

Astrobiology

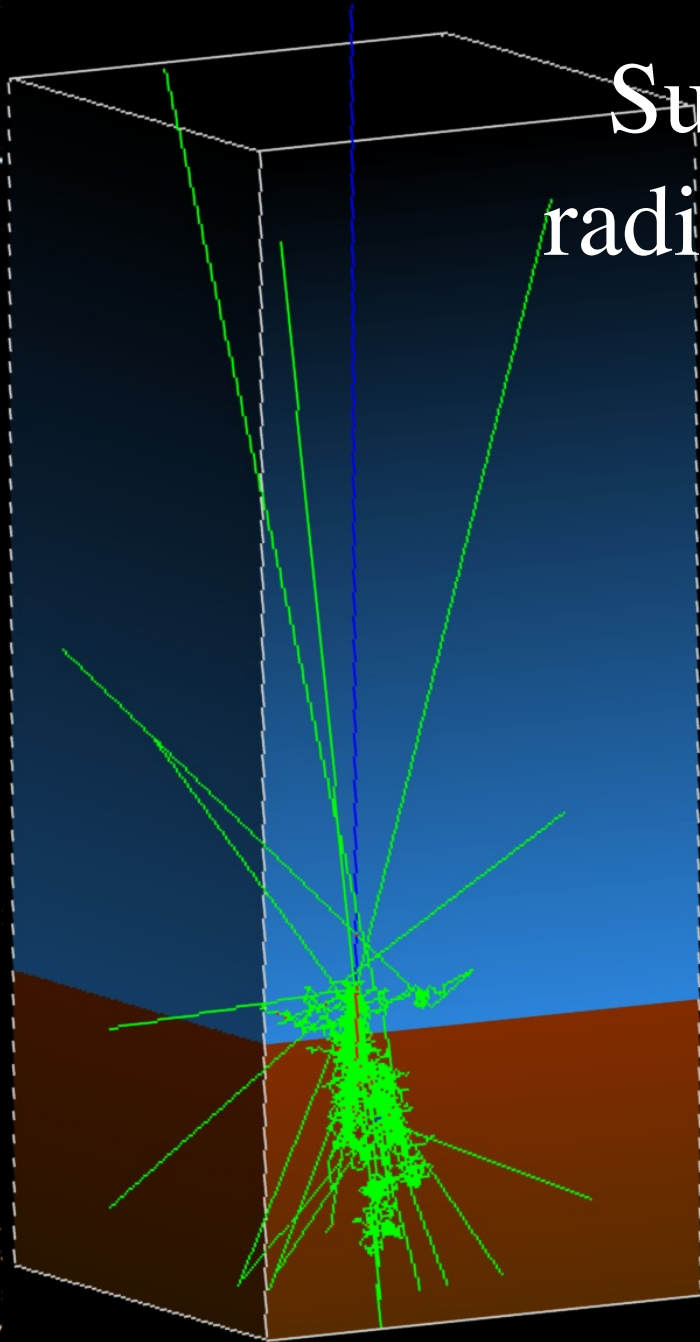
The search for *alien* life

Dr. Lewis Dartnell
Centre for Planetary Sciences
University College London

Twitter: [lewis_dartnell](#)

Subsurface cosmic ionising radiation environment of Mars or

'Martian Death Rays'



Life could be lurking in Mars' frozen sea

THE DAILY TELEGRAPH
TUESDAY, JANUARY 30, 2007

By Roger Highfield
Science Editor

SPACE probes looking for life on Mars must dig deeper to have any chance of success, according to new research. And they should start in what is thought to be a frozen sea of ice known as Elysium.

Unlike Earth, the Red Planet is not protected by a global magnetic field or thick atmosphere and is bombarded by radiation from space.

For cellular life to have any chance of surviving such high radiation levels it would have to be several metres below the surface – beyond the reach of even state-of-the-art drills.

A team from University College London has been studying cosmic radiation levels at various depths on Mars and has published its findings in the journal *Geophysical Research Letters*.

Lewis Dartnell, the lead author, said: "It just isn't plausible that dormant life is still surviving in the near-subsurface of Mars in the face of the ionizing radiation field."

"Finding life depends on liquid water surfacing on Mars, but the last time water was widespread was billions of years ago. Even the hardest cells could not possibly survive the cosmic radiation levels for that long."

The team found that the best places to look for life would be within the ice at Elysium, because the frozen sea is relatively recent and so has been exposed to radiation for a relatively short time.

Water also provides a shield of hydrogen to protect life from destructive cosmic radiation particles.

Mr Dartnell said: "We have found that this suspected frozen sea in Elysium represents one of the most exciting targets for landing a probe."

Other ideal sites include recent craters, because the surface has been exposed to less radiation, and the gullies recently discovered in the sides of craters, as they are thought to have flowed with water in the past five years.

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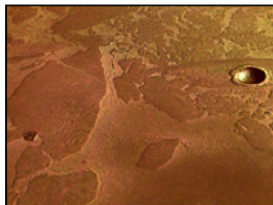
Last Updated: Monday, 29 January 2007, 16:12 GMT

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Frozen sea may harbour Mars life

A frozen sea found on Mars is one of the most promising places to look for life on the Red Planet, scientists say.



Elysium's frozen sea may be one of the best places to look for life

But planned missions designed to search for microbes below the Martian surface will not drill deep enough to find living cells, the UK team has said.

Researchers at University College London say that microbes in the first couple of metres of Martian soil would be killed off by intense radiation.

OPEN Enlarge Image

Life might survive deeper down, where conditions are more benign, they think.

But these depths were beyond the reach of drills envisaged for missions to Mars, said Lewis Dartnell, from UCL's Centre for Mathematics and Physics in the Life Sciences & Experimental Biology (Complex).

"It just isn't plausible that dormant life is still surviving in the near-subsurface of Mars"

Lewis Dartnell, UCL

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Technical look at Project Mercury
This documentary takes a look at the technical aspects of Project Mercury, including development of the capsule and the pioneering first manned flights of America's space program.

Apollo 15: In the Mountains of the Moon
The voyage of Apollo 15 took man to the Hadley Rille area of the moon. Astronauts Dave Scott and Jim Irwin explored the region using a lunar rover, while Al Worden remained in orbit conducting observations. "Apollo 15: In the Mountains of the Moon" is a NASA film looking back at the 1971 flight.

SkyLab's first 40 days
SkyLab, America's first space station, began with crippling problems created by an incident during its May 1973 launch. High temperatures

Must dig deeply to seek life on Mars, new report says

AMERICAN GEOPHYSICAL UNION NEWS RELEASE
Posted: January 29, 2007

WASHINGTON - Probes seeking life on Mars must dig deeply into young craters, gullies, or recently exposed ice to have a chance of finding any living cells that were not annihilated by radiation, researchers report in a new study. One promising place to look for them is within the ice at Elysium, site of a recently discovered frozen sea, they say.

Current probes designed to find life on Mars cannot drill deeply enough to find living cells that may exist well below the surface, according to the study. Although these drills may yet find signs that life once existed on Mars, the researchers say, cellular life could not survive incoming radiation within several meters [yards] of the surface. This puts any living cells beyond the reach of today's best drills.

The study, to be published 30 January in the journal *Geophysical Research Letters*, maps cosmic radiation levels at various depths, taking into account surface conditions in various areas of Mars. The lead author, Lewis Dartnell of University College London, said: "Finding hints that life once existed—proteins, DNA fragments, or fossils—would be a major discovery in itself, but the Holy Grail for astrobiologists is finding a living cell that we can warm up, feed nutrients, and reawaken for studying."

Tuesday, January 30, 2007

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OUT OF THIS WORLD with VINCE SOODIN

Martians 'hiding' on red planet

January 30, 2007

COMMENT ON THIS STORY

MARTIANS maybe hiding underground on Mars to stay alive, new research suggests.

