

XVIII. Miscellaneous Phyla 2009

Word Slide: Cheap Thoughts by Jack O'Brien

A. Phylum Mollusca, Class Bivalvia, Family Unionidae

1. Larvae of freshwater mussels parasitize freshwater fish
2. GLOCHIDIA larvae
 - a. Burrow into fish gills
 - b. Acquire nutrients from fish
 - c. Fish swim upstream
 - d. Larvae drop off fish when they become juvenile mussels

Picture Slide: Glochidia Larvae of Freshwater Mussels; Glochidium (Barnes, R. 1968, *Invertebrate Zoology*, p. 345) & Life-cycle of Unionid mussels (Pearse & Buchsbaum, 1987, *Living Invertebrates* p. 356)

Picture Slide: Glochidia Larvae of Freshwater Mussels; Some unionid mussels extrude fish-like "lures" containing infective glochidia larvae that parasitize the gills of predatory fish that strike the egg-sacs; Neves, R. *et al.*, 1997, in *Aquatic Fauna in Peril*, p.43 & Chaplin, S. *et al.*, 2000, in *Precious Heritage*, p. 179.

Picture Slide: "Losing More Species", Mobile Press Register August 10, 2008

3. Many unionid species threatened
 - a. Dam construction
 - (1) Tennessee Valley Association (TVA) generates hydroelectric power
 - (2) Tennessee-Tombigee Waterway enables barges to move from Mobile to Knoxville
 - b. Man-made changes in Appalachian rivers have altered abundance of potential fish hosts and interfered with life-cycles of unionids

Picture Slides Tennessee-Tombigee Waterway maps,

<http://www.tenntom.org/images/maps/TTWcompmap.jpg> &

<http://www.tenntom.org/images/maps/TTWtransartery.jpg>

Picture Slide: Regional Concentrations of Aquatic Diversity; Based on the number of at-risk fish and mussel species, the Tennessee-Cumberland and Mobile River basins have extraordinarily diverse assemblages of freshwater animal species. Chaplin, S. *et al.*, 2000, in *Precious Heritage*, p. 181

B. Phylum Nematomorpha = Horsehair or Gordian Worms (Chapter 31)

1. Characteristics
 - a. Superficially resemble nematodes
 - (1) No segmentation
 - (2) Grow by molting
 - (3) Pseudocoelomate
 - b. Differences
 - (1) Ends are rounded rather than tapered
 - (2) Non-functional rudimentary gut; they absorb nutrients across their cuticle

Picture Slide: Characteristic blunt anterior & branched posterior of a nematomorph worm; Pearse J. *et al.*, 1987 *Living Invertebrates*, p. 294

2. Life cycle of one species that infects crickets

Picture Slide: Generalized life-cycle of a nematomorph (Fig 31.8, p. 492)

- a. Aquatic stages
 - (1) Eggs hatch in freshwater
 - (2) Free-living larvae crawl on bottom of rivers & streams
 - (3) Utilize transport/paratenic hosts
 - (a) Larvae ingested by aquatic insects, fish, & snails
 - (b) Form cysts that can live over a year in paratenic host
 - (c) Most of these infections are “dead-ends” for the worms
- b. Terrestrial stages
 - (1) Some transport hosts will enter terrestrial environment
 - (a) Insect larvae with indirect development
 - i Metamorphose into flying adults
 - ii Example: damselflies and dragonflies
 - (b) Snails
 - (2) Crickets
 - (a) Become infected when they eat transport hosts
 - (b) Only development period in entire life-cycle when the nematomorphs feed
 - (c) Nematomorphs eventually fill the body cavities
 - (d) Hosts castrated
 - (e) Emergence
 - i Mature worms induce cricket hosts to enter freshwater
 - ii Cricket dies when worm emerges

Picture Slide: Nematomorph Worm Emerging from a Cricket; Thorp, J.H. &A.P. Covich, 1991 *Ecol. & Class. N. Amer. Freshwater Inverts*, p. 274

Picture Slide: Large Nematomorph Worm in a Marine Crustacean; Noble, E.R. *et al.*, 1989 *Parasitology* p. 437

Picture Slide: Mass of Adult Nematomorph Worms Showing Characteristic Coiling Loops Suggestive of the Gordian Knot of Alexander the Great; Pearse J. *et al.*, 1987 *Living Invertebrates*, p. 295

C. Phylum Nemertea = Ribbon Worms (No chapter)

- 1. Characteristics
 - a. Very thin, hence common name
 - b. RHYNCHOCOEL
 - (1) Specialized cavity lined by muscles
 - (2) Filled with fluid
 - (3) Contains a proboscis that may be almost as long as the body
 - (a) Pulled into cavity by retractor muscle
 - (b) Everted quickly by contraction of muscles lining rynchocoel
 - (4) Not part of digestive tract

Picture Slide: Anatomy of a Nemertean Worm; Notice that the Rhynchocoel is Separate from the Digestive Tract; Pechenik, J.A. 1996 *Biology of the Invertebrates* Wm C. Brown Publishers, p. 168

2. Biology
 - a. Most species are predacious
 - (1) Common in mud and sandy intertidal regions of temperate oceans
 - (2) Proboscis wraps around prey
 - (3) Prey paralyzed by neurotoxins
 - b. Commensal *Malacobdella*
 - (1) Found in mantle cavity of marine bivalve molluscs
 - (2) Filters plankton from the water

