

# Hollywood Science

## Week 5: Deep Space



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## Recap: Inner space

The past four weeks we have looked at art and science about the **inner space**.

- Dangers for humanity/earth in *War of the Worlds*
- Biotourism in *Fantastic Voyage*
- How our own creations can turn against us in *Frankenstein*
- What it means to be human in *Blade Runner*

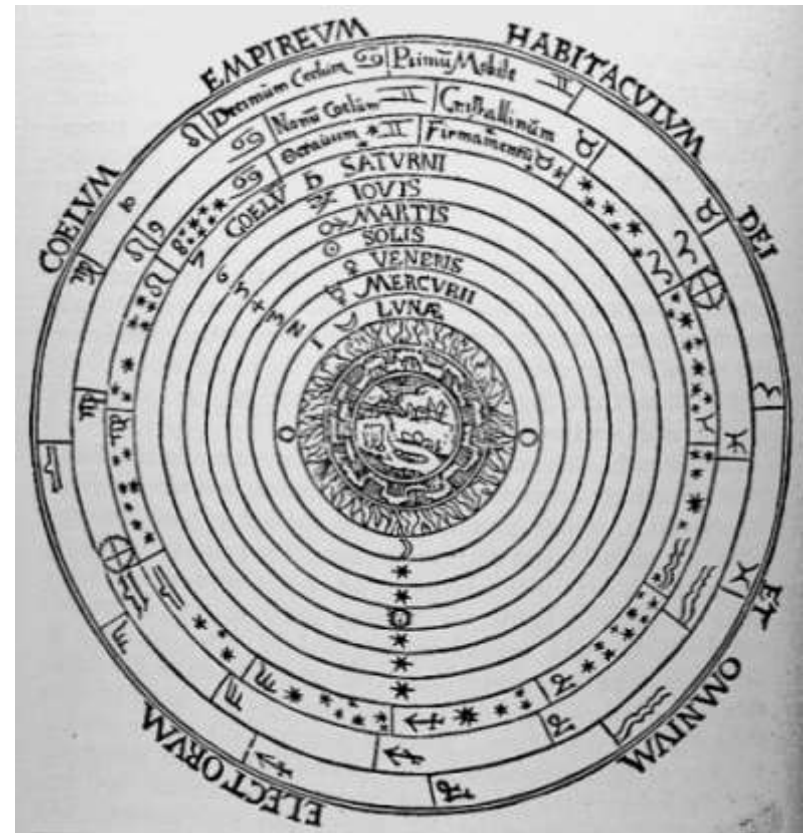
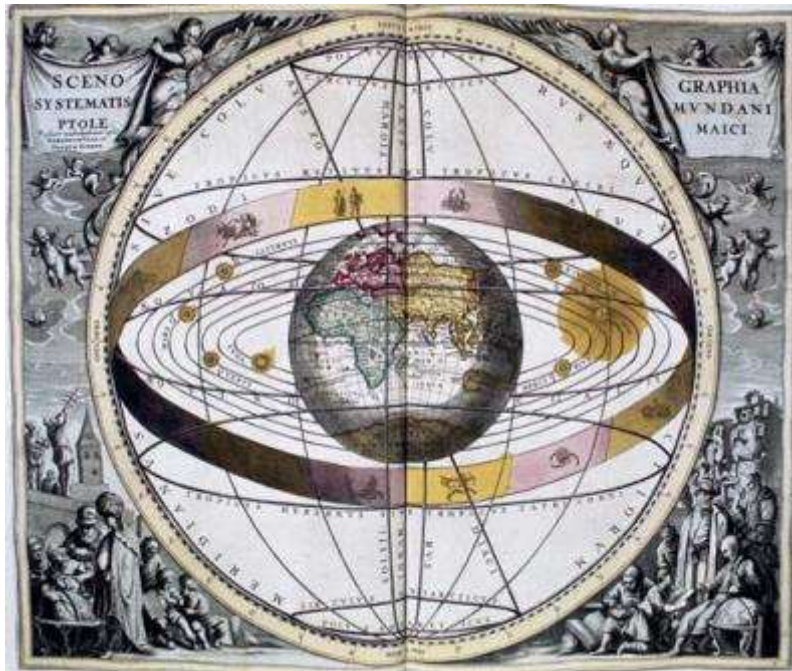
Let us now focus on what lies beyond!

From *Fantastic Voyage*  
(1966):

*“Something told me I got into  
the wrong end of this  
business. **Inner space...**”*

# History: Closed solarsystem (geocentric)

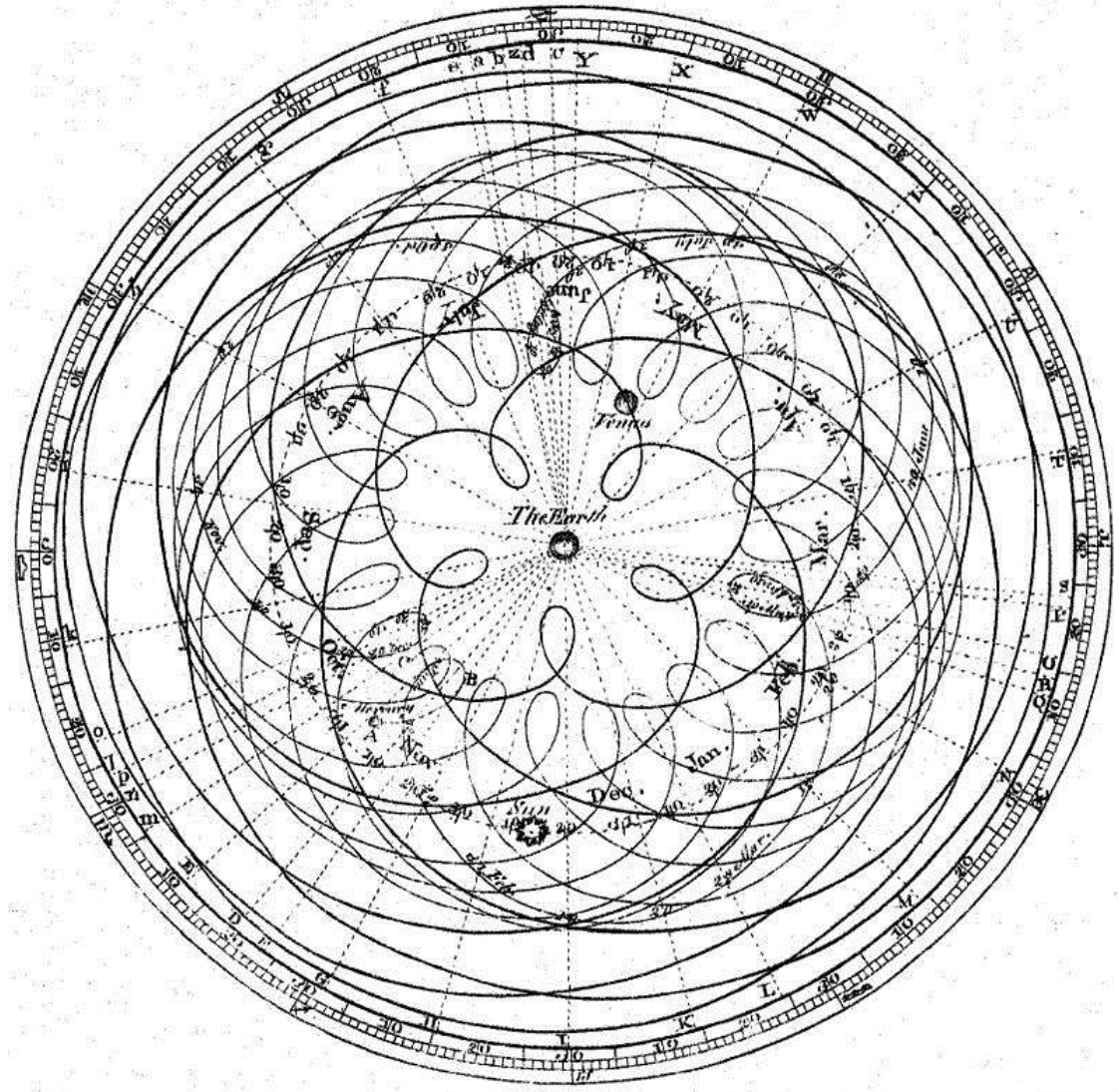
- **Aristotle** (4<sup>th</sup> century BC)
- **Ptolemy of Alexandria** (2<sup>nd</sup> century)
- Earth at the center
- Accepted until the 16<sup>th</sup> century





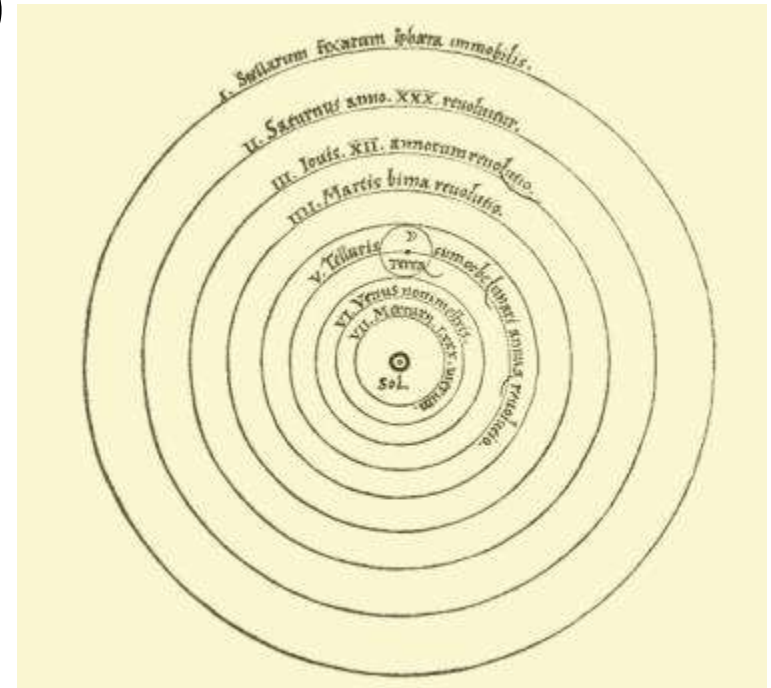
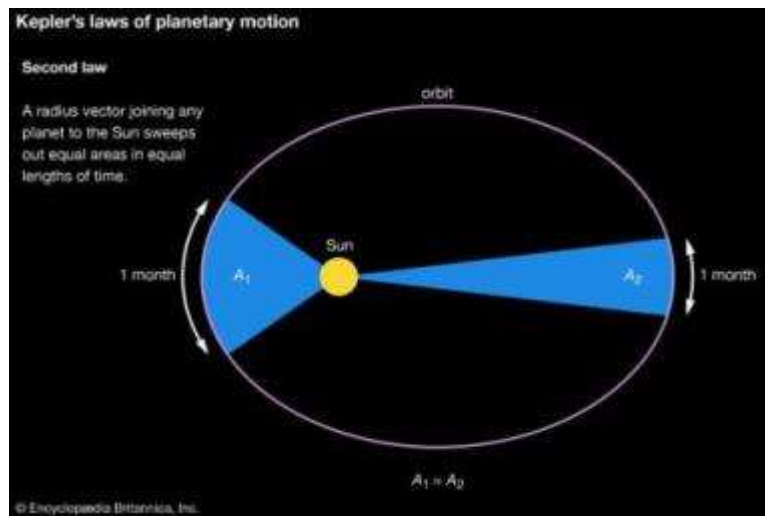
# History: Closed solarsystem (geocentric)

