**SUMMARY**

*Dalzellia zeylanica* (Gardn.) Wight.

This is a genus that prefers midland altitudes, (150-200m). A habitat in the midlands would confirm to this. These plants grow on charnockite rocks. November to January is the flowering period. Other genera which co-occur with them are *Zeylanidium*, and *Polyleurum*. Algal associates of Podostemads are *Spirogyra* and *Oedogonium*. The animal form in the same habitat is *Coleoptera* Sp.

The species of this genus are available from Uralanthanny, Athirappilly and Pooyamkutty.

Morphologically the fruits show medium length of stalk and prominent ribs. This indicates the protective measures adopted by the genus.

Pollen are seen in monads. Presence of operculum and granular echinations on exine surface are characteristic of the genus.

The survival of the genus can be attributed to the flowering period. It is understood that in the genus *Polyleurum* and *Zeylanidium*, a change in the phenological pattern is seen. Along with several other factors a difference in the phenology helps it to establish itself on the same habitat and to share a common space with other plant genera.
*Indotristicha ramossima* van Royen

*Indotristicha* is commonly found in low lands. This free floating genus occurs attached to the lateral surface of stable charnockite rocks.

A prolonged vegetative stage from August to December and flowering stage from November to February are its characteristics. Many of the genus under study co-occur with this genera *Farmaria* have a prolonged vegetative phase. Because of this factor a common niche may not be possible for them. Lateral rock position is preferred by both. This might be another reason for their non availability at the same spot.

*Polypleurum* Spp.

This genus has no preference for high or low attitudes. It has a wide ecological amplitude. Phenologically it has the shortest vegetative and flowering phases, culminating at the end of October. This species is found in the lateral position of rocks. The co-occurring genera are *Dalzellia* spp., *Zeylanidium* and *Indotristicha*.

Even significant variations in the physical parameters of water do not affect the life cycle of the genus. Large number of ribs on fruits together with seleroidal tissue and a prominent stalk are the protective measures acquired by the genus. The seeds show maximum hydration and spreading of the integument during the stage of germination and establishment. The pollen have protective opercula and granular echinations.

It is understood that among the podostemads of Kerala rivers, *Polypleurum* is the most successful genus, flourishing in almost all the
visited spots. Polymorphism of the genus is another feature of adaptive value.

*Podostemum subulatum* Gardn

Podostemum is a genus restricted to highlands and midlands of altitudes between 250 m and 600 m respectively. While *Podostemum* prefers charnockite rocks, *Podostemum munnarense* is specifically associated with granite rocks. Co-occurring genera are *Polyleurum*, *Zeylanidium* and *Indotristicha*. *Podostemum subulatum* has comparatively short fruit stalk and not too prominent ribs. It is noteworthy that *Polyleurum munnarense*, which is renamed as *Podostemum munnarense* has more resemblance with the genus *Polyleurum* than with *Podostemum*. However, further studies are needed to confirm this. Under the light microscope pollen in *Podostemum subulatum* appears to be lacking in adequate quantities of cytoplasmic content. These pollen appear as a "pollen system" in the SEM.

When compared to the co-occurring genera the flowering in *Podostemum* starts in January.

As in other podostemads a number of algal and animal forms are found among the thallus of these genera.

*Zeylanidium* (Tul) Engler

This is another genus of widespread distribution. The species of this genus exhibits a clear affinity for the waterfall habitats.
The other genera which co-occur with *Zeylemidium* are *Polypletrum* and *Maferria*. These plants are comparatively tolerant to pollutions of various parameters as evidenced by their presence in stations such as Mukkadavu and Kuthungal.

The genus has a regular phenological pattern which may be related to its position on rocks.

The algal and animal forms specifically associated with this genus were recorded.

Fruits show medium length of fruit stalk and are ribbed. The genus has pollen in diads with granular echinations. Both these characters are of protective function.

*Hydrobryopsis stassilis* (Willis) Engl.

This is a genus of restricted occurrence in the study area, distributed in midlands. The flowering period is in accordance with a phenological pattern. The other Podostemacean members seen intermingling with the thalli are *Zeylanidium* and *Dalzellia*. Available at Chaliyar station of high turbidity.

Fruit stalk almost sessile or short. The fruit wall is ridged with anasthamosing reticulate ridges.

*Far maria metzgerioides*

This is a highly restricted genera. Its preference to lateral position on rocks makes no other Podostemad to co-occur with it. Algal associates
are spirogyra. Plant has very restricted distribution, seen in Perumthenaruvi and Pooyamkutti in the study area in an isolated manner.

*Maferria indica*

The genus is totally restricted to Kallar. Algal associates are *Spirogyra, Oedogonium, Tetraspora, and Plectophora* Sp. were the main animal forms associated with these plants. *Zeylanidium lichenoides* was seen to intermingle with the thallus.

*Willisia selaginoides*

These are plants restricted to high land occur exceptionally at 60 m height at Pooyamkutty in the study area. No other Podostemaceae member is observed to co-exist with it.

The vertical disposition of the family, seed characters and presence of seed mass leads to terrestrial ancestry of the family.

The morphology of the reproductive entities indicates the high protection given to the pollen and the seed of podostemads. Short reproductive structures are found in several aquatic angiosperms having terrestrial ancestry (Philbrick and Les. 1996). In *Podostemaceae*, the shortening of the fruit stalks could be co-related with the surface pattern which has prominent ridges. The taxa with prominent ribs have long fruit stalks. However, only more studies involving several taxa could gather further knowledge regarding the reproductive structures of Podostemaceae.

From the foregoing account it is evident that the family has immense scope for discussion by taxonomists and ecologists. This unique group with
its *Seeming simplicity* really stands as an untapped resource for ecological and evolutionary studies. Further work on stress tolerance, medicinal value and phytochemistry are yet to be done. Thus speedy action from taxonomists and environmentalists is essential for the preservation of this fascinating group of aquatic flowering plants.

From the present study it could be understood that *Rheurum* is the most widespread genera with the maximum types of polymorphic expressions. The water chemistry shows that this genus can tolerate variable levels of the different kinds of parameters, such as dissolved oxygen content, free CO₂ content, hardness and alkalinity. The restriction of the genus *Majana* to Kallar might be indicative of its affinity to the types of rocks there.

Among the physical factors under this study dissolved O₂ is found to be a limiting one. It is noteworthy that *Polyleurum* can survive even at lower levels of dissolved oxygen. Maximum co-existence of the different genera is seen at Pooyamkutti. This is indicative of the fact that Pooyamkutti offers ideal habitat for podostemads. The genus *Willisia* is restricted to the spot Kannanpara at Pooyamkutty. No other genera co-occurs with *Willisia*.

Existence Podostemaceae in a highly polluted area like Mukkadavu is an intriguing phenomenon. A complete assessment of the ecological parameters might throw light in this regard.