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SEARCH FOR ALIENS, AND UFO'S

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The widespread existence of primitive life in the form of bacteria and viruses in the universe combined with the large numbers of habitable planets that are being discovered, leads to the serious possibility that intelligent life could be widespread throughout the cosmos. Discovering such alien intelligence in our vicinity continues to pose a challenge.

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"*As far as these suns and moons revolve, shedding their light in space, so far extends the thousand-fold world system. In it there are a thousand suns, a thousand moons, a thousand inhabited Earths and a thousand heavenly bodies ....*"

Anguttara Nikaya Sutta - Siddhartha Gautama Buddha
(circa 5th century BCE)

1. Introduction

We humans, *Homo sapiens sapiens*, since our first emergence some 300,000 years ago, have always sought to discover alien life in natural phenomena that we failed to understand. Today, in 2023, we are in essence no different. A lingering belief in the supernatural falls in this category, with an omniscient God, a pantheon of gods and goddesses or an evanescent world of spirits to explain the forces of nature continues unabated from the time of our stone-age ancestors to modern humans in the age of science. When these forces of nature eventually came to be understood, and in some instances even tamed, the quest for aliens did not cease; it simply took other forms.

A readiness to believe in Aliens and UFO's pervades popular culture of the 21st century, despite the tenuous nature of much of the evidence that is adduced in its support. The desire to believe in alien life is also encapsulated in the ever-increasing popularity of science fiction fantasising about aliens and alien life on other worlds. The famous radio broadcast as far back as 1938 of a dramatization of H.G. Well's "*War of the Worlds*" caused panic in the streets of New York, exemplifying again mankind's readiness to receive news that there is life out there – even intelligent life – on our neighbouring planet Mars. Notwithstanding such an instinct, official governmental bodies and the institutions of science in the 21st century behave

differently. An attitude of self-righteous conservatism still prevails. Acceptance of even the strongest evidence of primitive life on Mars or elsewhere in the Universe seems hard to achieve in a climate where extraterrestrial life is regarded as an "extraordinary claim for which extraordinary evidence" is demanded. This phenomenon is clearly documented in the earlier papers in this Journal (Volume 30, and earlier).

2. Primitive alien life and intelligence

The ingress of alien microbial life onto our planet, whether dead or alive should not by any rational argument be perceived as a cause for concern. From stratospheric probes launched by the Indian Space Research Organisation (ISRO) as far back as 2001 we discovered evidence for some 20,000-200,000 bacteria per square metre per day, falling from the stratosphere at 41km (Harris et al, 2001 (1)). Such a flux when it becomes mixed with terrestrial microbiota will normally go unnoticed, but this is clearly a component of cosmic alien microbial life that we cannot afford to ignore. We have argued earlier that such extraterrestrial microbes might even be carriers of coded genetic messages that may need to be deciphered if intelligent messages are to be discovered (Slijepcevic and Wickramasinghe (2); Temple and Wickramasinghe (3);Wickramasinghe et al (4)). We have also connected this in-fall of bacteria from cosmic sources as a source of evolutionary potential (5), we have here a process that has continued throughout geological time from the moment of the first bacteria arriving on the Earth some 4.2 billion years ago.

Unlike the prospect of discovering alien intelligence that might be justifiably viewed with apprehension by Governments of the world, the humblest of microbial life-forms occurring on a cosmic scale would not, or at any rate should not, constitute any serious threat. Neither would the discovery of alien microbes impinge on any issues of national sovereignty or defence, nor challenge our long-cherished position as the dominant life-form in our corner of the Universe. We have already discussed these matters in our earlier papers in the present volume (Vol. 30) of JoC. Aliens on other planets and further afield in the cosmos may, however, be viewed with apprehension. In particular the possible evolution of these alien life forms into creatures with intelligence that could even surpass human intelligence and so compete with humans would be matter of the justifiable concern.

