

Alien Archaeology in science fiction cinema

Cinéma et archéologie extraterrestre

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ABSTRACT. Some scenarios of science fiction films, episodes of television series, or documentaries are based on and/or develop the theme of extraterrestrial civilizations' research and discovery and their various consequences. The present study discusses their likelihood and implausibility by reviewing facts versus fiction in movies and television series. Some selected films were classified into two categories, depending on the location of the fictional discoveries of the remains of extraterrestrial civilizations: on Earth or other planets. Results highlight that while fiction movies are often inspired by controversial ufological theories such as that of ancient astronauts, some of them also emphasize scientific concern such as the risk of biological contamination.

KEYWORDS. Cinema, television series, science fiction, astrobiology, extraterrestrial civilizations, archaeology, xenoarchaeology, pseudoarchaeology, ufological theories.

1. Introduction

Archaeology is often a pretext to dream of fabulous discoveries of treasures and lost ancient cities (Alexandre-Bidon, 1986 & 2009; Auvertin, 2019). Jules Verne's novel entitled *Voyage au Centre de la Terre* and published in 1864, combining archaeology, geology, and paleontology, already presented all the ingredients of a fantastic adventure whose success was revived in the cinema in the following century. Jules Verne's *Voyage au Centre de la Terre* has also been adapted several times to the cinema (*Journey to the Center of the Earth*: Levin, 1959; Piquer Simón, 1976, Brevig, 2008). There is confusion between archaeologists and explorers (Alexandre-Bidon, 1986 & 2009) highlighted in this kind of film that oscillates between adventure and fantastic. The movie *King Solomon's Mines* directed by Robert Stevenson (1937), followed by several subsequent adaptations, as well as the film series *Indiana Jones* directed by Steven Spielberg (1981, 1984, 1989 & 2008) and James Mangold (2023), and *Tomb Raider* directed by Simon West (2001), Jan de Bont (2003) and Roar Uthaug (2018), and also, among the television series, *Relic Hunter* directed by Jay Firestone and Gil Grant (1999 to 2002), are some examples of this timeless craze for archaeological treasure searches. In this kind of film and television series, archaeologists, or tomb raiders, are intrepid explorers and adventurers of lost worlds, more often in expeditions to fascinating and hostile exotic lands than in the offices, libraries, or classrooms of their respective universities.

From adventure to fantastic, there is only one quick step toward science fiction (Bozzetto, 1990). For example, the film *Atlantis the Lost Continent*, directed by George Pal (1961), showed the ancient Atlantean civilization with very advanced and futuristic technologies. Some filmmakers use the theme of time travel to stage archaeological activities and discoveries in the future. The two films *The Time Machine* directed by George Pal (1960) and *Planet of the Apes* directed by Franklin Schaffner (1968) have staged time travelers projected into the distant future and discovering the remains of our contemporary (*Planet of the Apes*) or future (*The Time Machine*) civilization. The films *Planet of the Apes* and *The Time Machine* were adapted from novels from different times (*The Time Machine: An Invention* by Herbert George Wells, 1895; *La Planète des singes* by Pierre Boulle, 1963), which the context of the Cold War brought together. Nuclear war scenarios were in vogue in post-apocalyptic films of the 1960s, while since the early 2000s, climate pessimism has become a cinematographic object reflecting some anxieties of today's society (Planchon et al., 2022). In the film *Planet of the*

Apes, the archaeologist whose excavations allow us to discover the remains of our contemporary civilization is a chimpanzee (called Cornelius). At the end of the film *Artificial Intelligence: A.I.* directed by Steven Spielberg (2001), extraterrestrial archaeologists discover, buried under the ice, the remains of human civilization (New York City) extinct for 2000 years following climate change.

Already before the Second World War, science fiction literature combined exoticism and adventure of archaeological expeditions in search of lost civilizations with the search and discovery of extraterrestrial civilizations (Isto, 2019). The context of the rise of science fiction cinema during the second half of the 20th century, and the fascination for the ruins of extinct civilizations (Habib, 2011) and for ufology (Méheust, 1978) found themselves in some scenarios showing discoveries of remains of alien civilizations. Since the discovery and confirmation of the first exoplanet (Mayor & Queloz, 1995), more than 5,000 other exoplanets have been detected and confirmed (NASA Exoplanet Archive: <https://exoplanetarchive.ipac.caltech.edu>), but there is currently no evidence of the existence of present or past life forms elsewhere than on Earth. New discoveries and expanding knowledge in astronomy has also fostered debates and research on extraterrestrial life (e.g., see the activities of the *SETI Institute*: <https://www.seti.org/>) and revived the sources of inspiration of science fiction cinema.

In this contribution, we used as materials 11 films, episodes of television series, or documentaries, whose scenarios develop the theme of research and discovery of extraterrestrial civilizations and their various consequences, to discuss their pertinency concerning the current knowledge in astrobiology. The historical context of specific theories on which the scenarios of these films are more or less freely based, will be clarified by relying on some connected examples of films and literary works. This article is structured around two main parts: the first is dedicated to the discoveries of the remains of extraterrestrial civilizations on Earth, and the second is dedicated to xenoarchaeology, i.e., the discovery of remains of alien civilizations on other planets and their moons.

