



Metamorphosis in Anatomical Teaching over the Centuries



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Perspective

Revealing the marvellous intricacy of the human body to the common man has always been a challenge to anatomists for centuries. It was inevitable for early anatomists to confide in renowned artists in the absence of good preservatives such as formalin which was discovered in the mid nineteenth century. This is evident in the artistic sketches of Michelangelo (1475-1564) and Leonardo da Vinci (1452-1519) and in the distinguished works of artists and modellers like Ercole Leli (1702-1776), Clemente Susini and Fabricius. Fabricius is stated to have amassed over 300 paintings which made the "Tabulae Pictae" an illustrious atlas of anatomy and Clemente Susini the 18th century modeller prepared over 2000 models during his career based on the dissections made by the anatomist Francesco Antonio Boi Kamath VG & Ray B et al. [1]. Anatomical science thus evolved in a very aesthetic manner under the dexterity of acclaimed artists, painters and modellers preserved in museums in models of clay, ivory, wood and wax. The nineteenth century however was quite a revolutionary year for all those associated with anatomy as this century witnessed two significant transitions. First there was an attempt to legalise dissection and implement anatomy laws. The article "Capital punishment and anatomy: history and ethics of an ongoing association." illustrates how the bodies of executed criminals were the only source of bodies for dissection between the thirteenth to early seventeenth century Hildebrandt [2].

In late seventeenth and the eighteenth-century bodies of unclaimed persons were made legally available in some countries. In nineteenth century the British system renounced the practice of use of bodies of executed people. However, by 1913, "Anatomy Laws", were passed in America and also in London allowing unclaimed bodies to be consigned to medical schools for dissection Thomas RC [3]. Second there was the discovery of formalin which revolutionised the technique of specimen preservation. Though the aldehyde was first reported by a Russian chemist Alexander Michailovich Butlerov in 1859 it was conclusively identified in 1868 by a German chemist August

Wilhelm Von Hoffmann. The impact of these transitions was an unforeseen swift decline in the demand for artists and modellers which had prevailed for over four centuries. The consequent conflict that emanated between the artists and anatomists is evident in the article, "Artist versus Anatomist, Models against Dissection: Paul Zeiller of Munich and the Revolution of 1848. Paul Zeiller (1820-1893) was a modeller who confronted the Professor of anatomy of those times, claiming that the models created by him could save the proletarian corpses from dissection Hopwood N [4].

However as in nature change is but inevitable even so in the history of anatomy a transition was inherent and destined. A new era of specimen preservation and display was beginning to expound itself. The anatomists were now free to express themselves without being contingent on the artists as the legal and preservation issues were resolved. This is evident in the museums of the late nineteenth and twentieth century which include the Hunterian museum, The Museum of the Royal College of Surgeons of Edinburg, The Turin's Anatomy Museum of University of Turin, Italy, Anatomy Museum of Queen's University of Belfast, The Oxford University museum and the Pedro Ara Anatomy Museum founded in 1920 which are a few among the several renowned museums Kamath VG [5]. Nevertheless, formalin had its own demerits of being a carcinogen and an irritant to the skin and mucous membrane which made the anatomists to shift their focus from wet preservation to newer techniques of dry preservation. Perhaps no anatomist in the history of anatomy would have ever imagined that anatomical teaching would shift its focus over the centuries from artistic sketches, models and paintings to wet preservation and then to an era of dry preservation, corrosion casts and finally culminate in plastination.

Early attempts at dry preservation included paraffin impregnation of brain slices and other tissues, followed by attempts at freezing drying of organs and tissues and then the corrosion casts for demonstrating the lumen of various

structures like ureters, renal vessels, bronchial patterns, vasculature etc. Swammerdam (1670) is believed to be the inventor of this technique and Frederick Ruysch (1653-1731), Boyle, Pecquet, Leiberkuhn (1748), Hyrtl (1860), Schiefferdecker (1882), Huntington (1897) are a few eminent anatomists who further improvised the technique. Govard Bidloo (1685) was perhaps the first to inject lungs with a complex alloy of bismuth and mercury. In 1906-1907 Robinson prepared paraffin casts of ureteral calyces. Narat KJ et al. [6]. The discovery of plastination by the German scientist Gunter Von Hagens in 1977 was certainly a great leap ahead. The present trend in all the medical colleges is to prepare whole organ, luminal and sheet plastinates and develop newer techniques of light weight plastination. It is however indisputable that the gold standard method of teaching and understanding anatomy is by dissecting the body. The method of teaching has also changed over the centuries from blackboard teaching and demonstrations to use of overhead projectors and power points in the modern centuries.

Two modern day museums, which include the Anatomy Museum of Leiden Medical University in Netherlands and the Museum of Kawasaki Medical School, in Japan have applied the advances in information technologies and audio-visual aids for educational purposes by displaying specimens along with electronic screens that display educational information regarding each specimen Marreez et al. [7]. In my perspective anatomical teaching exhibits one of the most interesting histories among all the basic sciences. A form of teaching that initially commenced by expressing the anatomical intricacy using paintings, sketches and models then evolved into museums with formalin preserved specimens, corrosion casts and plastination

and finally culminated in the modern-day museums using electronic screens and audiovisual aids, if any anatomist were to look into such a wonderful heritage he would certainly be proud. This is certainly a science which in order to be expressed in all its grandeur, requires a combined team work of anatomists, renowned artists, modellers, technicians and a good scientific team of computer experts. In the times to come with the help of virtual dissection table and technological advances such as 3D holograms perhaps the days are not far away when anatomy will be expressed and studied in a three-dimensional manner in all medical colleges.

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