3. Life on Mars

Our neighbouring planet Mars has been the focus of attention with regard to habitability long before the advent of powerful telescopes or space probes. With the coarsest grade of early photographic data the situation remained delightfully ambivalent in the early decades of the 20th century, with serious discussions taking place as to the possibility of intelligent life on that planet. At the turn of the 20th century Nicola Tesla claimed that he was receiving radio signals from Mars and this story had a wide airing in the press, but did not inspire scientists of the day.

With a radius of about half that of the Earth and a mass of approximately one-ninth, Mars has a surface gravity which is a little less than half of terrestrial gravity. This permits a thin atmosphere at the present time, though with not enough opacity to shield against damaging ultraviolet light at the surface. The Martian day is almost the

same as the Earth day, and because the tilt of its axis of rotation is the same as of the Earth, the seasons are also similar to terrestrial seasons. On the other hand, Mars is further than the Earth from the Sun so that the Martian year is nearly twice as long as the Earth year.

Speculations about intelligent Martian life resurfaced as a result of observations of enigmatic features on the planet's surface when viewed with the low magnification telescopes available at the time. Some of these features were due to effects of Martian dust clouds that have only recently come to be fully understood; and the famous Martian canals which were assiduously mapped by many astronomers including Percival Lovell (1855-1916) were of course observational artefacts or optical illusions.

Although evidence for intelligent Martian life remained tenuous, it was difficult at the time to disprove the theory with the quality of images available at the beginning of the 20^{th} century. An argument that could not be refuted was that if the Earth were viewed using the same telescopes and technologies from a Martian vantage point, our planet Earth would have been just as elusive over the presence or absence of intelligent life. There was no way to resolve this question unequivocally until the first Mariner probes of the 1960's sent back close-up images of the Martian surface. The answer was of course disappointingly negative, so that H.G. Wells' musings sadly came to nothing. Not only was there no evidence whatsoever of intelligent Martian life, but there were no structures that even vaguely resembled the fabled canals.

Since the earliest Mariner probes that photographed and mapped the surface at a resolution of 1km, a veritable flotilla of Mars orbiters and landers have been sent to the red planet and they continue to explore its surface and atmosphere in ever-increasing detail. The Viking orbiters launched in the 1970's quickly led to a revolution in our ideas about the composition of the red planet, and of the possibility of water on or near its surface. Vast river valleys were discovered as well as evidence of flooding in earlier epochs.

The only space mission that was explicitly directed towards searching for extant microbial life on Mars was connected with the *Viking* missions of 1976 with life detection experiments under the leadership of Gilbert V. Levin (6). These missions involved two landers carrying dedicated life detection experiments. The *Viking 1* lander touched down on 20 July 1976 on the *Chryse Planitia* near the equator; the *Viking 2* lander touched down on 3 September 1976 on *Utopia Planitia* closer to the Martian North Pole. The landers carried out biological experiments *in situ* on samples of soil, one of which was taken from beneath surface rocks. The presumption was that any microorganisms which may be present had metabolic processes similar to those of Earth microbes. The soil was treated with nutrient labelled with ^{14}C isotope, and its uptake by microbes was monitored by detecting radioactive exuded gases such as CO_2 or CH_4.

As with all innovative scientific experiments, the results turned out at first sight to be more complicated than was expected. The profusion of gas released (metabolites) that frothed out when the labelled nutrient was poured on the soil was a strong positive for life detection, but against this was the finding that the Martian soil did not show detectable amounts of even simple organic compounds. Since one could not

have biology without evidence of the detritus of biology, the officialdom of NASA (Levin excluded) went public very quickly to say that the Viking results were not consistent with life. What was conspicuously missed in this assessment was the possibility that the turnover rate of life under the Mars surface conditions was so slow that the lack of organics is easily explained. Indeed, the *Viking* experiment prototype taken to the dry valleys of the Antarctic several years before the launch of *Viking* yielded nearly identical results in the presence of Antarctic microbiota. A few years later the discovery of methane in the Martian atmosphere with seasonal variations make ongoing microbiology a real prospect.

