

## A NEW THEORY REGARDING THE POSSIBLE PRESENCE OF HIDDEN ANATOMY IN MICHELANGELO'S PAINTINGS ON THE SISTINE CHAPEL (THE SEPARATION OF LIGHT FROM DARKNESS)

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The Sistine Chapel in Vatican City (Rome) is without a doubt one of the most prized landmarks in the history of art. Named after Pope Sixtus the IV<sup>th</sup> who restored it between 1477 and 1480, the fame of the Sistine Chapel lies in the fact that it houses the Papal conclave and in the inestimable value and age of the frescos that decorate the interior. The painting of the Sistine Chapel took place between 1508 and 1512 under the patronage of Pope Julius II (1443–1513) who commissioned Michelangelo di Lodovico Buonarroti Simoni (1475–1564) to paint the scenes from the Book of the Genesis on the ceiling of the Chapel.

The following work illustrates the opinions of the authors, who believe they have correctly identified the clear and certain illustrations of the Pons of Varolio, IV<sup>th</sup> ventricle and the Corpus Callosum in Michelangelo's fresco named "The Separation of Light and Darkness". The conclusions show that Michelangelo was a master anatomist and the whole fresco "The separation of light from darkness" is built out of human neural structures united by his imagination.

The authors believe that by using an image of the central nervous system, Michelangelo set great emphasis on the anatomy of the human nervous system, associating it with the image of God. The idea that mankind had the "divine luck" to possess one of the most powerful information systems ever known (the human nervous system) would have shown everybody, in the opinion of the authors, that the two most important things in the definition of man as the supreme being on Earth were God (as a superior life-giving entity) and His greatest creation, the human brain.

*Keywords:* Michelangelo, Vatican, Sistine Chapel, Neuroanatomy, Genesis God, Art.

Initiated<sup>1</sup> in the 14<sup>th</sup> century in Florence, Italy<sup>5</sup>, the Renaissance (a term first used by Jules Michelet and Jacob Burckhardt) represented for nearly three centuries a cultural movement in Europe which was centered around human conscience and the reconsideration of the legacy left behind by the forefathers of what was then called a "modern culture". If for example men like Michelet<sup>12</sup> or Burckhardt would have compared the Renaissance to "a veil being removed from man's eyes, allowing him to see clearly"<sup>4</sup> there are other individuals who would rather associate the Renaissance with the

worsening of the most negative social factors: poverty, warfare, feudalism, corruption, witch hunts or the birth of Machiavellian politics.

Whether we are talking about the mentality which encouraged people to develop a certain degree of knowledge regarding every possible field of knowledge, like foreign languages or physics, engineering, arts, architecture, mathematics, astronomy, poetry and soon, or whether we're considering the great medical discoveries such as Harvey's blood circulation (1628) or the first attempts for posterior spinal fixation, arterial ligation (used first by Galen and reintroduced by Ambroise Paré in 1564), bullet wounds treatment

and successful amputations, invoked by Ambroise Paré (1510–1590) in 1575 (the year when his complete works were published), one thing is certain: the Renaissance left a tremendous mark on the history of mankind through the invaluable works of art that saw daylight back then, through the scientific discoveries that enlightened mankind and enabled further progress. This is the case of Antoine Philips van Leeuwenhoek's (1632–1723) microscope or Johannes Gutenberg's printing press (1398–1468) and last, but not least, through the mysteries and speculations that revolve nowadays around certain figures such as Leonardo da Vinci (1452–1519) or Michelangelo Buonarroti and their masterpieces. In the analysis of Michelangelo's masterpieces on the ceiling of the Sistine Chapel,

the authors wanted to take a second look at two well-established hypotheses that demonstrated Michelangelo's knowledge of neuroanatomy, while at the same time trying to integrate these theories into a bigger picture, explaining why an artist like Michelangelo would integrate his anatomical knowledge into religious paintings.

The first theory we approached was published in 1990 when Frank Meshberger<sup>11</sup> in his paper called "An interpretation of Michelangelo's Creation of Adam based on neuroanatomy", considered that the fresco "The Creation of Adam" depicts a human brain as central element, concealed by the presence of a silhouette representing God and the shroud around Him (Fig. 1).

