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Cosmic Voices: Searching for signs of life elsewhere in the Universe

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Storyline

- What are we talking about?
- Is there anyone to talk to? [SETI]
- How do we communicate? [CETI]
Earth

- There are 100 billion galaxies, and a billion trillion stars, but this is the **only world we know with life**

- It is, as far as we know, **unique** in this regards

- Is there other life in the Cosmos? How do we find out?
As of 28 Dec 2010, we know of 515 worlds beyond our own solar system.

Still no worlds like the Earth.

There are places (perhaps) that could harbor life...

What might life look like? What should we be looking for? Can we friend them on Facebook?
Communicating

- The distances in the Cosmos are vast – communicating is a long term proposition

- **There are many obstacles!**
  - Broadcasters have to get the signal noticed!
  - Listeners have to interpret the signal!

- Use radio telescopes to send digital messages

- Use mathematical principles and astrophysics quantities
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The Arecibo Message

- In 1974, we sent a message consisting of 1679 digits toward the globular cluster in Hercules (25,000 lyr away)
The Arecibo Message

What’s that sound like?
The Arecibo Message

- The Arecibo Message is actually a digital image of sorts.

- Mathematical principle: there are 1679 digits. **1679** can be factored into **two prime numbers**:
  
  - **1679 = 23 x 73**

- Take the digits, and make a **picture grid** which is either:
  
  - (23 tall and 73 wide) or (73 tall and 23 wide)

  - If you have a 1, shade in the grid square

  - If you have a 0, leave the grid square blank

- Sometimes, there is a **primer**, to help you find one of the prime factors, or to teach you how to read the message
The Arecibo Message

The 23 tall x 73 wide doesn’t look like much:
The Arecibo Message

- The 73 tall x 23 wide looks like magic!

- **How to count 1 to 10**

- **Numbers 1, 6, 7, 8, 15** (atomic numbers of hydrogen, carbon, nitrogen, phosphorus – atoms in DNA)

- **DNA Nucleotides**

- **DNA Double Helix**, number of nucleotides

- **Human** (height on left, population on right)

- **Map of solar system**

- **Arecibo Telescope**
The Arecibo Message

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- **Arecibo Telescope**
THE EERIE SILENCE
Paul Davies

MURMURS OF EARTH
(out of print)
goldenrecord.org
"Sometimes I think we're alone. Sometimes I think we're not. In either case, the thought is staggering."
-R. Buckminster Fuller

- Pick up a Drake Puzzle Activity to practice on your own!
- Solution online at: www.physics.usu.edu/shane/science/drakePuzzle/