Principal Investigator Gilbert V. Levin always dissented from the official view of NASA that the Viking experiments *proved* no life on Mars. The gas released in the Viking Gas Release experiment was claimed by NASA to be more rationally explained by some inorganic chemistry involving a superoxidant, but to this day the search for the required material on the surface or in the laboratory has not been successful, and extant biology remains the most reasonable explanation of the results from Vikings 1 and 2.

In 2012 a re-examination of the data from the Viking experiments left little doubt that Levin and Straat really did discover microbial life on Mars in 1976 (6,7). Despite Levin's persistent protestations it is a sad commentary on the sociology of science that the 1976 Viking life-detection experiment, or one similar to it, was not considered desirable to include in any later mission to Mars. The Viking program ended in 1982 and another 14 years and several lost spacecraft (both US and USSR) were needed before the next successful phase of Mars exploration was resumed.

With the arrival of the *Mars Pathfinder* lander near the mouth of the Ares Valles valley on July 4 1997, further evidence of running water in the distant past was uncovered. Since then *Mars Odyssey*, *Mars Express*, and the rovers *Spirit* and *Opportunity* continue to reveal a varied terrain that may well be suited for some types of primitive extremophilic microorganisms – not dissimilar to the forms of life known to inhabit the harshest environments on the Earth.

The possibility of past life-forms more complex than microbes is also turning out to be a serious possibility with evidence gathered in the past few years, particularly in the Gale crater which most likely represents a dried-up river bed from 100's of thousands of years ago. At this time Mars seems likely to have been a hospitable life habitat; comet impacts that carried primitive life and genetic material to Earth may well have arrived there and taken root even for a short period.

The discovery of methane with a seasonal as well as diurnal variation, particularly at the Gale crater, is rather tediously interpreted as due to a geochemical process, but a biological explanation is clearly the most reasonable (8). The reluctance to conclude the existence of contemporary microbial life on Mars appears to be deep rooted in the prevailing science culture. This may well be part of the resistance to accept the wider concept of life being a truly cosmic phenomenon that takes root, evolves and flourishes whenever and wherever the right conditions prevail.

We have recently reviewed evidence that includes not only the discovery of organic molecules near the surface but also of a wide range of mineral configurations that are

strongly indicative of past life and biological processes at the bottom of the Gale crater (https://www.researchgate.net/publication/365926923) (Joseph et al, 2023(9)). The tantalising possibility of multicellular life existing here on Mars prior to its occurrence on Earth now appears to be a real possibility (9). A sample of such structures shown in Fig. 1 clearly provides evidence of fossil organisms that appear to be uncannily related to similar structures known to exist in terrestrial sediments. These images have been in the public domain for some years and, in our view, have been wrongly interpreted as non-biological artefacts. Joseph et al (9) have drawn attention to a wide range of such structures (some resembling ribbed tubes) very closely resembling fossilized organisms that appear for the first time on Earth after the Cambrian explosion about half a billion years ago. The existence of similar structures on Mars at a much earlier time, possibly 3 billion years ago when rivers flowed on Mars, hints strongly at the possibility that multicellular organisms may have existed on Mars before they appeared on Earth. Some of the Gale crater "fossils" resemble terrestrial stromatolites, sponges and corals, suggesting that the later emergence of similar multicellular life-forms on our own planet were possibly derived from the asteroidal or cometary bolides carrying such lifeforms that had remained in the Earth-Mars vicinity for over 2 billion years.

