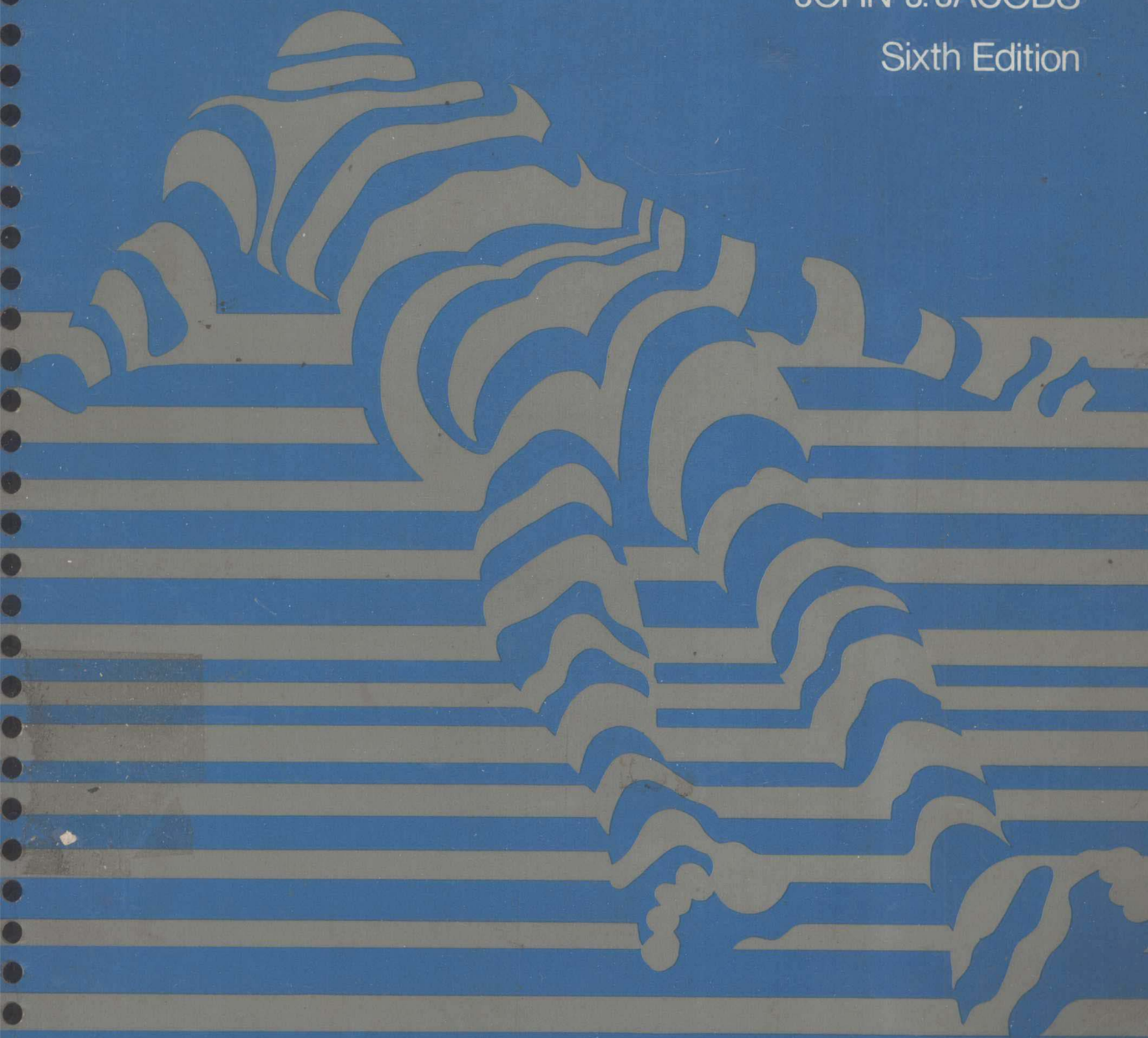


# SHEARER'S MANUAL OF HUMAN DISSECTION

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Sixth Edition



# Shearer's Manual of Human Dissection

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#### **SHEARER'S MANUAL OF HUMAN DISSECTION**

