the Webfooted Astronomer
The Seattle Astronomical Society
January 2006

Special points of interest:

- Banquet
- Nearby Disk Contains Life's Chemicals
- Reflections on the Scientific and Cultural Implications of Finding Life in the Cosmos

January Meeting:

The SAS Banquet

The meeting of this month will be replaced by the SAS Banquet. We are please to have Dr. Peter Ward to be our speaker. He is the author of "Life as We Do Not Know It: The NASA Search for (and Synthesis of) Alien Life"; "Gorgon: Paleontology, Obsession, and the Greatest Catastrophe in Earth's History"; and with Don Brownlee, "Rare Earth" and "The Life and Death of Planet Earth".

Meeting Information

The SAS Banquet, January 21
6:00 p.m.

Rock Salt on Latitude 47°
Restaurant & Catering
1243 Westlake Avenue North
Seattle WA 98019

Registration required. For more information, please see page 5...

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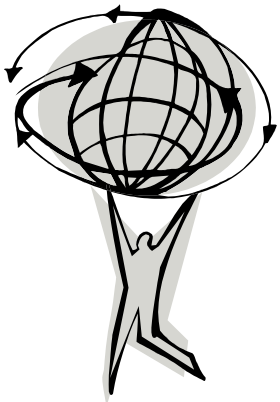


From the President's Desk…

Banquet

By Thomas Vaughan

Banquet

Have you sent in your reservations for Banquet? It's easy! Just send a check to the treasurer, and specify your menu choices there. See the ad in this newsletter, or go online at http://www.seattleastro.org/banquet.html.

This year's speaker is Dr. Peter Ward, author of *Gorgon* and *Rivers in Time*, and with Dr. Brownlee has written *Rare Earth* and *The Life and Death of Planet Earth*.

Again, the Banquet is Saturday, 21 January, at 6pm at the Rock Salt. Send in your checks now, **the last day to register is Saturday, 14 January.**

If you have astrophotos (or photos of the the Society) that you would like to share that evening, do get in touch with myself or Bruce Kelley. We will have a display and slideshow of photos before the meal.

As usual, there will be fabulous door prizes, and good food. If you have any questions about Banquet, feel free to contact me at president@seattleastro.org. I look forward to seeing you there!

The last day to register for the SAS Banquet is Saturday, January 14th.

Register before it's too late!

Dark Sky Site

We are still fundraising for a Dark Sky site for the club. Ideal sites are in Eastern Washington, near I-90 (Table Mountain is in that area, for instance). That's a great combination of accessibility, dark skies, and little precipitation. If you haven't yet signed up, please take a look at the proposal and membership/donation form available on our website at http://www.seattleastro.org/dark-sky.html.

Volunteering

Interested in helping out with the Society? We have a number of ways you can participate. For instance, the SAS volunteers at the UW's Theodor Jacobson Observatory. Volunteers receive training, and help out once every other month at the bi-monthly public viewing nights.

We are looking for a VP of Membership. And there is always room for more help at meetings and public star parties. Let myself or any member of the board know if you are interested in helping, or would like to know more!

Happy Observing, and Happy New Year-

-Thomas

SAS December 2005 Club Meeting Minutes

Announcements:

SAS Banquet will be held on 1/21/06 at The Rock Salt on Lake Union Restaurant. Speaker is Dr. Peter Ward, paleontologist and author..

If any members have photographs they would like to show off, please bring them to the banquet as a table will be set up to display them.

Calendar dates for January are 1/7 for the public star parties at Greenlake and Paramount Park. The telescope makers' group will meet on 1/28.

Volunteers are needed to assist at the UW Theodor Jacobson Observatory on observing nights. Anyone interested in participating in this great outreach program should Mike Langley.

Meeting Topic:

A detailed and fascinating talk was given by Tom Colwell on the research and history of "The Christmas Star".

Meeting was adjourned around 9:00PM.

The Latest Announcement on Our SAS BANQUET for 2006

The last day to register is Saturday, January 14th

Location	ROCK SALT ON LATITUDE 47° RESTAURANT & CATERING 1232 WESTLAKE AVENUE NORTH SEATTLE WA 98109
Date/Time	21 January, 2006 6:00-6:30pm: No Host Bar 6:30pm: Dinner served promptly
Menu	Roasted King Salmon **or** Prime Rib **or** Vegetarian Penne Pasta Entree will be served with: Caesar salad, garlic mashed potatoes, bread and butter, coffee or tea, dessert.
Cost	$31.00 per person
Speaker	**Dr. Peter Ward** Author of "*Life as We Do Not Know It: The NASA Search for (and Synthesis of) Alien Life*"; "*Gorgon: Paleontology, Obsession, and the Greatest Catastrophe in Earth's History*"; and with Don Brownlee, "*Rare Earth*" and "*The Life and Death of Planet Earth*".
Payment	Send your ***entree choice*** and ***check*** (made out to **SAS**) for $31.00 per person to the following address: Seattle Astronomical Society Attn: BANQUET P.O. Box 31746 Seattle, WA 98103 Questions? Contact Thomas Vaughan (banquet@seattleastro.org or (206) 772-1282)

