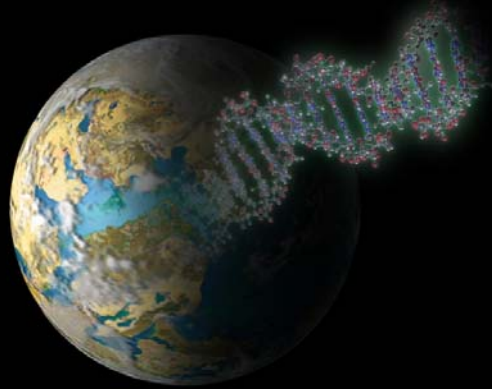
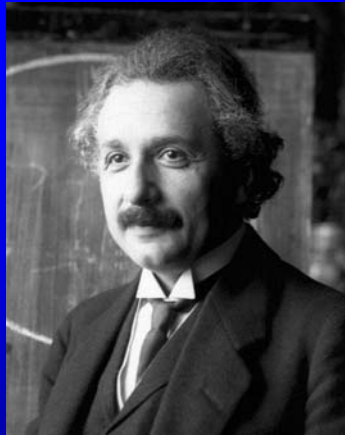


Lecture 46: This View of Life

Lecture 46
“This View of Life”
Astronomy 141 Course Summary



Astronomy 141 – Autumn 2009



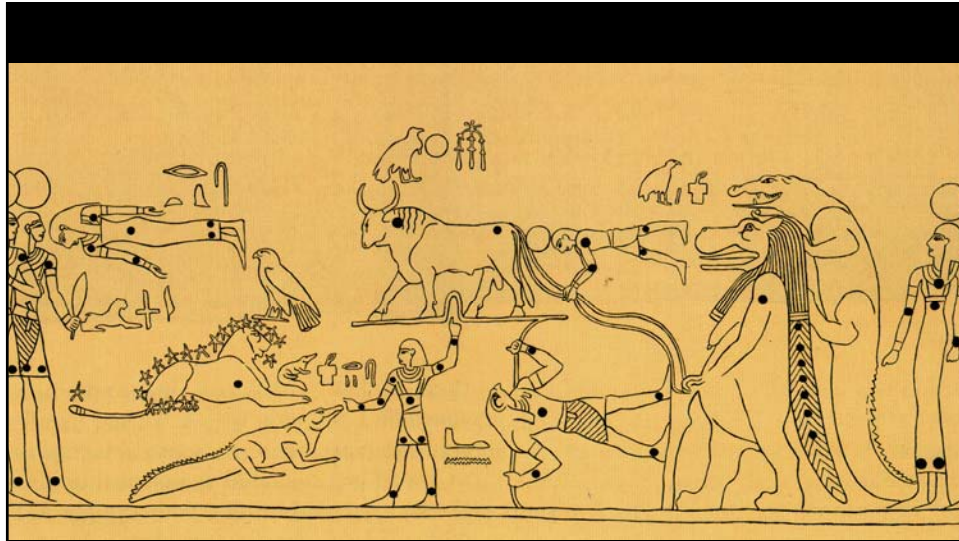
*“I am enough of an artist to draw freely upon my imagination.
Imagination is more important than knowledge.
Knowledge is limited. Imagination encircles the world.”*

Albert Einstein, 1929
Interview in *The Saturday Evening Post*

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Tomb of Pharaoh Seti I (c. 1275 BC)



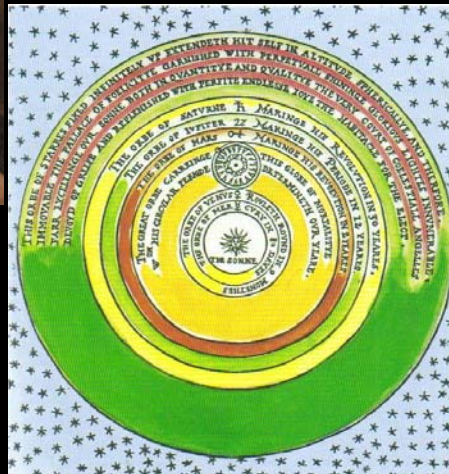
Nicolaus Copernicus



Johannes Kepler



Giordano Bruno



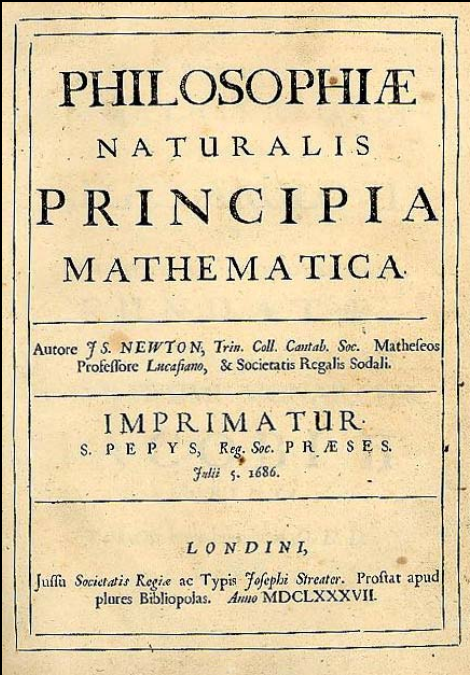
Lecture 46: This View of Life

Galileo Galilei (1564-1642)

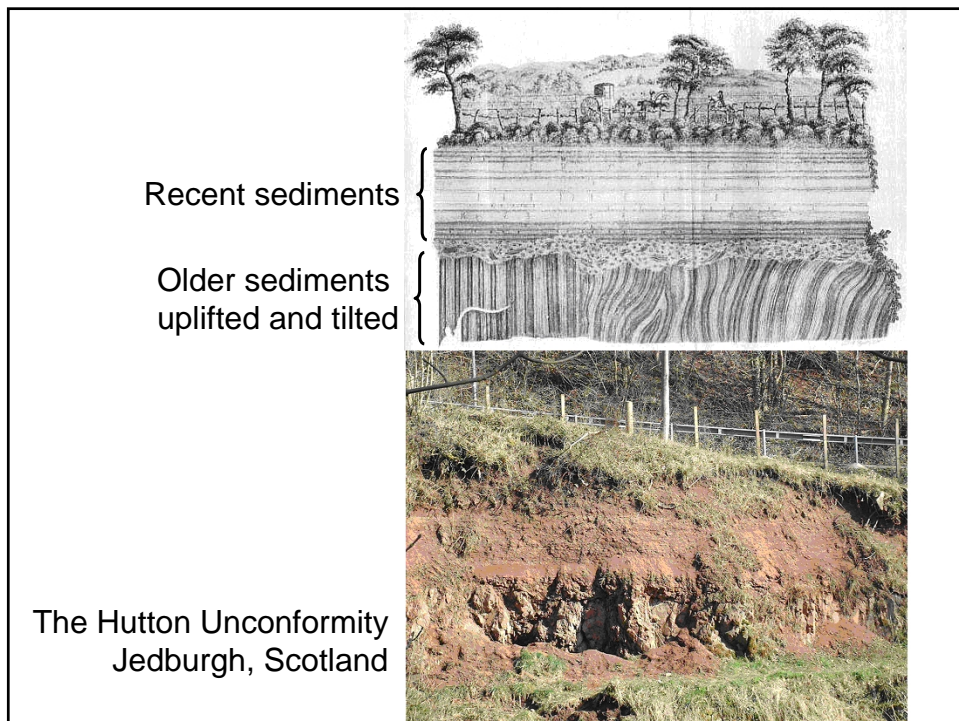
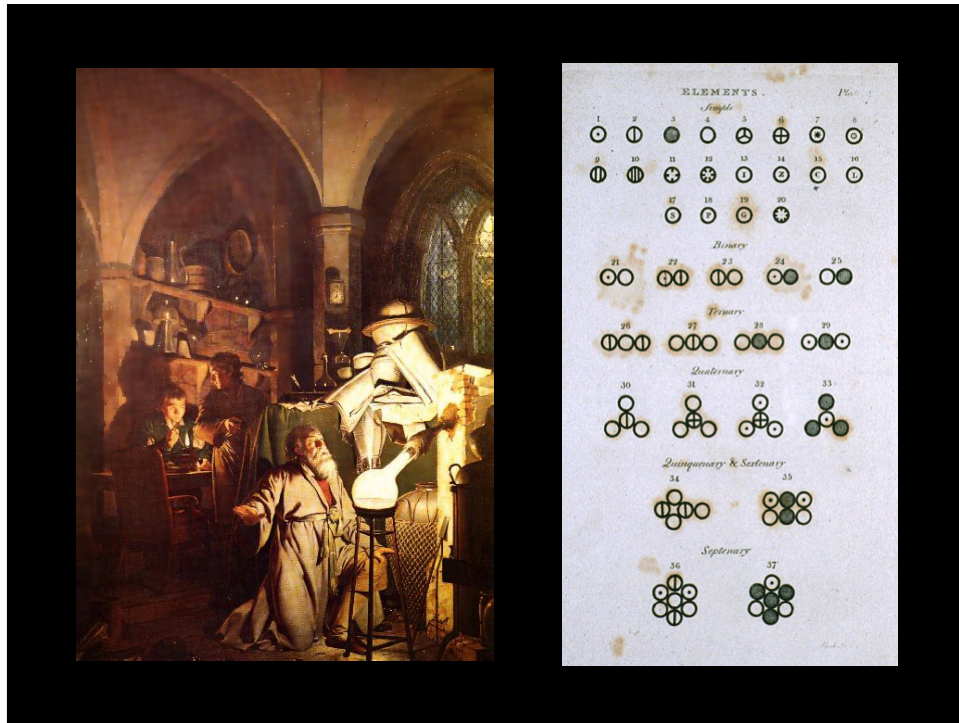
The composite image includes a portrait of Galileo Galilei on the right, a drawing of his telescope on the left, a circular diagram of a celestial body with a shaded crescent on the top right, and a diagram of a heliocentric model at the bottom right. The heliocentric model shows a central sun (circle) with four planets (asterisks) orbiting it. The planets are arranged in two rows: the top row has two planets, and the bottom row has two planets. The word 'East' is written on the left and 'West' on the right of the model.



