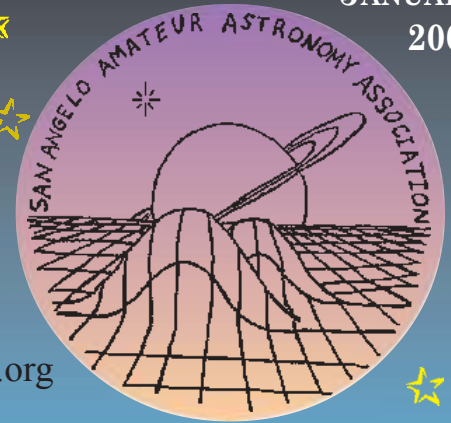


Starbeams and Heliowinds

JANUARY
2005



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NEWSLETTER OF THE SAN ANGELO AMATEUR ASTRONOMY ASSOCIATION INC. EST. 1962
MEMBER OF THE NASA NIGHT SKY NETWORK

Antennas, Designed by Darwin



BY PATRICK L. BARRY

Who in their right mind would design this bizarre-looking antenna? Actually, nobody did. It *evolved*. Taking a cue from nature, NASA engineers used a kind of “artificial evolution” to find this design. The result may look odd, but it works very well.

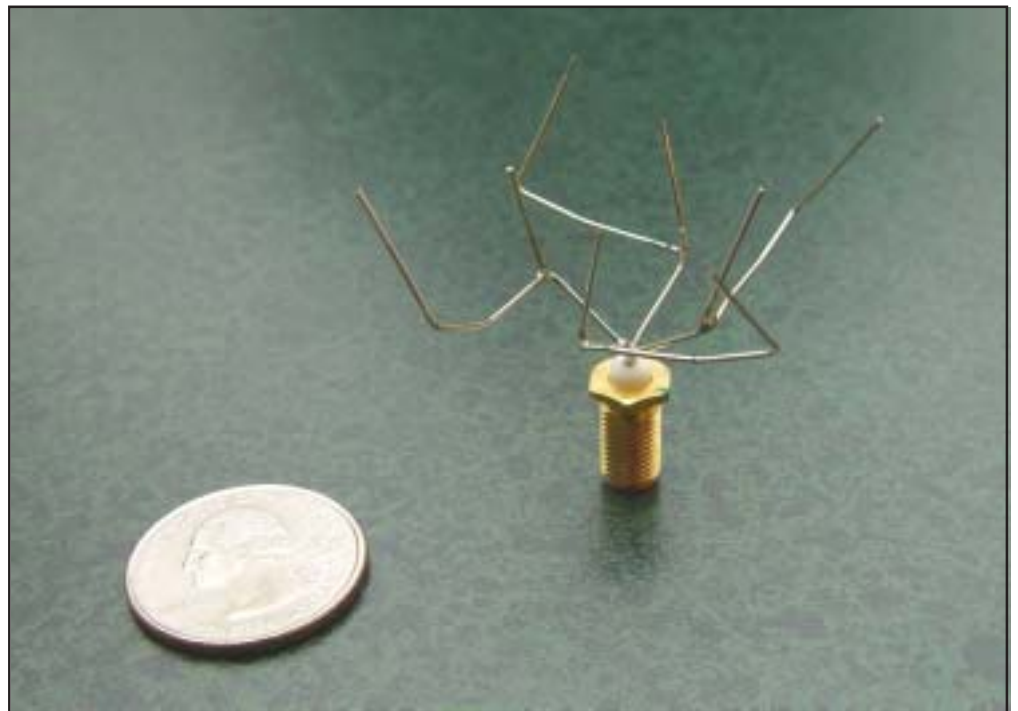
“The evolutionary process improves the design of antennas, just as evolution in nature leads to fitter plants and animals,” says Jason Lohn, leader of the Evolvable Systems Group at NASA’s Ames Research Center.

The improvement comes from Darwin’s idea of natural selection: only the fittest members of a generation survive to produce offspring. Over many generations, traits that hinder survival are weeded out, while beneficial traits become more common. “In the end,” he says, “you have the design equivalent of a shark, honed over countless generations to be well adapted to its environment and tasks.”

Evolutionary computation, as it’s called, applies this principle to hardware design. It’s particularly useful for tackling problems that

are difficult to solve by hand—like the design of new antennas.

Designing a new antenna for NASA’s Space Technology 5 (ST-5) mission was the challenge facing Lohn’s group. ST-5 will explore how TV-sized “nanosatellites” can perform the tasks of much larger, conventional satellites at a cheaper cost. Antennas on



Happy New Year!



these satellites must be smaller than usual, yet capable of doing everything that a bigger antenna can do.

The evolution of this bizarre-looking antenna happened inside a computer. Many random designs were tested in a computer simulation. The computer judged their performance against certain goals for the design: efficiency, a narrow or wide broadcast angle, frequency range, and so on.

