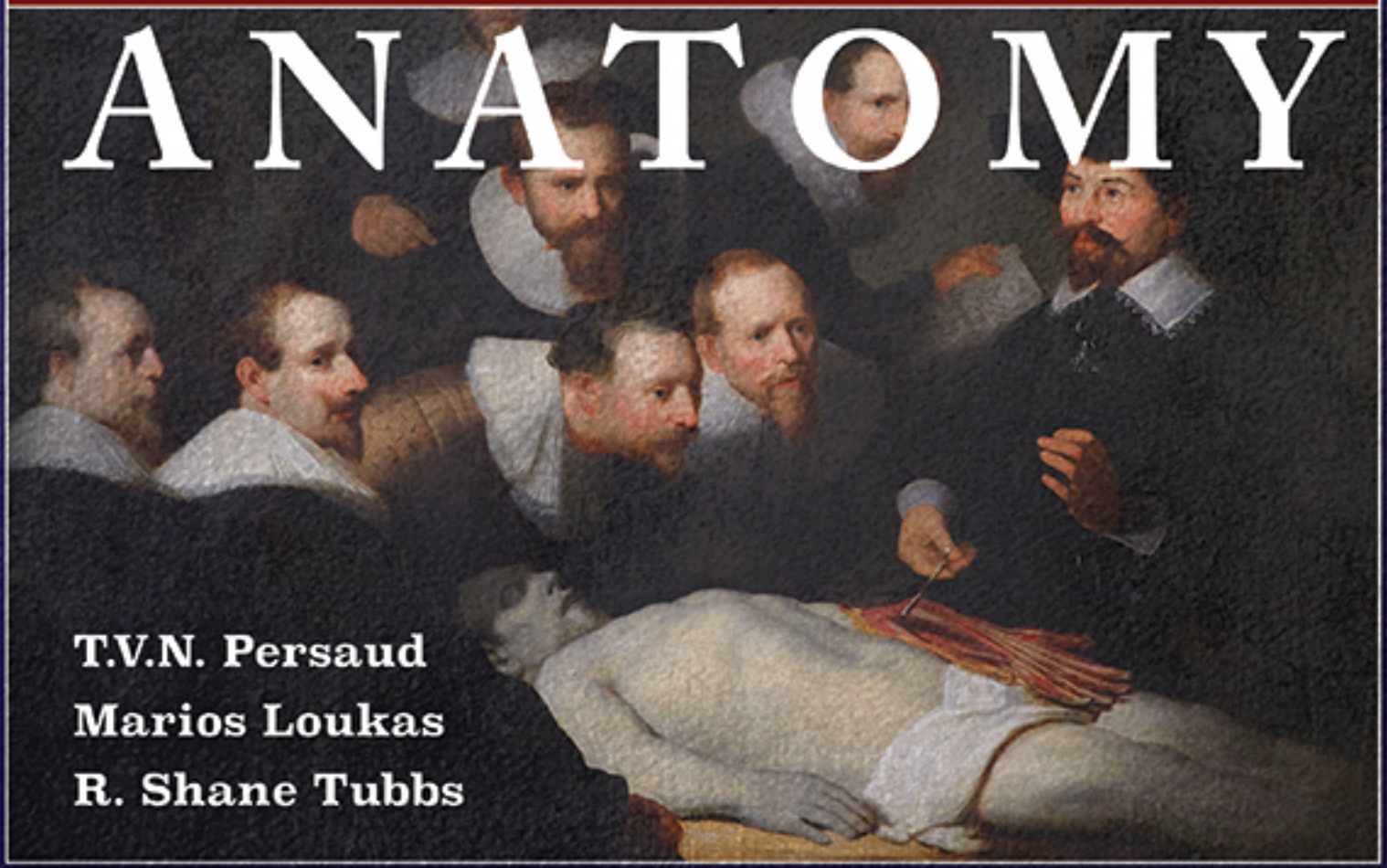
A History of HUMAN ANATOMY

Second Edition



T.V.N. Persaud
Marios Loukas
R. Shane Tubbs

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By

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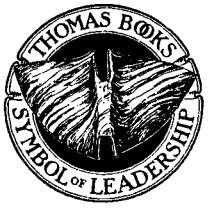

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For Gisela

Vid

To my father, Christos Loukas, who gave me the stimulus and support for academics and history in particular.

