

GRANT'S DISSECTOR

8TH EDITION

Eberhardt K. Sauerland



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8th edition

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**GRANT'S
DISSECTOR**

8th edition

A portion of the royalties from this *Dissector* have been donated to establish the **J. C. B. GRANT ANATOMY SCHOLARSHIP** in honor of the late Professor John C. Boileau Grant. The award will be given annually to exceptional senior medical students at the University of Texas Medical Branch who wish to pursue advanced anatomical studies in preparation for their chosen medical specialty.

Preface to the eighth edition

This present edition serves essentially the same purpose as the previous 7th edition of the *Dissector*. For general statements regarding the composition of this book, the reader is referred to the preface to the 7th edition (p. vii). The present edition contains nearly 2000 cross-references to appropriate illustrations in the new and expanded 7th edition of *Grant's Atlas of Anatomy*. Students who own the older 6th edition of the *Atlas* will benefit from a conversion table (Appendix V).

As stated previously, the dissections may be carried out in any chapter sequence desirable. Many schools prefer to approach certain dissections with their own special needs and circumstances in mind. This fact was appropriately considered by outlining alternative or optional procedures.

Anatomists and students across the country have provided me with valuable suggestions which were carefully considered in this edition. I am particularly indebted to Professor R. R. Peterson, Washington University School of Medicine, for his thoughtful suggestions. I am grateful to my colleagues in the Anatomy Department at the University of Texas Medical Branch for continually providing me with new ideas and suggestions for improvements. Ms. Joan Patterson and Ms. Carol Russo deserve special mention for their superb assistance in the preparation of the manuscript.

Finally, my special thanks go to Ms. Sara A. Finnegan, Associate Editor-in-Chief, and all others at The Williams & Wilkins Co. who worked so diligently on this edition.

E. K. SAUERLAND
May 1977

Preface to the seventh edition

In January 1972, Professor J. C. Boileau Grant asked me to prepare the 7th edition of his *Dissector* and to adapt this handbook to the everchanging needs of our medical school curricula. In my efforts to make the necessary changes I was not alone. Dr. Grant advised me frequently and made, as usual, brilliant suggestions. This great man and teacher is now dead at the age of 87. Only days before his death on August 14, 1973, Dr. Grant read the last pages of the manuscript. As an indication of his approval, he concluded his final communication with his old school motto "*laus finem.*" I am immensely grateful to Dr. Grant for his trust, advice, and his friendship.

Since new medical curricula have reduced the number of hours available for gross anatomical studies, it was our objective to save time whenever possible. Consequently: (1) The text is concise. (2) Numerous illustrations replace the printed word. (3) The text contains hundreds of references to appropriate illustrations in *Grant's Atlas of Anatomy* (6th ed.). These references ensure the most efficient use of the *Atlas* during dissection or review. (4) Since rapid and competent dissection often depends on thorough knowledge of pertinent bony reference points, a brief discussion of important bony landmarks is included for each anatomical region. (5) Several new procedures allow efficient dissection without sacrificing clarity or detail (e.g., *en bloc* removal and study of the G.I. tract and its associated glands; facilitated approach to intrapelvic and perineal structures by partial disarticulation of right hip bone; rapid exposure of brain stem and cranial nerves by removal of wedge of occipital bone; etc.).

Courses in physical examination (with emphasis on thoracic and abdominal structures) are being offered by many medical and dental schools during the freshman year. To accommodate the needs of students taking these courses, we have covered thorax and abdomen in the initial chapters. Pelvis, extremities, and head and neck follow in logical sequence. However, the dissections may be carried out in any sequence desirable. A detailed dissection of the brain was deleted from this edition since, in most cases, anatomical studies concerning the brain are incorporated in special neuroanatomy courses. If time permits, special projects may be desirable (dissection of bull's eye; fetus; lumbar approach to kidney; certain joints). Appropriate procedures for these projects are described in the Appendices.

