GUIDES FOR VERTABRATE DISSECTION. THE DOGFISH (ACANTHIAS): AN ELASMOBRANCH

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GUIDES FOR VERTEBRATE DISSECTION

THE DOGFISH

(*ACANTHIAS*)

AN ELASMOBRANCH

BY

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INTRODUCTION

THESE directions for dissection are intended eventually to include representatives of all the major groups of vertebrates. Each is complete in itself and is issued separately so that laboratories may select those forms best adapted for their courses. The directions have been tested by several years' use and are thought to have a distinct pedagogic value in that they do not so much tell the student what he will find, but instead ask him what he does find. He thus obtains his information from the specimen, not from the printed page. For similar reasons illustrations have been omitted; students sometimes find it easier to copy the published figure than to work out the points for themselves.

No attempt has been made to follow out every system of organs completely, but each has been traced far enough to give a good knowledge of the more important structures to use as a basis for comparisons. The student by following the directions may obtain a knowledge of the general anatomy of the animal studied, but this knowledge of itself has little value. More important is the benefit to be gained by comparing the different forms dissected, tracing as far as possible their resemblances and differences. Hence in his dissection the student should continually recall the conditions existing in all other animals as he is tracing out each part.

More than this: he should read the general statements given in manuals of vertebrate structure as he takes up each organ or system of organs, thus correlating his discoveries and making them a part of one general whole. It would be well to go farther and read the accounts of the development of the organs in question in some of the text-books of vertebrate embryology. It is only in this way that an explanation of many peculiarities of structure may be obtained.

Unless explicitly used otherwise the terms **right** and **left** in the following directions apply to the right and left of the animal being dissected, not of the student. **Anterior** and **posterior**

indicate relative position with regard to head and tail, while **dorsal** and **ventral** are used for the anterior and posterior of human anatomy. **Medial** is used to imply proximity to the middle line, **lateral** being the contrasting term. **Proximal** refers to that part of an organ or structure nearest to its centre or to its attachment to the body, **distal** being the opposite adjective. In speaking of muscles the fixed point of attachment is the **origin,** the attachment on the part to be moved is its **insertion.**

INJECTING.—In many cases it is almost impossible for the beginner to trace the blood-vessels unless they are filled with some colored substance which renders them more easily seen. This is especially true of the smaller vessels. Injection is also frequently convenient in tracing other vessels like those of the urogenital system.

Various substances ('injection masses') have been devised for filling the vessels. The essential features of a mass are that it have color, that it flow freely when injected, and that it soon harden so that it will not escape from a vessel accidentally cut. Within recent years a starch mass has been largely used, and as this answers all the purposes of these guides it is described here:

Corn-starch	400 pts. by volume
2% chloral hydrate in water	400 "
95% alcohol	100 "
Color and glycerin (equal parts)	100 "

The mixture should be thoroughly mixed by stirring and strained through cheese-cloth or paper cambric, stirring during the operation. The starch and color quickly settle, hence the mixture has to be stirred while using. It will keep indefinitely, but of course must be thoroughly mixed each time before using.

The colors commonly used are vermillion,* insoluble Prussian blue, chrome green, and chrome yellow. The vermillion is usually used for the arterial, the blue for the venous system, but it is often advantageous to use chrome yellow instead of blue, as it contrasts better with dark organs like the liver and kidneys, while, when a blood-vessel occasionally bursts in injection, the viscera are not so badly stained.

* Care should be taken to get true vermillion (mercuric sulphide), as much that masquerades under that name is red lead colored with eosine. This works disadvantageously as the eosine dissolves in the liquids in which the specimens are preserved and stains everything indiscriminately.

An extremely fine chrome yellow may be made by dissolving 200 parts of acetate of lead and 105 parts by weight of chromate of potash in separate dishes of water. After complete solution mix and allow the precipitate to settle. Pour off the supernatant fluid and wash the precipitate with several waters so as to remove the potassium acetate which would injure the specimen.

Many instruments—syringes, water-pressure apparatus, etc., have been proposed for injecting, but a considerable experience has led to the conclusion that for small animals there is nothing better than a large rubber bulb for the pressure. This is connected by rubber tubing with the canula which is inserted in the vessel to be filled. Use the largest canula possible and keep it free from precipitated mass.

Skeletons.—The skeletons made by the average student are likely to be imperfect, but the knowledge which he obtains in preparing them is of value. The laboratory should have skeletons well prepared, but the student should clean those which he studies. In the case of fishes it is sufficient to remove the skin from the body, next to place the animal for a few minutes in water near the boiling-point, and then to remove the flesh by hand. With other animals the tissues are more resistant, and in these cases the animal, after removal of the skin, should be boiled in a soap solution made as follows:

Thoroughly mix with heat 75 grams of hard soap, 12 grams of potassic nitrate (saltpetre), 150 cc. of strong ammonia, and 2000 cc. of soft water. For use, one part of this 'stock' is diluted with three of water and the body is boiled in this, the length of time varying with the size and consistency of the animal, care being taken not to boil it long enough to soften the ligaments unless it be desired to separate the bones from each other.

For decalcification of skulls in order easily to get at the brains, nitric alcohol, made by mixing equal parts of ten per cent nitric acid and ninety-five per cent alcohol, is useful.

Material for dissection can be obtained from

Supply Department, Marine Biological Laboratory, Woods Hole, Mass.

Dr. F. D. Lambert, Tufts College, Mass.

H. H. and C. S. Brimley, Raleigh, N. C.

H. A. Ward, Rochester, N. Y.

Kny-Scheerer Co., 225 Fourth Ave., New York.

THE DOGFISH

Acanthias vulgaris

Two species of dogfish are common on the New England coast, *Acanthias vulgaris* (*Squalis acanthias*) and *Galeus canis*.* *Acanthias* has a stout spine in front of each dorsal fin and sharp and cutting teeth; *Mustelus* lacks fin-spines and has flattened, pavement teeth. The following directions are based upon *Acanthias*, but, except in regard to the exits of the nerves through the wall of the cranium, will apply well to the other form.

Dealers supply *Acanthias* of three ages: 'pups,' about 8 to 9 inches long; 'garters,' 18 to 20 inches long; and adults, from 2½ to 3½ feet total length. For all purposes except the study of the brain and cranial nerves and the fully developed sexual organs the 'garters' are the most favorable. Each student will require two specimens, one for skeleton and one for dissection, while an adult head for the brain, etc., is valuable. Two students can readily compare specimens in order to see the other sex.

The specimen for dissection should be injected. Dealers supply them with the vessels filled with red and blue (or yellow, preferable), but it is possible to inject formalin material. The arterial system is filled by cutting off the tail behind the last dorsal fin and forcing the fluid forward through the caudal artery. The venous system requires more trouble. Inject, first, forward and back through the portal vein; second, in both directions through one of the lateral abdominal veins; and third, forward through the caudal vein which lies just ventral to the caudal artery.

* Some would refer the latter to the genus *Mustelus*, but the differences in internal structure between *Galeus* and *Mustelus* are sufficient to warrant their separation, even if there are no corresponding differences in the superficial characters relied upon by the systematist.