Space Bits

An artist's impression of the dusty disk orbiting IRS 46. Image credit: NASA/JPL-Caltech.

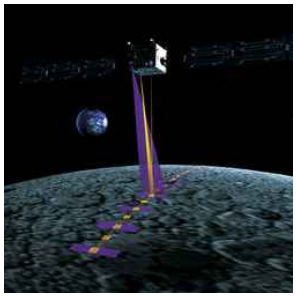
Nearby Disk Contains Life's Chemicals

A planet forming disk located about 375 light-years from Earth has been found to contain some of the building blocks of life: acetylene and hydrogen cyanide. The chemicals were discovered around "IRS 46" using NASA's infrared Spitzer Space Telescope. When mixed with water in a laboratory, these chemicals create a soup of organic compounds, including amino acids and a DNA base called adenine.
Link: http://www.universetoday.com/am/publish/milkyway_chemistry.html?27122005

Mars seems not to be as wet as it was predicted. Image credit: NASA

Lakebed on Mars Wasn't So Watery In the Past

The Meridiani Planum region on Mars is currently the home of NASA's Opportunity Rover. But scientists believe that the entire region was covered with water millions of years ago, and could have been home to life. A new study is proposing that the area might have been much less wet than previously believed. A key element discovered by Opportunity could have been created by sulphur-bearing volcanic steam, and not water sediment layered down.
Link: http://www.universetoday.com/am/publish/boulder_mars_less_watery.html?23122005



Remote-sensing instruments on SMART-1 scan the Moon's surface. Image credit: ESA

New Imaging Technique Reveals the Moon's Secrets

ESA's SMART-1 spacecraft is using a new technique to reveal details on the surface of the Moon. The spacecraft has been taking a series of images, only seconds apart, with its Advanced Moon Imaging Experiment (AMIE) instrument. The same location is imaged at different infrared wavelengths. Scientists back at ESA can then stack up the images to see the same spot on the Moon, imaged in all these different wavelengths, and notice any unusual features on the lunar surface.
Link: http://www.universetoday.com/am/publish/smart1_new_imaging_technique.html?23122005

Reflections on the Scientific and Cultural Implications of Finding Life in the Cosmos

[by Neil deGrasse Tyson]

Two species greeting each other, separated by epochs. Homo sapien and T. Rex

If the person on next to me on a long airplane flight ever finds out that I am an astrophysicist, nine times out of ten they ask, with wide eyes, about life in the universe. And only later do they ask me about the big bang and black holes. I know of no other discipline that triggers such a consistent and reliable reaction in public sentiment. This phenomenon is not limited to Americans. The time-honored question: "What is our place in the universe" might just be genetically encoded in our species. All known cultures across all of time have attempted to answer that question. Today we ask the same question, but with fewer words: "Are we alone?"

Ordinarily, there is no riskier step that a scientist (or anyone) can take than to make sweeping generalizations from just one example. At the moment, life on Earth is the only known life in the universe, but there are compelling arguments to suggest we are not alone. Indeed, most astrophysicists accept a high probability of there being life elsewhere in the universe, if not on other planets or on moons within our own solar system. The numbers are, well, astronomical: If the count of planets in our solar system is not unusual, then there are more planets in the universe than the sum of all sounds and words ever uttered by every human who has ever lived. To declare that Earth must be the only planet in the cosmos with life would be inexcusably egocentric of us.

Many generations of thinkers, both religious and scientific, have been led astray by anthropic assumptions, while others were simply led astray by ignorance. In the absence of dogma and data, history tells us that it's prudent to be guided by the notion that we are not special, which is generally known as the Copernican principle, named for the Polish astronomer Nicholas Copernicus who, in the mid 1500s, put the Sun back in the middle of our solar system where it belongs. In spite of a third century B.C. account of a sun-centered universe proposed by the Greek philosopher Aristarchus, the Earth-centered universe was by far the most popular view for most of the last 2000 years. Codified by the teachings of Aristotle and Ptolemy, and by the preachings of the Roman Catholic Church, people generally accepted Earth as the center of all motion. It was self-evident: the universe not only looked that way, but God surely made it so.

