

A Laboratory Guide to

ANATOMY
and
PHYSIOLOGY

KING and SHOWERS

W. B. SAUNDERS COMPANY

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ANATOMY
and
PHYSIOLOGY

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Preface to the Student

When you begin a course in a science you soon become aware that there is a scientific language in which there are unfamiliar terms. It is the laboratory instruction and experience that give meaning to these words. In place of presenting printed symbols on a page, as is done in textbooks, laboratory experiments demonstrate terms, concepts and mechanisms in their characteristic relation to time, and in the degree of detail which is limited only by the investigator's ingenuity and perseverance. Commonly, the resulting experience and the associative learning involve not only vision but several of the other senses.

Laboratory work also helps you by encouraging thinking and critical judgment for resisting fallacious dogma, superstitions and popular opinions which are not supported by evidence; it teaches you to see things as they are.

For the scientist the laboratory provides a means of developing new knowledge. This is done by forming a hypothesis, which is largely intuitive, and then submitting it to the most rigorous possible tests in the attempt to break it down. If the hypothesis cannot be shown to be invalid, it is not necessary to reject it. In your laboratory experiment, you will be following the same procedure except that the hypothesis will be given or implied, and the experimental procedures will not require a great deal of previous training or experience. Some of the experiments, although not difficult, have been performed by famous scientists of the past and have resulted in important advances in science.

Since your observations are based upon one experiment (the special case) it is wise to consider how well they would hold for all similar experiments (the general case). First, your results are subject to *experimental error* which is determined by your performance, and by the characteristics of the instrument you use for measurement. No matter how skilled you may be, you contribute a part of this error. Your instrument or equipment may permit readings only to one sixteenth of an inch or it may be capable of measuring a micron (one thousandth of a millimeter). At some point, however, the limitations of its precision will also contribute to experimental error. The accuracy of the instrument must be considered. If, for example, it is a metal rule which contracts or expands with cold and heat, the measuring device will be accurate at only one temperature.

Next, bear in mind that you will not always get the same response in the same individual. Variation is to be expected; hence, your observation represents *a point within a range*. This range may be wide or narrow. Further, there are differences in individuals. Thus, it is necessary to learn the limits of variation within the individual and among the species in order to deter-

mine whether your observation represents a normal response or whether it is being influenced by the experimental conditions which you are imposing. When you are studying man, it is important to remember that the normal or physiologic ranges of many reactions may be expected to show some variations with age and with sex; they may also be influenced by height, weight and other body characteristics. It is for these reasons that the results of experiments are frequently described statistically and the characteristics of the subjects reported in detail.

In conclusion, we recommend that you practice your knowledge gained in the laboratory by applying it to physiologic interpretation of normal and commonplace actions, and behavior of man. Physiology and anatomy are not abstract and unreal, since they are based upon the understanding of structure and function of living things.

BARRY G. KING
MARY JANE SHOWERS

Preface to the Instructor

The manual is designed to provide considerable flexibility in developing a course suited to the needs of the individual university, college or school of nursing. The work plan can be adjusted in relation to the duration of the course and the laboratory period, and the abilities of different groups. Further, in addition to basic assignments, supplementary experiments or exercises may be performed by a student as a term project or be tentatively scheduled so that the more effective students can use their time to best advantage. Some instructors may wish to offer extra credit for the additional work.

In a number of the subjects, the effectiveness of instruction may be increased by assigning different experiments to groups in the same class. This works well where the reactions or results are such that they can be demonstrated to other groups in a matter of a few minutes. It provides a broader experience than could otherwise be gained in the same time and benefits the students who learn by teaching. It also provides for effective use of a limited number of sets of equipment. The extent to which demonstrations and supplementary work can be given will, however, depend upon the staff and the extent of preparation and supervision required for the particular assignment.

Space for assignments is provided in the Table of Contents. Assignments should be made well in advance of the laboratory period on the system or subject and the student encouraged to read the background material in the text and plan the day's work ahead of time.

The separate tasks are listed as demonstrations, experiments, dissections or exercises. The student is directed to complete and/or label outline figures which appear in the manual under the pertinent task. The directions calling for discussion, answers or sketches are numbered so that the student's responses, which are written on separate sheets, may be identified without copying the direction on the answer sheet. The directions and completed figures can be removed from the manual and handed in with the other material. In the exercises on skeletal muscles the outline figures have been repeated to allow the student to draw in the origin and insertion of the muscles without crowding or overlapping.

The dissections have been given in detail to allow the student to prepare for the assignment and follow the procedure. The descriptions will also serve as a guide if the nature and duration of the course are such as to permit the student to perform the task himself. Students should participate in all demonstrations and, while they may not perform a dissection, they should be encouraged to assist and to make their own observations. For example, feeling the normally beating or the fibrillating heart, or the lung under artificial

respiration, affords a much clearer understanding of the phenomenon than can be gained by merely watching.

Finally we have attempted to guide the student in relating the physiology and anatomy he learns to his fellow man and to everyday life, by practicing interpreting what he sees. We have also sought to help him appreciate normal variation of response in the individual and among individuals.

The authors wish to acknowledge the assistance and the many helpful suggestions of the publishers, W. B. Saunders Company, in the preparation of this laboratory guide.

