

Name _____

Course/Section _____

Date _____

Professor/TA _____



Activity 29.3/30.3 How are the events in plant evolution related?

1. Working in groups of three or four, assign each student in the group one of the following events in plant evolution to research. Then give each student 5 minutes to report the results of his or her review to the other members of the group.

Events in Plant Evolution

I. Evolution of vascular tissue

Mutations in some land plants gave rise to vascular tissue. What advantage(s) did these plants have compared with land plants that did not contain any vascular tissue?

II. Evolution of roots and leaves

Mutations in some land plants gave rise to roots, leaves, or both. What advantage(s) did these plants have compared with plants that did not contain roots or leaves?

III. The trend toward reduction of the gametophyte generation

Mutations in some land plants gave rise to life cycles in which the gametophyte generation was reduced. What advantage(s) did these plants have compared with plants that did not have a reduced gametophyte generation?

IV. Evolution of the seed

Mutations in some land plants gave rise to the seed. What advantages did these plants have compared with plants that did not have seeds?

2. Work together as a group to determine how these events in plant evolution (I to IV) might be related. For example, which would have to come first (in evolution), which next, and so on? Another way to look at this question is to consider which of these events paved the way (or made it possible) for the other events to occur.

Be sure to state evidence for your proposed evolutionary scheme. To do this, it is useful to ask yourself questions like these: Would it have been possible for the seed to evolve without vascular tissue first having evolved? Leaves? And so on. If yes, how could this have occurred? If no, why not?

3. Incorporate the following *true* observations into your analysis of how the events in evolution (I to IV) could be related.
- a. The fossil record (spore evidence and so on) indicates that the first plants on Earth were similar to modern-day bryophytes.
 - b. The very large marine brown algae (for example, giant kelp) can grow to heights of 30 feet or more. These algae have both leaflike and stemlike structures and are held to the bottom of the sea by a holdfast. When examined microscopically, the algae are found to contain transport vessels that are similar to phloem in function. These giant kelp do not contain any xylemlike vessels, however, nor do they have roots.
 - c. The first land plants with xylem and phloem had no leaves or roots.
 - d. Some seedless vascular sporophyte plants do not release megaspores. Instead, the megaspore divides on the sporophyte (in the old sporangium) to produce the female gametophyte. This female gametophyte produces eggs in archegonia, which are fertilized by sperm produced in antheridia of this or other plants. Neither the female gametophyte (once formed) nor the developing embryo receives nutrition from the old sporophyte plant.
4. Write an analysis of how events a through d could be related.