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The origin of Moses' horns: a speculative hypothesis

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Abstract

Medieval artists used to depict Moses with two horns in sculptures and paintings. This tendency has been attributed to a mistranslation of the Vulgate Bible. However, similar striking horned images of ancient mythological Chinese emperors remind us of the possibility of a hidden medical condition underlying the myth. Tracing the horned phenomenon from realistic hieroglyphic characters in oracle bone inscriptions to the conservative split-head structure of goblins in traditional Chinese ink paintings, the presence of β-thalassemia intermedia under the selection pressure of malaria is raised as the presumed underlying cause of both the split-head deformity in ancient China and the horned appearance across the Far and Middle East. That is, it is proposed that Moses is depicted with horns because he may have had a cranial vault deformity with bilateral parietal bulging resulting from β-thalassemia intermedia.

Introduction

Moses, the most famous prophet in the Old Testament, was commonly depicted with horns in paintings and statues during the Middle Ages. Collections of the most outstanding horned representations can easily be enjoyed nowadays online (Anonymous, 2014). Despite much debate, the reason that Moses was depicted with horns remains a topic of controversy in the fields of religion and art.

A popular explanation attributes the horns to an error made by Saint Jerome in his translation of the Bible from Hebrew to Latin in the fourth century. He was blamed for translating the word 'qaran', which means 'horn' or 'rays of light' in Hebrew, to 'cornutam', which means 'horned' in Latin. Accordingly, it reads, 'And when Moses came down from the Mount Sinai, he held the two tables of the testimony, and he knew not that his face was horned from the conversation of the Lord. And Aaron and the children of Israel seeing the face of Moses horned, were afraid to come near... And they saw that the face of Moses when he came out was horned, but he covered his face again, if at any time he spoke to them' (Exodus 34:29-35, Douay-Rheims Bible) (Anonymous, 2020; Marshall, 2013).

On the other hand, some researchers have argued that the medieval scholars and artists accepted the translation and understood how their auidences would interpret horned depictions. They most likely viewed horns as a symbol of strength, power, and divinity since some ancient Greek and Roman gods, such as Pan, Triton, Dionysus, and Bacchus, were horned (Lovett, 2013). It is also notable that Celtic warriors and the Vikings attached horns to their helmets (Gonçalves, 2014).

Nonetheless, these facts lead one to wonder whether there might be a hidden reason behind the myths. Is it possible that depictions of Moses with horns could have resulted from him having a deformed cranial shape due to some underlying disease? Similar horned images of mythological emperors in ancient China exist and might provide excellent clues to help us solve this mysterious puzzle.

Case presentation

Three cases are presented as the main basis of the study. The first case is, of course, that of Moses, as mentioned above (Figure 1). This statue of Moses was sculpted by Claus Sluter from 1395 to 1406. The presence of two round, short horns sprouting from both sides of the head makes Moses look solemn and a little fearsome.

