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THE *DROSERA PELTATA* - *D. AURICULATA* COMPLEX

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Abstract

The correct authority of *Drosera peltata* is shown to be Thunberg and a specimen on *Herb. Thunberg 7720* (UPS) is chosen as the new lectotype of this species. *D. peltata* and *D. auriculata* are variable taxa which consistently intergrade in parts of their wide range. As a consequence, *D. auriculata* is reduced to a subspecies of *D. peltata*. A description of *D. peltata*, a key to the two subspecies and descriptions of each are presented.

Introduction

While preparing accounts of the genus *Drosera* for the 'Handbook Flora of Papua New Guinea' and 'The Alpine Flora of New Guinea', I noted an apparent difference between my initial concept of *Drosera peltata* and van Steenis' (1953) circumscription of this species. Upon further investigation, it was soon evident that this species had been variously interpreted by different authors. Furthermore, some of the New Guinea material appeared to be intermediate between *D. peltata* and *D. auriculata*. Therefore, I decided that it was necessary to study material of these two taxa over their full range, so that the New Guinea situation might be resolved.

During a brief visit to the Royal Botanic Gardens, Kew, in 1978, the type material of the various taxa were studied, but only with reference to New Guinea. It is only recently that I have become aware of some of the broader taxonomic and typification problems within the genus. However, while it is worthwhile to discuss the typification of the names, I feel that it is inappropriate for me to lectotypify many of the synonyms without re-examining the relevant material as some characters are subject to misinterpretation in photographs. Furthermore, the genus is in need of revision and such decisions would be better left until then.

Herbarium abbreviations are those given in Holmgren & Keuken (1974).

The Author of *Drosera peltata*

It has become clear to me that *D. peltata* has been attributed to the wrong author. This error has arisen through a lack of awareness of the correct publication dates and ignorance by most workers of the publication in which the protologue is located.

Drosera peltata was described by Thunberg (1797). This publication has been ignored by all subsequent workers, with the exception of Labillardière (1805: page number incorrectly cited) who nevertheless accredited the protologue to Willdenow. The title page of Thunberg's work has the publication date as '29 Novemb. 1797'. Juel (1918) confirmed the year. Stafleu (1967) has indicated that eleven days should be added to allow for differences in the calendars used by various countries at that time. This suggests that the publication date should be considered to be 10 December, 1797. However, Moberg (pers. comm.) of UPS, where Thunberg's herbarium is held, believes that "There is no doubt that the Dissert. 2: 295 appeared earlier than the day of defence (29 Nov. 1797)—rather some weeks earlier".

J.E. Smith has, until recently, almost universally been cited as the author of this species. It appears that de Candolle (1824) was the first author to make this assumption. Subsequently, the protologue has been cited as published in many different journals.

Early authors, such as Sprengel (1824) and Wight & Arnott (1834) cited it as being published by Smith in Rees' 'The Cyclopaedia' in 1819, while Planchon (1848), Bentham (1864), Diels (1906) and van Steenis (1933, 1953) stated that it was published by Smith in Willdenow's 'Species Plantarum' in 1798. Labillardière (1805), although referring to Thunberg's work, was apparently unaware that volume 1, part 2, of Willdenow's 'Species Plantarum' was published in July 1798, rather than 1797 as stated on the title page (refer Stafleu, 1967).

In 1965, Eichler modified the citation to "Sm. ex Willd.". This modification has been accepted by most workers, including Beadle *et al* (1972), Willis (1973) and Conn (1980). It is clear from Willdenow's (1798) publication that *D. peltata* was a manuscript name of Smith's ("Smith in Litt.") and since Willdenow initialed the relevant diagnosis with "W" for Willdenow, it is certain that he provided the description. Although, Eichler (1965) clearly established that Smith was not the author of this species, he did not discuss the effect of such a change on the lectotypification, nor was he aware of Thunberg's earlier publication.

