are called **derived characters.**

Derived characters can be used to construct a **cladogram,** a diagram that shows the evolutionary relationships among a group of organisms. You can see an example of a cladogram on the right-hand side of **Figure 18–7.** Notice how derived characters, such as "free-swimming larva" and "segmentation," appear at certain locations along the branches of the cladogram. These locations are the points at which these characteristics first arose. You can see that crabs and barnacles share some derived characters that barnacles and limpets do not. One such shared derived character is a segmented body. Another is a molted exoskeleton. Thus, this cladogram groups crabs and barnacles together as crustaceans and separates them from limpets, which are classified as gastropods.

Cladograms are useful tools that help scientists understand how one lineage branched from another in the course of evolution. Just as a family tree shows the relationships among different lineages within a family, a cladogram represents a type of evolutionary tree, showing evolutionary relationships among a group of organisms.

CHECKPOINT *What is a cladogram?*

Quick Lab

How is a cladogram constructed?

Procedure

1. Identify the organism in the table that is least closely related to the others.
2. Use the information in the table to construct a cladogram of these animals.

Derived Characters in Organisms

Organism	Derived Character		
	Backbone	Legs	Hair
Earthworm	Absent	Absent	Absent
Trout	Present	Absent	Absent
Lizard	Present	Present	Absent
Human	Present	Present	Present

Analyze and Conclude

1. **Analyzing Data** What trait separates the least closely related organism from the other animals?
2. **Classifying** List the animals in your cladogram in order of distance from the least closely related organism.
3. **Drawing Conclusions** Does your cladogram indicate that lizards and humans share a more recent common ancestor than either does with an earthworm? Explain.
4. **Inferring** Where would you insert a frog if you added it to the cladogram? Explain your answer.