

Name: Dr. Rachana Shalini
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Phylogeny of Psilotum:

Affinity with Ferns:

Bierhorst (1971) placed *Psilotum* along with *Tmesipteris* within Filicopsida primarily on the basis of similarities with some ferns like *Gleichenia*, *Stromatopteris*, etc., by the following characteristics:

- Axial nature of gametophytes.
- Superficial position of antheridia on the prothallus.
- Exoscopic type of embryogeny.
- Development of sporangial structure.
- Mutiflagellated spermatozoids.

However, this has been highly criticised by several pteridologists. Except for the above characteristics Psitolates (*Psilotum* and *Tmesipteris*) differ from ferns in almost all principal characteristic features.

Moreover, Psilotales are root-less, leaf-less plants (*Psilotum*) or with microphyllous leaves (*Tmesipteris*) showing eusporangiate mode of sporangial development, while *Gleichenia*, *Stromatopteris* have well-developed sporophyte with megaphyllous leaves and roots, showing leptosporangiate mode of sporangial development.

Affinity with Rhyniopsida:

Psilotum and Tmesipteris resemble the earliest known Silurian-Devonian vascular plants — Rhyniopsida — in the following characteristic features:

- The sporophytes are dichotomously branched with subterranean rhizome and upright branches.
- Absence of roots and sporophytic generation bears rhizoids.
- The branches are leafless e.g. Psilotum.
- Sporangia multilayered, in rare instance are terminal.
- Terminal branch shows protostelic configuration.

The above similarities suggest that Psilotales (Psilotum and Tmesipteris) is the most primitive extant group among the vascular plants. Moreover, biochemical characteristics of Psilotum and Tmesipteris have strengthened the above consideration. Tse and Towers (1967) isolated a unique phenolic compound, Psilotin, from the two genera which is not found in other groups of pteridophytes.

Hence Psilotum and Tmesipteris constitute a natural group in Pteridophyta and should be placed at the beginning of pteridophyte classification next to early vascular plants and before Lycopsidea.

It has been observed through Gel electrophoresis that histone protein profiles of Psilotum are more or less identical with the histones of mosses. Thus it suggests the primitiveness of Psilotum. Hence Psilotum must be treated as a primitive vascular plant.