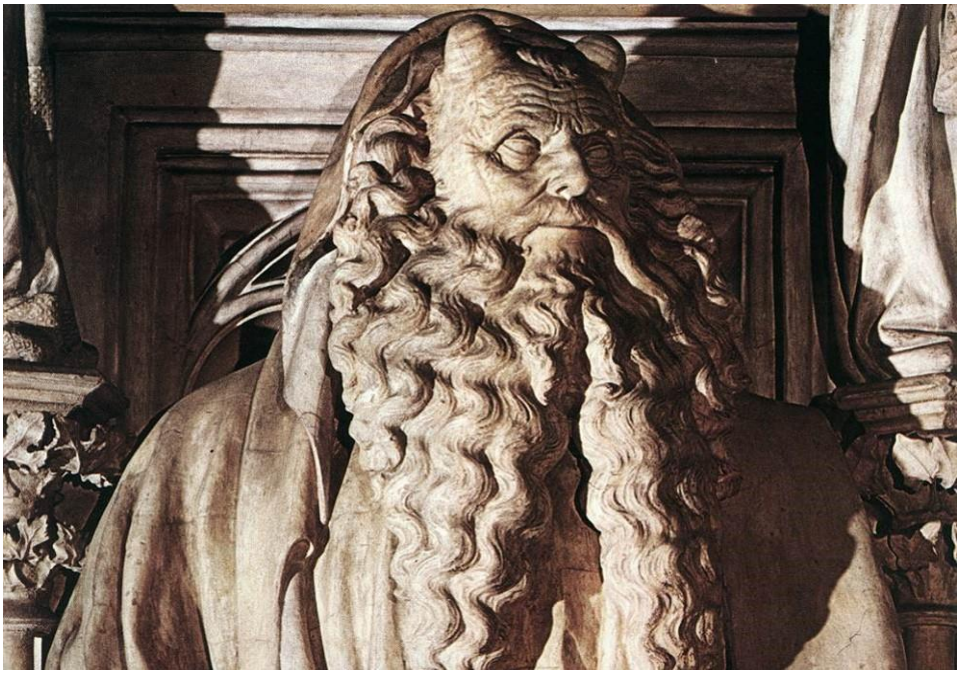

Figure 1: Moses with horns in the *Well of Moses*, stone sculpture by Claus Sluter, dated 1395-1406, Musée Archéologique, Dijon, France. Photo credit: Web Gallery of Art: http://www.wga.hu

The second case is that of Fu Xi, the legendary ancient Chinese emperor who ruled several thousand years ago and invented fishery and husbandry (Figure 2). This painting depicting him is believed to have been made in the traditional style in the late seventeenth century.

Figure 2: Fu Xi, a mythological emperor in ancient China, the creator of fishery and husbandry, from "*Portraits des Chinois célèbres*" compiled by Joseph-Marie Amiot (1718-1793), Bibliothèque Nationale de France. Figure credit: http://www.gmzm.org/?gujitushu/guxianjunchentujian.html

The third case is that of Shen Nung, a legendary ancient Chinese emperor who succeeded Fu Xi and created agriculture (Figure 3). This painting seems to have been produced at the same time as that of Fu Xi. Both were gathered in the *Portraits des Chinois célèbres* compiled by Joseph-Marie Amiot in the eighteenth century.

Some observers might be astonished by the similarity of the horns depicted in likenesses of these three great leaders in ancient times and might be bothered by the idea that the same issue was probably the cause of all these strange horned depictions. Was the cause of the horns spiritual or physical? Was it an imaginary product or historical documentation of a medical reality?

It is, thus, useful to consider another depiction of Fu Xi and Shen Nung, which is revealed in traditional Chinese folk art (Figure 4). As shown in the figure, a split-head depiction appears in place of the two-horned ones of the emperors shown in Figures 2 and 3. This split-head picture is most likely the predecessor of the double horns, depicting the original morphology more accurately. A hint of the primitive nature of this strange appearance also comes from traditional Chinese paintings and sculptures in which a goblin, demon, or devil is depicted with a cracked or split head (Figure 5). This conservative tradition has persisted for an unknown period. The two-horned visage mentioned above is, therefore, daringly assumed to derive from this conservatively depicted split-head feature. Nevertheless, is such a 'split head' a real phenomenon in medicine? The answer is, surprisingly, yes.

Figure 3: Shen Nung, a mythological emperor in ancient China, the creator of agriculture, from "*Portraits des Chinois célèbres*" compiled by Joseph-Marie Amiot (1718-1793), Bibliothèque Nationale de France. Figure credit: http://www.gmzm.org/?gujitushu/guxianjunchentujian.html

Figure 4: A traditional picture of the three mythological emperors in ancient China. From the left, Huang Di, Fu Xi, and Shen Nung. Both Fu Xi and Shen Nung were depicted as having split heads in place of the horns in Figures 2 and 3. Photo credit: Daily Headlines - https://kknews.cc/zh-my/culture/xzog439.html

The script on oracle bones is, so far, the earliest example of Chinese characters, and it first appeared in the Shang dynasty (1600-1046 BC), at least three thousand years ago (New World Encyclopedia, 2018). Fortunately, the hieroglyphic nature of the script captured vivid images of ancient life. A survey of oracle bone rubbings produced in the late nineteenth and early twentieth centuries led to the discovery of characters with split heads just like the goblins in traditional Chinese paintings. Five beautiful examples are presented in Figure 6.