Marios Loukas

To W. Jerry Oakes, M.D., who holds academia high.

R. Shane Tubbs

PREFACE

Anatomy is one of the oldest disciplines in medicine. Without a knowledge of human anatomy, the diagnosis and treatment of diseases are inconceivable. Many advances in medicine and surgery can be directly linked to improvements in understanding the structure and function of the human body. The publication of Vesalius's masterpiece *De Humani Corporis Fabrica* in 1543 ushered a new era in the history of medicine. The study of human anatomy suddenly became an objective discipline, now based on direct observations and scientific principles. The curiosity of early man regarding his own form has driven him to be inquisitive about the body's architecture. Not surprisingly, the study of human anatomy and medicine continues to be integrated and remain inseparable. The study of human anatomy has progressed to its universal acceptance and recognition as a scientific discipline, essential for the practice of modern medicine. This revised and expanded edition of *A History of Human Anatomy* presents anatomy from antiquity to the modern times.

In this book, we have presented many scholars and teachers; the time periods, places, and impact of their work; controversies in anatomy; and advances in the discipline. These topics run the gamut from early pioneers in the art to the development of techniques that have propelled the study of anatomy to its current state. Although a single source such as this work could never hope to comment on every person and place which has influenced the history of anatomy, we have attempted to present the "big picture" regarding the historic anatomists and movements that have shaped our current understanding of what we now call "medical anatomy." Perhaps we will never truly know of the early anatomists who braved passed cultural taboos to make the first examination of the human body with dissection, but we can recount those who are known to have contributed to the discipline.

To confine our topic to the history of the study of anatomy may be premature, as even now man continues to learn about the structure of his body with new and non-invasive technologies, such as MRI. With these new "eyes," we are uncovering parts of the human anatomy never before seen. As Corner (1930) has stated, "The history of a science never reaches the word finis; the work of discovery continues, each new stage growing out of the past without barrier of time or circumstance. Investigation may change its direction, but

does not cease." The study of the history of anatomy, therefore, continues and alongside the study of anatomy as a scientific discipline without obvious end. In fact, Northcote (1772) has stated, "There is no condition in life or manner of the study almost, but what may be improved by the knowledge of anatomy; and to many of the liberal sciences it is assistant, to others of them absolutely necessary."

The approach we have taken in writing this book is somewhat eclectic; otherwise it would have been a daunting task to complete. The sheer volume of historical anatomy literature available, as well as many untapped archival sources, forced us to be selective in the material that we have included in this work. For this reason, we cannot claim that this book is complete or exhaustive; there are obvious gaps. Many aspects of the subject have been treated only very cursorily and others have not even been touched.

It would be impossible to compile a book such as this one without borrowing extensively from other sources. For this new edition, we are particularly indebted to Mr. Jordan Bass, medical archivist, Neil John Maclean Health Sciences Library, University of Manitoba, Canada. Of particular value are the many figures for which we are grateful. Extracts taken from the relevant scientific publications and committee reports of historical interest are also acknowledged with thanks.

Mr. Michael Payne Thomas, of our publishers, Charles C Thomas, Publisher, Ltd., gave us the encouragement that made the writing of this book a satisfying experience. Once again, our thanks must also go to the editorial and production staff for their magical skill in shaping this work.

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Finally, my publisher, Charles C Thomas, has demonstrated infinite patience and given me the encouragement that made the writing of this book a satisfying experience. Once again, my thanks must also go to the editorial and production staff for their magical skill in shaping this work.

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For this new edition, we are particularly indebted to Mr. Jordan Bass, medical archivist, Neil John Maclean Health Sciences Library, University of Manitoba, Canada. Gisela Persaud helped in reviewing the manuscript.

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The preparation of this text required collective efforts and collaboration of many contributors for their comments, criticism and sharing their knowledge and expertise. We are indebted and appreciative of several doctors and medical students who contributed to the book as reviewers of selected chapters, served as consultants, wrote certain sections and provided constructive criticisms and suggestions.

