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COVER EDITORIAL

Some of the earliest depictions of the human spine: a glimpse into European history

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Abstract
Introduction Drawings of the human form have a history almost as old as mankind itself. However, illustrations of the human spine as seen with the vertebral column were not seen until much later. This paper reviews some of the early European depictions of the human vertebral column from the twelfth (e.g., *Fünfbilderserie* "Bone-Man": 1152 A.D.) and thirteenth (e.g., Ashmole 1292) centuries. Man's understanding of his body has evolved over hundreds of years.
Conclusions This glimpse into our past and early drawings of the human spine illustrate how this particular anatomical structure was perceived almost a millennium ago and would not be structurally correct renditions until Leonardo da Vinci in the fifteenth century.

Keywords European · History · Art · Drawings · Vertebral column · Anatomy

Background

It has been speculated that the origin of neurosurgery can be traced back nearly 5000 years to the ancient Egyptians. Some have suggested that one of the earliest recorded neurosurgical procedures took place at this point in history: a traction reduction of the cervical spine of an early Egyptian ruler. The procedure is said to have served as a template for the Egyptian myth detailing the resurrection of Osiris by his wife and son. Several other references have suggested the god recovered his strength after the efforts of his family [1]. While the facts are difficult to establish, this story raises several questions about the history of the spine in medicine. The present paper will briefly address differing views concerning the history of depictions of the human spine.

Sudhoff's findings

During the early twentieth century, Karl Sudhoff (1853–1938), a German medical historian, was a voracious explorer of pre-Vesalian anatomical drawings. Sudhoff was put in charge of a newly formed *Institut für Geschichte der Medizin* (Institute of Historical Medicine) at the University of Leipzig in 1905 and promoted to a newly established chair to help his work. Sudhoff scavenged literary works across Europe and discovered several groups of drawings [2]. One, dating back to 1292, came from the Ashmolean library in Oxford (Fig. 1), while another came from the "Provençal manuscript", now housed in the University of Basel's library (see Fig. 2) [2]. However, the oldest depictions of the human spine were found in the cloister of Prüfening outside Ratisbon, Bavaria, Germany, and dated to 1158 A.D. (see Fig. 3) [2, 3]. Sudhoff's investigation quickly expanded into the wider question of the earliest medical anatomical depictions of the human body. For Sudhoff, this "Bone-Man" was one in a series of five similar anatomical depictions [4].

The figures that Sudhoff discovered followed a somewhat formulaic pattern. Generally, a series of five figures would depict the skeletal, nervous, muscular, venous, and arterial systems [2]. In view of this near-

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Fig. 1 Ashmole 399: 1292

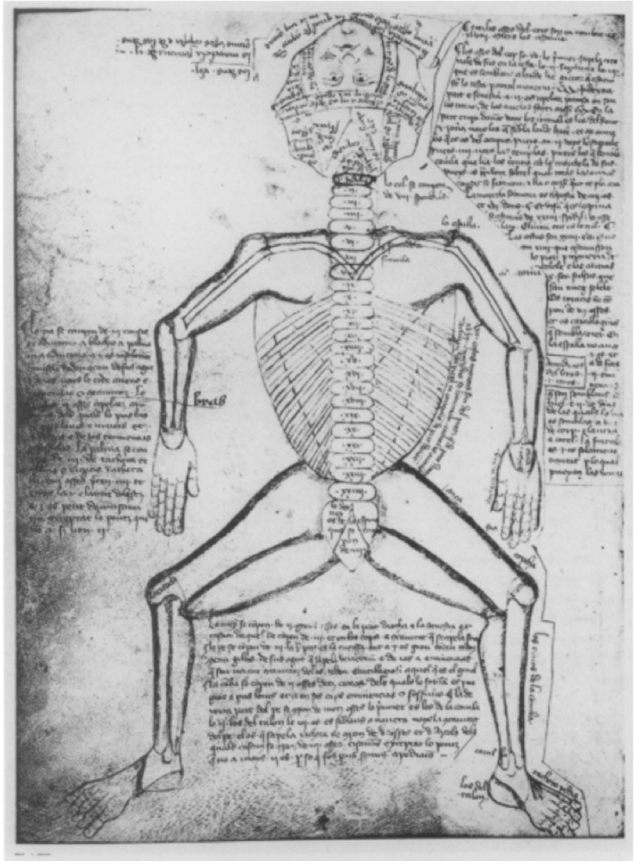

Fig. 2 University Library, Basel MS D.II.11 fol. 169v: thirteenth century

archetypal pattern of pre-Vesalian anatomy, Sudhoff came to group them together under the term *anatomische Fünfbilderserie* (anatomical Five-Figure Series) [4]. These five images, and an additional sixth image if a pregnant woman was portrayed, were often accompanied by a short text [4]. Other characteristics common to the images included the squatting pose (which became less common with the advent of Vesalius' anatomy), the systems portrayed, and a relatively low level of anatomical detail [2, 3]. Certain characteristics of the thirteenth century image housed in the Basel University Library (see Fig. 2) caused Sudhoff to believe that some *Fünfbilderseries* had distinct lineages or journeys to Western Europe [2]. The same pose was evident in contemporary Muslim anatomical depictions, including various later drawings by Ibn Mansur in the fourteenth century (Fig. 4) [5].

