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FLORAE MALESIANAE PRECURSORES XXII
CLADIUM AND MACHAERINA (Cyper.)

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The circumscription of the genus *Cladium* as adopted by BENTHAM (1883), PAX (1887), CLARKE (1908), and also recently by KÜKENTHAL (1942), in his monographic treatment, has often been criticized and with good reason, for it covers species so heterogeneous that they can not be considered congeneric.

Cladium was published as a monotypic genus based on *C. jamaicense* Crantz from the West Indies (BROWNE, 1756; CRANTZ, 1766). After BROWN (1810) had extended it considerably by the inclusion of a number of Australian species, several authors of the last century restricted it again to the immediate allies of *C. jamaicense*. For the other species some new genera were created, such as *Machaerina* Vahl (1806), *Baumea* and *Vincentia* Gaudich. (1829), *Chapelliera* Nees (1834), which were reduced once more to sections or subgenera of *Cladium* by Bentham and his followers. This reduction, however, was neither accepted by PALLA (1902), who on morphological and anatomical grounds reinstated *Baumea* as a separate genus, nor by STAPF (1914), who transferred a number of Malaysian *Cladia* to *Vincentia*, with the remark that the West Indian *Machaerina* approaches so closely to *Vincentia* that its claim to generic rank might be questioned.

Lately KOYAMA (1956) divided *Cladium sensu lato* into two genera, one comprising *C. jamaicense* and its immediate allies only, the other embracing those species formerly referred to *Machaerina*, *Baumea*, *Vincentia*, or *Chapelliera*. I fully agree with him that this procedure results in two well-circumscribed, natural groups of generic rank, and that the correct names respectively are *Cladium* and *Machaerina*.

To the numerous characteristic features of both genera as tabulated by KOYAMA (1956, p. 60), I might add some often overlooked or undervalued differences. Bentham ascribed to *Cladium* in its wide sense "glumae undique imbricatae", Pax "Deckschuppen spiralig oder nur sehr undeutlich 2-zeilig", and CLARKE (1894) "glumes imbricate on all sides". KÜKENTHAL (1944) divided the subfamily *Rhynchosporoideae* into three tribes: *Schoeneae* with 3 stigmas and distichous glumes, *Cladieae* also with 3 stigmas but the glumes spirally arranged, and *Rhynchosporeae* with 2 stigmas. It is somewhat surprising that in this very simplified system *Remirea maritima* Aubl. and *Actinoschoenus thouarsii* Kunth, both with exactly distichous glumes, are placed in *Cladieae*. As to *Cladium sensu stricto*, the glumes are here certainly spiral, but in *Machaerina* in Koyama's sense I always find the arrangement

to be distichous, as was already stated by excellent observers such as Kunth and Nees. The best characterization of the spikelet is perhaps that given by NEES (1846–47) for his genus *Chapelliera:*

"Dispositio squamarum et bracteolarum spiculae in universum haec est: Spiculis ternis bracteolae sunt duae, squamis latiores, spiculis lateralibus a latere incumbentes. Squamae sunt distichae: inferior paulo minor et sterilis; secunda fertilis ♀; tertia isti aequalis, sterilis; quarta minor, flore hermaphrodito saepe abortivo; quinta inclusa exigua."

When KÜKENTHAL (1942, p. 164) says that *Cladium distichum* C. B. Clarke stands apart in the genus (as circumscribed by him) because of the exactly distichous arrangement of the glumes, I can not agree with him. The two-ranked disposition of the glumes is much accentuated in the proliferous spikelets of *Cladium distichum*, but can also readily be observed in those *Machaerina* species with several-flowered spikelets, such as *M. articulata* (R. Br.) Koyama, *M. aspericaulis* (Kük.) Koyama, *M. iridifolia* (Bory) Koyama, etc. It must, however, be borne in mind that the bract and the prophyll of the lateral spikelets (one of them or both may be present) are placed transversally with respect to the glumes. Very rarely I found the uppermost, sterile glume also placed transversally, *e.g.* in *Machaerina gunnii* (Hook. f.) Kern. This irregularity may be caused by the ripening fruit pushing aside the tiny glume.