- Adapted to observations
- Epicycles



# Renaissance: Open solarsystem (heliocentric)

- **Nicolaus Copernicus** (16<sup>th</sup> century)
- **Galileo Galilei** affair (17<sup>th</sup> century)
  - Moon is not flat
  - Jupiter has moons
  - Terrestrial/celestial realm
- **Johannes Kepler** (17<sup>th</sup> century)



Engraving of the solar system from Nicolaus Copernicus's *De revolutionibus orbium coelestium libri VI*, 2nd ed. (1566)

## Remembered / honoured by

**Galileo** is the European [global satellite-based navigation system](#)

- Independent system from GPS

**Kepler** telescope ([Kepler Space Observatory](#), 2009)

- Finding potential planets in other solar systems



# Mathematical, Physical, technological and Philosophical Complexities

## Who is speaking here?

**“The first law:** in an inertial reference frame, an object either remains at rest or continues to move at a constant velocity, unless acted upon by a force.”

**“The second law:** states that the rate of change of momentum of a body, is directly proportional to the force applied and this change in momentum takes place in the direction of the applied force.  $F = ma$ .”



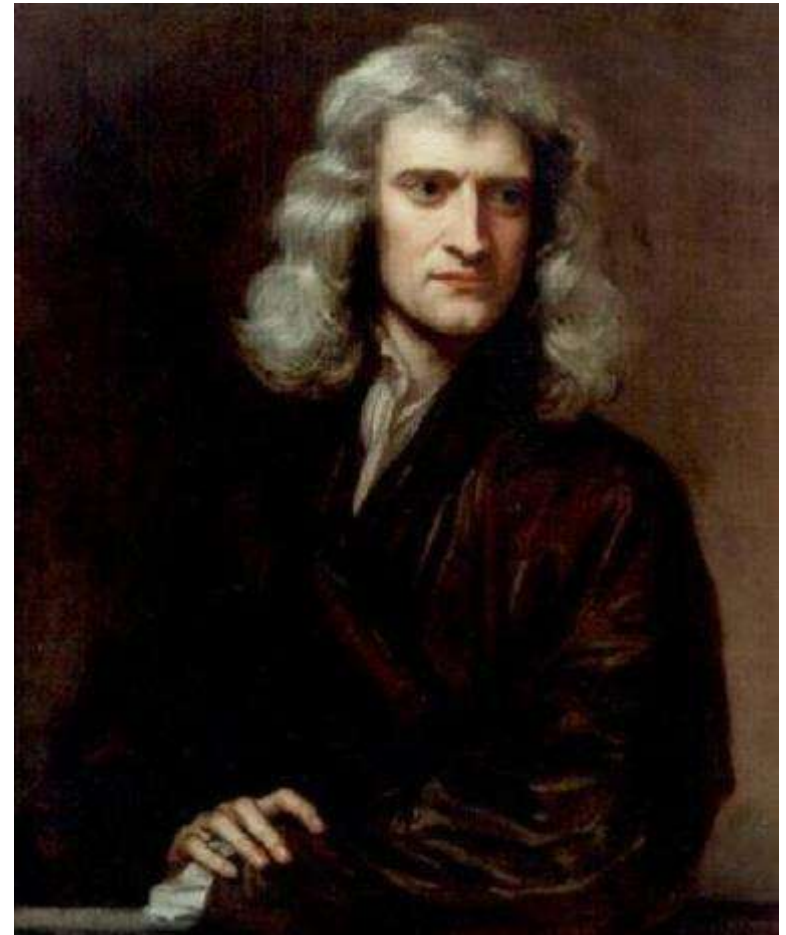
# The great divide in our classroom?

## Isaac Newton (1642-1727)

- Newton's First and Second law, original 1687 in Latin  
*Principia Mathematica*
- Mathematics and mechanics
- Gravitational forces

But:

- Problematic regarding electromagnetism (19th century)





# Principle of relativity

## Newtonian Physics:

- Length and time are absolute
- ‘Everything is stable’

## Lorenz transformations:

- Bridging electromagnetism and mechanics

## Albert Einstein:

- Principle of relativity
- Length and time do change, depending on the ‘frame’ you are observing
- ‘Everything is moving’

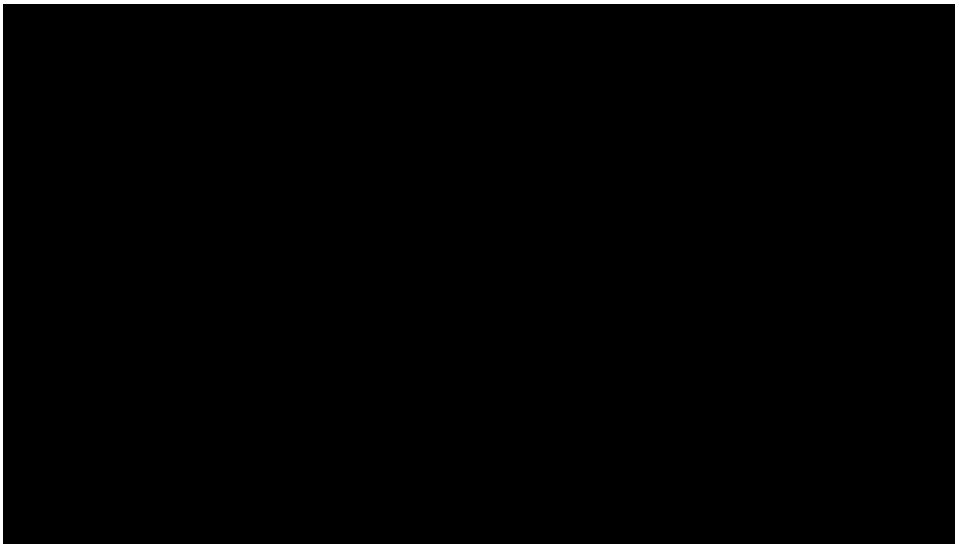


Foucault's pendulum

# Marilyn Monroe coming to help!

Marilyn Monroe explains  
relativity to Albert Einstein

- [Insignificance](#) (1985)



[https://www.youtube.com/watch?v=JS0n\\_fr1Fyo](https://www.youtube.com/watch?v=JS0n_fr1Fyo)



# Today: Complex, enigmatic

Theorists strive to find a totally unified theory, a **theory of everything (ToE)** that bridges existent theories in physics, that provides a framework to explain our universe.

Even Einstein's theorem could not provide this kind of unification between his theory of relativity and discoveries into electromagnetism.

## Candidates:

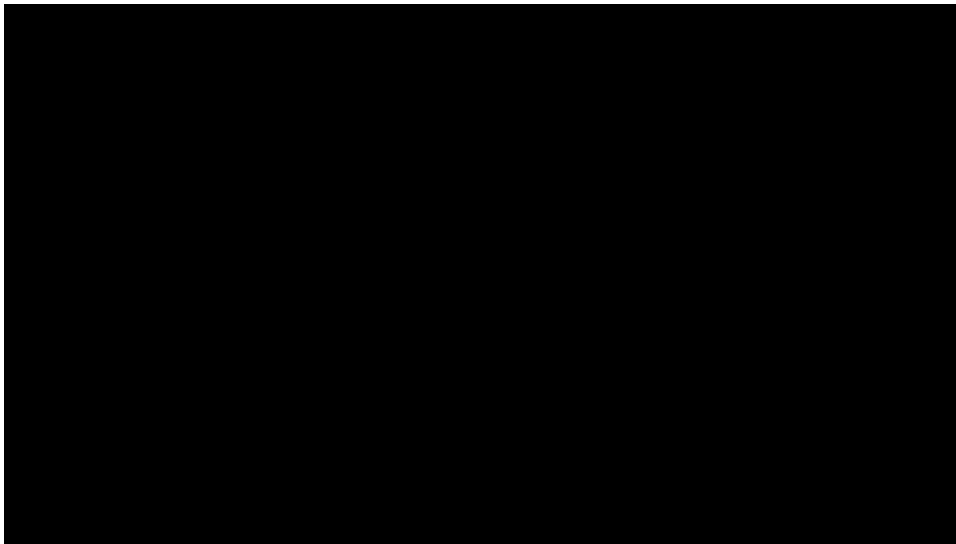
- **String theory**
- **Quantum field theory (QFT)**

Further reading: <http://www.bbc.com/earth/story/20150409-can-science-ever-explain-everything>

# The Theory of Everything (2014)

## Stephen Hawking (1942-2018)

- *A Brief History of Time* (1988)
- Insight into black holes, quantum physics, string theory and the big bang.



<https://www.youtube.com/watch?v=Salz7uGp72c>





## To sum up

- Due to technological developments there is an increasing orientation towards **outer space**
- We moved from thinking we were the **center of the universe** to being **part of the universe**
- Finding other life forms?
  - Appearance? Human-like?
- Finding habitable planets?
  - Earth-like?

“But even with all the technology that we have today -- satellites, buoys, underwater vehicles and ship tracks -- **we have better maps of the surface of Mars and the moon than we do the bottom of the ocean.** We know very, very little about most of the ocean. This is especially true for the middle and deeper parts far away from the coasts.” - [NASA](#)

Invitation for sci-fi writers!

