

SHEARER'S
MANUAL OF
HUMAN DISSECTION

EDITED BY

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THIRD EDITION

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Shearer's *MANUAL OF HUMAN DISSECTION*

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=====PREFACE TO THE THIRD EDITION

Since the second edition of this manual was published, attention has been called to minor errors, misprints, ambiguous statements, changes in dissection procedure and in the illustrations. The editor has endeavored to incorporate as many of these changes as feasible in this third edition without increasing the length of this manual to any marked extent.

Changes have been made particularly in the dissection procedure for the head and neck and for that of the perineum, to facilitate the dissections of these areas. Structures omitted from the previous editions, such as the ansa subclavia, otic ganglion, etc. have been added.

The sequential presentation of regional dissections in this manual is based on the traditional order of dissection. However this order may be changed to suit the plans or preferences of the staff teaching the course. At Rochester in order to achieve correlation in our anatomy courses, the order of dissection is so arranged that the students dissect the gross structures preceding or at the same time that these structures are being studied in histology or neuroanatomy.

Most of the illustrations are still the original ones made by Dr. Shearer for the first edition of this manual. They have been changed only where additional guide lines or labels, and slight changes in the legends would enhance the usefulness of the illustrations. References to original papers have been added only where descriptions in this manual differ radically from those in the standard descriptive texts.

I am greatly indebted to the many students, staff members and reviewers who have made suggestions to help improve the usefulness of this manual.

CHARLES E. TOBIN

PREFACE TO THE SECOND EDITION

With the decrease in time allotted for gross anatomy and the increased number of students in medical schools in the United States, the problem of finding a manual or dissecting guide which will facilitate and enhance instruction in the gross anatomic laboratories is confronting the staff of many schools. The revised edition of this manual was written with the desire that it would help alleviate this situation.

An endeavor is made to achieve a workable balance between the amount of procedure for dissection and descriptive text in this manual. It is, therefore, a compromise between the classical, lengthy manuals and the very brief guides for dissection. It is adaptable to various plans or sequences of dissection without overburdening the dissector with detailed instructions or, on the other hand, neglecting to indicate and correlate the structures of the human body.

This manual does not have to be used in conjunction with, or with reference to, any specific descriptive text of human anatomy, since it is designed as an autonomous unit. *However, the dissector should use this book in view of the purpose for which it is written—a manual of human dissection. Therefore, the information gained from the dissection and that obtained from the brief descriptions and illustrations in this manual should be supplemented by collateral reading in one of the standard descriptive texts, if he is to obtain a more thorough understanding of human anatomy.* Frequent reference to one of the standard medical dictionaries will also help the dissector to familiarize himself with the meaning, origin, and pronunciation of the numerous terms he will encounter. Many interesting sidelights on the development of medical science will be brought out by this means.

The value of the first edition of this manual was found to be greatly enhanced if certain changes in the dissection procedure and alterations in the text descriptions were made. These changes and alterations, which are incorporated in this second edition, are designed to accomplish the following purposes: (1) Maintain the original plan so that this manual can be adapted to any sequence of regional dissection. (2) Give the dissection procedure for the entire body and yet keep the dissected parts in as near their normal relationships as possible, so that relationships as well as individual parts can be studied. (3) Change the dissection procedure to show certain structures to better advantage. (4) Add the dissection procedure for regions which had not been covered previously. (5) Reorganize the text descriptions where they were considered too detailed for a manual of human dissection. (6) Add illustrations to supplement some of Dr. Shearer's original text or to illustrate changes in dissection procedure. (7) Make the more important structures

on each page more easily recognized by printing them in bold face type. (8) Introduce new anatomical concepts which have been developed since the first edition was written.

I am greatly indebted to Dr. K. E. Mason, Dr. V. M. Emmel, Dr. J. G. Wilson and to the Student Fellows and Post-Graduate Veteran Fellows for their many helpful suggestions which aided in the preparation of this edition.

CHARLES E. TOBIN

===== PREFACE TO THE FIRST EDITION

The following laboratory guide to the dissection of the human body is presented in the hope that it may be found useful by those who, like the author, have come to feel that, with the serious decrease in the number of hours allotted to the subject of gross anatomy in American medical schools of recent years, the admirable but lengthy guides at present available are not entirely satisfactory. With a subject of such tremendous scope, the average freshman medical student can not hope, nor should he be expected by his instructor, to emerge at the end of the severely limited time allowed him with a complete practical knowledge of all phases of structure of the human body. The aim of the present work is to point out to the inexperienced dissector what structures he can reasonably be expected to see in the time at his disposal, and to give directions, with as little excess verbiage as possible, for the procedures which should be followed in the demonstration of these structures. The book is designed essentially for use in the dissecting room; the descriptive matter it contains is intended to accompany the actual inspection of the dissected parts. It makes no pretense of being a complete text-book of descriptive anatomy. The knowledge gained in the dissecting room from the body, with the aid of the dissecting manual, should be supplemented by constant reference to one of the standard descriptive texts.

