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Optical interpretation of the glass orb in Leonardo da Vinci's, Salvator Mundi

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Abstract:

A debate in scientific literature has arisen regarding whether the orb depicted in „Salvator Mundi" by Leonardo da Vinci was rendered in a optically faithful manner or not. The object of this research is the glass orb in „Salvator Mundi". In our view the orb in „Salvator Mundi" is heterogenous and reflects three aggregate state that are characteristic of our planet- air, water and land. In the left part of the orb, there is a deformation and enlargement of the image of the fold, which is the result of the refraction of a light, and which is characteristic of the fluid. In the right part, the image of the folds is not deformed behind the orb, which means there is air in this space. The part of the hand cluster that appears behind the orb is perceived as a solid substance – land.

Keywords: Salvator Mundi; glass orb; Leonardo da Vinci

1. Introduction: A debate in scientific literature has arisen regarding whether the orb depicted in „Salvator Mundi" by Leonardo da Vinciwas rendered in a optically faithful manner or not. Some hypothesize that this orb was solid crystal while other hypothesize that it was hollow, with competing explanations.

2. Materials and Methods: The object of our research is the glass orb in„Salvator Mundi". This painting of Christ, performed by Leonardo da Vinci in 1500was rediscovered and restored(Fig. 1).

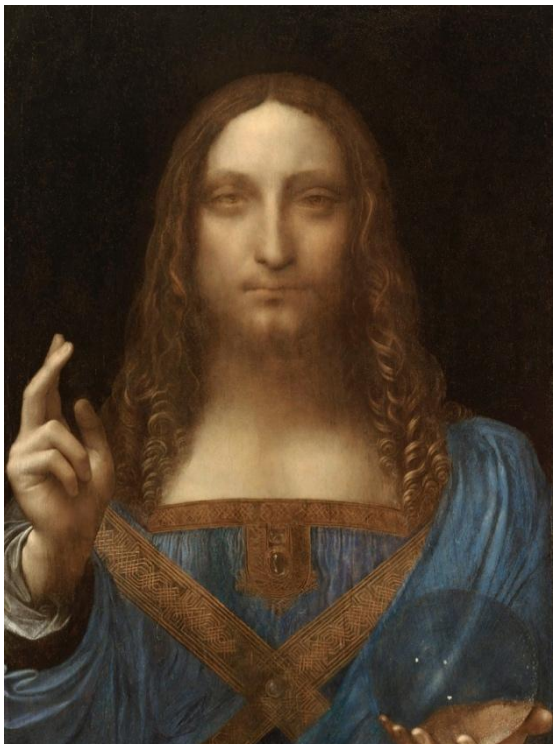

Fig. 1 *Salvator Mundi* by Leonardo da Vinci

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3. Results

In our view the orb in „Salvator Mundi" is heterogenous and reflects three aggregate state that are characteristic of our planet- air, water and land. In the left part of the orb, there is a deformation and enlargement of the image of the fold (Fig. 2), which is the result of the refraction of a light, and which is characteristic of the fluid (Fig. 3- W). In the right part, the image of the folds is not deformed behind the orb (Fig. 2), which means there is air in this space (Fig. 3- A). The boundary between the liquid and air is marked with a green line that coincides with the dark line in the painting (Fig. 2).The deformation of the image of the fold begins at exactly this line. The part of the hand cluster that appears behind the orb is perceived as a solid substance – land (Fig. 3- E).

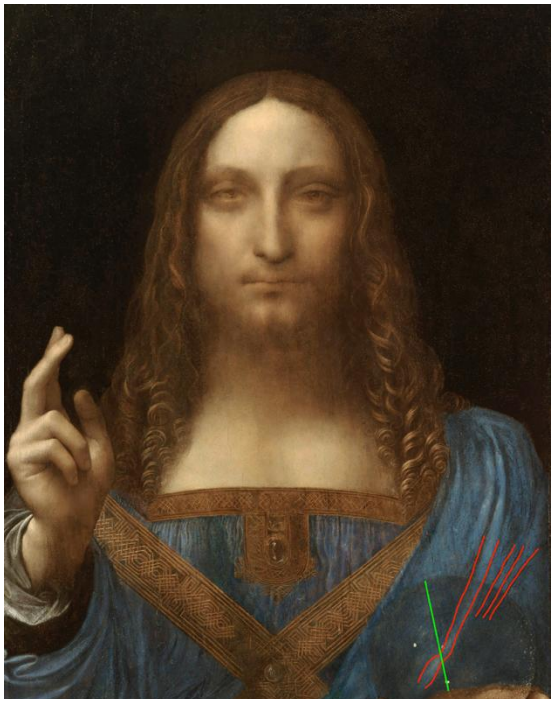

Fig. 2 Red lines- trajectories of the folds; Green line- the boundary between the liquid and air that coincides with the dark line in the painting

