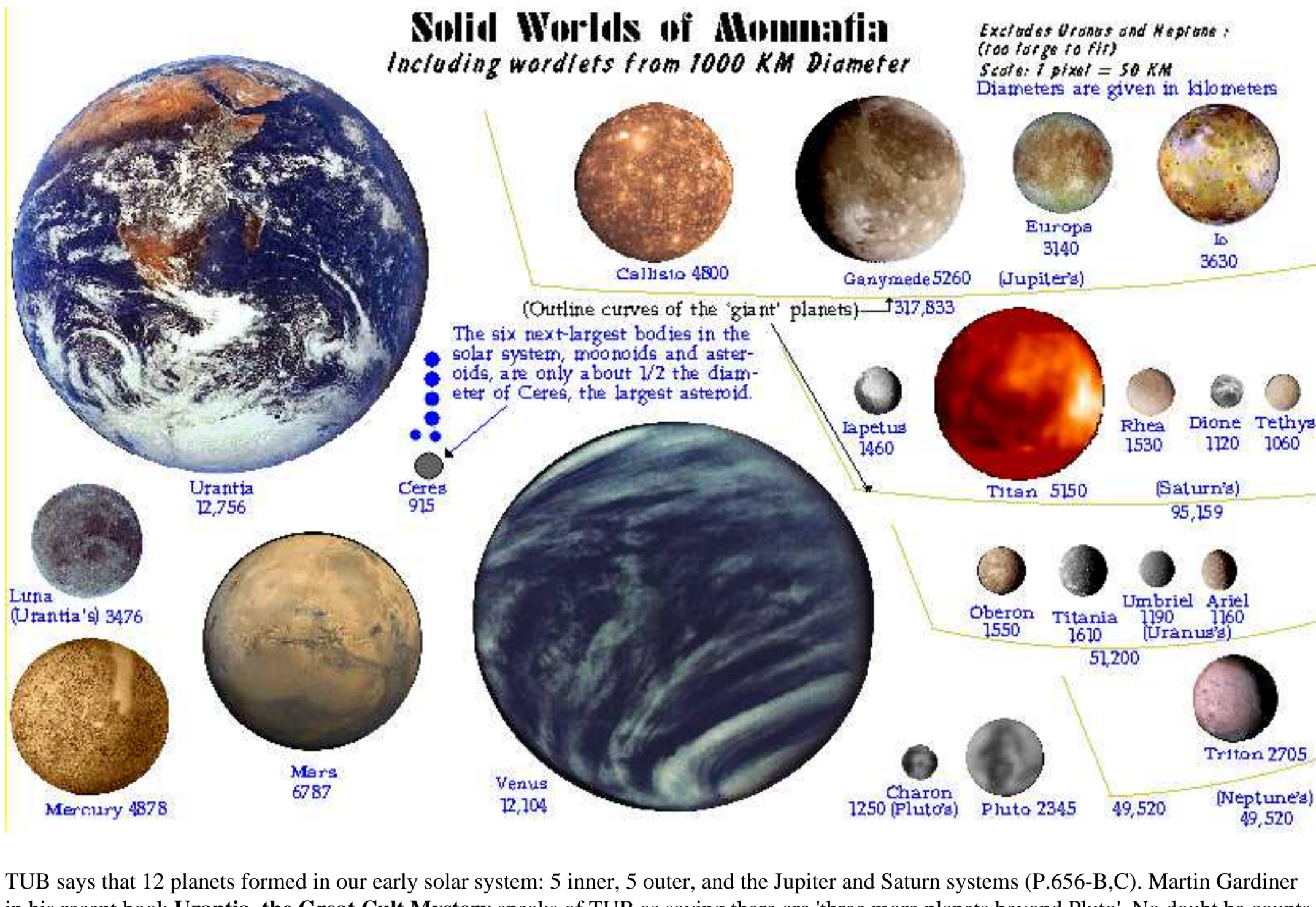


WORLDS OF MONMATIA

"Exploring Monmatia with Craig"

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TUB says that 12 planets formed in our early solar system: 5 inner, 5 outer, and the Jupiter and Saturn systems (P.656-B,C). Martin Gardiner in his recent book **Urantia, the Great Cult Mystery** speaks of TUB as saying there are 'three more planets beyond Pluto'. No doubt he counts today's nine and knows there are no more any closer than Pluto. However, this conclusion is not correct.