Figure 5: A goblin in a traditional Chinese ink painting owned by the author.

Figure 6: Four rubbings of oracle bone scripts in ancient China, collected by scholars in the late nineteenth and early twentieth centuries. The arrows indicate characters depicting a man with a split head.

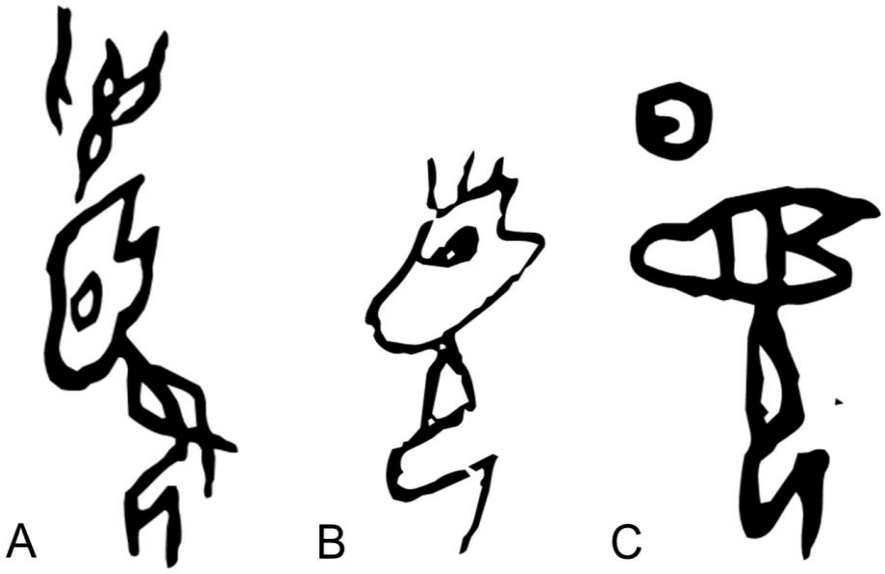

Figure 7: Three oracle bone script characters depicting men with a split cranial vault and protruding face kneeling on the ground, from "Digital Archive of the Oracle Bone Rubbings" (http://rub.ihp.sinica.edu.tw/~oracle/). A. A slave with hands tied behind the body and a rope around his head drawn by his master's hands. B. Probably another slave with some hair. C. A third slave under the sun with eyes wide open.

Figure 8: Three oracle bone script characters meaning 'head', all with characteristic pictures of a split cranial vault and protruding face, from "Digital Archive of the Oracle Bone Rubbings" (http://rub.ihp.sinica.edu.tw/~oracle/).

Based on these hieroglyphic characters, it can confidently be said that split heads were a common sight in China three thousand years ago. Such cracked skulls could logically be assumed to be the origin of the horns sprouting from the heads of ancient people. What caused this bizarre phenomenon, though?

Discussion

Three more characters depicting men with split heads and another three characters meaning 'head' were retrieved from a digital library of oracle bone inscriptions in Taiwan to provide more evidence that split heads did exist in the old days (Figures 7 and 8). Investigators of the oracle bone script have long interpreted the character in Figure 7A as 'slave.' We can see that the man is kneeling on the ground with both hands tied behind his body and a rope around his head held by his master's hands. Figures 7B and 7C probably also depict two slaves in the kneeling position. The characters meaning 'head' in Figure 8 remind us that such a split-head phenomenon was common and taken for granted at the time. Notably, the faces of all the hieroglyph characters seem to protrude like the snouts of rodents.