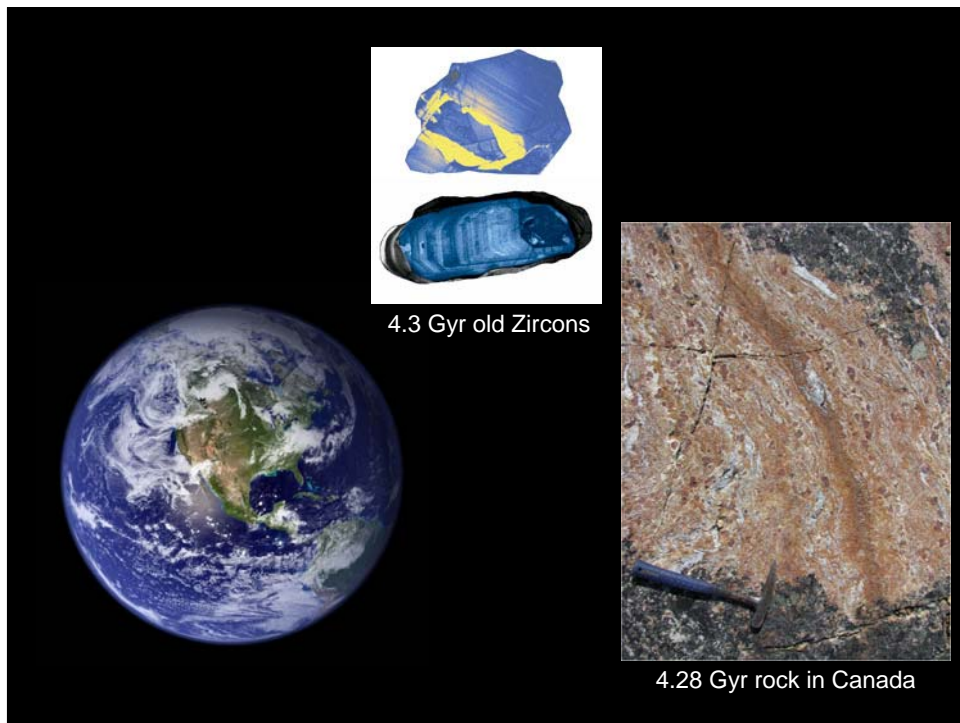
Isaac Newton (1642-1727)



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Gregor Mendel

Watson & Crick

Charles Darwin (1809-1882)

1. *Geospiza magnirostris*
2. *Geospiza fortis*
3. *Geospiza parvula*
4. *Certhidea olivacea*

Finches from Galapagos Archipelago

ON
THE ORIGIN OF SPECIES
BY MEANS OF NATURAL SELECTION,
OR THE
PRESERVATION OF FAVOURED RACES IN THE STRUGGLE
FOR LIFE.

By CHARLES DARWIN, M.A.,
FELLOW OF THE ROYAL GEOLOGICAL SURVEY, ETC., ROYAL SOCIETY;
AUTHOR OF "JOURNAL OF RESEARCHES INTO THE HISTORY & GEOGRAPHY OF THE VOYAGE
AROUND THE WORLD."

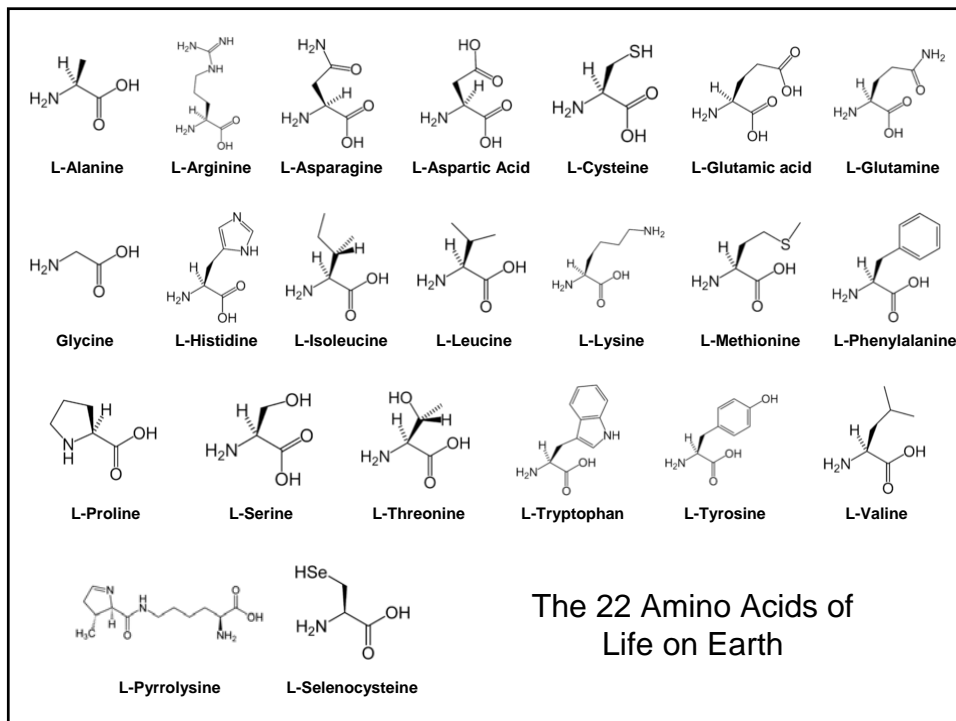
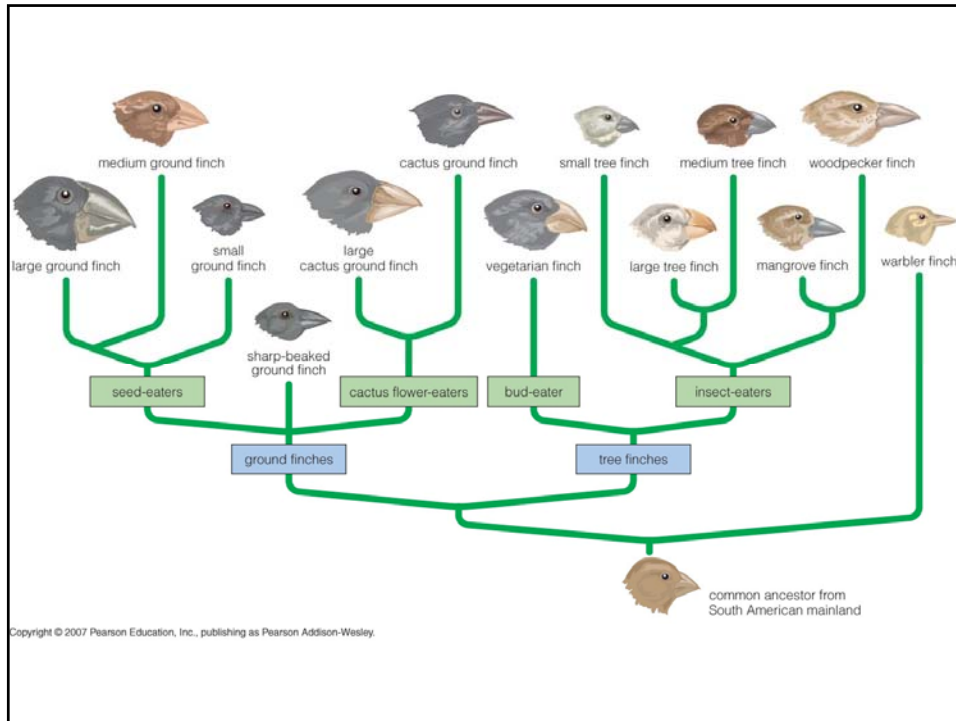
LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1859.