# Space colonialism

Finding exploitable planets



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# Inspired by: Utopian and didactic fiction

Last week:

- **Utopia**
  - *Gulliver's Travels* (1726)
- **Dystopia**
  - *Brave new world* (1932)
  - *1984* (1948)
    - Science Fiction?

Exploiting the idea of the existence of Other Worlds on Earth.  
What happens if these worlds lie beyond us?

become a supporter

theguardian

news / opinion / sport / arts / life



tech / world / UK / science / cities / global development / more

# Elon Musk: SpaceX can colonise Mars and build moon base

Musk says project codenamed BFR would also allow commercial travel to anywhere on Earth in under an hour



5,394 | 1,028

This article is 1 month old

**Michael Slezak** in Sydney and **Olivia Solon** in San Francisco

Friday 29 September 2017 09.30 BST

Elon Musk has unveiled plans for a new spacecraft that he says would allow his company SpaceX to colonise Mars, build a base on the moon, and allow commercial travel to anywhere on Earth in under an hour.

The spacecraft is currently still codenamed the BFR (Big Fucking Rocket). Musk says the company hopes to have the first launch by 2022, and then have four

<https://www.theguardian.com/technology/2017/sep/29/elon-musk-spacex-can-colonise-mars-and-build-base-on-moon#>



## Tourism

### New Shepard completes eighth flight



David Szondy | 13 hours ago



New Shepard lifting off (Credit: Blue Origin)

[VIEW GALLERY - 6 IMAGES](#)

Blue Origin's New Shepard rocket made its fourth suborbital flight and powered landing in West Texas while carrying the currently-unmanned Crew Capsule 2.0 for the second time. The 10-minute test flight reached a record altitude of 351,000 ft (66 mi, 107 km) with the capsule separating and returning by parachute.

<https://newatlas.com/new-shepard-eighth-launch/54407/>

# *Plumes From Saturn's Moon Enceladus Hint That It Could Support Life*

By KENNETH CHANG APRIL 13, 2017



Rows of plumes rise from ice fractures on the surface of Enceladus.  
NASA/JPL-Caltech, via Space Science Institute

Could icy moons like Saturn's Enceladus in the outer solar system be home to microbes or other forms of alien life?

Intriguing new findings from data collected by [NASA's Cassini spacecraft](#) suggest the possibility.

Plumes of gas erupting out of Enceladus — a small moon with an ocean of liquid water beneath its icy crust — contain hydrogen. Scientists infer a lot from that: that there are hydrothermal chemical reactions similar to those that occur at hot fissures at the ocean bottoms on Earth.

<https://www.nytimes.com/2017/04/13/science/saturn-cassini-moon-enceladus.html>

- In fiction: moon is not interesting anymore

## Lunar Base Designs



"We can be sure that those who come after us will think of much better ways of doing these things - and will wonder at our conservatism and our quaint, old-fashioned ideas. And they in their turn will be laughed at by those who come after them, when the Moon is only a suburb of the Earth, and the real frontier is far away among the planets..."

-Arthur C. Clarke

What will the first lunar base actually look like? No one knows yet, but many have been designed. In the 1950's and 1960's, many designs were put forth by scientists and engineers who hoped that by the next century a lunar base would be fully operational. In 1992, the FLO design, the First Lunar Outpost reference mission was developed (and rejected) by NASA. Igloos, railroads, buses, submarines, and stores, have all been proposed. Inflatable structures, underground structures, structures at the South Pole, and space ports at lunar libration points have all been designed. Hotels, laboratories, observatories, sports arenas, as well as mining and manufacturing plants are all very real possibilities. What would a lunar base that you designed look like? What types of power will be used on the moon? Solar? Nuclear? Fusion reactors? Fusion reactors? Laser beamed electricity? What kinds of fuel will be developed for rockets making the journey? Aluminum? Oxygen? Hydrogen? Solar sails?



NASA design for a solar powered lunar base

What kinds of life support systems will need to be developed for life on other worlds? Water, air and waste recycling are all major concerns. Read more about regenerative life support systems. Visit some of the NASA sites on regenerative life support systems. For more on regenerative life support systems visit Discovery Channel's SpaceNet.com. An alternative power source for the lunar night is to illuminate the solar arrays with laser power beamed from Earth.

## Historic Lunar Base Designs

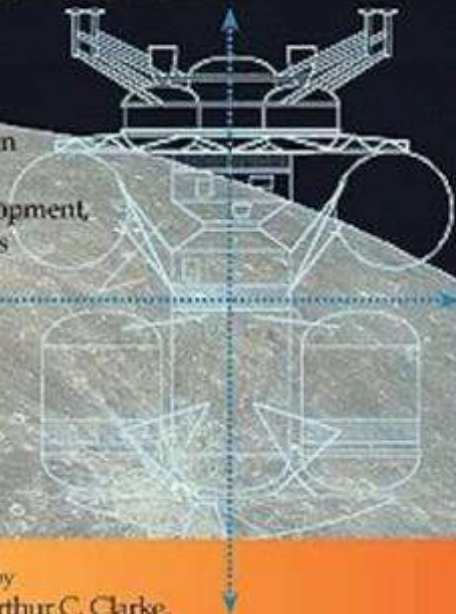
Early designs for bases included a design by Arthur C. Clarke, the science fiction writer, published in 1954. Igloo-shaped habitats were covered with dust for insulation and an inflatable radio mast was used for maintaining contact with crews in the field. Power was supplied by a nuclear reactor. The colonists farmed using hydroponic techniques and electric monorails connected their habitats, mining facilities, and telescopes. (Clarke's 1955 spy novel "Earthlight" is based on his plans.)

In 1953, the German rocket scientist Hermann Oberth designed a caterpillar-like "moon car" that would be able to cross craters by jumping 125 meters!

Peter Eckart

## The Lunar Base Handbook Second Edition

An Introduction  
to Lunar Base  
Design, Development,  
and Operations



With contributions by  
Buzz Aldrin, Arthur C. Clarke,  
Harrison H. Schmitt, John Young  
and many others

SPACE TECHNOLOGY SERIES

## NASA's Lunar Space Station Is Almost Here

The first contract to build components of the "Gateway" will be awarded next year.

By **Justin Bachman**  
20 april 2018 10:00 CEST  
From **Hyperdrive**



Race to Get Back to the Moon Is Full Steam Ahead

<https://www.bloomberg.com/news/articles/2018-04-20/nasa-s-lunar-space-station-is-almost-here>

NASA's goal of returning to the moon should see a major push in early 2019, when the agency awards its first contract for the lunar "Gateway" program.

The Lunar Orbital Platform-Gateway is NASA's planned "staging" area intended for studies of the moon and the deep-space environment. Eventually, it will function as a way station for astronauts traveling to and from Mars.



# Making planets habitable

## Carl Sagan: The planet Venus (Science)

“Also, before the detection of this planet’s sulfuric acid atmosphere, scientists such as Carl Sagan (1961) suggested the terraforming of Venus by growing algae in the atmosphere to capture the carbon dioxide, thereby lowering what he assumed was a runaway greenhouse effect.” (Westermann, p. 45)

24 March 1961, Volume 133, Number 3456

**SCIENCE**

### CURRENT PROBLEMS IN RESEARCH

## The Planet Venus

Recent observations shed light on the atmosphere, surface, and possible biology of the nearest planet.

Carl Sagan

The launching of the Soviet interplanetary vehicle toward Venus on 12 February 1961 opens a new era in planetary studies. This article is an assessment of current knowledge of Venus at the dawn of this era.

The planet Venus is enshrouded by clouds which prevent telescopic examination of its surface. In the absence of direct observations, reasons have been adduced for proposing a variety of differing and mutually inconsistent surface conditions. Since only water clouds were familiar to terrestrial observers, the apparent thickness of the Cytherean (1) cloud layer seemed to argue for a great abundance of water. From there it was only a step to the assertion (2) that “everything on Venus is dripping wet. . . . A very great part of the surface of Venus is no doubt covered with swamps. . . . The constantly uniform climatic conditions which exist everywhere result in an entire absence of adaptation to changing exterior conditions. Only low forms of life are therefore represented, mostly no doubt, belonging to the vegetable kingdom; and the organisms are nearly of the same kind all over the planet.”

After many unsuccessful spectroscopic attempts to discover water vapor in the Cytherean atmosphere, the hypo-

thetical Carboniferous swamp was generally abandoned, to be replaced by an arid planetary desert, overlain by clouds of dust from the wind-swept surface (3) (Fig. 1). The arid surface also explained the great abundance of carbon dioxide [which was accidentally discovered (4) in a search for water vapor]; for, in the absence of water, the Urey equilibrium pressure of carbon dioxide will not be established (5). Hoyle (6) explained the lack of water by assuming a great excess of hydrocarbons over water on primitive Venus, and subsequent oxidation of the hydrocarbons to carbon dioxide, until all the water was depleted. He suggested that the surface is now covered with the remainder of the hydrocarbons, and that the cloud layer is composed of smog.

Menzel and Whipple (7) replaced the wind-swept desert and the planetary oil field with a global Seltzer ocean; they argued that if Venus were completely covered by water (because of the high atmospheric content of carbon dioxide, the water would, of course, be carbonated), the access of carbon dioxide to silicates would be impaired, and for this reason the Urey equilibrium would not be established. The state of our knowledge of Venus is amply illustrated by the fact that the Carboniferous swamp, the wind-swept desert, the planetary oil field, and the global Seltzer ocean each have their serious proponents, and those planning

eventual manned expeditions to Venus must be exceedingly perplexed over whether to send along a paleobotanist, a mineralogist, a petroleum geologist, or a deep-sea diver. But new information has recently become available which probably eliminates three of the four proposed surface environments; taken together with some of the earlier data, it points the way to a consistent picture of the atmosphere and surface of Venus.