Although there were no cameras or X-ray examinations three thousand years ago, thanks to the hieroglyphs' nature, an image of craniofacial deformity was preserved to help us engage in an investigation. A scientific fact necessitates a reasonable explanation. A cutaneous horn, *cornu cutaneum* in Latin, could be a possible answer in the first place. The lesion, although rare, often presenting as a protruding hyperkeratotic mound in the sun-exposed skin, has been reported potentially to be actinic keratosis, basal cell carcinoma, inverted follicular keratosis, squamous cell carcinoma, seborrheic keratosis, or verruca vulgaris in nature (Cohen, 2023). And it can actually be found just like an irregular large horn on the head (Nietert and Babler, 1906; Vojvodic et al., 2016). Even so, the consistent appearance of a pair of horns located symmetrically on each side of the cranium as shown in the above examples makes cutaneous horns a doubtful explanation of the split-head pictures and those ancient leaders' strange looks.

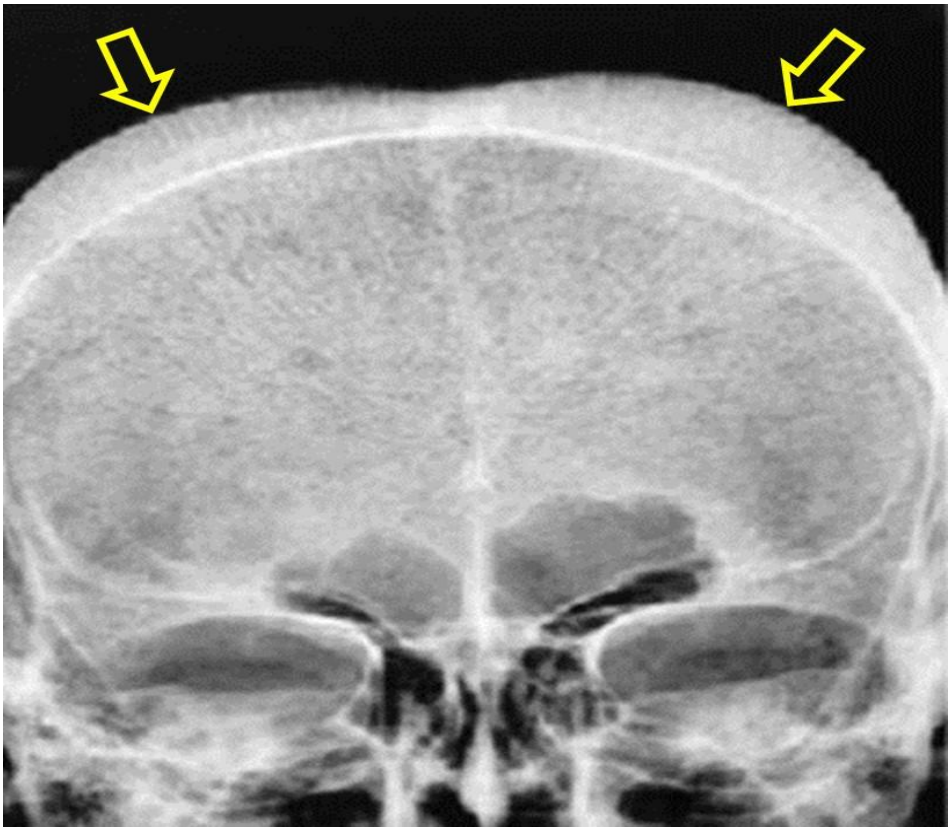

Figure 9: X-ray showing the skull of a thalassemia intermedia patient. Modified with permission from Balikar R. et al. (2013) BMJ Case Rep 2013:bcr2012008095. https://doi.org/10.1136/bcr-2012-008095. The arrows indicate the thickened and protruding parietal bones leading to a split-head morphology.

