

FROM VESTA TO CERES: PREDICTING SPECTACULAR DICHOTOMOUS CONVEXO- CONCAVE SHAPE FOR THE LARGEST MINI-PLANET IN THE MAIN ASTEROID BELT; Kochemasov G.G., IGEM of the Russian Academy of Sciences, 35 Staromonety, 119017 Moscow, kochem.36@mail.ru.

In compliance with the first theorem of the wave planetology –“Celestial bodies are dichotomous” [1-4 & others] – three largest asteroids of the main asteroid belt show striking tectonic similarity. Though not sharply imaged by the HST, and having differing sizes and compositions, they all show somewhat different hemispheres (Fig. 1, 2, 4,5). A flattening one side (up to development of a depression) is accompanied by a bulging of the opposite one. This dichotomous shape feature is a fundamental tectonic character of celestial bodies caused by their movements in non-circular keplerian orbits with alternating accelerations: speeding + and braking -. Arising inertia-gravity forces warp any moving and rotating (but all bodies move and rotate!) bodies in four ortho- and diagonal directions. An interference of these directions brings about uprising (+), subsiding (-) and neutral (0) regularly disposed tectonic blocks (Fig. 3). They have a stationary character (move up and down with certain periods), the same as giving them rise inertia-gravity waves are stationary waves (endless movements in non-circular orbits make them standing). Sizes of the tectonic blocks depend on lengths of the warping waves. The most pronounced tectonic wave produced feature is the tectonic dichotomy caused by the longest in any body fundamental wave 1 (long $2\pi R$, where R is a body radius). To think that this ubiquitous dichotomy is a result of a random giant impact hitting any body in a special place is completely unacceptable.

The theorem 3 of the comparative wave planetology [1-4] states: “Celestial bodies are granular”. Sizes of these tectonic granules are inversely proportional to orbital frequencies: higher frequency – smaller granule, lower frequency – larger granule. There is the following row of granule sizes (a half of a wavelength): Mercury $\pi R/16$, Venus $\pi R/6$, Earth $\pi R/4$, Mars $\pi R/2$, asteroids $\pi R/1$. It follows that in the asteroid belt there is a remarkable resonance 1:1 between the fundamental wave and an individual wave also long $2\pi R$. This causes an enormous scattering of planet building material from the main asteroid belt, impossibility of gathering a planet (no Phaethon is possible!) and severe flattening of asteroids of all sizes including the largest ones (all asteroids have a well known oblong shape). Normally, along with an oblong one observes a convexo-concave shape (the best studied example is the approaching Earth asteroid Eros) [5].

This severe resonance enhanced treatment causes visible distortion of not only relatively small bodies (less than 300-400 km across), that is widespread among celestial bodies of various classes [6, 7], but also the largest of them, more than about 500 km across. Thus, an oblong body of (1) Ceres has major/minor axes 898/788 km [8] or 970/930 km, according to J. Parker & Stern, and has a prominent dusky dark spot (Piazzi) from one side (Fig. 4). It occupies a significant part of the asteroid (a dwarf planet) – about 250 km, more than a quarter the size of Ceres and probably might be assigned to a depression (Fig. 4). Tectonically one may compare this depression with the Pacific basin hollow on Earth [9]. A NASA HST color image of Ceres PIA10235 (Fig. 5) shows spectrally different regions: relatively red and blue, hinting on different types of material and compositional dichotomy.

(2) Pallas has the radii of 291 x 278 x 250 km [10] and also represents a dichotomous shape with one bulging hemisphere and the other antipodean one more flat and dark. (4) Vesta, about 525 km across, has a deep dark depression from one side opposed to a bulging shining hemisphere [11] (Fig. 1, 2). So, in all three cases of the largest asteroids there is one tectonic peculiarity clearly showing their dichotomous nature. Inferred impacts have nothing to do with this inherent to all heavenly bodies wave induced structurization. The dichotomy is caused by an interference of fundamental waves 1 (Fig. 3) weaving a structural tetrahedron. The first overtone wave 2 makes a structural octahedron (a diamond shape). So, a new planetologic thinking is strongly required. The pronounced dichotomy predicted for Ceres will strengthened this conviction.

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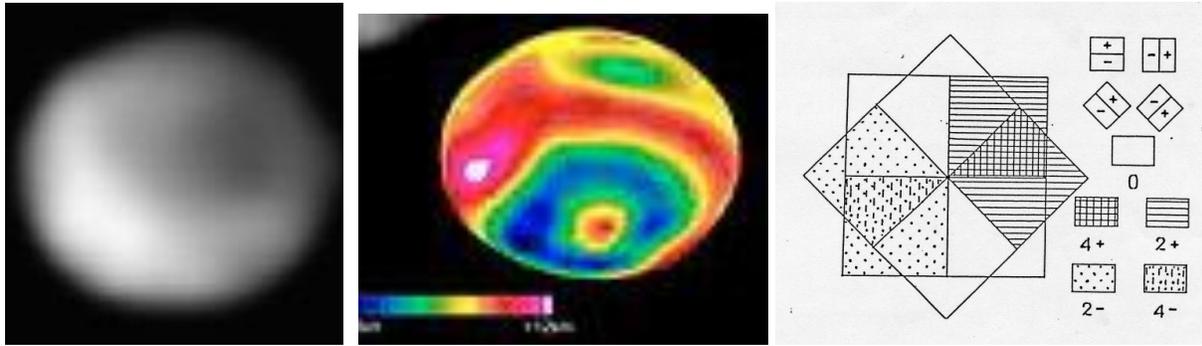


