

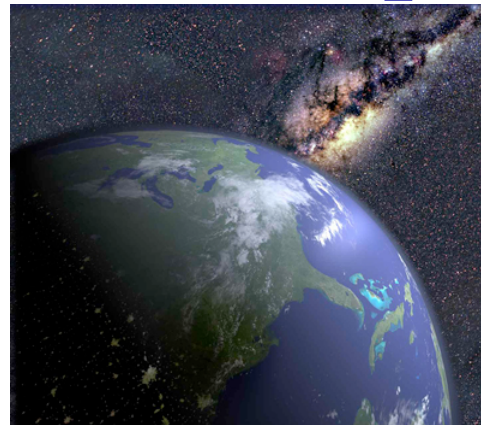
ASTR 202 – Life in the Universe

“An Introduction to Astrobiology”

Professor:

Yancy Shirley (N310)

Teaching Assistant: **Charlie Kilpatrick (201F)**



Course Materials:

The textbook for the class is *Life in the Universe*.

Readings will be posted online on the course webpage:

<http://eldora.as.arizona.edu/~yshirley/Arizona/AST202/>

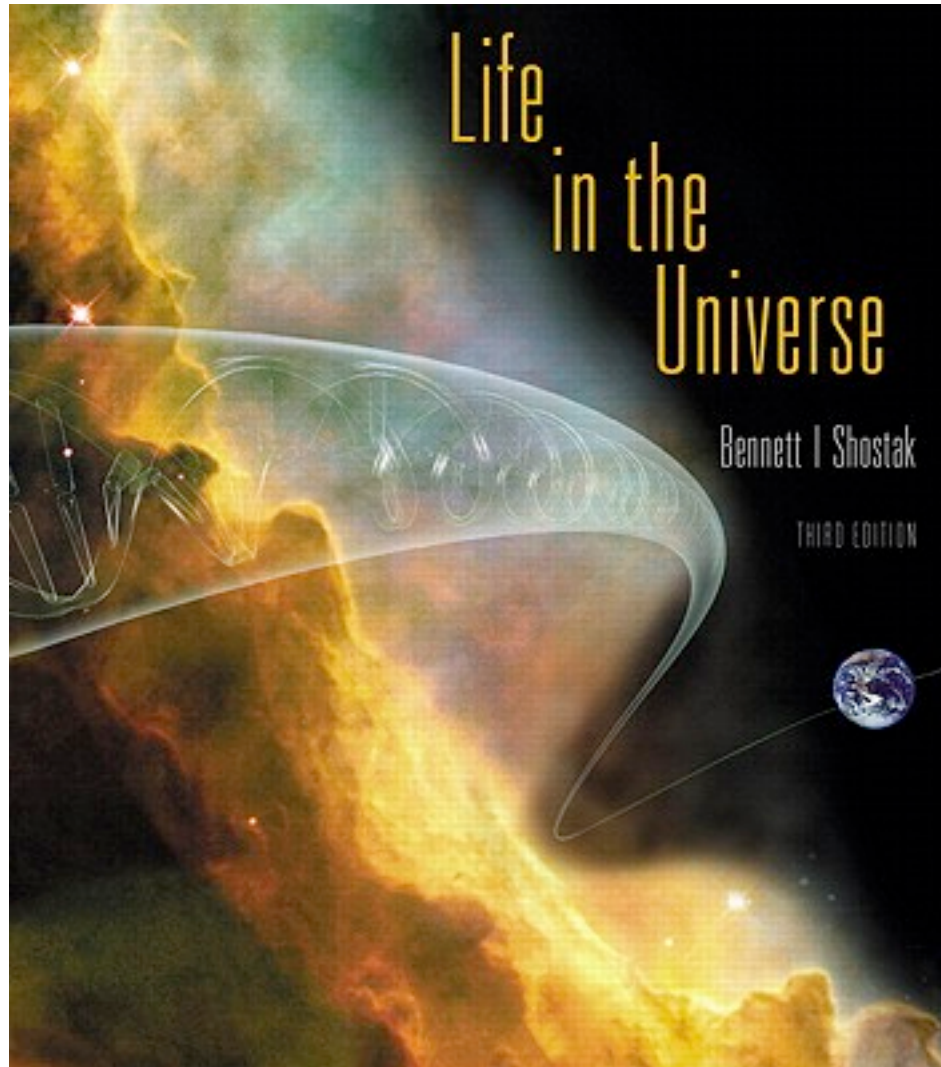
Goals of the Course

- Learn how scientists are trying to answer a very big question: is there life beyond the Earth?
- Become familiar with one of the most exciting and interdisciplinary areas in all of science
- Show you how scientists evaluate evidence and learn better how the natural world works
- Engage you in the process of science and let you actively participate in your own learning

NOT Goals of the Course

- Turn you into astronomers or scientists
- Get you to memorize facts and jargon
- Let you think that I have all the answers
- Evaluate you with multiple choice tests

TextBook



The Web Site

<http://eldora.as.arizona.edu/~yshirley/Arizona/AST202/>

AST 202 Life in the Universe

Class Homepage **MWF 10 - 11**
ILC 150
Spring 2014

APOD Prof: Dr. Yancy Shirley
office: Steward Observatory N310
office hours: MWF 11-12
phone: (520) 626-3666
[email](#)

Yancy's Webpage

GOOGLE TA: Charlie Kilpatrick
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office hours: TuTh 10-11
phone: (520) 621-6535
[email](#)

[Class Syllabus](#)

Life in the Universe is a scientific introduction to the burgeoning field of astrobiology. The main goal for students in this course is to have fun learning about the possibilities for life in the Universe and, in the process, gain an appreciation for the methods used in science.

CURRENT SCHEDULE (subject to change)

Date	Location	Topic	Reading
W Jan 15	ILC 150	Introduction to Astrobiology (slides) (Example A+ Creative Project)	Life in the Universe Chap. 1
F Jan 17	ILC 150	How Science Works (slides)	Life in the Universe Sec 2.3-2.4
M Jan 20	NO CLASS	MLK Day	

ON THE WEB SITE:

- Syllabus, our calendar
- Homeworks & Activities
- Powerpoint lectures
- Weekly readings

About Me



- I research how stars and planets form and study space chemistry
- My research includes projects on Space telescopes and ground-based radio telescopes
- I used to work at the Very Large Array in New Mexico
- I am a UofA alumnus (class of '97). **BEAR DOWN!**
- I was born in Indiana, but have lived in Tucson for over 12 years.