Lectotypification of *Drosera peltata*

Planchon (1848), assuming that Smith was the author of *D. peltata*, appears to have been the first person to lectotypify this species ("fide specim. authent. [sic authent.] in herb. Smith nunc Soc. Linn. Londin"). In 1906, Diels also regarded the material in the Smith herbarium as the type for this species ("Smith—Original der Art!"). The material of *D. peltata* in the Smith herbarium (*Herb. J.E. Smith 557. 15-1, LINN*), which was available for study prior to 1798, was collected by *W. White s.n., anno 1793*, Port Jackson, New South Wales, Australia. Planchon's (1848) lectotypification was based upon the misinterpretation that Smith was the author of *D. peltata*. Since this specimen is not annotated by Thunberg (nor by Willdenow) it is assumed that he did not examine this material. As the type was not chosen from elements that were definitely studied by the author prior to publication, Planchon's lectotypification is here rejected (Stafleu *et al*, 1978, p. 75).

Since *D. peltata* has been circumscribed in various ways, in different parts of its range, the choice of a lectotype which preserves current usage (as recommended by Stafleu *et al*, 1978, Recommendations 7B.1) has presented some problems (refer p. 94). In any case, it has not been necessary to invoke the concept of usage since there is only one specimen which is suitable as the lectotype.

The material in the Thunberg Herbarium (*Herb. Thunberg 7720*) is a mixed collection of two specimens. One specimen (on the left side) has glabrous sepals, each with an irregularly toothed margin and narrow-cylindrical seeds. This specimen (clearly cut from another sheet) has been added to the existing sheet with the other specimen. However, there is no indication as to which specimen was in Thunberg's possession the earliest. The other specimen (on the right side) has hairy sepals. The seeds are not known. The protologue does not refer to the important diagnostic characters of the presence or absence of indumentum on the calyx or the shape of the seeds. However, it is quite clear which specimen should be chosen as the lectotype because Thunberg incorrectly described the inflorescences as umbellate ("Flores umbellati"). The inflorescence of the specimen with hairy sepals develops laterally amongst new leaves (fig. 1). It appears that Thunberg mistook these leaves with unopened blades for flower buds. Superficially, the arrangement appears to be an umbel. Furthermore, he states that the "umbella prolifera", which describes the actual inflorescence of this specimen. Therefore, the specimen with hairy sepals (on the right side) of *Herb. Thunberg 7720* (UPS) is here proposed as the lectotype of *Drosera peltata* Thunbg.

On the back of the *Herb. Thunberg 7720* sheet, directly behind the specimen on the