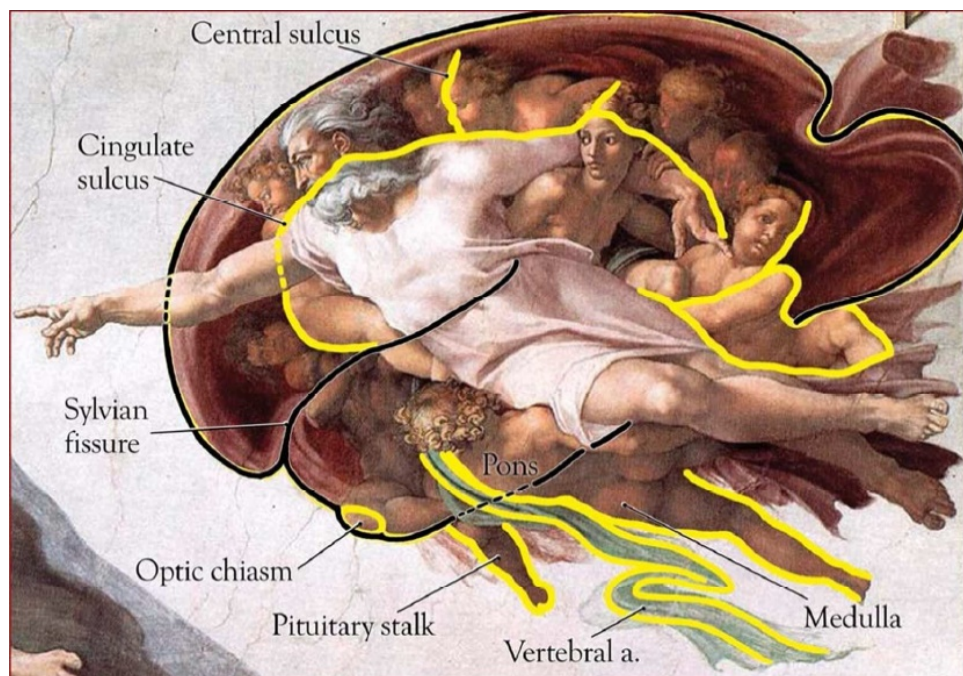


Figure 1. Frank Meshberger's interpretation [11] of the fresco "The creation of Adam".

While reading Meshberger's paper, one has the opportunity to notice the presence of the optic chiasmus, the pituitary stalk, the pons of Varolio, the medulla oblongata, the cervical medulla, the vertebral and basilar arteries, the cingulate and the central sulcus and last but not least the Sylvian fissure. A visionary and very well argued idea, this hypothesis caught the attention of the vast public, and, was accepted as valid. The success of this first attempt at deciphering the frescoes of Michelangelo encouraged the appearance of new researches and studies. In 2010, twenty years after Meshberger published his discovery, two

researchers, Ian Suk and Raphael Tamargo<sup>14</sup>, from the John Hopkins University School of Medicine discovered new elements concerning neuroanatomy in Michelangelo's paintings.

This time, the fresco "The Separation of Light and Darkness" was involved. As the two authors stated, in this fresco, Michelangelo concealed the image of a brainstem, the cranial base systems, a segment from the medulla and an image of the optic chiasmus (in the form of the letter "Y") (as depicted first in DaVinci's sketches) and the optic globes (Fig. 2). This idea represented the second theory the authors wanted to examine. The discoveries

mentioned above later proved to be strong arguments for the idea that, despite what was believed until then, Michelangelo was in fact an exquisite anatomist, way ahead of his time, always updated with the works of his fellow artists and anatomists – such as DaVinci, and, despite the strong suggestions that the Catholic Church had forbidden dissections of human beings, exceptions were indeed made – an idea first suggested by the work of Ascanio Condivi (1525–1574) who was Michelangelo's biographer<sup>6</sup>.

The articles about Michelangelo's hidden anatomy didn't stop here however, as many other authors came with their own personal contributions. Eknayan *et al.*<sup>7</sup> for example, proved that Michelangelo fused his knowledge of anatomy and physiology in an emblematic representation of kidney function in his rendering of the events that involve the Congregation of the Waters. Another author who came up with an interesting idea was Bondeson<sup>2</sup>, who suggested that in "The Separation of Light from Darkness" Michelangelo painted God suffering from goitre.

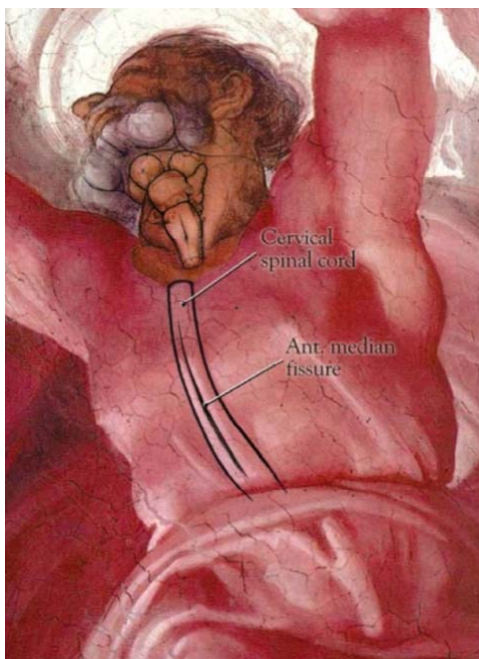


Figure 2. The hidden elements discovered by Suk and Tamargo<sup>14</sup>.