First, five of the twelve were *inner* planets, but inner planet number five was pulled within Jupiter's LaRoche limit of critical tidal disruption and broke up to become the Asteroid Belt, leaving only eleven planets. (658-B)

Then, Triton orbits Neptune backwards (retrograde) at an odd angle and is no doubt a planet captured by Neptune long ago, not a moon that formed with Neptune! Triton is very similar in composition and density to Pluto and not too much larger. Both have thin nitrogen atmospheres. The similarities suggest a commonness of origin away from Neptune's influence. Triton eventually crossed Neptune's path, with tidal friction slowing it so that it was captured, then circularizing the resulting highly eccentric retrograde orbit over time. Triton was fortunate enough to not hit Neptune's LaRoche limit of critical tidal disruption and be broken into asteroids in the process. So one planet became a moon, leaving ten.

The last world is less easy to pin down. First, we could resort to noting that Charon is large enough to cause itself and Pluto to orbit about a common center of gravity between them. Technically, this constitutes them a double planet instead of a planet with a moon. But I am not happy with this answer. Even Pluto is so small - Charon surely can't be a 'world', maybe a 'worldlet'. But if no other explanation was to be found Charon *could* be counted as planet number twelve, (now number ten) - technically.

But it is quite likely that yet another planet formed out past Neptune, then wandered into Neptune's LaRoche limit and was tidally disrupted - broken up - to form the estimated thousands of small comet and asteroid objects in today's **Kuiper Belt**.

The Kuiper Belt has much in common with the asteroids. Most remnant asteroids are locked into orbital resonances with Jupiter; 3 asteroid orbits per 2 Jupiter orbits, or 5:3, etc. Why? Because any that weren't were eventually captured by Jupiter. If the fifth planet had formed in or entered into such a resonant orbit originally, it wouldn't have wandered and gotten broken up. And this resonance of orbits is also true of the Kuiper Belt objects and Neptune, making it seem very much like a second asteroid belt at the outer edge of the solar system.

Pluto might be termed a 'Kuiper Belt Planet'. It too is locked into a 3:2 ratio synchrony with Neptune, and though their orbits actually cross each other, never are Neptune and Pluto both near the cross-over points at the same time.

Or, could there still be one more planet to be found?

Neptune was found by noting 'perturbations' in Uranus's orbit and predicting the size and location of the planet that must be causing them.

Pluto was found by error in observations of Neptune's position and a lucky hit: though it was far too small to explain Neptune's supposed orbital perturbations, it just happened to be in the right place at the right time to be detected by those searching for a large planet that didn't exist. But for this, might it still be undetected? I don't know.

If there is another planet still in existence, it also is likely to be found in the Kuiper Belt in an orbital synchrony with Neptune. It would have to be a small world like Pluto or Triton or perhaps - even smaller, as there don't seem to be any unexplained orbital perturbations in the outer planets. I won't hold my breath.

We need some new vocabulary here, I think. **Planets**, as currently used, excludes worlds orbiting other worlds (moons). We either have to start thinking in terms of **worlds** and let the word **planet** fade into much less usage, or else redefine **planet** to include planet-sized moons. (TUB implicitly does this, on page 166 using **planets** and **worlds** alternately.) **Moons** includes all planetary satellites from a lump of ice to a habitable world. These two ideosyncrasies of usage have created a mental block in our minds against moons. "All moons are like our moon: small cratered spheres of no interest, or just lumps of rock. They aren't planets." But Monmatia's seven moon-worlds are very diverse and interesting! Even Luna has now been found to have a bit of water ice near its poles, not *quite* all rock.

I'm using the word **moons** similar to **planets**: If it's greater than 2000 KM diameter, it's a moon or a planet: a world. (Pluto is the smallest world at 2345 KM diameter.) If it's less than 1000, it's a **moonoid**, or **asteroid**. Between these, from 1000 to 2000 KM, are **moonlets** and **planetlets**: **worldlets** perhaps.

So! We have 16 worlds worthy of the name: 9 solar planets and 7 moons (Jupiter: 4, Urantia: 1, Saturn: 1, Neptune: 1). Plus, there are 9 moonlets (Saturn: 4, Uranus: 4, Pluto: 1). Everything else under the sun is just asteroids, moonoids and meteoric debris.

Does that clear up a lot of conceptual clutter from the solar system?

All the moons are larger than Pluto; Ganymede and Titan are both larger than Mercury, though smaller than Mars. Callisto and Mercury are about the same size, as are Europa and Luna.