1. To actively participate during class activities
2. To ask questions and come prepared to learn
3. To use the project to deepen your knowledge

A few notes about *BEHAVIOR*

- Be courteous to each other, the TA, and me
- No eating, drinking, or paper reading in class
- Turn those pesky cell phones and pagers off
- Please do not come late, sleep, or leave early
- You can drop scores, so no late work please
- Follow the UA Code of Academic Integrity
- Always do your own work in this class

Let's all keep the classroom a *respectful* learning place!

Grading Scheme

- Absolute grading in this course
 - **no curves**
 - **no competition**
 - **no final, no multiple choice**
- 4 Exams (drop 1) 40%
- Homework/Activities (drop 1) 45%
- Creative project 15%

90 – 100% A

75 – 89.9% B

60 – 74.9% C

50 – 59.9% D

< 49.9%

No plus or minus grades

All grades in this class are final **1 week after they are posted or work is returned. Contact us **BEFORE** the **1 week** period if you find work that is missing, or you have a grading dispute. Project deadlines (the plan and the final submission) are in the syllabus.**

The Syllabus is our “Contract”

- *Class meets MWF 10:00am – 10:50am. You need to attend regularly to succeed so come to class!*

No attendance is taken, but...

Material for activities and exams are based on readings online and lecture material

Keep up with reading; it helps with lectures!

The Syllabus is our “Contract”

- *Class meets MWF 10:00am – 10:50am. You need to attend regularly to succeed so come to class!*
- *In-class group activities will occur regularly.*

Activities build on preceding classroom lectures

Group assignments = work together!

No make-ups given but lowest score is dropped

45% of grade.

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- *In-class group activities will occur regularly.*
- *Everyone is expected to do a semester-long creative project, most individually but possibly in pairs.*

Submit 1 paragraph plan by Mar 12

Final project due May 5 (firm)

Graded equally on its science content and its creativity

15% of total grade – take this seriously – it can change your grade.

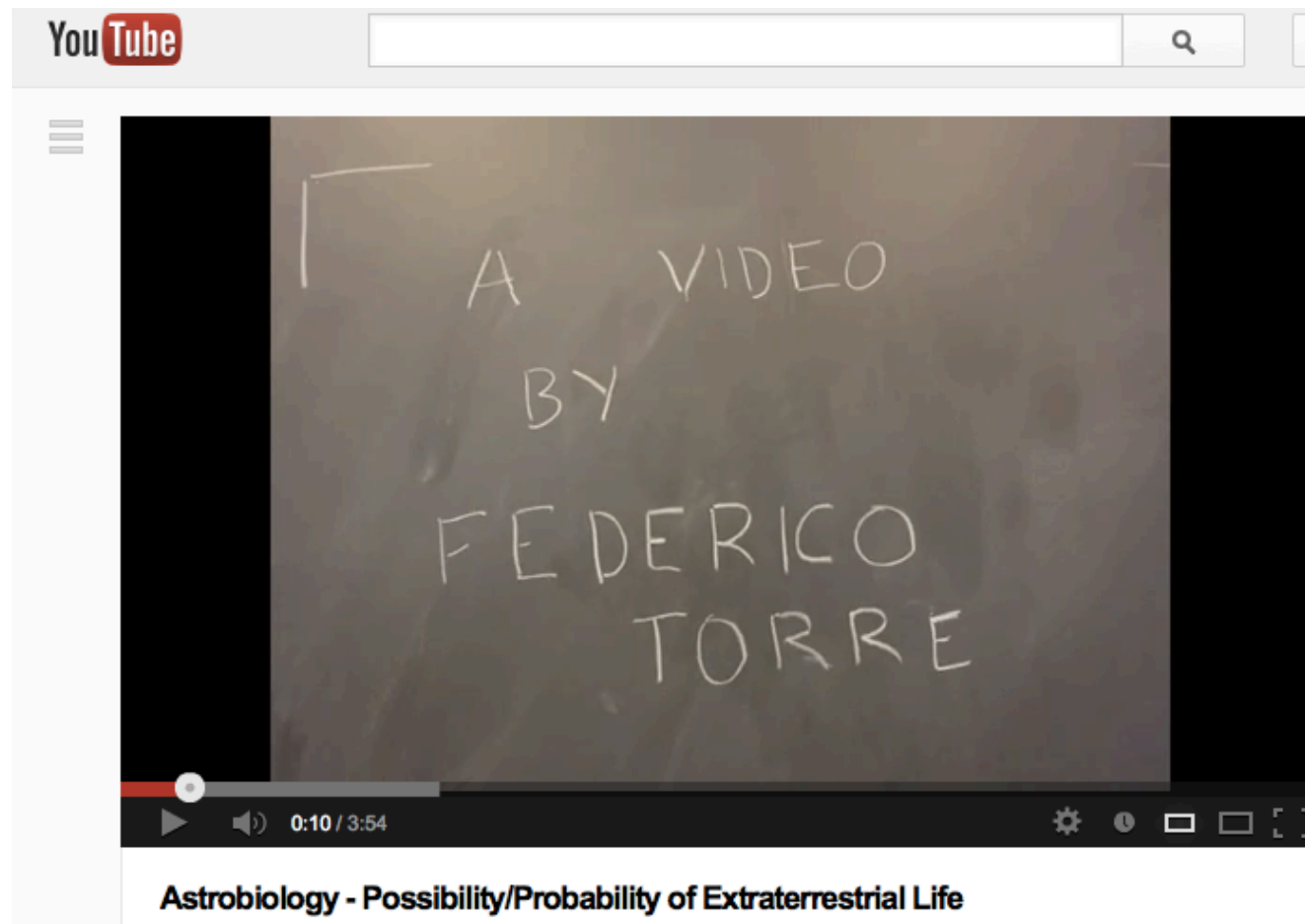
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- *In-class group activities will occur regularly.*
- *Everyone is expected to do a semester-long creative project, most individually but possibly in pairs.*
- *The project lets you to combine astrobiology with another of your interests or talents.*

Risk-taking and originality will be rewarded !!

