

Freakier Orbits

The Whorl list — 1 messages, 1 voices, 05 Apr 2000

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Adam Stephanides — 05 Apr 2000, 10:08

Kieran Mullen wrote:

alga [actually, it was me] wrote:

And if Green orbited Blue, and conjunction occurred only every six years, that would mean that Green's orbital period around Blue was six times as long as Blue's around the Short Sun, which I doubt would be possible.

I don't think that is correct. Imagine two cars circling a race track. If one catches the other every six laps, then that means it is going $7/6$ (1.16) times as fast. If one were 6 times the speed of the other, it would pass it 6 times or so in one year.

Read what I wrote again. My reference to Green's period being six times as long applied to the case in which Green orbited Blue (or Green and Blue orbited each other) while Blue orbited the Short Sun.

mantis wrote:

Lately I've been thinking along the lines of those freaky orbits of Saturn's moons Janus and Epithemis (sparked into posting this by the refs to shepherd moons). Took me a few minutes just now, but I found a clean and easy reference:

'Co-orbiting satellites are another weird example of a resonance. Saturn's tiny moons Janus and Epithemis nearly share an orbit; but one never passes the other. They're forever going faster and slower in the orbit, approaching as though to pass a baton in a relay, only to drop back before getting close enough to touch. As seen from Saturn, they'd get closer, slow down, and then separate again as though they'd "bounced off" each other. Things would look even more bizarre from one of the moons themselves; you'd see the other moon approaching, but you'd slow down and it would speed up as you got closer, until finally it would flee out of sight. Then the whole pattern would repeat half an orbit later--but you'd have to go around to the other side of the satellite to watch it again.'

Stop the presses! While searching the web for a statement of Kepler's Third Law, I stumbled across the asteroid 3753 Cruithne. This asteroid's motion with respect to Earth is like that of Janus and Epithemis with respect to each other, but more complicated. To really understand it, you have to go to the asteroid's web page (aries.phys.yorku.ca/~wiegers/3753.html) and look at the diagrams there; but to quote the brief summary there: "there are two types of motion going on: 1) every year, the asteroid traces out a kidney bean, 2) over time, this kidney bean drifts along the Earth's orbit, tracing out a spiral which, when complete (after 385 years) fills in an overlapping horseshoe." Something like this, suitably jiggered, could take care both of the observed (see below) six-year frequency of conjunctions and of Green's visible movement across the sky at conjunction. Cruithne's orbit was described in a paper published in the June 12, 1997 *Nature*, in time for Wolfe to incorporate the information into OBW; and simpler "spiral horseshoe" orbits had been theoretically known before this, though none had been

observed.

Given the existence of "freaky orbits" like this, it's clear that untutored individuals like me are unqualified to speculate as to what orbital configurations might be stable. But this does bring up two more general issues (which had actually occurred to me before):

1) Horn has only been on Blue for about twenty years, and so has only observed three conjunctions. Given this, do we know that the conjunctions occur every six years? What I mean is that when Cruithne's "kidney bean" is at its closest to Earth, conjunctions take place every year, but as it draws away, there is a long period when conjunctions don't take place, following which they resume on the "opposite side" of Earth's orbit. Something like this would be consistent with Horn's observations. If so, it would be good news for the inhabitants of Blue.

2) Even if setting aside the question of Green's motion with respect to the stars, it's clear that configurations allowing two planets to conjoin every six years (or every six years-pause-six years, as above) are rare. That being so, it would be stupefyingly improbable if the _Whorl_ had ended up, purely by chance, at a system in which there are two habitable planets in such a configuration (let alone in which one of the planets is populated by vampires who can fly across space at conjunction). So far I've come up with three alternatives to such a mind-boggling improbability:

A) Typhon knew about the Blue-Green configuration (though not about the inhum, as has already been established) and for some megalomaniacal-tyrant reason deliberately chose to plant his colony on such a system. (Possibly to facilitate his colonists' future conquest of the companion planet; but if so, why was it made so difficult to use the landers to travel between Blue and Green?)

B) The inhum diverted the ship in midflight, as has already been hypothesized. (But if so, why didn't they reprogram the ship's computer to land on Green while they were at it, instead of giving it a choice?)

C) The Hierogrammates diverted the ship to Blue, to punish Typhon for his presumption and the inhabitants of the _Whorl_ for their idolatry, or for some other cosmically incomprehensible reason. <g>

--Adam

*This is WHORL, for discussion of Gene Wolfe's Book of the Long Sun.