. Nanobacteria have been conclusively shown to be nonliving structures, crystallized from common materials. It is possible that in a process of self-replication similar to that seen in nanobacteria, minerals combined with small organic molecules to form the first building blocks of life, perpetuating themselves. These complexes could have served to shelter and compartmentalize the earliest life processes, but they are not alive themselves. So, life on Mars has not been verified, but the biologists and the medical community is very excited .