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History of Medicine

Origins are red, insertions are blue: Holden´s osteology

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Introduction
Surgeons and Anatomists alike may not readily recognize the name Luther Holden, but everyone will promptly acknowledge his anatomical colour code for muscular origins and insertions.
Objective
To rescue and celebrate Luther Holden´s original contribution and its repercussions for anatomical teaching and learning.
Method
A short review of Luther Holden's trajectory and contributions is presented.
Results
First introduced in Holden's "Human Osteology" of 1855, the colour system was soon replicated in several books, atlases and anatomical models and is present in every anatomical lab around the world today.
Conclusion
The authors celebrate the triple anniversary of Luther Holden's birth, death and "Human Osteology's" publication to bestow credit for this and other ingenious ways to learn and teach Anatomy for Surgeons.

Keywords: Anatomy, Osteology, Luther Holden

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Introduction

Luther Holden (1815-1905) was an English surgeon, born in Birmingham, who pursued his medical education at St. Bartholomew's Hospital, in London (1–3). He held several prestigious positions throughout his career, including Surgeon to the Metropolitan Dispensary and the Foundling Hospital and Member of the Royal College of Surgeons, where he served as an Examiner, Council Member, and eventually President in 1879. Above all, Holden is known for his dedication to teaching and mentoring young medical students and he has made lasting contributions to Medical Education.

One of Holden's most notable works is his "Human Osteology," first published in 1855 (1). This book provides a comprehensive description of the human bones, including detailed illustrations and explanations of their attachments (Figure 1).

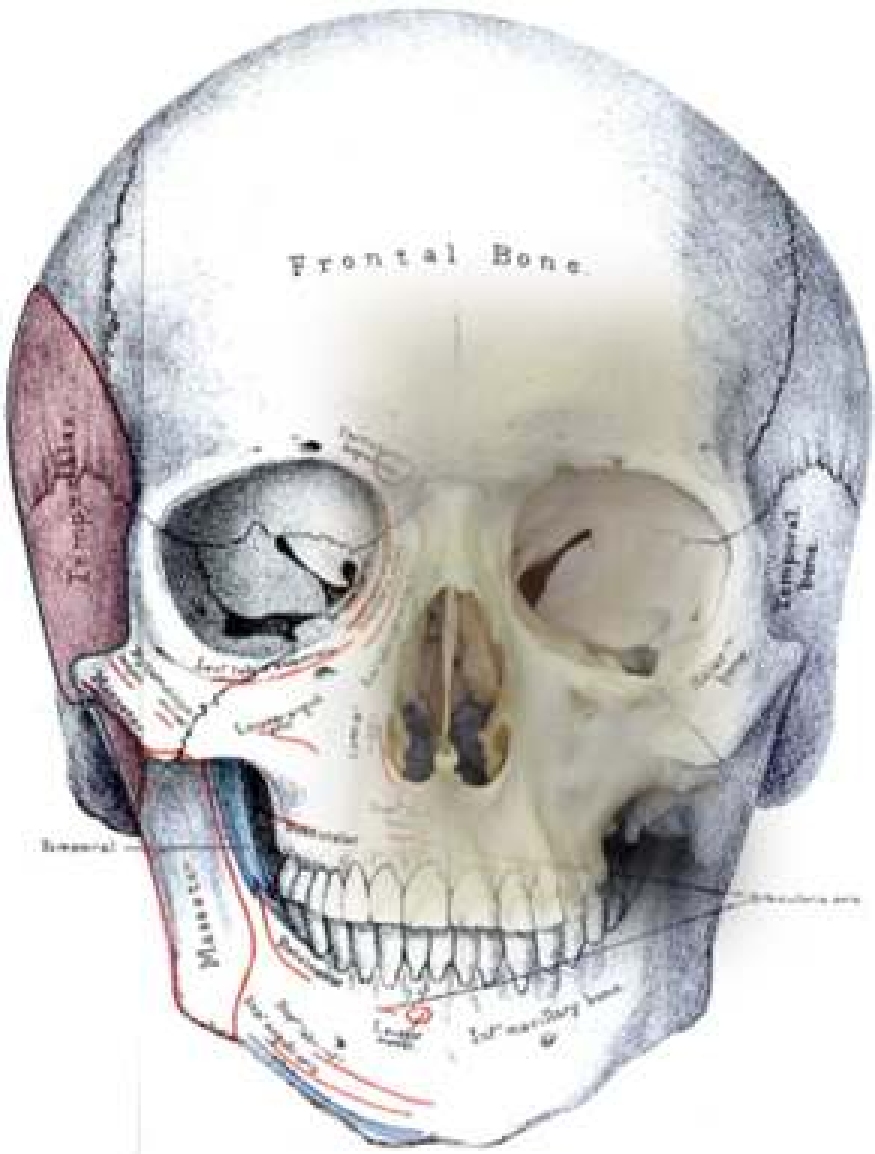

Figure 1. Frontal view of the skull. This is the last plate of the “Skull as a Whole” Section of Holden´s Human Osteology. In its original format, this image is shown in double, folded pages and are complemented by four other views of the skull in superior and lateral views. Here it has been embedded with a photograph of the skull by one of the authors (CM) and the origin (red) and insertion (blue) of the temporal muscle highlighted using Holden’s colour code. This very simple “clue” system once introjected by a given student of Anatomy opens up the possibility of a dynamic understanding of the muscular action over bones, which, in turn, become, levers for movement. This idea was swiftly adopted and appears in other authors works, as early as one year after Holden’s publication (4). Holden’s contribution to the study of the locomotor system lives on in countless books, atlases and 3D bony models.