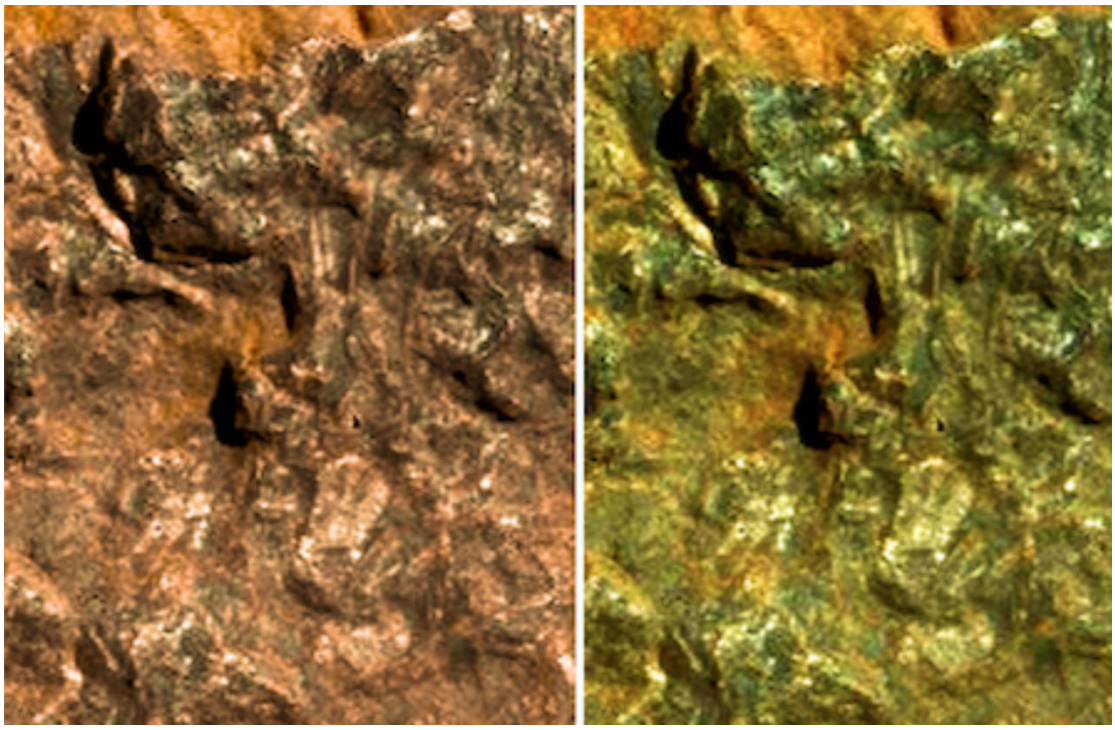


Fig.1. Joseph, R.G., Rizzio, V., Gibson, C.H. et al, 2023. Fossils on Mars? A "Cambrian Explosion" and "Burgess Slale" in Gale Crater?, Journal of Astrophysics and Aerospace Technology, 11:1

Further out in the solar system the possibility of alien life still remains an open question – extending from the moons of Jupiter to larger bodies in the Kuiper Belt, planet Sedna and the still to be discovered 9th planet (10).

4. Horizontal gene transfer and the spread of intelligent alien life

Whilst amplification of microorganisms within primordial comets could supply a steady source of primitive life (archaea and bacteria) to interstellar clouds and thence to new planetary systems, the genetic products of evolved life could also be disseminated on a galaxy-wide scale (11) Our present-day solar system which is surrounded by an extended halo of some 100 billion comets (the Oort Cloud) moves around the centre of the galaxy with a period of 240My. Every 40 million years, on the average, the comet cloud becomes perturbed due to the close passage of a molecular cloud. Gravitational interaction then leads to hundreds of comets from the Oort Cloud being injected into the inner planetary system, some to collide with the Earth. Such collisions can not only cause mass extinctions of species, as one impact surely at the K/T boundary 65 million years ago, killing the dinosaurs, but they could also result in the splash-back of surface material replete with evolved genes back into space. A fraction of such Earth-debris so expelled would survive shock-heating and could be laden with viable microbial ecologies as well as genes of evolved life. Such life-bearing material could reach newly forming planetary systems in a passing molecular cloud within a few hundred million years of an ejection event.