The ideas which the authors present target the same fresco as Ian Suk and Raphael Tamargo's paper does – "The Separation of Light and Darkness". From the perspective of the chronology of the Genesis, the fresco is the first of nine central panels that run along the center of Michelangelo's Sistine Chapel ceiling and depict scenes from the

Book of Genesis. Michelangelo probably completed this painting in the summer of 1512, the last year of the Sistine Chapel ceiling project. It is one of the five smaller scenes that alternate with four larger ones. "The Separation of Light from Darkness" is based on verses 3, 4 and 5 from the first chapter of the Book of Genesis<sup>15</sup>.

3. *And God said, "Let there be light," and there was light.*

4. *God saw that the light was good, and He separated the light from the darkness.*

5. *God called the light "day," and the darkness He called "night." And there was evening, and there was morning – the first day.*

Although in the terms of the Genesis chronology the fresco is the first of nine central panels along the Sistine Chapel ceiling, "The Separation of Light from Darkness" was the last fresco painted by Michelangelo on the Sistine Chapel and the most important of the nine pieces as art critics have called it<sup>3, 13</sup>. It is important to mention as well the fact that this fresco is placed directly above the altar of the chapel<sup>14</sup> and is basically the last fresco that visitors of the chapel are able to see, hence its great value. One might actually believe that the elements concealed in the fresco might actually be a direct message from Michelangelo to the future generations.

According to the Gestalt laws of grouping humans naturally perceive objects as organized patterns and objects. The Gestalt laws of grouping are organized in 6 categories approaching Proximity, Similarity, Closure, Good Continuation, Common Fate, and Good Form.<sup>1, 8, 9, 16</sup> According to the Gestalt principle of closure, the human mind has a tendency to see complete figures or forms even if a picture is incomplete or partially hidden by another object. For example, if part of a shape's border is missing people still tend to see the shape as completely enclosed by the border and ignore the gaps. This reaction stems from our mind's natural tendency to recognize patterns that are familiar to us and thus fill in any information that may be missing.

Closure is thought to have evolved from ancestral survival instincts in that if one was to partially see a predator their mind would automatically complete the picture and know that it was a time to react to potential danger even if not all the necessary

information was readily available. Under these circumstances the authors feel obliged to mention that the elements they present to be anatomical depictions are clearly outlined by lines of paint or variations of shades or color. In this paper there is not a single element which cannot be perfectly pinpointed by the human eye.

To facilitate a better understanding of this presentation, the authors have divided the image of the fresco (Fig. 3) into an area of interest noted (A), an area of interest noted(B) and an area of interest noted (C). These three main focus areas represent the central points of our article as follows.

The authors consider area (A) to be the illustration of a sagittal section through the fourth

ventricle, the area (B) to be the illustration of a sagittal section through the pons of Varolio and the area (C) to be the mirrored illustration of a sagittal section through the corpus callosum. Between elements A, B and C an observer could also notice around formation (Fig. 6, element a) – easily identifiable through its correspondence with the optic chiasmus identified by Meshberger *et al.*<sup>4</sup> The authors can only speculate however that the round formation might be a depiction of the medial wall of the human thalamus as it corresponds to the local anatomy and the methods that need to be used to achieve a perfect delimitation of the thalamic nuclei in any dissection were simply unavailable at the time.