Picture Slide: The Commensal Nemertean *Malacobdella* Found in Marine Bivalve Molluscs; Pearse, J. *et al.*, 1987 *Living Invertebrates* . Blackwell Scientific Publications, p. 266

- c. Egg predators
 - (1) In egg masses carried by female crabs
 - (2) Trophic characteristics
 - (a) Intimate, longterm association with host
 - (b) Feed on eggs brooded by female; do not feed on female host
 - (c) Bigger than eggs, much smaller than female host
 - (d) Usually just a few worms per host
 - (3) *Carcinonemertes*
 - (a) Very common on local spider crabs, but on other crab species as well
 - (b) May have contributed to population crash of Dungeness crab along west coast of US

Picture Slide: The Egg Predator *Carcinonemertes* Found in Egg Masses of Crabs; Pearse, J. *et al.*, 1987 *Living Invertebrates* Blackwell Scientific Publications, p. 266

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Picture Slide: Parasites & Hollywood ; Leeches steal scene from Humphrey Bogart & Katherine Hepburn in *African Queen*;

<http://www.vims.edu/env/research/leeches/graphics/Movie.gif>

D. Phylum Annelida, Class Hirudinea = Leeches (No chapter)

1. Characteristics
 - a. Segmented worms
 - b. One sucker at each end (Big one is posterior)
2. Found in both freshwater and saltwater habitats

Picture Slide: *Placobdella parasitica*;

<http://www.vims.edu/env/research/leeches/graphics/Parasitica3>.

3. Trophic interactions
 - a. Many are true predators that feed upon small
 - b. Others are micro-predators
 - (1) Take sequential blood meals from vertebrates

- (2) Vectors for protozoan blood parasites in local southern flounder
 - (a) *Trypanosoma bullocki*
 - (b) Hemogregarine *Haemogregarina*

Picture Slide: Lithograph showing physician removing illness causing “bad blood” through the application of a medicinal leech

<http://www.vims.edu/env/research/leeches/leechfigs.html>

- (3) Life-cycle of *Myzobdella lugubris*
 - (a) Young leeches attach, feed, and drop off several species of fish freshwater regions of GOM estuaries
 - (b) In late Fall, leeches attach themselves to blue crabs
 - (c) Do not feed on crab
 - (d) Mate & lay egg “cocoon” on crab
 - (e) Young hatch in about 30 days

Picture Slide: Cocoon of the leech, *Myzobdella lugubris* on carapace of a blue crab <http://www.vims.edu/env/research/leeches/graphics/bluecrab2.gif>

E. Phylum Cnidaria = Sea Anemones, corals and hydrozoans (No chapter)

- 1. Characteristics of cnidarians
 - a. Radial symmetry
 - b. Mouth, gut, but no anus
 - c. Stinging cells called *nematocytes*
 - d. Many exhibit *alternation of generations*
 - (1) Planktonic *medusa* = jellyfish
 - (2) Sessile *polyp*

Picture Slide: Life-cycle of typical cnidarians showing polyp and medusa stages; Sinauer & Associates, 2001

- 2. Even though few species are parasites, a parasitic sea anemone, *Edwardsia* sp. was recently discovered by Luciano Chiaverano, DISL
 - a. Infects the moon jellyfish, *Aurelia* in the Gulf of Mexico
 - b. Eats host’s gonads and partially digested food in canals of medusa

Picture Slides: Representations of a sea anemone; Sinauer & Associates, 2001

Pictures Slides: Series of photos showing *Edwardsia* sp. feeding on a medusa of the moon jellyfish, *Aurelia*. Photos Courtesy of Luciano Chiaverano, Dauphin Island Sea Lab.

F. Phylum Chordata: Catfish named “Candiru”

- 1. Found only in the Amazon and Orinoco Rivers of South America
- 2. Feeding habit
 - a. Able to recognize, *i.e.* taste, water streams exiting gill chambers of large fish
 - b. Enters gill chamber and anchors itself with spines that pierce scales of host
 - c. Feeds on host blood

Picture Slide: Candiru: The vampire fish of Brazil

<http://www.angelfire.com/mo2/animals1/catfish/candiru.html>;

<http://www.angelfire.com/biz/piranha038/candiru.html>; Photo by Frank Magallanes, OPEFE

Picture Slide: Three photos of candiru feeding in the lab;
<http://www.angelfire.com/biz/piranha038/candiru.html>
Photos by Dr. William L. Fink, University of Michigan

3. Mal-adaptive facultative parasite of mammals
 - a. Candiru can follow a urine trail upstream to a mammal immersed in the water
 - b. Will enter the urethra causing problems for . . .
 - (1) Cattle
 - (2) “Skinny-dipping” humans
 - c. Spines prevent the fish from exiting the non-normal host
 - d. Pathology
 - (1) Obstruction/blockage of urinary tract
 - (2) Extreme pain
 - (3) Death
 - e. Treatments include . . .
 - (1) Herb extracts (Xagua plant) that kill the fish
 - (2) Surgical removal
 - (3) Amputation

Picture Slide: Spines of a Candiru lodged in the urethra of a male human;
<http://www.internet.com.br/urologia/Casosclinicos.html>

Picture Slide: Candiru being removed from urethra of human male & specimen after removal; <http://www.internet.com.br/urologia/Casosclinicos.html>

Picture Slide: Candiru Collecting Gear;
<http://www.acnatsci.org/research/biodiv/ichSaulbio.html>