

Lectures on Science and Theology

Philosophical and Historical
Perspectives



Documentazione Interdisciplinare di
SCIENZA & FEDE

Lecture 6

Life in the Universe

Scientific and Theological Perspectives

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Pontificia
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III. Theology and Science on Extraterrestrial Life: A Common Quest for Understanding

A night sky filled with stars, with the silhouettes of trees visible at the bottom. The text is centered in the lower half of the image.

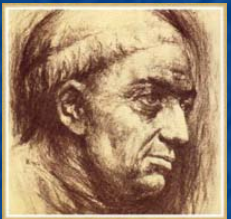
I. The Debate on Extraterrestrial Life
between Scientific Thought and
Humanistic Culture

■ The debate on the existence of life *beyond the Earth* is present, under different names, throughout the history of human thought



Plutarch (45–125), *De facie quae in orbe Lunae apparet* is probably the first author to wonder on the possible existence of inhabitants on the Moon.

Middle Ages theology tackled a debate on the "plurality of worlds" in relation to their dependence on God.



Nicholas of Kues (1401–1464), *On Learned Ignorance*, alludes to possible other "worlds" (naively placed on the stars), discussing what relations such worlds would have with the Earth, what relations between the nature of their inhabitants and the intellectual nature of humans.



Giordano Bruno (1548–1600) maintained that life was spread throughout the universe, not only in the form of inhabitants of the stars and planets, but also invoking a vitalist principle to provide a soul to the stars, planets, comets and to the entire universe.



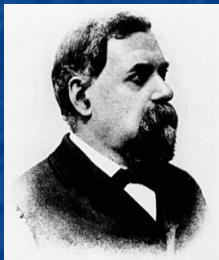
Galileo (1564–1642) and **Kepler** (1571–1630) did not address the question on ETL directly, but perceived that the heliocentric system placed the other planets of the solar system in a situation similar to Earth.

Very influential works, reprinted many times:



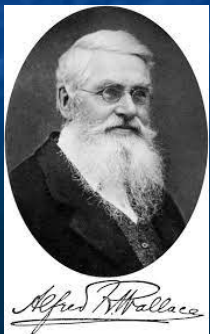
Bernard le Bovier de Fontenelle, *Entretiens sur la pluralité des mondes* (1686),

Christian Huygens, *Kosmotheoros, sive de terris coelestibus earumque ornatu conjecturae* (1698)

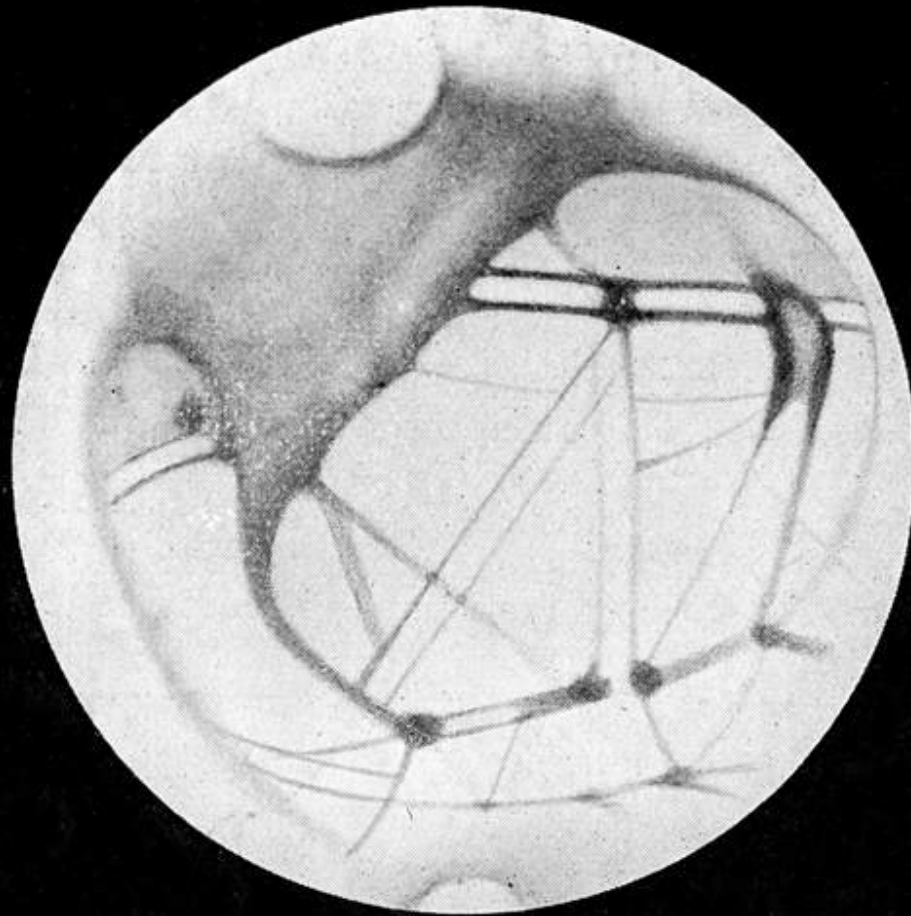


Camille Flammarion, *La pluralité des mondes habités* (1862)

Giovanni Schiaparelli (1835–1910), contributed to rising interest on the possibility of intelligent life on the planet Mars, reporting the observations of Mars "channels" (1877)