This work marked a distinct advance in the study of the human skeleton; as the illustrations by Holden and etched on stone by Thomas Godart, librarian of the Medical School of St. Bartholomew's Hospital, are of exquisite quality and introduce a new feature in the teaching of Anatomy, for the origins and insertions of the muscles were shown upon the figures of the bones in red and blue lines (Figure 2).

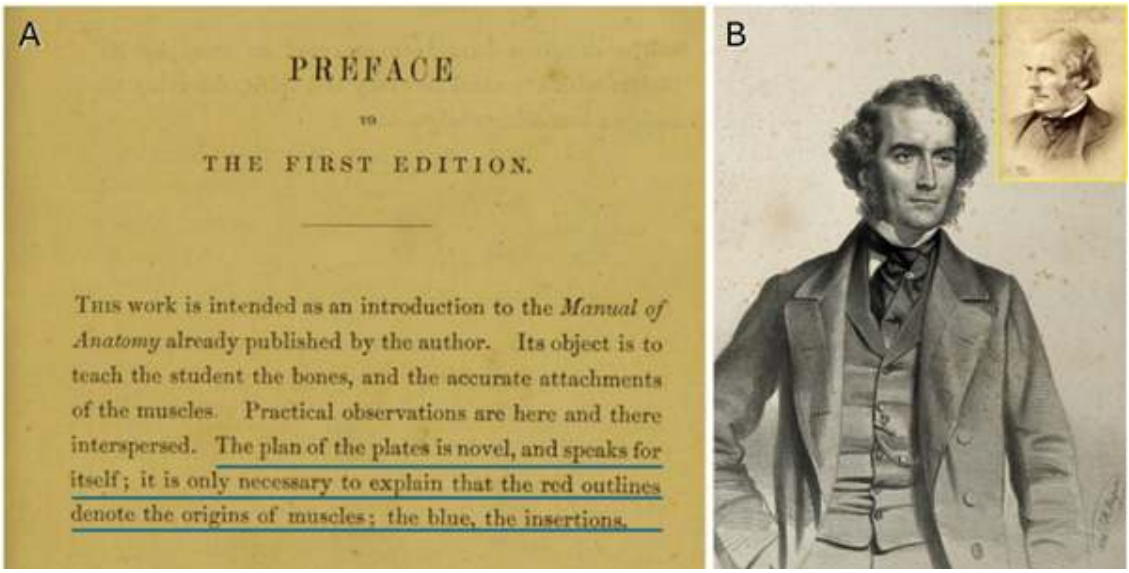

Figure 2. A. In the preface of the first edition it takes Holden three lines to explain the novel system adopted: origins are red, insertions are blue (1). Considering the origins are (usually) proximal and somewhat more fixed parts of a given muscle, the methodology is intuitive and simple, but it leads to a revolutionary change in the learner's ideas of motion and celebrates 170 years of continuous use for anyone teaching and/or learning Anatomy. B. Luther Holden's lithograph (2), done three years after the release of his "Human Osteology". Insert. Holden's photograph (3), circa 1880.

As the vascular injection of colour material in the Renaissance has added instant physiological understanding within an anatomical dissection, for arteries and veins were now easily identified and followed, the colour code introduced by Holden instantly added movement to a previously static bone. Considering the origins are (usually) proximal and (somewhat more) fixed parts of a given muscle, this dynamic understanding could now be extracted from previously static bony images, decisively contributing to the advancement of locomotor sciences and is a feature recognized by every anatomy learner.

"Human Osteology" became a valuable resource for medical students and professionals, and it remains a significant reference in the field of anatomy, influencing several other works (4). Holden, one of the last members of the Anatomical School of Surgery of the mid-nineteenth century, was primarily interested in anatomical, and only in a subordinate degree in surgical study - and then in its clinical rather than in its operative aspect. He held that Anatomy could be learnt only by personal dissection and examination of the dissected subject. Hence, it is suitable that NS&A's first cover of 2025 celebrates this triple anniversary of Luther Holden's as his contributions remain impacting learners to this day.

References

1. Holden L. Human osteology. 5th ed. London: J&A Churchill; 1857. 1–436 p. [accessed 5 Mar 2025] Available from: https://wellcomecollection.org/works/zfqqs777/items?canvas=9
2. Maguire T. Luther Holden. Lithograph. London: Wellcome Collection; 1858. [accessed 5 Mar 2025] Available from: Available from: https://wellcomecollection.org/works/mx74zpvk/images?id=wc4q5cun
3. Godart T. Luther Holden (1815-1905). Photograph. London: Wellcome Collection; 1880. [accessed 5 Mar 2025] Available from: https://wellcomecollection.org/works/sha45yjh
4. Gray H. Anatomy: Descriptive and Surgical. London: Jonh W Parker and Son; 1858.

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