A new planetary system could in this way become infected with terrestrial microbes' terrestrial genes that can contribute, via the well attested horizontal gene transfer process, to local biological evolution. Once life has got started and evolved on an alien planet or planets of a new system, the same process can be repeated (via comet collisions) transferring genetic material carrying the products of a local evolutionary history to other molecular clouds and other nascent planetary systems. If every life-bearing planet transfers genes in this way to more than one other planetary system (say 1.1 on the average) with a characteristic time of 40My, then the number of seeded planets after 9 billion years (lifetime of the galaxy) is $(1.1)^{9000/40} \sim 2\text{x}10^9$. Such a process will undoubtedly imply the vast preponderance in the galaxy of biological systems that would include creatures possibly not dissimilar to our own with high levels of what we might describe broadly by the term "intelligence".

5. Habitable exoplanets

In 2009 NASA launched its orbiting Kepler telescope, which was specifically designed to discover planets that are the size of Earth. The detection process involved tracking down minute blinks (dimming) in the star's light when a planet transited periodically in front of it during its orbit. At present, nearly 4000 definite as well as probable detections of habitable planets have been made within only a very small sampling volume of our Milky Way (12). Most of these planets orbit red dwarf stars that are on the average twice the age of our sun. Extrapolating from the sample of present detections, the estimated total number of habitable planets in our Milky Way galaxy is reckoned to be in excess of 100 billion.

These billions of exoplanets would of course be in different stages in regard to the development of indigenous and adapted life systems, and in a fraction of such planets life may even have become altogether extinct. But with the many astrophysical processes that could operate in transferring life-bearing material across galactic distances it would now seem inevitable that such habitable planets in the galaxy would be biologically interlinked into the galactic biosphere. The processes of horizontal gene transfer that are well recognised within the context of terrestrial biology would have its widest and most natural range across the entire galaxy.