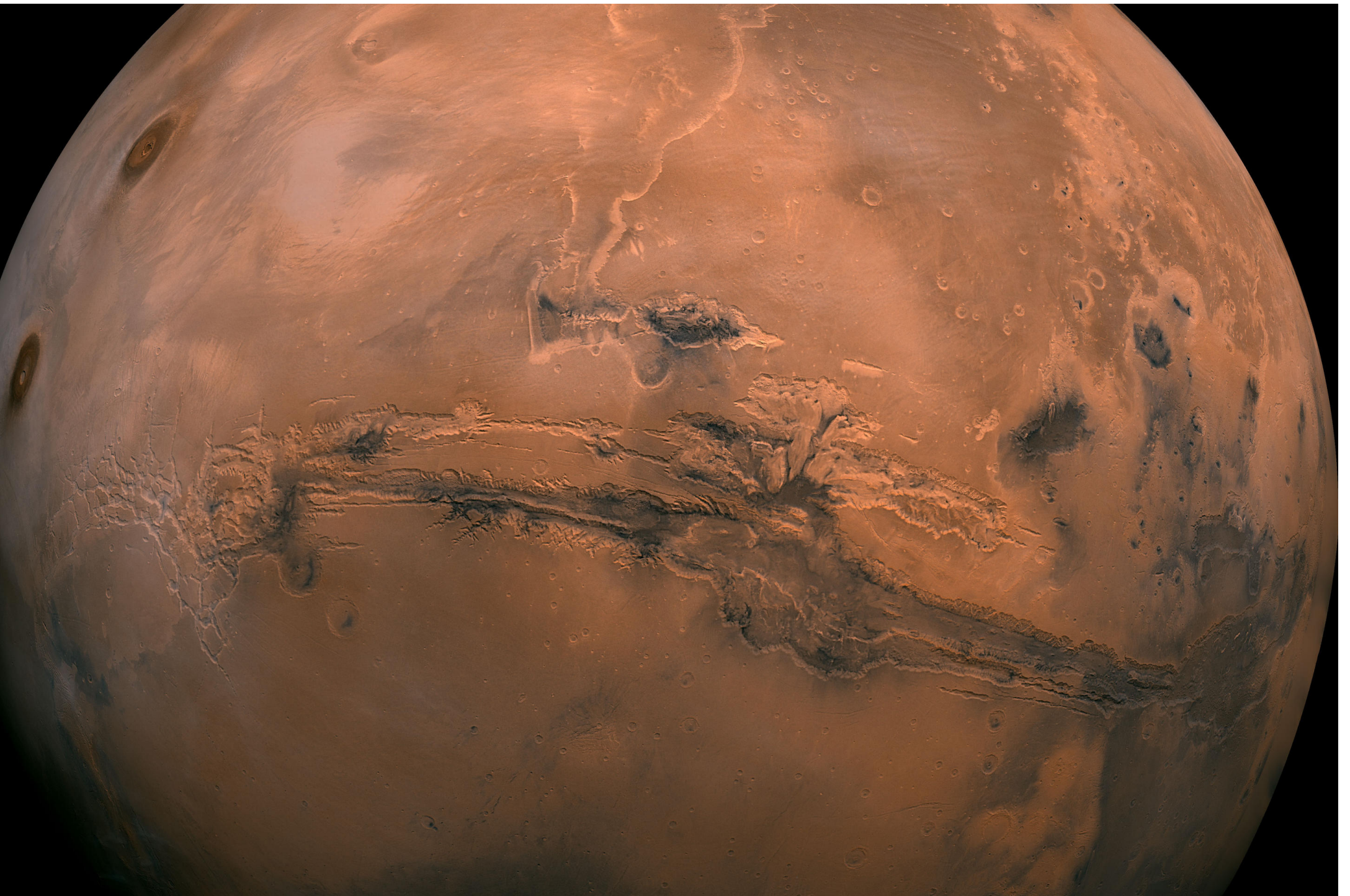


In contrast, **Alfred R. Wallace**, *Man's Place in the Universe. A Study of the Results of Scientific Research in Relation to the Unity or Plurality of Worlds* (1903), defended an anthropocentric universe



Composition of 102 *Viking Orbiter* images of Mars' surface. Canyons and Channels originated by asteroids impacts and ancient volcanic (?) rivers

Schiaparelli's drawings (1890). What the Italian astronomer indicated with the expression "Canali di Marte," was translated into English as *Canals*, instead of (natural) Channels



■ Plurality of Worlds, ETL and Christian Faith

19th Century astronomers such as William Herschel, Angelo Secchi, Francesco Denza, Virginio Schiaparelli maintained a **non-conflictive reading** of ETL in a Christian context.

In the **19th Century theologians** there is a shift from prudence to optimism: when considering a cosmic context, the greatness of God's glory, his immensity and fecundity are emphasized.

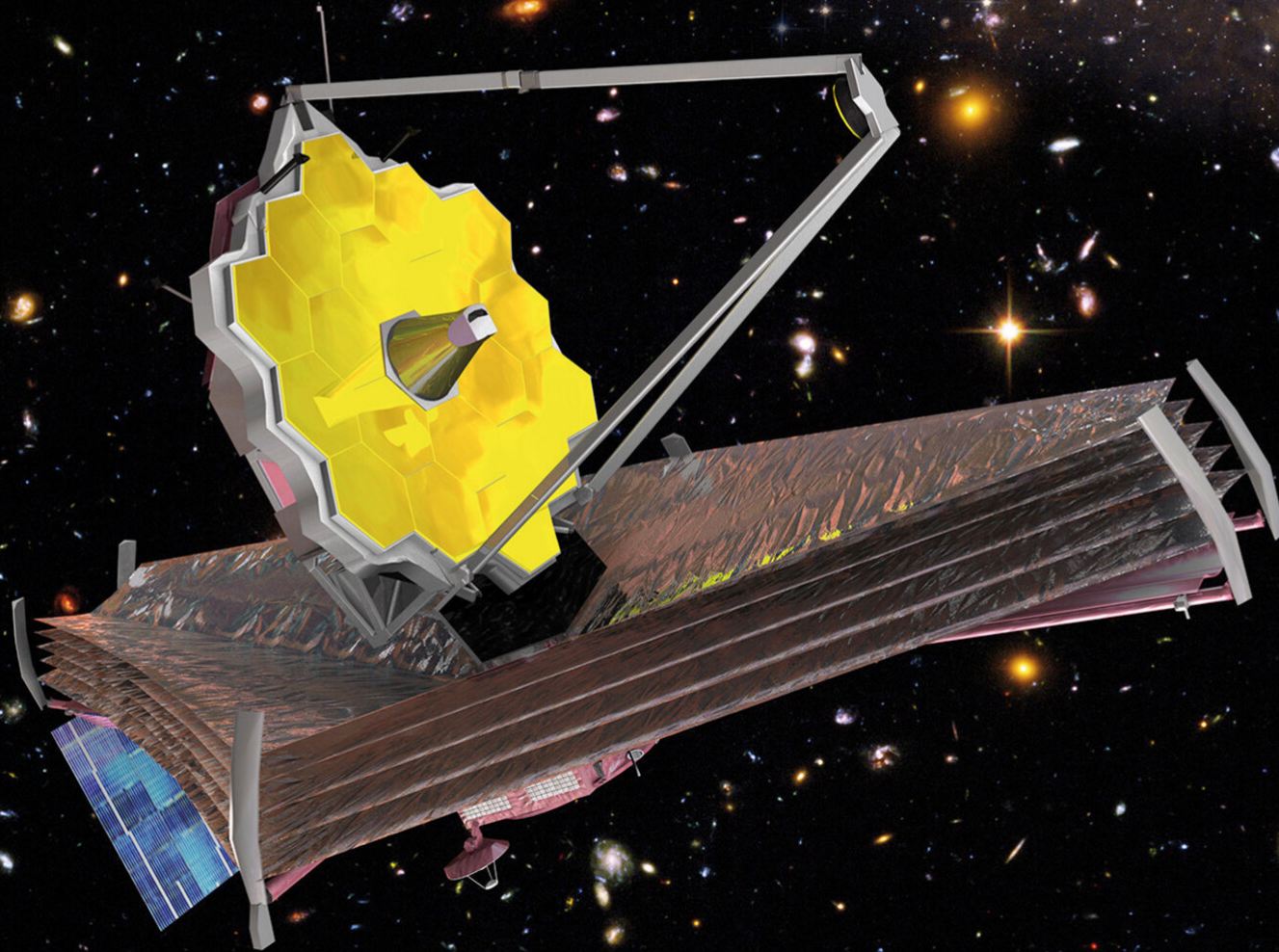
Some 20th Century Christian authors mentioned this topic in their works: Teilhard de Chardin, E. Mascall, P. Tillich, M. Schmaus, E. McMullin, T. Peters, etc. Actually, **K. Rahner** preferred not to tackle the subject...

