

HIDDEN ANATOMY IN THE SISTINE CHAPEL CEILING: AN OVERVIEW

The Sistine Chapel vault (Vatican City), which rises 20 metres above the main floor, is adorned with an 800-m² fresco, painted by Michelangelo Buonarroti between the years 1508 and 1512, and “cleaned” in 1980-1999. The pictorial scheme is made up of nine central panels featuring biblical narratives, surrounded by 12 prophetic figures (seven Prophets and five Sibyls), eight triangular spandrels, and, above the windows, 14 lunettes and four corner pendentives.

■ Central panels (c)

- c1** The Separation of Light from Darkness
- c2** The Creation of the Sun, Moon and Plants
- c3** The Separation of Land and Water
- c4** The Creation of Adam
- c5** The Creation of Eve
- c6** The Original Sin and Banishment from Garden of Eden (or The Temptation, or Fall of Man, and Expulsion from Paradise)
- c7** The Sacrifice of Noah
- c8** The (Great) Flood
- c9** The Drunkenness of Noah

■ Sybils and Prophets (p)

- p1** Prophet Jonah
- p2** Libyan Sibyl
- p3** Prophet Daniel
- p4** Cumaean Sibyl
- p5** Prophet Isaiah
- p6** Delphic Sibyl
- p7** Prophet Zechariah
- p8** Prophet Joel
- p9** Erythraean Sibyl
- p10** Prophet Ezekiel
- p11** Persian Sibyl
- p12** Prophet Jeremiah

■ Spandrels (s)

- s1** Above Jesse, David, Solomon lunette
- s2** Above Asa, Jehoshaphat, Jehoram lunette
- s3** Above Hezekiah, Manasseh, Amon lunette
- s4** Above Josiah, Jehoichin, Shealtiel lunette
- s5** Above Zerubbabel, Abiud, Eliakim lunette
- s6** Above Uzziah, Jotham, Ahaz lunette
- s7** Above Rehoboam, Abijah lunette
- s8** Above Salmon, Boaz, Obed lunette

■ Pendentives (a)

- a1** The Brazen Serpent
- a2** Judith and Holofernes
- a3** David and Goliath
- a4** The Punishment of Haman

[The numbers are ordered in an anticlockwise direction from the altar in the architectural scheme of Sistine Ceiling, shown on the right-hand side. Bold letters and numbers indicate the panels analysed below.]

The nine central panels illustrate stories from the Book of Genesis, arranged in chronological order from the altar wall to the doorway. Four of these are large, and five are small, the latter being framed by male nudes (*ignudi*) painted as powerful muscular figures. Of the nine biblical scenes, three episodes from the Creation are depicted, three panels illustrate the story of Adam and Eve, and three the story of Noah.

Around these central panels are the prophetic figures, each seated on a monumental throne and depicted reading manuscripts, books or scrolls. These men and women all prophesied the coming of Christ; seven are the Prophets of Israel, and five are the female Sibyls of the Classical World. These male and female figures alternate along the sides of the chapel ceiling, the ends being dominated by the figures of Jonah and Zechariah.

The triangular spandrels and the lunettes above the windows show the Ancestors of Christ, as listed in the Gospel of Matthew (verses 1.1-17), and the figures in the spandrels are thought to represent the families of the Ancestors in the series of lunettes below.

The corner pendentives contain four biblical scenes that narrate episodes of the miraculous salvation of the people of Israel.