Scientists could have burrowed below the red planet's surface to avoid deadly radiation above.

Now scientists led by the University College London say microbes need to drill deeper into the planet if they want to find signs of life.

Lewis Dartnell, lead author of UCL report, said: "Finding hints that life once existed – proteins, DNA fragments or fossils – could be a major discovery in itself."

But the Holy Grail for astrobiologists is finding a living cell that we can warm up, feed nutrients and reawaken for studying.

Astronomy

The UK's best selling astronomy magazine

April 2007/£3.25

Icy lakes may be the best refuge for Martian life

Planetary scientists have announced that the icy lakes such as the one recently discovered, near Elysium Planitia at the Martian equator, may be the best places to find any signs of Martian life. Mars is buffeted every second by high doses of radiation that is likely to kill any life that has not found suitable shelter. This new research suggests that a layer of ice may be all that is needed to preserve any primitive cells.

The signs of scientists modeled several scenarios on Mars for where life may be lurking, and the model for life beneath a layer of ice came out on top. Lewis Dartnell from University College London and lead author of the paper

describing the research believes that the results may help direct the future robotic exploration of Mars.

"Although finding photospheres, or signs of previous life, would obviously be ground-breaking, the Holy Grail for astrobiologists is to find surviving cells that can be reanimated with a little warming and some nutrients and be studied alive," he says. But radiation from space would destroy any life near the surface of Mars. "It just isn't plausible that dormant life is still surviving within the first couple of metres below the surface."

Finding dormant microbes may prove quite tricky for the next generation of Martian drilling missions, such as

ESA's ExoMars, which will drill down two metres. But according to Dartnell, at many locations across Mars the chances

of finding life at that depth is slim and future missions may have to drill down several kilometres to find anything. The advantage of the Elysium location is that it is a geothermal hotspot and may allow conditions for life closer to the surface.

"Our research tells us that the next generation of Mars landers will need to drill deeper than two metres, or else land in very inaccessible locations such as the bottom of recent impact craters or sites of recent liquid water flow," says Dartnell.



Aliens ... maybe underground

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life with

Underneath dark ice in the Elysium region of Mars may be habitats for native Martian life. Image: ESA/ DLR/ JPL/ Berlin G. Neukum

A deep-field astronomical image, likely from the Hubble Space Telescope, showing a vast field of galaxies and stars. The background is black, filled with numerous small, distant galaxies and stars of various colors (white, blue, yellow, orange). The text "What is *astrobiology*?" is centered in the image.

What is *astrobiology*?

A deep space photograph showing a vast field of stars and distant galaxies against a black background. The stars appear as bright points of light, some with diffraction spikes. The galaxies are small, distant objects scattered across the field.

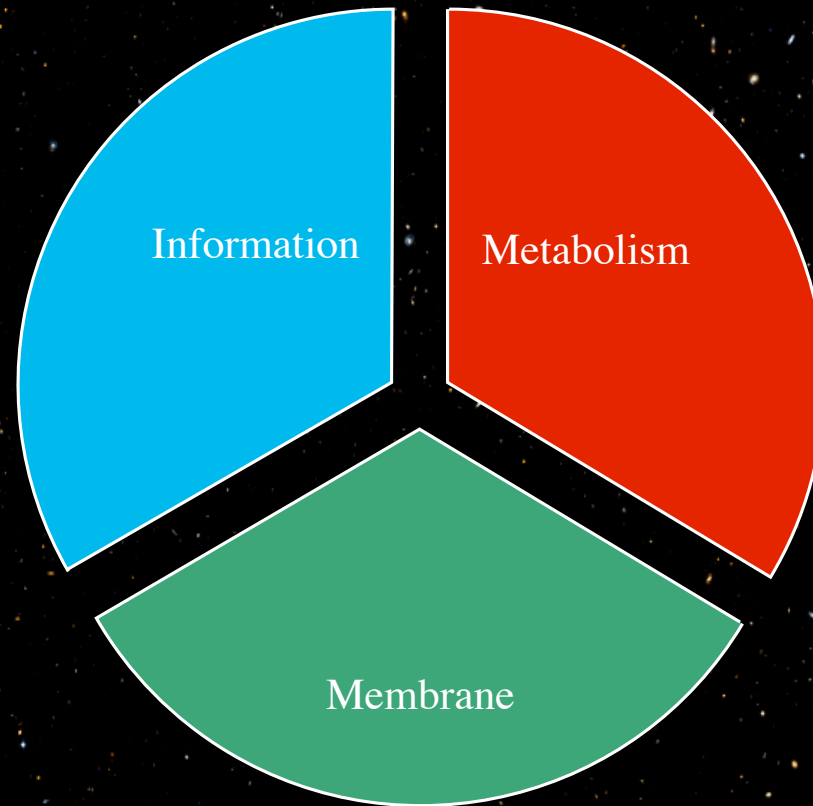
What is *astrobiology*?

*“ The quest to understand the origin,
evolution, distribution and future of life in
the Universe ”*

What is '*life*' ?

