

PowerLecture:

Chapter 25

Part II

Animal Evolution – The Invertebrates

Section 25.8: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online

Mollusks: Phylum Mollusca

- Bilateral, soft-bodied, coelomate
- Most have a shell or reduced version of one
- Mantle drapes over body and secretes shell
- Most have a fleshy foot
- Many have a radula for shredding food

Molluscan Diversity

- Gastropods
- Chitins
- Bivalves
- Cephalopods

Molluscan Diversity

Molluscan classes

Torsion

- Twisting of body parts during larval development
- Occurs only in gastropods

Torsion

Torsion in gastropods

Body Plan of a Snail

Body Plan of a Snail

Snail body plan

Body Plan of a Clam

Body Plan of a Clam

Clam body plan

Section 25.9: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online

Cephalopods

- Only the nautilus retains external shell
- Other cephalopods are streamlined, active swimmers
- All move by jet propulsion
 - Water is forced out of mantle cavity through a funnel-shaped siphon
- Have large brains relative to body size

Cuttlefish Body Plan

Closed circulatory system with heart and accessory heart

Cuttlefish Body Plan

Cuttlefish body plan

Section 25.10: Weblinks and InfoTrac

See the **latest Weblinks and InfoTrac articles** for this chapter online

Videos: CNN

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➤ Biology, 2001, Vol. 5, *Goodbye Guinea Worm* (2:59)

Roundworms (Nematoda)

➤ False coelom

➤ Complete digestive system

Roundworms (Nematoda)

Roundworm body plan

Flukes: Class Trematoda

➤ Parasitic worms

➤ Complicated life cycle

● Larval stage infects a mollusk

● Adult infects a vertebrate

Section 25.11: Weblinks and InfoTrac

See the **latest Weblinks and InfoTrac articles** for this chapter online

Arthropods:

Phylum Arthropoda

➤ The phylum with the greatest number of species

➤ Four lineages:

● Trilobites (all extinct)

● Chelicerates (spiders, mites, scorpions)

● Crustaceans (crabs, shrimps, barnacles)

● Uniramians (insects, centipedes, millipedes)

Adaptations for Success

➤ Hardened exoskeleton

➤ Jointed appendages

➤ Fused and modified segments

➤ Respiratory structures

➤ Specialized sensory structures

➤ Division of labor

Section 25.12: Weblinks and InfoTrac

See the **latest Weblinks and InfoTrac articles** for this chapter online

Chelicerates

➤ Originated in seas

- A few are still marine: horseshoe crabs, sea spiders
- The arachnids are all terrestrial

Spiders	Mites
Scorpions	Chiggers
“Daddy longlegs”	Ticks

Chelicerates

chelicerates

Body Plan of a Spider

Section 25.13: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online

Crustaceans

- Most are marine, some freshwater, a few terrestrial
- Head has two pairs of antenna, three pairs of food-handling appendages

Crustaceans

Crustaceans

Lobster Body Plan

Crab Life Cycle

Crab Life Cycle

Crab life cycle

Section 25.14: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online

Millipedes and Centipedes

- Segmented bodies with many legs
- Millipedes
 - Two pairs of legs per “segment”
 - Scavengers
- Centipedes
 - Flattened, with one pair of legs per segment
 - Predators

Insect Body Plan

- Thorax usually has three pairs of legs and one or two pairs of wings
- Abdomen contains most internal organs and specialized structure for reproduction
- Three-part gut
- Malpighian tubules attach to midgut and serve in elimination of wastes

Section 25.15: Weblinks and InfoTrac

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Insect Diversity

- The only winged invertebrates

- More than 800,000 known species

- Most successful species are small in size and have a great reproductive capacity

Insect Headparts

Insect Headparts

Insect head parts

Types of

Insect Development

Section 25.16: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online

Videos: CNN

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- Biology, 2003, Vol. 7, *Deadly Animals* (1:48)

- Environmental Science, 2003, Vol. 6, *Organic Farming* (1:37)

Unwelcome Arthropods

- Poisonous spiders
- Disease-carrying ticks
- Venomous scorpions
- Agricultural pests

Insect Development

Insect development

Section 25.17: Weblinks and InfoTrac

See the latest Weblinks and InfoTrac articles for this chapter online

Echinoderms

- Deuterostomes
- Body wall has spines or plates
- No brain
- Adults are radial with bilateral features

Echinoderm Diversity

- Crinoids (sea lilies and feather stars)
- Sea stars
- Brittle stars
- Sea urchins, heart urchins, sand dollars
- Sea cucumbers

Body Plan of a Sea Star

Body Plan of a Sea Star

Body plan of a sea star

Water Vascular System

Water Vascular System

Water vascular system