KBO (or TNO) to be discovered (besides Pluto and Charon, if they are counted). Its orbital period is computed to be 296 years.

8. A handful of small objects exist in between the orbits of Jupiter and Neptune. These are called Centaurs. Chiron, for example orbits between Saturn and Uranus. Chiron was originally classified as an asteroid, but it now appears that its composition is icy—like a comet. Centaurs are not nearly as plentiful as TNOs; the proximity of the giant planets would tend to make such orbits unstable.
9. Nearly 600 KBOs have been discovered as of May 2002. Undoubtedly, more TNOs will be discovered. Recent observations suggest that these objects may taper off rather abruptly at 50 AU—and not extend to 100 AU as originally thought. See The Edge of the solar system, <www.astro.lsa.umich.edu/users/garyb/WWW/KBO/>, 24 October 2000.
10. If such a large object were to fall into the inner solar system, it would make a very impressive comet! Alas, no observed comets have been this large. A particularly large KBO (named 2001 KX76) was recently discovered. It is over 1,000 km across—about the size of Pluto's moon Charon. The Kuiper Belt, *Spacetech's Orerry*; <www.harmsy.freeuk.com/kuiper.html>.
11. Seven binary TNOs have been discovered as of May 2002. See Distant EKOs: The Kuiper Belt Electronic Newsletter **22**, March 2002, <www.boulder.swri.edu/ekonews/issues/past/n022/html/index.html>.
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Did life's building blocks come from outer space? Amino acids from interstellar simulation experiments

Jonathan Sarfati

Quite a few headlines enthusiastically proclaimed 'Seeds of life are everywhere' and 'Scientists create life's building blocks'. These resulted from two studies where scientists formed amino acids, the building blocks of proteins, by zapping impure ice, supposedly matching interstellar compositions, with ultraviolet radiation. This ice contained a fairly high amount of ammonia (NH_3), methanol (CH_3OH) and hydrogen cyanide (HCN). Both studies were published in *Nature* on 28 March 2002—one from a combined NASA/SETI institute study[1] and another from Europe.[2] But do the data really support chemical evolution (the idea that life evolved from non-living chemicals)?

What's the truth about these experiments?

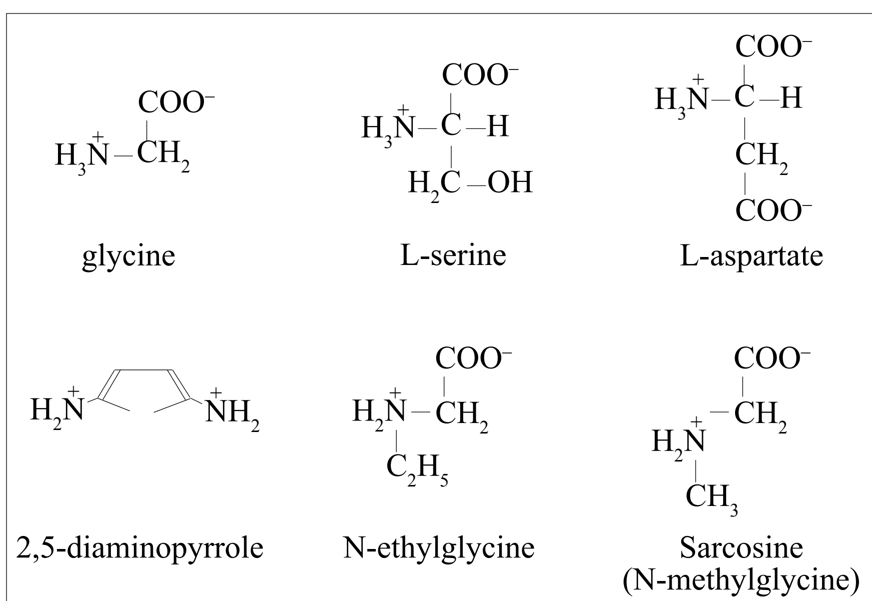
Role of biases

As we have often noted, we don't deny the observations, but point out that the interpretations of these observations depend on the biases. As shown when analysing the last enthusiastic claim,[3] the researchers have already made up their mind that chemical evolution is a fact, and all they need is to find the evidence to support their faith.