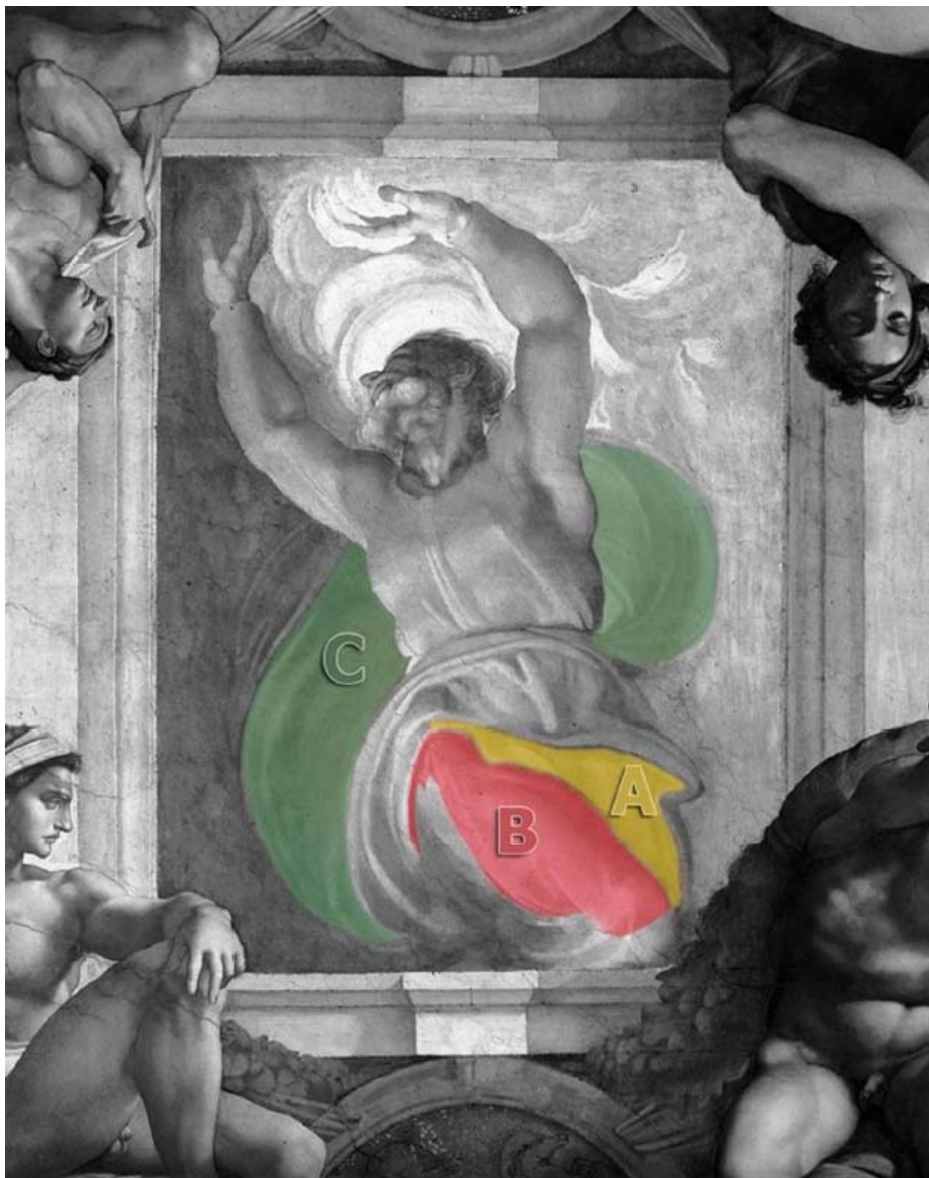


Figure 3. The main elements the authors consider to appear in the fresco.

