Leaf sheaths and obturators in Rutaceae - Pilocarpinae

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(Mit 1 Abbildung)

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Summary

From morphological and anatomical study it is clear that the dilated leaf bases of *Metrodorea* can be regarded as sheaths. They are not homologous with the spines of *Raulinoa*, as suggested by Cowan. The outgrowths on the ovules and immature seeds of Pilocarpinae have to be regarded as obturators.

The sheaths of Metrodorea

The presence of a special type of sheath on the leaves of *Metrodorea* Saint-Hilaire is unique in the family. The vaginae are somewhat cucullate and free at the tip. The petioles or, in *M. stipularis* Martius, the petiolules are departing dorsally on the sheaths, see figure 1. The sheaths are densely beset with long, multicellular hairs on the inner margin which disappear later on. Due to the opposite phyllotaxy the uppermost sheaths have a unique opportunity to enclose and protect the shoot-apex. The buds therefore don't need any protective scale as usual in the family. The apex remains enclosed until its growing forces the two protecting sheaths to reflexe.

I saw superficially similar sheath-like structures in several Araliaceae, e. g. in *Didymopanax pittieri* Marchal. Harms (1898: 51) said those structures were of a ligulate nature. Similar structures in *Bergenia* (Saxifragaceae) however, were called median stipules by Troll (1967: 1203), and ligule by Yeo (1966: 114).

In *Metrodorea* the vaginae develop sylleptically from a single initial median-adaxially on the hypophyll. When the sheath has developed, including its hairs (see figure 1 E), but not yet expanded, the petiole

extends. As in all other Pilocarpinae, there are three leaf traces. In *Metrodorea* they run under slightly thickened ribs on the dorsal side of the sheaths. The median bundle is horseshoe-shaped, the two lateral ones are V-shaped. Below the place of departing of the petiole (petiolules) the bundles unite into a somewhat triangular ring to make the petiole unifacial. The upper, free part of the sheath-like structure is innervated by side-bundles of the lateral leaf traces. The development shows that the vaginae are not stipular. Judging from TROLL's account about the "Unterblatt" (TROLL, 1967: 1237 ff.), the structures could also be designated as ligules. However, I agree with NAPP-ZINN (1974: 807 ff.) on the too ample use of this term, which should be confined to appendages in the transition between hypophyll and epiphyll, like in grasses. In my opinion, the most appropriate name for the discussed structure is sheath (vagina), as an outgrowth of the leaf base.