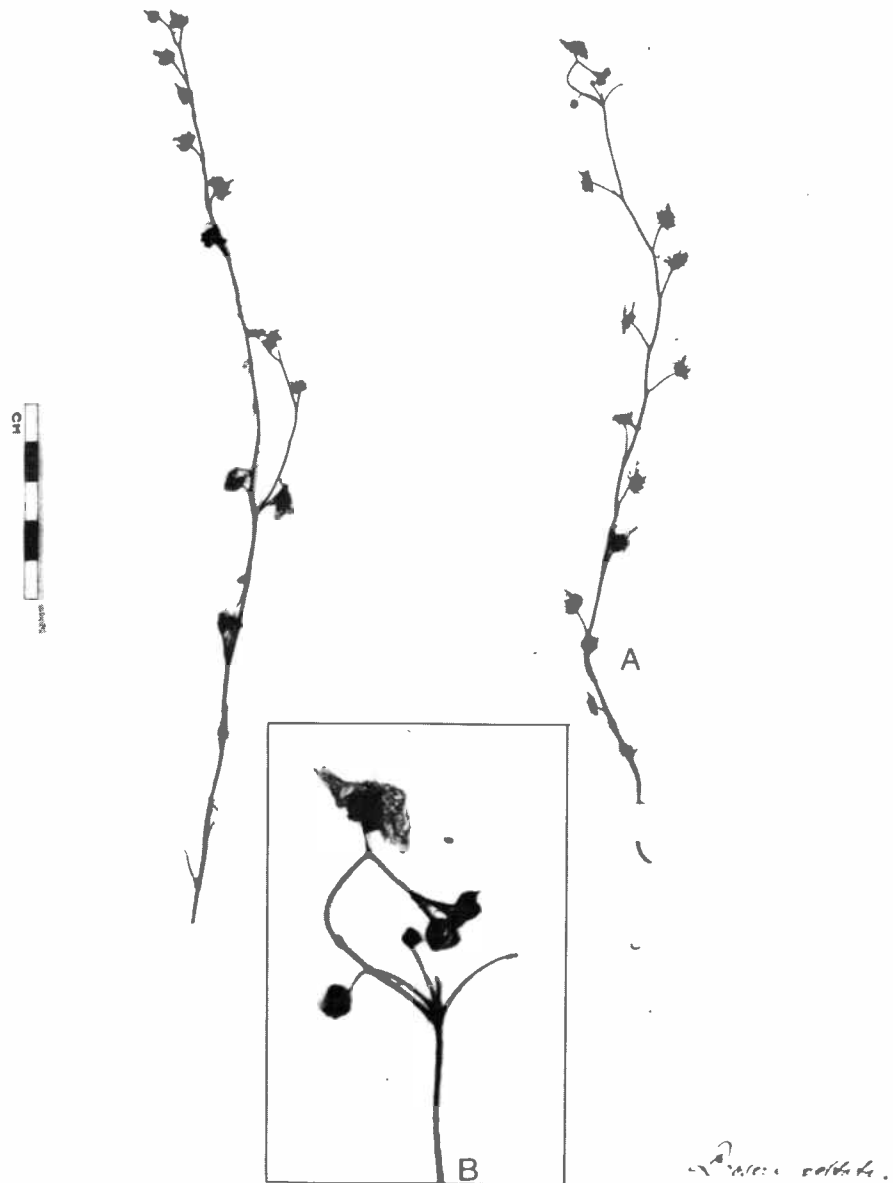


Fig. 1. *Herb. Thunberg 7720* (UPS). A, lectotype of *Drosera peltata* Thunb.; B, an enlargement of the inflorescence and upper leaves of the lectotype (the specimen on right side of sheet).

right side, Thunberg has written "Ex nova *Hollandia per Smith*". This indicates that, at least one of the specimens was probably sent to Thunberg by Smith. However, there is no evidence at UPS or in Smith's correspondence (as held at K) that Smith supplied the name of *D. peltata*. Since the lectotype with its hairy sepals (on the right side) is structurally similar to *Herb. Smith 557. 15-1* (LINN), this LINN specimen is possibly an isolectotype.

In addition, J.E. Smith appears to have sent a duplicate of W. White's collection to Jacquin (refer Diels, 1906) since the label and the back of the sheet of *Herb. Jacquin s.n.* (W) have written on them 'Smith' and 'Dr. Smith', respectively. This specimen is structurally similar to *Herb. Smith 557. 15-1* (LINN). However, the locality of this specimen is given as Botany Bay, not Port Jackson (refer Smith, 1805).

Since Willdenow (1798) has been frequently associated with the protologue of this species, it is useful to understand his concept of *D. peltata*. Willdenow only provided a brief description of *D. peltata*, including details of the flowers. The material in the Willdenow Herbarium (*Herb. Willdenow 6260*) is a mixture of material from J.J.H. de Labillardière and J.E. Smith (labels on back of sheet). Only one specimen (of the four) on the Willdenow sheet has flowers and the sepals of these are glabrous with irregularly toothed margins (Hiepko, pers. comm.). Therefore, the flowering material of *Herb. Willdenow 6260* (B) does not agree with the species concept of *D. peltata* as proposed by Smith (1805). There is no indication on *Herb. Willdenow 6260* as to which part of the material was from Smith and which from Labillardière. However, the flowering material was probably collected by Labillardière as it is similar to his illustration (t. 106, f. 2, 1805). If this is so, then it can be assumed that it was collected in Tasmania by Labillardière (Labillardière, 1805) and probably at Adventure Bay or Storm Bay (Nelson, 1974). Although the smaller specimens at the top of this sheet are sterile, these are structurally similar to the collections by White in *Herb. J.E. Smith 557. 15-1* (LINN). Therefore, it seems likely that these specimens were sent to Willdenow by J.E. Smith and can possibly be regarded as isolectotypes.