The clinical significance of gross anatomical structures was stressed whenever possible. Such clinically relevant comments (in fine print) are intended to demonstrate the practical importance of gross anatomy and to arouse the student's interest.

In addition to Professor Grant, I am indebted to Professor David S. Maxwell (U.C.L.A.) for critically reading the manuscript and making most valuable suggestions. Furthermore, I am most grateful to my colleagues in the Anatomy Department at the University of Texas Medical Branch, particularly to Professor Donald Duncan, for providing me with ideas and suggestions for the improvement of this edition. My wife deserves special thanks for her understanding, patience, and contributions.

Finally, I thank the editors and staff of The Williams & Wilkins Co., and particularly Miss Sara A. Finnegan, for their interest and efforts in preparing this book.

E. K. SAUERLAND
September 1973

Preface to the sixth edition

This handbook is a guide to the orderly and consecutive display of the structures of the human body, region by region. An effort has been made to discriminate between the more important structures for which **bold type** is used and the less important which appear in *italics*. If the student will follow the instructions given within, he should be able to proceed successfully alone at such times as the help of an instructor is not available.

On account of the diminishing number of hours made available to the student for the study of practical anatomy, the changes made in this edition have largely been directed towards saving time and speeding dissection by various means, such as: shortening the text, increasing the number of headings and subheadings, moving structures from bold type to italics, and supplying an illustration where it can adequately replace the printed word or where the pace of progress is unduly slow.

Moreover, since some cadavers can be dissected with relative ease and others only with difficulty and more time, the less fortunate dissector might profitably seek advice regarding omissions he might judiciously be permitted; these will in part depend upon the dissected material and the specimens available to him for study.

Many parts of the text have been modified or re-written, including the female pelvis and perineum, the cranial nerves, and the middle ear. Alternative procedures and sequences are suggested. Instructions for the dissection of the fetus and of the bull's eye have been added.

Although this handbook is well illustrated, many students seek additional visual aid. Of those who have used the author's *Atlas* in conjunction with the *Dissector*, some remark that they would have been saved a great deal of time and trouble if appropriate references to plates in the *Atlas* were noted in the margins of the pages of the *Dissector*. To fit this need, unobtrusive references are made throughout the text, thus (*Atlas*, 123).

To Professor J. S. Thompson of the University of Toronto and Professor C. H. Sawyer of the University of California at Los Angeles I am indebted for their courtesy and kindness in allowing me free access to the anatomical material in their respective schools.

To those who have provided me with ideas and suggestions for the improvement of this handbook I am indeed most grateful, and particularly to Professors R. V. Gregg, R. D. Laurensen, G. F. Lewis, R. G. MacKenzie and E. K. Sauerland, and Mr. D. W. Schwartz. Their contributions are incorporated in this edition.

To Mrs. Dorothy Chubb, who made the new illustrations and many of the earlier ones, I express my thanks for the thought and skill she devoted to them. And, here I repeat to Miss Nancy Joy, Head of Department of Art as Applied to Medicine in the University of Toronto, my thanks for the artistic help given in previous editions, and also to Dr. Brock Brown.

I would also thank Mr. Francis E. Old, Jr., who, representing the Publishers, has taken a personal and active interest in the preparation of this book and has with his customary courtesy met all my tedious requests.

J. C. BOILEAU GRANT
May 1967

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CHAPTER 1

INTRODUCTION TO DISSECTION

When the student is assigned to a cadaver or subject, he assumes responsibility for its proper care. He will find the subject already preserved or embalmed, the arteries occasionally injected with a (red) coloring matter, the veins sometimes full of clotted blood, and sometimes empty. The whole body has been kept moist by adequate wrappings or by submersion into suitable preservative fluid. It is the duty of the dissector to uncover only the parts on which he is engaged, to inspect every part periodically, and to renew and moisten wrappings as occasion demands. No part must ever be left exposed to the air needlessly. Special attention must be given to the face, hands, feet, and external genitalia. Once a part is allowed to become dry and hard, it can never be fully restored, and its proper dissection is impossible. Plastic bags are particularly useful to prevent drying.