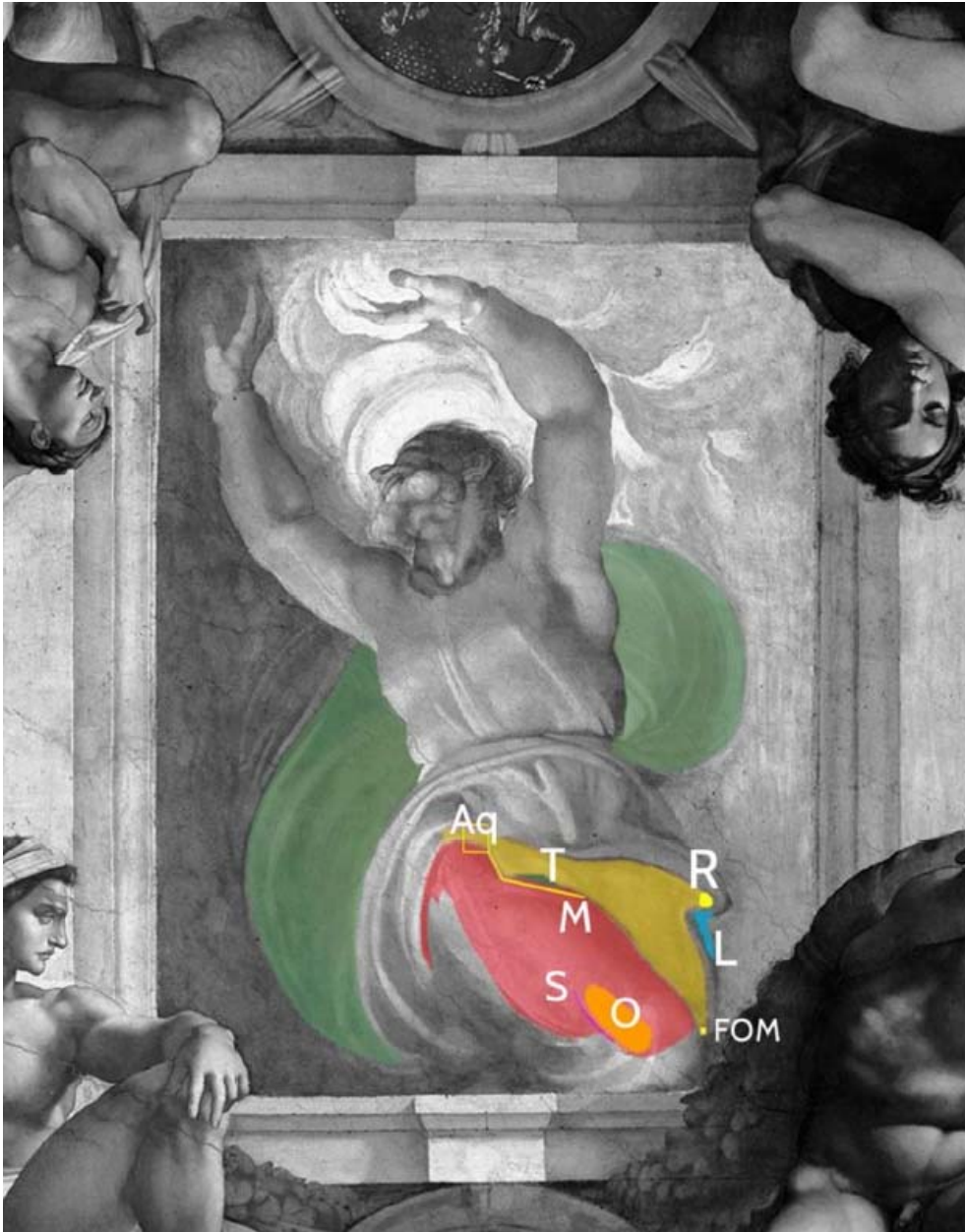


Figure 4. Characteristic anatomic elements in Michelangelo's fresco.

The figure of God appears in the fresco to be seen from a 3/4 artistic perspective, and even though all the other silhouettes painted by Michelangelo in this position, throughout the Sistine Chapel, show the presence of both thighs – the left and the right one – the figure of God depicted in “The Separation of Light from Darkness” seems to show only the right thigh (see focus area B), while the left one is replaced with a profound shadow that nobody has analyzed – see focus area A. As anatomic integrity prevails in the paintings of the Sistine Chapel the authors found it difficult to believe that in the most important painting on the ceiling of the Sistine Chapel, Michelangelo would

have forgotten or overlooked such an important detail as God's leg. The authors took a closer look at that region, considering the most minute color variations and shapes (Fig. 4).

The area (A) has a triangular aspect, with the basis on the right thigh of God (area B), and with the tip pointing upwards and towards the lateral right border of the fresco. The upper right tip of the triangular area (A) shows a recessus noted (R) that we consider to be the infundibulum of the 4<sup>th</sup> ventricle. Furthermore, it appears that the triangular profile resembles that of the 4th ventricle as well. By examining the fresco, the authors found that the right thigh of God bears four important landmarks.

The first one, noted (S) appears medially and we consider it to be an oblique sulcus, the collateral anterior sulcus, passing in front of a prominent ovoid formation (O) considered to be the pontine olive. Element (M), the third one represents the infero-lateral margin of the rhomboid fossa, while element (T) is considered to be the tip of the calamus scriptorius, positioned within the rhomboid fossa (Fig. 4).

Another possible argument sustaining the theory is the strange shape of God's right thigh in the fresco. Towards the hip, the thickness of element

(B) is not very pronounced and at the same time the element is accompanied by a series of various lines, While approaching the knee, the thickness of God's thigh (area B) remains constant, then it gets thicker and then it suddenly drops very close to the knee projecting itself after a concave line, with the concavity pointing upwards. The described pattern could resemble the profile of the Brainstem and Pons of Varolio (Figs. 5, 6). However perfect anatomical over lapping with the real aspect of the pons is unachievable.