2. Facts and Harms of Ancient Astronauts on Earth

2.1. Ancient Astronauts and Cinema

Films relating to the discovery of remains of civilizations of extraterrestrial origin are mainly inspired by the theory of ancient astronauts, developed in the 1960s (Pauwels & Bergier, 1960; Charroux, 1962; Sendy, 1969) and popularized by Erich von Däniken (1968). The pseudo-scientific documentary (or rather science fiction) television series entitled *Ancient Aliens*, broadcast since 2009 in the USA, deals with the theory of ancient astronauts (François, 2019). The ufological approach developed in this documentary and, therefore, in the theory of ancient astronauts is based on a somewhat religious belief (Cook, 1999; Jüdt, 2003; Richter, 2012) that extraterrestrial visitors have reportedly transmitted scientific and technical knowledge to several prehistoric and ancient civilizations (Stoczkowski, 1999; Le Quellec, 2009; Richter, 2017). Ancient Egypt, with its culture among the oldest in the world and its impressive architectural remains, has attracted the interest of Erich von Däniken and the proponents of the theory of ancient astronauts (Richter, 2012 & 2015), and hence of adventure cinema, archaeology fiction and science fiction (Stoczkowski, 1999; Hiscock, 2012; Fritze, 2016; Bièvre-Perrin, 2019). Ancient Egypt as a place of contact between humanity and ancient astronauts, has inspired, for example, the scenario of the film *Stargate* directed by Roland Emmerich (1994), and the scenario of the film *The Fifth Element* directed by Luc Besson (1997). The film *Stargate* is based on the discovery in Egypt, in 1928 in Giza (the site of the great pyramids and the sphinx), of a mysterious ring nearly seven meters in diameter and made of an unknown metal (Figure 1).



Figure 1. *Discovery of the Stargate in 1928 in Giza (Egypt). Image from the film Stargate, directed by Roland Emmerich, production companies: Canal+, Centropolis Film Productions, and Carolco Pictures, countries: USA and France, 1994.*

This ring proved to be a *stargate*, i.e., an interplanetary transport device (portal) engineered about sixty million years ago by an alien civilization called the *Ancients*. A stargate creates a wormhole, allowing them to travel quickly between two space-time points, from one door to another. A wormhole is still a hypothetical object whose existence was suggested by Albert Einstein and Nathan Rosen (Einstein & Rosen, 1935). Some explanatory details can be read in e.g., Taillet et al. (2008). The concept of wormholes, although theoretical, is widely used in science fiction (literature, comics, cinema, and television series) to allow travel in space and in time. Science fiction allowed to popularize this complex concept of theoretical physics to a non-scientific audience, but with pseudoscientific views (Matos, 2007; Nahin, 1999 and 2016).

2.2. *Myth of Atlantis and Ancient Astronauts*

The origin of the myth of Atlantis (ancient Greek: Ἀτλαντίς/Atlantís) is a set of two philosophical accounts of Plato (428-348 B.C.), the *Dialogues* including the *Critias* and the *Timaeus*: see e.g., the translations by D. Horan (2021). The *Dialogues* set out how Athens stopped the belligerent expansionism of the people from Atlantis, an island that Plato located beyond the Columns of Hercules. After the victory of Athens against the Atlanteans, a cataclysm caused by Zeus engulfed Atlantis in the ocean that still bears its name today.

Rediscovered in the Western world during the Renaissance, the myth of Atlantis has been the subject of the most diverse theories and speculations (Vidal-Naquet, 2005), including its hypothetical location (Kieffer, 2004). Most publications admit that the myth of Atlantis is a fable of Plato, therefore, purely fictional (Gill, 1977 and 1979; Naddaf, 1994; Kieffer, 2004; Nesselrath, 2002; Leveau, 2005; Vidal-Naquet, 2005). The interpretation of Plato's story of Atlantis based on real events by some authors is, therefore, in this sense, a pseudoarchaeological approach (Collina-Girard, 2009). As a source of inspiration, Atlantis has become and remains a theme widely treated in art, literature, cinema, or video games, in the genres of fantastic, peplum, and, or science fiction (Winch, 2012). The myth of Atlantis was also revisited by the theoreticians of ancient astronauts (Richter, 2015). The film *Warlords of Atlantis*, released in 1978, while retaining a classic localization of the sunken city in the Atlantic Ocean, refers to this theory by proposing an extraterrestrial origin to the Atlantean.



a)



b)

Figure 2. Images from the film *Warlords of Atlantis*, directed by Kevin Connor, production companies: Columbia Pictures and EMI Productions, country: United Kingdom, 1978.

a) Discovery of the golden statue on the floor of the Atlantic Ocean.

b) Queen Atsil and Atraxon in the hall of the Atlantean city of Vaar.

In 1896, Professor Aitken and his son Charles, British archaeologists, on an expedition on an American ship, discovered a gold statue at the bottom of the Atlantic Ocean (Figure 2a) that pointed to the entrance of an underwater gallery leading to the remains of Vaar, one of the seven cities of Atlantis having not been completely engulfed in the ocean and still occupied by the descendants of a mysterious people. Queen Atsil, accompanied by Atraxon, member of the ruling class of Vaar (Figure 2b), explained to Charles Aitken that his ancestors had to leave their home planet, Mars, following the fall of a meteorite that caused a global disaster and made their world uninhabitable. The origin of Atlantis and its inhabitants, as described in the film *Warlords of Atlantis*, recalls some pseudoarchaeological theories claiming to attribute an ancient extraterrestrial origin to an alleged lost pre-flood global civilization called Atlantis (Dobson, 2017; Stoczkowski, 2022). It is helpful to recall, in this context, that the film "*Warlords of Atlantis*" was released one year after the science fiction film *Star Wars* (retroactively titled *Star Wars: Episode IV – A New Hope*) directed by George Lucas (released on 25 May 1977) and *Close Encounters of the Third Kind* directed by Steven Spielberg (released on 16 November 1977).