Instruments

Usually, the student will be provided with a list of preferred dissecting instruments. If in doubt, procure the following (fig. 1-1):

1. **Two pairs of forceps** about 12 to 15 cm long, with handles transversely ridged to prevent slipping, ends blunt and rounded, and gripping surfaces corrugated. The second pair is needed for distracting the tissue.
2. A **seeker or probe** consisting of a rigid steel probe with blunt bent tip. Pointed needle-like seekers, as well as abruptly hooked ones, should be banned from the dissecting room.
3. A **scalpel**, preferably with detachable knife blades. The blade should be about 3.5 to 4 cm long. The cutting edge must possess some convexity near the point since in ordinary dissecting the movement is a circular one. The blade must be kept sharp at all times, particularly in the vicinity of the tip, for this is the part constantly used (fig. 1-3). No one can do good work with a blunt knife. The rounded end of the han-

dle can be conveniently used to separate soft tissues.

4. **Two pairs of scissors:** A larger, heavy dissecting scissors with two sharp points (sharp-sharp type), about 15 cm in length. A fine pair of scissors with two sharp points for the dissection of delicate structures.

Dissection

Light and Working Conditions. Be sure that the light falls on the part under investigation. Adequate light is essential for efficient dissection. Work in a position that is comfortable and not tiring. Make use of wooden blocks to stabilize parts of the cadaver and to maintain its most suitable posture. Protect your clothing by wearing a long white coat or an apron.

Purpose of Dissection. There is no substitute for a three-dimensional approach to the structures of the body. Observe and palpate the topographic relations of various structures to each other. Feel the texture of blood vessels, nerves, and various tissues. Test the rigidity of bones and the strength of ligaments. Add to your theoretical knowledge the three-dimensional concept which is so necessary for an intelligent approach to surgery and physical examination.

Efficiency. Time is immensely valuable. Learn as much as possible in the shortest possible time. The following suggestions will help you to increase your efficiency:

1. Acquire a *theoretical concept* of the area under investigation *before* you attempt to dissect it. You do not dig around and happen to find "something interesting." You must deliberately search for certain structures.
2. Make full use of a good *atlas*.
3. Always palpate *bony landmarks* since they are keys in your search for related soft structures. It is mandatory to have a skull on hand when dissecting the head.
4. *Use your time wisely.* To spend an hour tracing

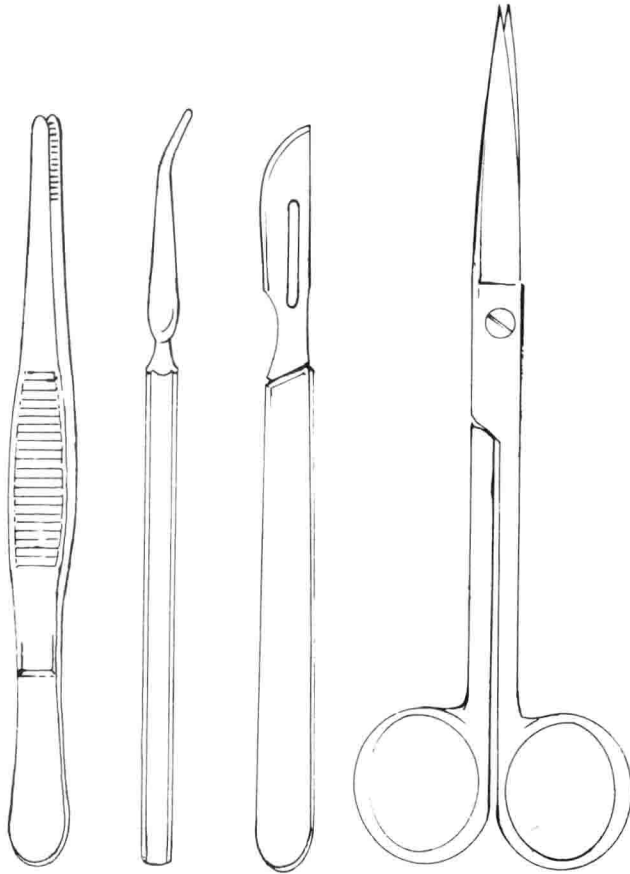


FIG. 1-1. Dissecting instruments.