The right of Translation is reserved.

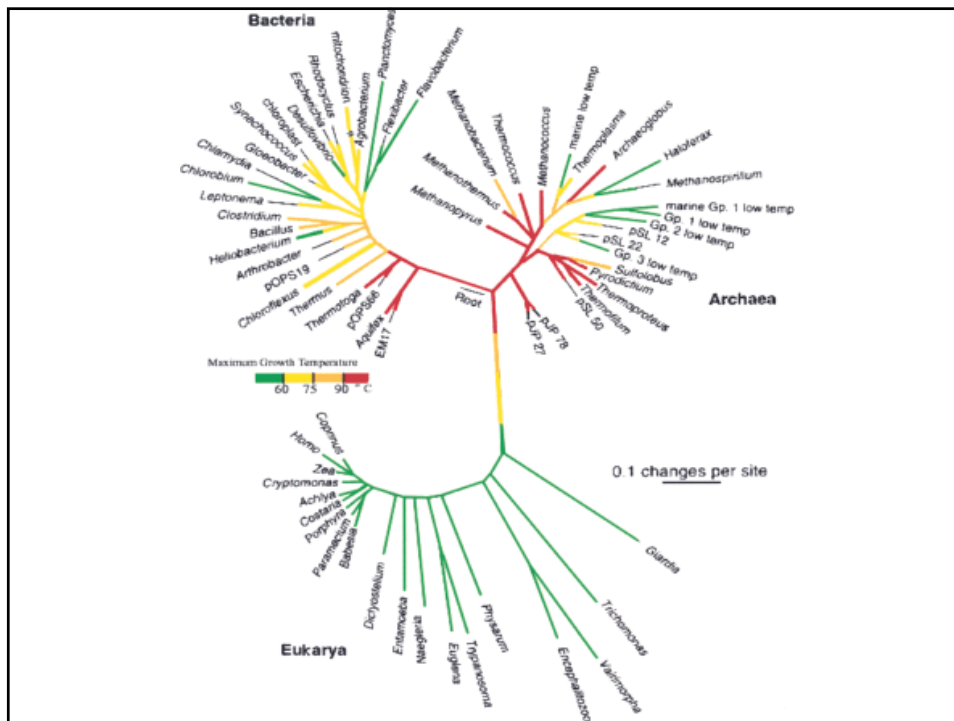
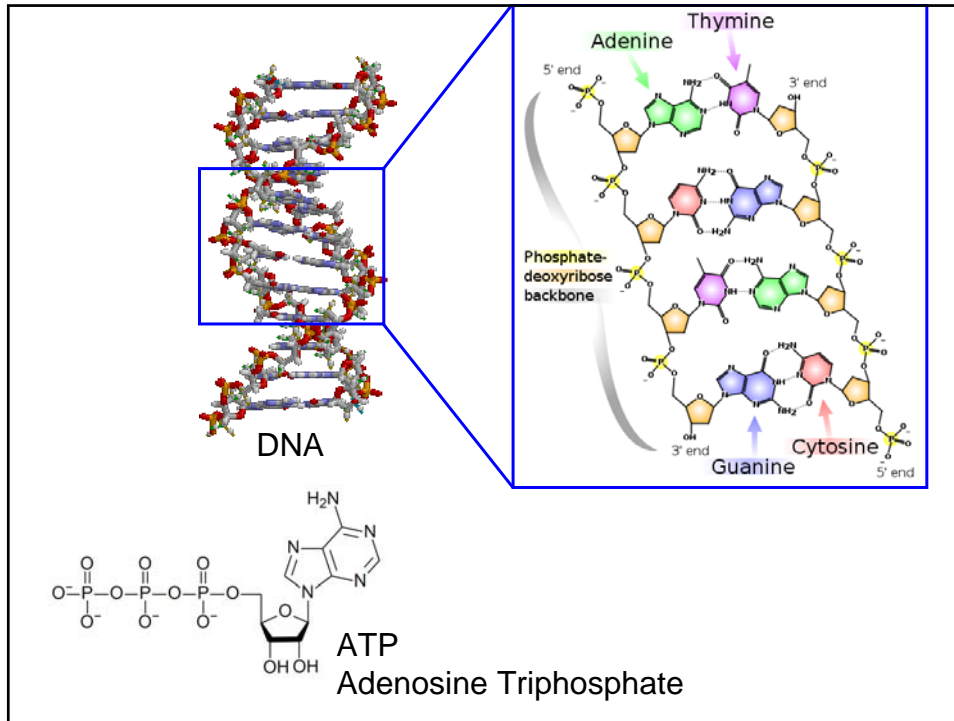
On *The Origin of Species*
(London, 1859)

HMS *Beagle* in Tierra del Fuego

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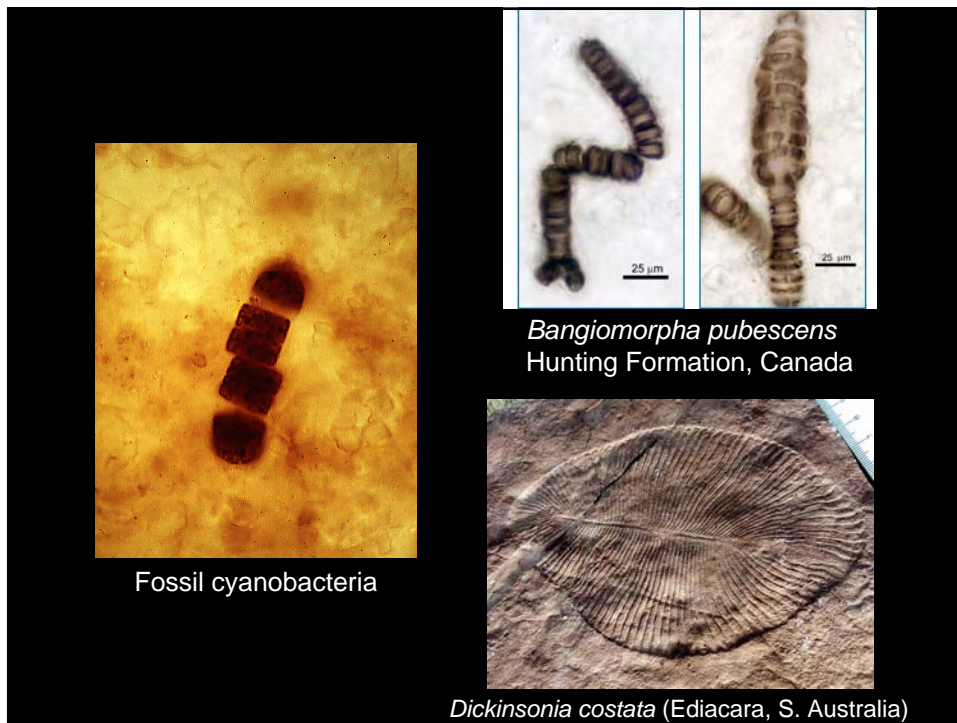
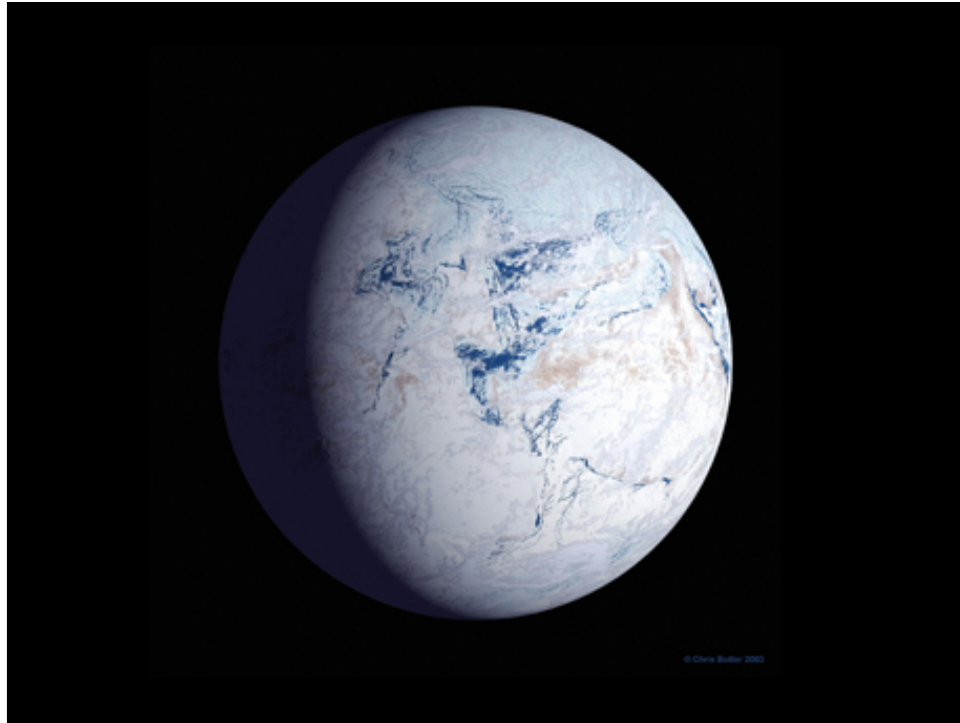
Lecture 46: This View of Life