As in nature, only the best performers were kept, and these served as parents of a new generation. To make the new generation, the traits of the best designs were randomly mixed by the computer to produce fresh, new designs—just as a father and mother’s genes are mixed to make unique children. This new generation was again tested in the computer simulation, and the best designs became the parents of yet another generation. This process was repeated thousands, millions of times, until it settled onto an optimal, shark-

like design that wouldn’t improve any further. With today’s fast computers, millions of generations can be simulated in only a day or so. The result: an excellent antenna with an odd shape no human would, or could, design.

For more about artificial evolution, see ic.arc.nasa.gov/story.php?sid=86&sec. For more about Space Technology 5, see nmp.nasa.gov/st5. For an animation that helps explain to kids how ST5’s antenna sends pictures through space, go to spaceplace.nasa.gov/en/kids/st5xband/st5xband.shtml.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

"There is just one thing I can promise you about the outer-space program - your tax dollar will go further."

Werner von Braun

"We will never be an advanced civilization as long as rain showers can delay the launching of a space rocket"

George Carlin

Editorial Information

STARBEAMS AND HELIOWINDS is the monthly newsletter of the San Angelo Amateur Astronomy Association, Inc.

Publication date is the 26th of each month. Deadline for the submission of articles is the Tuesday preceding the monthly meeting. Please submit articles on disk (.rtf, .doc, or .txt files) or via e-mail. Rich text format (.rtf) is preferred.

Address all newsletter correspondence to:
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The San Angelo Amateur Astronomy Association Inc. was founded in 1962. Membership is open to anyone. For membership information contact any of the following officers or visit our monthly meetings at the ASU Planetarium. Our mailing address is PO Box 60391, San Angelo Texas, 76906.

President – Ted Hume
Sec/ Tres – Lana Lynch, 651-4461

Got any news items or articles to contribute?
Anything to buy, sell or trade? Write to us!

Deadline for next newsletter is Thur, Jan. 27th.

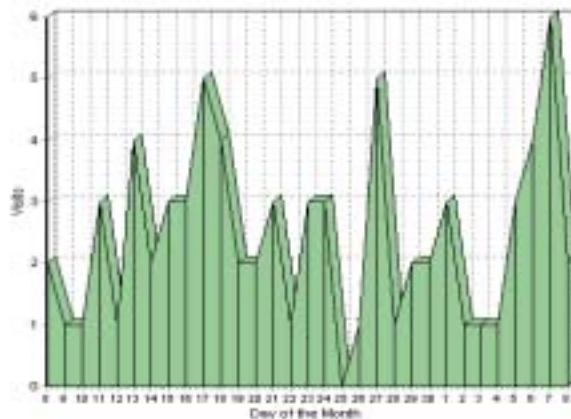
Meeting Schedule



Jan 4th • Feb 1st
Mar 1st • April 5th

Meetings are conducted at the Angelo State University Planetarium located in the Physical Science building. Meetings begin at 7:00pm on the first Tuesday of each month. No food, drink or tobacco in the planetarium, please.

Website Visit Summary for www.saaaa.org



Visits
Nov 8
to
Dec 8
-75-

Daily Avg.
2.5

**San Angelo Amateur Astronomy Association, Inc.
Meeting Minutes For Dec. 7, 2004**

Submitted by Lana Lynch, Secretary-Treasurer

President Ted Hume called the meeting to order at 7:00 p.m. Secretary-treasurer Lana Lynch announced that the annual club elections would be held at the February 01 meeting. The offices up for election this year Vice-president for Public Affairs, Vice-president for Observatory Affairs and Secretary-treasurer. The February meeting will also be our official Board of Directors annual meeting.

No star party dates were announced for December. Observing will be on an individual basis. Fred Johnson reported that he and Gary Brown had sprayed the 12 1/2 " scope building to get rid of the yellow jackets nesting within. Fred also reported that the 6" dobsonian scope has a 2" diagonal mirror and is working well. Kent Frazier talked about the HeavensAbove.com web site and watching the passage of the ISS and several other satellites.

Andy Oliver talked about the Night Sky Network program and presented part of the contents of one of the kits as the program for the evening. Out of 150

clubs participating in the Night Sky Network, San Angelo is tied with San Antonio in sixth place in presenting the programs to the public. The first place club has logged 70 events and we have presented 18 or 19 programs. The first kit we received was called Planet Quest and was intended for elementary level audiences. The second kit was Our Galaxy, Our Universe and was a more advanced kit. Each kit contained 5 activities. Andy used the activity Our Place in the Galaxy as the program for the evening. Andy volunteered to present the program for the January meeting. The program will be Hubble's Video Collection from the Night Sky Network kit. Ted thanked Andy on behalf of the club for his work with the Night Sky Network.

There were 19 members and 2 visitors present. The meeting was adjourned at 7:46 p.m.



STAR PARTY REPORT

There was no star party last month due to uncooperative skies.

Sent in by Ted Hume:

I was browsing around the Heavens Above website and saw the following brief discussion on magnitudes...

