Journal of Cosmology, 2009, Vol 1, pages 66-70.
Cosmology, 2009

The Search For Life On Other Planets. The Geometry of Intelligence

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Joseph (2009a) has hypothesized that the origin of life on Earth arises from microbes and spores that survived in a nebula which gave birth to our solar system. He proposes that as the "parent star" became a red giant, solar winds would have blown away any planetary atmospheres along with microbes which would have been deposited into the growing molecular cloud. Further, he states that most of these planets would have been ejected from the solar system of the "parent star" prior to supernova and would not have been totally atomized by the event.

Joseph's (2009a) explanation for the origins of life on this planet and the dispersal of life throughout our galaxy is provocative. If Joseph's hypothesis is correct, new planets may be seeded with life via generally accepted mechanisms of star and planet formation.

The hypothesis advanced by Joseph (2009a) may provide an answer to those who have argued there was not enough time for life to have emerged on Earth through abiotic processes. Instead of non-life having but a few hundred million years to achieve life, the stellar mechanisms proposed by Joseph provides us with a time frame which may extend towards the events of 13.7 billion years ago.

Were there circumstances in the earlier eras of our universe that would have made life more likely to have formed? Would more locations of non-equilibrium, for example, in the earlier stages of our universe have increased the odds of life? What other evidence is there that life may have been first fashioned billions of years before the birth of our planet? These are questions that his paper has not addressed.

Tantalizing clues which address the antiquity of life have been provided by Sharov (2006, 2009). The genetic analysis of Sharov (2006, 2009) raises the possibility that DNA-based life forms similar to those of Earth may have first begun to evolve 10 billion years ago, nearly 6 billion years before our own planet was fashioned.

The genetic data (Sharov 2006, 2009) coupled with Joseph's hypothesis and the proposals and evidence provided by Hoyle and Wickramasinghe (2000) could explain how the descendants of a single replicon which first achieved life over 10 billion years ago, came to be dispersed throughout the cosmos.

If the hypothesis (Joseph 2009a) and genetic data provided by Sharov (2009) and Joseph (2009b) are correct, and using the Earth as a model, then it could be predicted that living creatures would have also evolved on planets similar to Earth. This raises the possibility of intelligent life on other planets. Is there any evidence to support such a startling and unsettling possibility?

The Search For Intelligent Life on Other Planets

The Search for ExtraTerrestrial Intelligence (SETI) is based upon the premise that intelligent life can be detected from Earth, such as via the analysis of radio signals by the Megachannel Extra-Terrestrial Assay program. In 2002, Lazio, Tarter and Backus of SETI believed they'd picked up 11 radio signals, out of 60 trillion, which could not be explained by non-living sources and which were not from Earth. These signals had all the signatures scientists expect of a human radio transmitter, a frequency that could be transmitted across interstellar space, and a very small bandwidth. Then the signals disappeared (Lazio et al., 2002). According to the late Carl Sagan, if they were of intelligent origin, these radio signals should be continuous, and in the case of these 11, they weren't.

The search for intelligent life on other planets cannot rely on radio signals alone. In contrast, it has been suggested by Rose and Wright (2004) that sending physical artifacts in the form of inscribed matter is often a much more energy efficient mode for information carriage than that presumed by Radio SETI. Like the builders of the Great Pyramids of Egypt and the Great Wall of China (structures which can be viewed from space), it cannot be assumed intelligent life on other planets utilize radio signals to communicate. Further, we can't assume that intelligent extraterrestrial life is in any way similar to the humans of Earth. How might intelligent life have evolved on planets with a chemistry or environment completely unlike our own?

Then there is the problem of extinction. Could it be that technologically advanced life can only exist for a very brief window of time before self-destructing and becoming extinct? If so, how might we determine if they had ever existed? And if they still live, how might we detect their existence?

The answers may include geometry, math, and physical changes on the surface of their planets which could have only been fashioned by an intelligent mind.

The Geometry of Intelligence - Speculations and Thought Experiments

As a thought experiment, let us imagine that science marches on and 100 years from now space telescopes have been developed which are so powerful they not only detect Earth-like planets in distant solar systems but can closely examine their surface.

Continuing our thought experiment, let us imagine NASA discovers an Earth-sized planet, which we shall name "Mathematicus" orbiting in a nearby solar system. Further examination of planet "Mathematicus" reveals a series of 12 mounds in a formation which is sufficiently unusual that it can't be determined if it is natural or artificial. A team of experts are called in and they base their analysis on geometry and math.

For illustrative purposes, let us say these mounds are identical in their relative placements to a 12 mound formation (Fig. 1) on the surface of Mars in the Cydonia area, shown in this 1976 Viking Satellite image (image number 35A72). Their positions have been highlighted for the sake of clarity and rotated to emphasize the geometry of their relative placements (images from Crater 2007, and (Fig.12) McDaniel 1999).