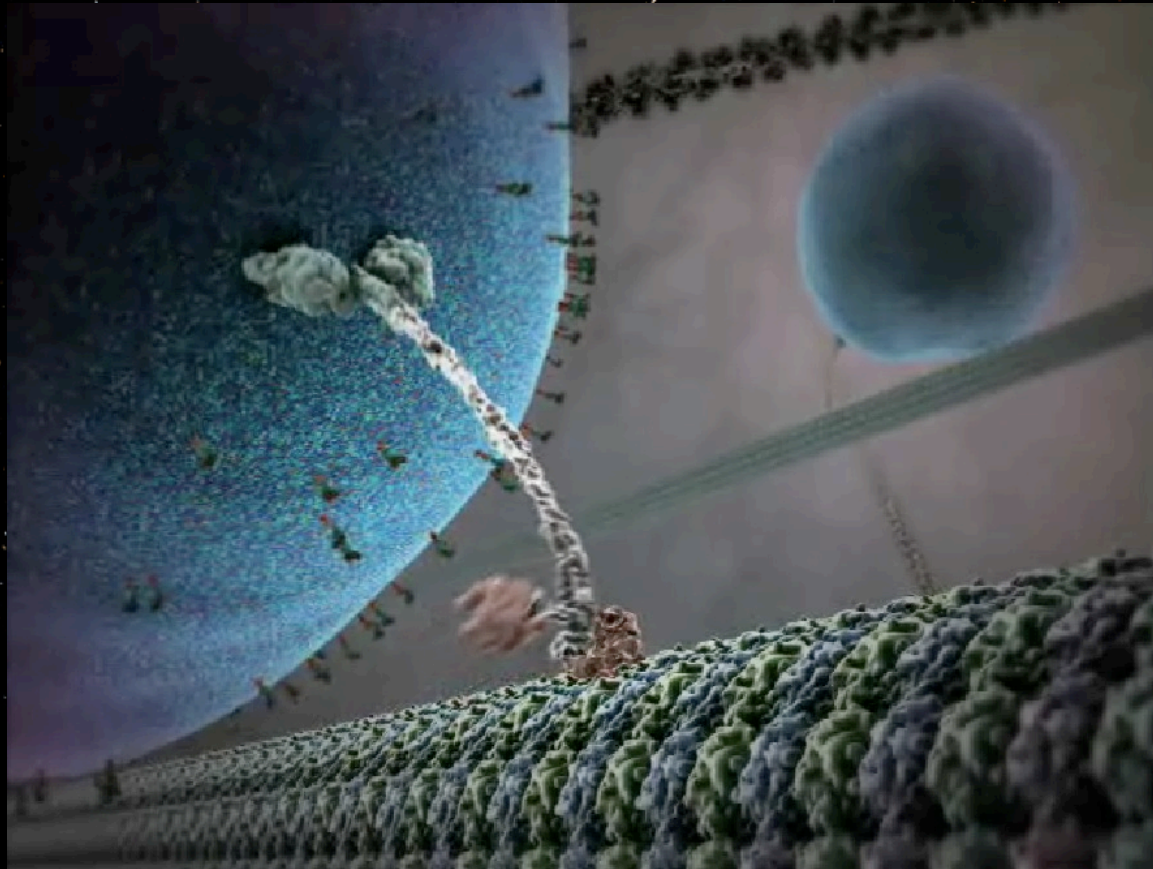


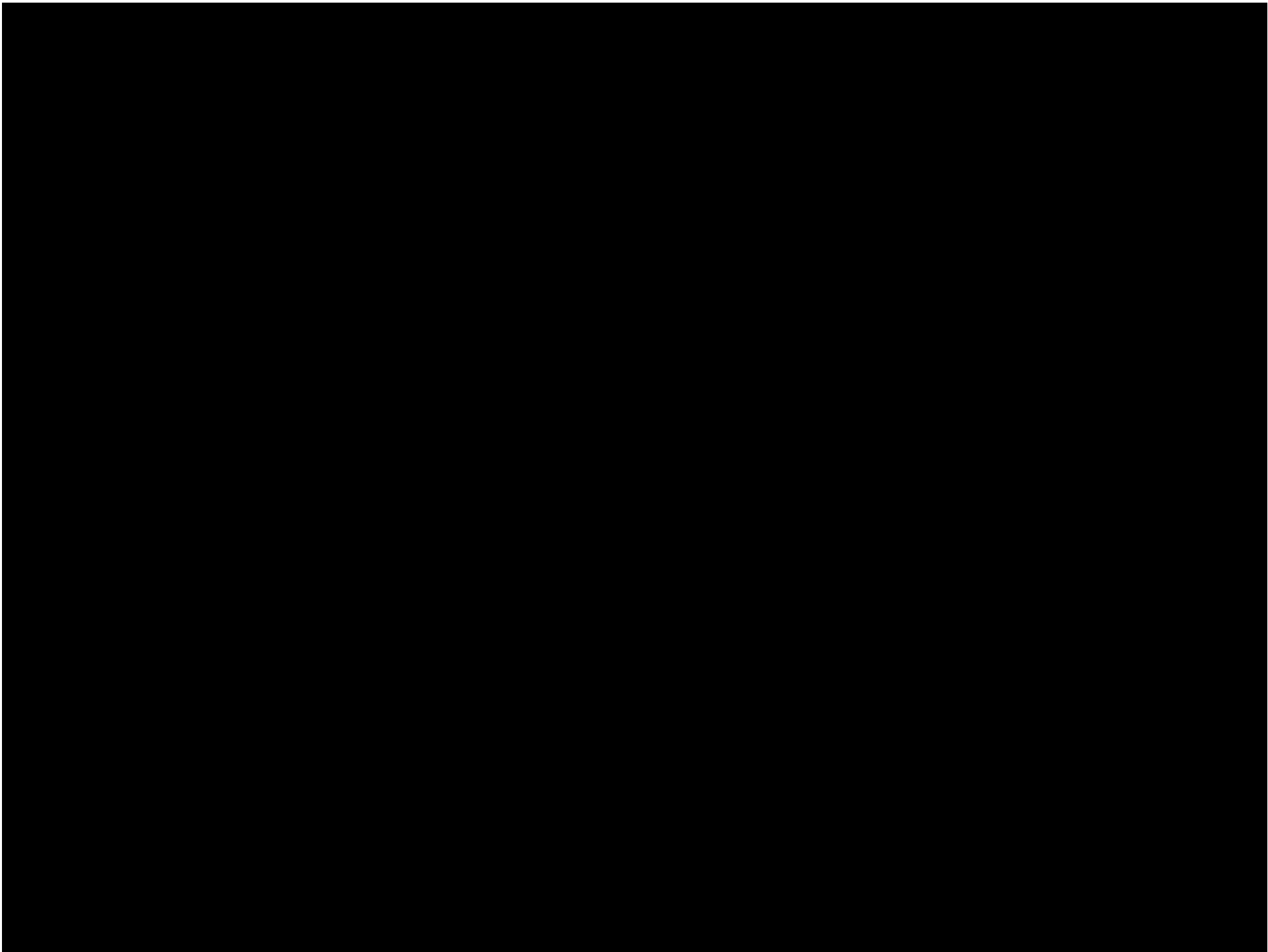
What is life?



A self-sustaining system able to process information and extract energy from the environment to maintain its own complexity and replicate.