These individuals are:

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CONTENTS

A HISTORY OF HUMAN ANATOMY

Chapter 1

ANCIENT RECORDS

PREHISTORIC PERIOD

From the spectacular fossil discoveries made by anthropologist Donald Johanson and his team in the Afar triangle of Ethiopia, man could retrace his origins to less than four million years (Johanson & White, 1980; Lovejoy, 1981; Johanson & Edey, 1981, 1982). The remains of this creature, affectionately named Lucy, were discovered in 1974 at a site called Hadar, and at the time were considered to comprise the oldest and most complete early hominid skeleton. Lucy belongs to a species called *Australopithecus afarensis*, hominids that walked upright, stood about 4.5 feet tall, and had brains smaller than those of chimpanzees. In 2009, paleontologists announced that a more complete hominid skeleton had been unearthed in the same region. This specimen, called Ardi, represents a species known as *Ardipithecus ramidus* and is dated 1.2 million years prior to Lucy (Fig. 1). Fossil remains from other hominids date back to at least six million years ago, extending man's origins far beyond that of what Lucy hinted. From the time of the appearance of these species, many centuries must have passed before our prehistoric ancestors began to think and act in ways that would be considered to be intelligible. Exactly when this occurred is a matter of speculation (Leakey, 1981; Lewin, 1983; Persaud, 1984; Gibbons, 2009).

The Stone Age began about 2.5 million years ago and hunting and the gathering of food had dominated man's life during this early period in history. The abundant and extraordinary prehistoric paintings, engravings, and reliefs found in different parts of the world emerged during the stone and ice ages and depict hunting scenes, animals, and in some instances, human figures (Obermaier & Kühn, 1930; Wendt, 1976; Hadingham, 1979; Leroi-Gourhan, 1982; Beltran, 1982; Sandelowsky, 1983). It is believed that prehistoric cave and rock art evolved from hunting, myths, and magic rituals.

Paleolithic cave paintings in Mas d'Azil, France depict an archer keenly aiming for the heart of his prey, suggesting that early man was conscious of specific anatomical targets, though they may not had yet fully understood how this happened (Loukas et al, 2007). Undoubtedly, the slaughtering of animals provided some crude anatomical insight, and wounds sustained by hunters might have given occasion for reflecting on the structure of the human body (Figs. 2–5).

Prehistoric paintings of 231 human hands were found in the cave of Gargas, near Aventignan, France (Janssens, 1957); 114 of the hands revealed mutilation of one or more fingers, and in only ten cases, were the hands complete. The pictures of the remaining hands have not been well preserved to determine whether they are intact or mutilated (Hooper, 1980). The age of the pictures has been estimated as possibly 30,000 years old, but the people it originated from, and the reason for the mutilation and for depicting the hands, remain a mystery. Hooper (1980) is of the opinion that these hand drawings were deliberately executed and not the results of some accidental activity. More recent analyses have offered a theory that the hands were not amputated at all, but contorted into shapes to elicit variety in the resulting images, using the hands as stencils (Guthrie, 2005).

ANTIQUITY

The great civilizations of antiquity thrived because of the complex and efficient social organization and the technological, as well as cultural, advances that were achieved. Their real accomplishments have been