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Magnitude

This is a measure of the brightness of a celestial object. The lower the value, the brighter the object, so magnitude -4 is brighter than magnitude 0, which is in turn brighter than magnitude +4. The scale is logarithmic, and a difference of 5 magnitudes means a brightness difference of exactly 100 times. A difference of one magnitude corresponds to a brightness difference of around 2.51 (the fifth root of 100). The system was started by the ancient Greeks, who divided the stars into one of six magnitude groups with stars of the first magnitude being

the first ones to be visible after sunset. In modern times, the scale has been extended in both directions and more strictly defined.

Examples of magnitude values for well-known objects are...

- Sun -26.7 (about 400,000 times brighter than full Moon!)
- Full Moon -12.7
- Brightest Iridium flares -8
- Venus (at brightest) -4.4
- International Space Station -2
- Sirius (brightest star) -1.44
- Limit of human eye +6 to +7
- Limit of 10x50 binoculars +9
- Pluto +14
- Limit of Hubble Space Telescope +30

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The Kingsville Astronomical Society, member of the Southwest Region of the Astronomical League, is hosting its *3rd Annual*

Deep South Texas Stargaze

Wednesday, Feb. 2 – Sunday, Feb. 6, 2005

Location: Escondido Ranch (25 mi. NW of Freer, TX)
Dark, Southern Skies - Remote Location - 28 degrees N. Latitude

Lodging: Very reasonable rates (\$5.00-\$12.50 per night)
 - Air conditioned/heated lodge with bunks and family rooms
 - Full hookup RV sites and primitive camping

Registration:
 \$15 per adult (\$7 for children) until January 26
 \$20 per adult (\$9 for children) after January 26

Program: Great speakers on Friday & Saturday afternoon
 Observing programs
 Drawings for great door prizes on Saturday afternoon

How to register for **DSTS 2005**:

1. Go to **DSTS 2005** website at http://www.geocities.com/kingsville_astronomical_society/dsts.htm
2. Download registration form (pdf file)
3. Print form and mail it with registration and any t-shirt order to:
 Kingsville Astronomical Society
 P.O. Box 5918
 Kingsville, TX 78364-5918

FMI:
 Jason Fry, President-
 Kingsville
 Astronomical
 Society
 1138 W. Henrietta Ave
 Kingsville, TX 78363
dstsreg@hotmail.com
 or 361-592-3783



Calendar of Upcoming Events

February 7–10, 2005, Houston, TX. Workshop on Radar Investigations of Planetary and Terrestrial Environments will be held at the Lunar and Planetary Institute (LPI), housed in the Center for Advanced Space Studies at 3600 Bay Area Boulevard, Houston, Texas. Ground-penetrating radar has been identified as an important tool in understanding the subsurface geology and distribution of water on the Earth, Moon, Mars, and Europa. Additionally, it is a key investigation for understanding the paleohydrology of planetary surfaces and for identifying potential subsurface habitats capable of sustaining primitive life forms.

During the coming decade a variety of radar tools will be used to address these tasks, with a particular emphasis on assessing the distribution and state of subsurface water. This workshop will focus on the capabilities of radar sounding and imaging systems to address these issues.

FMI: www.lpi.usra.edu/meetings/radar2005/

March 14–18, 2005, League City, TX. The 36th Lunar and Planetary Science Conference. All technical sessions, both oral and poster, will be held at the South Shore Harbour Resort & Conference Center, 2500 South Shore Boulevard, League City, Texas 77573 (phone: 281-334-1000 or 800-442-5005).

Masursky Lecture

The Masursky Lecture: speaker, Captain John Young, former astronaut during the Gemini, Apollo, and Space Shuttle eras.

Special Session on Cassini and Huygens: New Discoveries from Titan and the Saturnian System
 Special Session on the Genesis Mission
 Special Session on OMEGA@Mars: A New Window to the Composition and Evolution of the Martian Surface
 Special Session on Mars Polar Atmosphere-Surface Interactions
 Education/Public Outreach Workshop
 Open House Displays of Outreach Programs and Activities

Night Sky Network Notes....

- **Deep Impact Mission to Launch** from Kennedy Space Center, January 12. Educators are invited to attend the Deep Impact Winter Science Academy at Kennedy Space Visitor Center on January 11, one day prior to the launch of the Deep Impact spacecraft at Cape Canaveral. Night Sky Network members are welcome to attend as informal educators or share this opportunity with a teacher. Details can be found at: <http://deepimpact.umd.edu/workshop/index.html>

- **Huygens Rendezvous with Titan, January 14.** This mission was featured in our July teleconference when Dr. Stephen Gillam of the Jet Propulsion Lab provided the Night Sky Network with an evening telecon reviewing the Cassini mission and specifically what scientists are hoping the Huygens probe will reveal about Saturn's moon Titan. You can download Dr. Gillam's PowerPoint presentation from that teleconference by going to Toolkit Downloads and clicking on "Teleconference" or go to <http://nightsky.jpl.nasa.gov/docs/GillamCassini2.ppt>