### Composition of the Atmosphere

Only the portions of the Cytherean atmosphere which are above the cloud layer are accessible to spectroscopic investigation. Since the cloud layer may be situated tens of kilometers above the surface (see the discussion below), the spectroscopic data are not necessarily directly applicable to the lower atmosphere. It is possible that gases present above the cloud layer in undetectable amounts are abundant in the lower atmosphere. By laboratory intensity-matching of the Cytherean carbon dioxide intercombination bands near 8000 angstroms, the abundance of carbon dioxide (above the atmospheric level at which an 8000-angstrom photon is effectively reflected) is estimated to be 1 kilometer-atmosphere (km-atm) (8). The only other possibly identified atmospheric constituent is water vapor, marginally detected on Venus recently by high-altitude balloon spectroscopy. The abundance of water vapor (above the atmospheric level at which a 1.13-micron photon is effectively reflected) is estimated by Strong to be about  $2 \times 10^{-4}$  gm/cm<sup>2</sup> (9). Kozyrev reports observing several features in the aurora and night sky of Venus corresponding in wavelength to known emission bands of N, N<sub>2</sub>, and CO<sup>+</sup> (10). From considerations of cosmic abundance and from terrestrial analogy, we would expect to find N<sub>2</sub>—which has no permitted absorption spectrum in the presently accessible wavelength region—on Venus, and we would expect to

The author is Miller research fellow at the Institute for Basic Research in Science, the Space Sciences Laboratory, and the Department of Astronomy, University of California at Berkeley.

# Making planets habitable

1967

## Venus as habitable planet?

- Unrealistic!

## Hollywood reacts and alters its perspective

[http://news.bbc.co.uk/onthisday/hi/dates/stories/october/19/newsid\\_4082000/4082923.stm](http://news.bbc.co.uk/onthisday/hi/dates/stories/october/19/newsid_4082000/4082923.stm)

### 1967: US probe flies by hot and windy Venus

The American spacecraft Mariner 5 has successfully flown past the planet Venus, just one day after a Soviet space probe disappeared into its atmosphere.

Mariner 5 passed within 2,480 miles (3,990 km) of Venus and sent back the most detailed data yet gathered about what it is like there.

The probe was travelling at about 19,122 miles an hour (30,774 km/h) as it began the fly-by at 1734 GMT. After three minutes, communications were broken as it went behind the planet and out of the line of sight of the Earth.

It resumed transmissions 23 minutes later.

#### Blistering heat

During the fly-by, the spacecraft's instruments measured the amount of hydrogen and oxygen in the upper fringes of the planet's atmosphere.

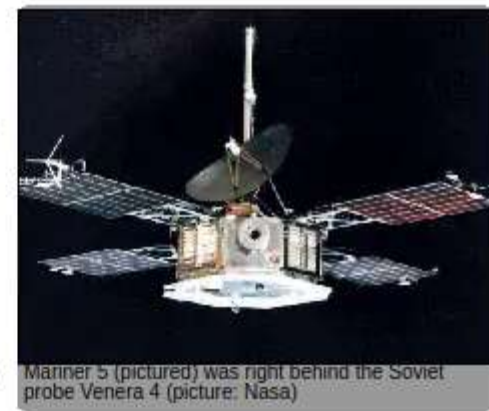
From this information, US scientists hope to work out how much carbon dioxide is there, and also double-check the data sent back from the Soviet probe, Venera 4, yesterday.

That probe was the first to penetrate the dense layer of cloud which permanently shrouds Venus.

It sent back information for 94 minutes after entering the atmosphere, but then suddenly disappeared.

Before it went, Venera 4 had already registered a temperature of 536 degrees Fahrenheit (280 degrees Celsius) - hot enough to melt lead.

It also found high-level winds whipping round the planet at six times the force of a hurricane.



#### In Context

The vision of Venus revealed after Mariner 5's data was analysed was described by Nasa scientists as "a hell-hole".

The planet was revealed as extremely hot and unpleasant, with an atmosphere high in carbon dioxide.

The heat is partly caused by an extreme "greenhouse effect" - now informing scientists researching the same effect on Earth.

The Mariner probes continued to explore deep space in the years that followed, taking detailed photographs of Venus, Mercury and Mars.

Mariners 11 and 12 were renamed the Voyager probes.

In 1989, Nasa launched the Magellan spacecraft from the space shuttle.

Between 1990 and 1994 it orbited Venus, mapping the majority of the surface in unprecedented detail before plunging into the atmosphere and disintegrating under the massive pressures.

# The Red Planet

## Movie: *The Red Planet* (2000)

- Earth is depleted
- Instead of projecting this onto Venus, a crew goes on a mission to Mars.
- Atmosphere through algae
- Explosive nematodes





# Mars in (film) fiction

Themes: Unknown, danger, **independence from Earth**

- Popular uprising and a Queen of Mars in *Aelita* (1924)
- Infiltration and hostile takeover from aliens in *Invaders from Mars* (1954)
- Mars as a place for criminals, gambling and mutants in *Total Recall* (1990)
- Native Martian life is insect-like (Nematodes) in *Red Planet* (2000)



The Mars colony from *Total Recall* (1990). Image: [Chris Skinner](#)




# Exploiting other planets

- Future earth?
  - Eco-criticism: Playing on the theme of climate change
- Mining resources?
- Ethical dilemmas?

“Although the chance of a disaster to planet Earth in a given year may be quite low, it adds up over time, and becomes a near certainty in the next thousand or ten thousand years. By that time we should have spread out into space, and to other stars, so a disaster on Earth would not mean the end of the human race.” – Stephen Hawking

## Encountering other life forms?

- Medical aspects
    - Introducing bacteria, viruses or other dangers to 'clean' areas or vice versa
  - Cultural aspects
    - *Star Trek* (1966-)
  - Other ethical aspects?
    - One way mission?
- 
- A group of Star Trek characters, including T'Pol, Trip Tucker, Spock, Captain Kirk, Ilia, and others, standing against a blue background.

See: Pinson, “Ethical considerations for terraforming Mars” (2002).



# Extraterrestrial life

What does it look like?



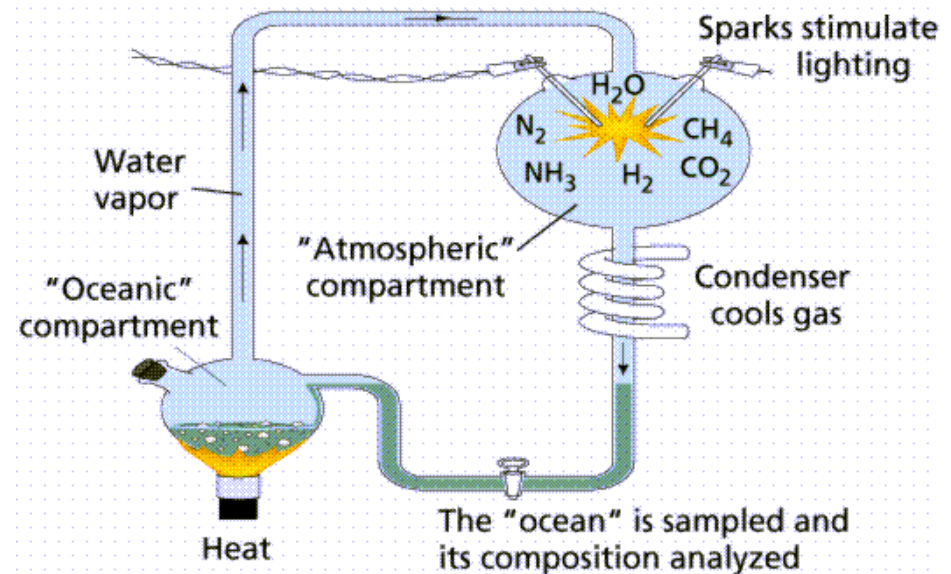
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# Miller apparatus (1953)

- Stanley Miller and Harold Urey
- 'Pre-historic soup'
- Under certain conditions complex molecules can be formed (e.g. amino-acids)

Inorganic → organic forms



<http://fig.cox.miami.edu/~cmallery/113/miller.htm>

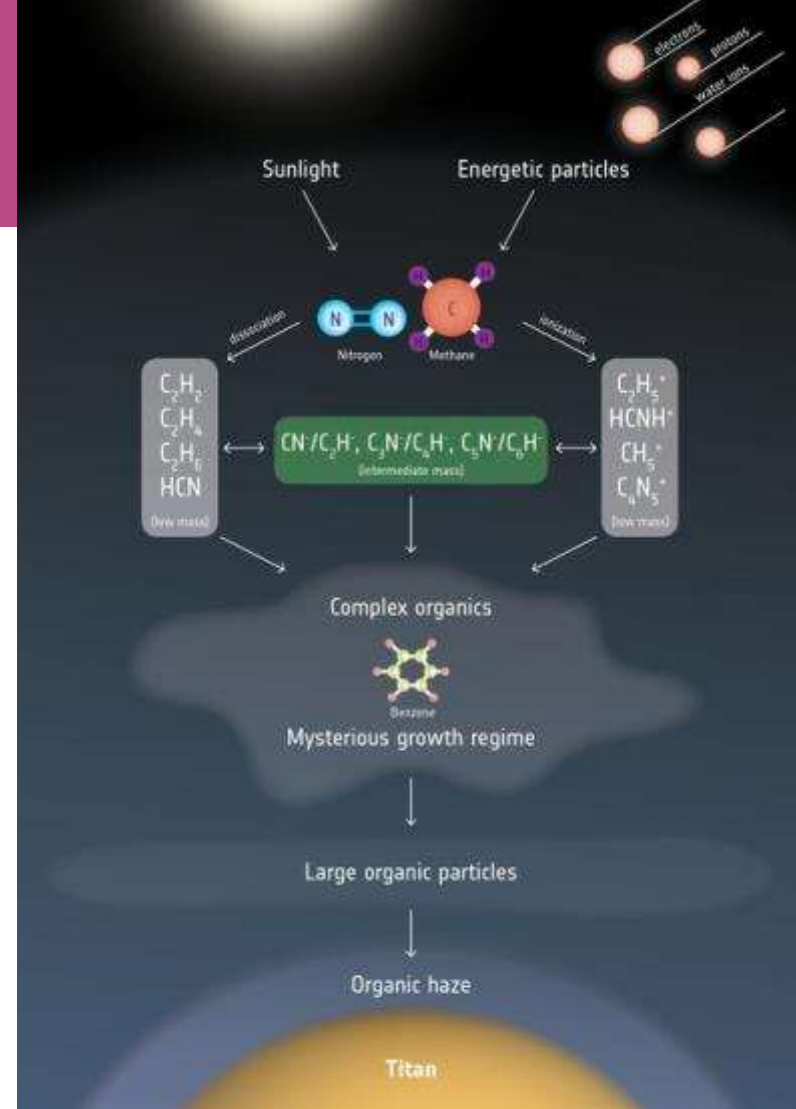


# Biochemistry

## Building blocks for life

- Carbon-based
- Non-carbon-based biochemistries
  - Silicon ( $\text{SiO}_2$ )?
  - $\text{NH}_3$ ?
- Most probable:
  - Similar to earth-like-life, cf. Darwin
  - See: <https://futurism.com/oxford-biologists-outline-what-alien-life-looks-like/>
  - Or: <https://www.theguardian.com/commentisfree/2017/nov/02/anybody-out-there-alien-life-look-like-darwin-teach-natural-selection>

[https://www.esa.int/Our\\_Activities/Space\\_Science/Cassini-Huygens/Life\\_on\\_Titan](https://www.esa.int/Our_Activities/Space_Science/Cassini-Huygens/Life_on_Titan)



# The Thing

## The Thing From Another World (1951)

- Plant-like structure
- ‘Super carrot’ but human appearance
- Violent: feeds on blood



“Instead of animal tissue, nerves, and blood, it sports thorn- like barbs and a green fluid **like plant sap**. [The scientist] **doubts that it can die**.