In the second half of 20th Century, different perspectives coexist. Human and earthly uniqueness, C. Davis, *The Place of Christ* (1960). Pluralistic view: K. Delano, *Many Worlds, One God* (1977)

Contemporary theologians (just a few ones) who deal with this subject bend toward a pluralistic and optimistic view...

However, **in the absence of evidence** in favor of ETI, **theological establishment** continues to work in the frame of a **"classical" solution**, considering the uniqueness of human intelligent life in the cosmos

In the 20th and 21st Centuries, the debate on the existence of extraterrestrial life (ETL), has gained new interest thanks to the widening of horizons brought about by contemporary cosmology and by the development of space missions.





A **galaxy** includes in average about 10^{11} **stars**
At least half of them have **planets** orbiting around
In the accessible universe there are no less than 10^{12} **galaxies**

■ Today, the search for ETL is a specific scientific research area



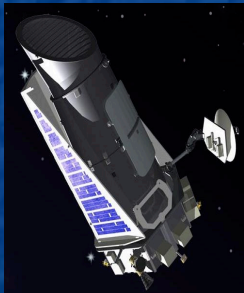
- **astrobiology** is part of contemporary astrophysics

- **Area 51** among the research areas of the IAU

- Space Agencies and Research Institutes host special committees to study the **cultural and psychological impact** of possible discovery of ETL (and ETI)



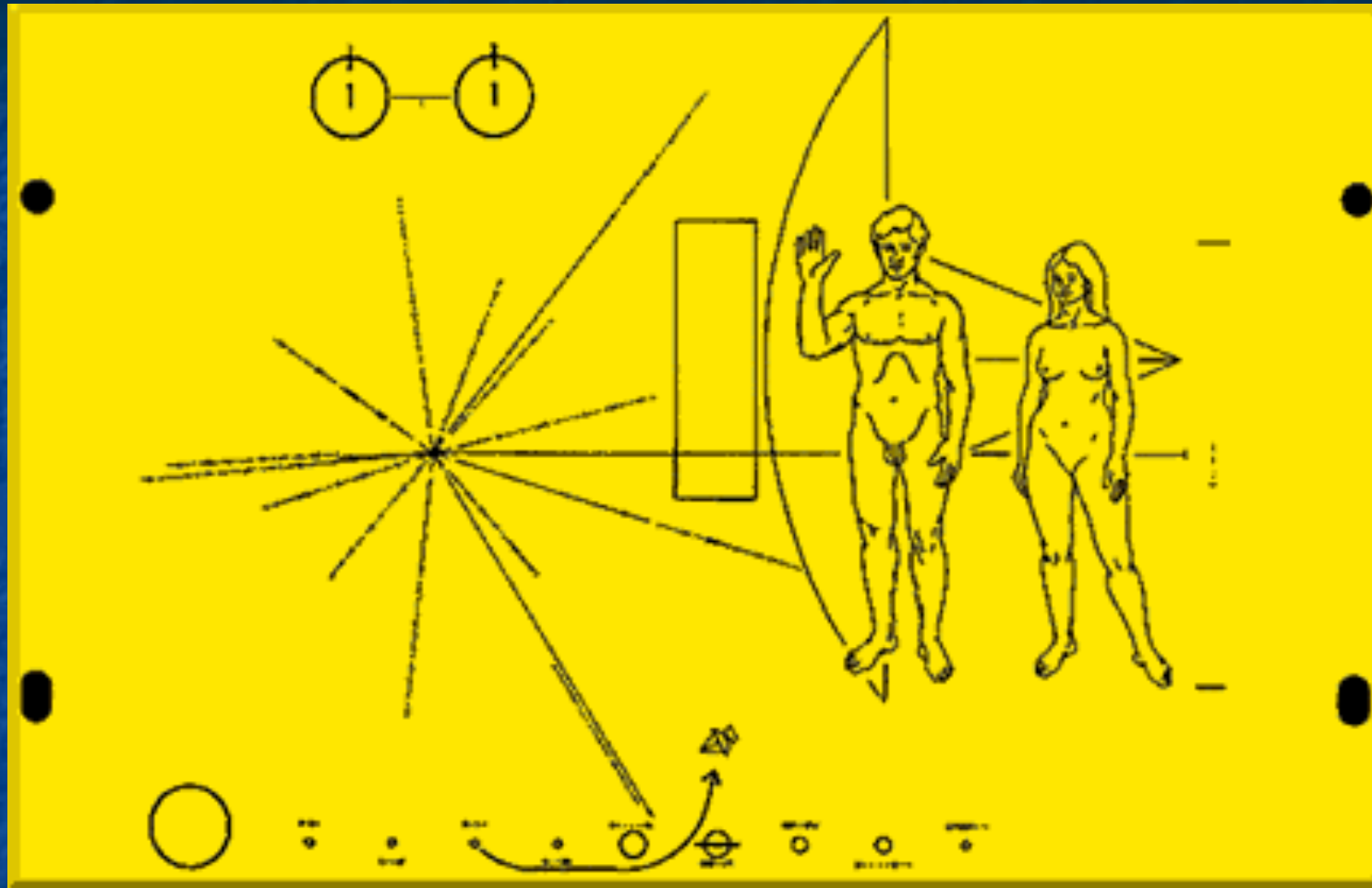
- **space missions on Mars** (rovers) looking for possible life forms: Pathfinder (1997), Spirit and Opportunity (2004), Curiosity (2011), Perseverance (2021), ExoMars (2022)



- **orbital telescopes** for searching and studying extra-solar planets: Spitzer (2003), Kepler (2009), TESS (2018), Nancy Grace Roman (2027)



- **future relevant missions** towards Jupiter and Saturn satellites: Europa Clipper (launch 2024, arrival 2027)
Dragonfly to Titan (launch 2027, arrival 2034)



Pioneer 10 (launched March 3, 1972) and Pioneer 11 automatic missions had on board a plaque with essential data on humans from the Earth

■ On distances and time-scale involved in ETI communications



- Since electromagnetic waves travel at the light speed (300.000 km/s), the time needed to exchange communications between Earth and other celestial bodies depends on the distance between them

- All question/answer conversation implies a time delay: (about 2 sec between Earth and Moon; about 15 min between Earth and Mars, on the average)