Complexity of life

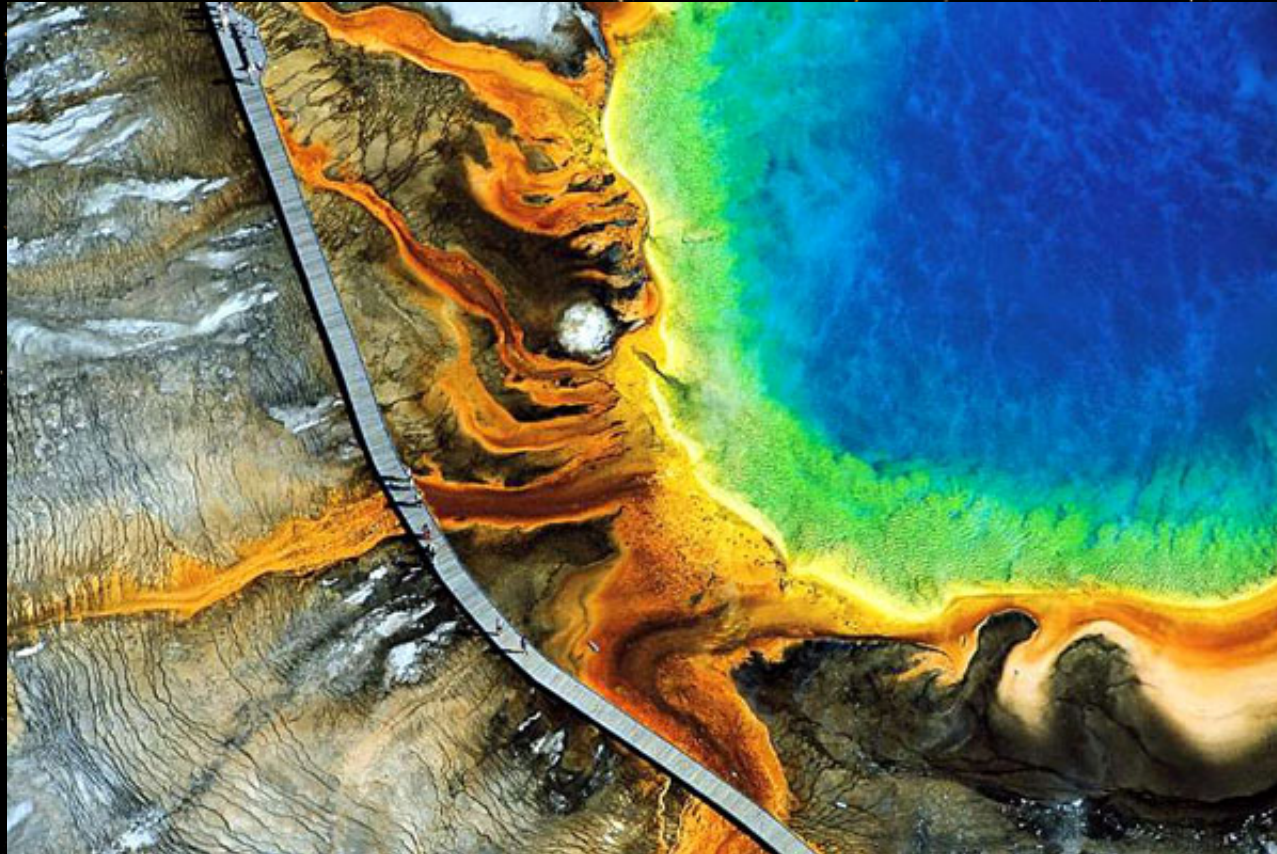




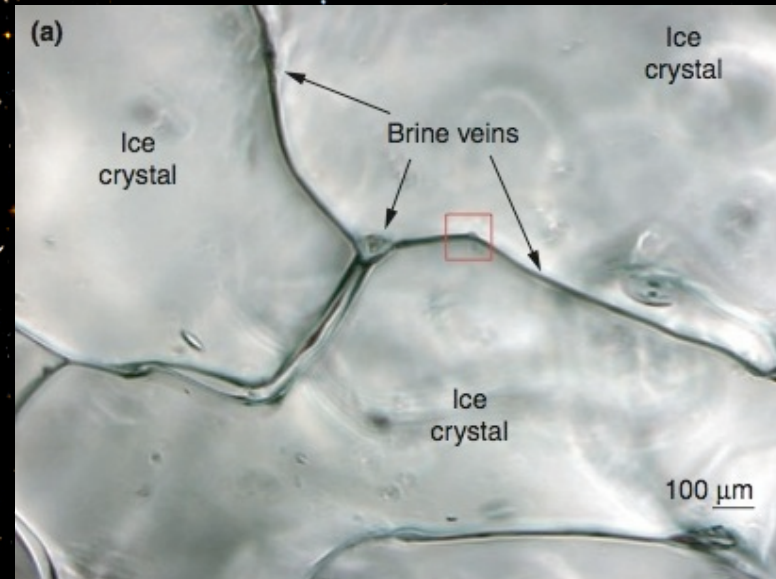
A deep-field astronomical image, likely the Hubble Deep Field, showing a vast field of galaxies and stars against a black background. The image is filled with numerous small, distant galaxies and stars, some appearing as bright, multi-pointed stars and others as faint, elongated shapes. The overall scene is a dense collection of celestial objects, with the word "Extremophiles" centered in the middle.

