

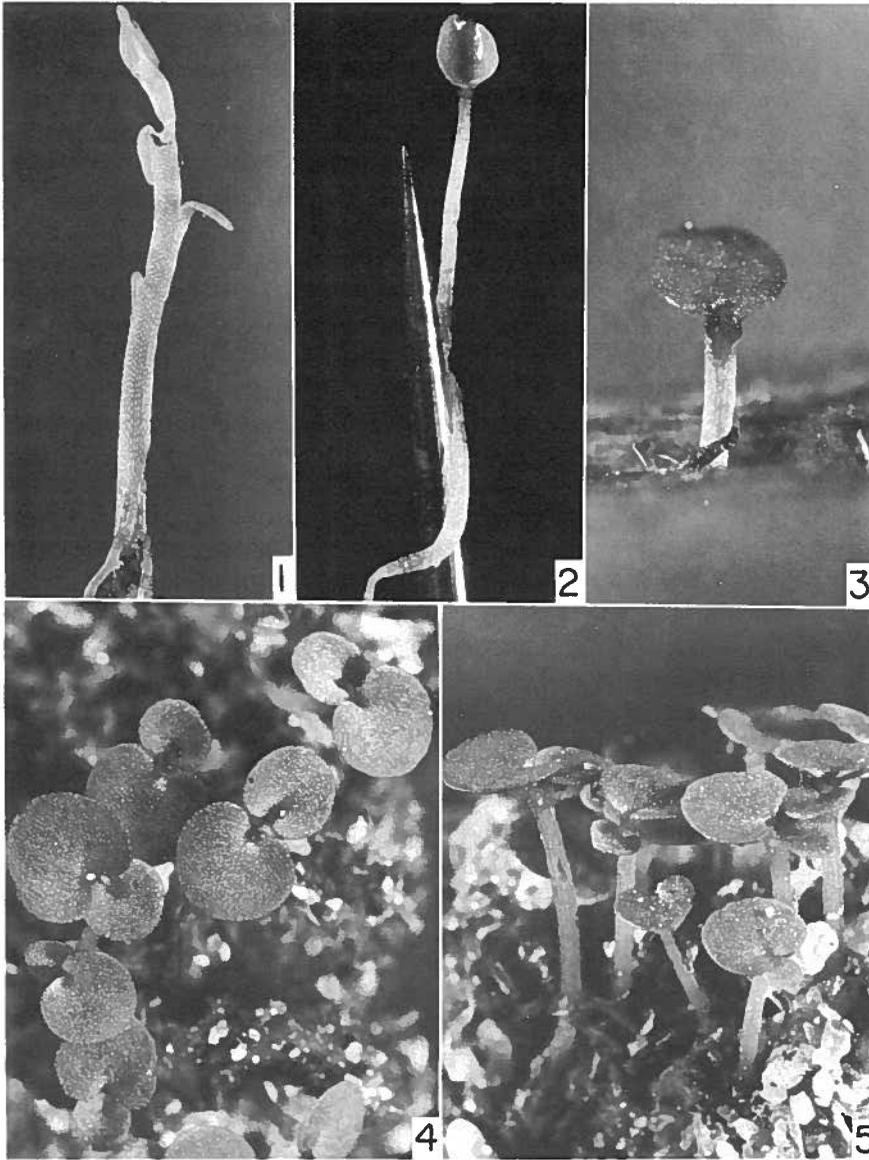
STUDIES IN STYLIDIACEAE: MONOCOTYLY IN THE  
FAMILY; NOMENCLATRURAL CHANGESherwin Carlquist<sup>1</sup>

## Monocotyly

Stylidiaceae have been assumed to be dicotylous to date. The encyclopedic descriptions on which one tends to depend, such as Schoenland's (1889) summary in the *Pflanzenfamilien* or Mildbraed's (1908) *Pflanzenreich* monograph do not mention anything about cotyledons. The classical source on seedling studies, that by Lubbock (1892), figures the seedling of only one species in the family, *Stylidium adnatum* R. Br. Lubbock's description and illustration show this species to be dicotylous, and there seems no reason to doubt his report. The species was cultivated not only by Lubbock, but by botanists in France (Vesque 1878; Van Tieghem and Morot 1883) as well, so monocotyly might have been noticed. However, I have observed only monocotyly in species of *Levenhookia* and *Stylidium* cultivated in Claremont.

Monocotylous seedlings were observed in the following (Carlquist collections, RSA): *Levenhookia dubia* Sond. (3806), *L. pauciflora* Benth. (3705), *L. pulcherrima* Carlquist (4027), *L. pusilla* R. Br. (3806), *L. stipitata* (Benth.) F. Muell. (3865), *Stylidium alsinoides* R. Br. (15542), *S. brunonianum* Benth. (3591), *S. calcaratum* R. Br. (3572), *S. evolutum* Carlquist (15190), *S. floodii* F. Muell. (15889), and *S. leptorhizum* F. Muell. (15472). A seedling of *S. evolutum* is shown in Fig. 1, and seedlings of *L. pusilla* are illustrated in Fig. 2-5.