- within a distance from us of about 10 light-years: 12 stars

- within a distance from us of about 100 light-years: 13.000 stars

- Milky way (our galaxy) size: about 100.000 light-years

- Nearest galaxy (Andromeda galaxy): 2.300.000 light-years



■ The contribution of radio-astronomy to the search for ETI

- In principle, radio signals coming from possible ETI can be received from earthly radio-telescopes.
- Ordinary earthly electromagnetic waves (radio, TV, etc.) are traveling through the outer space
- Electromagnetic waves coming from ETI are supposed to be easily distinguishable from natural waves (information, intentionality)
- Professional radio-telescopes use to dedicate only a very few time to patrol programs to detect ETI signals, due to other scientific priorities
- Regular activity to listen to possible ETI sources is carried out mainly by amateur astronomers. Here finds its origin the SETI program
- Important projects of large radio-telescopes arrays (SKA) are under construction, also useful for SETI



■ On scientific results concerning the search for ETL and ETI

- More than 200 complex molecules have been detected by radio and infrared astronomy, including organic compounds of C, N, O, alcohols, sugars and amino acids; some of them on asteroids and meteorites
- Small quantities of water detected under the Moon and Mars surfaces; water certainly exists on Jupiter and Saturn satellites, as Europa, Titan and Enceladus
- About 5,000 exoplanets and more than 3,500 planetary systems have been discovered up to now (2021). Among them only about 150 can be qualified as *earth-like*
- No evidence of life, not even elementary forms, in the bio-chemical analysis of Moon and Mars rocks and surfaces, nor in the atmosphere of solar system planets
- No radio signal originated by ETI, from the outer interstellar and intergalactic space, up to now...



Astrobiology and Interdisciplinary Reflections on ETL and ETI are present in **Academic courses** in US universities.

Historical-systematic works written or directed by **Steven J. Dick**

The Biological Universe. The Twentieth Century Extraterrestrial Life Debate and the Limits of Science (Cambridge: Cambridge University Press, 1996)

Life on Other Worlds. The Twentieth Century Extraterrestrial Life Debate (Cambridge: Cambridge University Press, 1998)

Many Worlds: The New Universe, Extraterrestrial Life, and the Theological Implications (Philadelphia-London: Templeton Foundation Press, 2000)

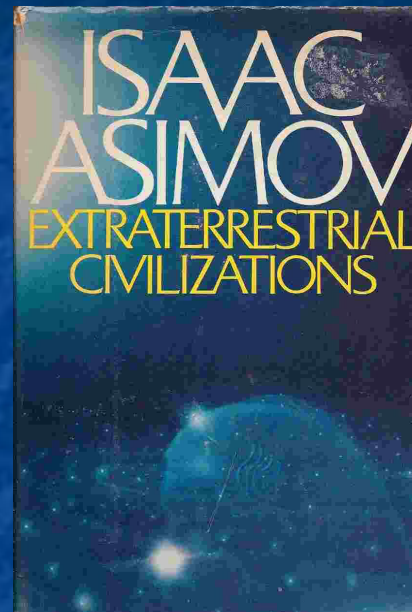
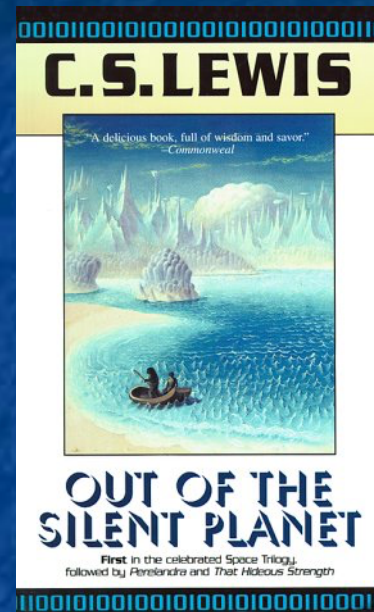
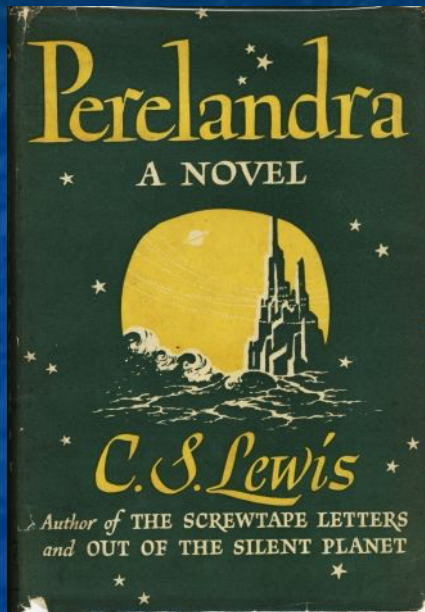
And also:

C. Impey, J. Lunine, J.- Funes (eds.), *Frontiers of Astrobiology* (Cambridge University Press: Cambridge UK, 2012)

T. Peters, *UFOs: God's Chariots? Spirituality, Ancient Aliens, and Religious Yearnings in the Age of Extraterrestrials* (Pompton Plains NY: New Pages Books, 2014)

T. Peters (ed.), *Astrotheology. Science and Theology Meet Extraterrestrial Life* (Eugene, OR: Cascade Books, 2018)

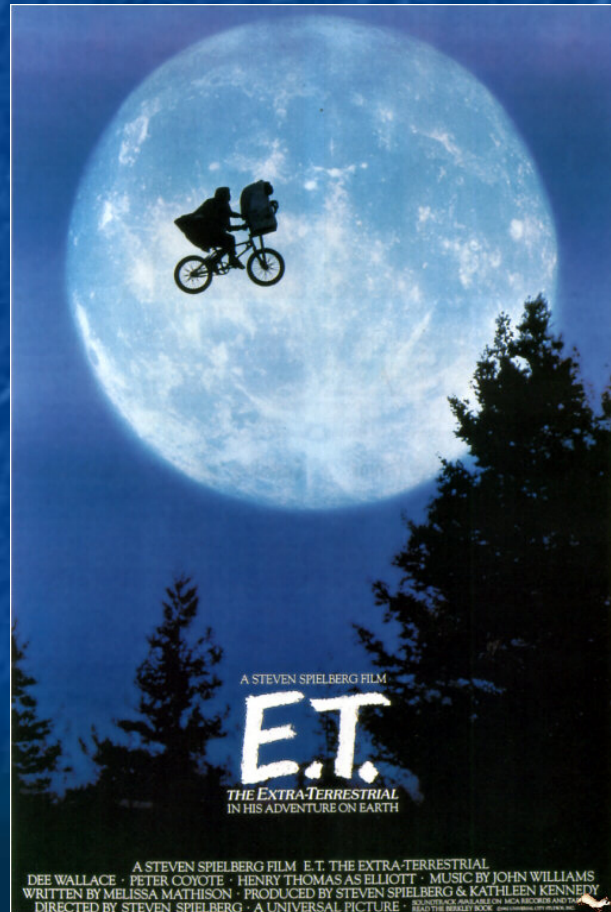
■ ETL and ETI is well present in 20th Century cultural debate: literature, science fiction, cinema...