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## Preface

This manual was originally conceived as a source of concise and specific detail in dissection procedures on a regional basis for the novice dissector. The new, revised edition continues to pursue those goals. The style and format of the preceding editions, which have proved to be so successful for teaching and learning human anatomy, have been preserved. As stated in the preface of the fifth edition, the manual is “planned to achieve a workable balance between the amount of procedure for dissection and the descriptive text” and “is a compromise between the classic, lengthy manuals and the very brief guides for dissection.”

Some conspicuous changes and additions have been made that will enhance the manual’s instructional value in the contemporary health science community. New figures have been added where needed to clarify dissection procedures or the anatomy. A number of the previously published figures have been replaced with simpler, more explicit ones, and other figures have been enlarged in order to augment their usefulness.

As a means of stimulating the dissector’s interest and comprehension, practical and clinical correlates of the anatomy, where readily demonstrable on the dissected cadaver (or on laboratory partners), are presented in the text to show reasons for doing dissections and to whet the dissector’s appetite for more.

The clinical correlates and the directions for skin incisions are distinguished at a glance from each other and from the rest of the text by the former being set in indented blocks of type separated from the rest of the text and the latter being set in italics. This feature, combined with the larger figures and the spiral binding, which allows the pages to lie flat on the book stand, should make the manual easy to handle and to use in the laboratory.

Three sections—brain, pelvis, and perineum—have been rewritten. The chapter on the brain bridges the gap between neuroscience courses, in which the brain specimens are usually preserved separately and are not related to the skull, and those gross anatomy programs that omit a study of the brain and its relationships. This manual emphasizes how the brain's surface relates to the bony cranial vault. The chapters on the pelvis and perineum present a complete dissection guide for studying the male and female anatomy separately.

The fourth edition of the *Nomina Anatomica* (1977) was used to update the terminology and nomenclature throughout the text and figures. Where appropriate, more descriptive vernacular terms replace the classic forms. The metric system of measurement is used throughout.

Aside from a few minor alterations, the sequential presentation of regional dissections is the same as that of the fifth edition. Persons involved with organizing anatomy courses can relatively easily rearrange the chapters into an order of dissection that suits the plans and needs of their own curriculum.

A statement from the preface of the fifth edition is equally pertinent to this edition:

Since the manual is designed as an autonomous unit, it does not have to be used in conjunction with, or with reference to, any specific descriptive text on human anatomy. The dissector should use this book for the purpose for which it was written—as a guide for human dissection. If the student is to obtain a thorough understanding of human anatomy, he should supplement the information gained from the dissection and from the brief descriptions and illustrations in this manual with collateral reading in one of the standard descriptive texts. Frequent reference to one of the standard medical dictionaries will also help to familiarize the dissector with the meaning, origin, and pronunciation of the numerous terms he will encounter.

Too often in recent years, human gross anatomy courses have been reduced to a mere exercise of cutting the human body apart, with the learning of anatomy unfortunately postponed to a later time. The time to learn is while doing; dissectors must therefore be encouraged to learn as they dissect. Inasmuch as human anatomy is usually the first major course in the medical or dental school curriculum, the staff teaching human anatomy are entrusted with the responsibility of guiding students in the formation of efficient and effective learning habits—habits that train the mind to observe accurately, to assimilate, to recall, and to express concisely what is learned. Used properly, this manual, which presents anatomy as clearly as possible, can assist in the learning process because it requires that the dissector read directions carefully, dissect accordingly, and then observe. We hope that the mental process required and the skills acquired to learn anatomy in this manner will reward students again and

again with an enthusiasm to learn and the confidence to do so, long after the course in anatomy is over.