(*Continued on page 12...*)

January 2006

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5 UW Astronomy Colloquium	◐ 6	7 Public Star Party
8	9	10	11	12	13	○ 14 Telescope Makers Meeting
15	16	17	18	19 UW Astronomy Colloquium	20	21 SAS Banquet
◑ 22	23	24	25	26 UW Astronomy Colloquium	27	28
● 29	30	31				

February 2006

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2 UW Astronomy Colloquium	3	4 Public Star Party
5	6	7	8	9 UW Astronomy Colloquium	10	11 Telescope Makers Meeting
12	13	14	15 SAS Meeting	16 UW Astronomy Colloquium	17	18
19	20	21	22	23 UW Astronomy Colloquium	24	25
26	27	28				

A New View of the Andromeda Galaxy

[By Dr. Tony Phillips and Patrick L. Barry]

This is a good time of year to see the Andromeda galaxy. When the sun sets and the sky fades to black, Andromeda materializes high in the eastern sky. You can find it with your unaided eye. At first glance, it looks like a very dim, fuzzy comet, wider than the full moon. Upon closer inspection through a backyard telescope—wow! It's a beautiful spiral galaxy.

At a distance of "only" 2 million light-years, Andromeda is the nearest big galaxy to the Milky Way, and astronomers know it better than any other. The swirling shape of Andromeda is utterly familiar.

Not anymore. A space telescope named GALEX has captured a new and different view of Andromeda. According to GALEX, Andromeda is not a spiral but a ring.

GALEX is the "Galaxy Evolution Explorer," an ultraviolet telescope launched by NASA in 2003. Its mission is to learn how galaxies are born and how they change with age. GALEX's ability to see ultraviolet (UV) light is crucial; UV radiation comes from newborn stars, so UV images of galaxies reveal star birth—the central process of galaxy evolution.

GALEX's sensitivity to UV is why Andromeda looks different. To the human eye (or to an ordinary visible-light telescope), Andromeda remains its usual self: a vast whirlpool of stars, all ages and all sizes. To GALEX, Andromeda is defined by its youngest, hottest stars. They are concentrated in the galaxy's core and scattered around a vast ring some 150,000 light years in diameter. It's utterly *un*familiar.

"Looking at familiar galaxies with a new wavelength, UV, allows us to get a better understanding of the processes affecting their evolution," says Samuel Boissier, a member of the GALEX team at the Observatories of the Carnegie Institution of Washington.

Beyond Andromeda lies a whole universe of galaxies—spirals, ellipticals and irregulars, giants and dwarfs, each with its own surprising patterns of star formation. To discover those patterns, GALEX has imaged hundreds of nearby galaxies. Only a

few, such as Andromeda, have been analyzed in complete detail. "We still have a lot of work to do," says Boissier, enthusiastically.

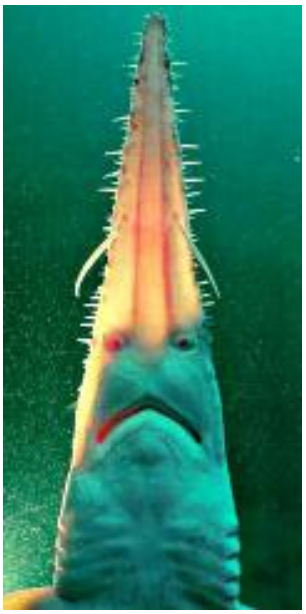
GALEX has photographed an even greater number of distant galaxies—"some as far away as 10 billion light-years," Boissier adds—to measure how the rate of new star formation has changed over the universe's long history. Contained in those terabytes of data is our universe's "life story." Unraveling it will keep scientists busy for years to come.

For more about GALEX, visit www.galex.caltech.edu. Kids can see how to make a galactic art project at spaceplace.nasa.gov/en/kids/galex/art.shtml.

The GALEX telescope took this UV image of the Andromeda galaxy (M31), revealing a surprising shape not apparent in visible light.

(*Continued from page 7: Reflections on the Scientific and Cultural Implications of Finding Life in the Cosmos...*)

The sixteenth century Italian monk Giordano Bruno suggested publicly that an infinite universe was filled with planets that harbor life. For these thoughts he was burned upside down and naked at the stake. Fortunately, today we live in somewhat more tolerant times.