KÜKENTHAL (1942, p. 2) drew attention to another important character peculiar to *Cladium sensu stricto* but lacking in *Machaerina, viz* the saucer-shaped disc below the nut, not unlike that frequently found in *Scleria.* In *Cladium mariscus* (L.) Pohl, from which in my opinion *C. jamaicense, C. procerum* S. T. Blake, etc. are only racially distinct, this disc usually remains on the rhachilla when the fruit falls off. Though less conspicuous than in *C. mariscus*, a disc is also found in the North-American *C. mariscoides* (Muehlenb.) Torr. The incrassate, obpyramidate stipe of the nut in some species of *Baumea*, according to KÜKENTHAL (1942, pp. 2 & 6) a rudimentary disc, is morphologically quite different.

The hollow stems of *Cladium* in contrast to the pithy or septate ones of *Machaerina* may possibly also furnish a distinctive generic character.

There are some regrettable inaccuracies in Koyama's extensive list of transfers to *Machaerina.*

It is generally accepted that *Cladium vauthiera* Clarke and *C. borneense* Clarke belong in *Lepidosperma, Chaetospora capillacea* Hook. f. in *Tetraria, Cladium cyperoides* Merr. in *Fimbristylis, Cladium melleri* Baker and *C. pantapodum* Baker in *Costularia, Cladium monocarpum* Black and *Schoenus punctatus* R. Br. in *Schoenus*, and *Cladium procerum* S. T. Blake is a true *Cladium.* Their transfer to *Machaerina* obscures the delimitation of this genus, and disagrees with the principle that the useless creation of new names should be avoided.

The authority cited in parentheses is not always correct: the basionym of *Machaerina iridifolia* is *Scirpus iridifolius* Bory, *Machaerina laxa* should be based on *Chapelliera laxa* Nees, *Machaerina scirpoidea* on