Why are they looking at a space source?

The European paper is very revealing:

> 'How life originated is one of the earliest and most intriguing questions for humanity. Early experiments on the processing of a gas mixture simulating the primitive Earth conditions assumed a reducing atmosphere with CH_4 [methane] as the carbon-containing molecule.[4,5] Several amino acids were formed under these conditions as the products of spark discharge, photoprocessing or heat. It is now



Five of the 16 animo acids formed by bombarding impure ice with UV rays plus another compound. The top three amino acids are protein constituents, the bottom two are not, and 2,5-diaminopyrrole is non-biological.

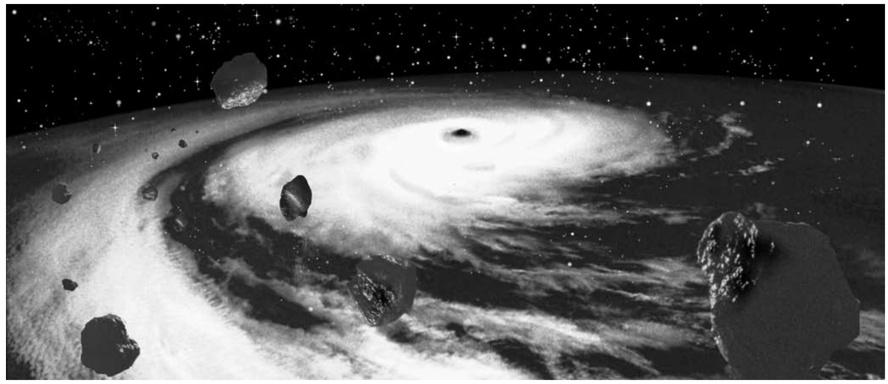
believed, however, that the Earth's early atmosphere was rather non-reducing, with CO_2 as the main carbon carrier. Processing of these alternative gas mixtures under experimental conditions leads to the formation of, at most, traces of amino acids.'[6,7]

That is, Earth is regarded as a non-starter for chemical evolution. But because they already know, by faith, that chemical evolution is 'a fact', they look to outer space as a source of building blocks. It's no accident that other evolutionists, such as Sir Francis Crick, the co-discoverer of the structure of DNA, and the late Sir Fred Hoyle, have resorted to such ideas, even going as far as *panspermia*, the idea that life itself began in outer space and seeded Earth.[8] In Hoyle's case, he resorted to this to overcome the probability problems, but he realized it was a vain attempt—see his obituary,[9] and the section, *Getting the right arrangements*, below.

It's also worth noting that the myth of the methane-ammonia primitive atmosphere is an 'Icon of Evolution', very hard for people to give up even though it was largely discredited in the early 1980s. But as shown, knowledgeable scientists like the European authors know better.

As a sidelight, Sir John Maddox, the then editor of the very journal *Nature*, gave a lecture tour of New Zealand in its sesquicentennial year 1990. Among other things, he claimed that the mystery of the naturalistic origin of life would be solved quite soon (I forget exactly when), and my then organic chemistry professor, a theistic chemical evolutionist and world expert on carbohydrate chemistry, repeated this in an origin-of-life lecture.

His prediction must be getting close to being falsified, if it hasn't been already. More recently Maddox has written *What Remains to Be Discovered: Mapping the Secrets of the Universe, the Origins of Life, and the Future of the Human Race,* admitting that the problem is still unsolved. Also, when I asked him about chemical evolution after his lecture in Wellington, he affirmed belief in the methane-ammonia atmosphere, despite papers in his own journal discrediting that. He still gives lectures on the origin of life,[10] apparently advocating the RNA world theory despite major chemical problems.[11]



Did life's building blocks come from outer space?

