

BIOLOGY 3110
LABORATORY SCHEDULE 2009

PART I:

Aim: The following laboratory exercises are intended to give you a detailed understanding of the basic construction of vertebrates. Ammocoetes illustrates the major organ systems of vertebrates in primitive but functional form. Examine these organs carefully, taking note of their proportions and their positions relative to each other. Your drawings should be an accurate record of your observations (e.g., in the whole mount, precisely where is the otic vesicle in relation to the gills; what proportion of the body length is occupied by the pharynx; etc.).

Sept. 1, 3

Registration in sections; assignment of desks; issuance of slides and microscopes; preliminary instructions.

AMMOCOETES: Study and draw the whole mount first, then continue with the cross-sections. Since each slide has only one section through each subdivision of the body, your sections will not contain the same structures as shown on other students' slides. Hence you will find it necessary to compare sections (especially those of the trunk region) on your slide with those on other slides.

Draw your Ammocoetes whole mount, and draw cross lines through it to indicate, as accurately as possible, positions of the cross sections on your slide. Also draw one cross-section chosen anywhere from the anterior end of the pharynx to the posterior end of the gut. Make these drawings in lead pencil and label as completely as you can. These drawings should be handed in on or before Sept. 8. (See model drawing on bulletin board.)

References: Lab Manual (M), 1-12

Sept. 8, 10

HISTOLOGY: Epithelial tissues, M 110-111. Connective tissues including cartilage and bone M 112-122. General body skin and palm or sole skin, M 13-17. Striated, smooth, and cardiac muscle, M 123-127 (don't overlook suggestions on pages 126-127). Also, muscle and tendon, M 115. You should be able to identify all structures mentioned in the manual. No drawings are required, however, any drawings you submit will be examined and returned to you.

DEMONSTRATION on Epithelial Tissues in demonstration room

PART II: Endoskeleton

Aim: The term "vertebrate" is derived from the central element of the endoskeleton. This is appropriate, for it is the continually growing internal skeleton that made it possible for vertebrates to differ from invertebrates in the critical matter of body size, and thus to evolve into the subphylum as we know it. In the assignments on the skeleton that follow, try to think about the axial and appendicular structures that you study as evidences of the great adaptability of the simple internal supporting structures that first appeared in primitive aquatic forms. In comparing the skulls, try not to lose sight of the fact that the modern amniote skull represents the evolutionary integration of exo- and endoskeletal elements that once separately provided protection and support for brain, sense organs, jaws, and gills. Even without

considering fossils, the development and comparative anatomy of the skulls of extant vertebrates provides very persuasive evidence for evolution.

Sept. 15

Finish Histology, begin Skulls

Bone boxes are available in your specimen cabinets

SKULLS: Fluid mounts of dogfish chondrocrania are on the laboratory tables. Amia skulls may be signed out, but should be returned promptly, since we have a limited number. Alligator skeletons became unavailable commercially when the reptiles were declared an endangered species. With protection they proliferated extensively but never reappeared in supply catalogues. Our holdings are therefore limited. Some large alligator skulls are on demonstration in the display case. There are also some smaller ones that can be signed out for individual study. Cat skulls are in the bone boxes.

Bisected cat skulls may be signed out.

References: M 31-52.

DEMONSTRATION on skulls in demonstration room and Rebstock Hall display case.

PLEASE do not mark our valuable skulls and bones by poking at them with pencil points and ball point pens. Do use a wooden probe. And please handle all skeletal material with care.

Sept. 17,22

Finish Skulls, begin Axial Skeletons

Sept. 24, 29

AXIAL AND APPENDICULAR SKELETONS: Sections of dogfishes showing vertebrae, and vertebrae mounted in fluid or plastic, will be available. Cat vertebrae, long bones, and girdles are in your bone box. A variety of large bones will be available for study in room 216, and skeletons are on display in the corridor.

References: M 18-25, 26-31 (omit tarsal bones, p. 31).