2.3. Ancient Civilizations and Ufological Myths

Myths and legends about the lost pre-Columbian civilizations go back to the Spanish Conquistadors, in the 16th century, in search of the Golden Cities (or Seven Cities of Cíbola: Locke, 2001; Lucena Giraldo, 2006) and the *Eldorado* (Bennassar, 2007). Imagination developed around lost pre-Columbian cultures has been at the heart of many science fiction stories since the late 1960s (Auvartin, 2019). The fictional city of Akator (Figure 3a), which is the research goal of Pr. Jones in the film *Indiana Jones and the Kingdom of the Crystal Skull*, is inspired by these legends and by the mythological ancient city of *Akakor*, described by German journalist Karl Brugger (1976) and allegedly located somewhere between Brazil, Bolivia, and Peru. Details of the film, such as the disappearance of Pr. Oxley, recall the disappearance in Brazil in 1925 of Percival Harrison Fawcett during an expedition in search of a mysterious lost city. The story of this expedition was the subject of a novel (Grann, 2009) and a film (Gray, 2016) entitled *The Lost City of Z*.



a)



b)

Figure 3. Images from the film *Indiana Jones and the Kingdom of the Crystal Skull*, directed by Steven Spielberg, production companies: Lucasfilm Ltd., The Kennedy/Marshall Company, and Paramount Pictures, country: USA, 2008.

a) Remains of the city of Akator.

b) Alien crystal skeletons inside the Akator City Temple.

Since the Spanish conquest, other myths have been added to the initial quest for gold. Some of them are mentioned in the film *Indiana Jones and the Kingdom of the Crystal Skull*:

- 19th-century fake of the *Crystal skulls* (Figure 3b; Sax et al., 2008; Walsh, 2008),

- Roswell affair in 1947 and Area 51 associated with him in UFO theories (Darlington, 1998; Patton, P., 1998; Jacobsen, A., 2011),

- the geoglyphs of Nazca, objects of various controversial and fanciful theories also (Nickell, 1983). The film *Indiana Jones and the Kingdom of the Crystal Skull* ends in apotheosis with the spectacular take-off of a Chariot of the Gods dear to Erich von Däniken and the defenders of the theory of ancient astronauts, without knowing the causes of the abandonment of the city in an undetermined past.

The remains of lost civilizations and cities discovered across the Americas (e.g., Olmec civilization/Mexico in 1862: Soustelle, 1979; cities of Caral/Peru in 1948-49: Kosok, 1965; and Ciudad Perdida/Colombia in 1972: Soto-Holguín, 1976), much later than those of the Old World, fed the most fanciful theories, such as the hoax of the Ica stones (Feder, 2010). The hoax of the Ica stones is a set of 15,000 engraved pebbles discovered in Ica (Peru), in the 1960s. Engravings depict ancient Native American populations of the region in the company of dinosaurs, performing heart transplants and other complex surgical procedures, or observing the sky with telescopes (Coppens, 2001; Carroll, 2003). Despite evidence of a hoax (the stones were engraved using a dental drill: Feder, 2010), these stones have been a great success within the creationist communities (e.g., cohabitation between humans and dinosaurs) and ufologists defenders of the theory of ancient astronauts (Charroux, 1974: extinct civilization, technologically very advanced and anterior to the present humanity), Coppens (2001), Carroll (2003). Why and how did this so-called extraordinarily advanced civilization disappear? Defenders of the theory of ancient astronauts claim the following answer: thanks to their astronomical knowledge and observations, they saw the arrival of the asteroid that ended the Cretaceous era of dinosaurs. They left Earth before the impact, leaving as memories of their civilization only the engraved pebbles of Ica and the geoglyphs indicating the location of the so-called spaceport of Nazca (Coppens, 2001)!

It seems complicated to believe that such an advanced civilization could have left only stones engraved as proof of its past existence. G. Schmidt and A. Frank (2019) wondered what traces could have left an industrialized civilization that existed 55 million years ago. G. Schmidt and A. Frank (2019) showed a low probability of finding direct and material evidence, such as technological artifacts, of such an ancient industrialized civilization. On the other hand, it would be more likely to find indirect evidence, such as anomalies in sedimentary chemical composition or isotopic ratios.

Combustion of fossil fuels changes the isotopic ratios of carbon and oxygen in surficial reservoirs, which leaves an imprint in the geological archives. Possible evidence of vanished advanced civilizations could include plastics and residues of nuclear waste buried deep underground or in seafloor sediments.

In the continuity of the film *Stargate*, the television series *Stargate SG-1* show the discovery, buried under the Antarctic ice sheet, of the remains of an outpost built by the *Ancients* and abandoned for five or six million years following an epidemic (*Stargate SG-1*, Season 7 and Episode 22: *Lost City*). According to G. Schmidt and A. Frank (2019), it is doubtful that an installation such as the *Ancient* Antarctic base could have been discovered intact after abandonment of five or six million years!

Given the erosion and tectonic activity, which would have removed any visible trace of advanced civilizations so ancient on Earth, the preservation of artifacts would therefore be, from this point of view, theoretically more conceivable on other celestial bodies with reduced geological surficial activity such as the Moon or Mars.

2.4. Alien Contact and Biological Hazards

The film *The Thing*, which is as much about science fiction as it is about horror films, offers a more original reflection on the theory of ancient astronauts by highlighting the theme of contact with an unknown extraterrestrial life form and in total rupture with the anthropomorphism characteristic of the films previously mentioned. The scenario of this film is based on the discovery, made by scientists at a Norwegian base and then rediscovered by American scientists (Figure 4a), of the wreckage of a spaceship buried under Antarctic ice for at least 100,000 years (based on the thickness of the ice layer above it).



a)



b)

Figure 4. Images from the film *The Thing*, directed by John Carpenter, production companies: Universal Pictures and Turman-Foster Company, country: USA, 1982.