Tiny amounts

The amounts of these chemicals were tiny, with a quantum yield (Φ) of only 1.0×10^{-4}, i.e. only one amino acid formed for every ten thousand photons, and 36% of that was the simplest, glycine.[12] Only about 0.5% of the carbon in the methanol was turned into glycine.[13] This is too low to have any hope of getting the polymerization[14] needed for life[15]—see 'Origin of life: the polymerization problem'.[16] This is why peptides are never detected in either simulations or meteorites.[17]

So this can also be interpreted as evidence *against* chemical evolution, by showing that under quite optimistic laboratory simulations, only trace amounts of these compounds are formed. And even though they may be called 'building blocks' in the loosest sense of the word, they are incapable of actually building anything.

Contamination

The experiment produced 16 amino acids, but only 6 are protein constituents,[12] and they comprise only 36.5% of the total (tiny) amount of amino acids produced.[18] Also, these amino acids were only about 1/80 of the total amount of material formed—most of the material produced in simulation is typically an intractable tar.

Of course, experiments that purport to demonstrate prebiotic amino acid polymerization, the linking up of many small molecules into one large one, never use anything like the dilute and 'grossly contaminated gunks'[19] produced by the typical experiments purporting to produce the amino acids.

Getting the correct 'handedness'

Living things require homochiral amino acids, i.e. with the same 'handedness'.[20] But the ones produced in these experiments are definitely not. The NASA/SETI institute paper even has the word 'racemic' in the *title*, meaning an equal mixture of left- and right-handed amino acids.

There have been claims that meteorites have produced some excess of one handedness, although nothing like the 100% required. The evolutionary expert on amino acid racemization, Jeffrey Bada urged caution:

> 'There is, indeed, a reported excess of L-alanine in the Murchison meteorite (M.H. Engel, S.A. Macko and J.A. Silfer, *Nature* **348:**47–49, 1990). Is this evidence of an extraterrestrial origin of homochirality? In my view, it is dangerous to rely on enantiomeric ratios of protein amino acids because of the omnipresent problem of terrestrial contamination. In fact, the non-protein alpha-dialkyl amino acids in Murchison, such as isovaline, which are not prone

to contamination problems, are racemic.'[21]

But Ref. 1 cited a claimed discovery of a small excess (2–9%) of amino acids.[22] Bada commented that this type of amino acid, 'has not been reported to occur in terrestrial matter', supposedly ruling out contamination. The type is known as an α-dialkyl amino acid, which has two other carbon atoms attached to the α-carbon atom, the one attached to the amino and acid groups, whereas biological α-amino acids always have at least one hydrogen atom attached instead. Bada points out that a mechanism to generate this excess 'if verified' is unknown.[23] He cautions further about the unknowns in this discovery and any application to chemical evolution, and we should also note the lots of 'may haves' and 'somehows' in this:

> 'Whether exogenous delivery could have provided sufficient amounts of organic compounds necessary for the origin of life, or to sustain life once it started, is largely unknown, although extraterrestrial organic compounds, including racemic (within the precision of the measurements) isovaline, have been detected in deposits associated with impact events [ref.]. The reported L amino acid excesses are very small and would need to be amplified by some process in order to generate homochirality. Even if this did take place, the L amino acid homochirality would be associated with α-dialkyl amino acids, which are not major players in protein biochemistry. If α-dialkyl amino acids had an important role during the origin of biochemistry, then initially life may have been based on a different protein architecture because peptides made primarily of these amino acids tend to form 3_{10}-helical structures rather than the α-helical conformation associated with proteins made of α-hydrogen amino acids [refs.]. Finally, the homochirality of α-dialkyl amino acids would need to be somehow transferred to the α-hydrogen protein amino acids either during the origin or early biochemical evolution of life on Earth.'[23]

Getting the right arrangements

Even if the amino acids could form and polymerize, this is a long way from getting a useful protein. A protein must have a certain number of amino acids combined in an exact way, and this is beyond the reach of chance.[24] Yet even the simplest self-reproducing cell, *Mycoplasma genitalium*, has 482 genes so presumably as many enzymes.[25]

Some researchers have proposed that the simplest life form could exist with only 256 genes. This is most doubtful.[26] *Mycoplasma* is an obligate parasite because it needs more complex organisms to make chemicals it can't make itself. Pathogenicity may be an indirect consequence of *loss* of genetic information, e.g. for amino acid synthesis.[27] So *Mycoplasma* may have descended from a more complex form by loss of information, meaning that the hypothetical first living cell would need *more* than 482 genes.