My good friend and colleague William J. Swartz deserves to be mentioned and thanked for his advice, time, and criticism. I also received a good deal of editorial assistance from Virginia Howard, to whom I am grateful. Don Alvarado did the new illustrations; his work, which adds greatly to the worth of the manual, speaks for itself.

*John J. Jacobs*

# Introduction

The right to dissect the human body was won after centuries of struggle against the prejudice of the unenlightened. Today's medical and dental students are apt to forget that having at their disposal, legally and without effort on their own part, a well-preserved body for dissection is a privilege for which the anatomist of 300 years ago would have given much. The body on the dissecting table is all the corporeal remains of what was once a human being, and it should be regarded with respect at all times.

The early anatomists—if they were so fortunate as to procure a body—were frequently confronted with the need to work secretly and in stealth; their work had to be done hurriedly because of the rapidity of decay. Modern methods of embalming and preservation eliminate the problem of decay. Your only responsibility, as the dissector, for the preservation of the body in the dissecting room is to prevent it from becoming too dry by keeping it wrapped in cloths dampened with preserving fluid when it is not being dissected or studied.

The technique of human dissection is acquired only by practice. Fortunately, you will develop an adequate technique usually in a relatively short time. It is a different technique from the one you may already be familiar with from studies of comparative anatomy, chiefly because of the vastly larger size of the body. For this reason, the technique of human dissection is less difficult than that used by the comparative anatomist, and often requires patience rather than great skill.



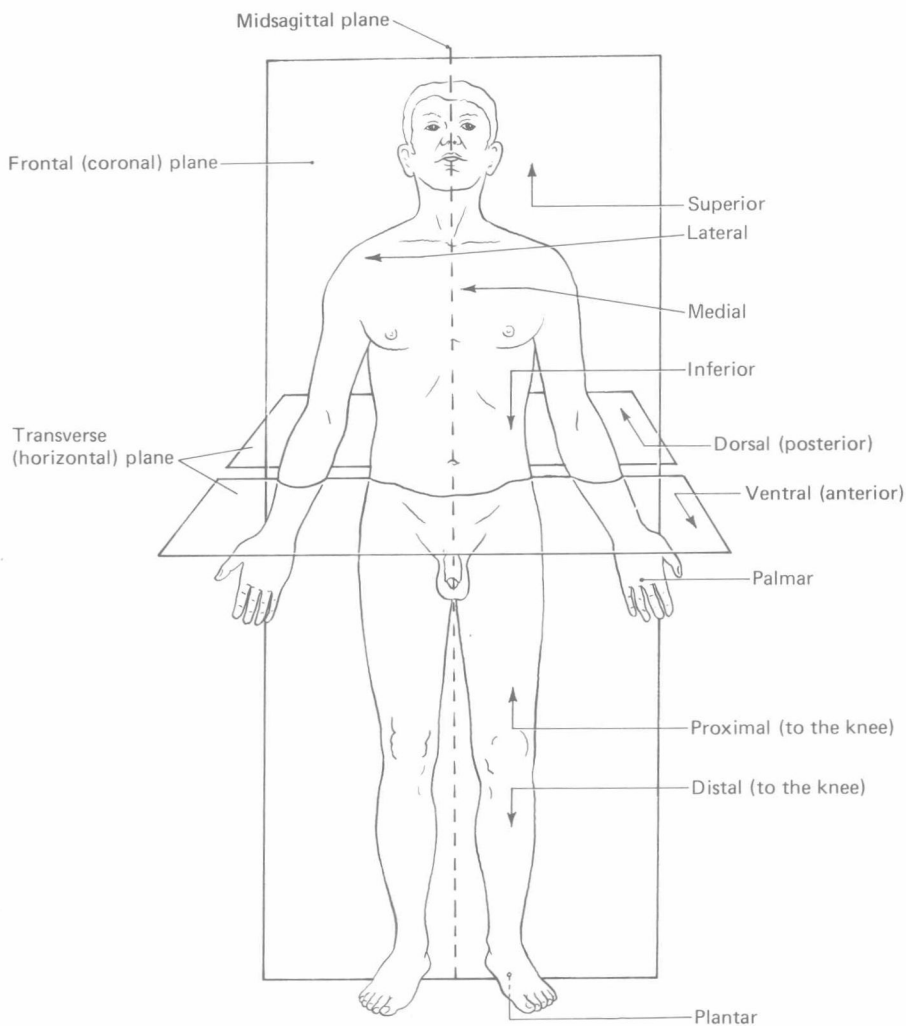
The essential instruments for the dissection of the human body are a strong pair of blunt-pointed forceps and a sharp scalpel with a broad blade of medium to large size. A flexible probe, a medium size hemostat, and a pair of scissors of medium size with one rounded and one pointed end are occasionally needed. Small, sharp-pointed forceps, narrow-bladed, sharp-pointed knives, and various elaborate surgical instruments are not essential for dissecting. The number and kinds of instruments selected need not conform to this list but may vary according to the needs and plan of study in various medical schools.

