on *existing* genetic information—as proposed by the creationists Wood and Cavanaugh?

It now seems that the genes for C_4 enzymes and anatomy are selectively expressed in the roots, stems and petioles of C_3 plants, but are suppressed in the leaves. C_4 plants differ in having these genes expressed in the leaves as well. If the suppression in the leaves of C_3 plants were due to the synthesis of proteins that interact with promoter sequences, for example, it may even be possible to see mutations in the genes for these proteins that result in the expression of C_3–C_4 or C_4 photosynthesis. Or there might be some designed means of switching on this adaptation genetically so that it is inherited once switched on—something like Wood's Altruistic Genetic Elements (AGEs)?[5]

These developments underline just how cleverly the original plants were created—with built-in latent capacity for adaptation to a wide range of environments. It will be interesting to see the details fleshed out.

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The short-period comets 'problem' (for evolutionists): Have recent 'Kuiper Belt' discoveries solved the evolutionary/long-age dilemma?

Robert Newton

Recently, astronomers have discovered that several KBOs ('Kuiper Belt Objects') are binary—they consist of two co-orbiting masses. What are the implications for Creation?

Comets—icy masses that orbit the sun in elliptical paths—are one of many evidences that the solar system is much younger than billions of years. Every time a comet passes near the sun, it loses some of its icy material to evaporation. This stream of lost material is what gives rise to the characteristic comet tail. A comet can only survive a certain number of orbits before it runs out of material completely.[1] If the solar system were billions of years old, there should be no comets left.[2]

Evolutionary astronomers, who assume the solar system is billions of years old, must propose a 'source' that will supply new comets as old ones are destroyed. The Kuiper Belt[3] is one such proposed source. It was invented to explain the existence of short-period comets (comets that take less than 200 years to orbit the sun). Whereas an 'Oort Cloud' (which has been previously addressed in *TJ*[4]) was proposed to explain the existence of the long-period comets.[5] The Kuiper belt is a hypothetical massive flattened disc of billions of icy planetesimals supposedly left over from the formation of the solar system.

These planetesimals are assumed to exist in (roughly) circular orbits in the outer regions of the solar system—beyond Neptune (extending from 30 AU[6] out to around 100 AU).

Photo by NASA.

Comet P/Halley as taken with the Halley Multicolor Camera on the mission Giotto.

It is thought that these objects are occasionally disturbed by gravitational interactions and are sent hurtling into the inner solar system to become short-period comets. In this fashion, new comets supposedly are injected into the inner solar system as old ones are depleted.

Astronomers have detected a number of small objects beyond the orbit of Neptune. The term 'Kuiper Belt Object' (KBO) is being applied to these objects. The first of these[7] was discovered in 1992, and many more have now been detected. What are we to make of these discoveries? Do these objects confirm the existence of a 'Kuiper Belt' as the evolutionists were expecting?

There is no reason to expect that the solar system would end abruptly at Pluto's orbit, or that minor planets could not exist beyond the orbit of Neptune. Many thousands of asteroids exist in the inner solar system, so we should not be surprised that some objects have been discovered beyond the orbits of Neptune and Pluto.[8] Several hundred of these 'KBOs' have now been observed.[9] But a Kuiper Belt would need around a *billion* icy cores in order to replenish the solar system's supply of comets. It remains to be seen whether KBOs exist in such abundance. Currently, this is merely an evolutionary speculation.

It should also be noted that the observed KBOs are much larger than comet nuclei. The diameter of the nucleus of a typical comet is around 10 kms. However, the recently discovered KBOs are estimated to have diameters ranging from about 100 to 500 kms.[10] This calls into question the idea that these objects are precursors of short-period comets. So, the discovery of objects beyond Neptune does not in any way confirm a Kuiper Belt—at least not the kind of Kuiper Belt that evolutionary astronomers require. As such, the term 'Kuiper Belt Object' is a bit misleading. 'Trans-Neptunian Object' (TNO) would be a more descriptive term for these distant minor planets—and many astronomers use these terms (TNO and KBO) interchangeably.