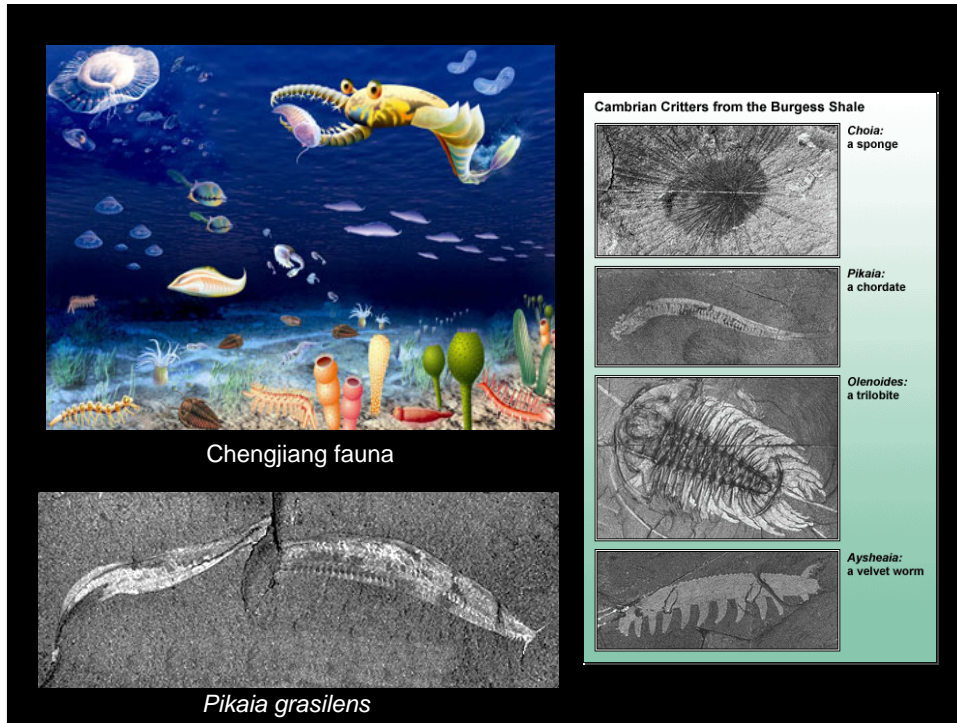
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Chengjiang fauna

Pikaia gracilens

Cambrian Critters from the Burgess Shale

- Choia*: a sponge
- Pikaia*: a chordate
- Olenoides*: a trilobite
- Aysheia*: a velvet worm

The image is a composite. On the left, a vibrant illustration of the Chengjiang fauna shows a variety of marine life, including jellyfish, a large crustacean, and various small organisms. Below this is a fossil of *Pikaia gracilens*, a long, thin, segmented creature. On the right, a list titled 'Cambrian Critters from the Burgess Shale' includes four items, each with a small fossil image and a label: *Choia* (a sponge), *Pikaia* (a chordate), *Olenoides* (a trilobite), and *Aysheia* (a velvet worm).



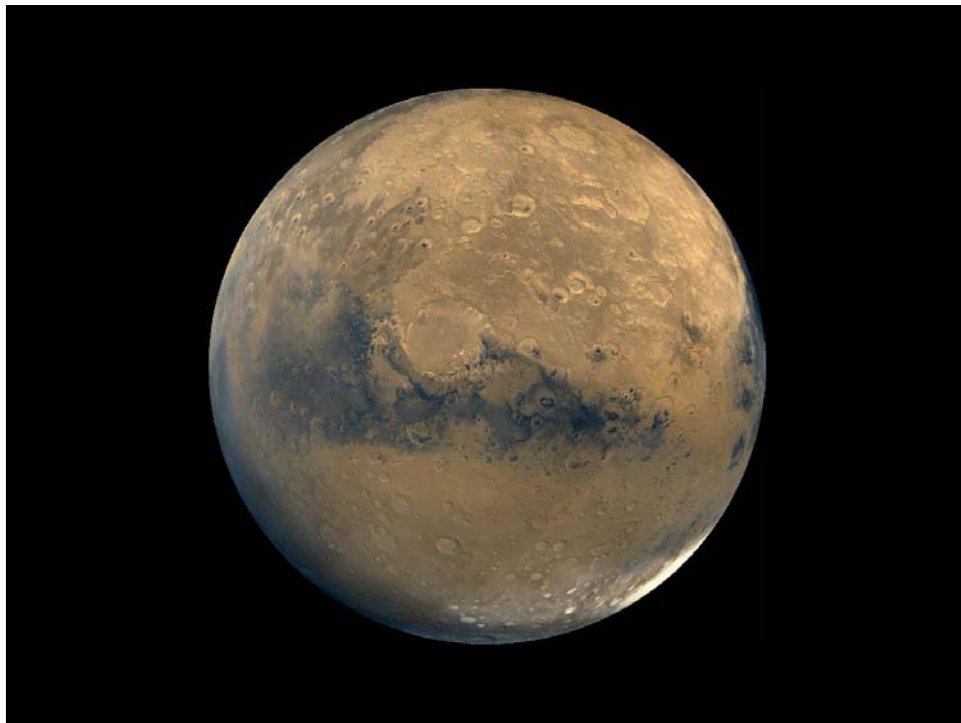
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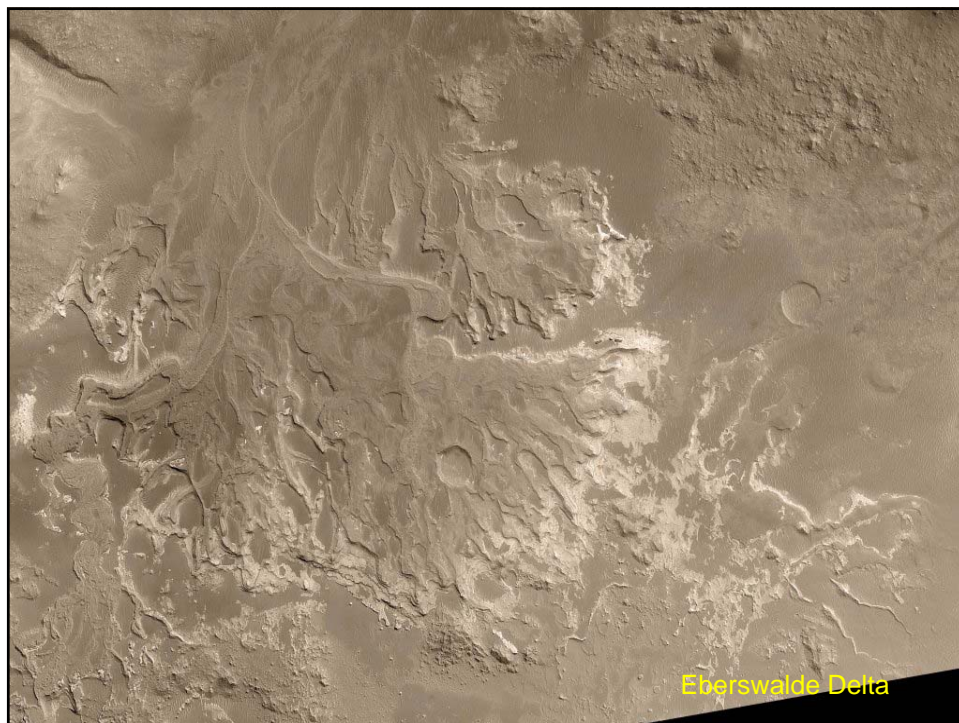
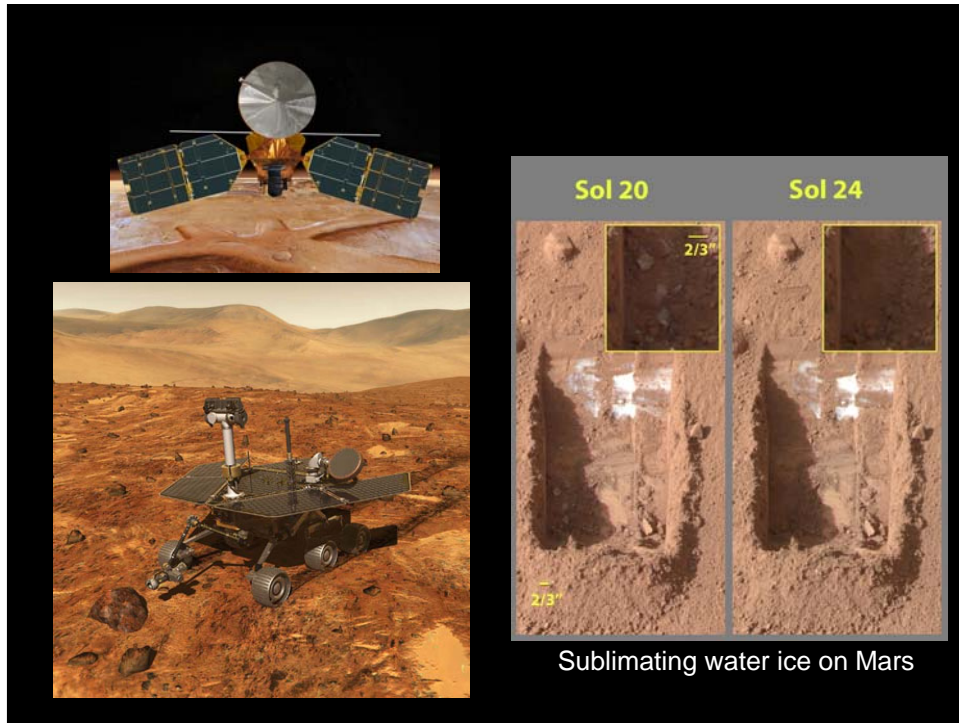
Lecture 46: This View of Life