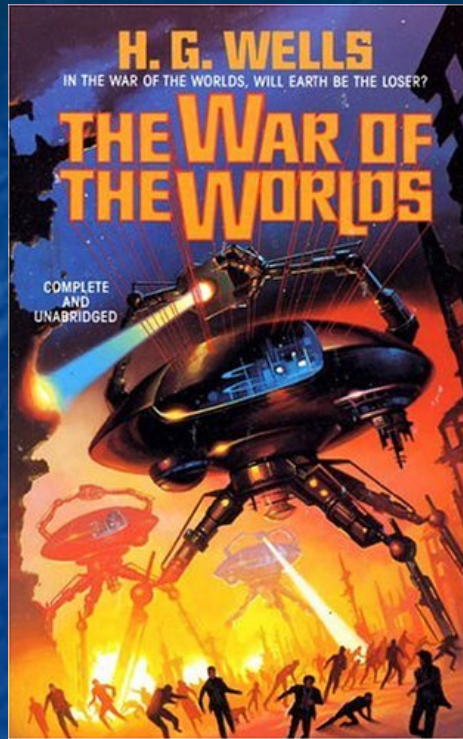
Science popularization includes ETL and ETI among the "big questions" which capture public opinion, such as the origin of the cosmos, the origin and evolution of life, etc.

■ Interestingly, we often approach ETI with moral categories, even distinguishing between...

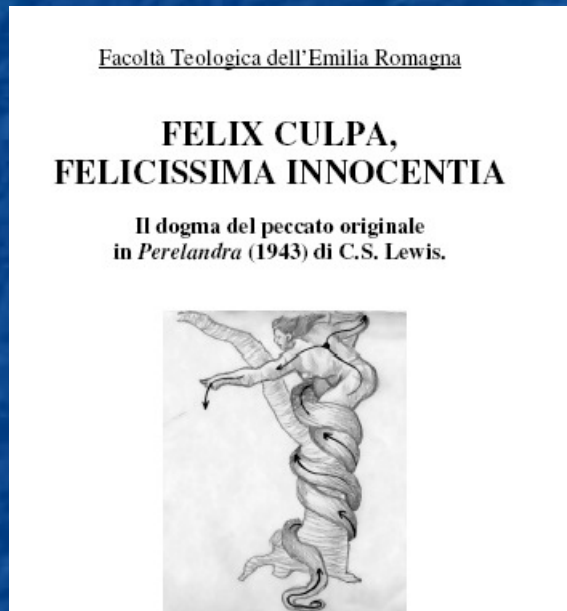
Angelic ETI



and Demonic ETI



■ When conveyed through literature, cinema and popular science, ETL, especially ETI, **rise philosophical questions which flow into religious, moral, existential, and theological issues.**



Matthew McConaughey and Jodi Foster

☞ **It makes sense to ask:**

Why debate on ETL and ETI almost naturally flows into religious questions?

- When trying to answer big questions, we instinctively seek **sources of knowledge beyond our anthropological horizon**; we expect a kind of "revelation" from *someone* who knows **more than us**, as ETI is supposed to do.

- When thinking about ETL, the human race acquires a "common identity": it is **the consciousness of a common "I" in front of a new "you"**, with whom to confront on the deepest existential questions.

- Among the big questions we are most interested in, questions we would address to a civilization more advanced than us, are **certainly religious issues**, such as:

What is **the place of human life** in the cosmos?

Is there **Someone behind and in the origin of the world?**

What is **our origin and what is our destiny?**



It is perhaps for these reasons that literature and cinema often attribute to ETI a moral role, capable of directing human behavior towards the good.



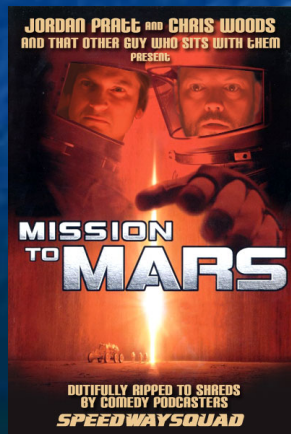
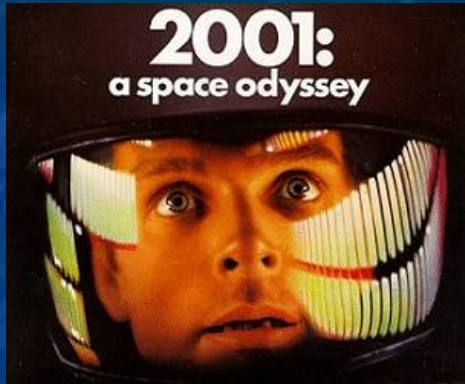
“The powerful theme of alien beings acting as a conduit to the Ultimate—whether it appears in fiction or as a seriously intended cosmological theory—touches a deep chord in the human psyche.

The attraction seems to be that by contacting superior beings in the sky, humans will be given access to privileged knowledge, and that the resulting broadening of our horizons will in some sense bring us a step closer to God.

The search for alien beings can thus be seen as part of a long-standing religious quest as well as a scientific project. This should not surprise us. Science began as an outgrowth of theology, and all scientists, whether atheists or theists, and whether or not they believe in the existence of alien beings, accept an essentially theological world view.

P. Davies, *Are We Alone? Philosophical Implications of the Discovery of Extraterrestrial Life* (Harmondsworth: Penguin, 1995) 137-138

■ A kind of “religious” issues are explicitly present also in the plots of good science fiction movies