Interestingly, astronomers have recently discovered that several TNOs are binary.[11] That is, they consist of two objects in close proximity; these orbit each other as they orbit the sun. The tremendous controversy on the (evolutionary) origin of Earth's moon,[12,13] highlights the difficulty of forming (by random processes) two co-orbiting masses. Currently, giant impacts are being invoked to explain the origin of Earth's moon as well as Pluto's moon Charon. But these involve unlikely 'chance' collisions at precise angles and have other difficulties as well. Yet, we are finding that binary objects are far more common than previously thought.[14] Might this point to a creative designer?

Some astronomers would classify Pluto as a (particularly large) Trans-Neptunian Object. Indeed, Pluto may have far more in common with TNOs than it has with the other eight planets—such as its icy composition and its orbital properties. In fact, a substantial fraction of the newly discovered TNOs have an orbital period nearly identical to that of Pluto.[15] These are called 'Plutinos' (little Plutos). So, while Pluto is a dwarf among planets, it may be 'King' of the TNOs. Since Pluto's moon Charon is so large (relative to Pluto), Pluto is often considered a binary system. As such, Pluto could be considered not only the largest TNO, but the largest *binary* TNO as well. As these new discoveries continue to pour in, creationists should delight in the marvelous complexity and structure of the universe God has created.

References

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2. This is explained in detail in Faulkner, D., Comets and the age of the solar system, *CEN Tech. J.* **11**(3):264–273, 1997.
3. The hypothetical Kuiper belt is named after Gerard Kuiper who proposed its existence in 1951.
4. Faulkner, D., More problems for the 'Oort comet cloud'? *TJ* **15**(2):11, 2001.
5. Incidentally, long-period comets are also a problem for those who believe in billions of years. In evolutionary thinking, a massive spherical 'Oort cloud' is supposed to replenish long-period comets. Currently, there is no evidence whatsoever of a massive Oort cloud. Moreover, there is tremendous difficulty in forming an Oort cloud of sufficient mass (through natural processes) in the first place! Hence, long-period comets also present a serious challenge to a multi-billion year old solar system.
6. An AU (Astronomical Unit) is the average distance from the Earth to the Sun. It is roughly equal to 150 million kilometres or 93 million miles. Neptune orbits the Sun at 30 AU. Pluto's distance from the Sun varies in its orbit from about 30 AU to 50 AU with an average distance of around 40 AU.
7. An object named '1992 QB1' was the first

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>.
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15. These Plutinos orbit the Sun at an average distance of about 40 AU with a period of 248 years—the same as Pluto. This is no coincidence; this orbital period is particularly stable because it is a 2:3 resonance with Neptune. Pluto and the Plutinos orbit the Sun twice for every three orbits of Neptune.

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?

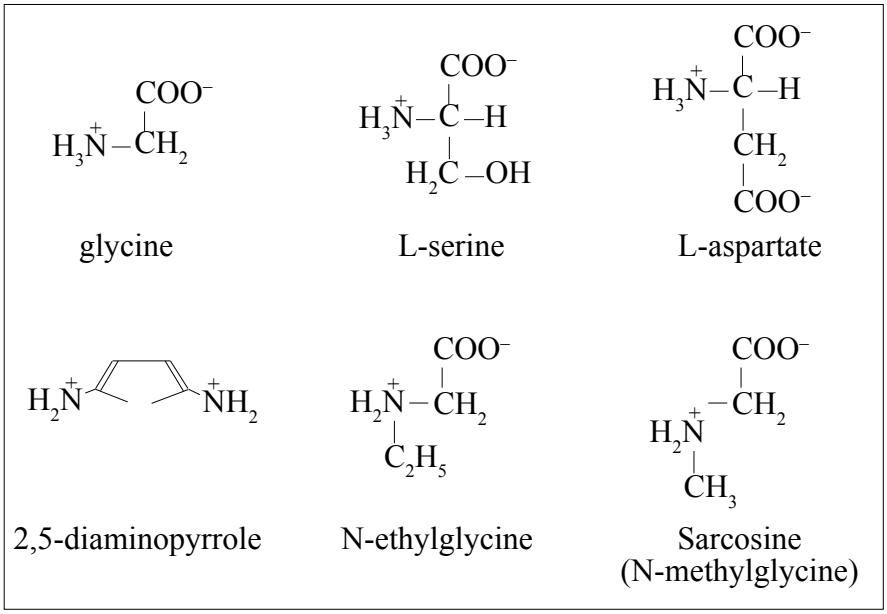
Role of biases

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.