

OEB 51. The Biology and Evolution of Invertebrate Animals

Catalog Number: 7873

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Half course (spring term)

- Lectures **Tuesdays & Thursdays 10:00 - 11:30 am** (MCZ 202)
- Labs **Wednesdays 3:00 – 6:00 pm**; BioLabs B063)
- Field trip to Bocas del Toro Marine Lab (Panama) 12-20 March, 2011 (spring break)

An introduction to invertebrate diversity. This course will emphasize the development, adult anatomy, biology and evolutionary relationships of the main animal phyla including sponges, mollusks, annelids and arthropods. Special emphasis is placed on understanding the similarities and differences in embryonic development, the broad diversity of animal forms and their adaptations to different ecosystems, and how these phenomena shape animal evolution. The aim of this course is to understand animal diversity from a phylogenetic perspective as well as from a developmental and functional morphology point of view, and to be able to put in context general concepts such as body layers, coeloms, ground patterns, and their roles in animal evolution. Lectures will be complemented with mandatory weekly laboratory exercises and a field trip to different areas of outstanding marine diversity in Panama.

- Prerequisite: LS1b, OEB10, OEB53 or permission of the instructors
- Course limited to 12 students

Recommended Textbooks:

Brusca, R. C. and G. J. Brusca. 2003. Invertebrates, 2nd edition. Sinauer Associates, Sunderland. (\$116.95)

Gilbert, S. F. and A. M. Raunio. 1997. Embryology: Constructing the Organism. Sinauer Associates, Sunderland. (\$97.95)

Moore, J. An Introduction to the Invertebrates, 2nd edition. Cambridge University Press, Cambridge. (\$44.00)

Nielsen, C. 2001. Animal evolution: interrelationships of the living phyla, 2nd edition. Oxford University Press, Oxford. (\$62.10)

Additional Textbooks in Animal Evolution:

Heming, B. 2003. Insect Development and Evolution. Cornell University Press, Ithaca.

Stern, C. Gastrulation: From Cells to Embryo. 2004. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY.

Schmidt-Rhaesa, A. 2007. The Evolution of Organ Systems. Oxford University Press, Oxford.

Minelli, A. 2009. Perspectives in Animal Phylogeny & Evolution. Oxford University Press, Oxford.

Syllabus Spring 2011

Date	Notes	Event	Lecturer	Topic
Tu 25 Jan		Lecture 1	GG/CE	Intro to the Metazoa; general concepts of development, evolution and systematics
Th 27 Jan		Lecture 2	GG	Before and after the Cambrian Explosion; the early fossil record of metazoans
Tu 1 Feb		Lecture 3	CE	Principles of non-bilaterian embryogenesis: pluripotency, terminal differentiation
W 2 Feb		LAB 1		Precambrian and Cambrian metazoans, Sponges and cnidarians
Th 3 Feb		Lecture 4	GG	Introduction to “diploblastic” animals: Porifera, Cnidaria and Placozoa
Tu 8 Feb		Lecture 5	GG	Mesoderm, cephalization: Ctenophora, Acoela, Nemertodermatida, Xenoturbellida
W 9 Feb		LAB 2		Ctenophores, acoels, nemertodermatids, xenoturbellids; morphological matrices
Th 10 Feb		Lecture 6	CE	Evo-Devo and uses of embryogenesis to study mesoderm evolution in Bilateria
Tu 15 Feb		Lecture 7	GG	Deuterostomes I: Echinodermata, Hemichordata, Tunicata and Cephalochordata
W 16 Feb	CE away	LAB 3		Deuterostomes: diversity, embryology, development
Th 17 Feb	GG away	Lecture 8	CE	Deuterostomes II: embryology and development
Tu 22 Feb		Lecture 9	GG	Introduction to the protostomes: Spiralia and Ecdysozoa. Spiralian phyla: Annelida
W 23 Feb		LAB 4		Polychaete embryogenesis; annelid diversity; vent worms
Th 24 Feb		Lecture 10	CE	Spiralia I: Introduction to Spiralian Embryology; Mollusc Embryology
Tu 1 Mar		Lecture 11	GG	Spiralia II: Mollusca, Entoprocta, Lophophorates
W 2 Mar		LAB 5		Mollusc embryogenesis: Ilyanassa
Th 3 Mar		Lecture 12	GG	Spiralia III: Nemertea & Platyhelminthes
Tu 8 Mar		Lecture 13	CE	Spiralia IV: Nemertean & Platyhelminth Embryology
W 9 Mar		Review		Review session for midterm; field trip preparation: collecting techniques, safety, etc.
Th 10 Mar		Exam		Midterm exam
12–20 Mar		Field Trip		Field trip to Bocas del Toro
Tu 22 Mar		Recess	n/a	No class
W 23 Mar		Recess	n/a	No class

Th 24 Mar		Recess	n/a	No class
Tu 29 Mar	GG away	Lecture 14	GG	Platyhelminths; free-living and parasitic; flatworm embryology
W 30 Mar	CE/GG away	LAB 6		Spiralia V: The gnathiferan phyla: Gnathostomulida, Micrognathozoa and Rotifera
Th 31 Mar	CE away	Lecture 15	GG	Ecdysozoa I: Nematoda, Nematomorpha, Priapulida, Kinorhyncha, Loricifera
Tu 5 Apr		Lecture 16	CE	Ecdysozoa II: Ecdysozoan embryogenesis outside of Arthropods
W 6 Apr		LAB 7		The ecdysozoan phyla: introvertans; nematode development
Th 7 Apr		Lecture 17	CE	Ecdysozoa III: Embryogenesis in Tardigrada and Onychophora
Tu 12 Apr	CE away	Lecture 18	GG	Ecdysozoa IV: Tardigrada and Onychophora
W 13 Apr		LAB 8		The ecdysozoan phyla: arthropods, tardigrades, onychophorans
Th 14 Apr		Lecture 19	GG	Ecdysozoa V: Arthropods
Tu 19 Apr		Lecture 20	CE	Ecdysozoa VI: Arthropod Embryology
W 20 Apr	CE away	LAB 9		Visit to arthropod exhibit, HMNH
Th 21 Apr		Lecture 21	CE	Ecdysozoa VII: Arthropods in the study of evolution and development
Tu 26 Apr		Review		Review session for final exam
Th 28 Apr		Exam		Final Exam

Grading:

- Midterm Exam (March 10) 30%
- Final Exam (April 28) 30%
- Field course (March 12-20) 20%
- Lab book (entire course) 20%