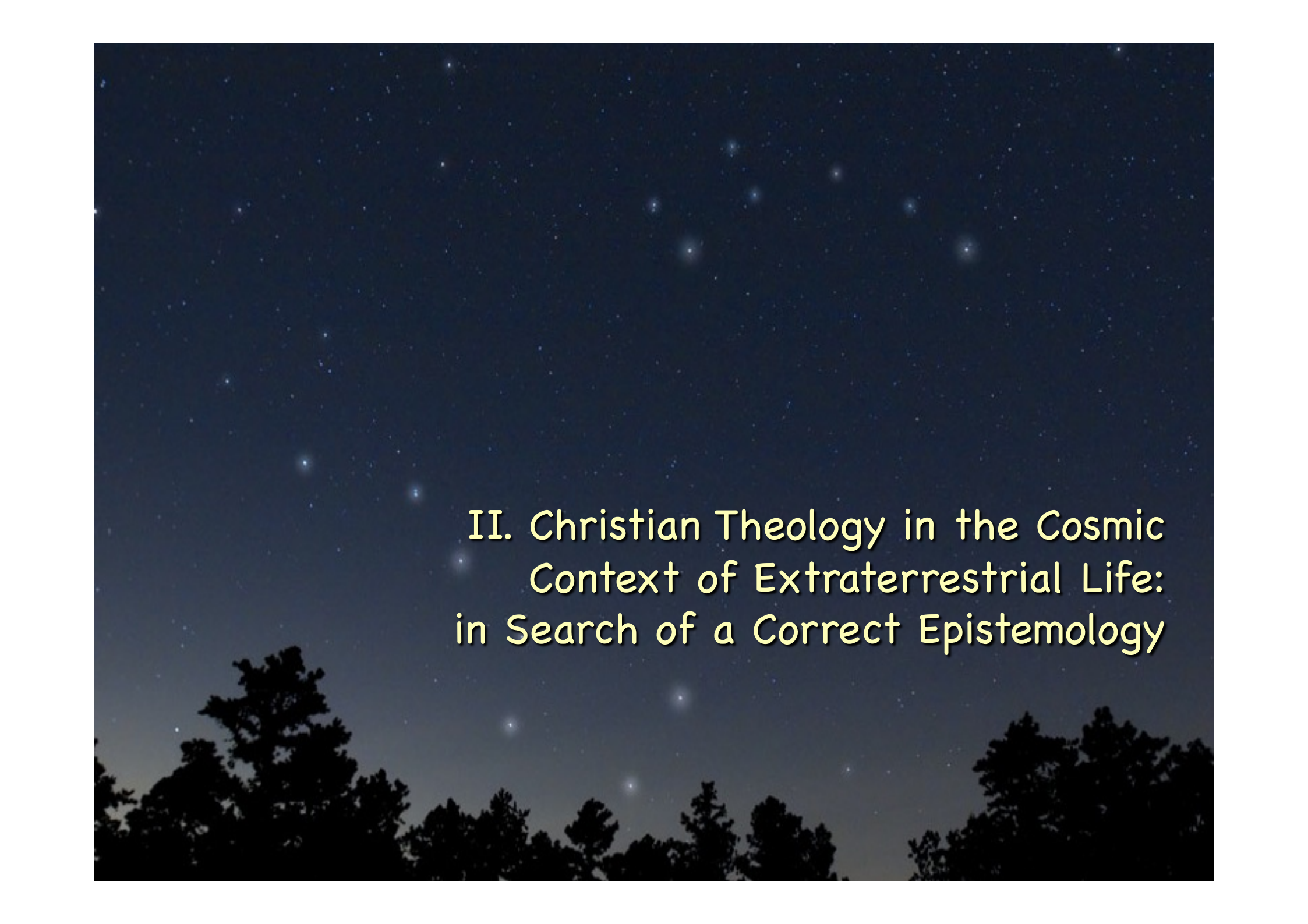
- *2001 Space Odyssey*: traveling beyond the barriers of space-time, the protagonist has the possibility to know the transcendent mystery that gave rise to life in the cosmos, a mystery which seems to possess the keys to eternity
- *Contact* discusses whether to meet ETI should be a believing scientist or a non-believer, atheist researcher (Jodi Foster). The plot presents this decision as strategic, to draw more fruit possible from the “contact.” Moreover, ETI conveys an out-of-time contact with the protagonist’s (J. Foster) loved and dead father
- *Mission to Mars* lets the protagonists know, in the final episode, who originated life on Earth, and what is the “father's house” to which he humans must now return.



- *Interstellar* deals with the great themes of immortality and love. The movie seems to communicate the idea that the laws of space and time depend on a transcendent foundation which is revealed by love, and that eternity is the place of imperishable love.



- *Arrival* features extraterrestrial intelligences capable of showing humans that war and violence are mistakes, that love is stronger than hate. ETI helps humans to read their own personal history, and to recognize a good superior destiny which seems to oversee their lives.

A night sky filled with stars, with the silhouettes of trees visible at the bottom. The text is centered in the lower half of the image.

II. Christian Theology in the Cosmic
Context of Extraterrestrial Life:
in Search of a Correct Epistemology

■ When speaking of ETL, ETI in particular, a major question soon arises, concerning the **uniqueness of Incarnation** and the **original sin** which characterized the history of salvation on the Earth:

☞ On such delicate issues, Science and Theology studies must be carried out according to **a consistent and proper epistemology**



Letter by pope Zachary (741-752):

addressed to Bishop Bonifatius, concerning the teachings of the priest Virgil, Zachary **disapproves of the idea that there were inhabitants at the antipodes, on the moon or on the sun** (*quod alius mundus et alii homines sub terra sint, seu sol et luna: cfr. Epistola XI ad Bonifacium, PL: 89, 946-947*).

The **underlying doctrinal motive** was simply that of not introducing **innovative elements** which, by calling into question the unity of the human race, would make it more complex to understand what kind of relationship with God and with the original sin those men, who were not descendants of Adam, had.

■ What questions scientific thinking can (perhaps, must) address to Christian theology

- Is faith in God the Creator of Heaven and Earth, the **One and Triune God** revealed by Jesus Christ, consistent with the presence of ETL and ETI in a cosmic space-time context such as we know today?
- What is the relationship between life elsewhere in the cosmos and the revelation of God *as Life* and *source of all Life*?
- What relationship should *ETI* reasonably have to God, **being God the ultimate end of human life**, which is an *intelligent* form of life in the cosmos?



■ What questions *would not be* epistemologically consistent to address to Christian theology, requiring it to justify itself?...



- to explain whether or not ETI has an "original sin."
- to explain whether or not God should, or should not, **reveal** himself, **incarnate**, **die** on the cross, **rise** from the dead, on other inhabited planets....
- to explain whether the presence of ETL or ETI on planets other than Earth is **confirmed** or **denied** by the Holy Scripture

☞ If theology is not obliged to comply with these questions, it is not to avoid headaches, but because these questions, when posed in this way, do **contain pre-understandings** and **human categories** which condition the whole subject.

The Christian God **is not a Platonic God**, from Whom all can be known by inference and deduction.

■ What kind of answers theology is reasonably prompted to give:



- Report whether the issue has been **addressed by Christian authors along the centuries**:
 - a) which **theological a priori arguments** have been offered, if any, in favor or contra **ETL and ETI**;
 - b) whether are there **any official and well founded teaching by Church Magisterium** on that.
- Show whether **the image and attributes of the One and Triune God**, as taught by Christian dogmas, are **meaningful also in a cosmic context** in which ETL, or even ETI, were relatively widespread phenomena
- Explain what role the mystery of **God's Incarnation on the planet Earth** might play in this new cosmic wider context, and how keep the **Christ-Logos headship** over the entire universe

■ **Two epistemological clarifications** are especially important when confronting science and theology on the ETL and ETI:



1. Theology is **not obliged** to accept ETL only because of **statistical reasons**, that is,

- because of the many planets and the enormous size of the universe, or
- because the statistical expectation ruled by the so-called **Drake equation**.



2. The discovery of ETL, or even more an encountering with ETI, **would not be the conclusive event to confirm or deny** the existence of a **God Creator** of the universe.



- Because of the cosmological expansion, the **large size of the universe** is inevitably related to the **time needed** to produce all the chemical elements necessary to have human life on Earth.
- The enormous space-time scale of the cosmos is not an apodictic argument in favor of ETL: **it is a necessary anthropic condition.**
- Lacking a thorough knowledge about **what** life is and **why** does it appear, to know that many planets exist which **can host life is not enough, by alone**, to state a priori that life is a wide-spread cosmic phenomenon.