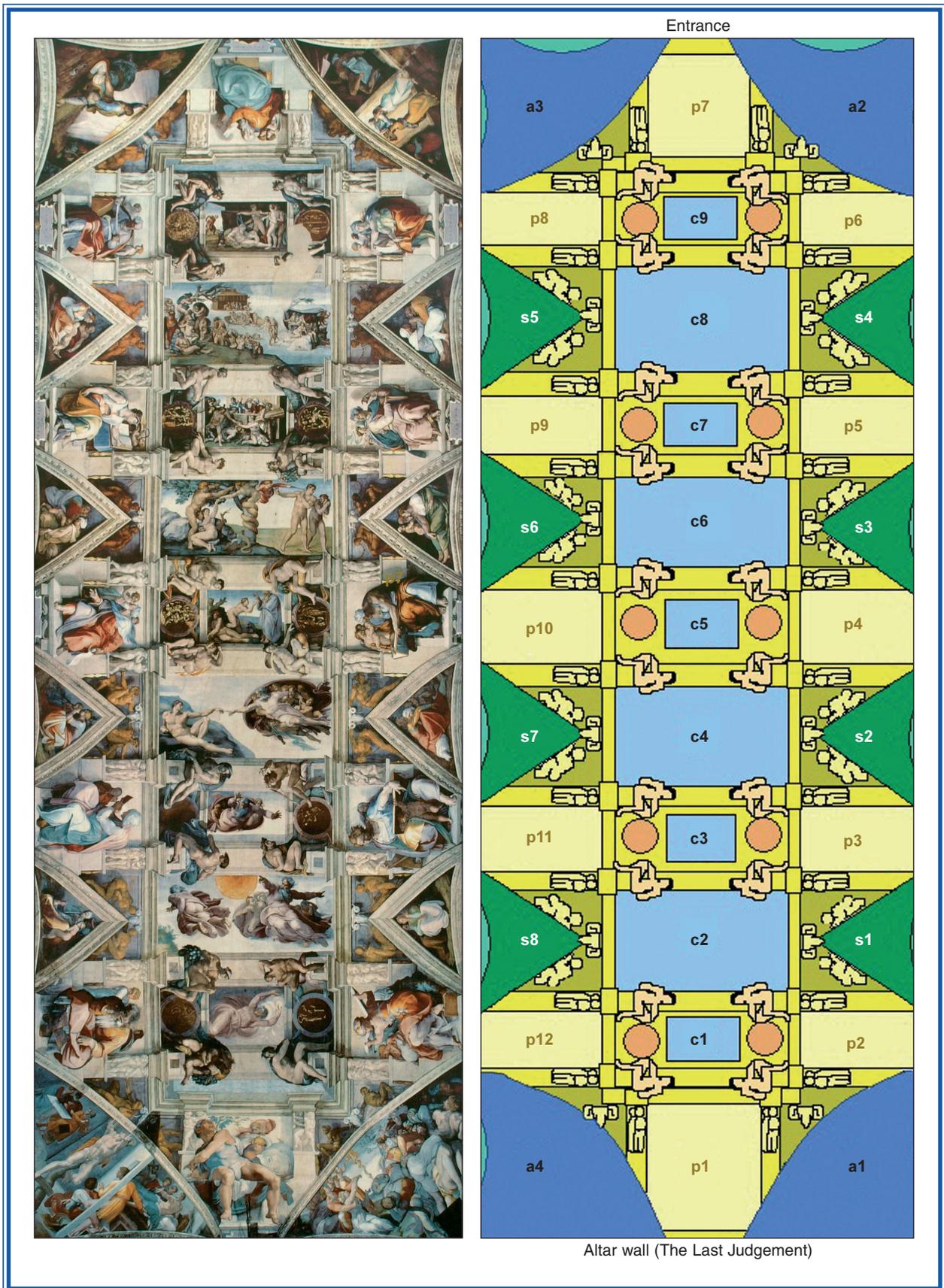
■ CENTRAL PANELS



The Separation of Light from Darkness (c1): a ventral view of the brainstem and basal cisterns around the brainstem (in God’s neck; specifically the cisterns are highlighted by “shadow analysis”), oblique ventral view of cervicothoracic spinal cord (along the midline of God’s torso), frontopolar cerebrum (in the lateral folds of his gown), optic chiasm and optic nerves (a peculiar Y shaped structure below God’s waist), according to Ian Suk, a medical illustrator, and Rafael Tamargo, a neurosurgeon, both from the Johns Hopkins University School of Medicine (*Suk I, Tamargo RJ. Concealed neuroanatomy in Michelangelo’s Separation of Light From Darkness in the Sistine Chapel. Neurosurgery 201; 66 (5): 851-861*). Plus, there is a hyoid bone (“U” shape formed by God’s upper chest and

outstretched arms), according to the Brazilians Gilson Barreto, oncological surgeon at the Municipal Hospital of Paulínia, and Marcelo Ganzarolli de Oliveira, professor of chemistry at the University of Campinas (*Barreto G, de Oliveira MG. A arte secreta de Michelangelo: uma lição de anatomia na Capela Sistina. Arx; São Paulo (Brazil), 2004*).