Sudhoff then sought to determine the lineages and origins of the *Fünfbilderserie* and their connections to the Muslim world [3]. Controversially, he believed that the illustrations originated in Alexandria and accompanied the teachings of Galen [6]. Galen is explicitly cited at the beginning of one of the texts Sudhoff discovered: "In the name of the Father, and of the Son, and of the Holy Spirit. Here begins the account of incision as Galen, the most skillful of physicians" [7]. Terms such as *rete mirabile* and *anaphusa*, which are Galen's, are used in conjunction with some of the images [6]. The images are inaccurate, and Sudhoff believed none of the drawings to have been based on actual dissections of the human body, but rather on Galen's descriptions [2]. It is therefore clear why the oldest image stemming from Prüfening, like the other skeletal drawings in *Fünfbilderseries*, depicts an incorrect number of vertebrae.

Sudhoff further divided the lineages of the *Fünfbilderserie,* suggesting that the drawing housed in the Provençal manuscript had probably passed from Alexandria to the near east in Arabia [2]. He also believed that the older drawings from the Prüfening-Scheyern line had entered Europe via the Byzantium [2]. The figures of the *Fünfbilderserie* are now so easily recognizable that they are near-archetypal because they evolved from a common depiction of the human body based on Galen's teachings, their chief focus being on Bone-Man [4]. The themes common among the sets of drawings, notwithstanding the great geographical distances between their presumed sources, are further evidence for a common origin [3, 4].

Fig. 3 The earliest *Fünfbilderserie* "Bone-Man": 1152 A.D

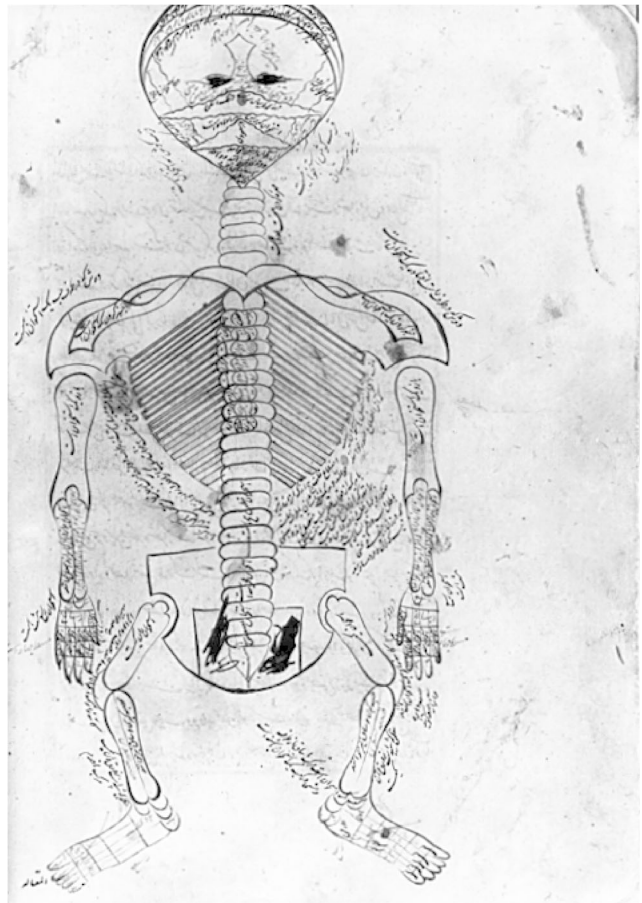

Fig. 4 From the Anatomy of the Human Body (Tashrih-i- insan) by Ibn Mansur near the end of the fourteenth century

However, not all researchers agree with Sudhoff's hypothesis of an Alexandrian progenitor, arguing that ancient Greek and Byzantine writings on medicine have not yet yielded a *Fünfbilderserie* [4]. Some, on the basis of translations by Hunain ibn Ishâq, suggest that the drawings originated in the ancient world or Islamic medicine. Others believe they began to appear in Europe around the time Galen was rediscovered in the West [4].

It is unlikely that the true nature of the origin of the *Fünfbilderserie* will ever be completely elucidated. However, perhaps a more realistic and exciting goal would be to discover a depiction of the human spine from an even earlier date. Ancient China is believed to have several *Fünfbilderserie*-like drawings, discovered after our Prüfening-Scheyern, which were supposedly based on a much older text written during the Sung Dynasty (960–1127 A.D.) [3]. Some authors remain convinced that the Egyptians portrayed the spine before these Galenic drawings but with a lack of evidence, this claim is difficult to support [3]. Whatever the case, the most anatomically correct renditions of the human spine would not appear until the works of Leonard da Vinci in the 1400s [8].

Compliance with ethical standards

Conflicts of interest The authors have no conflicts of interest to report.

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