Example “A+” Creative Project

- <http://www.youtube.com/watch?v=QrKmBNFRJHs>



Class Weekly Schedule

Time	Mon	Tue	Wed	Thu	Fri
10:00am	CLASS	Charlie	CLASS	Charlie	CLASS
11:00am	Yancy		Yancy		Yancy
12:00pm					
1:00pm					
2:00pm					
3:00pm					
4:00pm					
5:00pm					<i>(chill)</i>



Yancy's Office

Charlie's Office

You are here now

IMPORTANT DATES

EXAM #1	Feb 10
EXAM #2	Mar 03
Creative Project Proposals Due	Mar 12
EXAM #3	Apr 07
EXAM #4	May 02
Creative Project Due @ 10am	May 05

(NO FINAL!)

Last Comments

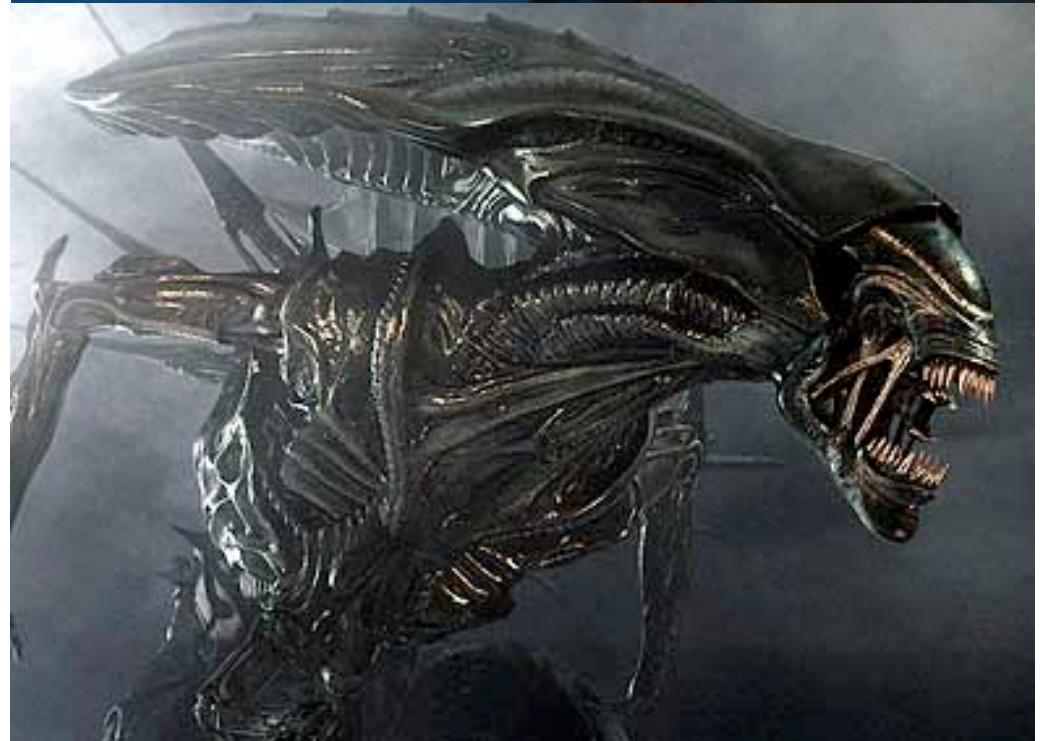
- Refer to paper syllabus, or website, for details
- Email or call me, or pick a time to stop by
- *Never be afraid to think “outside the box”*
- Ask questions, work hard, enjoy the course

The Science of Astrobiology



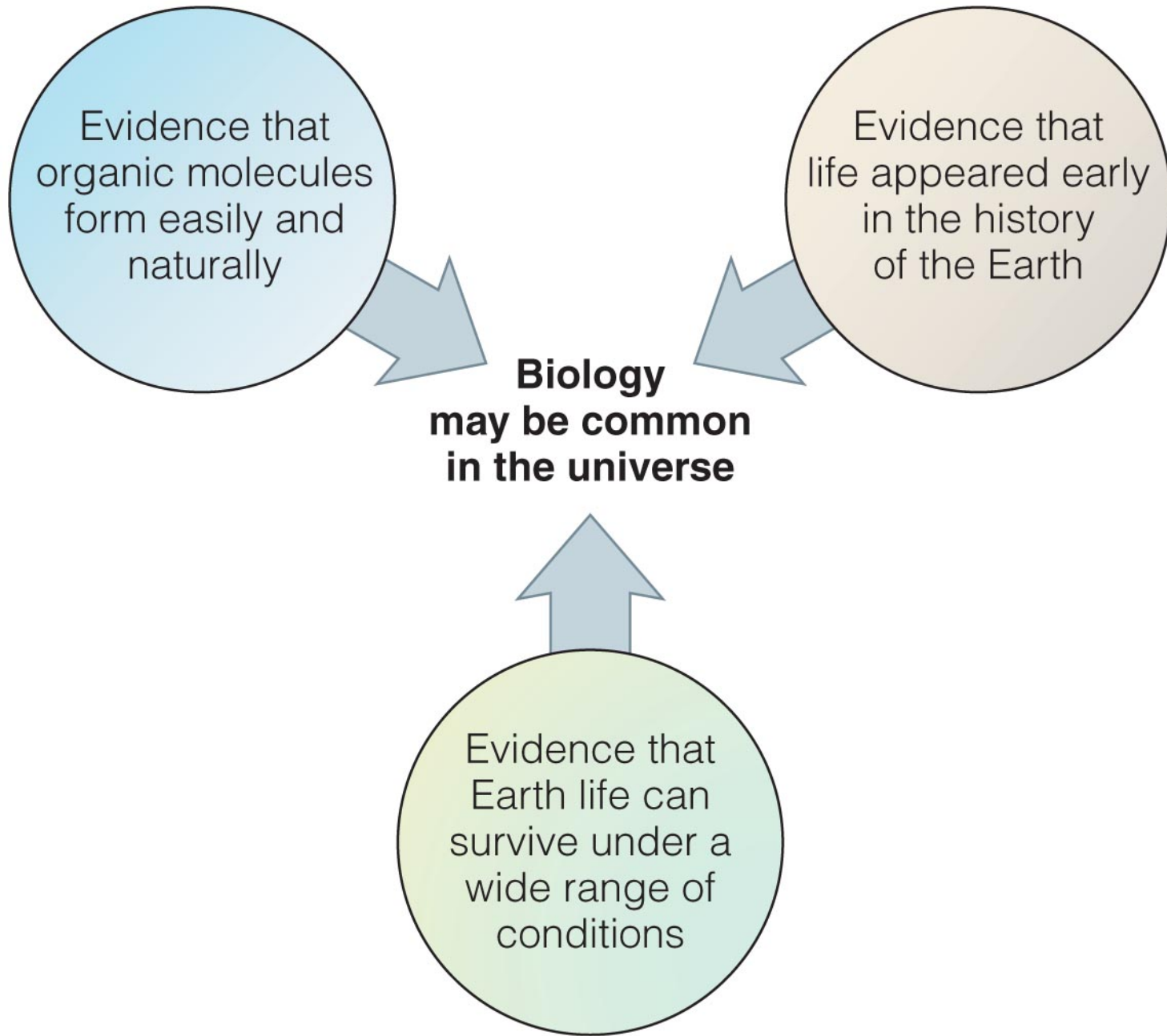
...the pale blue dot, is it unique?