Before we go on, a word about the Kelvin temperature scale. Fahrenheit & Celsius just aren't suitable for what I'm about to describe. -225 degrees simply doesn't mean much to anybody - may we never see such weather!

Water freezes at 273 degrees Kelvin and boils at 373, a 100 degree range the same as Celsius. 0 degrees is absolute zero where all molecular motion ceases, so there can't be a negative temperature. Urantian room temperature is about 295 degrees. So in absolute terms, 150 degrees Kelvin is about half as warm as Urantia.

It is interesting to note that while TUB says Jupiter and Saturn are still in a gaseous state, Uranus and Neptune (both about four times the diameter of Urantia, or 16 times our land area or 64 times our volume) are described with "the other ten planets" that have solidified (656-D), though astronomers still seem to regard them as "gas giants". Looking at those patterned cloud layers, one does indeed not see a similar latitudinal banding to that which characterizes Jupiter and Saturn.

However, they are so far from the sun they could not possibly be life spheres. They must certainly qualify as 'frigid outlying worlds'. From these distances the Sun is just the brightest star. Uranus also has an unhealthy 98 degree axis tilt: most parts of the planet experience days and nights that last for Urantian decades at various times. Temperatures in the vicinity of both are around 40 degrees Kelvin. Triton's south pole was measured by Voyager 2 at just 37 degrees, the coldest weather ever recorded anywhere!

Likely Europa, orbiting Jupiter, is the world of the non-breathers. (464-A)

The space environs around Jupiter are in the vicinity of 125 degrees Kelvin, but the inner three moons are locked into orbits of about 43, 86, and 172 hours, and outer Callisto is somewhat over double that at 400. They are heated internally by tidal frictions resulting from their alternately lining up and being away from each other. This heat energy is paid for in gradually reducing orbital velocities: the moons are slowly spiralling inward like the track of a phonograph record.

Innermost Io has boiled off all its water and is the most volcanically active world in Monmatia, spewing geysers of sulfur and sodium hundreds of miles into space. It is gradually approaching Jupiter's LaRoche limit and is destined to undergo tidal disruption within the next few million years, either being captured by Jupiter or becoming a ring system. (658-B)

Europa appears to have an Ocean covered by a thin layer of ice like our Arctic Ocean. There are no meteor craters or valleys, undoubtedly because water immediately floods and fills them in. There are no high mountains because the ice would crack and they would sink.

Ganymede and Callisto, farther out, have less heat and their surfaces seem frozen and dead. But even they have liquid circulating in their interiors, generating magnetic fields.

A recent study suggests that with no atmosphere, there is no source of energy on Europa to energize life, even in the water. But this is in keeping with the statement in TUB that non-breather life utilizes light energy and firsthand power transmutations of the Master Physical Controllers (563-A,B), in radical contrast to breathing worlds. Sunlight around Jupiter is about 1/16 the energy as at Urantia, equivalent to being in the shade here.

Other interesting facts: Europa has an ionosphere (its only bit of tenuous atmosphere) and a magnetic field to protect life from dangerous radiation. Sodium, chlorine and oxygen have been detected at the surface. It is a bit smaller than our own moon, Luna, but just 66% of its mass, and has about the land area of Africa.

What will Io's tidal disruption mean for Europa if it is the life world? Surely the climate will become significantly colder when its closest tidal friction partner vanishes! But that is millions of years off yet. No doubt it will be long since settled in light and life by then.

If it does prove to be inhabited, I bet it is one of the smallest inhabited worlds in Satania if not the smallest. And the inhabitants would be, conversely, among the largest owing to the light gravity - probably 10 feet tall (562-C). Galileo, which took pictures as close up as 600 kilometers from Europa at 6 meters-per-pixel resolution, has failed to disclose anything that looks like habitations or artificial creations (- on any of the four moons. See www.jpl.nasa.gov/galileo for pictures and more info). But inhabitants may well live under the ice cover until they advance enough to build electronic apparatus for 'shunting or consuming' meteorites (563-D).



A Europa Closeup, as if through an airplane window.
The bottom of the picture is about a mile wide, and 600 KM distant.
The top is much farther in the distance. The basic white material is ice.