a) *The spaceship discovered in Antarctica.*

b) *The alien creature in one of its forms.*

The archives left by the Norwegian team suggest that when this spaceship crashed on Earth, one of its occupants was ejected outside the spaceship. *The thing*, so-called, was extracted from the ice by the Norwegian researchers and became the vector of rapid contamination (by simple contact) by a parasite of extraterrestrial origin (Figure 4b). *The Thing* was the remake of a 1951 film (*The Thing from Another World*, directed by Christian Nyby), both adapted from a novel by American science fiction writer John W. Campbell, entitled *Who Goes There?* and published in 1938. These films and this novel were presumably and strongly inspired by Howard Phillips Lovecraft's novel *At the Mountains of Madness*, published in 1936. The scenario of *The Thing* highlighted, beyond the extraordinary discovery of technological remains of extraterrestrial visitors, the biological risks incurred by contact with a species of unknown origin arising from a distant past. Biological risks, as well as the lack of precautions when handling contaminated alien organic remains, are also developed in scenarios of other films that we will discuss in the next chapter devoted to xenoarchaeology: *Alien* and *Prometheus*. Related to the scenario of *The Thing*, the theme of an intelligent alien life form hibernating in Antarctic ice and carrying a parasite or virus that infects its human discoverers has been developed in the

television series *Stargate SG-1* (Season 6 and Episode 4: *Frozen*). The mysteries of Antarctica and what might be hidden under its ice sheet are also discussed in some episodes of the television series *The X-Files* and *Ancient Aliens*.

According to L.A. Yarzabal et al. (2021), ice sheet melt and permafrost thaw induced by global warming could release pathogenic microorganisms, and expose human population to a risk of biological contamination. Regarding pathogens of extraterrestrial origin, the risk of biological contamination is taken very seriously by organizations such as NASA and ESA for all space missions (Glavin et al., 2004 & 2010; Zorzano et al., 2023). The main kind of risks identified are the contamination from Earth on other planets (including their possible moons), as well as contamination of extraterrestrial origin upon return from certain missions, for example, in anticipation of future return missions to Mars. Some science fiction authors did not wait for the beginnings of space exploration, starting in the middle of the 20th century, to approach and develop the theme of biological contamination. For example, H.G. Wells, in his novel *The War of the Worlds* published in 1898, explained how Martian invaders were exterminated by pathogenic germs present on Earth, and against which they were not immune. Despite differences between the novel by H.G. Wells and the film directed by Byron Haskin in 1953, the sudden end of the Martian invasion due to biological contamination has been reproduced.

This theme was also shown as biological contamination of extraterrestrial origin, for example, in the movie *Life* directed by Daniel Espinosa (2017). The film *Life* showed the awakening of a microorganism taken from the Martian regolith that contaminates a whole crew of astronauts back to Earth. As mentioned in twelve episodes of the television series *The X-Files*, the black oil would have been introduced on primitive Earth during the cosmic impacts of the *Late Heavy Bombardment*, which would have occurred about four billion years ago (Bottke & Norman, 2017). The black oil scenario is based on panspermia, which is the speculative hypothesis of the transfer of living organisms through space (Horneck et al., 2001) and, or from one planet to another (Mileikowsky et al., 2000), made possible, according to this hypothesis, by cosmic impacts (Nicholson, 2009). Greek Ionian philosopher Anaxagoras first evoked the theory of panspermia (from ancient Greek *πανσπερμία* / *panspermia*) in the fifth century BC (O’Leary, 2008). Lord Kelvin relaunched this hypothesis in 1871 in a communication to the *British Association for the Advancement of Science* (Thomson, 1871). British physicist Lord Kelvin proposed the hypothesis that when small celestial bodies hit the surface of a planet where life could have developed, some living organisms may have been trapped in the core of ejecta propelled into space and eventually landed on Earth inside meteorites (see also the study of the Martian meteorite ALH84001: McKay, 1996). Swedish chemist Svante Arrhenius (1903 & 1908) suggested the hypothesis of the propagation of life forms (e.g., spores) from planet to planet driven by the blast of light from stars and carried by meteorites and interstellar dust. Other authors have taken up this theory since the 1960s (Crick & Orgel, 1973; Hoyle et al., 1986; Cockell, 2011). *Expose project* recently aimed to assess the survival rate of biological samples to test some of the hypotheses of panspermia theory (Horneck & Zell, 2012).

3. Xenoarchaeology: Searching for lost Extraterrestrial Civilizations

Xenoarchaeology or interstellar/extraterrestrial/cosmic archaeology involves searching for material traces of extinct extraterrestrial civilizations (Carrigan, 2010 & 2012). NASA and SETI Institute seriously considered the search for relics or remains of such cultures, one of the orientations of their research programs (Vakoch, 2014). The discovery of remains of extraterrestrial civilizations on other planets and their moons has already fuelled the scripts of many science fiction films since the middle of the 20th century, even before the beginning of space exploration (*Forbidden Planet* in 1956). The causes of the disappearances of these fictional civilizations and the often dangerous consequences of the discoveries of their remains are often projections, on other worlds, of the many dangers that threaten the human species, such as climate change.

3.1. Mythical Red Planet

In 1877, the Italian astronomer Giovanni Schiaparelli observed on the surface of Mars what he described as channels (Schiaparelli, 1882), improperly translated (in Italian: *canali*, already mentioned in 1858 by astronomer Pietro Angelo Secchi) by canals. These observations, linked to an erroneous interpretation of observations still imprecise at that time, very quickly convinced some authors of their artificial character and, therefore, of the possible presence of a Martian civilization (Flammarion, 1892; Lowell, 1895). Science fiction literature quickly followed scientific debates in an already prolific era in this field (e.g., Jules Verne and Herbert George Wells). The novel *The War of the Worlds* written by H.G. Wells (1898) is an example. Although the hypothesis of Martian canals was definitively discarded from the beginning of the 20th century (Evans and Maunder, 1903; Wallace, 1907; Antoniadi, 1909), literature and then science fiction cinema continued to picture Martian civilizations, for example in literature (Ray Bradbury: *The Martian Chronicles*, 1950). Some photographs taken by the Viking I and II probes during their flyby of Mars between 1976 and 1980 have later revived speculations on a so-called Martian civilization and brought up-to-date Martian science fiction in cinema from an archaeological perspective.

