Phylum Arthropoda - I
(Subphyla: Trilobita, Myriopoda & Chelicerata)

[Exercises 13 & 15 (part)]

Identifying Characteristics of the Phylum

- hardened chitinous exoskeleton
- paired jointed appendages; anterior appendages modified into feeding structures
- segmented body
- reduced coelom is a haemocoel with dorsal heart
- complete digestive tract
- well developed nervous system with paired ventral ganglia and well developed sense organs
- muscles in bundles rather than layers

Cell Types and Characteristic Structures

terga = dorsal plates of exoskeleton (singular = tergum)
sterna = ventral plates of exoskeleton (singular = sternum)
chitin = a major component of the exoskeleton made of carbohydrate and protein
feeding appendages: chelicerae, mandibles or gnathobases
respiratory organs: gills, book gills, tracheae or book lungs
excretory organs: coxal glands (= antennal glands, maxillary glands, green glands)
or malpighian tubules
sense organs: ocelli, simple eyes, compound eyes, antennae, statocysts, tactile hairs, chemoreceptors, tympanum

Body Organization

varies in each subphylum, see below

Classification (part):

Subphylum: Trilobita
body plan: head, thorax, pygidium
compound eyes
antennae
mandibles for feeding?
branched (biramous) appendages
respiration by gills?
able to roll up like pill bugs
once most common arthropod, now completely extinct

Subphylum: Myriopoda (centipedes, millipedes)
body plan: head, long trunk
lack compound eyes
single pair of antennae
mandibles for feeding
unbranched legs on most segments
respiration by tracheae

Subphylum: Chelicerata: (spiders, horseshoe crab, scorpions, mites, ticks)
body plan: cephalothorax, abdomen
most lack compound eyes
no antennae
chelicerae for feeding (no mandibles)

Major Classes:

Merostomata (horseshoe crabs)
four pairs of unbranched legs
respiration by gills, book lungs,
book gills or tracheae
Arachnida (spiders, scorpions, mites & ticks)
Pycnogonida (sea spiders)

**Lab Activities:**

- Read description and discussion of arthropods in the lab manual beginning on page 205

A. Subphylum Trilobita (HO):

1. Trilobites
   - know: **head** (cephalon), **thorax**, **pygidium**
   - note the three ‘lobes’ typical of group
   - know: **antennae**, **compound eyes**; **appendages**
   - note presence of compound eyes
   - be able to recognize examples of the subphylum

B. Subphylum Myriopoda (Ex 15, [223]):

1. Centipede (p223):
   - be able to distinguish between a centipede and a millipede
   b. identify external features: **head**, **trunk**, **antenna**, **ocelli**, **poison fang**, **mandibles**, **walking legs**

2. Millipedes (p 223)
   - be able to distinguish between a centipede and a millipede
   b. identify external features: **head**, **trunk**, **antennae**, **ocelli**, **mandibles**, **walking legs**

C. Subphylum Chelicerata - Merostomata (Ex 13, p206)

2. The horseshoe crab: *Limulus* (p206)
   - make sure that you see both the male and the female

3. Reproduction: *Limulus* larva (p2067 & Fig 13-2):
   - be able to recognize as larva of horseshoe crab; it is NOT a trilobite!
   - note superficial similarity to Trilobites

D. Subphylum Chelicerata - Arachnida

4. The Garden Spider: *Argiope* (p 208):
   - external anatomy (you should use a dissecting scope or hand lens)
   - know: cephalothorax, **pedicel**, **abdomen**, **eyes (ocelli)**, **chelicerae**, **pedipalps**, **walking legs**, **lung slit** (opens into **book gills**), **spinnerets**

5. The scorpion (HO)
   - refer to illustrations and descriptions included in this handout

   **preserved:** *Argiope*
- know: **prosoma** (cephalothorax), **opisthosoma** (abdomen), **chelicerae**, **pedipalps**, **eyes**, **walking legs**, **pectines**, **genital operculum**, openings into book lungs

6. Mites (HO)  
   a. the follicle mite, *Demodex* lives in hair follicles and oil glands of the human forehead; it is a commensal, not a parasite; recognize it as a mite & as a chelicerate

b. dust mites are common in the dust of houses and are a common cause for allergic reactions to dust, recognize it as a mite & as a chelicerate

E. Subphylum Chelicerata – Pycnogonida
   7. sea spiders  
      - refer to illustrations and descriptions in handouts and your text  
      - be able to recognize it as a Chelicerate

**Demonstrations:**

- Evolutionary relationships between the Arthropod subphyla  
  - note the diversity that has arisen from a single ancestral form

- Contribution to world species diversity by the Arthropod phylum  
  - note that more than three fourths of all animal species are Arthropods and most of that in the subphylum Insecta

- The Arthropod Exoskeleton  
  - note how hinges and muscle attachments are formed

- Be able to recognize members of these three subphyla  
  - some sheets may be useful in your dissections  
  - be able to identify and recognize the two dangerous spiders; the black widow and the brown recluse

**Notebook Suggestions:**

→ What are the main visible characteristics that distinguish these two subphyla?

→ What are the similarities and differences between centipedes and millipedes?

→ What anatomical features do members of the Chelicerata have in common?

→ What are the typical habitats that of these three subphyla

**Disposal:**

Return the horseshoe crab, spider and scorpion to designated buckets when you are through; **do not discard!**