

Proportion of the Golden Section in the Structure of the Eye

Rudkovska OD*

Optics "Yasny zir", Storozhynets, Chernivtsi Region, Ukraine

***Corresponding Author:** Rudkovska OD, Optics "Yasny zir", Storozhynets, Chernivtsi Region, Ukraine.

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Abstract

"Golden section" is the law of structural harmony of systems, including the human body. In the structure of the human eye, there are proportions of the "golden section" (in the structure of the cornea, lens, retina). According to the author, this allows the eye to work ergonomically: to obtain the maximum result with minimum energy consumption.

Keywords: "Golden Section"; Eye; Ergonomics

The proportions of harmony and beauty were known even in ancient Greece. They were called Divine. They are present in the architecture of galaxies, the structure of atoms, and the structure of human DNA. The term "golden section" was introduced by Leonardo da Vinci. "Golden ratio" is the law of structural harmony of systems. The human body also belongs to such a system. V. I. Vernadskyi and N. Rashevsky hypothesized that the structure of the human body is such that the body performs its functions adequately and with minimal consumption of energy and material [1].

The value of the "golden section" ($x_1/x_2 = x_2/x_1 = 0.618$) is one of the important constants of nature, similar to the number π , the basis of natural logarithms e and others.

For example, during the examination of cardiac surgical patients [2,4], the relative stability of the ratio of diastolic blood pressure (DBP), systolic blood pressure (SBP) and pulse pressure (PP) was shown: $DBP/SBP = PP/DBP = 0.62$, i.e. about to the "golden ratio" value.

Another example. The ratio of the thickness of the diaphyseal part of the fibula to the thickness of the diaphyseal part of the tibia in young men approaches the value of the "golden section" ratio: $1.74 \text{ cm} / 2.79 \text{ cm} = 0.624$ [3].

In the structure of the organ of vision, the proportion of the "golden section" can also be traced. So, the thinnest and thickest parts of the cornea are correlated as $0.6 \text{ mm} / 1 \text{ mm} = 0.6$.

The ratio of the radii of curvature of the back and front surfaces of the lens: $6 \text{ mm} / 10 \text{ mm} = 0.6$.

The 10 layers of the retina are divided by 2 sources of blood supply (the central retinal artery and the choriocapillary layer of the chorioid) into 2 segments: the inner (6 layers) and the outer (4 layers). Ratio: $6 \text{ layers} / 10 \text{ layers} = 0.6$.

In all three cases, the obtained results (0.6) are close to the value of the proportion of the “golden section” (0.618).

It is logical to assume that if the structural elements of the eye are built on the principle of harmony, then this should be reflected in their functions.

In our opinion, the “golden section” in the architecture of the cornea ensures its maximum mechanical stability; in the structure of the lens - causes such a configuration of the lens (lenticular), which provides the largest volume of accommodation with the smallest energy consumption of the ciliary muscle; in the structure of the retina - provides the best metabolism of retinal cells with a minimum number of blood vessels.

So, the presence of the “golden section” ratio in the structure of the eye enables it to function ergonomically. Let’s not forget that the “golden ratio” is the quintessence of beauty. Therefore, it is not surprising that the eyes, called to contemplate the beauty of the surrounding world, are themselves built according to the laws of this beauty.

Based on the above, it can be concluded that the divine proportions of the “golden section” in the architecture of the sky and the structure of the human eye are identical. This testifies to the unity of heavenly and earthly harmony and is another mathematical proof of the existence of the creator.

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