The method of dissecting the body is a regional one, in which the design is to see everything that is to be seen in a single area of the body at one time, as opposed to the systemic method more commonly followed in studies of comparative anatomy. In approaching any region of the body, first identify the surface landmarks (bones, muscles, vessels, etc.) that can be seen or palpated through the skin. Then you will be instructed to reflect the skin from that region. Skin should be removed only when that region is to be studied, as skin is the best protection against drying of the underlying parts. The actual technique of skin reflection is best learned by practice, but remember that the incisions that mark out a flap of skin for reflection must be made completely through the skin and along its entire length before reflection is begun, and that the skin alone must always be reflected cleanly from the underlying fascia.

The structures to be exposed and studied after the skin is reflected are embedded in various types of connective tissue that come under the generic term "fascia." Before you remove the fascia, its form, extent, and connections should be studied. Not only does this tissue form the framework for (and enclose) the various structures, it is also important in limiting and directing the spread of infections. The dissection of the body consists, to a very great extent, in removing the fascia without injuring the structures it contains. This process—the cleaning of the embedded muscles, nerves, arteries, and other structures—is a tedious business, and you will often be tempted to leave it incomplete and pass on to other things once you have partially cleaned the particular structure you are seeking. This, however, is a bad practice, not only because careless work is, in itself, detrimental to proper observation, but also because of its cumulative effect on the dissection as a whole. Clean each structure in its entirety. The more thoroughly you clean a particular region, the more easily and satisfactorily can you clean and observe ensuing and deeper structures.