Therefore, we must ask whether it possible that the craniofacial deformity shown in the hieroglyphs resulted from β-thalassemia intermedia. ß-thalassemia intermedia, which has a complex genetic profile involving various gene defects in combination, usually sustains a transfusion-independent status despite the presence of mild-to-moderate anaemia (Musallam et al., 2012). However, it may masquerade as ß-thalassemia major in manifestations of a thickened but centrally depressed cranial vault due to haematopoietic marrow expansion of the bilateral parietal bones (Figure 9), and a face that appears to protrude can result from maxillary expansion (Ballikar et al., 2013; Singh and Varma, 2014; Tayari et al., 2013). Consequently, the bulging of both parietal bones may have led to the split-head appearance and maxillary expansion may have caused the protruding 'chipmunk face' effect. These characteristics are perfectly compatible with what we see in the oracle bone scripts mentioned above.

Archaeological excavation in China have led to the discovery of bronze vessels mimicking the shapes of elephants and rhinoceros from the Shang dynasty, when the scripts on oracle bones were commonly used (Asian Art Museum Chong-Moon Lee Center for Asian Art and Culture, 2017; Freer Gallery of Art, Smithsonian's National Museum of Asian Art, 2020). These findings provide strong evidence that the Shang dynasty was established in a tropical, wet environment three thousand years ago. Accordingly, malaria must also have been a prevalent disease in such an environment.

The interaction between thalassemia and malaria has long been a well-known evolutionary-selection phenomenon (Weatherall, 1997). The global distribution of malaria corresponds, to a great degree, to that of haemoglobin E, haemoglobin S, α-thalassemia, and ß-thalassemia. Both the Middle East and Southeast China are among the areas affected by both malaria and thalassemia (Colah et al., 2010; Hay et al., 2004; Weatherall, 2012).

If the ancient Chinese emperors Fu Xi and Shen Nung could have suffered from ß-thalassemia intermedia and, thus, have had deformed skulls which evolved into a modified horned appearance later, Moses presumably could also have suffered from the same condition. The likely skeletal features of ß-thalassemia syndrome, mainly due to expansion of erythroid precursors in the bone marrow as a response to anaemia, include porotic hyperostosis, porous orbital roofs, maxillary hypertrophy, hair-on-end X-ray pictures, growth arrest lines, porosity of long bones, rib-within-a-rib radiographic images, premature fusion of the humeral epiphyses, deformed vertebral bodies, and enlarged foramina of hand's phalanges (Lagia et al., 2007; Lewis, 2012; Scianò et al., 2021). Although molecular-medicine techniques have yet to be used by Chinese anthropologists to search for evidence of malaria in human skeletons from the Shang dynasty, modern paleopathology research has demonstrated the prevalence of the simultaneous existence of *Plasmodium falciparum* antigens and thalassemia-related characteristic skeletal changes like porotic hyperostosis, diploic expansion of the cranial vault, marrow hyperplasia of the zygoma and maxilla in excavated human remains from ancient Egypt (Brier, 2004; Sabbatani et al., 2010), the prehistoric Israeli coast (Hershkovitz et al., 1991), and Southeast Asia dated back to the early seventh millennium BP (Vlok et al., 2021), providing strong support for the hypothesis raised herein.

According to the Old Testament, Moses was placed inside an ark made of bulrushes and abandoned along the reeds of a riverbank when he was three months old. Is it possible that Moses looked so anaemic and unhealthy that his mother decided to abandon him? Fortunately, he grew up and survived thalassemia intermedia, which does not require a life-saving red blood cell transfusion like thalassemia major does.

Conclusions

A medical hypothesis has been developed to explain why Moses was depicted with two horns based on the belief that the context of a myth always contains an underlying reason for every phenomenon. Thus, it can be proposed that Moses was shown with two horns because of a split-head cranial deformity, presumably resulting from ß-thalassemia intermedia, which was a prevalent disease under the selection pressure of malaria during the time when he lived. Finally, it must be emphasised that the three ancient leaders mentioned, Fu Xi, Shen Nung, and Moses, were most likely legendary heroes rather than real historical figures. Their strange skull shape can be considered a remnant of the remote memories of an era when malaria and thalassemia spread rampantly across the lands where the people of the past lived.

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