Oct. 1

HISTOLOGY REVIEW

Oct. 6 (Tuesday)

PRACTICAL EXAMINATION, covering all laboratory exercises from Sept. 1-Oct. 1. The examination will consist of a series of marked skulls and limb and girdle bones, with questions (e.g., name the process marked, name the homolog in some other animal, etc.). Slides of skin, epithelium, connective tissue, cartilage, bone, and muscle as well as preparations of Ammocoetes will be included.

PART III: Dissection of the Muscles of the Cat

Aim: Dissecting the muscles of an animal gives you the opportunity to observe at first hand that the muscle mass is made up of a large number of individual muscles, so arranged in relation to each other as to make possible a great variety of finely controlled movements. You will get something out of this work if you will try to think of each muscle in terms of what happens when it contracts, and how it interacts with other muscles. Merely identifying muscles without thinking about them is a waste of time.

Oct. 8

CATS issued today. Read general considerations, pp. 53-54 and instructions, page 54, in Manual before skinning your specimen. Skin on one side only, and leave skin attached. To keep flesh soft and workable, wrap specimen in its own skin at the end of each session, place it in its plastic bag, and close the bag carefully.

After skinning, begin dissecting muscles, M 55-57. As far as possible, identify each muscle by dissecting it free to its origin and insertion. By the end of the period, you should have proceeded at least as far as the rhomboideus capitis.

Oct. 13

Pectoral muscles; muscles of forelimb and girdle, M 57-59. Muscles of wrist and digits, pp. 59-61.

Oct. 15

Abdominal muscles, M 61-62, Thoracic muscles, M 62.

Muscles of neck, throat, and jaws, M 62-64.

Oct. 20

Muscles of vertebral column, M 64-65. Muscles of thigh, M 65-67.

Oct. 22

Muscles of the shank. Dissect gastrocnemius, plantaris, soleus, tibialis anterior, extensor digitorum longus, and peroneus group (do not separate out members of this group). M 67-68. Remainder of shank optional.

Present your cat to one of the teaching assistants for grading. The grade will be based on the caliber of the dissection itself; i.e., how accurately, thoroughly, and neatly you have separated each muscle from origin to insertion.

Oct. 27 (Tuesday)

MUSCLE EXAMINATION. Practical examination will be primarily based on dissected cats covering all laboratory exercises from Oct. 8-22. Bone specimens will also be used for recognition of sites of muscle origins and insertions.

PART IV: Examination of the Internal Organ Systems of Vertebrates.

Oct. 29, Nov 3

Digestive and respiratory systems, coelom and mesenteries, of dogfish, M 69-74, and cat, M 74-78. (Begin cat dissection with p. 74, salivary glands. Free the glands from adherent connective tissues. Some ducts are difficult to visualize. If they are not readily identifiable, do not spend an inordinate amount of time trying to find and trace them.) Histological examination of small intestine, liver and pancreas. M 130-135.

Nov. 5, 10, 12, 17

Circulatory system of dogfish, M 79-85, and cat, M 86-95. Omit cat hepatic portal system, M 88-89. For gill circulation in the dogfish, you may find it helpful to examine Kluge, pp. 311-321. Histology of artery and vein, M 136-137. Examination of blood smear under the microscope, M 139-141.

Nov. 19

Urogenital systems of dogfish, M 95-99, and cat, M 99-102.

Nov. 24

Histological examination of kidney, M 142-146, and ovary, M 106-108. Sheep kidneys (M141) will also be available for dissection.

Dec. 1

HISTOLOGY REVIEW

Dec. 3 (Thursday)

PRACTICAL EXAMINATION covering all laboratory exercises from Oct. 29 - Dec. 1.

I. Laboratory Assignments and Laboratory Hours

The work to be done in the laboratory is outlined on the Laboratory Schedule. The schedule is somewhat flexible, and you may sometimes be a bit ahead of it, sometimes a bit behind. But try to avoid running more than a half period behind.

Rebstock Hall will be open: Monday through Thursday from 7:00 AM to 10:30 PM; on Friday from 7:00 AM till 7:00 PM, Saturday from 7:00 AM till 5:30 PM, and Sunday from 12:30 PM until 6:30 PM. During holidays, the building is generally locked. The laboratories will be open at all times that the buildings are open. No one may remain in the rooms after closing time. You may work at any time during open hours EXCEPT when another section or class is in session. Permission of the instructor is required to work in a section in which you are not registered.