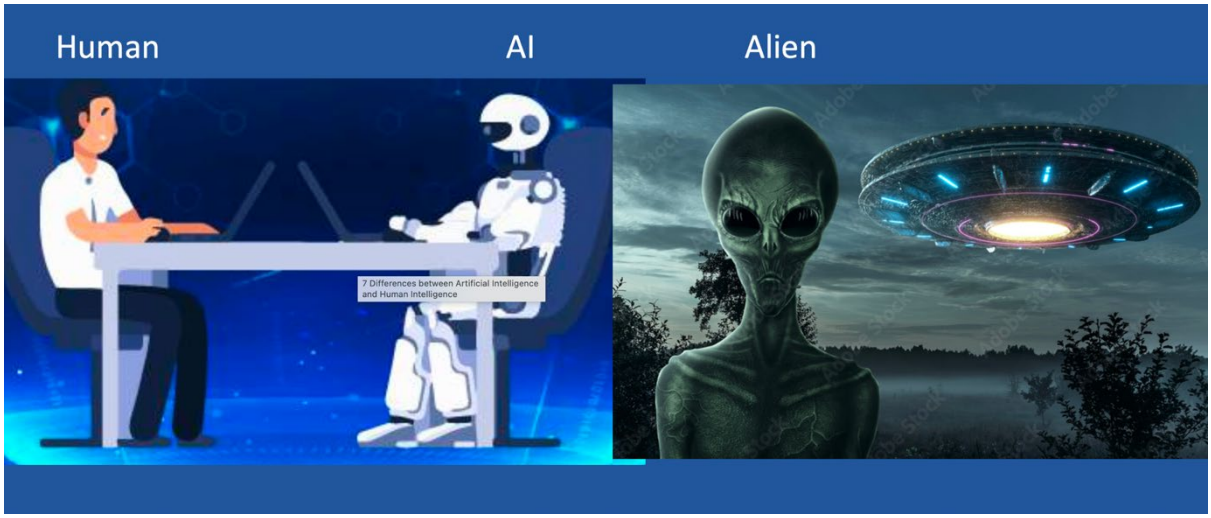
6. The Octopus

If a single discovery is to serve as a watershed in the journey to accepting our cosmic origins, it is a recent study of two related species, the squid and the octopus. The squid has an antiquity in the geological record that goes back to the great metazoan explosion of multi-celled life 540 million years ago. The octopus apparently branches out from the squid lineage about 400 million years ago, presumed to evolve from an ancestral squid. Recent DNA sequencing of the squid and octopus genomes has exploded a bombshell. The squid contains a very meagre compliment of genes adequate to serve its modest survival needs. The emergent octopus, on the other hand, has over 40,000 genes (the human has only 25,000 genes) and many of these genes apparently code for complex brain function. Others code for a highly sophisticated camouflage capability including rapid switches of colour. The octopus is incredibly more complex in structure and performance than its squid predecessor. Where did the suite of genes coding for complex brain function come from? They were not present in the ancestral squid or in any other living form that existed on the Earth at the time. The clear implication is that they came from outside the Earth – external to terrestrial biology – part of the cosmic milieu of life.

The late Arthur C. Clarke once said to one of us (Temple) that he believed the most common intelligent life forms on other planets would be octopoid. He thought two-legged land-dwellers like ourselves would be in a minority. However, octopuses as known to us on Earth are solitary creatures lacking in social groups. If octopoid beings of high intelligence on other worlds have such characteristics, they will be lacking in many social feelings which we ourselves value, and empathy would not be one of their primary characteristics. We might find that they were alien to us in more ways than one. But it is highly likely that if we survive as a species, we will indeed have to find ways of relating to octopoid beings who are not only different from ourselves but far more advanced.

7. Intelligence, Aliens and UFO's

We cannot accept that the evolution of intelligence is anywhere near the end of the road with modern humans in 2023. Rather it is more likely to be nearer the beginning. Human intelligence and human technology to enable space exploration and the creation of AI developed over less than a few hundred thousand years. Within the next million years, future developments along an upward trajectory would in our view be inevitable. These may involve further advances that involve human space travel as well as contact with ET intelligence, making the currently obsessive prevailing fear of human-engineered AI pale into utter insignificance.



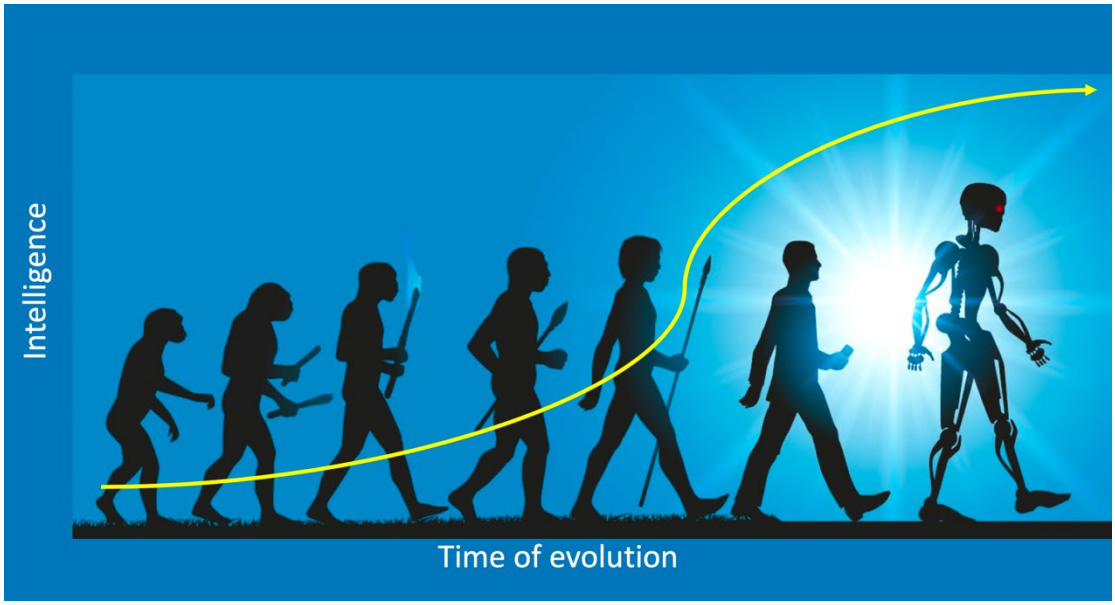


Fig.2 The evolution of human intelligence began with our ancestors over 300,000 years ago, and is on a steeply rising trajectory in 2023.

