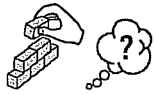


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Activity 29/30.2 What can a study of extant species tell us about the evolution of form and function in the plant kingdom?

Fill in the chart on the next pages to compare the major features of key groups of land plants with one another and with the charophyceans.

| | | Plant group | | | | | | |
|--|-----|-------------|------------|------------------|-------------|-------------|--------------------------------|-----|
| | | Bryophytes | Lycophytes | Pterophytes | Gymnosperms | Angiosperms | Charophyceans (green algae) | |
| Feature | | | | | | | | |
| Peroxisomes | Yes | Yes | Yes | Yes ^f | Yes | Yes | Yes | Yes |
| Chlorophylls <i>a</i> and <i>b</i> | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Jacketed gametangia | Yes | Yes | Yes | Yes | Yes | Yes | No | No |
| Cuticle | | | | | | | | |
| Stomata | | | | | | | | |
| Vascular tissue | | | | | | | | |
| Stems containing vascular tissue | | | | | | | | |
| Roots or rhizomes | | | | | | | | |
| True leaves (contain vascular tissue) | | | | | | | | |
| Antheridia | | | | | | | | |
| Archegonia | | | | | | | | |
| Flagellated sperm | | | | | | | | |

| Feature | Plant group | | | | | |
|--|-------------|------------|-------------|-------------|-------------|--------------------------------|
| | Bryophytes | Lycophytes | Pterophytes | Gymnosperms | Angiosperms | Charophyceans (green algae) |
| Pollen | | | | | | |
| Seed | | | | | | |
| Flower | | | | | | |
| Fruit | | | | | | |
| Gametophyte dominant | | | | | | |
| Sporophyte dominant | | | | | | |
| Sporophyte dependent on gametophyte for energy | | | | | | |
| Sporophyte and gametophyte both independent | | | | | | |
| Gametophyte dependent on sporophyte | | | | | | |

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Use the information in the chart to answer the questions.

1. Some of the major plant groups are listed in the following chart from most primitive to most advanced. For each group, indicate what major characteristics make it more advanced than the preceding group. For example, how are ferns more advanced than mosses?

| | | Plant group | | | | | |
|--|--|---------------|------------|------------|-------------|-------------|-------------|
| | | Charophyceans | Bryophytes | Lycophytes | Pterophytes | Gymnosperms | Angiosperms |
| Advance(s) over preceding group | | | | | | | |

2. How do the bryophytes differ from the seedless vascular plants? How are they similar?

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3. The life cycle of all land plants includes an alternation of generations between a multicellular gametophyte phase and a multicellular sporophyte phase.

Diagram the life cycle of a seed plant.

- a. What cellular division process always precedes formation of the gametophyte generation?
- b. What cellular division process always precedes formation of the sporophyte generation?
- c. If the sexual generation gives rise to the gametes, what part of an angiosperm is sexual?
- d. If the sexual generation gives rise to the gametes, what part of a bryophyte moss is sexual?