The film *Mission to Mars* refers to the *face of Mars*, a Martian relief called *Cydonia Mensae*, photographed by the orbiter Viking I on 25 July 1976.



a)



b)

Figure 5. Images from *Mission to Mars*, directed by Brian De Palma, production companies: Touchstone Pictures, Spyglass Entertainment, The Jacobson Company, and Red Horizon Productions, country: USA, 2000.

a) Landscape view of the face of Mars.

b) Inside the face of Mars: holographic representation of the take-off and flight of Martian spaceships after the impact event.

In the film *Mission to Mars*, the face (Figure 5a) is a sanctuary that contains the archives of an ancient Martian civilization that has disappeared. The group of astronauts who manage to enter there discovers the history of this civilization through a holographic presentation and learn that the red planet was habitable and inhabited until the cataclysmic fall of a meteorite that forced the survivors to migrate to a distant destination outside the Solar System (Figure 5b), except for one ship that left for Earth. *Mission to Mars* therefore seems to give us explanations to understand the scenario of the film *Warlords of Atlantis!* The evocation of a face in the photograph taken by the Viking I probe in 1976 became the object of countless theories and speculations on the possible artificial character of this formation (Grossinger, 1986; Carlotto, 1988) and, by extension, evidence of a long-extinct Martian civilization (Hatcher Childress, 2000; Hoagland, 2001). Pyramid-shaped rock formations in the same Martian region of Cydonia may have suggested the existence of monumental remains of a large ancient city (DiPietro et al., 1988; Hatcher Childress, 2000; Hoagland, 2001; Haas et al., 2017). The Martian pyramidal rock formations were used as the setting for the film *Total Recall* directed by Paul Verhoeven (1990): Figure 6a.



a)



b)

Figure 6. Remains on the planet Mars of a long-extinct alien civilization. Images from the film *Total Recall*, directed by Paul Verhoeven, production company: Carolco Pictures, country: USA, 1990.

a) Landscape view of the Pyramid Mountain.

b) The powerplant built by the lost alien civilization inside Pyramid Mountain.

In the context of human colonization of Mars, the excavation of galleries under Pyramid Mountain gave access to a gigantic powerplant (Figure 6b) built by an alien civilization that disappeared from the planet several hundred thousand years ago and whose activation is intended to transform the Martian ice cap into a breathable atmosphere for all. Although this very advanced technology is half a million years old, it is still usable and put into operation successfully. This is, therefore, a very similar theme to that of the films *Stargate* and *Forbidden Planet*; see later in this contribution. More recent and better quality (higher resolution) photographs of the so-called face of Mars, taken on 5 April 1998 and 8 April 2001 by the Mars Global Surveyor probe, showed that it was only an eroded hill (*mesa*: Guest et al., 1977; Pieri, 1999) whose shading effects could, by pareidolia, evoke a face (NASA, 2001). Erosion is also responsible for pyramid-shaped structures (Kite et al., 2016).

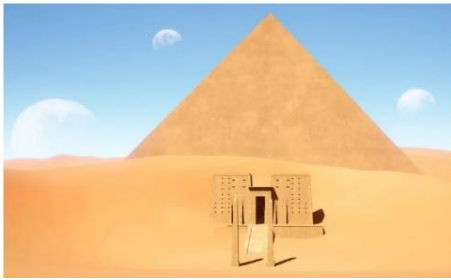
Our closest neighbor, the Moon, was also concerned by the dream of discovering the remains of an ancient lost alien civilization. One of the most spectacular examples is the *Apollo 20 hoax*. The *Apollo 20 Hoax* is a fake made by a series of videos released in 2007 about a so-called joint lunar mission between the United States and the former USSR, launched in 1976 that reportedly discovered the remains of an alien civilization on the dark side of the Moon (Johnson, 2007). This hoax is based on photographs taken by the astronauts of the Apollo 15 mission in 1971 while they were orbiting the Moon (photos archived on the website Lunar and Planetary Institute: Apollo 15 Mission, photos of Delporte area). These photographs were faked using photo-manipulations to reveal a spaceship of unknown origin, more than three kilometers long and supposedly 1.5 billion years old, the ruins of an abandoned city, and the body of a 26,000-year-old hibernating alien woman (Johnson, 2007). The immediate success of this hoax comes from the broadcast of videos on YouTube and probably also from the temptation to believe in it!

3.2. New Horizons? Exoplanetary Archaeology

The first exoplanet (51 Pegasi b) was discovered and confirmed at the end of the 20th century (Mayor & Queloz, 1995). Still, some Greek philosophers and scholars of antiquity had already sensed its existence. Democritus (c. 460-370 BC) seemed to have already been convinced of the plurality of worlds (Mugler, 1953). Epicurus (342/341-270 BC) wrote in his *Letter to Herodotus*: *It is not only the number of atoms, it is the number of worlds that is infinite in the Universe. There are an infinite number of worlds similar to ours and an infinite number of different worlds* (Hamelin, 1910; Conche, 1992; Vauclair, 2016; de Peretti, 2019). The Greek astronomer and mathematician Aristarchus of Samos (c. 310-230 BC) assumed that the stars, given their remoteness and following his thesis of the infinity of the universe, were comparable to our sun (Meyerhof, 1942; Comité de Sauvegarde des Sites de Meudon, 2019). Some of these documentary sources and ideas of antiquity are again disseminated

in Renaissance Europe. The Dominican monk Giordano Bruno (1548-1600) wrote, in his work entitled (in Italian) *De l'infinito, universo e Mondi/* (English translation) *Of the infinite, the universe and the worlds* and published in 1584, that *Every star is a sun like ours, and around each of them are other planets, invisible to us, but existing*. Giordano Bruno went even further in his reasoning, stating that these worlds are not only inhabited but their inhabitants are perhaps *similar and even superior* to us (de Peretti, 2019; Arnould, 2021).