Frank Drake (Chicago 1930)

$$N = R_* \cdot f_P \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L$$

N = number of civilizations with which humans could communicate

R_* = mean rate of star formation

f_P = fraction of stars that have planets

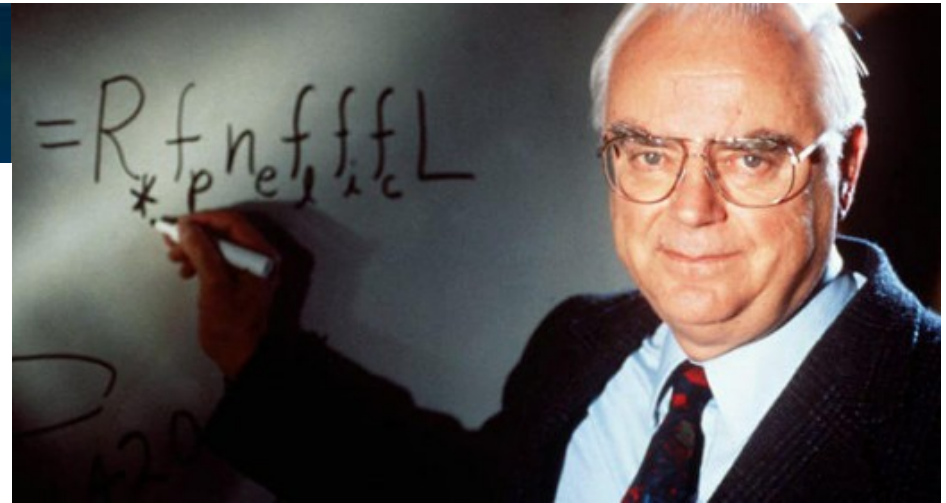
n_e = mean number of planets that could support life per star with planets

f_l = fraction of life-supporting planets that develop life

f_i = fraction of planets with life where life develops intelligence

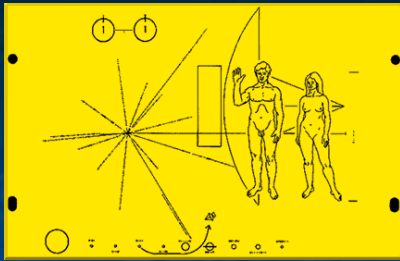
f_c = fraction of intelligent civilizations that develop communication

L = mean length of time that civilizations can communicate



☞ We do not have a **scientific knowledge** capable of satisfactorily estimating all the parameters present in this equation.

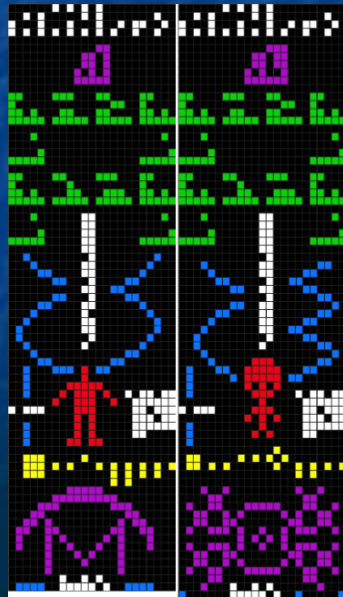
☞ The equation is about **necessary**, and not **necessary and sufficient conditions**: we do not know why life, and intelligent life, originates on a planet: we do not know if this **should** happen a certain number of times or never.



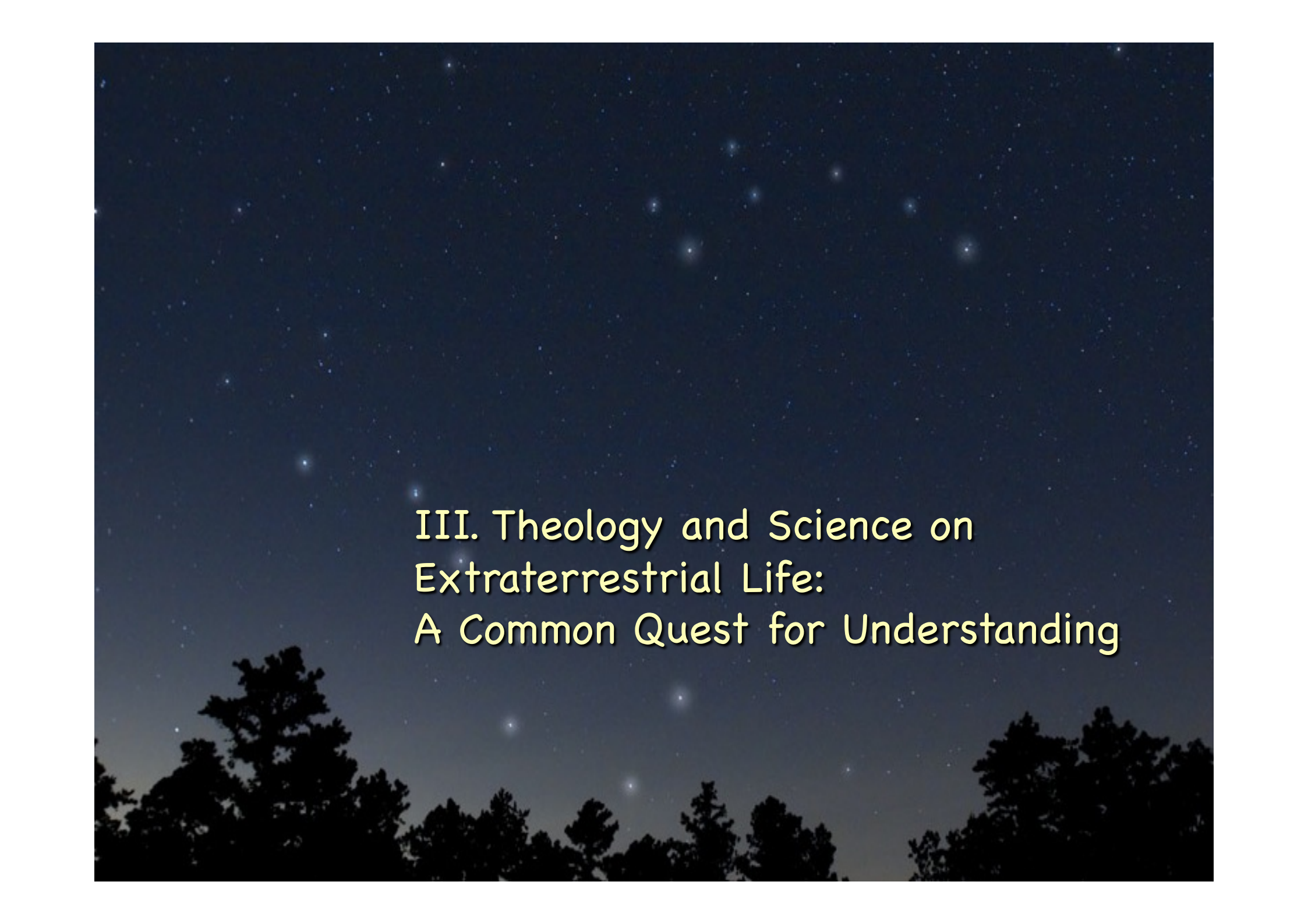
On ETI encountering, as if it were a conclusive event to confirm or deny the existence of a God Creator..., consider that:



- any statement or argument provided by aliens in favor or against the existence of God, if beyond our empirical experience, should be carefully analyzed, and its credibility critically evaluated, as usual;



- when preparing our "messages in bottles," we human beings decided not to communicate the widespread belief in a God Creator, a belief shared by the majority of people on the Earth.