*We are conditioned by the popular culture to believe in aliens, or to think they have already visited, but what's the **scientific evidence** for life in the universe any other place than Earth?*



Astrobiology is Interdisciplinary

- **Astronomy** and the laws of **physics** give us a cosmic context for life in the universe
- Stars show us that **chemistry** is universal
- **Planetary science** tells us about the number of habitable worlds
- **Biology** informs us about life processes and their range on Earth
- **Geology** tells us how the environment acts to shape evolution
- **Sociology** and **anthropology** give us a hint of the role of intelligence and technology

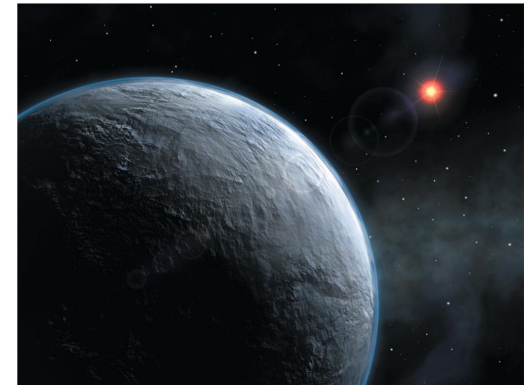


Where Should We Look?



Explore the potential sites for life in the solar system

Find habitable planets around Sun-like stars



Explore the full range of life on the Earth itself



Listen and send signal to find the forms of life with technology

Topics We Will Cover:

Astrology

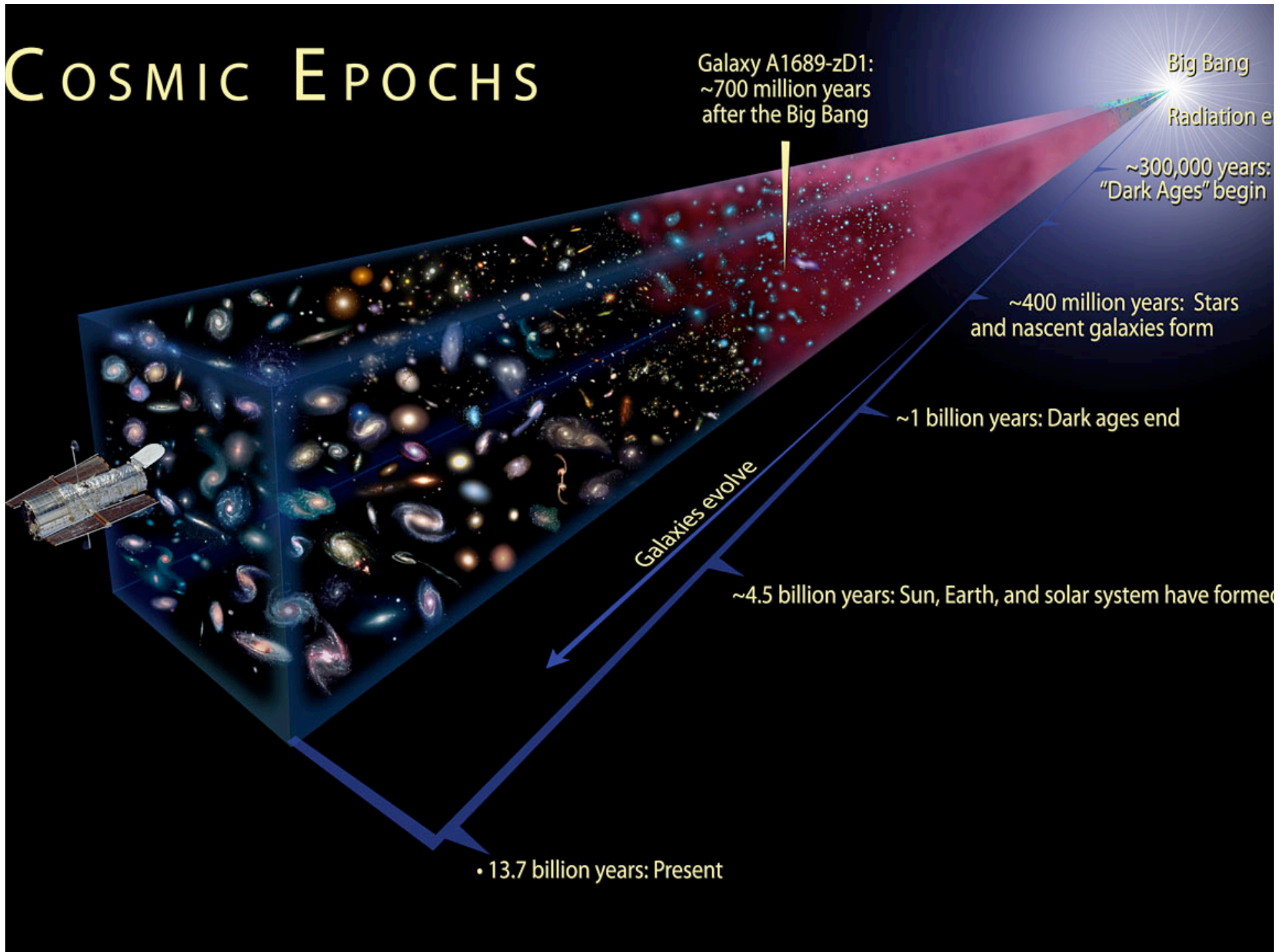


Topics We Will Cover:

History of Astronomy



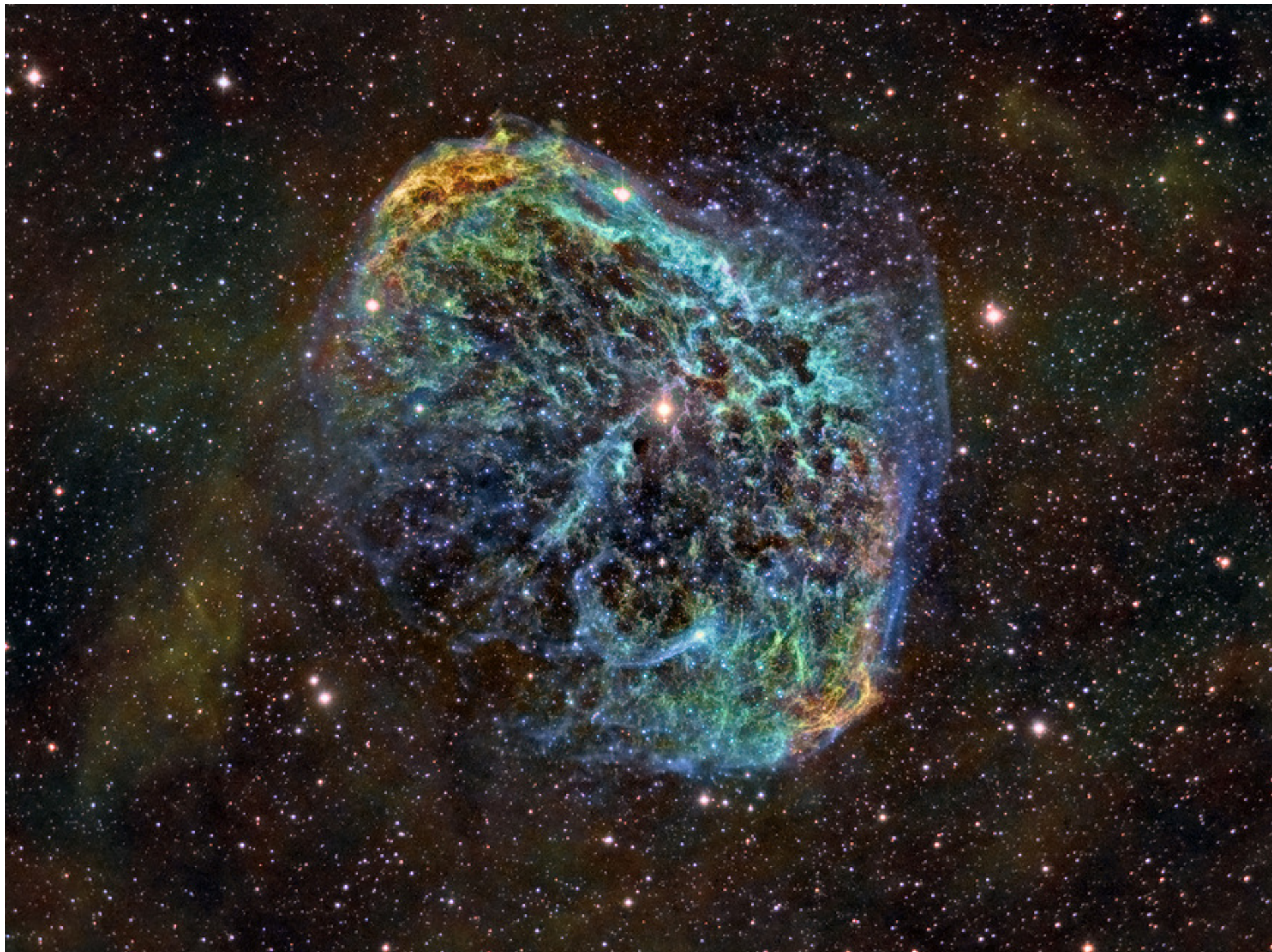
COSMIC EPOCHS