Extremophiles

Thermophiles & Acidophiles



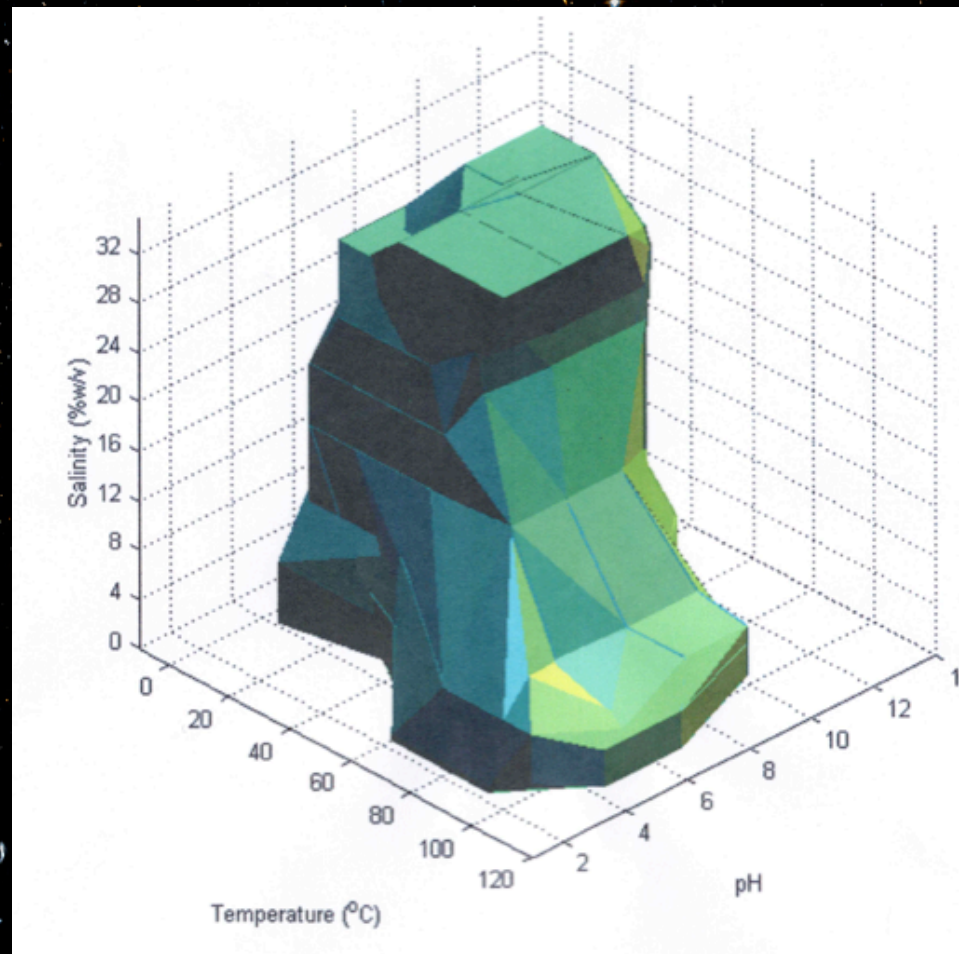
Psychrophiles



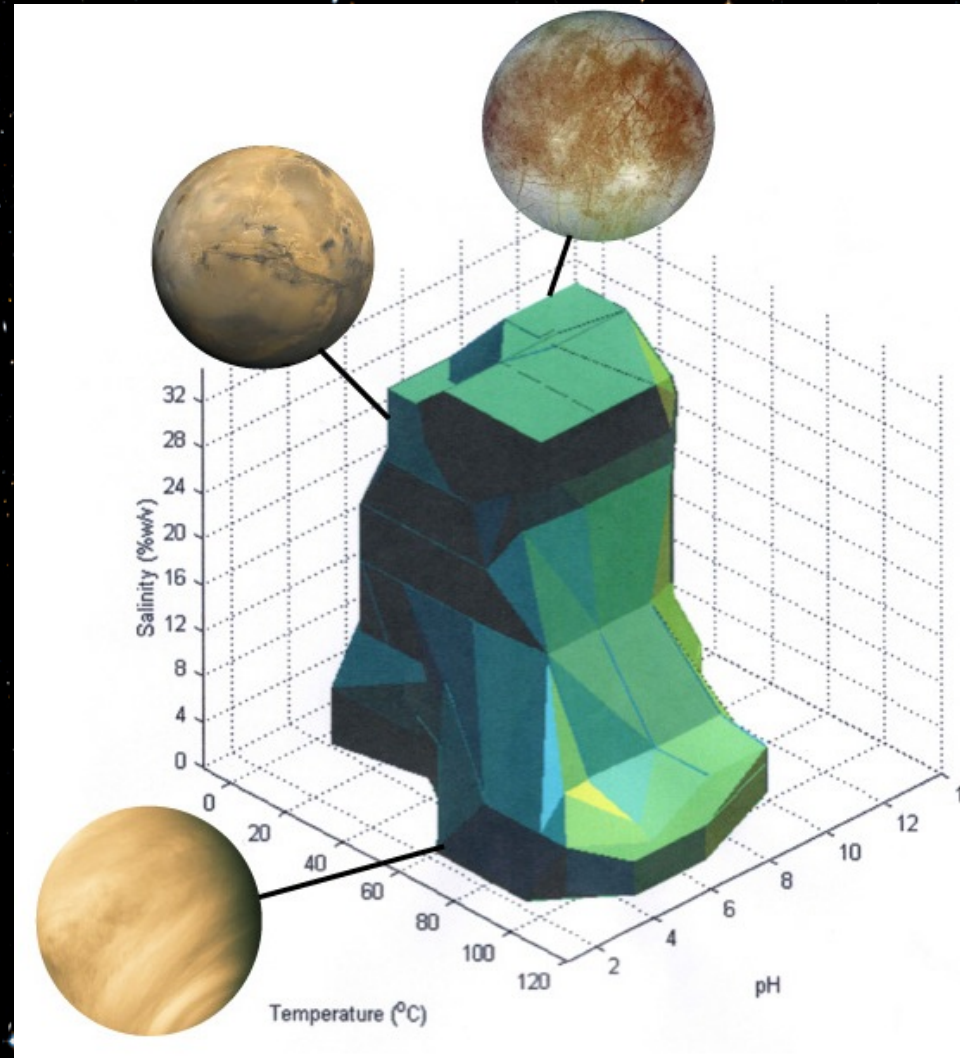
Methane worm



Envelope of life

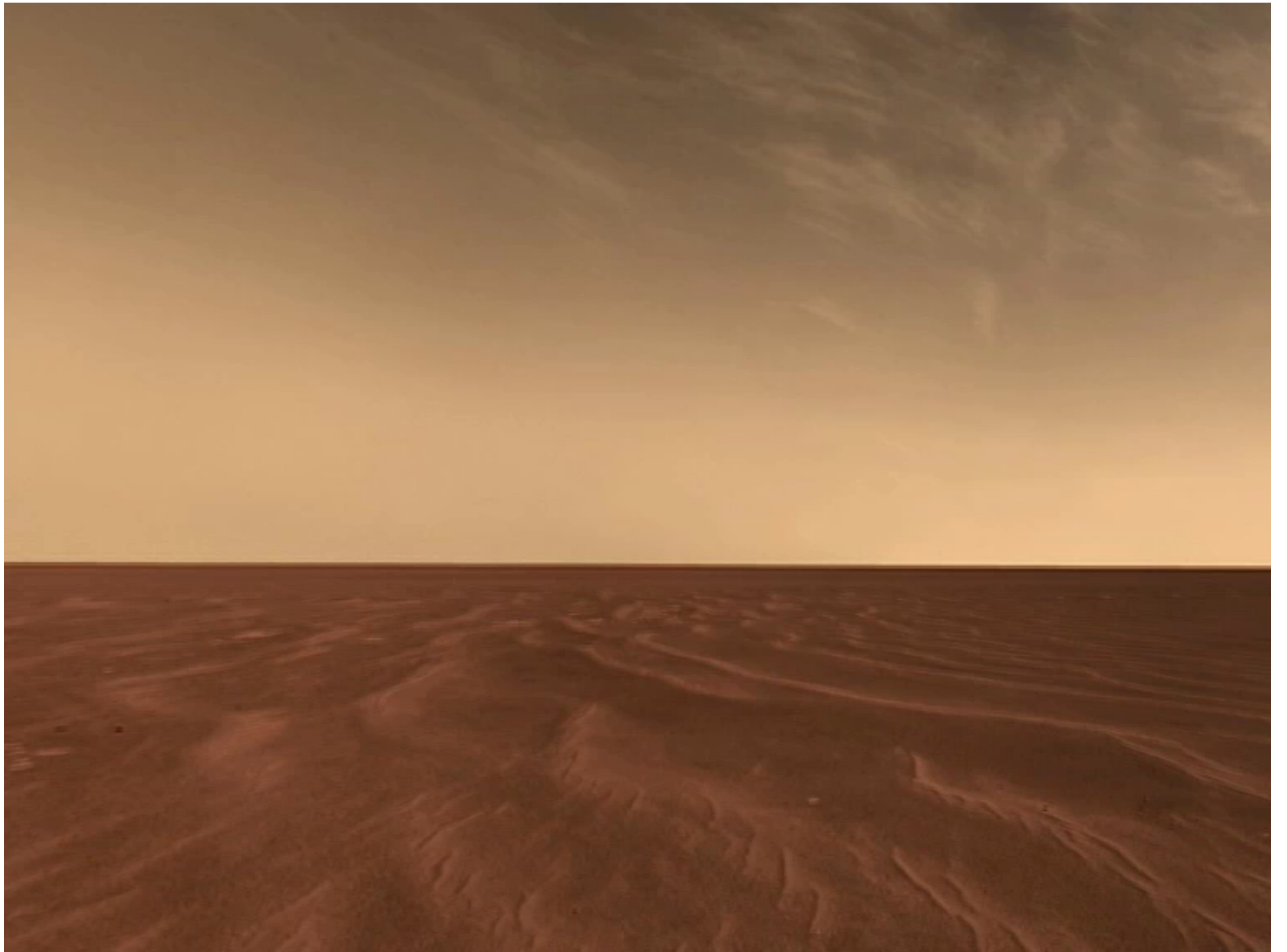


Envelope of life



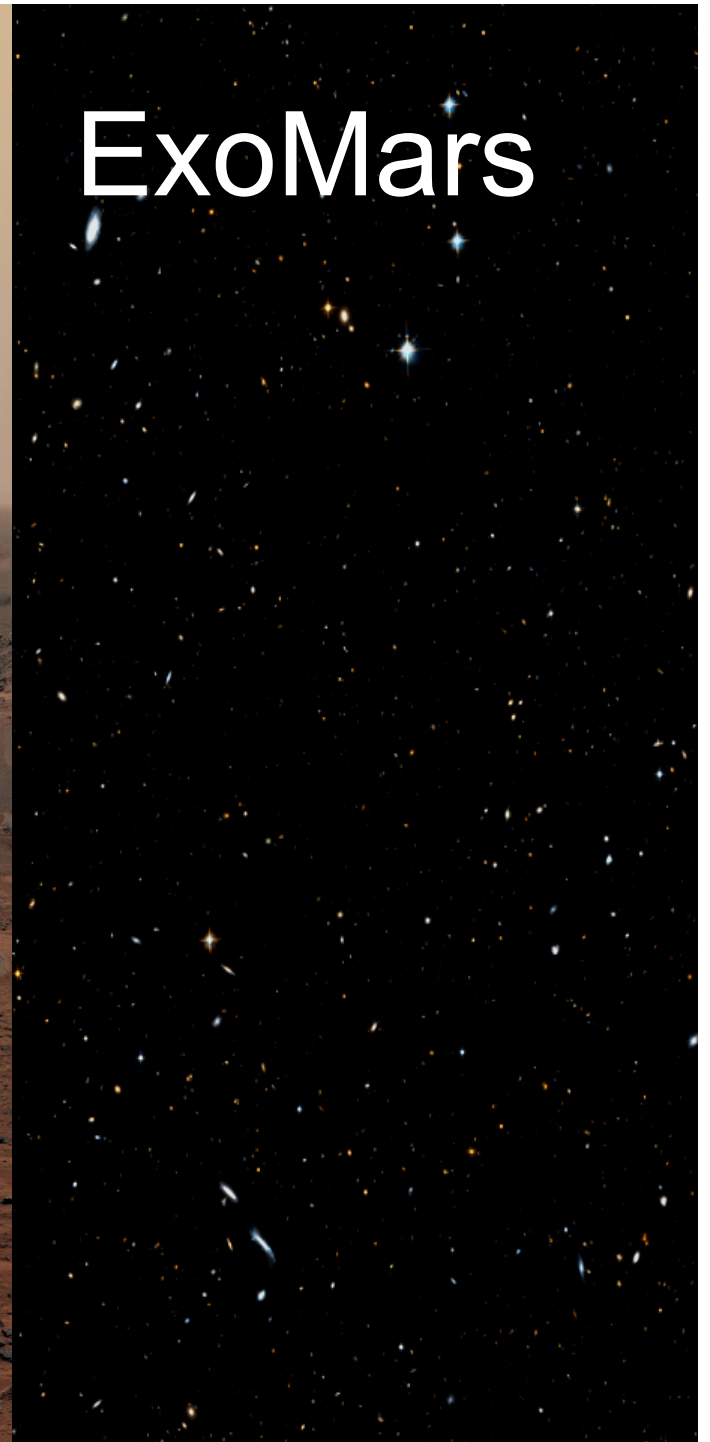
A deep-field astronomical image showing a vast expanse of space filled with numerous stars of varying colors (white, yellow, blue) and sizes. Some stars have prominent diffraction spikes. The background is a dense field of distant galaxies and nebulae, creating a rich, textured cosmic scene. The text "A Tour of the Solar System" is centered in a white, serif font.