III. Theology and Science on
Extraterrestrial Life:
A Common Quest for Understanding

■ Although the issue of ETL and ETI remains one of more challenging ones for Christian Theology, a few of theological statements could serve as guidelines

1. There are no theological a priori arguments against the spread of ETL and ETI in the cosmos (pluralist hypothesis); however, the "classical solution" (uniqueness of human beings) cannot be a priori refused, nor considered as naïve or anti-scientific

2. The image and the attributes of the Triune God revealed in Christ hold their universality and consistency, even in a cosmic context which may include ETL and ETI

3. The cosmic headship of the Incarnated Logos and the value of His Paschal Mystery have a universal, i.e. *non-local*, meaning: they hold over all creatures, because of their non strictly anthropocentric character



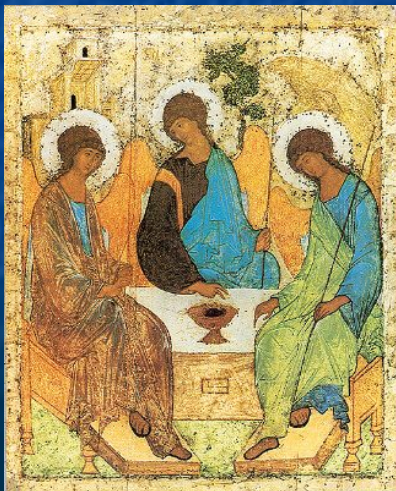
1. There are no a priori arguments against the spread of ETL and ETI in the cosmos (pluralist hypothesis); however, the "classical solution" (uniqueness of human life) cannot be refused a priori



- There are no **theological arguments**, nor teachings of the **Church Magisterium** that a priori reject or deny the possibility of ETL or ETI.
- The Judaeo-Christian tradition confesses and acknowledges the existence of **angels**. The meaning of intelligence and spirit in creation is not exhausted by the relationship between God and the human beings. The logic of creation "**remains open**" to **other creatures** which, while dependent on God, have their own economy of salvation.
- A theological **classical** solution (uniqueness of humankind) is open to be assumed within **a more general ET frame**, in which the basic theological and christological dogmas should **continue to hold**, though completed with new and more general insights.

2. Universality and consistency of the image of the Triune God, even in a cosmic context which may include ETL and ETI.

- The image of God delivered by the Judaeo-Christian tradition is **neither geocentric, nor anthropocentric**: the power and the causality of the One and Triune God have a cosmic, certainly *not local*, import and range
- In the context of free and conscious life (plausibly ETI), the **Trinitarian Mystery** possesses explicit non-local, i.e. universal, characteristics:



- **paternity** and **sonship** are universal concepts, whose intelligibility belongs to the generative process, plausibly common to all living beings (ETL) more complex than bacteria;
- the concept of a Love-Gift, the **Holy Spirit**, is universal as well, as it refers to the idea of communion, altruism and donation, certainly not foreign to the dynamics of a free and conscious life (plausibly ETI)

3. The cosmic headship of the Incarnated Word-Logos and the value of His Paschal Mystery have a *non-local* meaning: they are non-anthropocentric in character, and then hold over all creatures



- The logic of Revelation and the salvific value associated with the **Incarnation of the Word-Logos** have a universal, not only local import
- The headship of Christ, the Incarnate Word, over angelic creatures (cf. *Heb* 1:3-14 and 2:5-18) should be interpreted as revealing his **headship over all possible creatures** (cf. *Eph* 1:10; *Col* 1:20).
- When theology speaks in terms of **Christocentrism**, this implies neither a **geocentric** nor an **anthropocentric** perspective.
- Jesus Christ is at the center of the **cosmos** and **history**, insofar as he is the **Incarnate Word-Logos**, that is, **having the Logos assumed** a creaturely, historical and definite, space-time existence.



- The mystery of Christ, the Incarnate Word, is meaningful to **every creaturely being**: God has assumed in Christ a *space-time created nature*, and this has a value that goes beyond the "human" creature as such.
- Taking upon Himself the reality of death, **His resurrected body** reveals that corruption and degradation, intrinsic to the whole material world, are not the last word. His resurrection herald and realize **a destiny that concerns the whole space-time universe**, not only the human beings.
- Along with the value of redemption from sin (human history), **Christ's death on the cross** also has the value of conscious acceptance of space-time creaturalty and finiteness, the locus of a supreme obedience able to embrace **all creaturely living beings**, just as Christ's resurrection would result meaningful to all existing creatures.

As known, the idea of a possible future dialogue seems prohibitive because of the distances involved (*detect, not dialogue*).

In any case, if unforeseeable technologies would allow it, then...



■ A believer in God would see such a dialogue / an encounter as an extraordinary **religious** experience; he or she would manifest a **sense of respect** toward “the other,” acknowledge our common origin, appreciate the possibility of better understanding God's relationship with the whole of creation.

■ In such a dialogue, however, any information of a religious-spiritual nature should be **critically analyzed**, using all the other sources of knowledge.

■ If the new “religious” knowledge acquired by ETI has been judged reasonable, then a Christian believer **should compose such a new knowledge** with the revealed truths and with the other Church teachings corresponding to what we called the “classical solution.”

■ Depriving the (unthinkable) dialogue between the human beings and ETI of its **religious dimension**, for instance reducing it to mere exchange of technical knowledge, seems no possible.



■ The idea that a contact with ETI **may free Homo sapiens** from a childish and immature religious believing, making him finally aware that his place in the universe is nothing but chance by-product of cosmic evolution results in a totally unjustified opinion.

■ Most of the **great existential, religious questions**, subject matter of philosophy and theology, questions that characterize our biological species **would keep all their meaning unchanged...**

namely: the search for the ultimate reason for the universe; human aspiration to a personal, everlasting and faithful love, and then to an eternal life; strong existential queries on innocent pain, injustice and death...

to end up

While theology is certainly involved, the last word on the question of extraterrestrial life is not up to theology, but up to science

The existence of intelligent life on planets other than Earth is neither required nor excluded by any theological argument

to all of humanity, including theologians, nothing remains but to wait...

Selected Bibliography

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