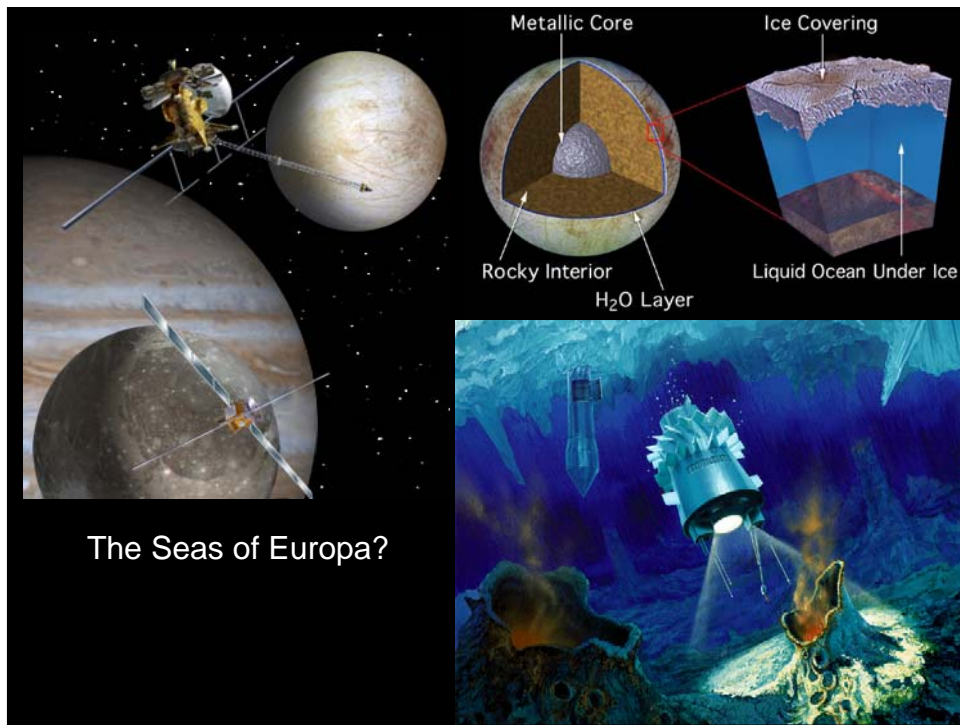
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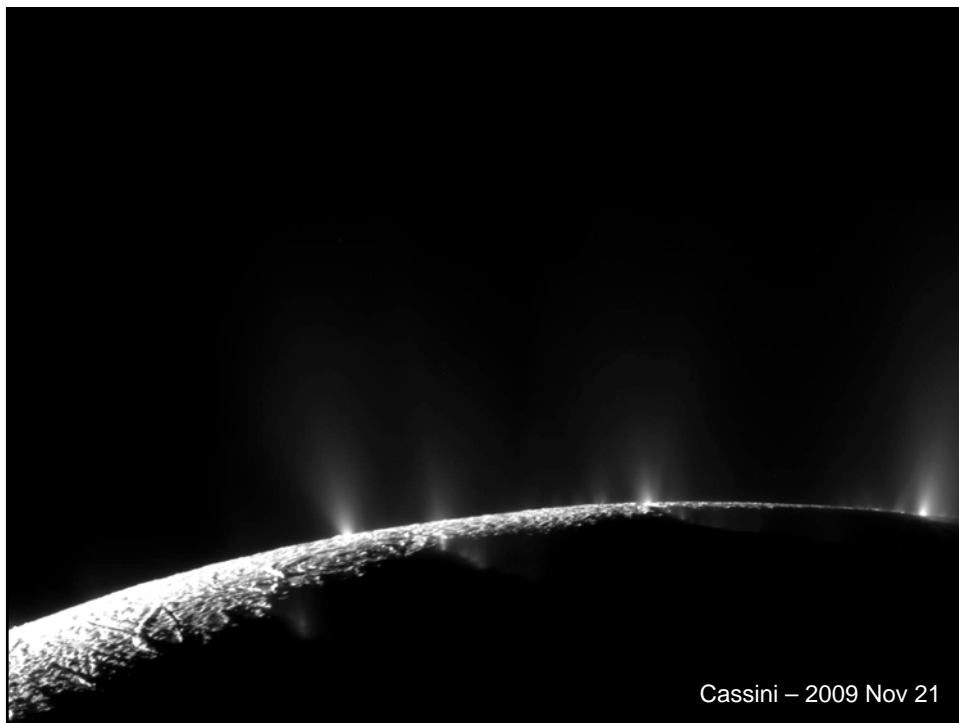
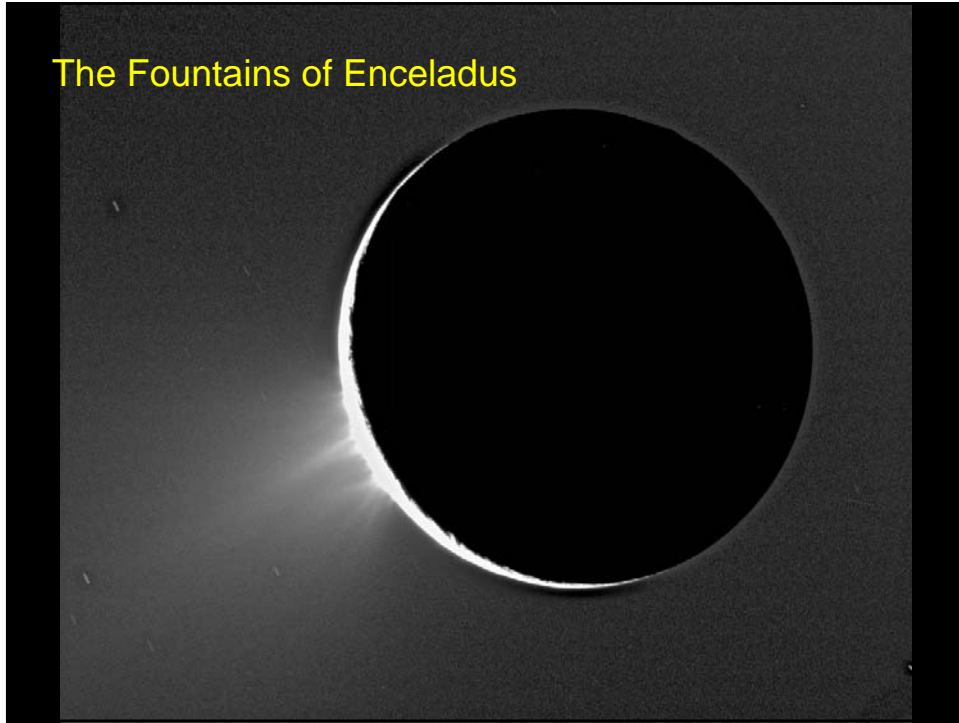