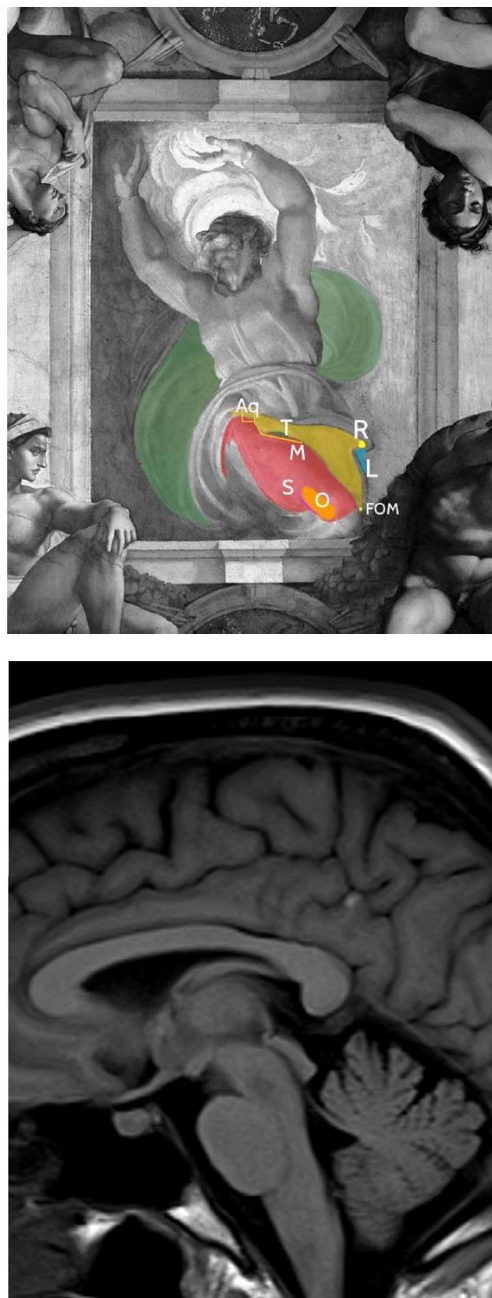


Figure 5. Comparison between the anatomy and our ideas. Note the close anatomical relationships and their resemblance to the authors' illustration.

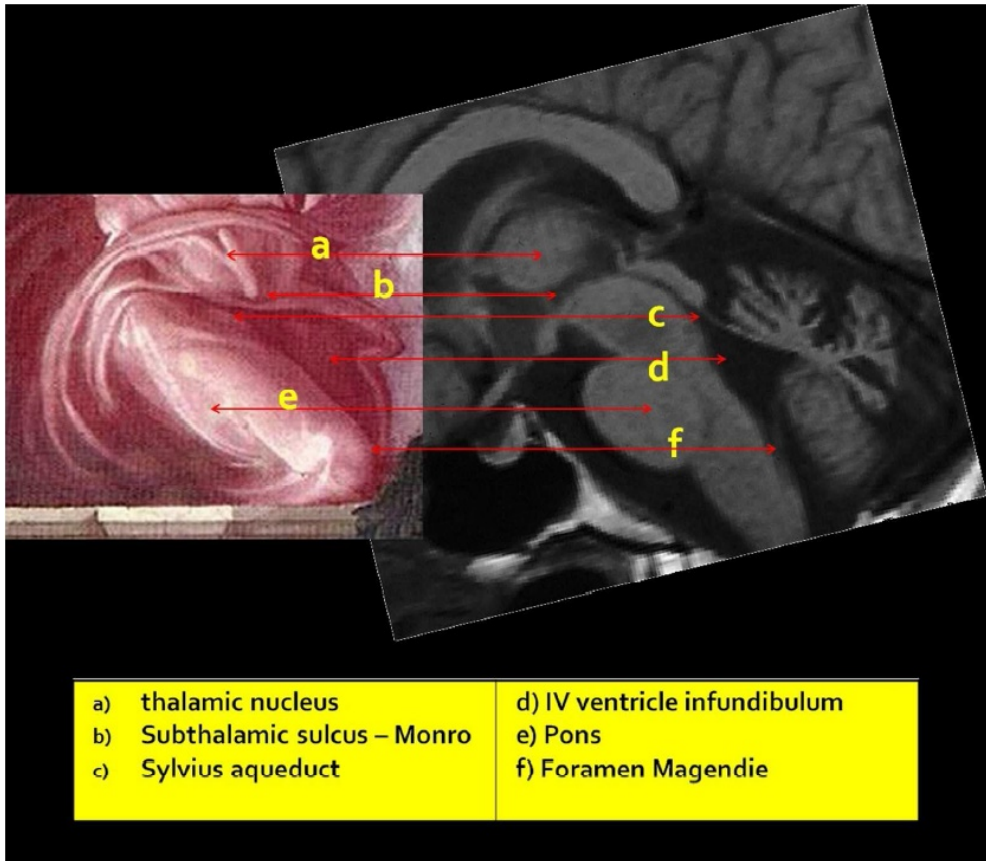


Figure 6. Comparison between Michelangelo's fresco and an MRI.  
Note the correspondence.