8. Inorganic intelligent entities

Two of us (Temple and Wickramasinghe) have published a paper (4) and one of us (Temple) has published a book (15) in which evidence is produced which strongly suggests that highly intelligent inorganic entities, an adjunct to organic life, may also exist throughout the Universe. Furthermore, they are life forms which do not live on planets but exist freely floating in space. They would be what are technically known as 'dusty complex plasmas', which are capable of self-organisation to such an extent that they can evolve high levels of intelligence, albeit possibly of an AI kind. Laboratory results have shown that this is indeed possible, and the many references to such findings are to be found in the two works to which we have referred. The fact that the Universe consists of 99.9% plasma rather than of 100% atoms, as had been thought in the past, suggests the possible predominance of intelligent entities in the Universe might well be "dusty complex plasmas". It could even be suggested that the Sun and all stars, which are made of plasma, as is well known, include such entities, and that they are 'alive' and 'conscious'.

There are two gigantic dusty plasma clouds between the Earth and the Moon (though not in the direct line of sight, being at the two Lagrange Points L4 and L5) which are far larger than the Earth, and which may be conscious entities. They emit no light and are extremely difficult to detect. Satellites passing through them would not be able to detect their dust particles, because their 10 nm diameters are below the level of present detectability in size. Indeed, it is possible that the entire Universe is conscious. It may be that our SETI programs should not be looking for little green men but should instead be looking for intelligent plasmas (4 and 15).

9. SETI and UFO's

In Journal of Cosmology Vol. 30 (14), we have discussed the continuing attempts at restoring SETI programmes that were started in the 1960's but which have not led to any positive results. Less respectable have been a flood of claims and counterclaims about the discoveries of UFO sightings that have not led to any decisive result. The alleged discovery of artefacts from the "Roswell incident" of July 1947 still continues to haunt us. Add to this, the ongoing reports of sightings and events reported by airline pilots and others, still remain unsolved and unresolved, and the fact that much of this data still appear to be in the domain of "classified" in both the USA and the UK.

In the present context it is relevant to note that in 2020 the United States Pentagon released a stack of formerly classified military visual recordings of UFO's (UAP's) seen from cockpit instrumentation displays of US Navy fighter jets based aboard aircraft carriers USS _Nimitz_ and USS _Theodore Roosevelt _in 2004, 2014 and 2015. The released material also included additional footage taken by other Navy personnel in 2019.

Then, on November 3, 2021, the Department of Defence announced the establishment of its Airborne Object Identification and Management Synchronization Group (AOIMSG) as the successor to the U.S. Navy's Unidentified Aerial Phenomena Task Force, established on August 4, 2020. The AOIMSG will synchronize efforts across the Department and the broader U.S. government to detect, identify and attribute objects of interests in Special Use Airspace (SUA), and to assess and mitigate any associated threats to safety of flight and national security. All this clearly signals a growing acceptance that humans are not the only highly intelligent species even in our cosmic vicinity. Indeed, the lack of surprise in the populace at large when the recordings were recently released is the clearest confirmation of this fact.

With the vast numbers of alien habitable planets that we now know to exist (12) even within a few parsecs of the sun, it will be difficult to exclude the possibility that very much higher levels of intelligence than we have ourselves achieved in 2023 would likely to have evolved on some of these planets. So intelligent aliens must be commonplace in the Universe and the challenge is to find them! As Putoff (16) has recently discussed, a wide range of possible manifestations of alien intelligence in our midst can be identified and are fully worthy of further exploration.

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