“A carrot that can construct a ship beyond our terrestrial intelligence . . . and guide it sixty million miles or more through space,” implying that it may have come from Mars.

On the alien planet, says Carrington, vegetable evolution **outdid animal development** because **it wasn’t handicapped by emotion or sex**. These beings experience no pain or pleasure, which in Carrington’s eyes **makes them superior to humans**. The scientists make one more ominous discovery: **this Thing drinks blood for nourishment.**”

(Perkowitz, p. 20-21)

# Extra-terrestrial (E.T.) Life

## Bug-eyed Monster (B.E.M.)

**bug-eyed monster** *n.* (also with capital initials) an extraterrestrial being having oversized bulging eyes, considered as a stereotype or cliché of science fiction; abbreviated *B.E.M.* (see *B.E.M. n.* at *B n. Initialisms 1*); cf. *little green man n.* at *LITTLE adj., pron., n., and adv. Special uses 4*.

[Thesaurus »](#)  
[Categories »](#)

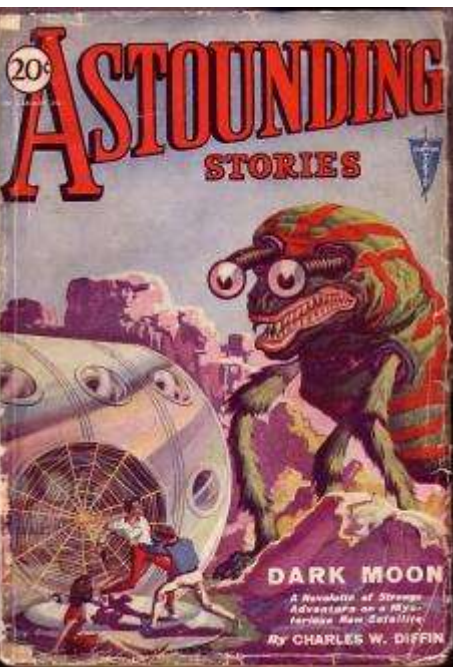
- 1939 M. ALGER *Let. in Thrilling Wonder Stories* Aug. 121/2 The cover inspired me to organize the SFTPOBEMOTCOSFP. (Society For The Prevention Of Bug-Eyed Monsters On The Covers Of Science-Fiction Publications.)
- 1949 *N.Y. Times* 13 Nov. BR46/2 Mr. Winton is an expert on..Bug-Eyed Monsters on other planets—known to his readers as B.E.M.'s.
- 1957 P. MOORE *Sci. & Fiction* 45 He was no dabbler in fiction of the bug-eyed monster and ray-gun type.
- 1979 D. ADAMS *Hitch Hiker's Guide to Galaxy* v. 43 Are you trying to tell me that..some green bug-eyed monster stuck his head out and said 'Hi fellas,..I can take you as far as the Basingstoke roundabout?'
- 2012 *N.Y. Times* (Nexis) 11 Dec. D4 This abstract and alien Mars-scape is real, not a bug-eyed monster in sight.

[\(Hide quotations\)](#)

(OED Third Edition, March 2017)

# Extra-terrestrial (E.T.) Life: Evolution

## Bug-eyed Monster (B.E.M.)



1931



1942



1951



1959



# Extra-terrestrial (E.T.) Life: Evolution

- Worm-like creatures with eyes
  - Why?
  - Cognitive estrangement or defamiliarisation: Induce fear!

## Horror and Grotesque literature

1. Grotesque depicts the **estranged world** where the **mundane practices** and **artefact** of lived experience take on a **sinister, altered** aspect.
2. Grotesque is a play with the **absurd** in which the **possibility of a deeper meaning is suggested**, but never confirmed.
3. It represents an attempt to invoke and subdue the **demonic aspects** of the world representing the **triumph of art over alienation**.

(Wolfgang Kayser)

# On Extra-terrestrial life

Gary Westfahl (2005) writes:

"Science fiction aliens are both **metaphors** and **real possibilities**. One can probe the nature of humanity with aliens that by contrast illustrate and **comment upon human nature**.

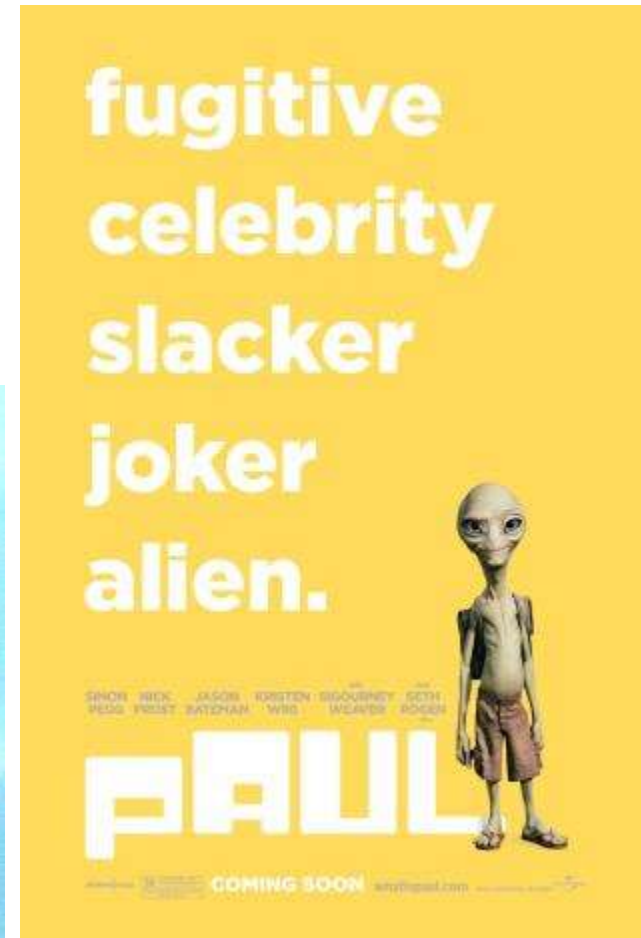
Still, as evidenced by widespread belief in alien visitors (see UFOs) and efforts to detect extraterrestrial radio signals, humans also crave companionship in a vast, cold universe and **aliens may represent hopeful, compensatory images of the strange friends** we have been **unable to find**.

Thus, aliens will likely remain a central theme in science fiction until we actually encounter them."

# Extra-terrestrial (E.T.) Life: Evolution

## Humanlike

- *2001: A space Odyssey* (1968)
- *E.T.* (1982)
- *Paul* (2011)



# Communicating with E.T.

*Close Encounters of the Third Kind* (1977), dir. Steven Spielberg



<https://youtu.be/m2JL0xABlrQ?t=1m20s>



## On Extra-terrestrial life

“There is, as yet, no established science of aliens; there is, however, solid science that supports one remarkable result, which is that our odds of actually encountering alien life have increased hugely since these films were made.”

(Perkowitz, p. 35)

“While there’s no telling if aliens would be quite that repellent, according to how evolution works, **it’s nearly impossible that they would look just like us or any Earthly species.** There’s every reason to think that organisms would develop on other planets according to the same evolutionary laws that work on ours, and how evolution plays out depends on the physical and biological environment.”

(Perkowitz, p. 46)

# Deep space

Through observation and mediation



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# Observation: Beyond heliocentrism

Hubble (1990)