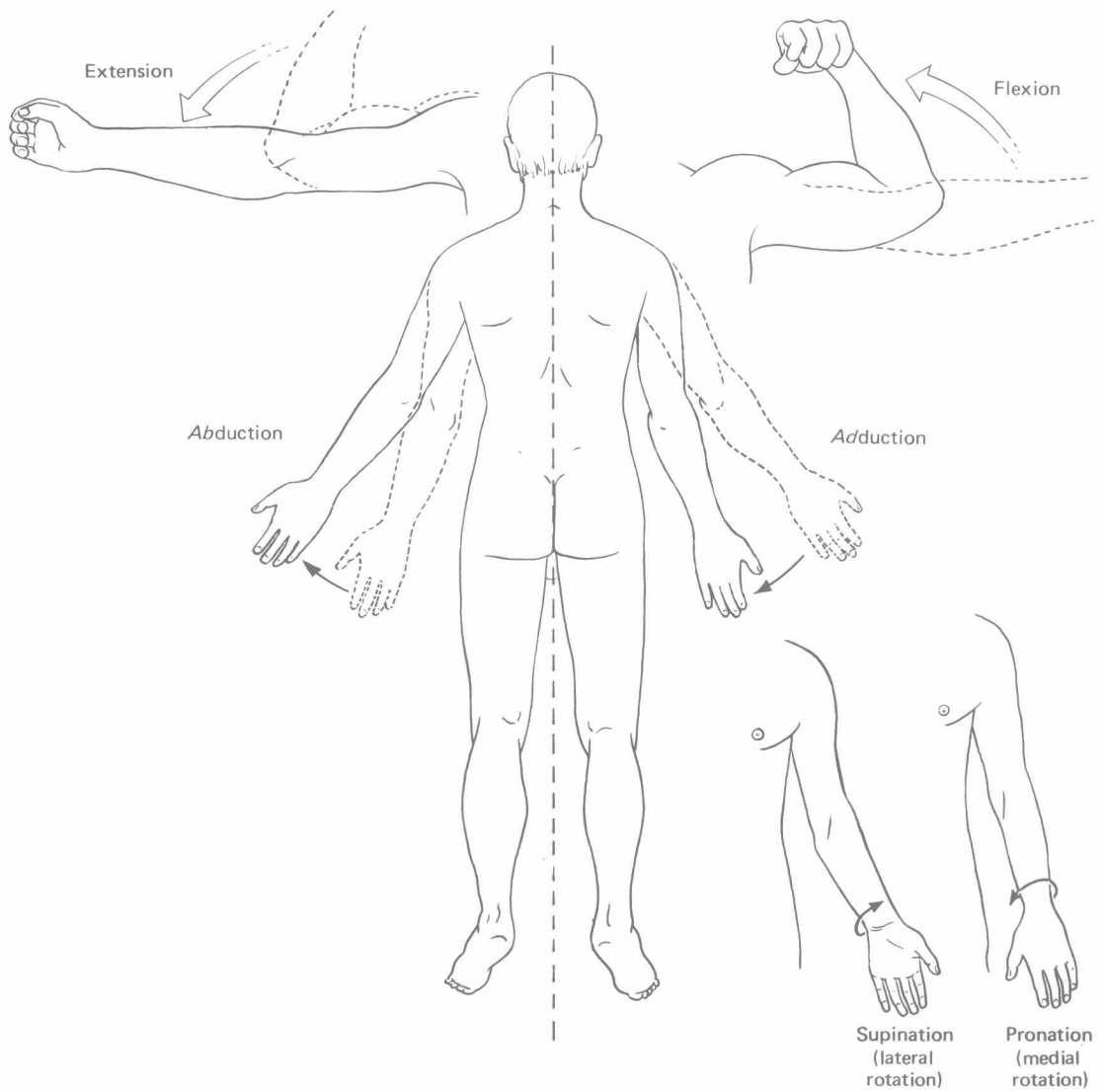
When you have cleaned all the structures in a particular region, you should take time to review and study them as they appear in the body. A definite plan of study should be followed for each structure dissected. This plan should include the plane or part of the body in which it is located, the form, size, and shape of the structure, its origin, course, and distribution, and its function. If at any time you wish to test your knowledge of any structure or region, you can write in exact terms a brief description of the part or parts of the body being studied or you can make a drawing or diagram and discuss it with your fellow students. Although function will be studied in more detail in other courses, gross anatomy can be more dynamic and interesting if you have some knowledge of the function of the structure you are dissecting.





**Figure 1.1** Anterior view of **planes** and **directions of reference** for the human body in the anatomical position.

Occasionally, a source of pardonable distress to you will be the realization that from a regional study you are expected to acquire a systemic knowledge of human anatomy. The only consolation that can be offered is that here is an opportunity for you to exercise the integrative intellectual powers that those who embark on the study of anatomy may be assumed to possess. Although it is a practical necessity to dissect a series of separate regions, it is by no means a necessity to keep the observations made in separate compartments of your mind. As the dissection proceeds, associate in your mind the knowledge acquired region by region so that you will eventually see



**Figure I.2** Terms of movement used in speaking of the human body: **abduction** means to move away from the midline; **adduction**, to move toward the midline; **lateral rotation**, to rotate outward; **medial rotation**, to rotate inward; **flexion**, to bend (decrease the angle of) a joint; and **extension**, to straighten (increase the angle of) a joint.

the body as a whole and be able to reproduce this knowledge in systemic form—even though, for example, you may never actually see the entire arterial system or the entire nervous system at one time.