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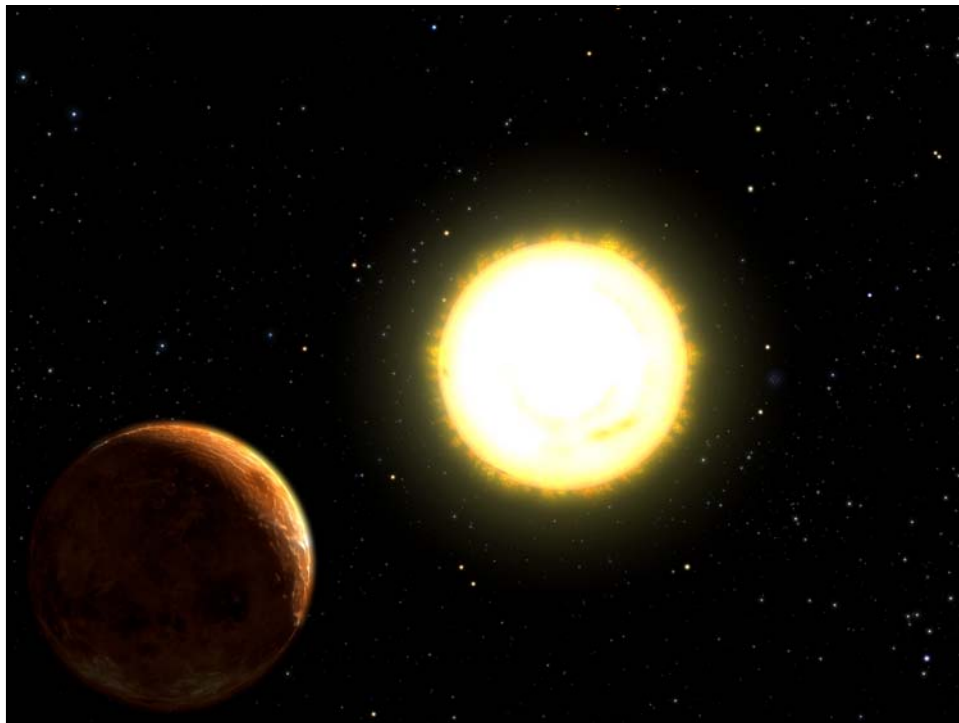
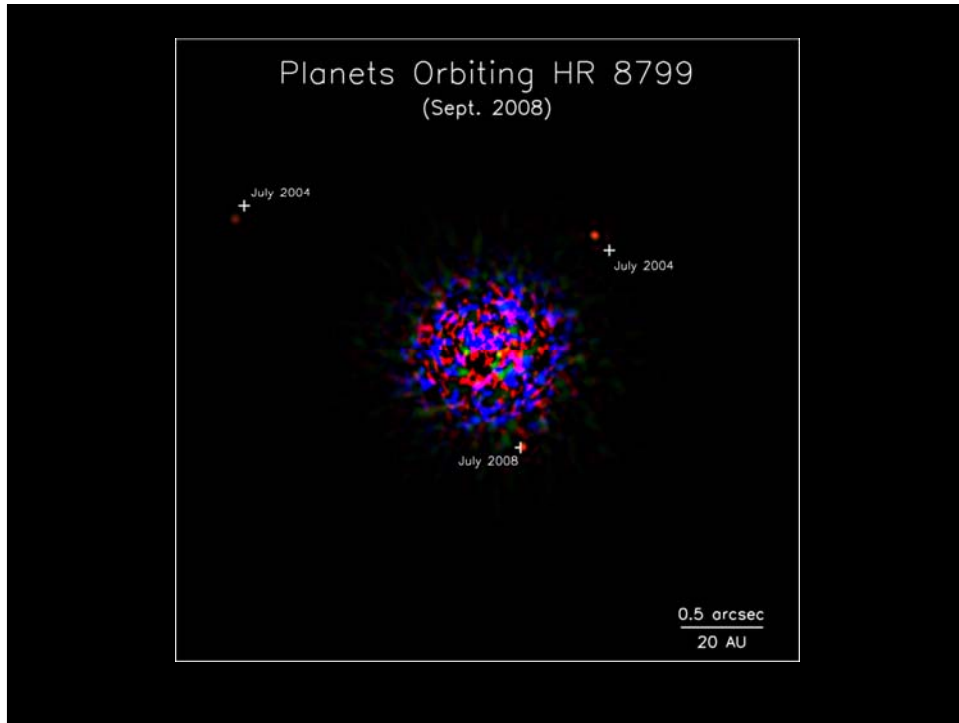


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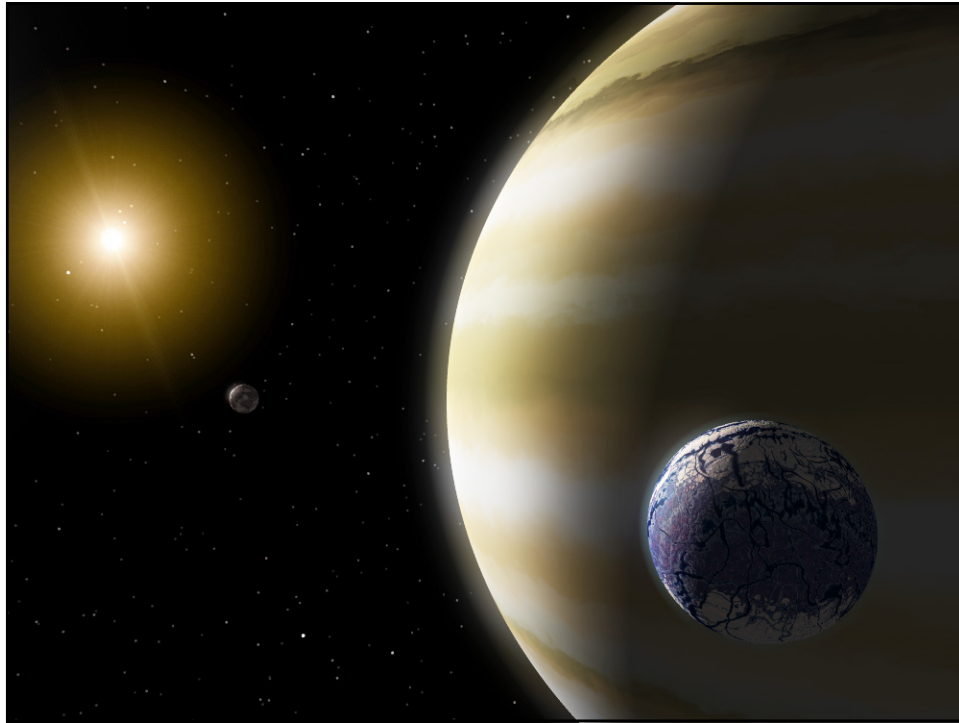
The Fountains of Enceladus



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Got Oxygen? O_3 Ozone, produced by plants, algae