The author does not claim for the illustrations any high degree of artistic excellence. It has been his aim rather to provide drawings which are accurate, and which may be of practical use to the student. With the exception of a few purely diagrammatic figures, the drawings were all made directly from dissections, and from dissections done in exactly the manner

that the student is directed to follow. It is, therefore, thought that they may be of immediate aid to the dissector while at work, and of further use in providing him with a permanent record of the dissection which he himself has done. There is the added hope that the simple technique employed may inspire the ambitious student to make similar drawings from his own dissections.

The order of dissection followed may be changed to suit the individual desires of the instructor. The present order is that which the author has found, after considerable experimentation, most favorable for the complete dissection of a single body by one student or one group of students. If it is desired to have two students, or two pairs of students working on different parts of the same body at one time, the manual will be found to lend itself to a division of the body into two parts, with the diaphragm as the dividing structure.

It may be objected that certain structures, notably the lymphatic system and many of the articulations, have been grossly neglected. The author can only reply that this has been purposely done. The average medical student has neither the time nor the skill properly to demonstrate these structures in his own dissection. The knowledge of these parts which is essential for his further progress is best supplied by lectures, reading, and demonstrations provided by the instructor.

The author is particularly grateful to the publishers for their interest and cooperation at all times, and for their almost saintly patience with his own procrastinations. A special debt is owed to Mr. W. T. Shoener, who personally did the lettering on all of the figures.

EDWIN M. SHEARER

The right to dissect the human body has been won with difficulty after centuries of struggle against the prejudice of the unenlightened. The callow medical student of the present day, who occasionally finds it amusing to drop a bit of human liver down his partner's neck, is apt to forget that in having at his disposal, without effort on his own part, a well preserved body for dissection he is enjoying a privilege for which the anatomist of three hundred years ago would have given much. The body which awaits attention on the dissecting table is all the corporeal remains of what was once a human being, and should be regarded with respect.

The older anatomist was frequently confronted with the necessity of secrecy and stealth, if he was so fortunate as to procure a body at all, and in addition to this, his work had to be done hurriedly because of the rapidity of decay. With modern methods of embalming and preservation, decay has ceased to be a factor, and the only responsibility of the dissector for the preservation of the body in the dissecting room is to see that it does not become too dry. To avoid drying, the body should always be kept wrapped in damp cloths when not in use. The liberal use of water on the part actually undergoing dissection will help to keep the part from drying and will also facilitate the process of dissection.

The technique of human dissection is something that can be acquired only by practise. Fortunately, however, an adequate technique is usually acquired with relatively little practise. It differs from the technique of dissection with which the student may already be familiar from studies of comparative anatomy, chiefly because of the vastly larger size of the body. For this reason, it is less difficult than the technique of the comparative anatomist, often requiring 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. Since proper results cannot be achieved with a dull scalpel, a stone for renewing the edge should always be at hand. A blowpipe, a flexible probe, 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 the various elaborate surgical instruments with which the amateur anatomist so frequently likes to decorate his kit are quite useless in the dissecting room. The number and kind of instruments do not necessarily have to conform to this list. They may vary with the ones selected to suit the needs and plan of study in various medical schools.

The method followed in dissecting the body is the regional method, in

which the design is to see everything that is to be seen in a single region of the body at one time, as opposed to the systematic method more commonly followed in studies of comparative anatomy. In approaching any region of the body, the first procedure is to identify the surface landmarks (bones, muscles, vessels, etc.) which can be palpated through the skin, and then the reflection of the skin which covers it. Skin should be reflected from a region 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 practise, but it is well to remember that the incisions which 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 must always be reflected cleanly from the underlying fascia. Whenever possible, it is advisable to leave a skin flap attached along one of its borders, so that it may be folded back over the part when this is not in use.

The structures which it is desired to expose and study after the skin is reflected are embedded in the various types of connective tissue which come under the generic term of *fascia*. Before the fascia is removed, its form, extent, and connections should be studied. This tissue not only forms the framework for and encloses the various structures, but it is also important in limiting and directing the spread of infections. The further dissection of the body consists, to a very great extent, in the removal of this fascia without injury to the structures it contains. This removal of fascia is known as the *cleaning* of the embedded muscles, nerves, arteries, etc. It is a tedious business, and the dissector will often be tempted to leave it incomplete and pass on to other things when he has cleaned the particular muscle or nerve he is seeking sufficiently to see that it actually exists. This, however, is a bad practise, not only because careless work is, in itself, detrimental to proper observation, but also because it is cumulative in its effect on the dissection as a whole. The more thoroughly a particular region is cleaned, the more easily and satisfactorily can ensuing and deeper regions be cleaned and observed.