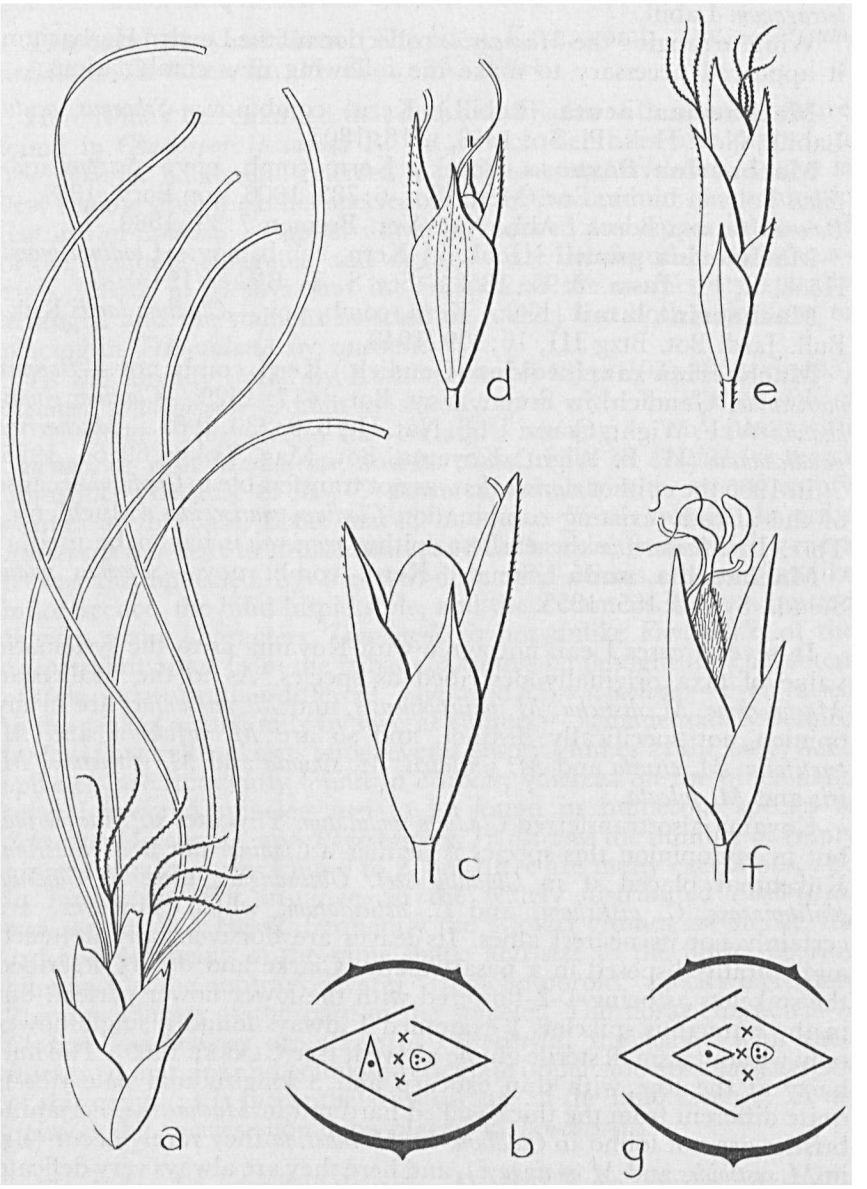

Fig. 1. *a:* spikelet of *Machaerina sinclairii* (Hook. f.) Koyama; *b:* diagram of lateral spikelet of *M. gunnii* (Hook. f.) Kern; *c:* spikelet of this sp.; *d:* spikelet of *M. deplanchei* (Boeck.) Koyama; *e:* spikelet of *M. articulata* (R. Br.) Koyama; *f:* spikelet of *M. mariscoides* (Gaudich.) Kern; *g:* diagram of 1-flowered lateral spikelet of *Machaerina* sp. — All spikelets × 7.

Terobera scirpoidea Steud., and *Machaerina tetragona* on *Lepidosperma tetragonum* Labill.

While arranging the *Machaerina* collections of the Leyden Herbarium, it appeared necessary to make the following new combinations:

Machaerina acuta (Labill.) Kern, comb.nov.—*Schoenus acutus* Labill., Nov. Holl. Pl. Sp. 1:18, t. 18. 1805.

Machaerina flexuosa (Boeck.) Kern, comb. nov.—*Scirpus iridifolius* Poir. in Lamk, Enc. Méth. Bot. 6:783. 1806, non Bory (1804).—*Baumea flexuosa* Boeck., Abh. Nat. Ver. Bremen 7:39. 1880.

Machaerina gunnii (Hook. f.) Kern, comb. nov.—*Cladium gunnii* Hook. f., Fl. Tasm. 2:95. 1858.—See S. T. Blake (1943).

Machaerina lamii (Kük.) Kern, comb. nov.—*Cladium lamii* Kük., Bull. Jard. Bot. Btzg III, 16:309. 1940.

Machaerina mariscoides (Gaudich.) Kern, comb. nov.—*Baumea mariscoides* Gaudich. in Freyc., Voy. Bot.: 417. 1829.—*Cladium gaudichaudii* W. F. Wight, Contr. U. S. Nat. Herb. 9:230. 1905.—*Machaerina gaudichaudii* (W. F. Wight) Koyama, Bot. Mag. Tokyo 69:64. 1956.

In 1905 the epithet *mariscoides* was not transferable to *Cladium* because of the already existing combination *Cladium mariscoides* (Muehlenb.) Torr. In *Machaerina* the earliest epithet *mariscoides* has to be used.

Machaerina nuda (Steud.) Kern, comb. nov.—*Schoenus nudus* Steud., Syn. 2:165. 1855.

In several cases I can not agree with Koyama as to the systematic value of taxa originally described as species. As to the Malaysian *Machaerinae*, *M. disticha*, *M. philippinensis*, and *M. micranthes* are in my opinion not specifically distinct, and so are *M. arfakense* and *M. teretifolia*, *M. crinita* and *M. sinclairii*, *M. sinuata* and *M. glomerata*, *M. iris* and *M. falcata*.