Another class will be using the laboratory on MONDAYS from 4:30 –7:00 PM, WEDNESDAYS from 4:30 – 7:00PM, and THURSDAYS from 4:30 –7:00 PM. Rebstock 217 will be closed to Bio 3110 students during these times.

The last students leaving the laboratories are REQUESTED to see that the windows are closed, Fans are turned off, and the lights are switched off.

II. Care of Slides and Other Equipment

Each desk locker contains a microscope with an internal light source, and a set of slides; and a box of skeletal materials. These items are shared by the students using the same desk in different sections. At the end of each period put all items into the locker--AND LOCK IT.

MICROSCOPES, SLIDE BOXES, AND BONE BOXES MAY NOT BE TAKEN OUT OF THE LABORATORY UNDER ANY CIRCUMSTANCES. THERE ARE NO EXCEPTIONS TO THIS RULE. WE HAVE BEEN ASKED TO REPORT ANY INFRACTIONS DIRECTLY TO THE DEAN'S OFFICE.

III. Drawings

Making sketches of what you see is frequently useful in both gross and microscopic anatomical studies, and you will occasionally be asked to make drawings of material under study. Such sketches are helpful in training yourself to observe accurately and in full detail, and to record precisely what you see. Thus the drawings that you make should be regarded as scientific notes or records.

The drawings you hand in will be corrected and returned to you. The corrections are intended to aid you in making observations, and, when necessary, to rectify your interpretations of what you see. Grades will be given for your guidance only. Drawing grades will NOT be counted into the final course grade.

IV. Demonstrations

Special materials will frequently be placed on demonstration in room 216 (which is entered from 217). Major demonstrations are announced on the laboratory blackboard, but other items are set out from time to time. Make a point of checking room 216 for specimens of interest. Materials pertinent to the course are also placed in the large case in the corridor of Rebstock (facing the entrance), and printed materials and pictures are put up on the bulletin boards marked with the course number.

V. Examinations

Practical examinations will be given on the days announced. THERE ARE NO MAKE-UP EXAMINATIONS FOR LABORATORY PRACTICALS.

VI. Final Grades

The final grades in this course are based on practical examinations and general laboratory performance as evaluated by the instructors. "Laboratory" performance relates to such matters as regular attendance, adequate preparation, thoughtful and concentrated attention to the work in hand, skillful use of eyes and hands as reflected in drawings and dissections. No student will earn a high grade in this course, regardless of scores on written tests, if his or her laboratory work is indifferent or mediocre. Course evaluations for Vertebrate Structure Lab are available at: <http://evals.wustl.edu> starting sometime in November.

VII. Course Website

The course website may be accessed through the Natural Sciences Learning Center at <http://www.nslc.wustl.edu/courses/Bio311/bio311.html>, the site contains a syllabus as well as photomicrographs from demonstrations, handouts and drawings.

Username bio311
Password integrate

VIII. Non-Course Website: <http://www.bio.psu.edu/people/faculty/strauss/anatomy/>

Biology Library Reserve Materials for this course. R = Recommended to purchase!

Title Author

Atlas and dissection guide for comparative anatomy / Saul Wischnitzer

R Manual of Vertebrate Dissection, Comparative Anatomy, 2nd Edition/Dale Fishbeck, Aurora Sebastiani

Di Fiore's atlas of histology with functional correlations / Victor P. Eroschenko

Atlas of normal histology / Mariano S.H. di Fiore

New atlas of histology; light microscopy, histochemistry, and electron microscopy [by] Mariano S. H. di Fiore, Roberto E. Mancini [and] Eduardo D. P. de Robertis. Translation [by]

R Pictorial anatomy of the cat / illustrations & text by Stephen G. Gilbert.

R Pictorial anatomy of the dogfish / illustrations and text by Stephen G. Gilbert.

Comparative vertebrate anatomy : a laboratory dissection guide / Kenneth V. Kardong, Edward J. Zalisko