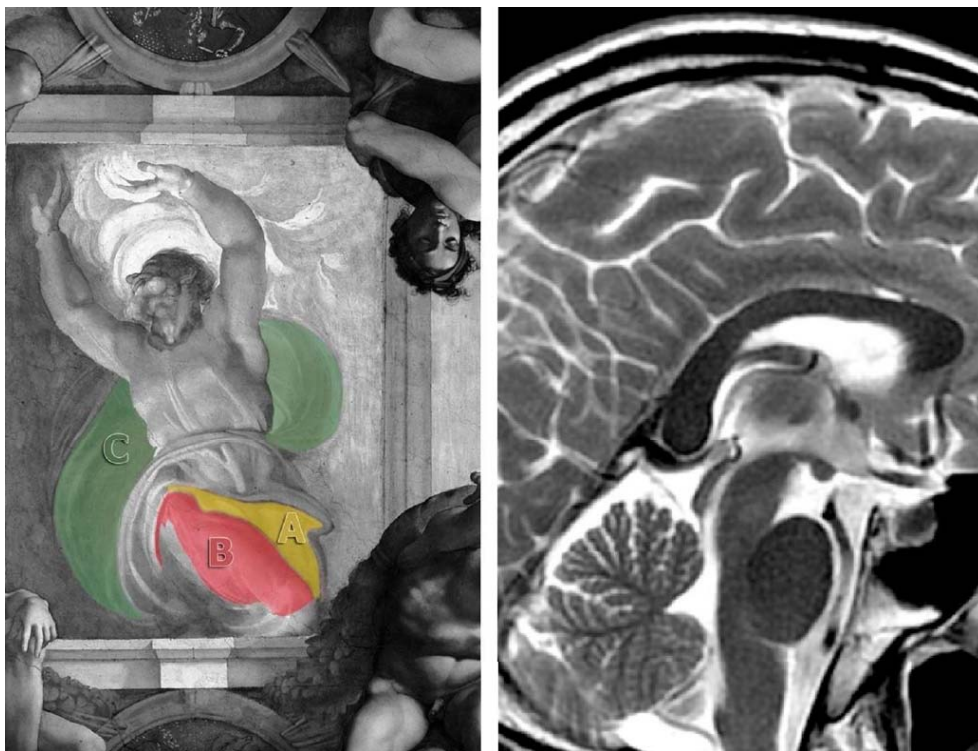


Figure 7. Comparison between Michelangelo's fresco and a horizontally flipped MRI.  
Note the resemblance of Michelangelo's element C and the corpus callosum on the MRI.