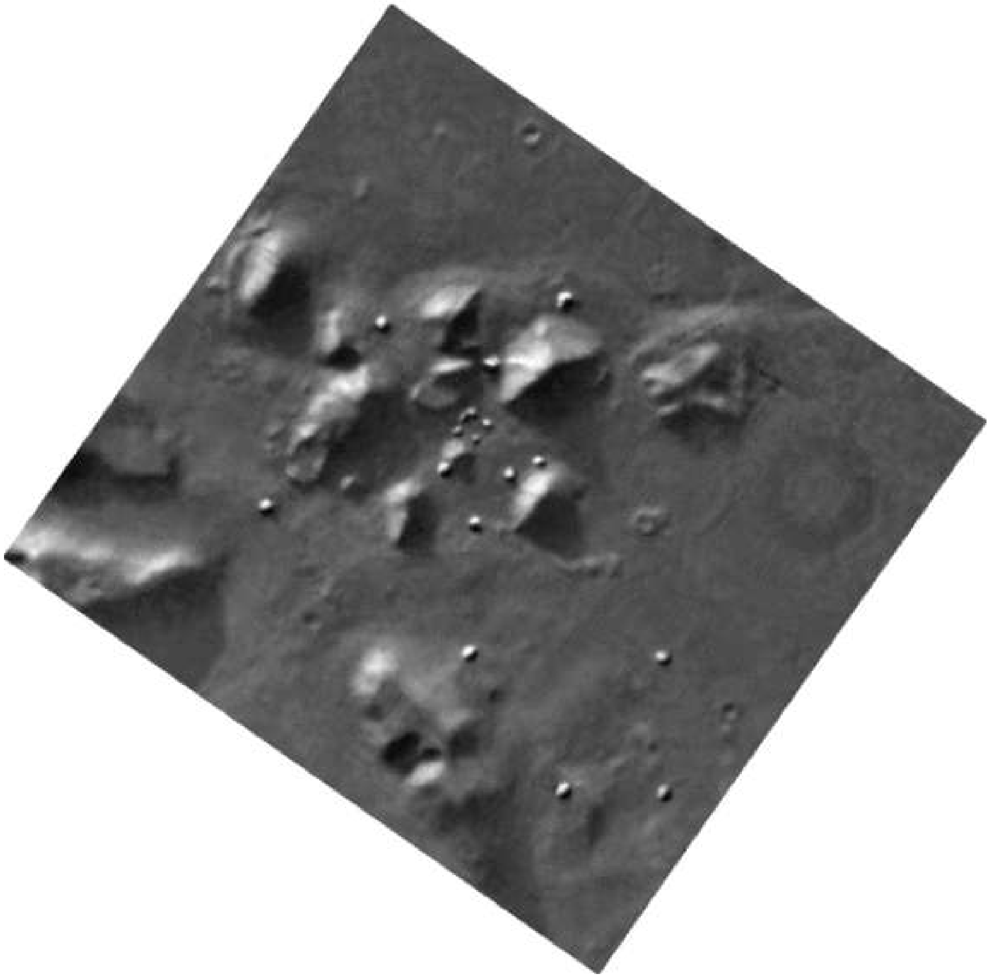
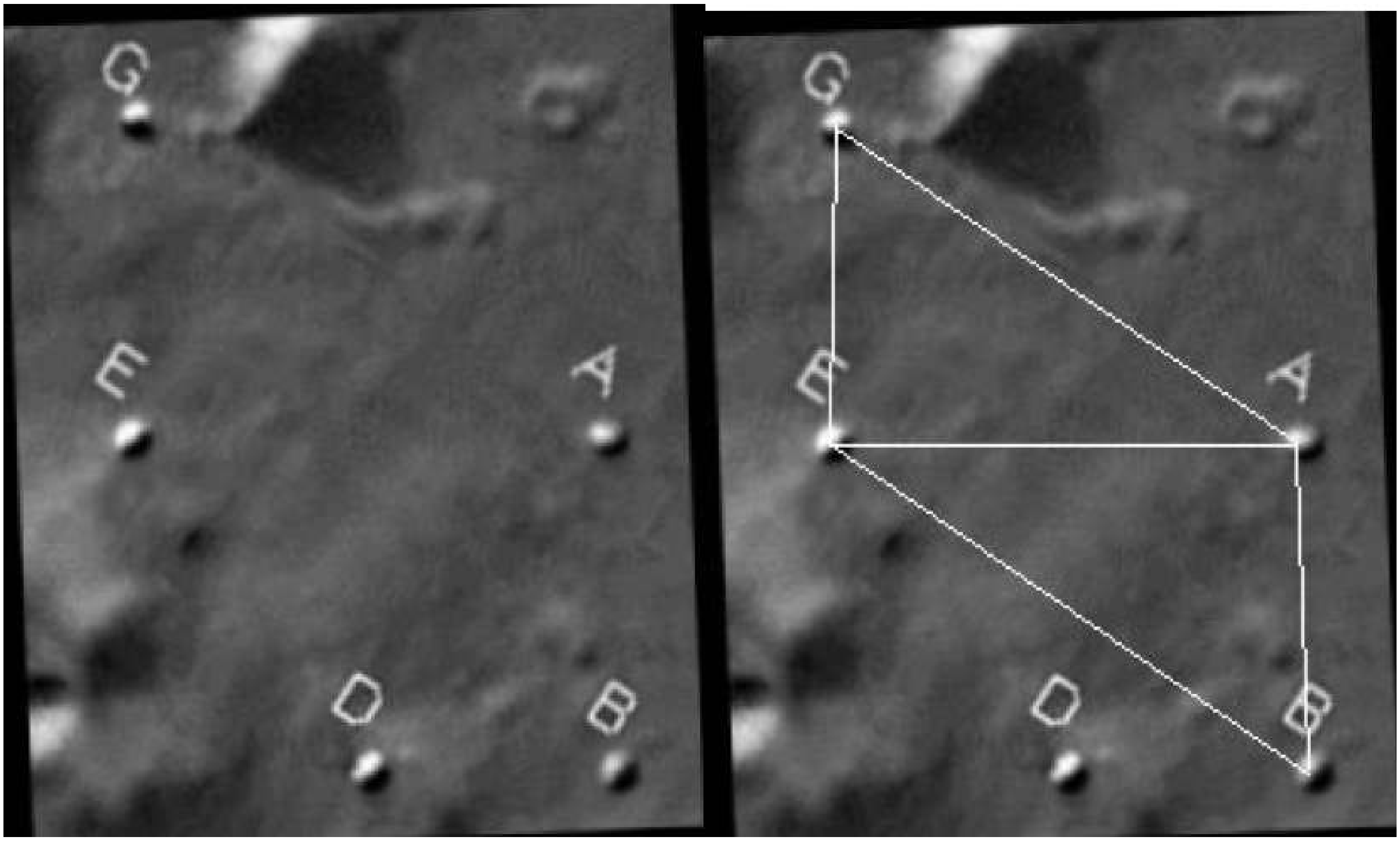