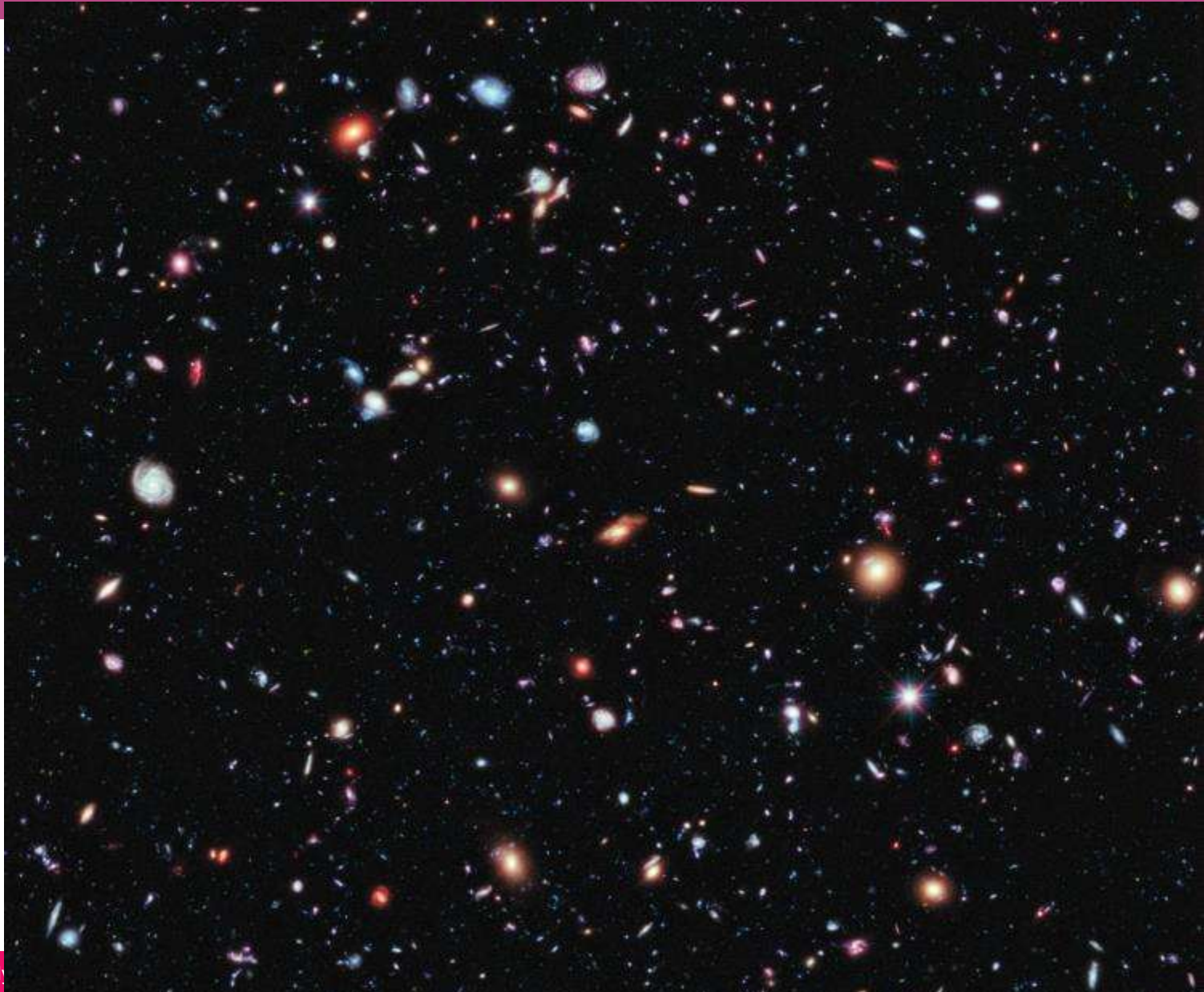


Look at what Hubble is seeing right now!

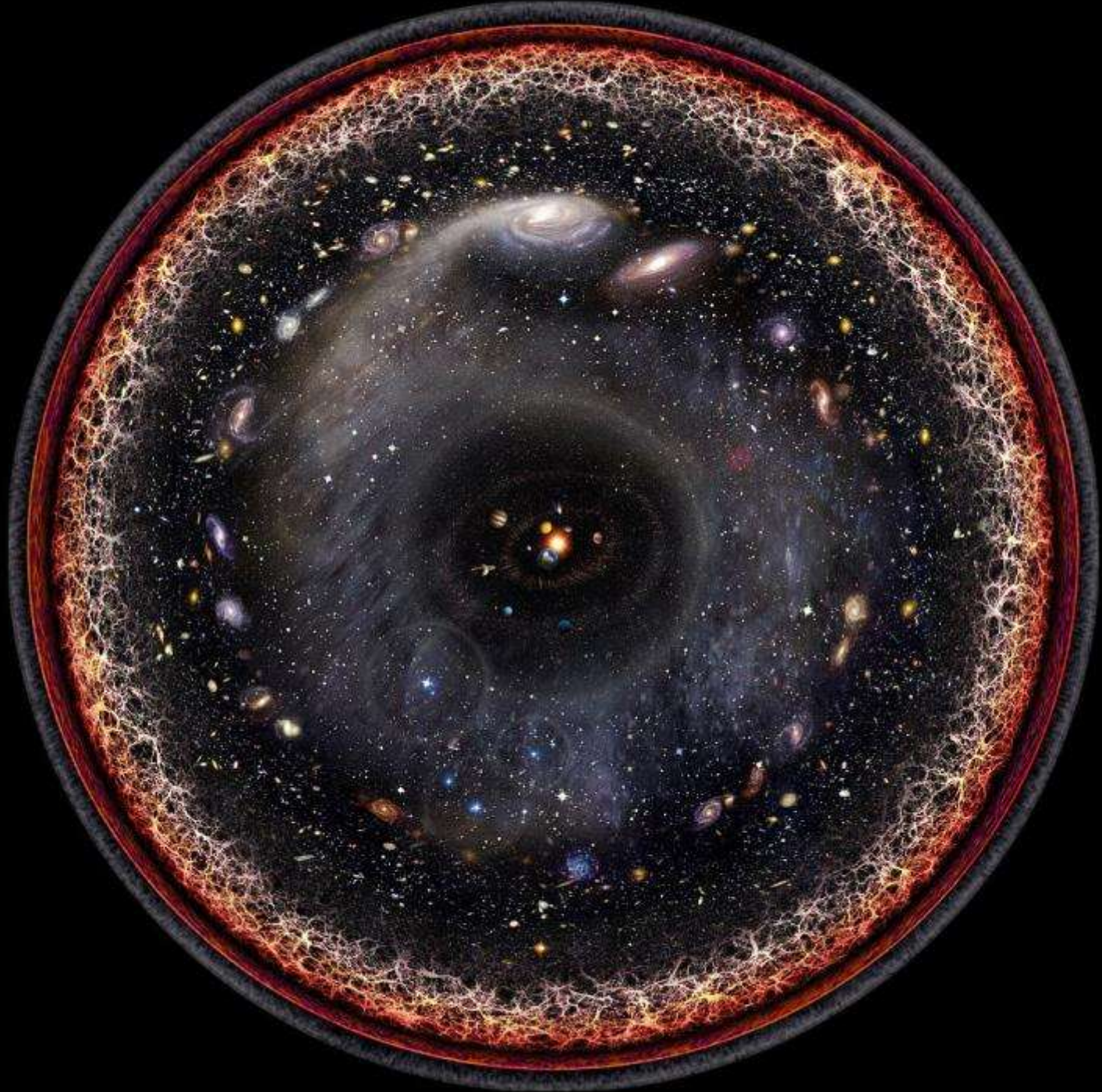
<http://hubblesite.org/>



# Hubble, the eXtreme Deep Field (XDF), remote galaxies









# Hubble Space Telescope Sees Giant Galaxy Cluster

Apr 30, 2018 by News Staff / Source

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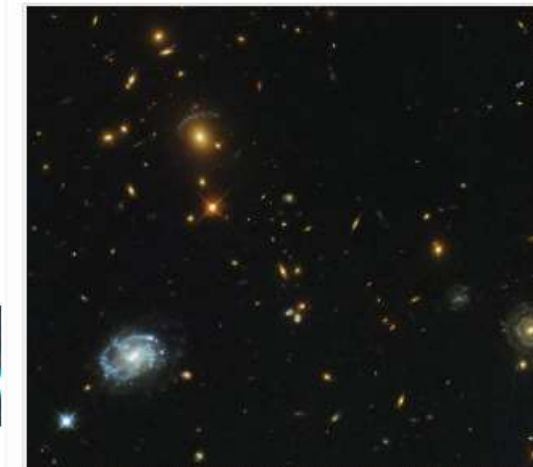


ESA's Gaia  
Mission Releases  
Catalog of Nearly  
1.7 Billion Stars



Astronomers  
Discover Two  
Massive  
Protoclusters of  
Young Galaxies in  
Early Universe

The NASA/ESA Hubble Space Telescope has captured a fantastic photo of a massive galaxy cluster named SDSS J0150+2725.

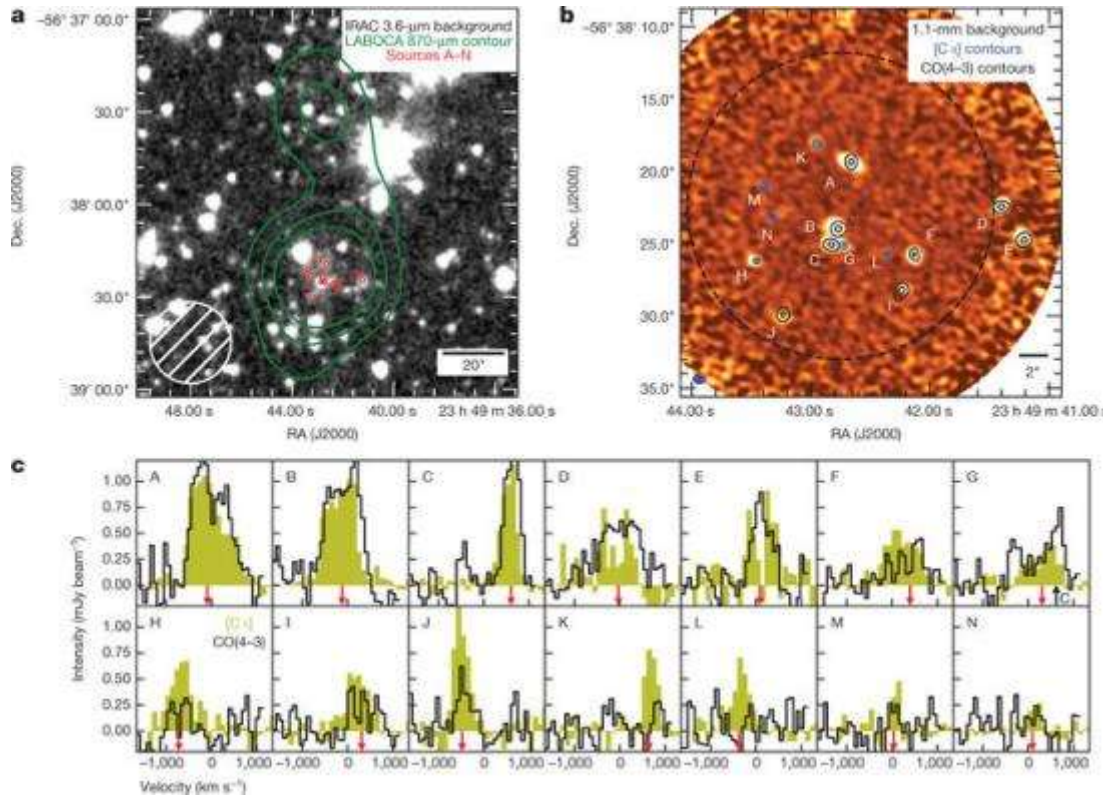


In the upper part of this Hubble image, the light from distant galaxies has been smeared and twisted into odd shapes, arcs, and streaks. This phenomenon indicates the presence of a massive galaxy cluster, SDSS J0150+2725, which is bending the light coming from the galaxies behind it with its monstrous gravitational influence. Image credit: NASA / ESA / Hubble / Judy Schmidt, [www.geckzilla.com](http://www.geckzilla.com).

