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Convergence to Cometary Panspermia: Time for Disclosure?

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Abstract

Recent data from comets and geology challenges the idea of terrestrial abiogenesis and point clearly to the concept that comets delivered microorganisms, or proto-life, to the Earth over 4.1 billion years ago.

Keywords: Comets; Panspermia; Abiogenesis

Earliest Life on Earth

Several discoveries over recent weeks appear to add weight to the view that life exists outside the Earth, a likelihood that the scientific community has for long been reluctant to engage with.

Three decades ago the earliest evidence of microbial life in the geological record was thought to be in the form of cyanobacteria-like fossils dating back to 3.5 Ga ago [1,2]. From the time of formation of a stable crust on the Earth 4.3 Ga ago there seemed to be available a 800 million years timespan during which the canonical Haldane-Oparin primordial soup may have developed. This time interval was then reduced to 500 million years with the discovery of a biogenic carbon signature ($^{12}C/^{13}C$ ratio) indicating a predominance of the lighter isotope in carbonaceous inclusions within grains of apatite in sediment sequences from the Isua region of West Greenland dated at 3.8 Ga [3].

Now that time interval has been further reduced. Detrital zircons older than 4.1 Gy, discovered in meta-conglomerates in the Jack Hills region of Western Australia, have also been found to contain a similar isotopic signature of biogenic carbon [4]. This most recent study refers to material whose secure encasement in crack-free zircons can be taken to imply that no recent contamination had occurred. The ^{12}C-enrichment found in these inclusions may thus be taken as conclusive evidence for the existence of life on Earth before 4.1 Ga. The dilemma now before us is that an essentially instantaneous transformation of non-living organic matter to bacterial life is demanded, a fact which strains credibility of Earth-bound abiogenesis to the limit. A far more plausible possibility is that fully-developed microorganisms (or a form of proto-life) arrived to Earth via impacting comets, and these then became carbonized and trapped within condensing mineral grain conglomerates. The new data gives strong support to the theory of cometary panspermia, originally proposed by Hoyle and Wickramasinghe [5-7].

New Data from Comets

Other new evidence in support of cometary panspermia comes from the exploration of comets. The Rosetta Mission's Philae lander has recently provided us with exciting novel information about the comet 67P/C-G [8,9]. We maintain that jets of water and organics issuing from ruptures and vents in the ice are consistent with biological activity occurring within sub-surface cometary pools. The most recent report of O_2 along with evidence for the occurrence of water and organics provides further clear evidence of such ongoing biological activity [10]. Such a mixture of gases can be used, but possibly change to gases. cannot be produced under thermodynamic conditions since organics are readily destroyed in an oxidizing environment. The freezing of an initial mixture of compounds, including O_2, not in thermochemical equilibrium might be proposed, but no evidence is available to support such a claim. On the other hand the oxygen/water/organic outflow from the comet can be explained on the basis of microbiology. Photosynthetic microorganisms operating at the light levels near the surface at perihelion could produce O_2 along with organics (carbohydrates) thus:

$$6CO_2+6H_2O+light \rightarrow C_6H_{12}O_6+6O_2$$

Cyanobacteria and prochlorophytes, in particular, are capable of mediating this reaction.

Many species of fermenting bacteria can also produce ethanol from sugars, so the recent discovery that Comet Lovejoy emits ethyl alcohol amounting to 500 bottles of wine per second may well be an indication that such a microbial process is operating [11]. As we have pointed out elsewhere, a wide variety of data from Comet 67P/C-G already points to ongoing biological activity with evidence that is consistent with the view that bacterial metabolites cover the surface [8,12].

Concluding Remarks

There comes a point when any cherished paradigm withers under the weight of a veritable flood of evidence. We contend that such a flood will imminently sweep away the long-held theory of Earth-based abiogenesis. The first shift away from the original version of this theory suggested that organic molecules, which it is claimed were the "building blocks" of life on Earth originated from comets. Abiogenesis from such abiotic chemicals was still required however, despite the fact, as was mentioned above, that latest evidence requires this transformation to be instantaneous.

The rival theory of cometary panspermia proposed by Hoyle and Wickramasinghe in 1982 argued for life to be transported from space to Earth; i.e., it is a cosmic phenomenon. From the time of the last perihelion passage of Comet Halley in 1986, evidence supporting the theory has steadily grown. The first infrared spectra of the dust tail of Comet Halley as well as mass spectroscopy of particles examined by the Giotto spacecraft revealed tantalizing evidence of consistency with biology. To this data should be added a series of recent investigations showing that biological entities sampled at heights of 30-40 km in the stratosphere are incoming to Earth from space [13], findings that add further support to support the theory of cometary panspermia.

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