Figure 1.

The purpose of our team of experts is to examine the placements of these mounds on planet "Mathematicus" and to determine evidence for their possible natural or artificial origins. We make no claims whatsoever as to their natural or artificial nature as pertaining to the planet Mars. Rather we shall just take their relative placements as a given fact, as exemplified in the Cydonia region of Mars, and see where that leads us.

These 12 mounds are of relatively small and nearly uniform size (about a city block) and have angular placements that repeatedly display symmetries in the apparent form of related right and isosceles triangles.

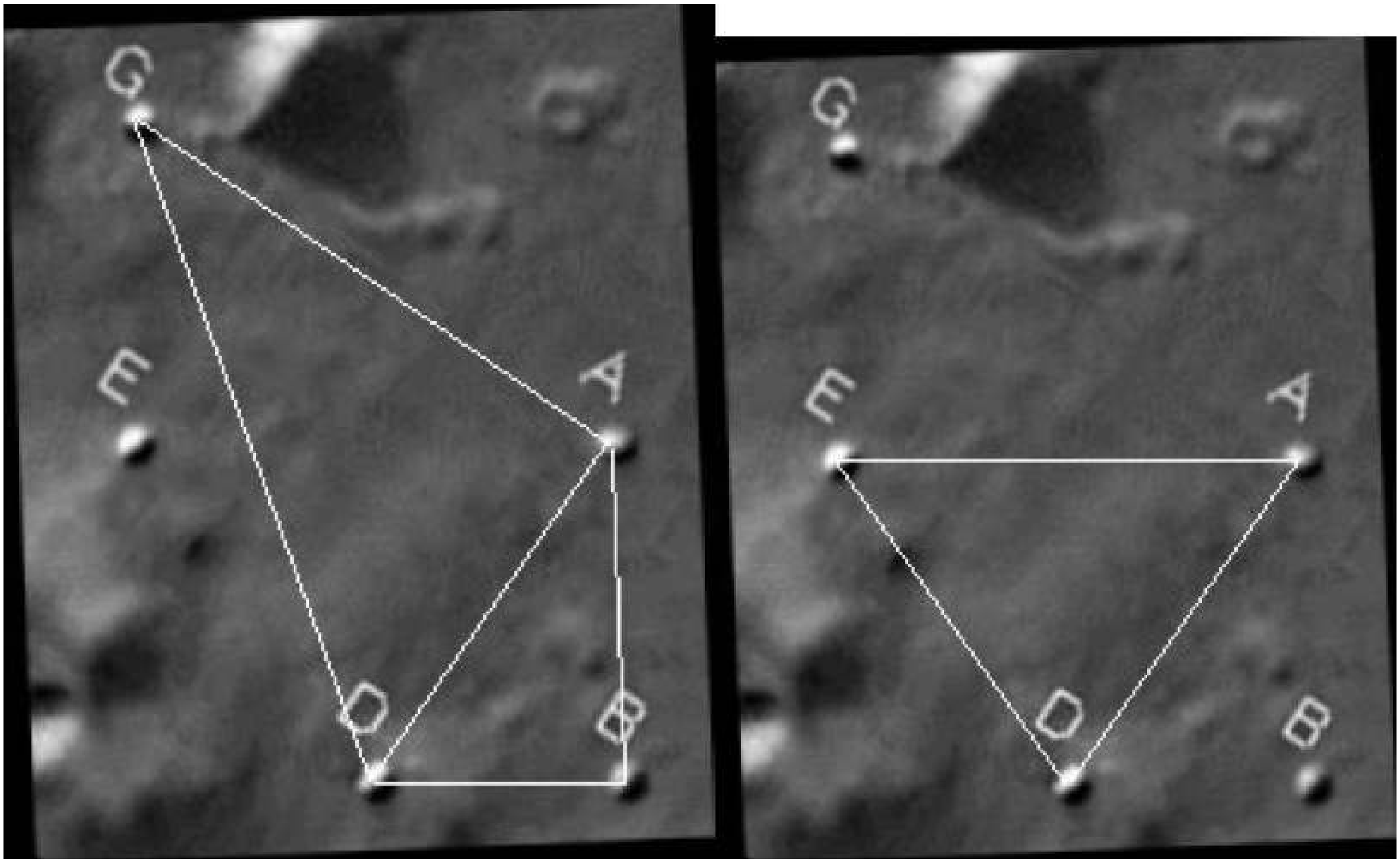
We focus here on five of these mounds. The five mound region is magnified and the mounds are designated in Fig. 2 by the letters GEDBA. The 4 right angles (GEA, EAB, GAD, and ABD) in the relative placements of the mounds are quite striking.