SDSS J0150+2725 is a massive cluster of galaxies approximately 3 billion light-years away.

It was first documented by the Sloan Digital Sky Survey (SDSS), hence its name.

SDSS uses a 2.5-m optical telescope located at Apache Point Observatory in New Mexico, the United States, to observe millions of objects and create detailed 3D maps of the Universe.

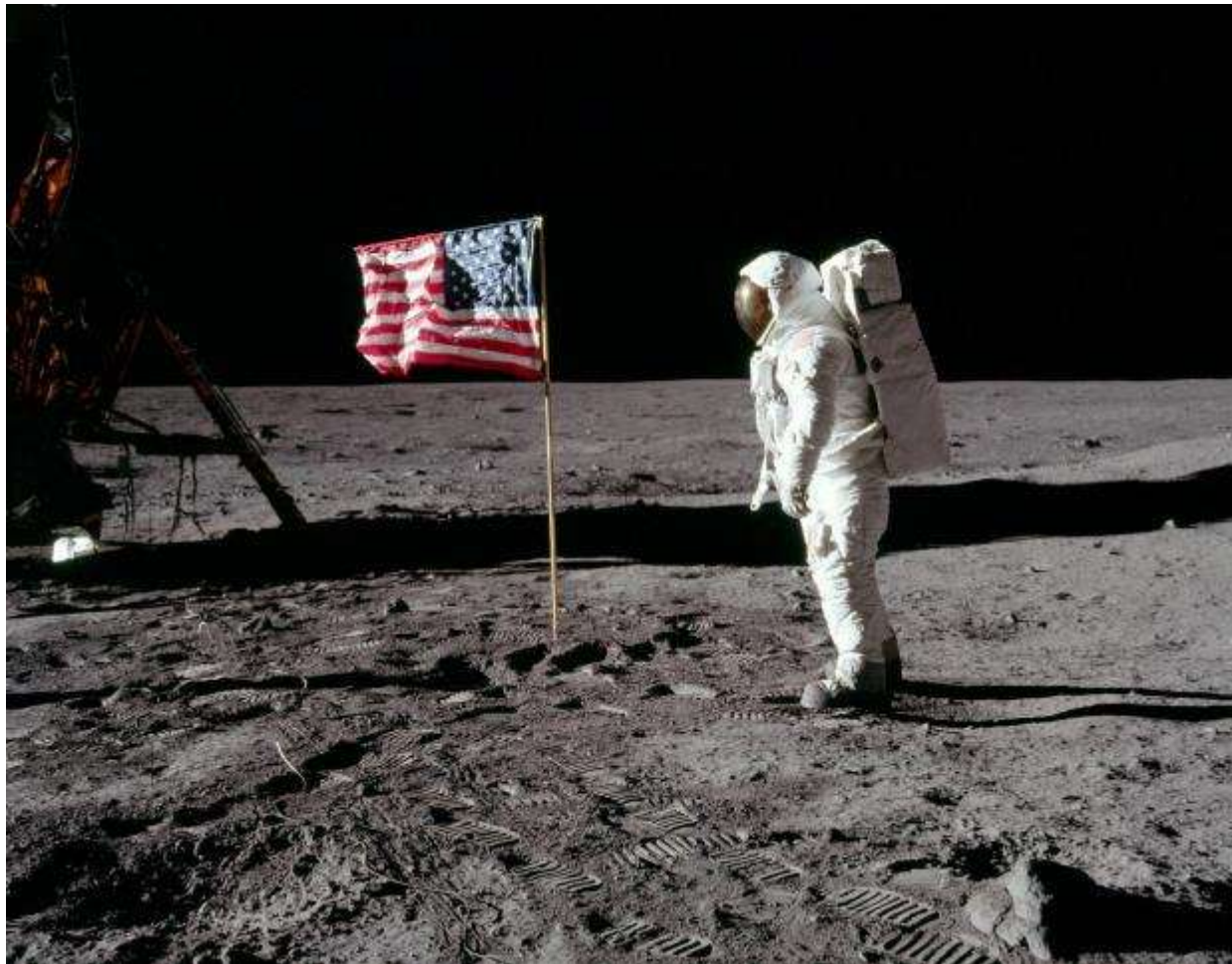


<https://www.nature.com/articles/s41586-018-0025-2>

<http://www.sci-news.com/astronomy/hubble-galaxy-cluster-sdss-j0150-2725-05957.html>

# Mediatisation

Photos, Books, (television)films, Lectures...?

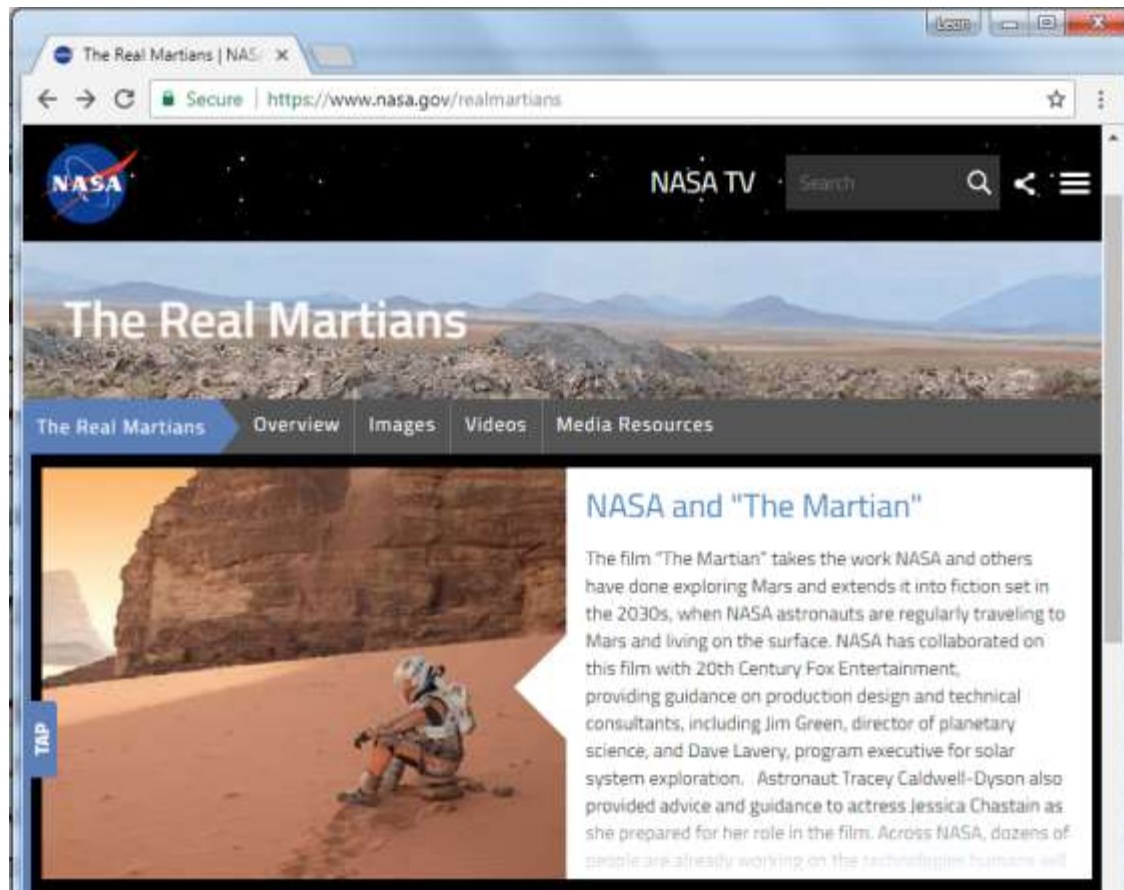




# NASA and the movies

## NASA as consultant in *The Martian* (2015)

- Propaganda?



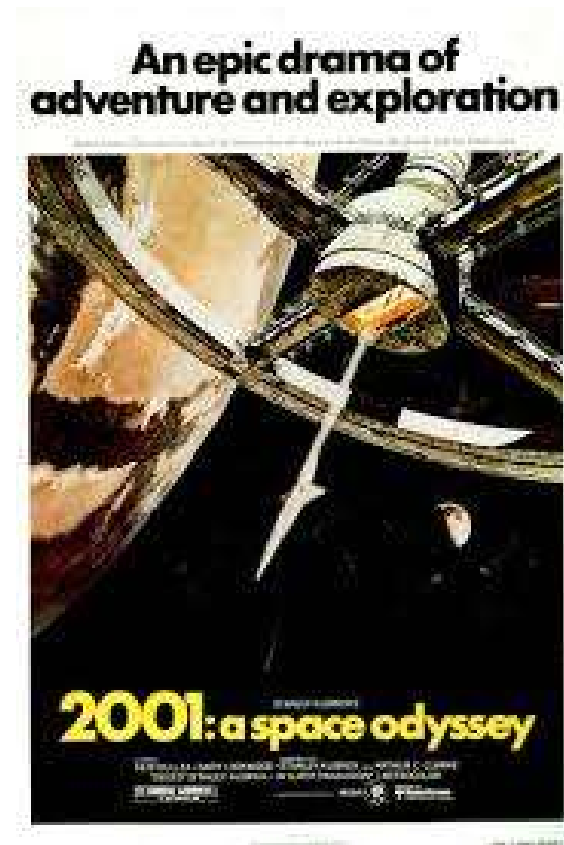


# 2001: A Space Odyssey

- A 1968 **epic** science-fiction film produced and directed by Stanley Kubrick.
- The screenplay was written by Kubrick and Arthur C. Clarke, partially inspired by Clarke's short story "The Sentinel"

**Intertextual:** Homer's *Odyssey*, the ancient Greek epic poem

**Epic (drama):** classical (narrative) genre.



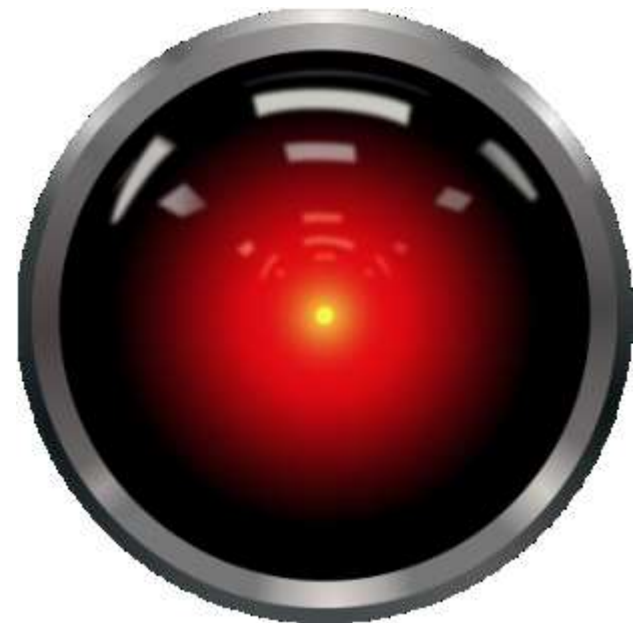
# *2001: A Space Odyssey*

**Vital reception**, cult film, 'must see'

Today, *2001: A Space Odyssey* is widely regarded as **one of the greatest and most influential films** ever made.