The order of dissection starts with the back for the following reasons: (1) For those who are not accustomed to human dissection, dissecting the back causes less emotional trauma than dissecting areas of the body that are visible and more familiar, e.g., face, hand. (2) Because the skin on the back is relatively thick, the technique of skinning can be learned faster than with the thinner skin over the ventral areas of the body. (3) The amount of fat in the subcutaneous tissue of the back is usually less than that found in other areas of the body, permitting easier dissection of the superficial vessels and nerves. (4) In this subcutaneous tissue there are no large secretory parts or glands, such as the mammary gland, that require additional dissection skill. (5) The superficial muscles are large, extend over a fairly large area, and are, therefore, easy to clean. (6) The dissector is also introduced to the concept of the smaller, shorter muscles of the deeper sacrospinalis group. (7) The dissection of the vertebral column initiates the concept of the skeleton at an early stage of dissection. (8) The spinal nerves and their component parts are studied at the beginning of the dissection of the total body, facilitating a better understanding of these nerves when they are encountered in subsequent work.

The terms for location and movement are usually described for the body in the “anatomical position”—that is, standing erect with the arms straight down by the sides and with the forearm and hand in supination (Figs. I.1 and I.2). Although this is not the position of the cadaver on the dissecting table, keep in mind that all descriptions, whether of planes, positions, or relationships, are referred to the anatomical position. Some adjectives and adverbs are used in this manual that do not conform to *Nomina Anatomica* (NA) terminology. These terms are used for the convenience of the dissector—in keeping with the NA policy of translating terms into the vernacular for the sake of clarity. Among these terms are back, backward, below, deeply, down, downward, first, front, highest, lower, lowermost, outward, superior, upper, upward, uppermost. The meaning of these terms should be clear. In applying the terms “first” and “lowermost” to a number of structures (e.g., ribs, vertebrae), it is assumed that you will count them from the cranial toward the caudal region of the body and therefore will use these terms for the upper and lower structures, respectively.

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# Back

For the dissection of the back, the body lies prone with a block elevating the thorax and the head hanging freely, so that the back of the neck is stretched. Certain surface points should be identified before the skin is reflected. In the midline at the base of the skull is the **external occipital protuberance**. Laterally, behind the lower part of the external ear, is the **mastoid process**. Arching between the external occipital protuberance and the mastoid on each side is the **superior nuchal line**. In the median line of the back, the **spinous processes** of most of the vertebrae may be palpated. The most superior vertebral spine that is ordinarily palpable is that of the seventh cervical vertebra (**vertebra prominens**). The upper cervical spines are separated from the skin by the **ligamentum nuchae**, a strong fibrous band that stretches in the median plane from the external occipital protuberance to the seventh cervical

spine and is attached to the spinous processes of all the cervical vertebrae. Inferior to the last lumbar spine, the posterior surface of the **sacrum** is subcutaneous, and below it, between the buttocks, is the **coccyx**. Identify the **crest of the ilium** arching laterally from the **posterior superior iliac spine**. The posterior part of the iliac crest is often covered by a fairly thick layer of subcutaneous fat.

Locate the **vertebral border of the scapula**. Running laterally and upward from this border at the level of the third thoracic vertebral spine is the **spine of the scapula**. It is subcutaneous throughout its length and ends as the broad **acromion process**, the bony prominence of the shoulder.

*After these points have been observed, make the following incisions through the skin as shown in Fig. 1.1: (1) a median longitudinal incision from the external occipital protuberance to the tip of the coccyx; (2) from the upper end of the first*