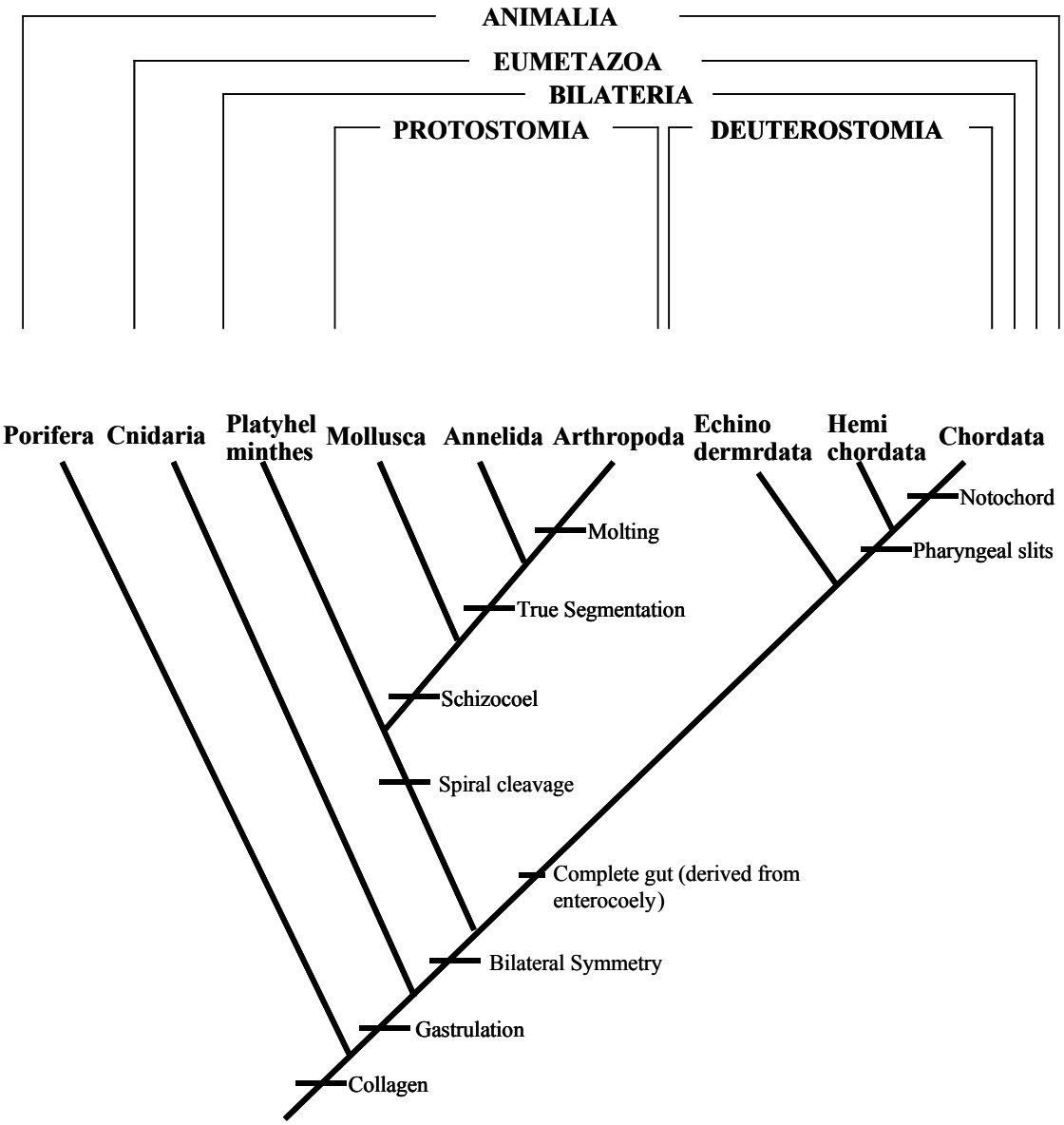
EVOLVING TREES

This exercise introduces the basic methods of Phylogenetic analysis. You will make a hypothesis about evolutionary relationships of groups of organisms and become familiar with the methods using the basic principles of taxonomy and classification for building evolutionary trees.

Part I

1. Using the cladogram on the next page, (Figure 1, Modified from Gergus and Schuett, 1997), complete the attached chart by determining which taxa (groups) have the characters listed in the left column. With this exercise, you will be working backwards utilizing the steps for building a cladogram.

Figure 1


ANIMALIA
EUMETAZOA
BILATERIA
PROTOSTOMIA
DEUTEROSTOMIA
Porifera
Cnidaria
Platyhel minthes
Mollusca
Annelida
Arthropoda
Echino dermrdata
Hemi chordata
Chordata
Notochord
Pharyngeal slits
Molting
True Segmentation
Schizocoel
Spiral cleavage
Complete gut (derived from enterocoely)
Bilateral Symmetry
Gastrulation
Collagen

	Porifera	Cnidaria	Platyhelminthes	Mollusca	Annelida	Arhropoda	Echinodermata	Hemichordata	Chordata
Notochord									
Pharyngeal slits									
Complete gut									
Molting									
True Segmentation									
Schizocoel									
Spiral cleavage									
Bilateral Symmetry									
Gastrulation									
Collagen									

Questions

Describe how the pattern in the chart reflects the pattern of the cladogram.

Part II

Illustrated on the last page is a group of hypothetical fly species.