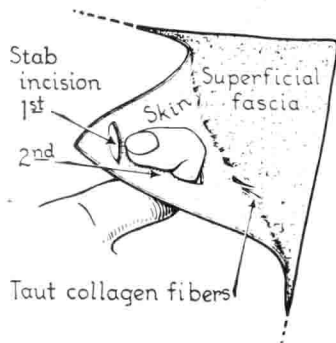


FIG. 1-2. When removing skin, apply traction.

the terminal twigs of a cutaneous nerve, when the general skin area supplied by the nerve is obvious, is spending an hour for little gain. To spend 3 minutes to define the exact fiber direction of a ligament, is to spend 3 minutes for great gain since a knowledge of the movements restrained or prevented by that ligament is the reward.

5. Demonstrate the *essential features* of a given anatomical region with *clarity*. Remove fat, connective tissue, and smaller veins. If a clear-cut display of the arteries is obtained, the general arrangement of the companion veins will be obvious.

Dissecting Techniques. Keep in mind that a varia-

ble amount of subcutaneous fat lies immediately deep to the skin. In that fat course superficial nerves and vessels, particularly veins. Therefore, in removing skin, all fat should be left behind. In those subjects nearly devoid of fat, one needs to exercise special care in order not to go too deep. If, during removal of skin, you see brownish muscular fibers shining through the filmy deep fascia, you are too deep. Always remember to put *traction on the skin* as it is being removed, to keep the *sharp knife* directed against it, and to leave the fat in place (unless specified otherwise). In this manner, you will work faster and encounter fewer difficulties (figs. 1-2 and 1-3).

The unnecessary destruction of many soft structures can be avoided and a great deal of time can be saved by utilizing the following safe and efficient technique: As illustrated in figure 1-4, use a pair of scissors of the sharp-sharp type and gently force the blades apart in a direction parallel to the structures of interest. Use the same technique with a fine pair of scissors to prepare delicate blood vessels and fine nerve filaments.

Terminology

Anatomical Position (fig. 1-5). Anatomists have agreed to relate everything they describe to a universally approved and accepted position of the body. It is that position in which the body stands erect with the feet together, arms by the side, and the palms facing forward. That the dissector is, on most occasions, working with the subject lying on its back makes not the slightest difference. When he says this or that structure is *inferior* to this or that muscle, he is understood by all anatomists to mean it is nearer the feet.

Figure 1-6 illustrates such essential terms as *superior* (*cranial*), *inferior* (*caudal*), *anterior* (*ventral*), and *posterior* (*dorsal*). The terms *coronal*, *sagittal*, and *transverse* (*horizontal*) are explained in figure 1-7.

Descriptions

Anatomical structures can be precisely described. Learn and practice to give an *accurate account* of

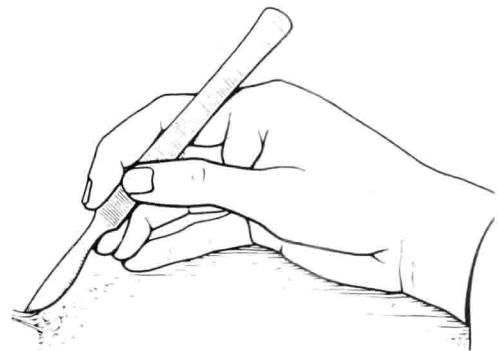


FIG. 1-3. When dissecting, rest the hand. Eliminate unsteady movements.