When all of the structures in a particular region have been cleaned, time should be taken for review and study of these structures 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. Although the function of the structures dissected will be studied in more detail in future courses, gross anatomy can be made more dynamic and interesting for the dissector if he has some knowledge, however brief, of the function of the structure he is dissecting.

Too often there is a tendency on the part of the dissector merely to go through the motions of dissection in the dissecting room, and do his actual anatomical study elsewhere from textbooks. The purpose of dissection is not, however, to provide a mild gymnastic exercise, but to afford the opportunity of observation and study of the actual structure of the body itself.

Since human anatomy is the introductory course in the medical career of the dissector, he should form the habit early of accurate observation and concise expression of the knowledge gained in this as well as in future courses. If at any time the dissector wishes to test the knowledge which he has obtained of any structure or region, this can be done by drawing or diagramming with labels, describing to his fellow dissectors, or writing in exact terms a brief description of the part or parts of the body being studied.

An occasional source of pardonable distress to the inexperienced dissector is the reflection that from a regional study, he is expected to acquire a systematic knowledge of human anatomy. The only consolation that can be offered is that here is an opportunity for exercise of the mild integrative intellectual powers that one who embarks on the study of anatomy may be assumed to possess. Though it is a practical necessity to prosecute the dissection as a series of separate regions, it is by no means a necessity to keep the observations so made in separate regional compartments of the mind. As the dissection proceeds, the knowledge acquired region by region should be associated in the mind of the dissector so that he will eventually see the body as a whole and be able to reproduce his knowledge in systematic form, even though, for example, he may never actually have seen the entire arterial system or the entire nervous system at one time.

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PECTORAL REGION

Before starting the dissection of the **pectoral region**, identify the bony points which may be felt through the skin. In the midline at the base of the neck is the **jugular notch**, which marks the superior border of the manubrium sterni. At each side of the jugular notch the prominent medial end of the **clavicle** may be felt; it takes part in the sternoclavicular articulation. The clavicle may be felt along its entire length. At its lateral end it articulates with the **acromion process** of the scapula, which also is subcutaneous, and which forms the bony prominence of the shoulder. The **sternum** may be felt through the skin in the midline along the entire length of the **manubrium** and **corpus sterni**. At the lower end of the corpus sterni is a depression in the anterior body wall corresponding to the **xiphoid process** of the sternum. About an inch and a half below the jugular notch is a marked transverse bony ridge. This is the **sternal angle**, which marks the junction of the manubrium and corpus sterni; it is of importance in that it indicates the level at which the second rib joins the sternum and may be used as a starting point for counting the ribs on the surface of the body.

Observe the position of the **nipple**. It usually corresponds to the fourth intercostal space, about four inches from the sternum. In the female it is at the summit of a rounded elevation formed by the superficial fascia which contains the mammary gland.

Abduct the arms and observe the **axillary folds**. These are folds of skin, fascia, and muscle which bound the **axilla** or armpit. The anterior fold is caused by the lower border of the pectoralis major muscle. The posterior fold, which extends farther inferiorly, is caused principally by the latissimus dorsi. Between the two folds the skin, here covered with hair, is indented to form the arched floor of the axilla.

For the dissection of the pectoral region and axilla, the arms should be abducted and tied in this position to a long board placed under the shoulders and extending outward on each side. This abduction should only be about 12 inches from the side of the body when beginning this dissection. Full abduction will tear the muscles. During subsequent dissection periods, gradually abduct the arms until the axilla is fully exposed. With the body so placed, the following skin incisions should be made: (1) in the midline from the **jugular notch** to the middle of the xiphoid process; (2) from the upper end of the first incision, one laterally on each side along the full length of the clavicle to the tip of the acromion; (3) from the lower end of the first incision, one laterally and somewhat inferiorly across the thoracic wall to the posterior axillary fold; (4) from the lower end of the first incision, one upward and laterally to the nipple, which it should encircle, then upward and laterally

along the line of the anterior axillary fold and down the front of the arm for about six inches. Transverse incisions should then be made across the front of the arm for about two inches. The large flaps of skin thus marked out on each side should be reflected laterally. Some difficulty may be met in reflecting the skin of the axilla, since this skin, which is quite thin, is rather firmly attached to strands of axillary fascia.