1. Form a hypothesis that states the evolutionary relationships among the flies. (sketch your predicted cladogram below)

2. Test your hypothesis by following the steps below to build a cladogram.

a. Carefully compare the flies' features (characteristics) and identify the characteristics that are present or absent for each animal.
b. Fill out the chart below to arrange the data. (+ = feature is present)

	Species A	Species B	Species C	Species D	Species E
Large Wings					
Stinger					
Wing Veins					
Bug Eyes (Bg)					
Leg Bulbs					

3. Build a series of cladograms beginning with Large Wings and adding each characteristic as you go. Keep it simple. (Sketch the new cladograms below.) (Hint: the absence of a trait can also be a characteristic.)

Large Wings

Stinger

Wing Veins

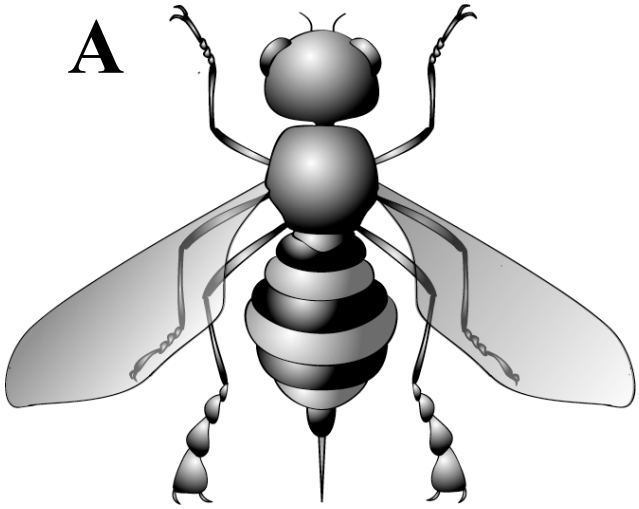
Bug Eyes

Leg Bulbs

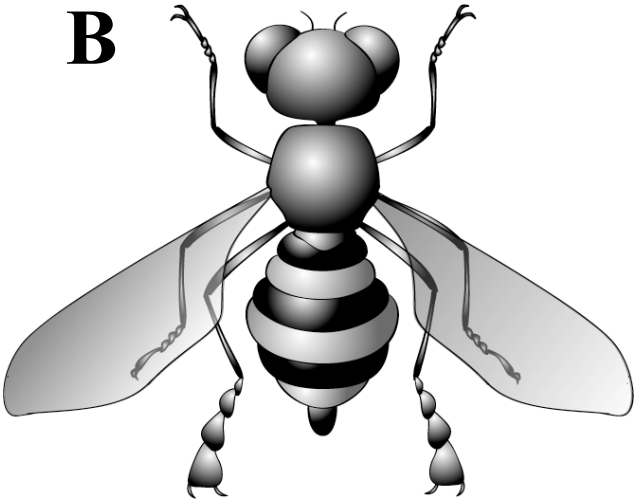
4. Compare the final cladogram to your hypothesis. Does the data support or reject your hypothesis? Are there other acceptable cladograms? Explain.

5. Practice your taxonomy skills. Using the Figure 1 as an example, use your final cladogram and create a hierarchical system to name the groups of flies.

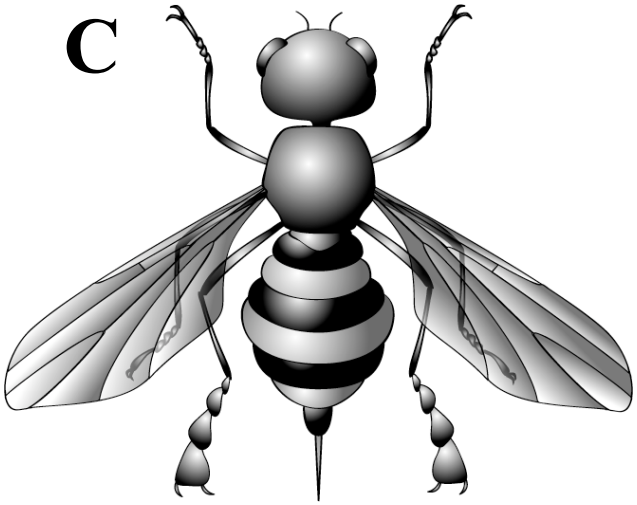
A



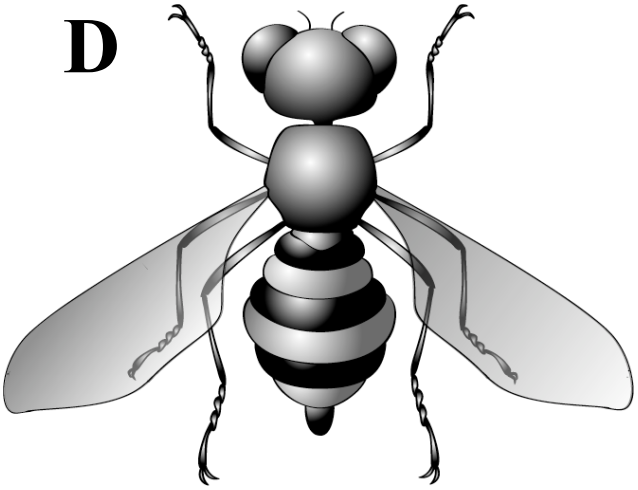
B



C



D



E