Fig. 1.-left. (4)Vesta. A dichotomous celestial body. Press release #: STScI – PR95-20. Asteroid or mini-planet? A portion of HST.WFPC2, B. Zellner, NASA, April 19, 1995. **Fig. 2.**-centre. Large depression on Vesta (Asteroid-vesta-three-views-bg.jpg). **Fig. 3.**-right. Graphical presentation of sectors and dichotomy formation by interference of quantum-mechanical waves (+ or -) of 4 directions.

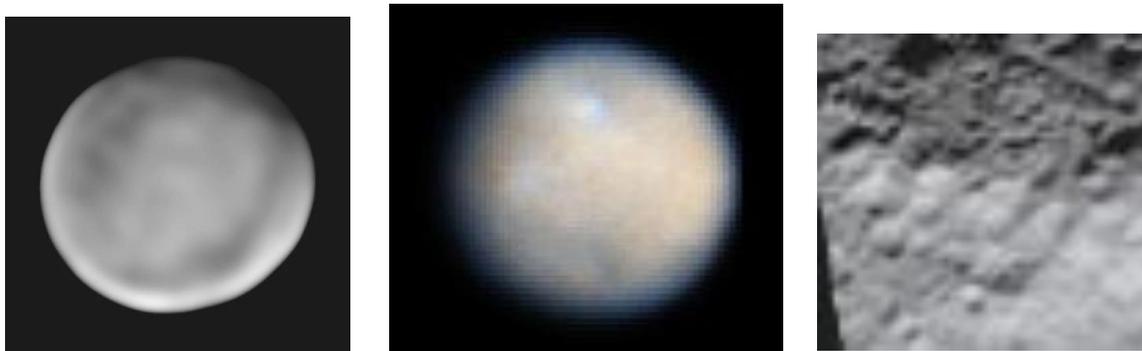


Fig. 4.-left. (1)Ceres. Piazzini basin – the huge darker oval. Credit: Keck Observatory by C. Dumas (NASA-JPL). **Fig. 5.**-centre. (1)Ceres. Dwarf planet. PIA10235. Credit: NASA/ESA/J. Parker, P. Thomas, L. McFadden, and M. Mutchler and Z. Levay. **Fig. 6.** Vesta, a portion of IOTD-104-page.jpg. A grid of non-impact craters long ~ 20 km.

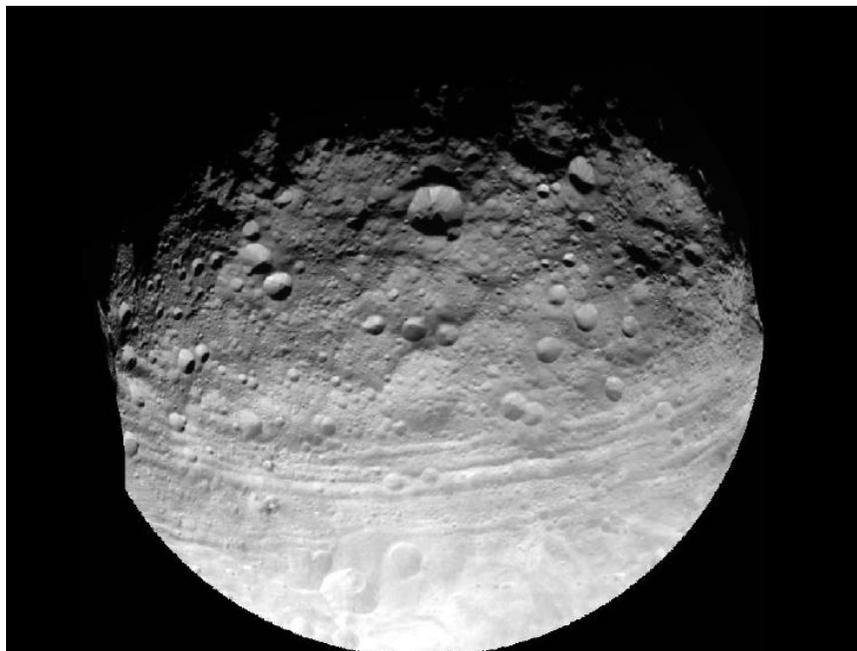


Fig. 7. Vesta, 595403main_pia14894-43_946-710.jpg

Many vestan craters considered as impact features have the wave interference nature. This is especially true for chains and regular grids of subdued ring structures often observed on vestan surface (Fig. 6). Partially imaged the northern hemisphere shows clear signs of chess-board structure developed due to intersecting waves (Fig. 7). Bordering checks intersecting lines sometimes are marked by crater chains obviously related to degassing (compare with the comet Hartley2 core).