A Tour of the Solar System

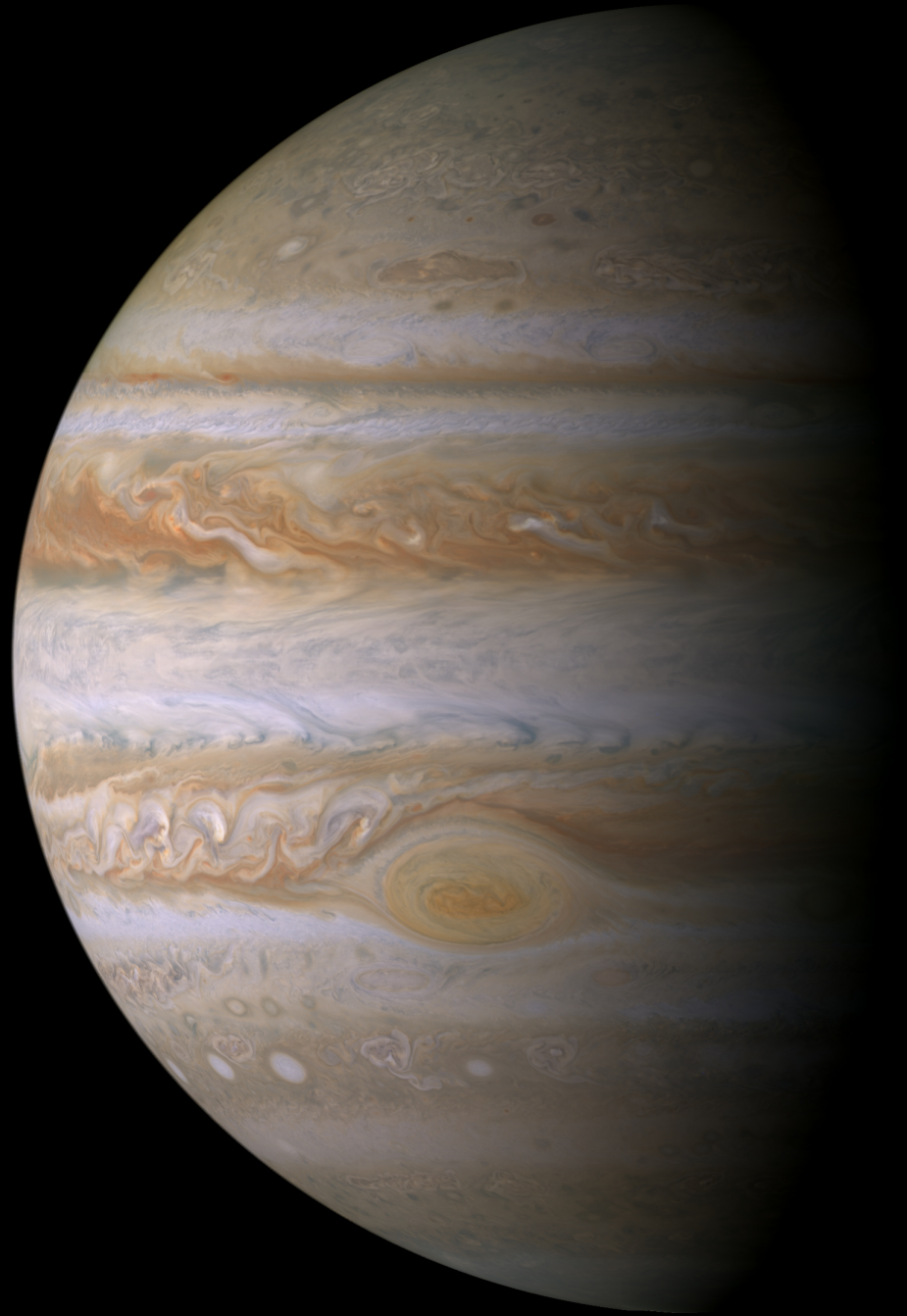


Mars

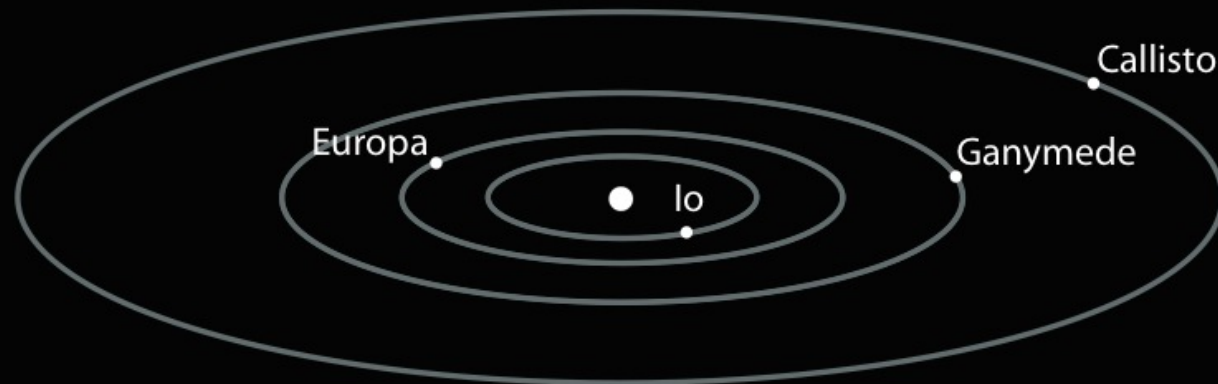




Jupiter system



Galilean satellites



Io



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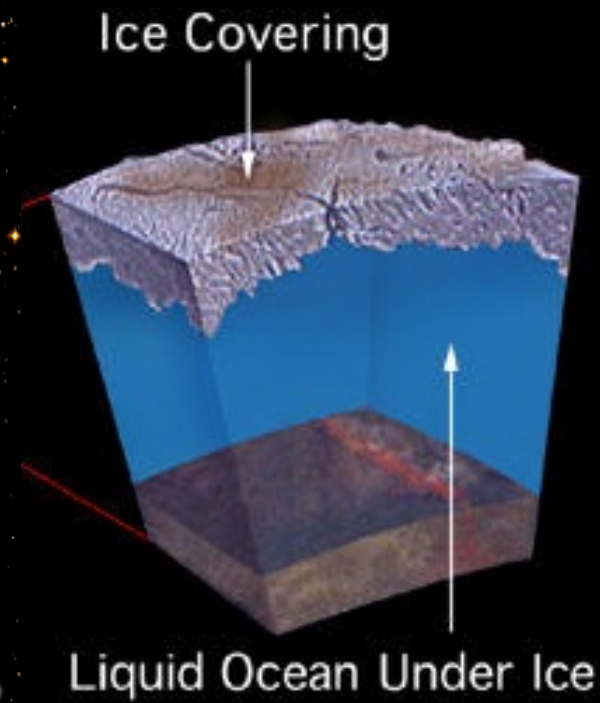
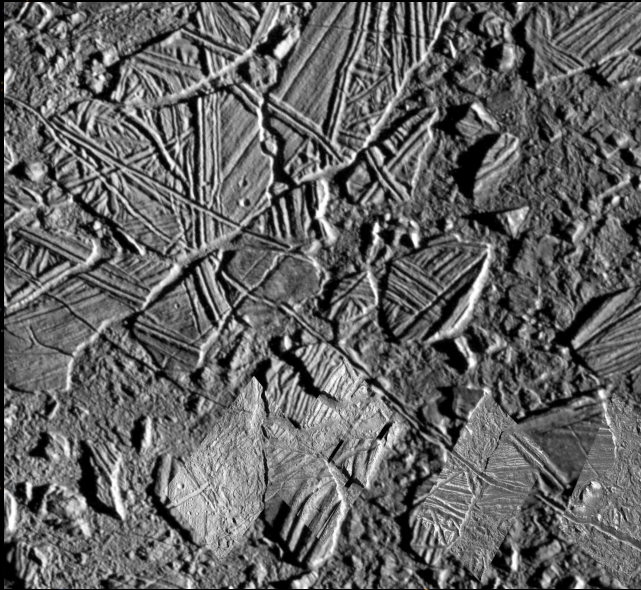