Monocotyly in Stylidiaceae would be easy to overlook because (1) Seedlings are very small; (2) the cotyledon tends to resemble foliage leaves in morphology in many species; (3) a seedling with a cotyledon and one foliage leaf would be easy to mistake for a dicotylous seedling; and (4) monocotylous seedlings in a seed flat could easily be assumed to be seedlings of a monocotyledon present as a contaminant. The reader may wonder, in fact, if what is identified here as a first foliage leaf may not actually be a late-appearing second cotyledon. Some species of Gesneriaceae which are now thought to be monocotylous were earlier thought to have a second, late-appearing cotyledon by Dickson (1883), Ridley (1906), and Hill (1938). However, as Haines and Lye (1979) mention, the Gesneriaceae in question have the first foliage leaf borne above the cotyledon, separated by a short stem portion known as a mesocotyl. This also occurs in *Stylidium evolutum* (Fig. 1). In *Levenhookia pusilla* (Fig. 2-5), however, the first foliage leaf is borne



Figs. 1-5. Seedlings of Styliaceae.—1. *Stylidium evolutum*, stublike cotyledon center left; foliage leaves with laminae form in upper half. Portion shown 4 mm long.—2-5. *Levenhookia pusilla*.—2. Seedling with one cotyledon, about 3 mm long.—3. Seedling with cotyledon, showing groove and sheath at base of cotyledon. Cotyledon about 0.75 mm in diameter.—4-5. Seedlings with cotyledon plus one foliage leaf.—4. View from above, the cotyledon still larger than the emerging foliage leaf for each seedling.—5. View from side, showing that foliage leaf emerges from sheathing base of cotyledon.

at a level lower than that of the cotyledon. This is possible because the first foliage leaf in monocotylous Stylidiaceae is formed within a sheathlike base of the cotyledon (Fig. 3).

The cotyledons, like the first foliage leaf and subsequent foliage leaves, is ovate or cordate in all the species of *Levenhookia* studied (Fig. 2–5). This is also true of *Stylidium calcaratum* and *S. alsinoides*, and *S. leptorhizum*. In *S. evolutum*, the cotyledon (Fig. 1) is stubby, the foliage leaves laminar but narrow. In *S. brunonianum*, the cotyledon and foliage leaves are linear. The resemblances between the cotyledons and the foliage leaves within each species are evident, although this is not true in *S. adnatum*, in which the two cotyledons are cordate, whereas foliage leaves are linear (Lubbock 1892).

A monocotylous group of dicotyledons is of phylogenetic interest. Haines and Lye (1979) direct their observations on monocotylous dicotyledons to the contrast between origin of monocotly by syncotly (fusion of the two cotyledons) or suppression of one of the two cotyledons. Some of the instances they cite, such as *Bunium*, *Conopodium*, and other Apiaceae, as well as monocotylous Gesneriaceae, show no evidence of duality in the structure of the single cotyledon. Evidence of duality in structure of the cotyledon of monocotylous dicotyledons or in the cotyledon of monocotyledons is what Haines and Lye seek in support of Sargent's (1902) theory of syncotly. Stylidiaceae give no evidence of syncotly. Because the first and subsequent leaves are very much like the cotyledon, one could more logically argue that suppression of one of the cotyledons has taken place. The apparent occurrence of two cotyledons in *S. adnatum* seems to underline this, because the cordate cotyledons are like the single cordate cotyledon in *S. calcaratum*, *S. leptorhizum*, and *Levenhookia*. The dicotylous nature of *S. adnatum* is presumably primitive. If so, one would expect two cotyledons in *Phyllachne*, *Forstera*, and *Oreostylidium*, genera assumed to have more numerous primitive features for the family (Carlquist 1969; James 1979).

Another perspective regarding seedlings is the ontogenetic one. In embryogeny, evidence regarding mode of origin of a monocotylous condition is not cited, according to my present knowledge. However, it is precisely in the embryo that one ought to expect remnants of a suppressed cotyledon or remnants of fusion of a cotyledon pair, because earlier stages in ontogeny are, in general, less easily modified than later ones. However, ontogeny in angiosperms does tend to be very economical, and one must not expect relictual structures very often.

#### Nomenclatural Change

When I published (1979) a new name in *Stylidium* denoting resemblance of the new species to the genus *Mitrasacme*, I did not suspect that this

unusual name had already been used by Mueller. *Stylidium mitrasacmoides* F. Muell. is a synonym of *S. alsinoides* R. Br. according to Mildbraed (1908). The species I named requires a new epithet:

*Stylidium nominatum*, nomen nov. (*S. mitrasacmoides* Carlquist. Aliso 9:419, 1979, non *S. mitrasacmoides* F. Muell., Fragm. Phyt. 1:150, 1858).

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### Footnote

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