When the skin flaps are reflected, the **superficial fascia** of the pectoral and axillary regions are exposed. In the male subject, the superficial fascia of this region has no specific characteristics, except that in its uppermost part will be found the fibers of origin of the **platysma**, a superficial muscle of the neck. In the female, however, it contains the mammary gland, which should now be studied. Dissect the vessels and nerves within the superficial fascia, paying particular attention to those related to the mammary gland in the female. Consult one of the standard descriptive texts for the **lymphatic drainage of the mammary gland**.

The **mammary gland** does not have a distinct capsule of connective tissue. Its essential glandular portion, the **corpus mammae**, is embedded in the general subcutaneous fatty tissue, which is here increased in amount. The corpus mammae consists of from 15 to 20 **lobes**, each of which has a single **excretory duct** opening separately into a depression on the nipple. Pass a bristle into one of these openings and attempt by dissection to demonstrate the **lactiferous duct** whose termination it is. Look also for the **sinus lactiferus**, a dilation of the lactiferous duct just internal to its opening. Internal to the sinus each duct breaks up into smaller and smaller branches within the substance of the gland. These cannot ordinarily be demonstrated in gross dissection.

The pectoralis major muscle should now be cleaned. On one side, remove the superficial fascia (including the mammary gland and nipple) and the deep fascia covering the muscle. Cut through the fascia (until the red muscle fibers are exposed) in a transverse line running from the lower border of the medial end of the clavicle outward to the anterior aspect of the arm, and in a vertical line along the lateral part of the anterior aspect of the sternum. This will mark out a triangular flap of fascia which can then be reflected laterally and downward to expose the sternocostal portion of the muscle. In cutting the strands of fascia from the surface of the muscle, the blade of the scalpel should be moved in the direction in which the muscle fibers run. When the lower border of the muscle, corresponding to the anterior axillary fold, is reached, the flap of fascia removed from its surface may be cut away and discarded. Next remove the fascia from the upper or clavicular portion of the muscle in the same manner by reflecting it upward and laterally.

On the other side, leave the mammary gland in place as a landmark, and to observe its blood supply from vessels supplying the pectoral muscles in a

later stage of the dissection. The pectoralis major muscle on this side can be cleaned by cutting and reflecting the fascia from the peripheral borders of the mammary gland.

The **pectoralis major** is a large triangular muscle consisting of a smaller **clavicular portion** and a larger, inferior **sternocostal portion**, the two usually separated by a distinct groove. The clavicular portion arises from the anterior surface of the medial half of the clavicle. The superficial fibers of the sternocostal portion arise from the lateral part of the entire length of the anterior surface of the manubrium and corpus sterni. Its deeper fibers arise from the anterior surfaces of the second to sixth costal cartilages, but this cannot be demonstrated until the muscle is reflected. Laterally, the fibers of both parts converge to be inserted together into the outer lip of the **intertubercular sulcus** of the humerus. The insertion, however, cannot be properly studied until the arm is dissected, as it is now under cover of the deltoid muscle.

Attempt to demonstrate some of the small anterior **cutaneous nerves** and **vessels** which pierce the pectoralis major in longitudinal series slightly lateral to the sternum. These are the terminal portions of the upper intercostal nerves and vessels, and supply the skin over the anterior part of the chest.

Identify and clean the **cephalic vein**. This is a superficial vein of the arm, usually large, but sometimes reduced in size or lacking, which will be found in the present area of dissection in the groove between the upper border of the pectoralis major and the deltoid. It disappears from view by going behind the clavicle in the **deltopectoral triangle**. This is a small triangular depression bounded by the anterior border of the deltoid, the upper border of the pectoralis major, and the lower border of the middle portion of the clavicle. Remove the fat which it contains and look for the small **deltopectoral lymph glands** which are often present. Emerging through the fat of the deltopectoral triangle will also be found the **deltoid branch** of the **thoracoacromial artery**, which accompanies the cephalic vein laterally and supplies the anterior border of the deltoid.

The anterior wall of the axilla is formed principally by the pectoralis major. To prepare the axilla for dissection this muscle should now be reflected. *Before the pectoralis major (or any other muscle) is reflected, it is advisable to insert a finger beneath the muscle and, by palpation, ascertain its bony attachments, relationships to other structures, and nerve and blood supply.* This procedure will avoid the error of cutting through not only the muscle being dissected, but also the adjacent structures, since the thickness of the muscle to be reflected cannot be fully appreciated until it is palpated. Detach the clavicular portion from its origin, and cut through the sternocostal portion by an incision running parallel and about an inch lateral to its