Figures 2 & 3.

Angle measurements for the triangles GEA and BAE show (Crater 2007; Crater and McDaniel 1999), that these two triangles (Fig. 3) are not only similar but are congruent right triangles within measurement errors. The angle measurements are made on an orthorectified version of this image by using the cartesian coordinates of the centers of the mounds, whose position is uncertain within 1 pixel, about 47 meters.

Triangles GAD and ADB (Fig. 4) are also right triangles and within measurement errors are not only similar to each other but to the previous two right triangles. Altogether, there are four similar right triangles among this isolated group of just five mounds.



Figures 4 & 5.

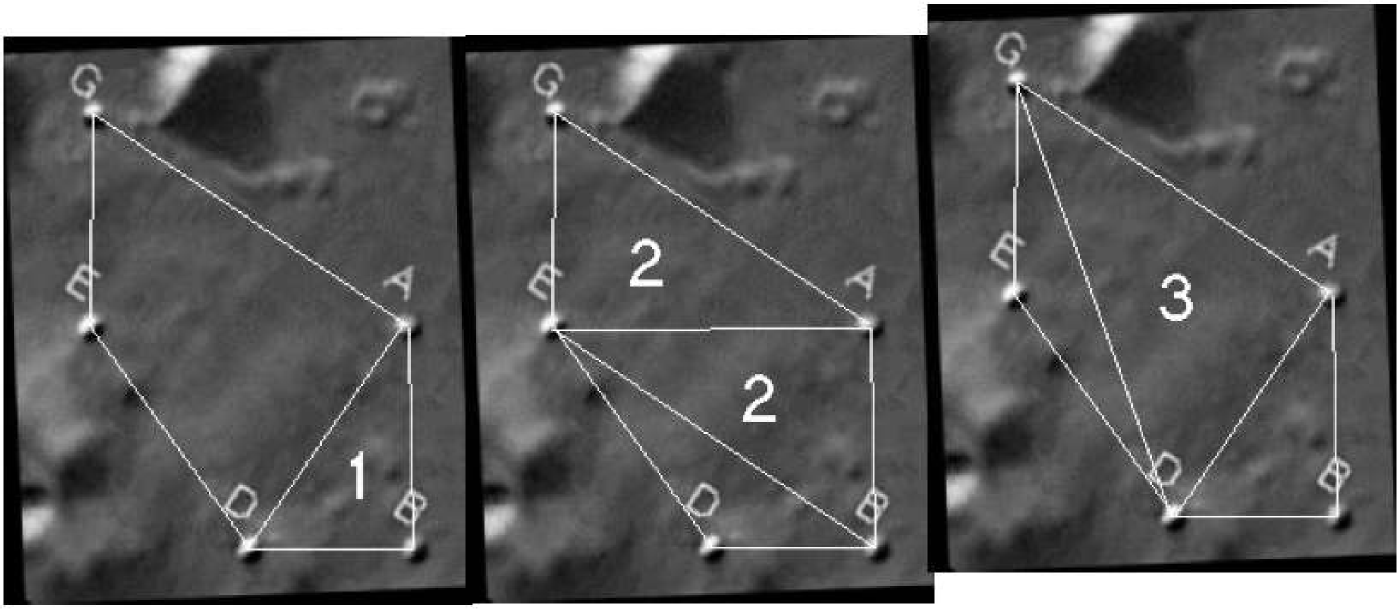
In addition, as seen in Fig. 5, there is a related isosceles triangle from mounds ADE with angles, again within measurement errors, that show not only that it is isosceles but is the double of the small right triangle ABD.