Ganymede



Callisto

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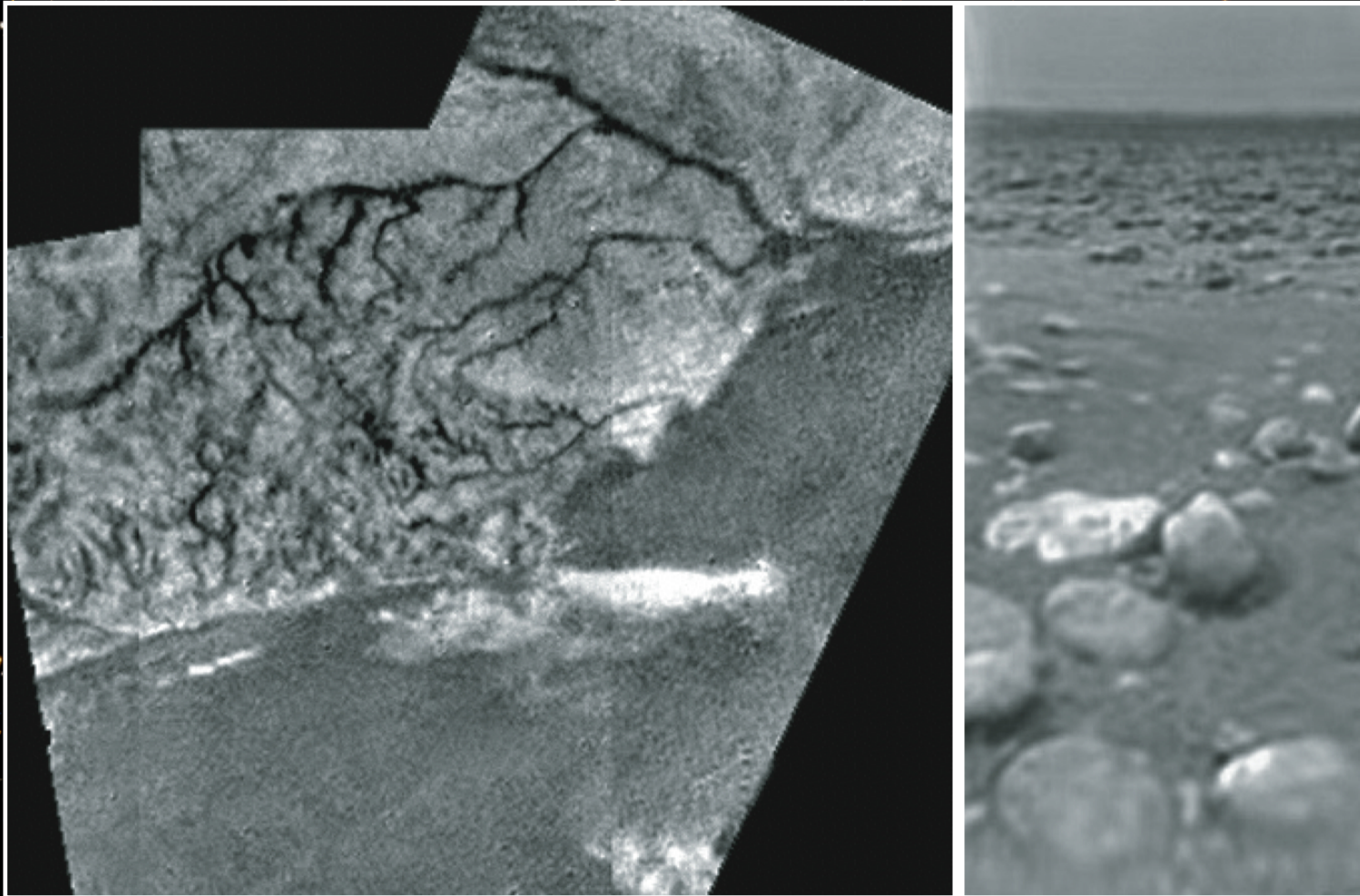
Saturn system