The film follows a voyage to Jupiter with the sentient computer **Hal** after the discovery of a mysterious black monolith affecting human evolution.

- AI



## *2001: A Space Odyssey*

It deals with the themes of (1) **existentialism**, (2) **human evolution**, (3) **technology**, (4) **artificial intelligence**, and (5) **extraterrestrial life**.

It is noted for its scientifically accurate depiction of space flight, pioneering special effects, and ambiguous imagery.

The soundtrack consists of classical music such as *Also sprach Zarathustra* (1896) by Richard Strauss.

- **Intertextual:** Nietzsche
  - ‘The last human’, individualism
  - “Gott ist tot!”

# *2001: A Space Odyssey*: Trailer



<https://youtu.be/Z2UWOeBcsJI>

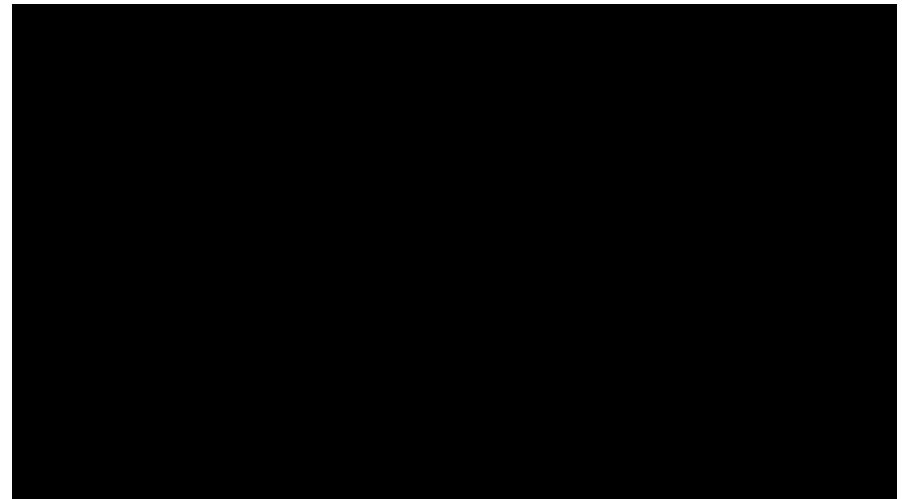


# Mediation through satire: Monty Python

“**Satire**, artistic form, chiefly literary and dramatic, in which human or individual vices, follies, abuses, or shortcomings are held up to censure by means of **ridicule**, derision, burlesque, **irony**, **parody**, caricature, or other methods, sometimes with an intent to inspire social reform.”

- Humorous
- Critical: social criticism?
- Reflective

<https://youtu.be/buqtdpuZxvk>



# Monthly Python

## Explicit:

- light years
- galaxy
- expanding universe
- speed of light (maximum speed)
- rotation
- milky way
- spiral arm

## Implicit:

- marvel
- Amazement
- Fright
- Indifference
- Nonchalance
- overwhelming feeling of insignificance
- feeling of being blown away by the insane scale of the universe
- deep faith
- doubt?

# Interpretation of abundance of 'spacemovies'

## Why?

We are all wandering, wondering, asking, thinking. And with that, we need some **help**.

Culture helps, by offering (in books, movies etc.) attractive possible 'clues' of even 'scenarios' for interpretation – fictional & non fictional.

**Geertz** described culture as "a system of inherited conceptions expressed in symbolic forms by means of which men communicate, perpetuate, and **develop their knowledge about and attitudes toward life**" (1973, p.89).

Geertz believed that **the role of anthropologists** was to try to interpret **the guiding symbols of each culture**.

# Space and movies: subculture?

*Alien*

*Gravity*

*Close encounters of the third kind*

*Prometheus*

...

[https://en.wikipedia.org/wiki/List\\_of\\_films\\_about\\_outer\\_space](https://en.wikipedia.org/wiki/List_of_films_about_outer_space)



# Alien (1979)

**Alien** is a 1979 British-American science fiction horror film directed by Ridley Scott.

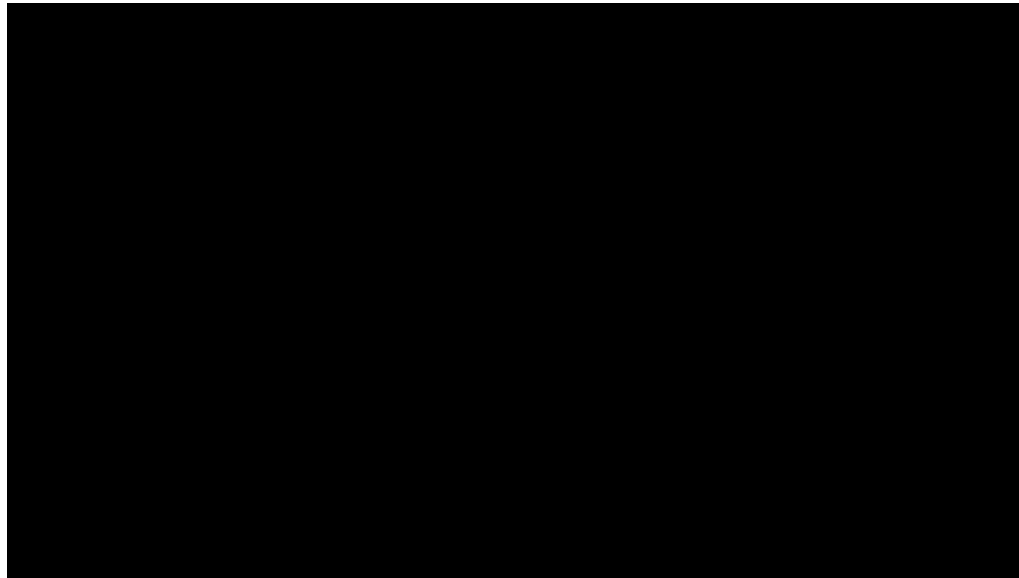
The film's title refers to a **highly aggressive extraterrestrial creature** that stalks and kills the crew of a spaceship.

## Why?

- Popular in cultural studies
- Biological intruder (Alien possession)
- Inspiration from field of Evolutionary Biology

Alien is characterised as being highly intelligent, secretive, sadistic and it impossible to find or kill. (Creed p.16)

# Alien (1979): Trailer



<http://youtu.be/LjLamj-b0I8>

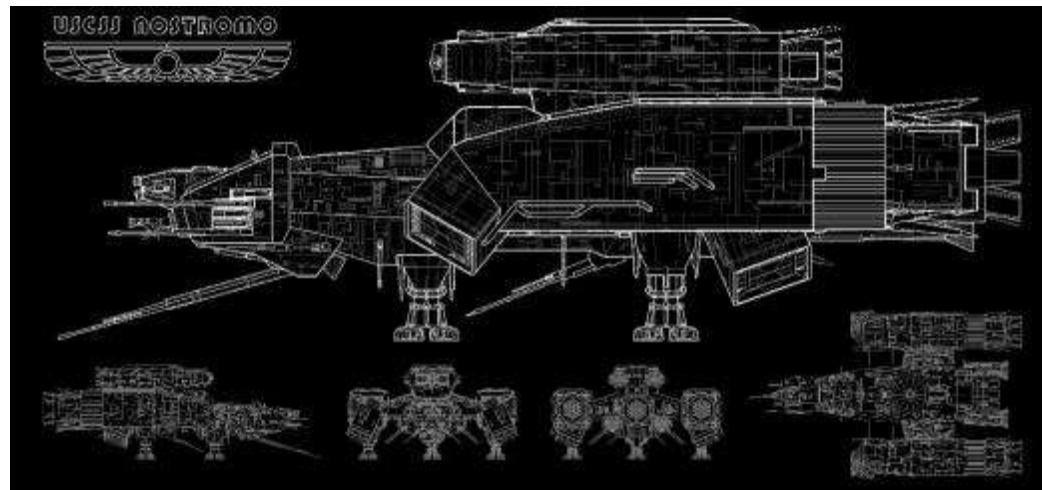
# Alien – Intertextuality

**Nostromo → Political novel *Nostromo* (1904) by Joseph Conrad**

“He [Conrad] wrote stories and novels, often with a **nautical setting**, that depict **trials of the human spirit** in the midst of an indifferent universe.”

**Narcissus → *Nigger of the Narcissus* (1897)**

“The novel is seen as an allegory about **isolation** and **solidarity**, the ship's company serving as a microcosm of a social group.”



# Alien - Biology

## **Birth and reproduction in sci-fi horror**

- Egg hatched
- From inside (cf. wasps)
- Alien has a silicon skin
- Atmosphere at the discovered planet

Other examples: Perkowitz

# Alien – Class theory

- The Company as prototypical capitalist
- Life of the crew expendable in favour of technology
  - Ash?
- “Perfect organism”
- Death of the Alien (technology?) signals (re)birth of the human



# Alien – Feminist movie

- Female character as individualist hero
- Breaking conventions:
  - female heroism
  - female independence.
- Hero (F) survives and defeats the monster
- Class is irrespective of sex. Unusual for Hollywood.



# Alien – The Freudian interpretation

"Mother Alien is primarily a terrifying figure not because she is castrated but because she castrates. (Creed, p. 22)

- Ship's name: Mother
- Born (twice) from men

If you are interested, read "Horror and the Archaic Mother: Alien." by Barbara Creed.

## Alien – Watch the cat!



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