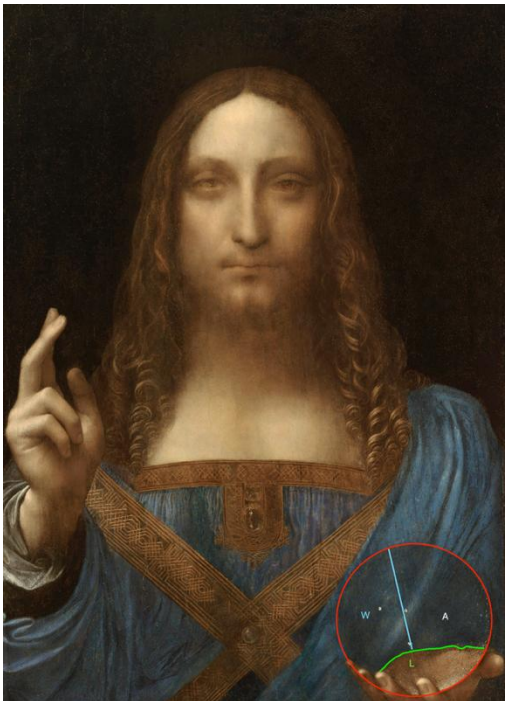

Fig. 3 A- air; L- land; W- water

Our attention was also drawn to the ratio of the dimensions of the three parts described above. We know that air on our planet has more volume than water, and water has more volume than land. This ratio is also revealed in the orb between air, liquid and solid substance.

The mysterious three spots that cause the difference of opinion between the researchers may be the Leonardo's reference to the fact that the orb consists of three parts.

We face one resistance. How can water and air be placed like this? We think Leonardo da Vinci emphasizes the omnipotence of Christ. He can break the laws of physics. Christ fully owns land, water and air.

4. Discussion

Painting „Salvator Mundi" looks straightforward at fir glance: a depiction of Jesus Christ in Renaissance-era clothing, raising one hand in blessing and holding a clear orb in the other. That orb defies the laws of optics, creating a controversy. Now, a new study argues that the orb may be a realistic depiction of a hollow glass ball (Pappas 2020).

The researchers of University of California used a computer-rendering technique to show that the appearance of the orb would have been physically possible in the real world, if the orb were made of thin blown glass (Liang 2019). Their experiments show that an optically accurate rendering qualitatively matching that of the painting is indeed possible using materials, light sources, and scientific knowledge available to Leonardo da Vinci circa 1500. They additionally tested alternative theories regarding the composition of the orb. Thisstudy provide empirical evidence that solid calcite balls are unlikely to produce images similar to the painting, and that the orb is instead hollow (Liang 2019).

In 1883, Richter published a compilation of Leonardo's notes, including drawings and English translation. These notes show, for example, that Leonardo had an understanding of light refraction (Richter 1883).

Kemp was not convinced by the study of Liang and his colleagues. In a section of his new book Kemp traces the context of the orb from entries in da Vinci's journals, finding that the artist had a fascination with rock crystals and their optics at the time the „Salvator Mundi" was painted. He also lists examples of paintings in which da Vinci tweaked the laws of physics and light to create a more pleasing composition (Kemp M 2020).

In 2010, Dr. Elliott discovered that the prominent triangle made by these star-like spots could be linked to a known observable star-pattern in the sky – that found in the Constellation of Leo the Lion. Photoshop was utilized to proportionally sizing and overlay the Leo Constellation of the modern sky chart atop Leonardo's crystal sphere; the findings was that the angles in both were a precise match, even to the congruence of relative sizes of Leonardo's painted stars and those in the actual Leo Constellation.

5. Conclusion

In our opinion, the orb includes liquid, air, and solid substanceis a symbol of earth. The three spots may be the Leonardo's reference to the fact that the orb consists of three parts.

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