The above measurements for the angles were made separately for each triangle with the vertices at the respective centers of each of the three mounds. If the placements of these mounds were to represent possible intelligence are there ways of analyzing this beyond the visual impact of the symmetry alone?

Is it possible, with common vertices used when separate triangles have vertices on the same mound, that these four right triangles all have the same angles? If these mounds were discovered on planet "Mathematicus" a hundred years from now, this is exactly the question we would have to answer.

In order to search for answers to this possibility we consider what we shall call a “coordinated fit”. In this fit, one uses the same fit point in each mound for all triangles that have one vertex in that mound. We have found (Crater 2007; Crater and McDaniel 1999), that by varying those 5 common fit points, it is possible to have the four right triangles mentioned above to be similar with a high degree of precision (less than 0.2 degrees). Right triangles have angles: 90, 45 + t/2, 45 - t/2. This precise coordinated fit to 4 similar right triangles is possible only for t about 19.5 degrees. (One can show the mathematically unique and exact result of t = arcsine (1/3) radians, or 19.46…degrees, by use of analytic geometry). This is an example of what could be called the self replication property of this t value. That is, for this special value the number of appearances of these triangles is a maximum. For different values of t, a coordinated fit would show that not only can they not be all right triangles, but they cannot all be similar. Furthermore, for this unique t value, triangle ADE is precisely isosceles with angles of 45 + t, 45 + t, and 90 - t. One can also show (Crater 2007; Crater and McDaniel, 1999), that the ideal geometry corresponding to t = 19.5 degrees are within measurement errors at the centers of the five mounds.

A curious property of this pentad of mounds is that the three different sizes of the four similar right triangles are ordered by the first three (prime) numbers. As indicated in Figures 6a,b,c, if one takes the smallest triangle to be 1 unit of area, then the area of each of the two congruent middle sized ones is 2 units and that of the large one is 3 units.



Figures 6a,b,c.

Not only do the three sizes of the similar right triangles correspond to the first three prime numbers, but, also, as seen in Fig. 7, the next prime number 5 appears (in a self-referent way) as the area of the entire five-sided pentad. As a result, the pentad of mounds displays the concept of area, with a correspondence to the first 4 prime numbers.

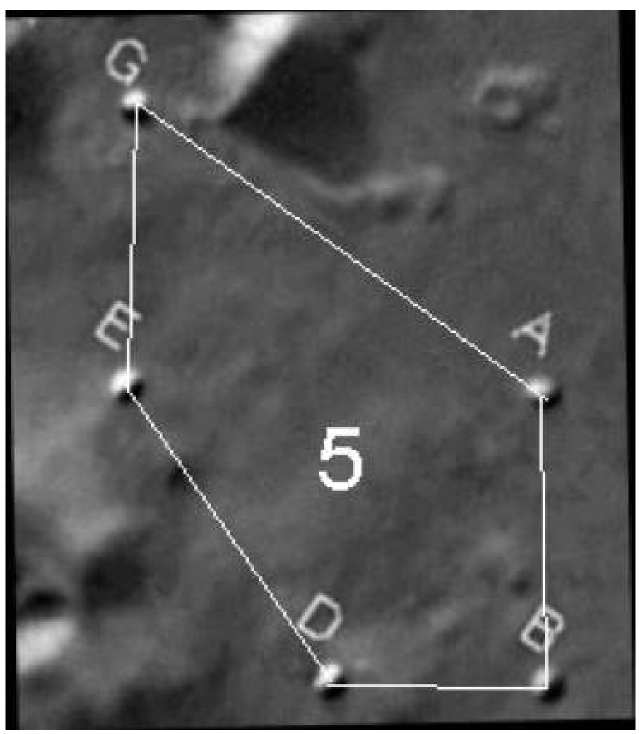


Figure 7.

Stepping down one dimension from areas to lengths, one finds that paralleling the basic 1,2,3 sequence of areas is the same sequence of triangle side relative lengths. Taking the shortest side (DB) of the smallest triangle (DBA) to be 1, then the middle side (EA) of the middle sized triangle (AEG) is 2, and the longest side (GD) of the largest triangle (GDA) is 3. As Fig. 8 emphasizes, in sequence of size (triangles ADB, GAE and GAD), the three basic aspects of the sides of a right triangle (opposite, adjacent, and hypotenuse) are ordered 1,2,3 sequentially with their side lengths (opposite of ADB, adjacent of GAE, and hypotenuse of GAD). This 1,2,3 sequence is repeated a third time in the ratios of the sides of each similar right triangle of √1,√2,√3. Beyond that, one can show that all 10 inter-mound distances are multiples of √2 and/or √3.

