

Astronomy 330



HW#5 due tonight.

Next Week Presentations:

**Mike McCarthy & Tim Nossem
Max Schoenoff & Seth Kelter**

Presentations



- **Paul Mikols & Jack Sadanowicz:**
[Suspended Animation](#)
- **Matt Pest & Tom Doran:**
[Death of a Star](#)

Music: *It Overtakes Me/The Stars Are So Big, I am So Small... Do I Stand a Chance-* Flaming Lips

Life in Our Solar System

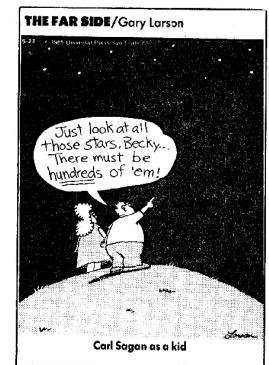


- ***No conclusive evidence exists for life in our solar system besides on Earth***
- But, possibilities exist for life
 - Venus's clouds may have migrated life.
 - Mars may have some microbial history linked to water, and perhaps some subsurface life.
 - Jupiter's reducing atmosphere may harbor sinkers.
 - Europa's sub-crustal oceans may harbor life, even fish-like life.
 - Titan is still very interesting
 - Thick atmosphere
 - Reducing chemistry



Optimism?

- Carl Sagan argues for $n_p > 3$.
 - If Venus had less clouds (less greenhouse) it could have been cool enough for life.
 - If Mars had a thicker atmosphere it could have been warm enough for life.
 - If solvents other than water were used, maybe the moons of the outer planets?
 - Giant Jupiter-like planets close in?
 - Non-Earth life?



<http://www.uranos.cu.org/biog/sagan.html>
<http://spider.ipac.caltech.edu/staff/jarrett/sagan/sagan.html>



Pessimism?



- We only considered temperature. What about:
 - Gravity?
 - Atmospheric pressure?
 - Size of the moon or planet?
 - Does life need a Moon-like moon? Does life need the tides? Does the Moon protect the Earth's rotation? Is a Jupiter needed?
- If we impose Earth chauvinism, we can easily reduce to $n_p \sim 0.1$



http://sagiru.tripod.com/Travel/Lost_in_the_Sahara/lost_in_the_sahara

HW #2



- **Adam Musto:**
http://www.alien-ufo-pictures.com/absolute_proof.aliens.exist.html
- **Peter Kim:**
<http://www.anunseenworld.com/do-ufo-exist.html>
- **Trent Wright:**
<http://ufocasebook.conforums.com/index.cgi?action=display&board=general&&num=1263008691&&start=6>

n_p : number of life planets per planetary system (average)



- Can range from 0.01 to >3 .
 - Is seismic activity necessary to recycle bioelements?
 - How important is the first atmosphere? Ozone?
 - Is a moon needed? A large Jupiter-like planet?
 - Is liquid water a requirement? Other solvents okay?
 - Not too hot, not too cold; not too much pressure, not too little— Goldilocks requirement?
 - Habitable Zone around the star.
 - Galactic Habitable Zone
 - Does atmosphere need feedback mechanism?
 - But in our solar system, maybe 5 nearly possible life planets.