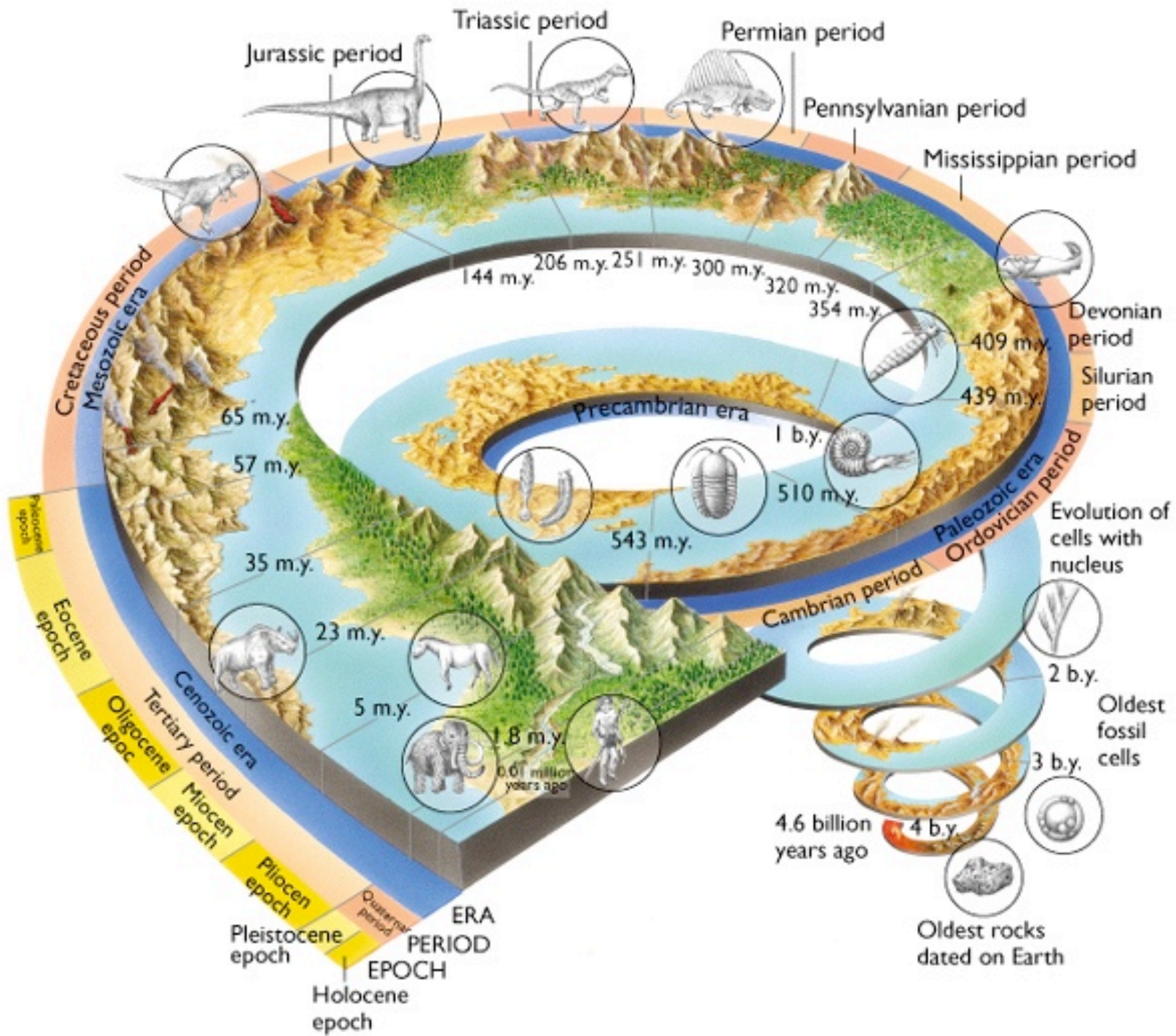










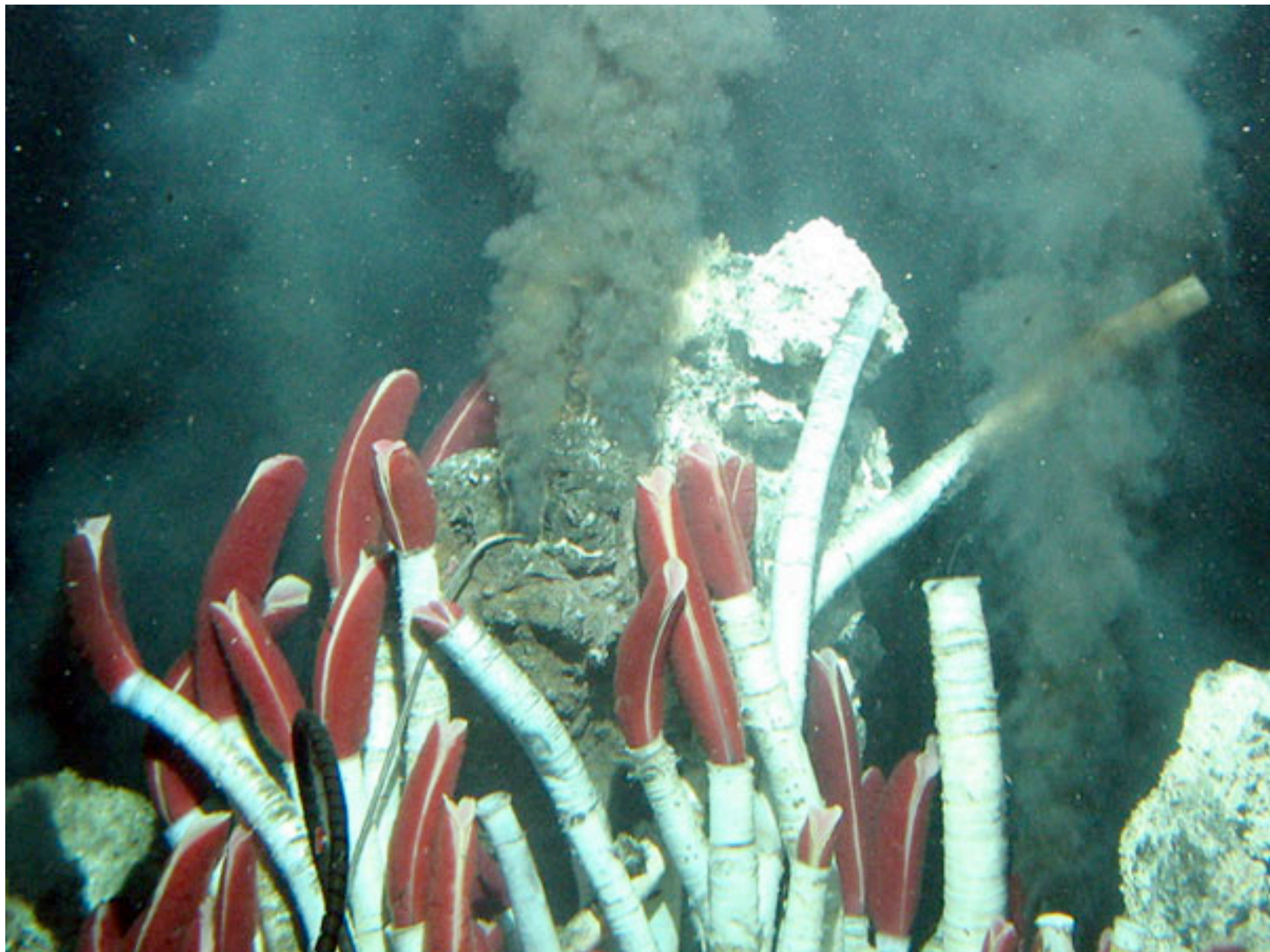


SAVE YOURSELF, MAMMAL!

