

OEB 51. The Biology and Evolution of Invertebrate Animals

Catalog Number: 7873

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Half course (spring term)

- Tuesdays & Thursdays 10-11:30 (MCZ 202)
- Labs Wednesdays (hours to be decided; BioLabs B063)
- Field trip to Bocas del Toro Marine Lab (Panama) 13-21 March, 2010 (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 a mandatory weekly LAB 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

Date	Event	Lecturer	Topic
Tu 26 Jan	Lecture 1	GG/CE	Introduction to the Metazoa; general concepts of development, evolution and systematics
Th 28 Jan	Lecture 2	GG	Before and after the Cambrian Explosion; the early fossil record of metazoans
Tu 2 Feb	Lecture 3	CE	Principles of non-bilaterian embryogenesis: pluripotency versus terminal differentiation
W 3 Feb	LAB 1		Precambrian and Cambrian metazoans, Sponges and cnidarians
Th 4 Feb	Lecture 4	GG	Introduction to “diploblastic” animals: Porifera, Cnidaria and Placozoa
Tu 9 Feb	Lecture 5	GG	The origins of mesoderm and cephalization: Ctenophora, Acoela, Nemertodermatida and Xenoturbellida
W 10 Feb	LAB 2		Ctenophores, acoels, nemertodermatids and xenoturbellids; morphological matrices for phylogenetics
Th 11 Feb	Lecture 6	CE	Evo-Devo and uses of embryogenesis to study mesoderm evolution in Bilateria
Tu 16 Feb	Lecture 7	GG	Deuterostomes I: Echinodermata, Hemichordata, Tunicata and Cephalochordata
W 17 Feb	LAB 3		Deuterostomes: diversity, embryology, development
Th 18 Feb	Lecture 8	CE	Deuterostomes II: embryology and development
Tu 23 Feb	Lecture 9	GG	Introduction to the protostomes: Spiralia and Ecdysozoa. Spiralian phyla: Annelida
W 24 Feb	LAB 4		Polychaete embryogenesis; annelid diversity; vent worms
Th 25 Feb	Lecture 10	CE	Spiralia I: Introduction to Spiralian Embryology; Mollusc Embryology
Tu 2 Mar	Lecture 11	GG	Spiralia II: Mollusca, Entoprocta, Lophophorates
W 3 Mar	LAB 5		Mollusc embryogenesis: <i>Ilyanassa</i>
Th 4 Mar	Lecture 12	CE	Spiralia III: Nemertea & Platyhelminthes
Tu 9 Mar	Lecture 13	GG	Spiralia IV: Nemertean & Platyhelminth Embryology
W 10 Mar	Review		Review session for midterm exam; preparation for field trip, collecting techniques, safety, etc.
Th 11 Mar	Exam		Midterm exam
13 – 21 Mar	Field Trip		Field trip to Bocas del Toro
Tu 23 Mar	Recess	n/a	No class
W 24 Mar	Recess	n/a	No class
Th 25 Mar	Recess	n/a	No class
Tu 30 Mar	Lecture 14	GG	Spiralia V: The gnathiferan phyla: Gnathostomulida, Micrognathozoa and Rotifera
W 31 Mar	LAB 6		Platyhelminths; free-living and parasitic; flatworm embryology
Th 1 Apr	Lecture 15	GG	Ecdysozoa I: Nematoda, Nematomorpha, Priapulida, Kinorhyncha, Loricifera

Tu 6 Apr	Lecture 16	CE	Ecdysozoa II: Ecdysozoan embryogenesis outside of Arthropods
W 7 Apr	LAB 7		The ecdysozoan phyla: introvertans; nematode development
Th 8 Apr	Lecture 17	GG	Ecdysozoa III: Tardigrada and Onychophora
Tu 13 Apr	Lecture 18	CE	Ecdysozoa IV: Embryogenesis in Tardigrada and Onychophora
W 14 Apr	LAB 8		The ecdysozoan phyla: arthropods, tardigrades, onychophorans
Th 15 Apr	Lecture 19	GG	Ecdysozoa V: Arthropods
Tu 20 Apr	Lecture 20	CE	Ecdysozoa VI: Arthropod Embryology
W 21 Apr	LAB 9		Visit to arthropod exhibit, HMNH
Th 22 Apr	Lecture 21	CE	Ecdysozoa VII: Arthropods in the study of homology and development – development as a character for understanding evolution
Tu 27 Apr	Review		Review session for final exam
W 28 Apr	Exam		Final Exam

Grading:

- Midterm Exam (March 11): 30%
- Final Exam (April 28): 30%
- Field course (March 13-21): 20%
- Lab book (entire course): 20%