Science fiction cinema did not wait for the first detections of exoplanets to implement their stories, as exemplified by the film *Stargate* and its sequels in the form of the television series *Stargate SG-1* and *Stargate Atlantis*. It is in the first place remains discovered on Earth that allows finding the extrasolar origin of their builders. Among the most classical sources discussed in the theory of ancient astronauts are, as already seen in chapter 2., Egyptian antiquity and the myth of Atlantis (Figure 7).



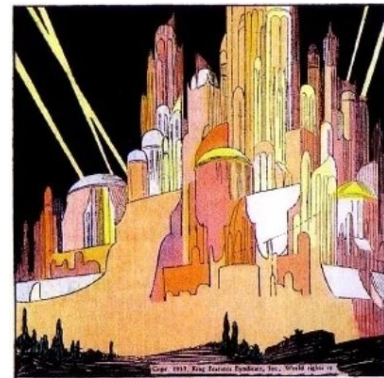
a)



b)



c)



d)

Figure 7. Archaeological discoveries on the fictional exoplanets Abydos and Lantia.

a) Pyramid, pylon, and obelisks on the planet Abydos. Images from the film *Stargate*, directed by Roland Emmerich, production companies: Canal+, Centropolis Film Productions, and Carolco Pictures, countries: USA and France, 1994.

b) Pylon of the temple of Horus in Edfu (Egypt). Source of the photograph: Depositphotos (<https://fr.depositphotos.com/>).

c) The city of Atlantis rises from the ocean on the planet Lantia. Image from the television series *Stargate Atlantis* (Season 1 and Episode 1: Rising), directed by Brad Wright and Robert C. Cooper, production companies: Acme Shark Productions, MGM Worldwide Television Distribution, and Sony Pictures Television, countries: Canada and USA, 2004-2009.

d) View of Mingo City on the planet Mongo. Image from the comic strip *Flash Gordon* (Raymond, 1937), New York: King Features Syndicate, Inc.

In the film *Stargate*, the monumental complex discovered on the planet *Abydos* (Figure 7a) is directly inspired by the architecture of ancient Egypt (pyramid, pylon, and obelisk: see Figure 7b in Edfou). The name *Abydos* is itself borrowed from ancient Egypt, since it is the Greek name of one of its oldest cities (Archaeological evidence from the *Predynastic* period: 4th Millennium BC; see <https://www.universalis.fr/encyclopedie/abydos/1-histoire-et-mythe/>). On the other hand, the city of Atlantis, rising from the ocean of the planet *Lantia* (Figure 7c) after having been intentionally engulfed

10000 years ago by the *Ancients*, seems straight out of a sheet of the comic strip *Flash Gordon* 1930s (Figure 7d) rather than the imagination of Plato.

While the film *Stargate* and its derivative television series show the discovery of the existence of extraterrestrial civilizations on extrasolar planets from their remains left on Earth, the movie *Forbidden Planet* imagine the discovery of xenoarchaeological remains directly on a distant planet, and without any connection with ancient cultures and mythologies on Earth. *Forbidden Planet* is a 1956 film whose scenario suggests that space travel to extrasolar systems will be made possible within three centuries by using spaceships capable of moving at the speed of light.



a)



b)

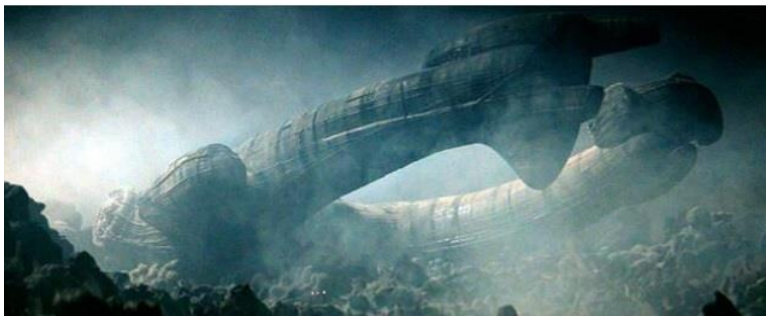
Figure 8. Images from *Forbidden Planet*, directed by Fred M. Wilcox, production company: Metro-Goldwyn-Mayer, country: USA, 1956.

a) *The Krell laboratory.*

b) *The monster from the Id.*

In the 23rd century, a scientific expedition discovered on the exoplanet Altair IV the remains of an ancient, technologically advanced (Figure 8a) alien civilization: the *Krells*, who suddenly disappeared more than 200,000 years ago. The Krells built a gigantic underground powerplant whose reactor was powered by the energy emitted by the core of the planet. This installation still works, but the extraordinary technological advance of the Krells caused their loss. The gigantic powerplant allowed the Krells to materialize and project anything imaginable anywhere, including the *monsters from the Id*, their darkest subconscious (Figure 8b). Such a scenario can be compared to that of the film *Sphere*, directed by Barry Levinson and released in 1998: the mysterious sphere of unknown origin reported on Earth by an American spaceship of exploration materializes all wishes but also all fears and nightmares.

