Ostomachion

Ostomachion, also known as *loculus Archimedius* (Archimedes' box in Latin) and also as *syntomachion*, is a mathematical treatise attributed to Archimedes. This work has survived fragmentarily in an Arabic version and a copy, the *Archimedes Palimpsest*, of the original ancient Greek text made in Byzantine times.[1] The word Ostomachion has as its roots in the Greek Ὀστομάχιον,[2] which means "bone-fight", from ὀστέον (*osteon*), "bone"[3] and μάχη (*mache*), "fight, battle, combat".[4] Note that the manuscripts refer to the word as "**Stomachion**", an apparent corruption of the original Greek. Ausonius gives us the correct name "Ostomachion" (*quod Graeci ostomachion vocavere*, "which the Greeks called ostomachion"). The Ostomachion which he describes was a puzzle similar to tangrams and was played perhaps by several persons with pieces made of bone.[5] It is not known which is older, Archimedes' geometrical investigation of the figure, or the game. Victorinus,[6] Bassus[7] Ennodius[8] and Lucretius[9] have talked about the game too.
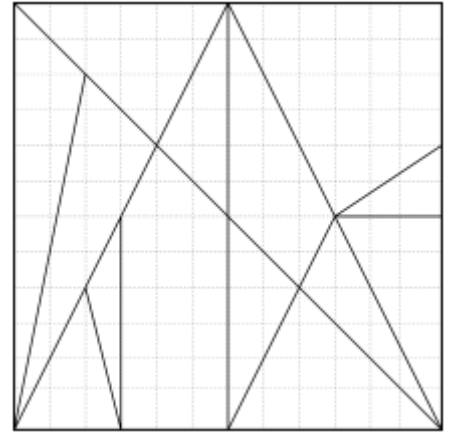
Ostomachion (after Suter; this version requires a lateral stretch by a factor of two to match that in the Archimedes Palimpsest)

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Ostomachion (after Suter): square reformed with some pieces turned over

Game

The game is a 14-piece dissection puzzle forming a square. One form of play to which classical texts attest is the creation of different objects, animals, plants etc. by rearranging the pieces: an elephant, a tree, a barking dog, a ship, a sword, a tower etc. Another suggestion is that it exercised and developed memory skills in the young. James Gow, in his *Short History of Greek Mathematics* (1884), footnotes that the purpose was to put the pieces back in their box, and this was also a view expressed by W. W. Rouse Ball in some intermediate editions of *Mathematical Essays and Recreations*, but edited out from 1939.

The number of different ways to arrange the parts of the Stomachions within a square were determined to be 17,152 by Fan Chung, Persi Diaconis, Susan P. Holmes, and Ronald Graham, and confirmed by a computer search by William H. Cutler.[10] However, this count has been disputed because surviving images of the puzzle show it in a rectangle, not a square, and rotations or reflections of pieces may not have been allowed.[11]

References

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6. Ars grammatica, III, 1 in *Grammatici latini*, Lipsiae in aedibus R. G. Teubneri, 1857, vol. 6, part 1, pagg. 100-01 (https://archive.org/stream/p1grammaticilatini06keil#page/100/mode/2up).

7. De metris, 9 in *Grammatici latini* cit., pagg. 271-72 (https://archive.org/stream/p1grammaticilatini06keil#page/270/mode/2up),

8. *Carmen CCCXL (2, 133)* in Monumenta Germaniae Historica, auctores antiquissimi, vol. 7, Magni Felicis Ennodi opera, Berolini apud Weidmannos, 1885, pag. 249 (http://www.dmgh.de/de/fs1/object/display/bsb00000796_00316.html?sortIndex=010%3A010%3A0007%3A010%3A00%3A00&contextSort=sortKey&contextType=scan&contextOrder=descending&context=ostomachio) Archived (https://web.archive.org/web/20160306033650/http://www.dmgh.de/de/fs1/object/display/bsb00000796_00316.html?sortIndex=010:010:0007:010:00:00&contextSort=sortKey&contextType=scan&contextOrder=descending&context=ostomachio) 2016-03-06 at the Wayback Machine

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10. Kolata, Gina (December 14, 2003), "In Archimedes' Puzzle, a New Eureka Moment" (https://www.nytimes.com/2003/12/14/us/in-archimedes-puzzle-a-new-eureka-moment.html), *The New York Times*

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Further reading

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- Reviel Netz & William Noel, *The Archimedes Codex* (Weidenfeld & Nicolson, 2007)
- J. Väterlein, Roma ludens (Heuremata - Studien zu Literatur, Sprachen und Kultur der Antike, Bd. 5), Amsterdam: Verlag B. R. Grüner bv 1976

External links

- Heinrich Suter, Loculus (http://quod.lib.umich.edu/u/umhistmath/)
- James Gow, Short History (http://quod.lib.umich.edu/u/umhistmath/)
- W. W. R. Ball, Recreations and Essays (https://archive.org/details/mathematicalrecr00ballrich/)
- Ostomachion, a Graeco-Roman puzzle (http://www.archimedes-lab.org/latin.html#archimede)
- Professor Chris Rorres (https://web.archive.org/web/20070807013521/http://www.mcs.drexel.edu/~crorres/Archimedes/Stomachion/intro.html)
- Kolata, Gina. "In Archimedes' Puzzle, a New Eureka Moment." *The New York Times*. December 14, 2003 (https://query.nytimes.com/gst/fullpage.html?res=9D00E6DD133CF937A25751C1A9659C8B63)
- A tour of Archimedes' Stomachion (http://math.ucsd.edu/~fan/stomach/), by Fan Chung and Ronald Graham.
- Ostomachion and others tangram (http://pecesjocdetangr.sourceforge.net/applet/appletpeces.html) Play with 38 Tangram games online: more that 7,300 shapes proposed by the program.