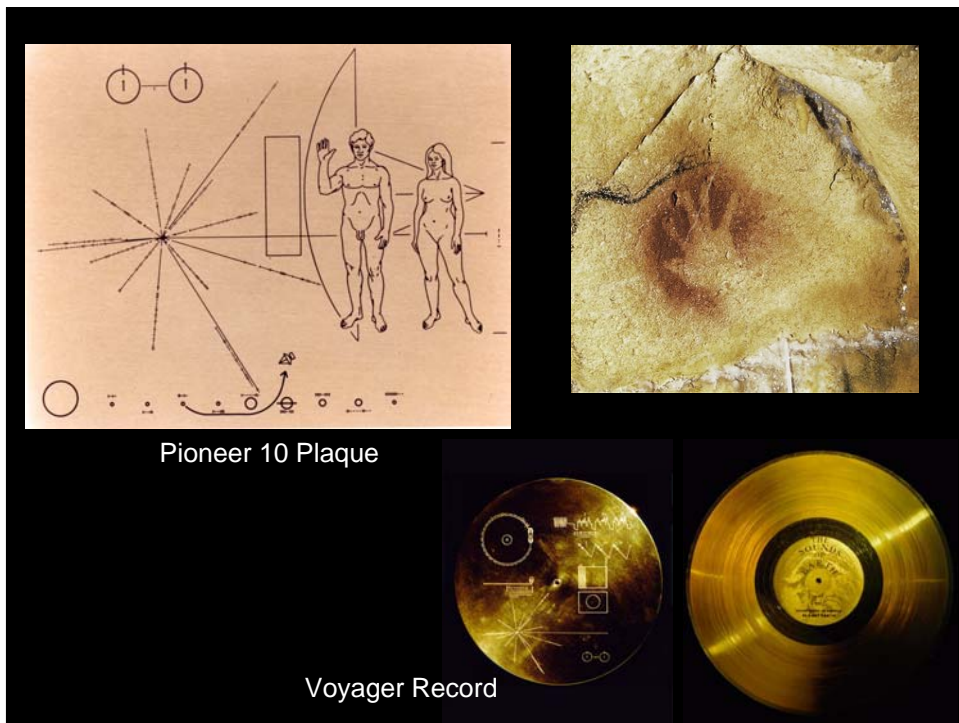
Got Water? H_2O Liquid water

Got an Atmosphere? Intensity vs. Wavelength graph showing H_2O , O_3 , and CO_2 absorption bands.

Got Life? Methane produced by living organisms

From NASA Origins website

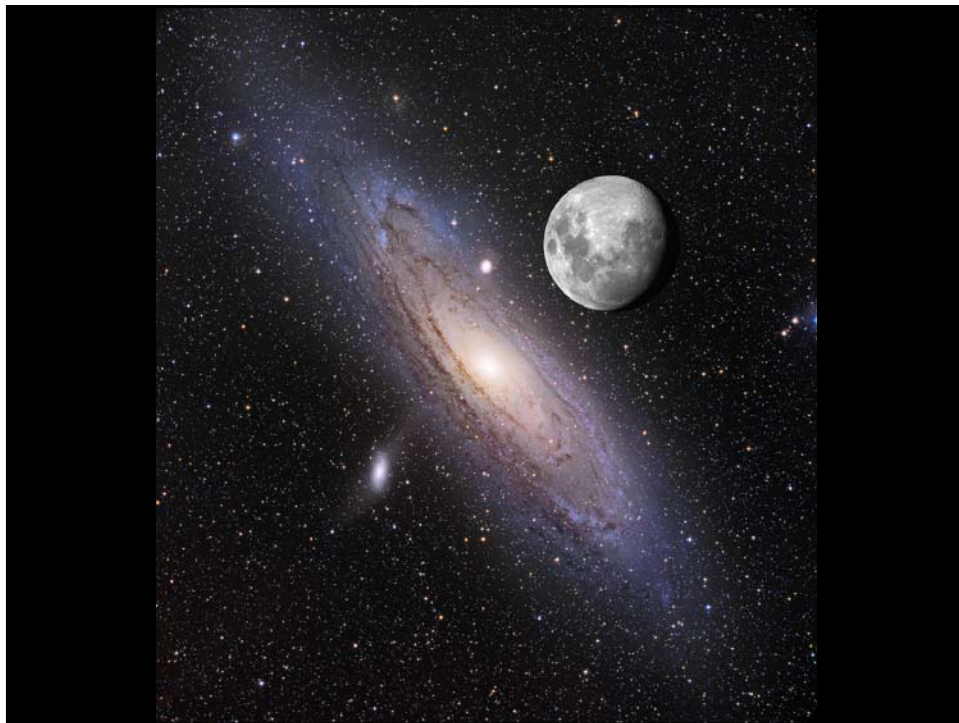
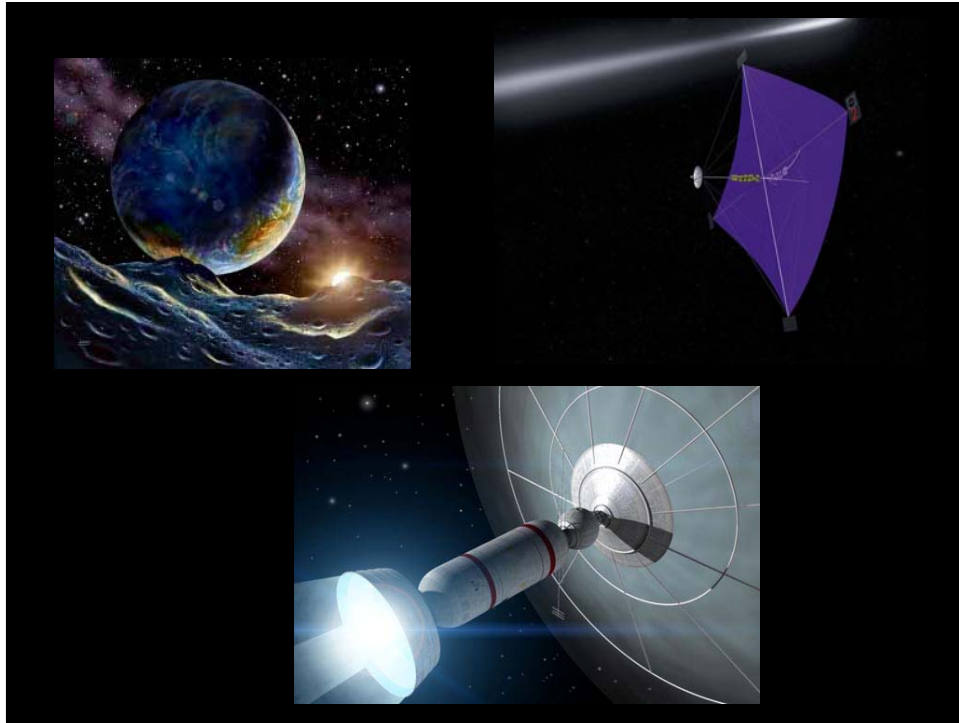
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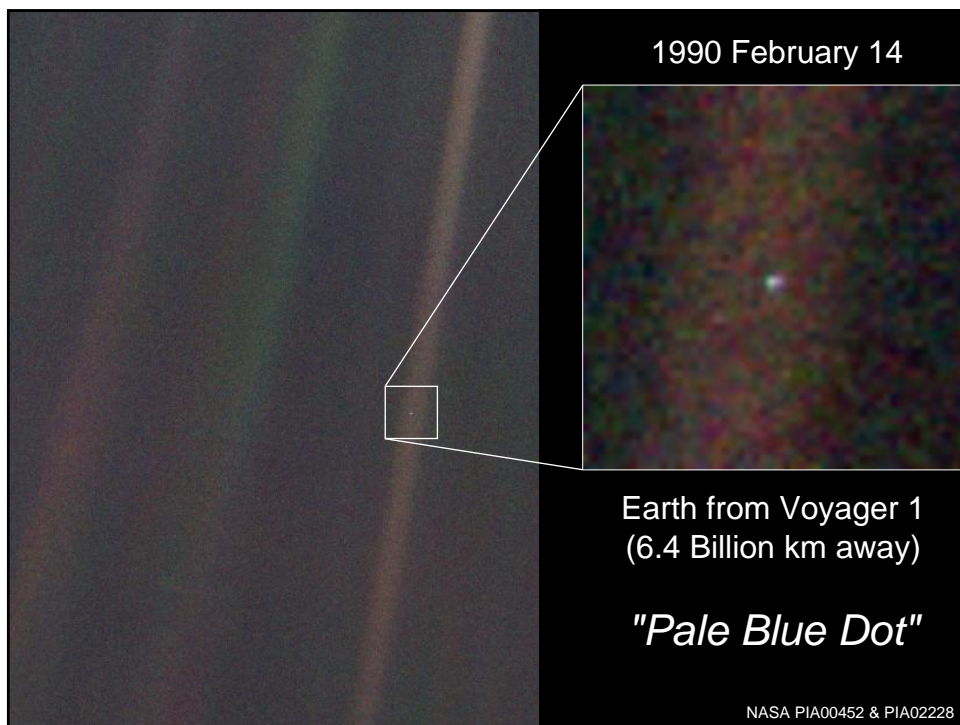
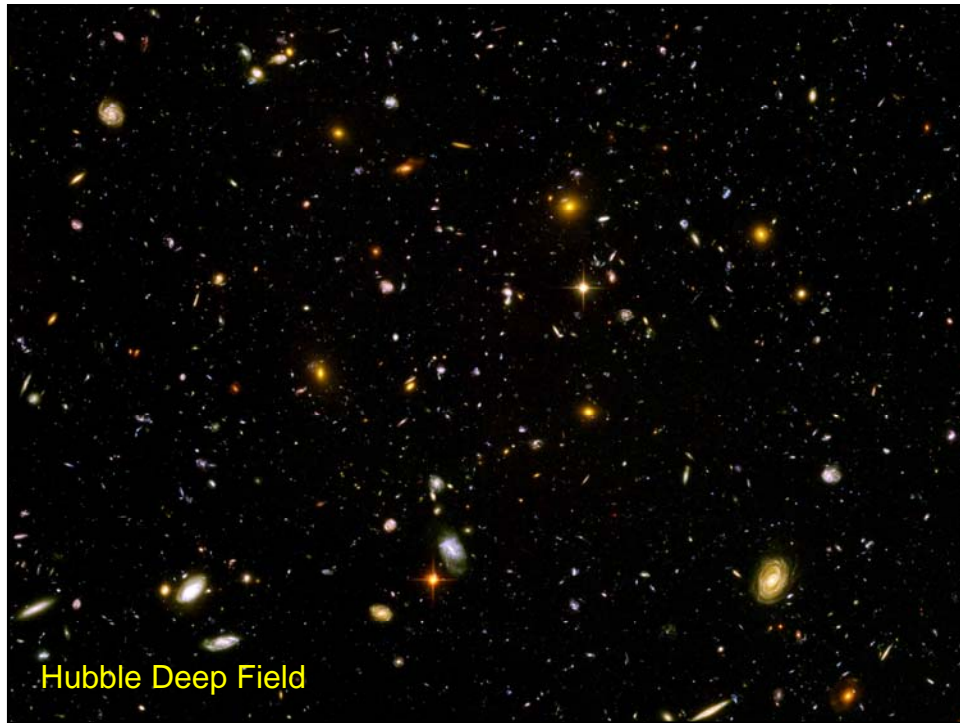
Pioneer 10 Plaque