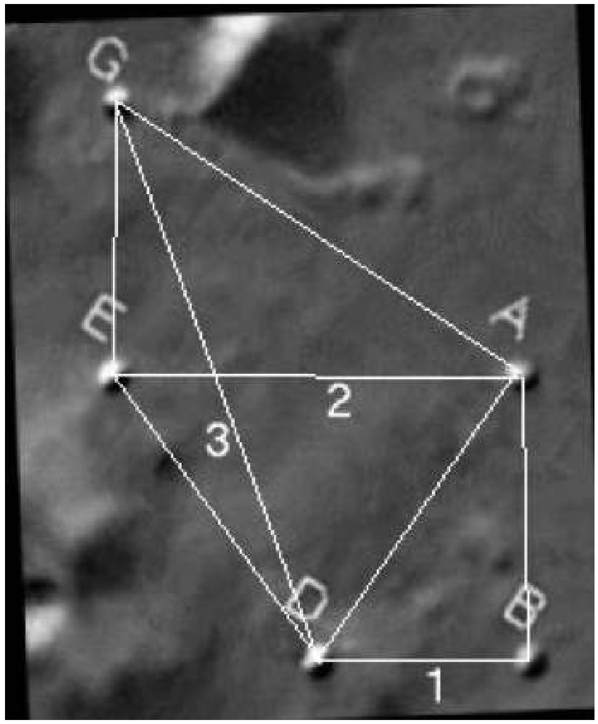


Figure 8.

Speaking geometrically, the origin of these tantalizing basic geometrical and prime number features lies in the fact that these five mounds are at 5 of the 8 nodal points of a special rectangle called the square root of two rectangle (Fig. 9). The sqrt(2) rectangle is special in that bisected at its exterior long side, it produces two smaller replicas of itself. The rectangles containing the triangle EAD and GED have the same proportions. The only other geometrical objects having such a duplication property is the 45 degree right triangle.

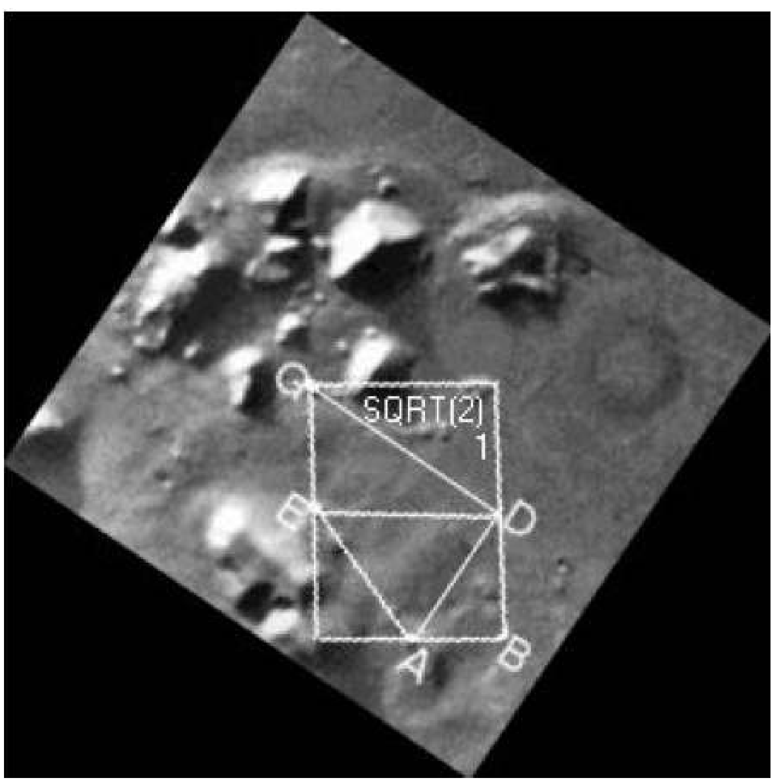


Figure 9. Relation of Pentad of Mounds to √2 Rectangle.

Let us now consider three of the remaining 12 mounds. Interestingly, the inclusion of mound P on the far left (see Fig. 10) produces the additional triangle PEG having angles close enough to the ideal of 90, 45-t/2 = 35.3, 45 + t/2 = 53.7 (with t =19.5 degrees) so that a precise 6 mound coordinated fit (within 0.2 degrees) can be easily obtained, giving a fifth right triangle similar to the four above and congruent to two of them. In addition, there is a hint of a double sized √2 rectangle. (Two corners of the inferred rectangle do not exhibit mounds.) This √2 grid-like feature was discovered by Professor Stanley McDaniel (1999). For the ideal geometry, the enclosed area of the 6 mound hexad of mounds is 7, the next prime number after 5.