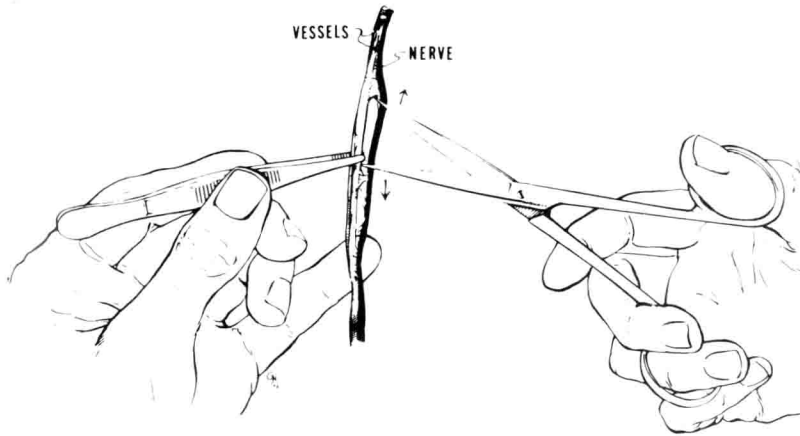


FIG. 1-4. Scissor technique: separating delicate structures.

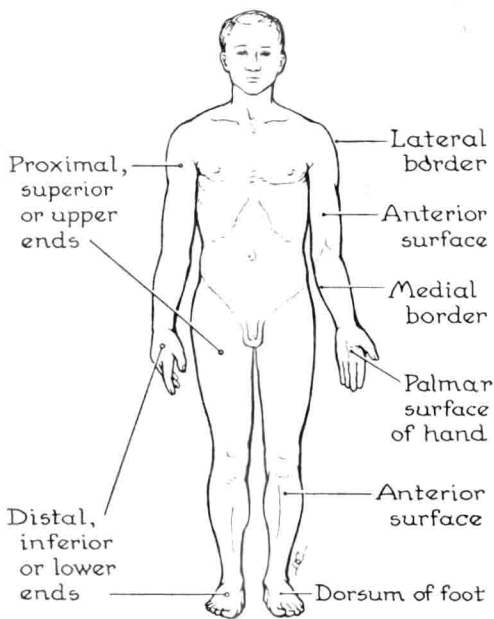


FIG. 1-5. Anatomical position, except for right forearm.

each important structure in an *orderly* and *logical* fashion. Always project yourself into a future professional situation: Remember, you must give orderly and logical accounts when reporting on radiological findings, on performed surgery or autopsies, etc. Your ability to recall facts will be greatly enhanced if you adopt the following schemes or similar ones:

Muscle:

1. Shape, size, and position
2. Attachments (origin and insertion):
 - a. Fleishy
 - b. Fibrous (tendinous or aponeurotic)
3. Actions and uses
4. Nerve supply (spinal nerve; cranial nerve)
5. Immediate relations (anterior; posterior; etc.).

Bone:

1. Type or class (long; short; flat; irregular; sesamoid)

2. Situation (where in the body)
3. Shape, size, and appearance
4. Parts (e.g., body, borders, processes, foramina; articulate surfaces)
5. Attachments of muscles, ligaments, and septa
6. Ossification and epiphyses.

Joint:

1. Type or class (fibrous, cartilaginous, or synovial)
2. "Proximal" bone concerned
3. "Distal" bone concerned
4. Articular capsule (fibrous capsule; synovial membrane)
5. Ligaments
6. Bursae
7. Movements.

Blood Vessel or Nerve:

1. Size, source, and situation
2. Course and terminal branches
3. Structures supplied
4. Immediate relations and accompanying structures
5. Variations and anomalies.

Variations

No cadaver will conform in all details of its anatomical construction to the patterns outlined in the pages of this Dissector. This manual describes the most usual patterns encountered in the adult. Minor and even major variants frequently occur: arteries may arise from other sources than those indicated or may pursue different courses. Muscles may have extra heads of origin or be absent entirely. Organs may vary from their accepted shape and (or) be found in other than "normal" positions. The usual anatomical relations may be distorted by disease processes.

Regard the cadaver you are working on as a "typical example." By all means, examine as many different subjects as possible. Only in this manner will you be able to familiarize yourself with the accepted "normal" and with variations and anomalies.