The scenario of the film *Forbidden Planet* thus presents some common traits with that of *Total Recall*, with the discovery of a giant machine built by a lost extraterrestrial civilization that disappeared for several hundreds of thousands of years. In the film *Alien* and its prequel *Prometheus*, a xenoarchaeological discovery is the context to show the potential danger from contact with unknown life forms. The scenario of the film *Alien* is very similar to that of *The Thing*: a horrific science fiction, the discovery of a spaceship of unknown origin and abandoned for thousands of years, and the discovery of a strange and dangerous parasitic life.



a)



b)



c)



d)

Figure 9. Images from the film *Alien*, directed by Ridley Scott, production companies: Brandywine Productions and 20th Century Fox, countries: USA and United Kingdom, 1979.

a) Landscape view of the abandoned alien spaceship on the exomoon LV-426.

b) Discovery of the alien skeleton inside the alien spaceship.

c) Large room lined with eggs inside the alien spaceship.

d) Alien egg opening in front of Executive Officer Kane.

In 2122, the space cargo *Nostromo*, back to Earth, receives a radio signal emitted from an exomoon (LV-426) located in the binary system of Zeta Reticuli, 39.5 light-years from Earth. Searching for the signal source on the surface of LV-426, three crew members discover the wreckage of an alien spaceship (Figure 9a), inside which they first discover a strange alien skeleton (Figure 9b) abandoned here for thousands of years. Executive Officer Kane found a vast room with thousands of eggs (Figure 9c). Kane approaches one of them, which opens (Figure 9d) and suddenly throws a creature clinging to his face (*face-hugger*). Violating a mandatory quarantine allows the introduction of the beast in the *Nostromo*. This chain of unforeseen events, unfortunate decisions, and their catastrophic consequences recall the scenario of the film *The Thing*, released only a few years after *Alien*.

The film *Prometheus*, conceived as a prequel to the film *Alien*, takes up the main issues of the latter: xenoarchaeological discovery on an exoplanet and succession of unforeseen events leading to a catastrophe for the crew of space explorers. Such as, in the film *Stargate*, the discovery of archaeological remains on Earth allows us discovering the remains of an alien civilization inhabiting an exoplanet. In 2093, the *Prometheus* spacecraft led a scientific expedition to the Zeta Reticuli system to confirm the hypothesis of contact with extraterrestrial visitors on earth at different times of prehistory and antiquity (cf *ancient astronauts*). Archaeologists Elizabeth Shaw and Charlie Holloway called these aliens *Engineers* because they would have intervened in the evolution of the human species. The scenario of this film recalls the novel *The Engines of God* by Jack McDevitt (1994), in which a spaceship of scientific exploration is sent to planets housing the archaeological remains of an extinct alien civilization, the *Monument-Makers*.



a)



b)

Figure 10. Images from the film *Prometheus*, directed by Ridley Scott, production companies: Brandywine Productions, Scott Free Productions, and Dune Entertainment, countries: USA and United Kingdom, 2012.

a) Landscape view of the archaeological site on LV-223: the enclosure and dome.

b) Inside the dome: view of the room of urns.

Arriving at the destination, after two years of travel, on the exomoon LV-223 (same planetary system as LV-426), the crew discovered a vast artificial structure (Figure 10a) abandoned for 2000 years, according to archaeologists and buried over time by dust storms deposits. Inside a central dome, the explorers discover a room with urns and a sculpture of a humanoid head (Figure 10b). As in the *Alien* scenario, a succession of unforeseen events led this expedition to disaster. The urns contain a black pathogenic liquid that infects and contaminates part of the crew and turns out to be a biological weapon developed by the Engineers. The Engineers were victims of an accident during an experimental phase of development of this biological weapon that had become out of control: It is, in this sense, a scenario close to that of the extinction of the *Krells* in the film *Forbidden Planet*. The black liquid also recalls the black oil of the television series *X-Files*. The discovery in 1996 of an exoplanet in the Zeta Reticuli system somehow substantiated Ridley Scott's movie. This discovery was later retracted because the observed data were due to pulsations of the star (Todd, 2021). In any case, the Zeta Reticuli system has been known to the UFO community since the 1960s, including the case of the so-called kidnapping of Betty and Barney Hill in 1961 and the conspiracy hoax of the *Serpo Project* (Robin, 2009; Johnston, 2013).

Science fiction can also be the basis of popular science documentaries dealing with future exploration of extrasolar systems. For example, in the four-part science documentary entitled (in French) *L'Odysée Interstellaire* (in English) *The Interstellar Odyssey*, released in 2019 by the television channel *Arte*, scientific experts in the fields of exobiology, astronautics, engineering, and physics have been interviewed to picture the construction of an interstellar spaceship driven by artificial intelligence and the journey it could undertake towards the fictional exoplanet *Minerva-B*, in the search for life forms detected during this century by the James-Webb or E-ELT telescopes.



Figure 11. Discovery of remains of a lost civilization on the fictional exoplanet *Minerva-B*: close view of the site with petroglyphs. Image from the documentary film *L'Odysée Interstellaire* (Episode 4 Premier Contact, <https://www.youtube.com/watch?v=xJIR5N37Mpw>), directed by Vincent Amouroux and Alex Barry, production

The spaceship, designed and manufactured in the second half of the 21st century, was put into orbit in 2207 around Minerva-B, located about 4.5 light-years from the Solar System. It was chosen for this expedition following the detection of biosignatures in its atmosphere. Minerva-B is a fictional planet inspired by *Proxima Centauri b*, a planet of the closest extrasolar system (ca. 4.2 light-years) and identified as potentially habitable (Anglada-Escudé et al., 2016). A drone fleet is exploring Minerva-B under the guidance of artificial intelligence. After discovering increasingly complex life forms during the exploration of the planet, the fourth and final episode (in French: *Premier Contact*/ in English: *First Contact*) of the documentary film *L'Odyssée Interstellaire* ends with the vision of structures identified as artificial but visibly abandoned, including possible traces of writing (Figure 11). Detecting fossils in some geological strata also suggests the possibility of mass extinctions on Minerva-B. Like its model Proxima Centauri (or Alpha Centauri C), the star Minerva is a red dwarf subjected to powerful eruptions likely to destroy life on its host planets repeatedly (Davenport et al., 2016; MacGregor et al., 2021).