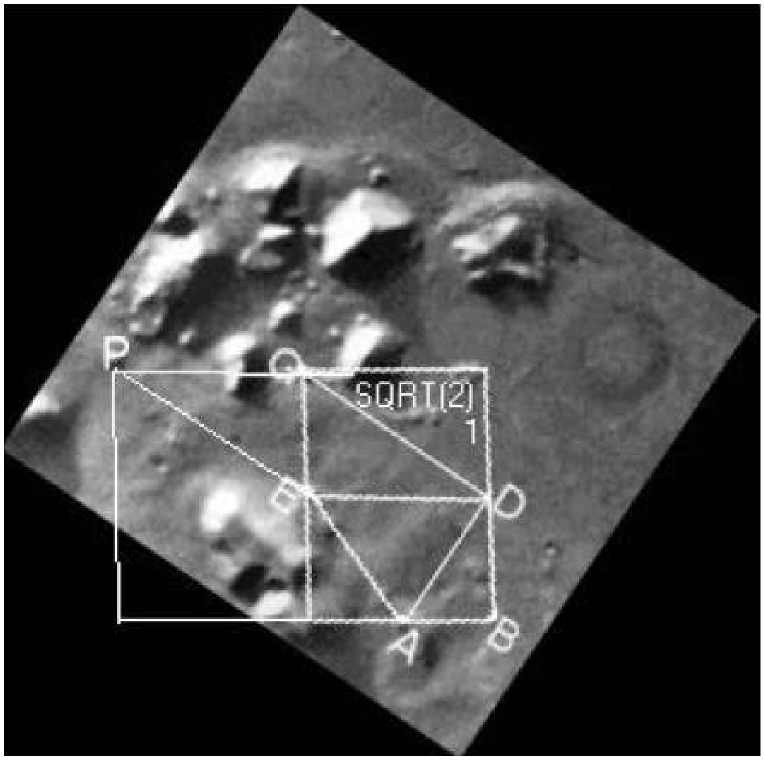


Figure 10. Mound P and Extended Rectangular Grid.

Including mound M (see Fig. 11) produces a large replica PMD of the triangle EAD, both are close enough to the ideal of, 45 + t/2 = 53.7, 45 + t/2 = 53.7, 90 - t (with t =19.5 degrees) so that a precise 7 mound coordinated fit (within 0.2 degrees) can be easily obtained, giving us two similar isosceles triangles and five similar right triangles. However, the coordinated fit points to the ideal are not as close to the center as with the original pentad of mounds.

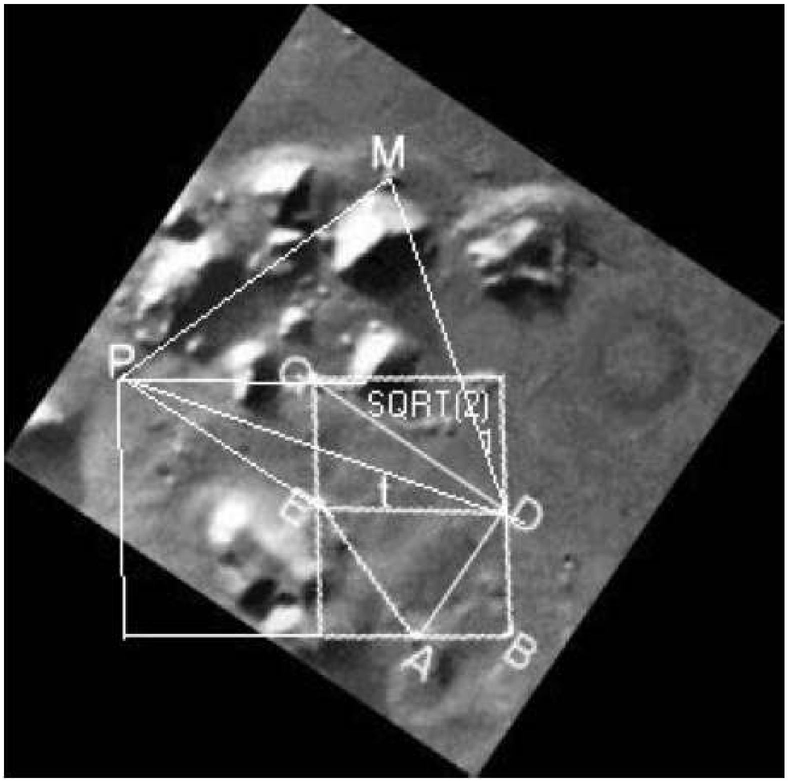


Figure 11. Mound M with Isosceles PMA similar to ADE.

Stepping up in dimensions to three-dimensional space, it is of interest that the similar isosceles triangles PMD and EAD have the same proportions as the triangular cross section interior to the tetrahedron obtained by a perpendicular bisection of the tetrahedron (see Fig. 12). The right triangle EXA has the same proportions as the ideal 5 similar right triangles between the 7 mounds so far included.

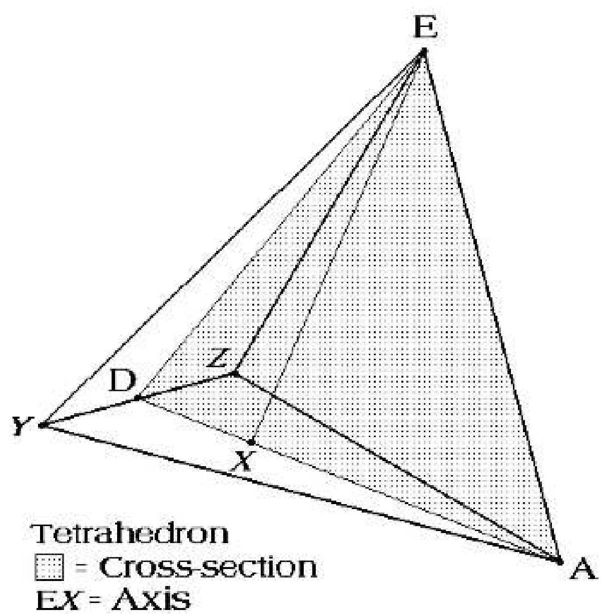


Figure 12. The Isosceles Triangular Cross Section of the Tetrahedron.