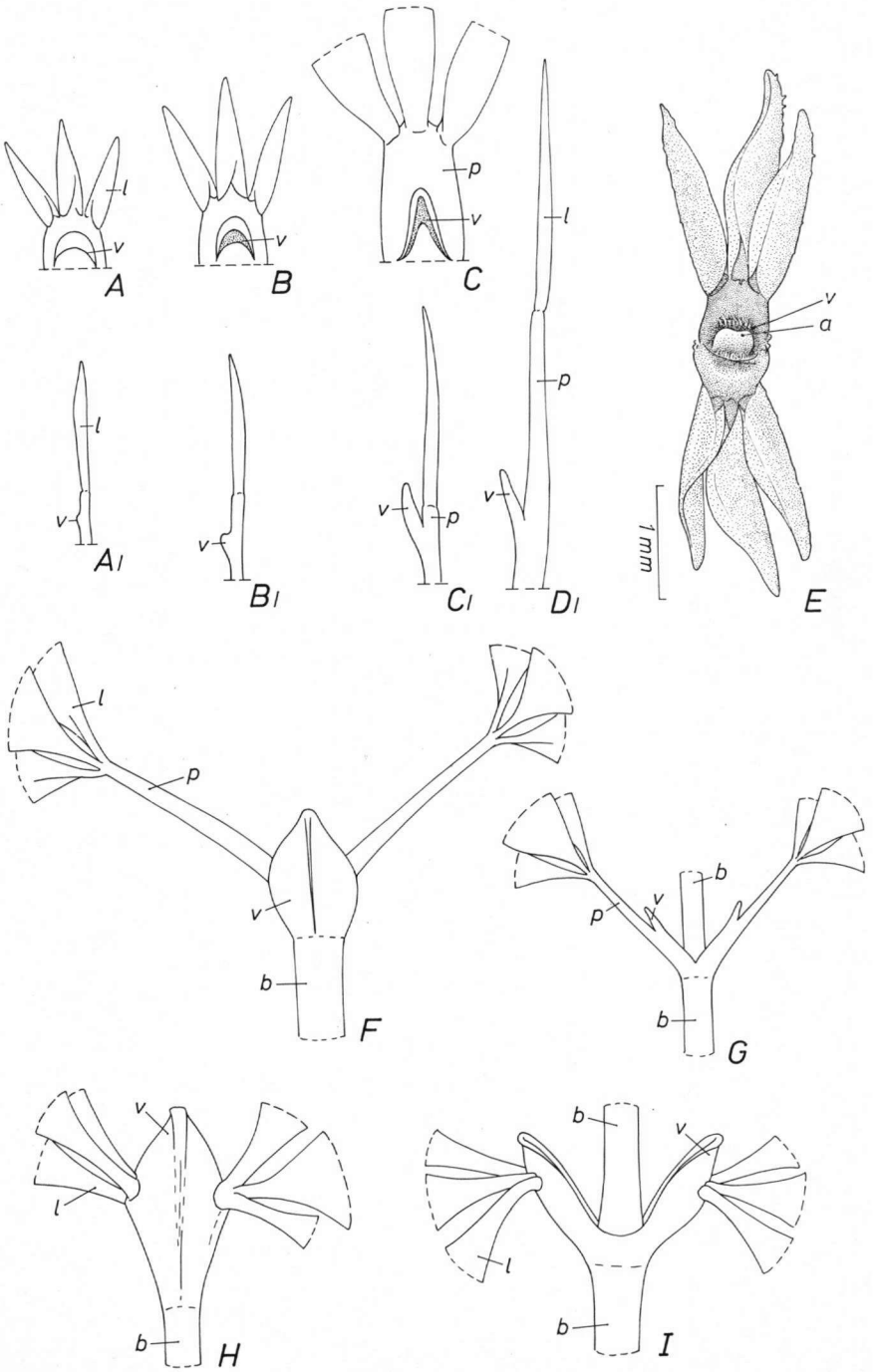
The petiole is partly coalescent with the sheath, and in *M. stipularis* completely. This is indicated by the absence of a free part of the petiole in *M. stipularis*. If there would be no petiole at all in the latter species, the leaflets would be borne directly on the hypophyll, which is not very likely.

COWAN (1960) assumed that the sheaths should be modified lateral branchlets. This is incorrect, however, as they don't have a vascular supply of their own. The sheaths are therefore not homologous with the spines of *Raulinoa* Cowan, as COWAN suggested.

Obturator versus aril

In all species of the Pilocarpinae, like in several other Rutaceae, the funicle forms an outgrowth which protrudes towards the micropyle. The outgrowth develops before fertilization and is persistent in seed stage, but it detaches from the ripe seed. Recently BOESEWINKEL (1977) called this structure an obturator. CORNER (1976: 236, figure 490) reported the presence of an aril in *Pilocarpus racemosus* Vahl. It is clear that both have the same structure in view. There are three reasons in

Figure 1. Development of the sheath of *Metrodorea*
A - C: interior face; A_1 - D_1: lateral face; E: habitus, referable to A; F, H: mature sheaths enclosing the shoot apex; G, I: sheaths reflexed. A - E: *M. nigra* Saint-Hilaire; F - G: *M. flavida* Krause; H - I: *M. stipularis* Martius. a = shoot apex; b = branchlet; l = leaflet; p = petiole; v = vagina.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favour of the term "obturator": 1. the fact that the outgrowth doesn't remain attached to the ripe seed; 2. the membranous consistence when ripe; 3. the early development and its growing up to the micropyle. Therefore the use of the term aril is to be rejected at least in the Pilocarpinae, and in the species studied by BOESEWINKEL (see reference).

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