Alien species, terrestrial biodiversity. Credit: NGS

While there is no guarantee that the Copernican principle will guide us correctly for all scientific discoveries to come, it has humbled our egos with the realization that not only is Earth not in the center of the solar system, but the solar system is not in the center of the Milky Way galaxy, and the Milky Way galaxy is not in the center of the universe. And in case you are one of those people who thinks that the edge may be a special place, then we are not at the edge of anything either.

A wise contemporary posture would be to assume that life on Earth is not immune to the Copernican principle. If so, then how can the appearance or the chemistry of life on Earth provide clues to what life might be like elsewhere in the universe?

I do not know whether biologists walk around every day awestruck by the diversity of life. I certainly do. On this single planet called Earth, there co-exist (among countless other life forms), algae, beetles, sponges, jellyfish, snakes, condors, and giant sequoias. Imagine these seven living organisms lined up next to each other in size-place. If you didn't know better, you would be hard-pressed to believe that they all came from the same universe, much less the same planet. Try describing a snake to somebody who has never seen one: "You gotta believe me. There is this animal on Earth that 1) can stalk its prey with infrared detectors, 2) swallows whole live animals up to five times bigger than its head, 3) has no arms or legs or any other appendage, yet 4) can slide along level ground at a speed of two feet per second!"

Given the diversity of life on Earth, one might expect a diversity of life exhibited among Hollywood aliens. But I am consistently amazed by the film industry's lack of creativity. With a few notable exceptions such as life forms in *The Blob* (1958) and in *2001: A Space Odyssey* (1968), Hollywood aliens look remarkably humanoid. No matter how ugly (or cute) they are, nearly all of them have two eyes, a nose, a mouth, two ears, a head, a neck, shoulders, arms, hands, fingers, a torso, two legs, two feet -- and they can walk. From an anatomical view, these creatures are practically

indistinguishable from humans, yet they are supposed to have come from another planet. If anything is certain, it is that life elsewhere in the universe, intelligent or otherwise, will look at least as exotic as some of Earth's own life forms.

The chemical composition of Earth-based life is primarily derived from a select few ingredients. The elements hydrogen, oxygen, and carbon account for over 95% of the atoms in the human body and in all known life. Of the three, the chemical structure of the carbon atom allows it to bond readily and strongly with itself and with many other elements in many different ways, which is how we came to be carbon-based life, and which is why the study of molecules that contain carbon is generally known as "organic" chemistry. The study of life elsewhere in the universe is known as exobiology, which is one of the few disciplines that, at the moment, attempts to function in the complete absence of first-hand data.

Is life chemically special? The Copernican principle suggests that it probably isn't. Aliens need not look like us to resemble us in more fundamental ways. Consider that the four most common elements in the universe are hydrogen, helium, carbon, and oxygen. Helium is inert. So the three most abundant, chemically active ingredients in the cosmos are also the top three ingredients in life on Earth. For this reason, you can bet that if life is found on another planet, it will be made of a similar mix of elements. Conversely, if life on Earth were composed primarily of, for example, molybdenum, bismuth, and plutonium, then we would have excellent reason to suspect that we were something special in the universe.

Appealing once again to the Copernican principle, we can assume that the size of an alien organism is not likely to be ridiculously large compared with life as we know it. There are cogent structural reasons why you would not expect to find a life the size of the Empire State Building strutting around a planet. But if we ignore these engineering limitations of biological matter we approach another, more fundamental limit. If we assume that an alien has control of its own appendages, or more generally, if we assume the organism functions coherently as a system, then its size would ultimately be constrained by its ability to send signals within itself at the speed of light -- the fastest allowable speed in the universe. For an admittedly extreme example, if an organism were as big as the entire solar system (about 10 light-hours across), and if it wanted to scratch its head, then this simple act would take no less than 10 hours to accomplish. Sub-slothlike behavior such as this would be evolutionarily self-limiting because the time since the beginning of the universe may be insufficient for the creature to have evolved from smaller forms of life over many generations.

Source: http://www.nasa.gov/vision/universe/starsgalaxies/search_life_I.html

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The Seattle Astronomical Society is an organization created and sustained by people who share a common interest in the observational, educational, and social aspects of amateur astronomy. Established in 1948, the SAS is a diverse collection of over 200 individuals. A variety of programs and activities is presented by the SAS throughout the year. Monthly meetings feature speakers on a wide range of topics, from the Hubble Space Telescope to electronic imaging to personal observing experiences. The club holds public observing "star parties" at Green Lake every month, dark sky observing parties outside Seattle, plus such activities as meteor watches, public telescope and astronomy displays, National Astronomy Day, and an annual Awards Banquet.

The Seattle Astronomical Society

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