[For details see also: *Grassi E, Palumbo P. Seen/Unseen: Michelangelo master of camouflage and deception. Anatomy lessons hidden in the Sistine Chapel. Prog Neurosci 2013; 1 (1-4): 117-123*]



Altar wall (The Last Judgement)



The Creation of the Sun, Moon, and Plants (c2): human male genitals (in the rolled fold of God's cloak between his legs and buttocks) and female genitals (in the cape of the angel beneath the sun), according to Konstantin Alexandrovich Efeto, doctor of both biological sciences, and medicine and philosophy, of the Crimea State Medical University (*Efeto KA. A shocking secret of the Sistine Chapel. CSMU Press, Simferopol (Ucraina), 2006*).

The Separation of Land and Water (c3): bisected right kidney, with the renal pelvis, ureter, renal artery, and renal vein (visible in the robe, if the figures of God and the cherubims are removed), and, in one of the surrounding ignudi, specifically the ignudo sitting to the left of the figure of the Persian Sibyl, two kidneys (in the two cushions he holds beneath his left and right arms), according to Garabed Eknoyan, a nephrologist from Baylor College of Medicine (*Eknoyan G. Michelangelo: art, anatomy, and the kidney. Kidney Int 2000; 57 (3): 1190-1201*).



The Creation of Adam (c4): mid-sagittal cross-section of the human brain (visible behind God and the angels), according to Frank Lynn Meshberger, an obstetrician-gynaecologist from Indiana (*Meshberger FL. An interpretation of Michelangelo's Creation of Adam based on neuroanatomy. JAMA 1990; 264 (14):1837-1841*).

The Creation of Eve (c5): lateral view of left lung (visible in the mantle of the Creator) and trifurcated segment of the bronchial tree (in the trunk of a dry tree, which seems somewhat out of place in Paradise), according to *Barreto and de Oliveira* (2004).



The Original Sin (c6): female reproductive system with vagina (identifiable in main tree trunk, and the constricting snake may hint at the muscular function associated with the vagina), uterus (made up of the head of the snake and a tree limb) and the fallopian tubes (represented by tree branches), according to the American biologist and artist Sue Binkley Tatem (*Tatem S. Michelangelo: faces and anatomy in his art. Xlibris Corporation, Bloomington (USA), 2010*). Also, the aortic arch with the brachiocephalic trunk to the right (figure of a trunk

near Eve's back), jugular vein and carotid artery with its bifurcation (the main tree and its branches), according to *Barreto and de Oliveira* (2004) (*Santos IP, Rosa JPC, Ellwanger JH, Molz P, Rosa HT, Campos D. Michelangelo's art on the Sistine Chapel ceiling: sacred representation or anatomy lessons? J Morphol Sci 2013; 30 (1): 43-48*).