Koyama also transferred *Cladium undulatum* Thwaites to *Machaerina*, but in my opinion this species is neither a *Cladium* nor a *Machaerina*. Kükenthal placed it in *Cladium sect. Obtusangula* next to *Cladium philippinense*, *C. distichum*, and *C. articulatum*, which, however, are certainly not its nearest allies. Its leaves are dorsiventrally flattened and spirally disposed in a basal rosette. Clarke and others described the spikelets as being 1–2-flowered with the lower flower perfect, but in the numerous spikelets I examined I always found a single flower only without a small sterile glume above it (see CLARKE 1909). The nut, hairy at the top, with thin exocarp and 3 longitudinal pale ribs is quite different from the thick-walled hard nut in *Machaerina*. Perianth-bristles are not found in *Cladium*. In *Machaerina* they rarely occur (*e.g.* in *M. restioides* and *M. maingayi*), and here they are always very delicate and capillary. The bristles in *Cladium undulatum*, however, are whitish, flattened and scale-like, very similar to those of *Lepidosperma*, but hairy and not thickened after anthesis. The species occurs also in Australia. BENTHAM (1878) placed it in *Tricostularia*, as *T. fimbristyloides* F. v. M., and remarked that it is very nearly allied to *Cladium undulatum* from Ceylon and to an "unpublished Borneo species", which three might almost rank as a distinct genus. The Ceylon and Borneo plants are

undoubtedly conspecific with the Australian ones and their systematic place is rather in *Tricostularia* than in *Cladium* or *Machaerina*.

Tricostularia undulata (Thwaites) Kern, comb. nov.—*Cladium undulatum* Thwaites, En. Pl. Zeyl.: 353. 1864.

Here it may be remarked that nuts and bristles of the same type are found in *Chaetospora paludosa* R. Br., which Bentham also placed in *Tricostularia*. Kükenthal referred it to *Schoenus sect. Helothrix*, but it is very remote from the other species of this section, and the characteristic features of *Schoenus* — upper flower(s) reduced and upper internodes of the rhachilla elongated and zigzag — are not found in it. KÜKENTHAL (1938, p. 5) says that in *Tricostularia* the glumes are spirally arranged and the stamens inserted on a disc, but both objections to placing in *Tricostularia* are unsound.

As was already stated by KÜKENTHAL (1942, p. 193; 1952, p. 495) *Cladium stradbrokense* Domin is synonymous with *Trachystylis foliosa* S. T. Blake. This species has certainly nothing to do either with *Cladium*, or with *Machaerina*, and its transference to *Machaerina* seems unjustified. Because of its 1–2–flowered spikelets with several empty glumes at the base, Blake placed his genus *Trachystylis* in the tribe *Rhynchosporeae* next to *Actinoschoenus* and *Arthrostylis*, from which genera it was distinguished by the well-developed leaves, the umbel-like inflorescence, the bifid hispid style, and the 2 stamens. Blake admitted that in many characters *Trachystylis* is not unlike *Fimbristylis* of the *Scirpeae*, but apart from the tribal characters he thought the characters of style and nut rather different. The tribe *Rhynchosporeae* — even raised to the rank of a subfamily by several authors — is inadequately defined by few-flowered spikelets with several empty glumes at the base. Such spikelets are frequently found in *Scirpeae*, whereas on the other hand several-flowered spikelets are to be found in numerous species of *Schoenus*, *Machaerina*, and *Rhynchospora*. In *Scirpeae* the number of empty glumes usually varies from 0 to 2, but there are many exceptions, also in *Fimbristylis*. For instance, in the widely distributed *Fimbristylis monostachyos* (L.) Hassk. frequently the 4 lower glumes are sterile, the 3rd and 4th being of the same shape and size as the flower-bearing glumes. On the contrary several "rhynchosporoid" species have only 2 empty glumes at the base of the spikelet. The floral characters of *Cladium stradbrokense* are those of *Fimbristylis*, the leaves with their thickened margins and cellulose-reticulate upper side are characteristic of this genus, as is the anthelate structure of the inflorescence. In my opinion the species should be placed in *Fimbristylis*.

Fimbristylis stradbrokensis (Domin) Kern, comb. nov.—*Cladium stradbrokense* Domin, Bibl. Bot. Heft 85:476. 1915.—*Trachystylis foliosa* S. T. Blake, Proc. R. Soc. Queensl. 48:89. 1937.—*Trachystylis stradbrokensis* (Domin) Kük., Bot. Jahrb. 75:496. 1952—*Machaerina stradbrokensis* (Domin) Koyama, Bot. Mag. Tokyo 69:65. 1956.

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