This connection to the solid geometry of the tetrahedron is made emphatic when including mound O. One finds that OPG in Fig. 13 can have a coordinated fit (with the other mounds) to that of an equilateral triangle. The surprising connection is that the ratio between its area and that of the isosceles EAD is identical to that between the external (equilateral) face and internal cross sectional area (isosceles) of triangles of a tetrahedron. This is exact given the ideal geometry since the √2 rectangular grid implies that length PG = ED.

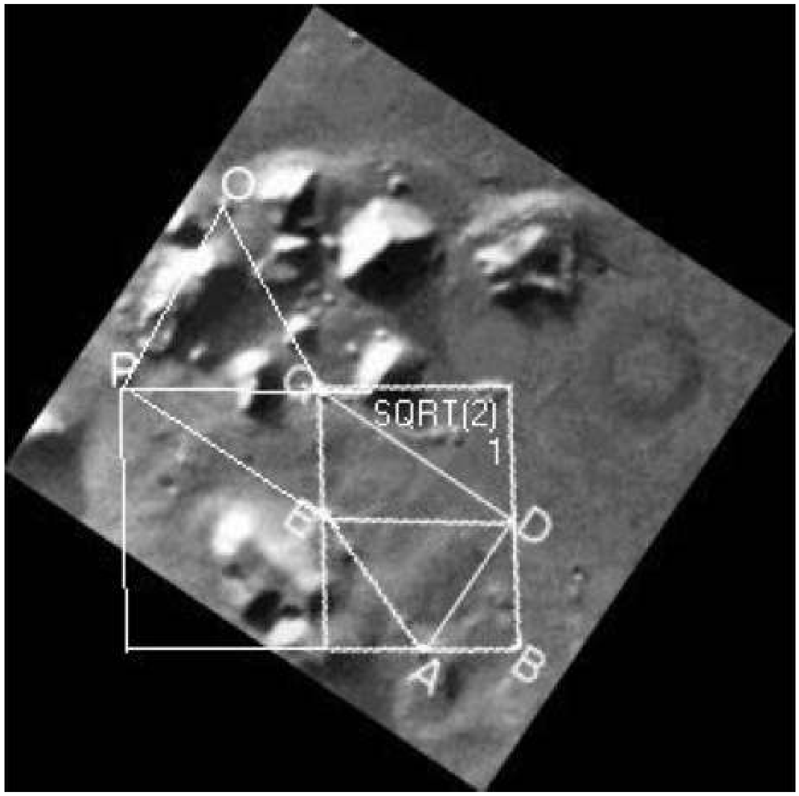


Figure 13. Mound O and Related Equilateral Triangle.

Conclusions and Speculations

In this essay we have tried to present a hypothetical example of how evidence of intelligent extraterrestrial life may be obtained relying on a geometric and mathematical analysis of the surface features of a hypothetical planet "Mathematicus" with a grouping of mounds identical to those in the Cydonia region of Mars. The possibility that math and geometry are a universal, cosmic language, are central to these speculations. In previous articles (Crater 2007, Crater and McDaniel 1999), the likelyhood of these configurations appearing by chance are discussed in detailed statistical analyses related to the unusual mound configurations.

We are not making any claims, in this essay, as to the artificial or natural nature of these mounds, be it on Mars or our hypothetical planet. However, as a thought experiment, if we were to assume that the mound placements described in this paper were artificially aided, what speculations might we make about the extraterrestrials that were responsible? They would obviously be expected to have a deep reverence for mathematics. If these mounds were created to be viewed from space, then we could suspect they desired for the observers of these patterns to recognize mathematics as centrally important to their culture. Only a reverence for math and geometry and a high degree of intelligence could explain why so much effort would be expended on the positioning of these very large and essentially permanent surface features.

The builders of these mounds would also be skillful in presenting insights into basic mathematics that is deeply profound and yet easily visualized and understood. Further, we have shown (Crater 2007) that the proportions of the similar right triangles as well as the isosceles triangle included in this pentad of mounds describe precisely certain fundamental aspect of spin-angular momentum in quantum mechanics.

Continuing our thought experiment, one might also speculate that the use of the √2 rectangular shape and its replication property by bisection was meant to symbolize a fundamental aspect of biology, namely biological cell division which leads us back to the basic biological premise of Joseph's (2009a) paper. Joseph (2009a), basing his arguments on cell theory and basic biology, tells us that life comes from life. Therefore, life on Earth must have also come from life, the descendants of that first replicon which may have begun to seed the universe with life over 10 billion years ago.

Acknowledgements

The author wishes to express thanks to the members of the Society for Planetary SETI Research (SPSR -http://spsr.utsi.edu) for correspondences on various aspects of this paper and to the graphics division at UTSI.

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