■ PROPHETS AND SIBYLS

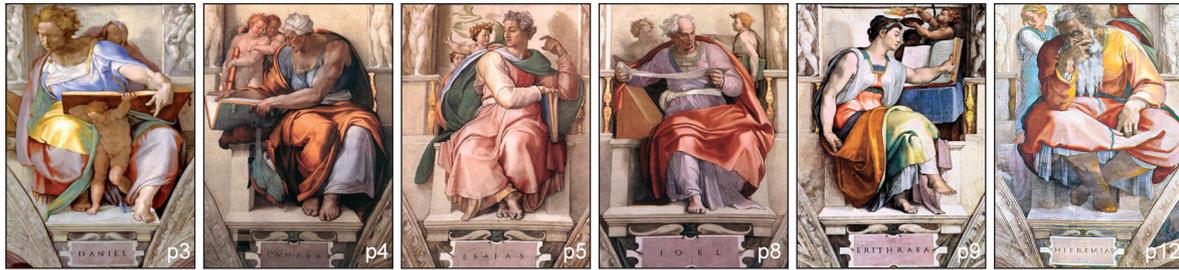


Prophet Jonah (p1): cross-section of the base of the penis (the mouth of the fish), according to the Brazilian team (*Reis LO, Zani EL, Alonso JC, Simoes FA, Rejowski RF, Barreto G. The interpretation of the figure of the prophet Jonah by Michelangelo on the ceiling of the Sistine Chapel: anatomical urological vision. Int Braz J Urol 2012; 38 (3): 317-322*) and the anatomy of the eye, including the cornea, anterior chamber, optic nerve, and tendon of the medial rectus muscle (drapery behind the hand of the putto), according to the art historian

Simon Abrahams (*Abrahams S. Michelangelo's art through Michelangelo's eyes, 2005 [cited October 20, 2013]. Available from: www.everypainterpaintshimself.com*).

According to *Barreto and de Oliveira* (2004), in the Prophets the nearby figures also seem to be pointing out the following anatomical structures, on which light is often seen to fall in the frescoes:
- **Libyan Sibyl** (p2): shoulder joint with glenoid cavity and head of the humerus (identifiable in the folds of her robes if the image is rotated by 180°) (*Ellwanger JH, Mohr H and Campos D. Anatomy lessons in the Michelangelo's works? J Morphol Sci 2012; 29 (1): 38-43*);





- **Prophet Daniel** (p3): patella, the upper third of the tibia and tibial tuberosity (hidden in the conformation of the robe and mantle in the region of the right knee) (*Santos et al., 2013*);
- **Cumaean Sibyl** (p4): two representations of the heart: one showing the pericardium with the superior vena cava, aorta and diaphragm (the bag hanging below the book), and the other featuring the right and left coronary arteries (in the right leg, with the apex at the knee);
- **Prophet Isaiah** (p5): elbow joint, complete with ulna, radius and humerus (in the folds of his robe, below the waist and over the knees);
- **Prophet Joel** (p8): temporal bone with mastoid process, external auditory foramen and zygomatic arch (respectively delineated by the border of the prophet's cloak and the triangular structure supporting his arm, the dark niche under his right arm, and the unrolled scroll);
- **Erythraean Sibyl** (p9): an oblique view of the larynx (in the robes covering her legs) with lowered epiglottis (in the folds under her right hand) revealing the vocal cords (in the V-shaped fold above the left knee);
- **Prophet Jeremiah** (p12): the middle ear, showing the medial surface of the tympanic membrane, which is being struck by the malleus (outlined by the garment resting on the left knee).

■ SPANDREL 'FAMILIES'

Also according to *Barreto and de Oliveira* (2004):

- **Above Asa, Josaphat and Jehoram** (s2): shoulder joint with scapula and humerus (in the vestment on the leg of the figure and the white sack on which she is seated) (*Santos et al., 2013*);
- **Above Uzziah, Jotham and Ahaz** (s6): lateral view of the left kidney, complete with ureter, adrenal gland and ureter (formed, respectively, by the arm of the baby in the centre of the image, and the shoulder and left hand of the female figure) (*Santos et al., 2013*);
- **Above Salman, Booz and Obeth** (s8): a scapula (in the vestment across the knees of the female figure).



■ CORNER PENDENTIVES

Judith and Holofernes (a2): the second cervical vertebra, or axis (whose form is comparable to Holofernes' body position), according to *Barreto and de Oliveira* (2004).



Many anatomical structures 'hidden' in the Sistine Chapel ceiling frescoes have been reported, and it is likely that many more will be 'discovered'. Like the clouds in the sky appear to depict familiar shapes, it appears that Michelangelo's frescoes lend themselves to a peculiarly anatomical interpretation.

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