BARRY G. KING
MARY JANE SHOWERS

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UNIT I

The Body as an Integrated Whole

LESSON 1

Body Organization

1. Body Plan

Equipment and Materials. Anatomical charts showing ventral body cavity, model of torso, x-rays of skull, vertebral column, chest and abdomen.

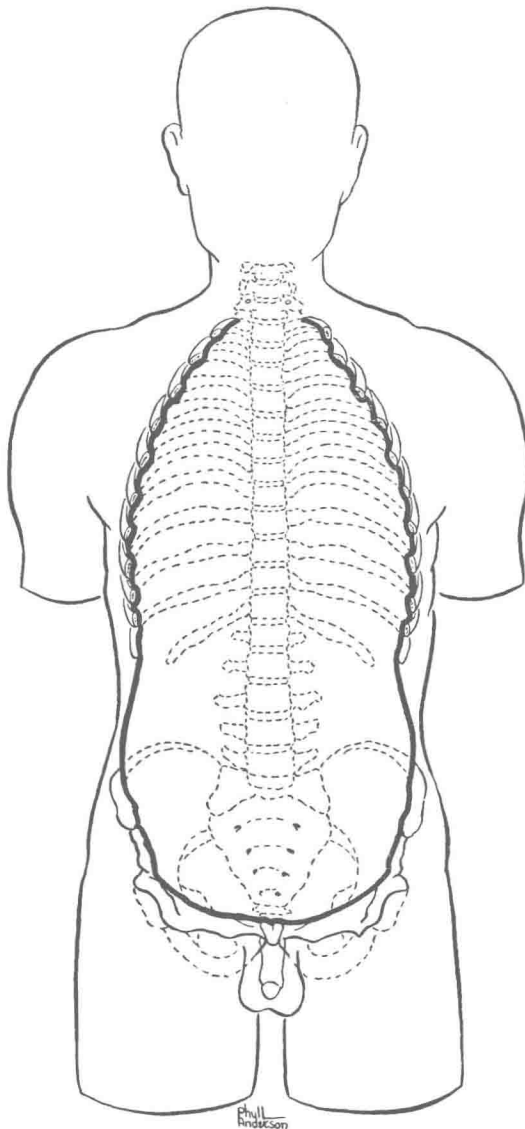


FIGURE 1

EXERCISE

Use the above material to identify the cranial, vertebral, thoracic, pleural, pericardial, abdominal and pelvic cavities. Note their contents and record (1) in outline form. Practice with the material until you can recognize and name the organs by their respective systems and cavities. Add (2) this information to your outline. Mark outline Figures 1 and 2 into their subdivisions and sketch in the organs which belong and label them appropriately.

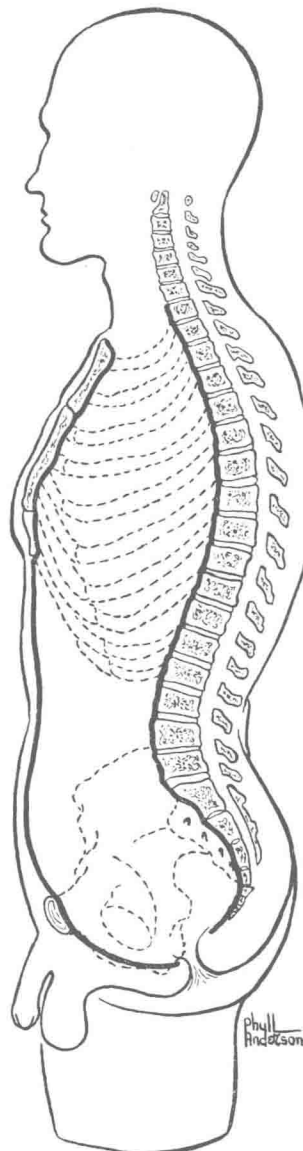


FIGURE 2

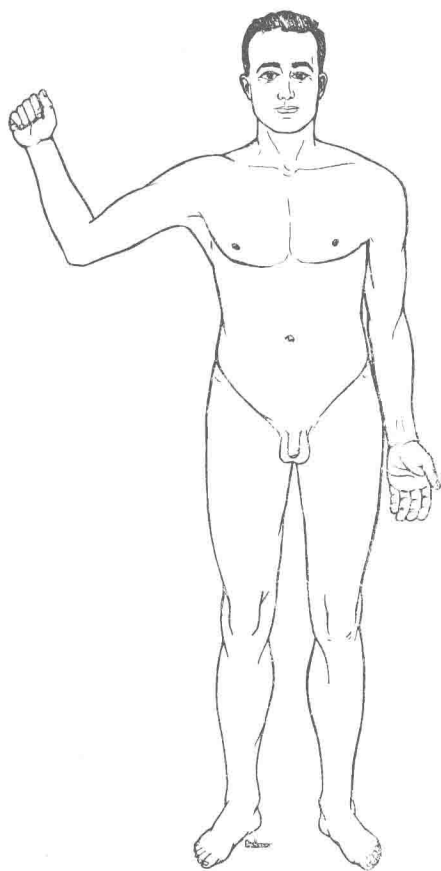


FIGURE 3



FIGURE 4



FIGURE 5