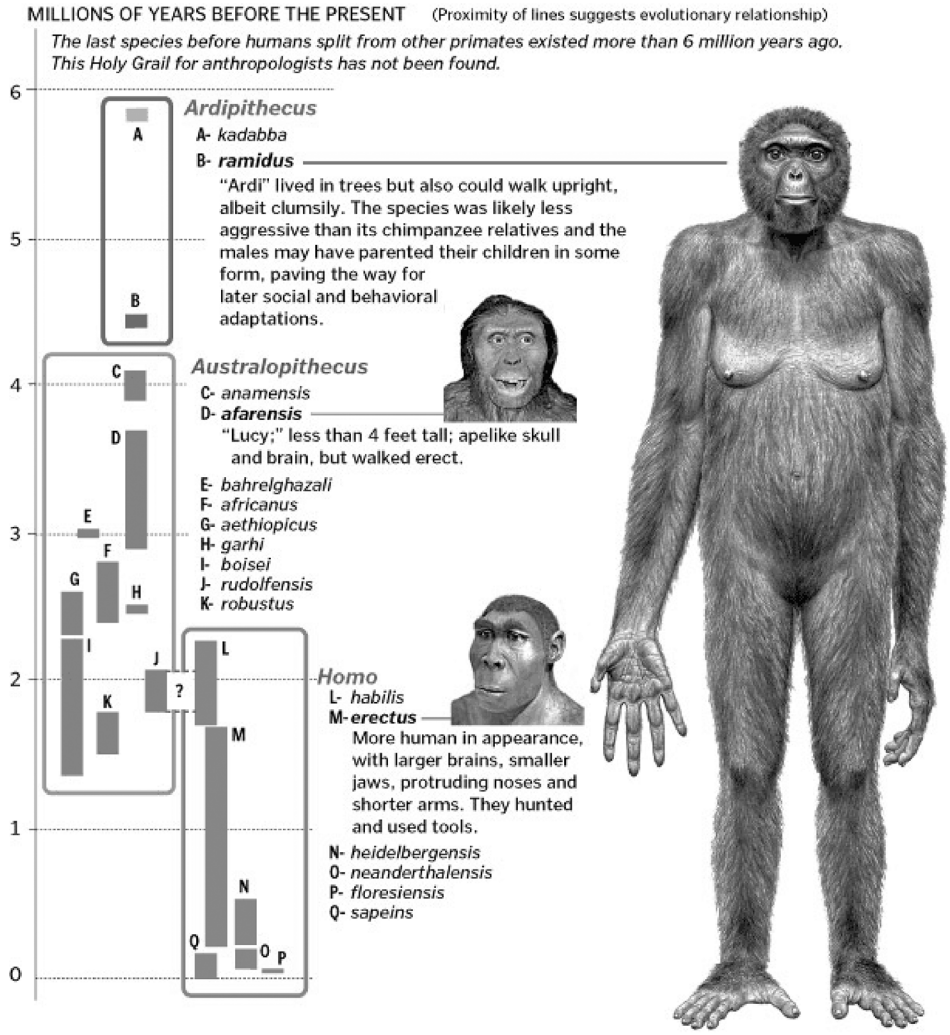

Figure 1. The identification of "Ardi" is a major breakthrough because her species was an early step in the process of human evolution. Scientists do not claim to know whether that Ardi's species evolved directly into modern humans, but it is an important branch on the family tree. Source: Science – AAAS, National Museum of Natural History's department of anthropology. (Illustration by J. H. Matternes; Graphic by The Washington Post – Oct. 1, 2009.)

largely neglected and still remain far from being fully appreciated because of the lack of accurate records and problems of deciphering the material that is now available (Persaud, 1984).

An example of this in more recent times is the discovery of 16,500 tablets and fragments, written some 45 centuries ago, in the ancient city of Ebla, which is located in present day Syria. The tablets and fragments were unearthed between 1974 and 1976 by a team of Italian archeologists and the ancient inscriptions have sparked heated controversy regarding the origin of man and the source of his religions (Pettinato, 1981; Matthiae, 1981).

There are many surviving artifacts, which clearly indicate that some anatomical representations were made in prescientific times. In many respects, these have paralleled the cultural evolution of man (Figs. 6–8). The oldest however, known medical text has been written in Sumerian (approximately 2200 B.C) (Fig. 9).

Mesopotamia

Magic, sorcery, and the practice of divination were distinct features of the great Babylonian civilization that flourished in the fertile valley between the rivers Tigris and Euphrates (Meissner, 1920–25; Dawson, 1930;

Figure 2 (*Left*). Venus of Willendorf. This Paleolithic limestone figurine (4 3/8" tall) is believed to be one of the earliest known representations of the human form (25,000–20,000 B.C.). The head is almost faceless; the pendulous breasts and protuberant abdomen are symbolic of a fertility goddess (Natural History Museum, Vienna).

Figure 3 (*Right*). Female figurine of baked clay (4th millennium B.C., Arpachiyah provenance). (By kind permission of the Trustees of the British Museum.)

Dhorme, 1949; Kramer, 1961, 1963; Mallowan, 1965). Here, where civilization probably began, clay tablets, several millennia old, were discovered and some described monstrous births and the internal organs of sacrificial animals with the omens they predicted (Fig. 10).

The Mesopotamian diviners even made models of these organs for instructing their disciples. The liver and lung of sheep were often used and different parts were carefully marked out with appropriate cuneiform scripts (Figs. 11 & 12), which were used for predicting the future and interpreting natural events (Jastrow Jr., 1914; Chiera, 1938; Grayson, 1980). Although used frequently for various rituals, animal dissection was not performed for scientific purposes. Mesopotamian medicine was based solely on spiritual practices and strict codes were in place to prohibit discussion or adaptation, preventing advancement for centuries (Retief et al., 2008).

Egypt

The earliest of the Egyptian papyruses (Edwin Smith Papyrus) is probably a copy of the one that was first