Voyager Record

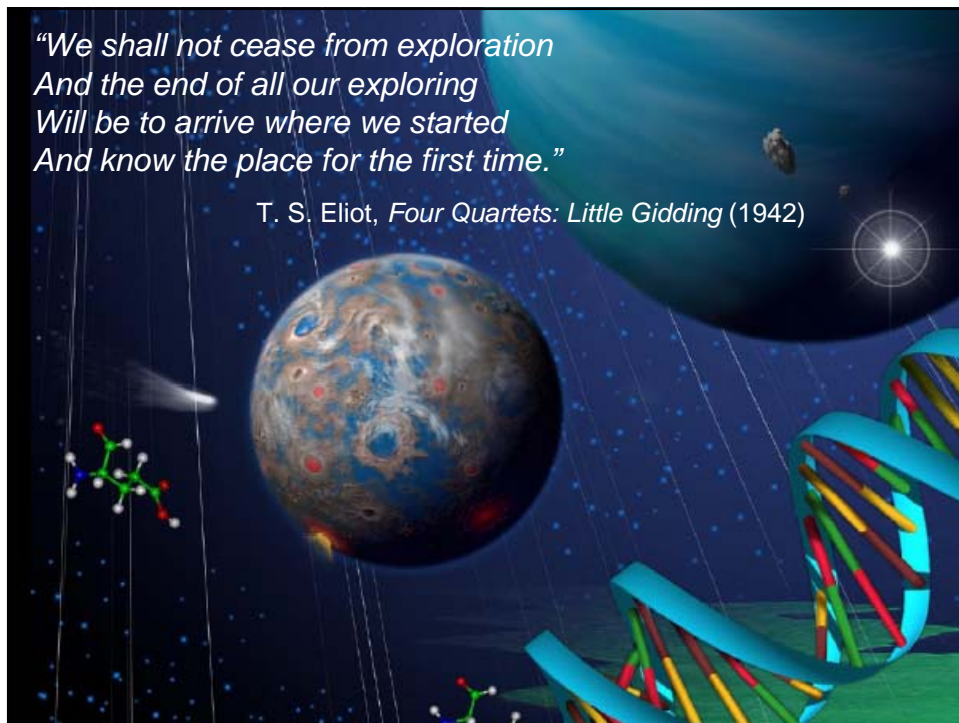
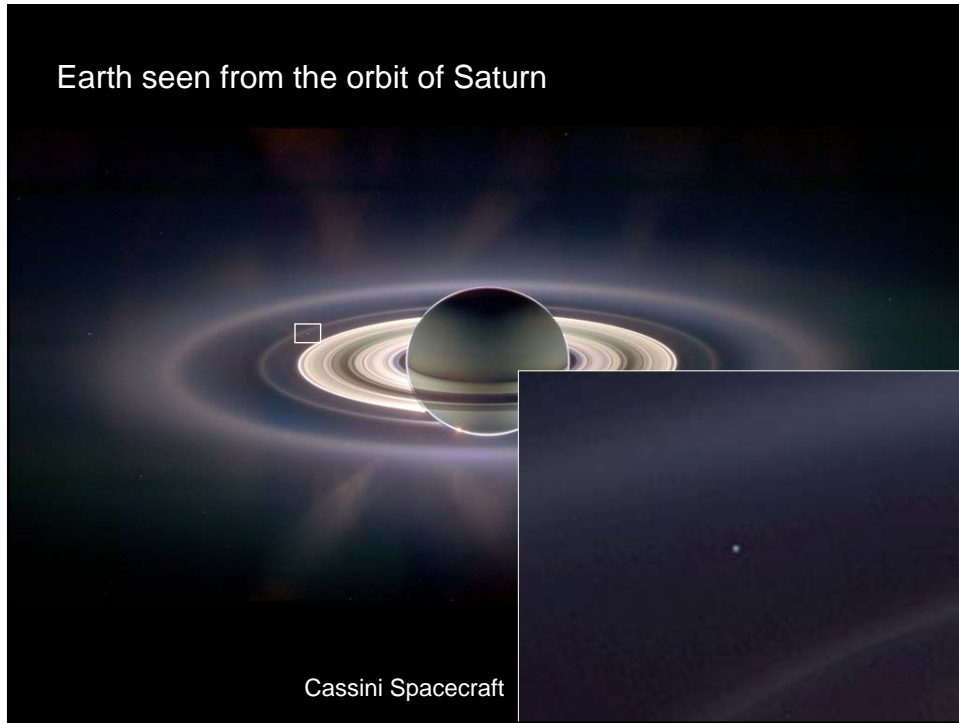
Lecture 46: This View of Life



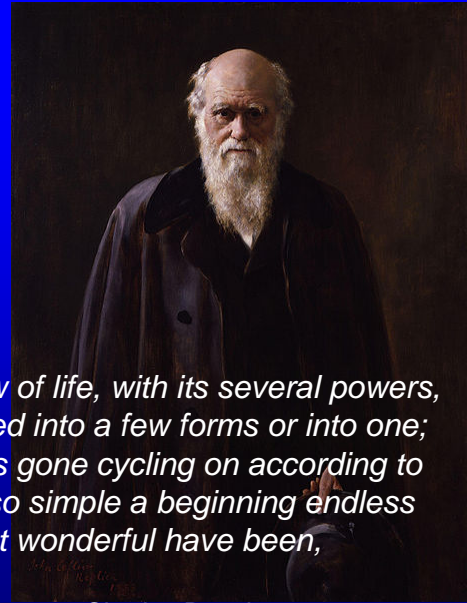
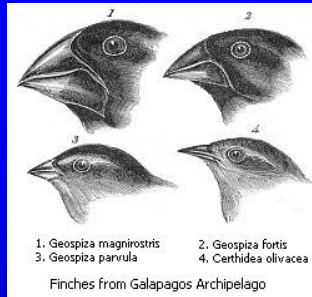
Lecture 46: This View of Life



Lecture 46: This View of Life



Lecture 46: This View of Life



“There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.”

Charles Darwin, 1859
On the Origin of Species
(first edition)