Titan



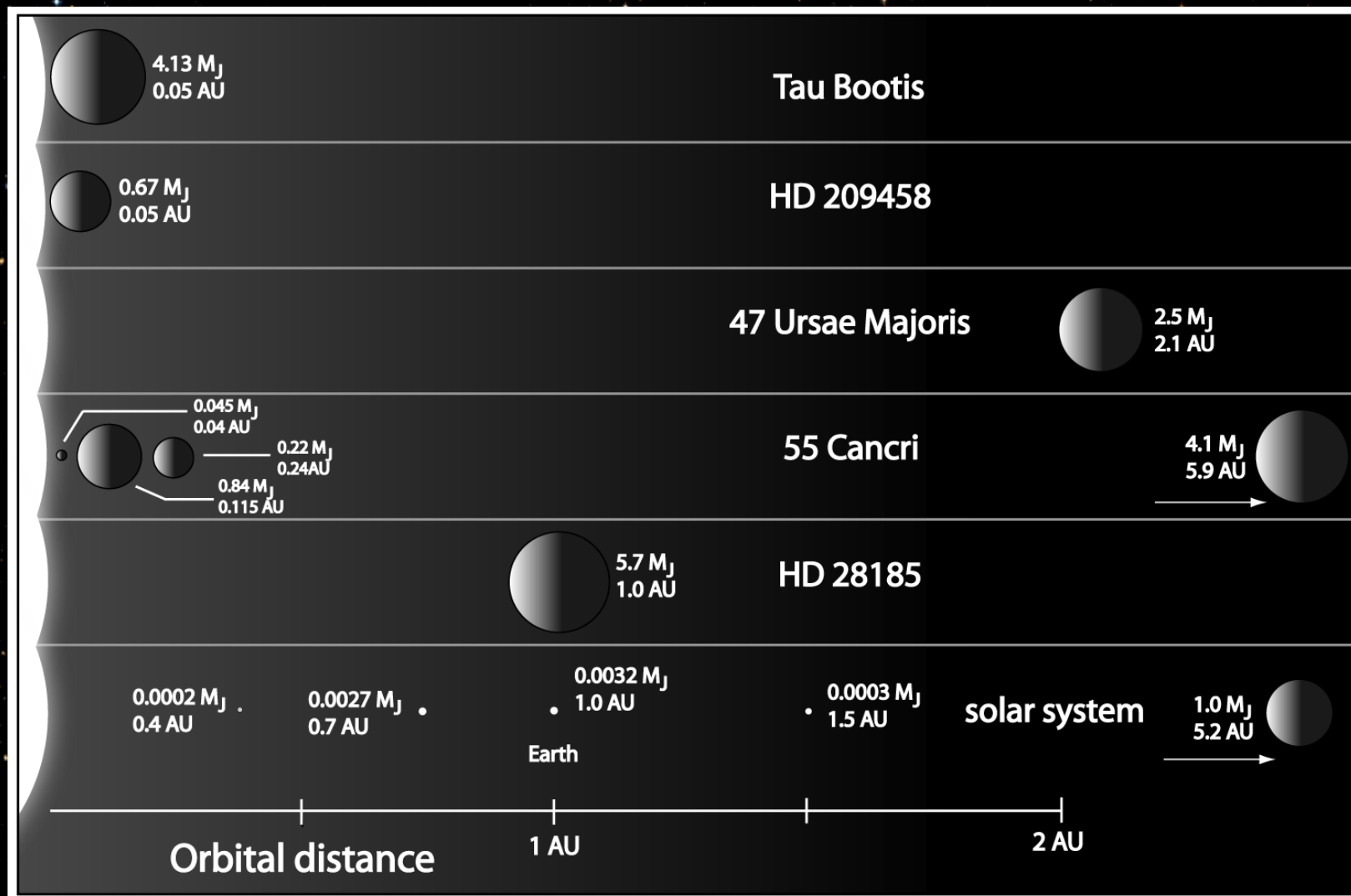
A Hidden World

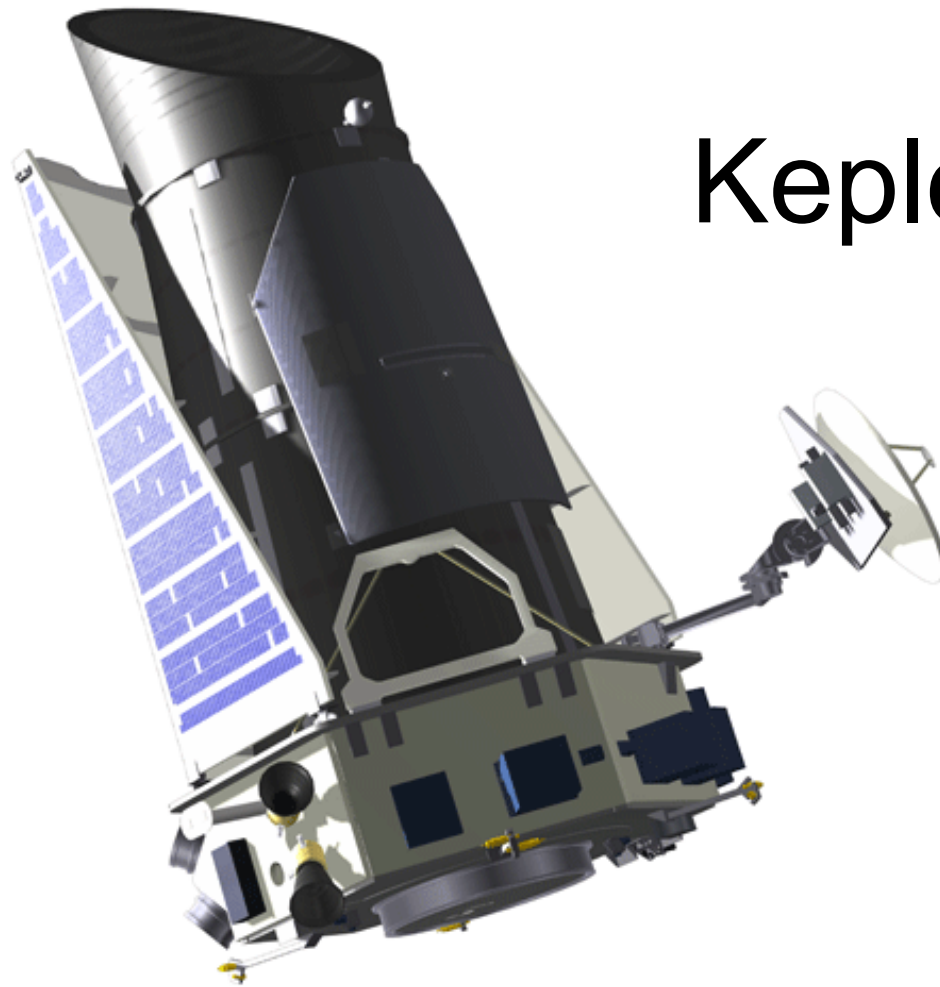


Our local galaxy



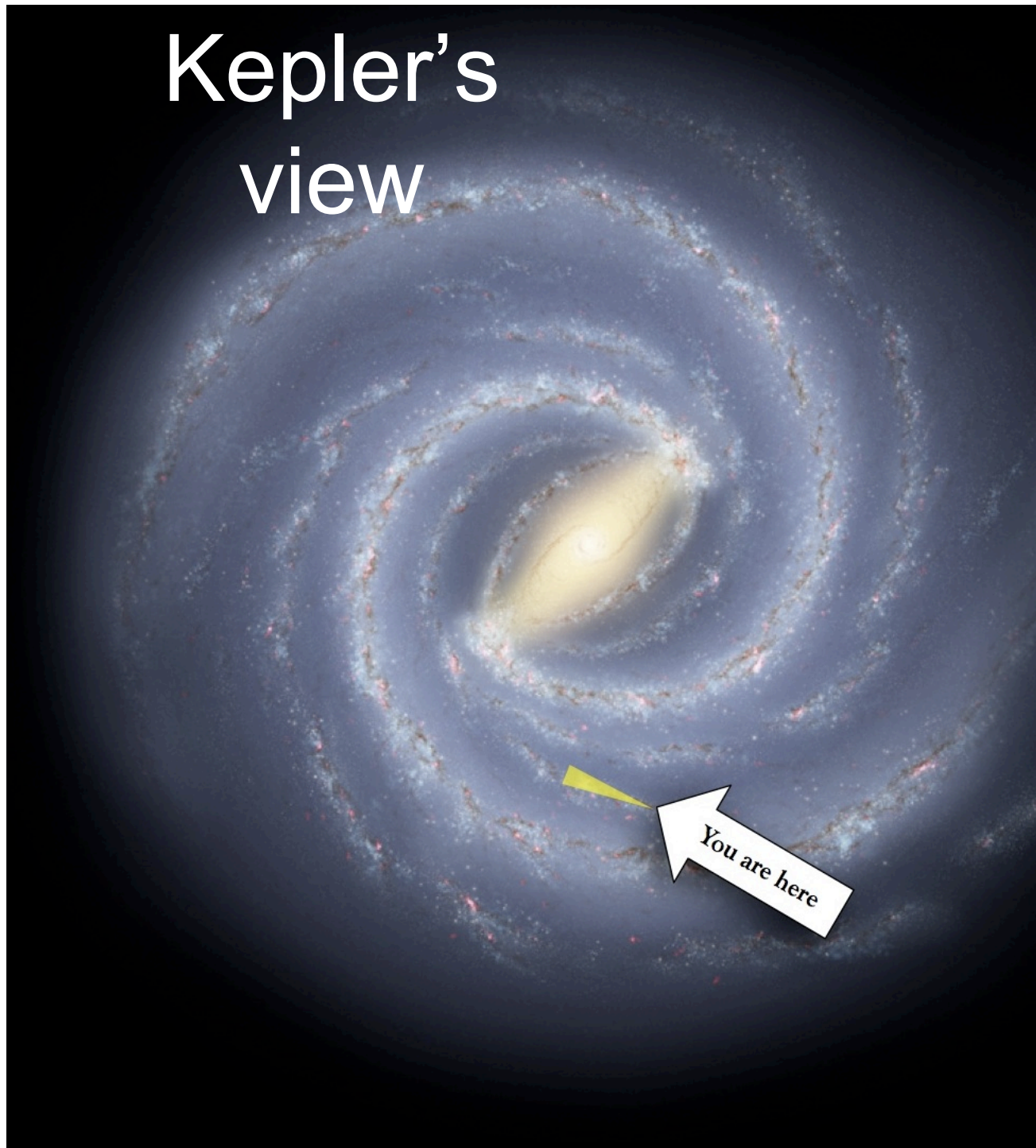
Alien solar systems





Kepler

Kepler's view





A Second Earth

Hubble Deep Field





... questions ?

Lewis Dartnell

Life In The Universe

