Group: *Pteridophytes* (Ferns)

Pteridophytes, also known as ferns, include about 12 000 species of vascular plants that do not produce seeds or flowers, reproducing instead via the production of spores. Sexual reproduction is accomplished by the release of spores, which develop in special structures called sporangia. The sporangia usually occur in clusters called sori, found on the underside of leaves. Fern leaves, often called fronds, usually arise from underground stems. The primary divisions of compound leaves are referred to as pinnae (singular: pinna), and further divisions of pinnae are known as pinnules. Ferns are one of the oldest groups of plants on Earth, with a fossil record dating back to the 383-393 million years ago. Recent divergence time estimates suggest they may be even older, possibly having first evolved as far back as 430 million years ago. But many of the current families and species did not appear until about 145 million years ago in the early Cretaceous, after flowering plants came to dominate many environments.

Division: *Psilophyta*

Members of the division are the only living vascular plants to lack both roots and leaves. Although they have been considered "primitive," recent developmental and molecular evidence suggests that the group may actually be reduced from fern-like ancestors. The psilophyte stem lacks roots; it is anchored instead by a horizontally creeping stem called a rhizome. The erect portion of the stem bears paired enations, outgrowths which look like miniature leaves, but unlike true leaves, the enations have no vascular tissue. These paired outgrowths lie immediately below the spore-producing synangia, which produce the spores. The synangia appear to be the product of three sporangia which became fused over the course of evolution and are borne on the tip of a short lateral branch. This is another feature in which the psilophytes differ from other living vascular plants; all other such plants produce their sporangia on their leaves. When the synangia mature, they open to release yellow to whitish spores, from which the gametophyte plants will later emerge. The gametophytes are very

small, usually less than two millimeters long. They are subterranean and saprophytic, getting their nutrition by absorbing substances dissolved in the environment.

Order: *Psilophytales*

Members of the order were the earliest vascular plants, from the Silurian and the Devonian. They had slender, tapering, leafless or scale-bearing stems often with cone-shaped sporangia at the top.

Order: *Psilotales*

Members of the order are the earliest land plants that contain the vascular system and stoma cells. It was estimated that 415 million years ago from the Upper Silurian period to the Middle Devonian period, and they disappeared in the Upper Devonian.

Division: *Lycopodiophyta*

Lycopodiophyta, also known as Lycopods, includes 1 subclass, 3 orders, each with one family, 5 genera, about 1,300 species. The division is one of the oldest lineages of living vascular plants and contains extinct plants. Its earliest fossils are from 428–410 million years ago. Its members reproduce by shedding spores and have macroscopic alternation of generations, although some are homosporous while others are heterosporous. The division contains some of the most primitive living species that reproduce by shedding spores and have macroscopic alternation of generations. Members of the division have a protostele, and the sporophyte generation is dominant.

Order: *Lycopodiales*

The Lycopodiales are the most primitive living lycopsids and among the most ancient members of the division Lycopodiophyta. The order evolved into the Protolepidodendrales during the Middle Devonian, initiating a great evolutionary radiation of lycophyte shrubs and trees.

Order: *Selaginellales*

The order has living and extinct members with heterospores.

Order: *Lepidodendrales*

The order contains extinct tree lycophytes that have some strobili forming seedlike str

Order: *Isoetales*

The order includes living and extinct members which have endosporic gametophytes.

Division: *Sphenophyta*

The Sphenophyta is a spore-bearing division of vascular plants with both living and fossil members. Although division members were abundant and diverse in the late Paleozoic Era, Equisetum members are the only surviving represents of the division.

Order: *Equisetales*

Genus: *Equisetum*

Equisetum, commonly known as horsetails, contains approximately 20 species which are naturally distributed throughout much of the world from the equator to the temperate zone in the northern hemisphere. Equisetum species are herbaceous perennials and they characterized by jointed aerial stems and jointed rhizomes.

Division: *Pterophyta*

Pterophyta is the largest division of living ferns, including about 11000 species worldwide. Sporangia of the division members arise from a single epidermal cell and not from a group of cells as in eusporangiate ferns. The sporangia are typically covered with a scale called the indusium, which can cover the whole sorus, forming a ring or cup around the sorus, or can also be strongly reduced to completely absent. Many leptosporangiate ferns have an annulus around the sporangium, which ejects the spores.

Classification of The Division Pterophyta

Class: *Filicinae*

Subclass: *Primofilices*

Subclass: *Eusporangiatae*

Order: *Ophioglossales*

Family: *Ophioglossaceae*

Order: *Marattiales*

Subclass: *Leptosporangiatae*

Order: *Filicales*

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