Note that the idea that a single protein could function as a true replicator, promoted on some evolutionary websites, should thus be seen as the absurdity it is. I actually addressed the specific case they mention a few years ago,[28] showing that this highly designed peptide has no relevance to the origin of life for a number of reasons.

Conclusion

Once again, the pro-evolution newspaper headlines promote extravagant extrapolations arising from interpreting the actual data (even if reported accurately) in a materialistic framework. In interpreting the data in a Biblical creationist framework we stick to well-attested chemical principles. Then we see that the data provide yet more evidence against chemical evolution, since the naturalistic production stops at tiny amounts of impure and racemic amino acids.

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The naturalistic formation of planets exceedingly difficult

Michael J. Oard

The way some scientists talk about planet formation, one would think that the process was easy:

> 'Our solar system was built from the dust of dead stars. It's an often-repeated fact.'[1]

Planet formation is just one of the many hypothetical evolutionary processes that started with the big bang and ended with humans on Earth after many billions of years. Since planets exist, evolutionists reason they 'must' have formed from a dust cloud called a nebula. The dust must first develop from dead stars because dust does not just develop from gas molecules. So the dust is believed to have 'evolved' from the explosion of a star in a supernova. Hence our solar system is believed to be the result of a collapsed dust cloud from an exploded star. These are the simple naturalistic deductions, assuming evolution is the only mechanism.

Many people are satisfied with this scenario and take it no further. But if an inquiring person were to ask how the planets actually formed from the dust, he would get a surprising answer:

> 'But if you ask how this dust actually started to form planets, you might get an *embarrassed silence.* Planets, it seems, grow too fast—no one knows why the dust clumps together so quickly'[1] [emphasis mine].

This, among other theoretical processes in the big bang scenario, is actually held by faith. (The formation of stars has similar challenges as planet formation.[2] The main difference is that stars accumulate more mass from the dust cloud. Since star and planet formation have similar problems, for the sake of simplicity, I will only discuss the naturalistic origin of planets.) A recent article in *New Scientist* admits that forming a planet naturalistically is exceedingly difficult.[3]

There are four stages in the supposed evolution of planets:

> 'A successful nebular model must account in some detail for four important stages in the solar system's evolution: the formation of the nebula out of which the planets and sun originate, the formation of the original planetary bodies, the subsequent evolution of the planets, and the dissipation of leftover gas and dust. Modern nebular models (there are more than one!) give tentative explanations for these stages, but many details are lacking. No one model today is entirely satisfactory.'[4]

For the sake of argument, I will just assume that the dust is leftover from a supernova explosion. This is the first stage. Then according to Laplace's nebular hypothesis, first presented in 1796, the process of planet formation, the second stage, begins with the simple collapse of the dust cloud. There are three theoretical steps in the collapse of the dust cloud and the growth of a planet: 1) gravitational contraction of the dust into small particles, 2) accretion of particles or small aggregates to form large aggregates, and 3) condensation by the accumulation of atoms and molecules on the growing mass.[5]

The most difficult step is the first, gravitational contraction of dust to form small particles. Dust grains must first accrete to form small particles, which must continue to grow until they are at least 10 m in diameter. This size is the point at which gravity is expected come into its own, accreting and condensing material at a faster and faster rate. Then supposedly, planetesimals would form that are many kilometres across. The planetesimals are finally envisaged to collide to form planets. There are difficult problems with these later steps, but I will focus on the first step: how does the dust collide, stick together and grow before gravity can assert itself? That is the big question. The tiny dust particles must hit each