4. Discussion and Conclusion

Cinema and television series have approached and developed the topic of the discovery of remains or traces of extraterrestrial civilizations from an archaeological point of view. The list would, of course, be much longer if we consider all the scenarios of direct encounters with extraterrestrial civilizations. No concrete evidence, neither material nor archaeological in particular, has yet been able to attest to the existence of such societies. Such lack of evidence for life elsewhere than on Earth and its implication can be discussed from the perspectives of the *Fermi paradox*.

The *Fermi paradox* is the name given to a series of questions posed by the Italian physicist Enrico Fermi in 1950 when he discussed with friends the possibility of extraterrestrial life and an alien visit (Agelou et al., 2017). The main question can be summarized as follow: why humanity has so far found no trace of extraterrestrial civilizations, while at the same time, the sun is younger than many stars in our galaxy? According to E. Fermi, more advanced civilizations should have appeared among the older planetary systems and left visible or detectable traces from Earth, such as probes, spaceships, or radio waves. Michael H. Hart (1975) made several hypotheses to solve the paradox, classified into four categories:

1. The probability of occurrence of a technologically advanced civilization may be very low;
2. If an extraterrestrial civilization exists, interstellar communication and travel are impossible or not considered desirable;
3. Life may exist elsewhere, but in places that make it difficult to detect, for example, due to too long distances or in oceans protected by an ice layer around hydrothermal vents (see e.g., Mann, 2017);
4. If aliens exist and may visit us, it might be in an undetectable way with current technical means.

For some authors, the paradox does not exist; for others, it is a dilemma or a problem of logic; for others, finally, it is based on an anthropocentrism reasoning that apprehends reality through the biased human perspective. The narrowness of this reasoning would prevent solving the question of extraterrestrial life: see, for example, the review article by Kuiper & Brin (1989). Other approaches, such as the theory of evolution (Ćirković, 2004; Kent, 2011; Smart, 2012), ecology (Haqq-Misra & Baum, 2009) or computer simulation (Bezsudnov & Snarski's, 2010), have broadened the basis for reflection, but have also made it more complex (Ćirković, 2009). Yet, there is no consensus on a

solution to the Fermi paradox. Statistical tools such as the *Drake equation* have attempted to solve it using mathematical expression.

The equation theorized by astronomer Frank Drake in 1961 is systematically associated in the literature with the Fermi paradox (Drake, 1961).

The Drake equation, recalled by the SETI Institute (<https://www.seti.org/drake-equation-index>) as follows, is: $N=R* \cdot f_p \cdot n_e \cdot f_i \cdot f_c \cdot L$, where:

N = The number of civilizations in the Milky Way galaxy whose electromagnetic emissions are detectable;

R^* = The rate of formation of stars suitable for the development of intelligent life (number per year);

f_p = The fraction of those stars with planetary systems;

n_e = The number of planets, per solar system, with an environment suitable for life;

f_i = The fraction of suitable planets on which life appears;

f_i = The fraction of life-bearing worlds on which intelligent life emerges;

f_c = The fraction of civilizations that develop a technology that produces detectable signs of their existence;

L = The average time such civilizations produce such signs (in years).

Stephen Webb (2002) considered that the Fermi paradox, combined with the Drake equation, leads to the conclusion that human civilization is most likely the only one in the galaxy. S. Webb noticed, however, that this conclusion could stem from the low values assigned to specific variables in the equation, such as the average length of time such civilizations produce signs of their existence (L). Employing statistical methods (objective Bayesian analysis and uniform-rate process assumption) and using the chronology of life's appearance in the fossil record on Earth, D. Kipping (2020) showed that abiogenesis is a rapid process compared to intelligence, whose emergence may be rare. If the encounters are unlikely, the discovery of archaeological remains or traces of extraterrestrial civilizations that disappeared for thousands, even hundreds of thousands of years or more, as suggested in some science fiction films, should be more likely.

Human observation from Earth of hypothetical material traces of extraterrestrial civilizations (known as *technosignatures*: Xiangyuan et al., 2023) could be megastructures visible from far away in space, such as the *Dyson spheres*. These are hypothetical megastructures whose idea comes from the science-fiction literature (Stapledon, 1937) and whose scientific description was proposed in 1960 by the physicist and mathematician Freeman J. Dyson. This hypothetical astro engineering structure would consist of a sphere of matter, artificial and hollow, located around a star and designed to capture almost all its emitted energy emitted for industrial use.

These theories and hypotheses have been, in science fiction cinema, almost always approached with the discovery of remains or traces of extraterrestrial civilizations. The scenario of film *Artificial Intelligence: A.I.* directed by Steven Spielberg (2001), proposes a very original inverse story. In this film, extraterrestrial archaeologists discover the remains of human civilization (New York City and the skyscrapers of Manhattan) buried under ice. The story suggests that humanity went extinct due to climate change, and then the Earth entered a new ice age. Behind science fiction, the story of this film is essentially a warning against the potentially catastrophic effects of climate change (Planchon et al., 2022).

The fertile imagination of the world of science fiction cinema in the field of discoveries of extraterrestrial civilizations has abundantly adapted the most fanciful ufological theories such as ancient astronauts. Distinguishing science from fiction in the scenarios of films and television series also highlights some of the warnings concerning, for example, the risks of biological contamination and specific technological threats. Although no life form has yet been discovered elsewhere than on Earth, this makes some scenarios partially plausible. Indeed, science fiction is a powerful tool for educational exploration of the risks that could weigh on the future of humanity (Rumpala, 2016; Kammerbauer, 2019).

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