By a process of eliminating unsuitable worlds, we are left with Titan as probably TUB's third world 'currently suitable for inhabitation' (173-D) in our solar system. Of the other seeming candidates: Venus hardly rotates; Mars has almost no water and no ionosphere or magnetic field; Io is in Jupiter's radiation zone and has no water; Ganymede and Callisto appear dead and frozen; and Europa we've already accounted for.

Titan has a permanent cloud layer that has prevented us from seeing anything of the surface until very recently. The two Voyager space probes could tell us very little about it, the biggest disappointment of the Voyager missions. Hubble space telescope pictures in the near infra-red have now revealed many surface features, and while their meanings haven't yet been interpreted, and the resolution is something like 100-miles-per-pixel, it's clear that it isn't all ocean as per some speculations. These pictures have disclosed that it rotates every 16 days, with one side always facing Saturn in its 16 day orbit, as previously predicted. (This gives new meaning to the expression "It's been a long day!")

The environment around Saturn is very cold, around 100 degrees Kelvin, and this certainly seems a very cold region, even though there are said to be two temperature zones for life "much colder" than Urantia (562-C).

But Titan, like Urantia, has an atmospheric blanket, and I speculate that the surface of Titan will be found to be much warmer than astronomers expect. I base this on other worlds which are apparently warmer than expected.

* Venus, with its very thick 'greenhouse' atmosphere is hotter than Mercury.

* The space regions around Urantia are well below freezing, 225 K(?), but Urantia surface temperatures are much warmer than this, averaging 295 K, a 70 degree difference - thankfully enough to turn solid ice into balmy seas.

* Although the Jupiter region is around 125 Kelvin, Io has boiled off all its water and has continuous volcanic activity and Europa appears to have liquid water under a thin layer of insulating ice. Even Ganymede and Callisto, previously thought to be solid, now are shown to have liquid circulating in their interiors, generating magnetic fields. Scientists seem to have been taken by surprise by each new discovery that indicates more warmth and activity than they thought.

Titan has much more actual air substance than Urantia. That's a substantially better insulation blanket. It yields in spite of the low gravity a 22 PSI surface pressure, very close to our 15 PSI and ideal for mid-breathers like ourselves (561-B).

My guess is that the surface will be around 200 degrees K, at least 100 degrees warmer than the surrounding space region and its own upper atmosphere. (The matter is certainly outside my expertise and I am on 'thin ice' in suggesting this or any other temperature.)

If the temperatures are as astronomers expect, perhaps the anticipated ethane-methane liquid forms the required ocean liquids for life.

But if it is as 'warm' as I speculate, an interesting possibility is that the solution <two water molecules to one ammonia> freezes at 190 degrees K, whereas water alone is 273 degrees and ammonia by itself is similar to that. At temperatures below 273, any excess of either water or ammonia freezes out, leaving exactly the two-to-one mixture to provide an anti-freeze liquid with water for oceans and lakes on quite cold worlds.

There are traces of many common organic compounds and amino acid precursors from which life is built present in the atmosphere, which is thought to be similar to Urantia's primitive pre-life atmosphere.

If Titan's air is added to its solid diameter of 5150 KM then it exceeds Ganymede's 5260 KM and makes Titan the largest moon in Monmatia.

The probe **Huygens** is currently on its way to land on Titan as a part of the **Cassini** mission to Saturn. Perhaps when it arrives in about seven years we will learn more about this most mysterious and intriguing world. The Hubble images will help to decide on a landing site.

If only Mars had enough water to make lakes and streams and generate an ionosphere, and had a magnetic field, we might have a world of sub-breathers as neighbors. If only Venus rotated for a reasonable day and night, or if Uranus or Neptune were closer to the sun, there might have been superbreathers. If only the fifth planet hadn't broken up, there might be another world perhaps very similar to Urantia! The universe must be teeming with 'almost' inhabitable worlds!

But the solar system is not static. Perhaps in 100,000,000 years Ganymede will get close enough to Jupiter to warm up and get Europa-like oceans and evolve into another non-breather world, and still later on, maybe Callisto. Perhaps Uranus or Neptune or a solidified Saturn will get their day in the sunshine billions of years from now when the sun expands and swallows up the whole inner solar system.

TUB says that not one world in forty can support 'your order' of life. (173-D) Only five solar systems in Satania have more than two inhabited worlds (359-D). To have two among 16 worlds inhabitable by Adjuster-fusing beings, plus a third Spirit-fusing order non-breather world, one of just nine in Satania, plus future evolutionary potential, must constitute Monmatia to be an exceptionally rich solar system indeed.