

## POSTER 2

A Comparative-Study of *Pinguicula ramosa* MIYOSHI and *P. variegata* TURCZ.  
Ecology and Morphology

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*Pinguicula ramosa* MIYOSHI and *P. variegata* TURCZ., both classified in the subgenus *Temnoceras*, are considered to be distinct species (Casper, 1966). Even though there are some morphological differences between the two species, Ernst (1961) considered that the former was a 'form' of the latter species. In 1997, the authors studied the little-known species *P. variegata* in habitat on the Russian island of Sakhalin. The ecological and morphological differences between *P. ramosa* and *P. variegata* are discussed.

**Ecology.** *P. ramosa*, an extremely rare Japanese endemic species, is confined to the Nikko Mts., at an altitude of between 1,500 and 2,000 m (4,500-6,000 feet), and grows upon wet vertical or overhanging rocks. This species usually occurs as scattered individual plants. *P. variegata*, widely distributed across eastern Russia, grows in bogs and wet grassland, and often forms colonies of up to 20 plants.

**Morphology.** Both species are very small perennial rosette herbs. A very clear morphological difference between the two species can be seen in the flower stalks. The flower stalks of *P. ramosa* are often branching, hence the Latin name (*ramosa* = branching), i.e. Y- or Ψ-shape, and the length is usually not more than 8 cm. *P. variegata*, on the other hand, has a single straight flower stalk reaching up to 13 cm. The flower colour of the two species is similar being pale reddish/purple to white. However, the corolla of *P. variegata* is slightly larger and the corolla lobes are longer in comparison to *P. ramosa*. The central lobe of *P. variegata* (6-7 × 4-5 mm) is wider than that of *P. ramosa* (3.5-5 × 2.5-4 mm), and has a single large yellow spot, while that of *P. ramosa* has two small yellow spots. The spur of *P. variegata* is sometimes longer and only slightly thicker (4-5 × 1.5-2 mm) than that of *P. ramosa* (3-5 × 0.8-1 mm). The calyx of *P. ramosa* is clearly divided into 3 upper lobes and 2 lower lobes, but that of *P. variegata* is radially symmetric. The leaf-blade of *P. ramosa* is ellipsoidal to oblong (10-15 × 5-10 mm), bright yellowish green, while that of *P. variegata* is orbicular (5-7 mm), tinged with dark red. *P. ramosa* forms short petioles, but *P. variegata* forms long underground petioles, which sheathe the base of the flower stalk. The numbers of chromosomes, 2n=18 in *P. ramosa* (Yoshimura, 1973) and 2n=64 in *P. variegata* (Zhukova and Tikhonova, 1971), shows a great difference. Although a taxonomically close relationship has been pointed out, many differences can likewise be seen between the two species. Ernst (1961) suggested that *P. ramosa* was a 'form' of *P. variegata*, without having seen any flowers of *P. ramosa*. The authors consider that *P. ramosa* made its speciation at a relatively early evolutionary stage.

## References

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## POSTER 3

*Nepenthes* - from Carnivory to Myrmecophyty

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The genus *Nepenthes* L. is well known for its carnivorous lifestyle. Recent research indicates the relationship between *Nepenthes* and visiting animals to be much more complex than just a predator-prey interaction (Clarke 1997; Clarke and Kitching 1995). *Nepenthes bicalcarata* HOOK. f. is outstanding because of the combination of carnivory and myrmecophyly. The phytotelmata of the pitchers and their faunal diversity have been studied recently by various authors (e.g. Beaver 1983). Much less attention has been paid to the obviously diverse *Nepenthes*-ant-interactions "outside the pitcher". For understanding these, the investigation of *Nepenthes bicalcarata* - ant relationships appear especially appropriate. These as well as interactions between ants and selected *Nepenthes* species (*N. albomarginata*., *N. ampullaria*, *N. gracilis*, *N. mirabilis* var. *echinostomata*, *N. rafflesiana*) were performed in Brunei.

**Predator-prey:** Predator-prey interactions obviously are an important part of the relationships between *Nepenthes* and ants. For a considerable number of *Nepenthes* species (e.g. *N. mirabilis*, *N. rafflesiana*) ants are the principal animal group trapped in the pitchers (Moran 1996; own observations). Nevertheless, only parts of the visiting ant species get trapped easily, others move safely on the plants. Some features of *Nepenthes* and special ant species are fundamental not only for coexistence and unspecific (mutual?) relationships but also for specific interactions between *N. bicalcarata* and *Camponotus schmitzi* STÄRKE.

**Myrmecophytic features:** Three characters observed in *Nepenthes* and visiting ants are regarded as most important for the evolutionary development of myrmecophyly and carnivory: extrafloral nectaries (EFN), nesting sites provided by the plants and moving abilities of ants on the plants.

EFN are - as attractant - of principal importance for ant-plant-relationships and are regularly visited by several ant species. Some *Nepenthes* species appear to be especially attractive to ants. Most nectaries are easily accessible except for those located in the peristome area. Ant species have different "moving abilities" in this zone. Some species lack the ability to move on the peristome and frequently fall into the pitchers. In addition to *C. schmitzi* also other ants move safely in this area and usually do not get trapped. A third group is able to move on the peristome but nevertheless constitutes a considerable part of the prey. Old, often dried pitchers provide nesting sites for ants and are colonised. Structures like hollow tendrils are not unique to *N. bicalcarata*. *N. rafflesiana* (giant form) has hollow tendrils too and is sometimes colonized. The studied ant - *Nepenthes* - systems display a variety of interactions with different tendencies towards carnivory or myrmecophyly.

**Herbivore damage:** Observations on herbivore damage revealed differences among the species. *N. bicalcarata* proved to have the least herbivore damage among the observed species. This fact in combination with a comparatively long pitcher "life" (Clarke 1997) suggests a protective function of ants.

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