A SATURDAY MORNING BREAKFAST CEREAL COLLECTION

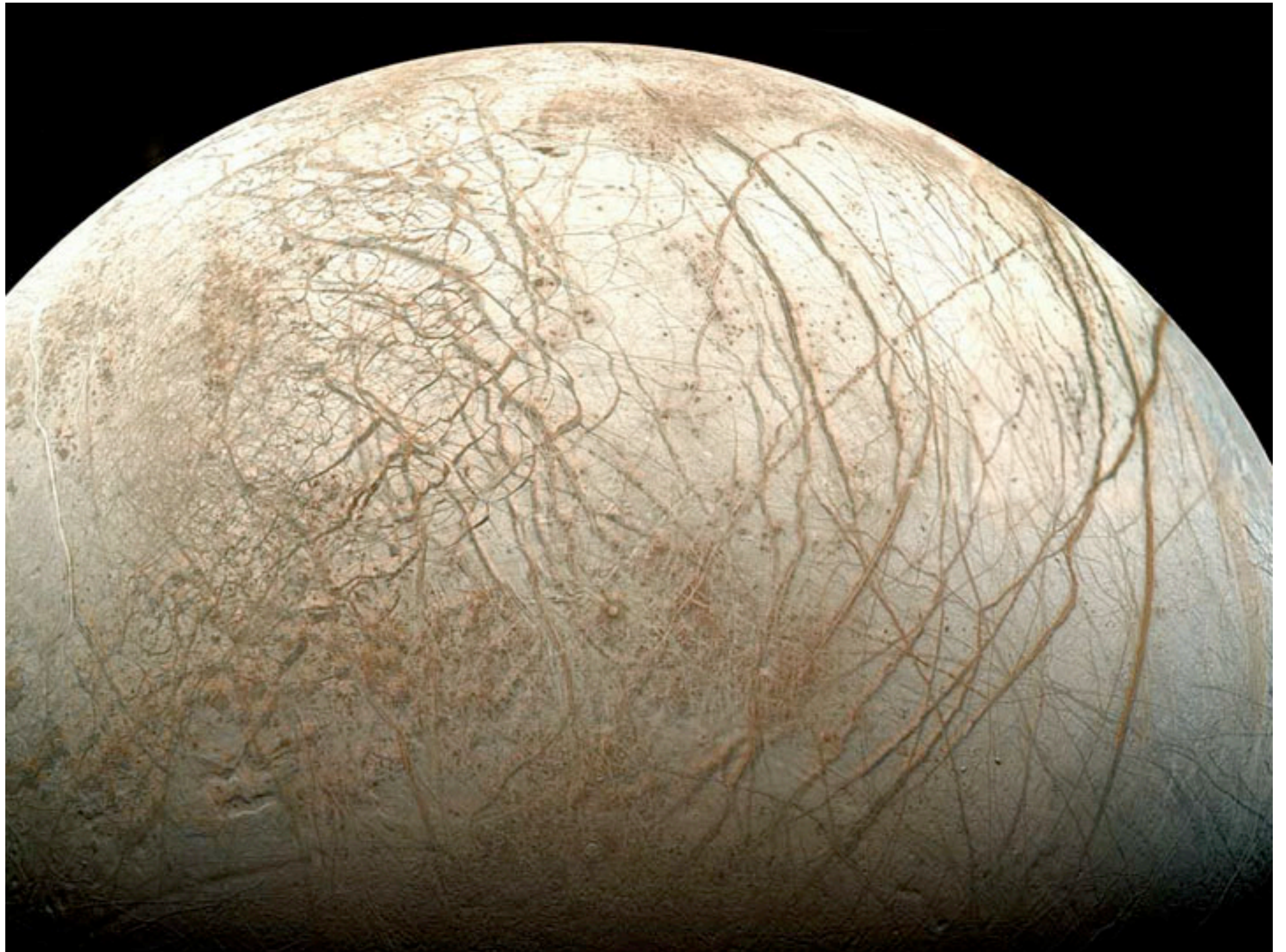
BY ZACH WEINER



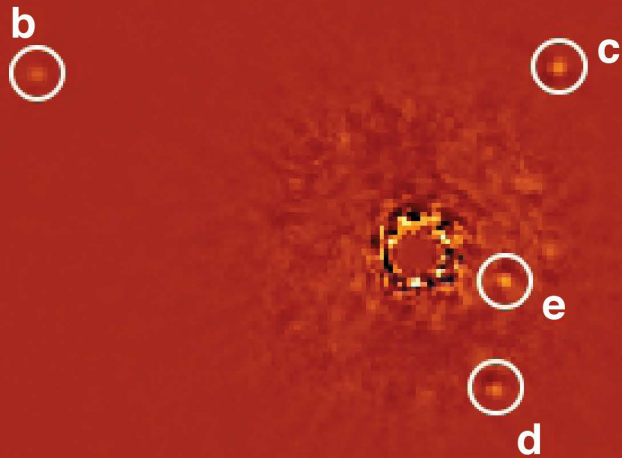








LBTAO/PISCES H-band

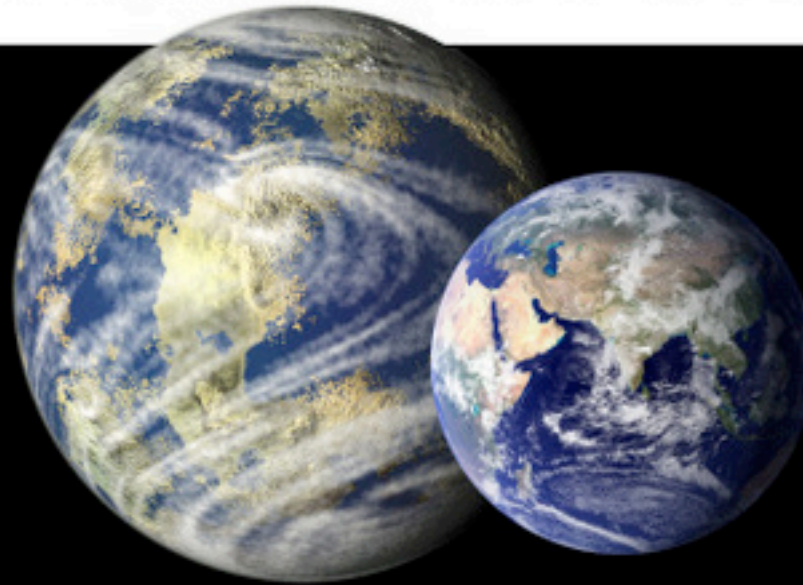


1"



Four exosolar planets around the star HR 8799
Imaged with PISCES at 1.6 microns and LMIRCam at 3.3 microns
A. Skemer et al. 2012

Classed as a “super-Earth,” candidate planet KOI (Kepler Object of Interest) 172.02 orbits within the habitable zone of a sun-like star. This means the planet, which has yet to be confirmed by follow-up observations, could have liquid water on its surface, thought to be essential for life.



KOI 172.02

Earth

Diameter	11,900 miles (19,000 km)	7,926 miles (12,756 km)
Orbital distance from star	70 million miles (112 million km)	93 million miles (150 million km)
Year in Earth days	242 days	365 days

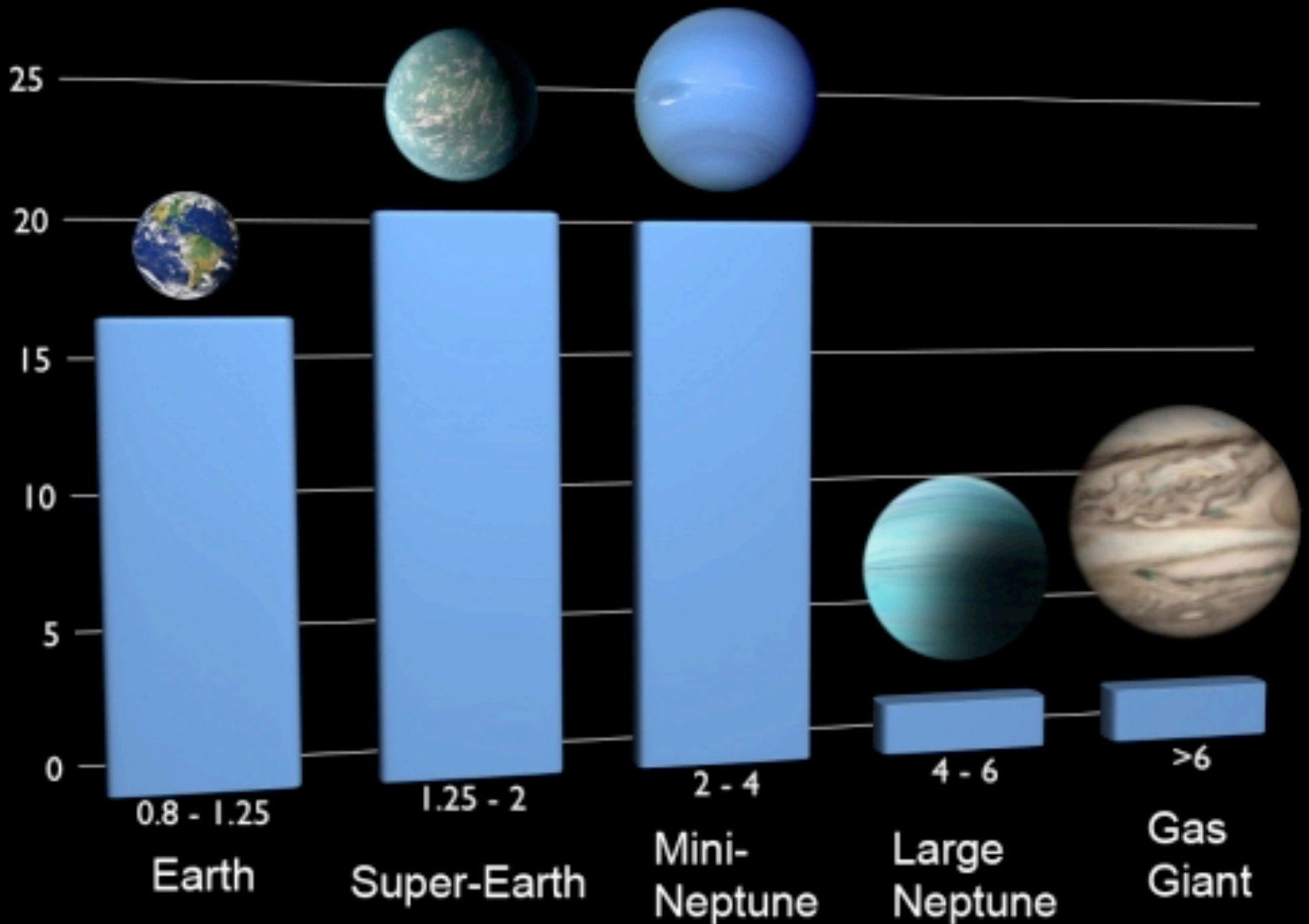


ORBIT OF KOI 172.02

ORBIT OF EARTH

ARTIST'S CONCEPTION. PLANETS AND STAR SHOWN ENLARGED COMPARED WITH ORBITS

FRACTION OF STARS WITH AT LEAST ONE PLANET



PLANET SIZE (relative to Earth)





SETI