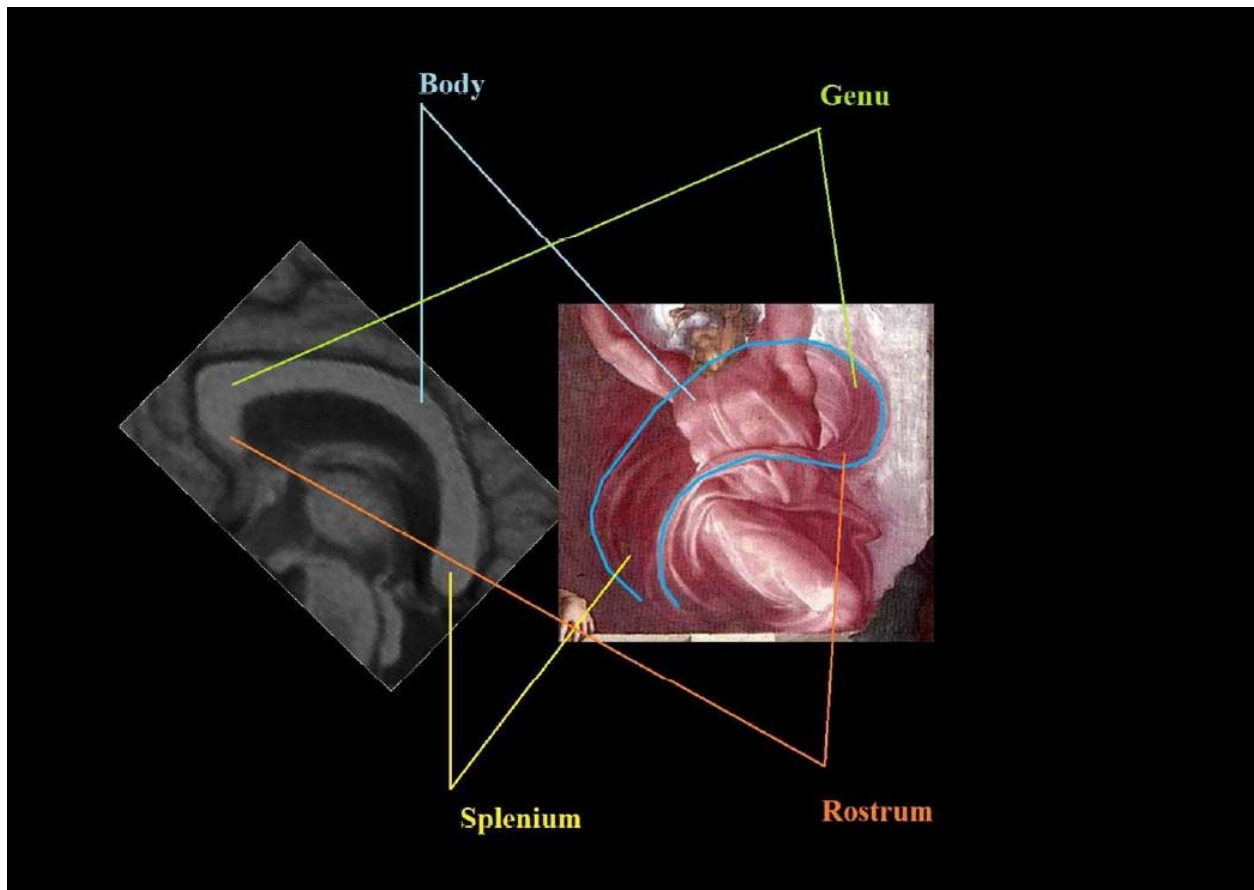


Figure 8. Detailed comparison between an MRI image of the corpus callosum and Michelangelo's fresco.

At the borderline between the formations B and C, and above the tip of the Calamus Scriptorius, lies what the authors consider to be the Sylvian aqueduct (noted Aq). This element has a correct anatomic position, continuing the 4<sup>th</sup> ventricle upwards and having its trajectory drawn on the dorsal surface of the brainstem.

To further reinforce the idea that the 4<sup>th</sup> ventricle is indeed concealed, the authors describe what appears to be the inferior cerebellar lake (L) and the foramen of Magendie (FOM), both of them present here as a doubling of the shadow immediately inferior to the ventricular infundibulum and a sudden narrowing of what is supposed to be the ependymary canal. These elements are as well in strict correspondence with the anatomy of the area.

Another interesting aspect that the authors approached is the shape of the shroud that engulfs God (focus area C). The authors have analyzed its peculiar outline and concluded that it could be considered the mirror image of a corpus callosum. It presents a convex superior surface and a concave inferior one, a protruding anterior extremity and a thin posterior one. If one was to compare the corpus

callosum in situ with the image on the fresco, the genu, splenium, body and rostrum would easily be visible. The anatomic position of the corpus callosum is correct<sup>10</sup> however given that its orientation is reversed, this idea is only a biased speculation. The authors consider this fact to be the result of Michelangelo's imagination that simply took the corpus callosum and flipped it horizontally, fitting it in the image of the fresco (Fig. 7)

The authors' ideas are that there is quite a big possibility that Michelangelo intended to suggest that the brain is used to process information, which is the fundament of creation and last but not least to connect with other beings and even God.

Religious texts, such as the Bible, say that God made Adam out of dust and gave him the breath of life. The "breath of life" might actually stand for the gift of reasoning – implicitly the superior nervous system. In the authors' opinion the embedding of the neuroanatomy elements described above has an obvious meaning: Michelangelo's genius considered that the Creation of Man coincides with the moment of the appearance of logical reason and the beginning of intellectual development.



Furthermore Michelangelo saw the importance of the Central Nervous System and its functions and associated it with the image of God. It's in this way that Michelangelo states the Brain is the most important organ in the human body and the building block of human evolution.

Given the two previous interpretations of the fresco and the authors' analysis the obvious conclusions show that Michelangelo was indeed a master anatomist and the whole fresco "The Separation of Light from Darkness" is built entirely out of neural structures united and blended by his imagination. The authors consider that the whole image of the fresco is a tribute brought to the image of God and his greatest creation – mankind and implicitly the human brain. In this fresco Michelangelo set a great emphasis on the role of the human nervous system, by associating it with the image of God, and the idea that mankind had the divine chance to evolve having one of the most powerful informational systems ever known. As god created man by His own appearance so will man follow in His footsteps. Man will use his God-Given creativity and further contribute to the progress of the species. The authors feel entitled to speak of a "Code" of Michelangelo, as he masterfully hid in his frescoes various elements of anatomy.

This "code" makes a strong analogy between God and mankind and stands as proof for the importance of the creativity of man and the transmission and processing of information that take place in the brain, processes that represent the basis for the evolution of man into the dominant species on Earth.

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