If the flowering specimen of *Herb. Willdenow 6260* was collected by Labillardière, when was it sent to Willdenow? Labillardière received his material in Paris only late in 1796 and worked on it from 1797 (Nelson, 1974). Therefore, there was little time to send the material to Willdenow before 1798. Since the archives of the Botanisches Museum Berlin—Dahlem (B) were destroyed in 1943, it is not known at what time Willdenow received Labillardière's material (Hiepko, per comm.). Although it is possible that Labillardière's material may have been sent to Willdenow for identification after Willdenow's 1798 publication, I believe that it is more likely that he based his concept of *D. peltata*, at least in part, on this flowering specimen because he described the inflorescence (as a terminal raceme). Since the other three specimens are sterile, it is not possible to establish whether they are in accord with his description of this species.

Variation in *D. peltata* — *D. auriculata* Complex

Currently, the name *D. peltata* is applied to quite different variants in different parts of its wide geographical range. It was circumscribed by van Steenis (1933, 1953) as having glabrous sepals in the Malesian region, while in Australia, a number of authors, such as Black (1963) and Willis (1973) regarded this species as having hairy sepals. In New Guinea, I found that although the sepals are usually hairy, they may also be glabrescent, or sometimes glabrous.

D. auriculata is usually distinguished from *D. peltata* by the absence of indumentum on the sepals, the greater amount of branching of the styles, and by the narrower seeds. However, I have found a significant amount of variation in these characters, such that their usefulness, particularly at the specific level, is questionable. Firstly, under present concepts the sepals of *D. auriculata* are glabrous, each with their margin irregularly

toothed. However, in *D. peltata*, the sepals are glabrous with the margin of each varying from sparsely fimbriate to irregularly toothed (variation attributed to '*D. lunata*',—found in India, eastern Asia and throughout most of Malesia), sparsely hairy with margin fimbriate (*D. peltata* s. str., p.p.,—in most of Papua New Guinea and much of Australia) or densely hairy with margin fimbriate ('*D. foliosa*', '*D. gracilis*' and *D. peltata* s. str., p.p.,—in much of the Australian material and some of the Papua New Guinea specimens). Secondly, the amount of branching of the style is extremely variable in both taxa and does not appear to be useful taxonomically. Thirdly, the shape of the seeds of *D. peltata* varies from more or less ellipsoid (the usual shape) to oblong-cylindrical. When the seeds are oblong-cylindrical, they are difficult to distinguish from those of *D. auriculata* which are narrow-linear to oblong-cylindrical.

The degree of variability found within this complex is reflected in its taxonomic history. For example, the Labillardière material (t. 106, f. 2, 1805), the flowering material of *Herb. Willdenow 6260* (B) and the glabrous specimen on *Herb. Thunberg 7720* (UPS) represent the one taxon (*D. peltata* subsp. *auriculata* in this revision). Labillardière's material was excluded from *D. peltata* by Planchon (1848) and by J.D. Hooker (1855) and placed in *D. gracilis*. Bentham (1864) reduced this latter species to *D. peltata* var. *gracilis*. Diels (1906) referred Labillardière's material to *D. auriculata* while maintaining 'gracilis' as part of the variability found in *D. peltata*.

A number of authors (e.g. Planchon, 1848, Bentham, 1864 and Diels, 1906) have already emphasized that *D. auriculata* and *D. peltata* are extremely closely related. A thorough investigation of the two taxa throughout their geographical range has shown that the degree of overlap in these characters is such that *D. auriculata* and *D. peltata* are best regarded as conspecific.

If the presence or absence of indumentum on the sepals is used as a criterion for separating *D. auriculata* from *D. peltata*, then it is unjustified to maintain these two as separate species while regarding other species formerly recognised by minor characters, for example *D. lunata*, as synonyms of *D. peltata*. If we regard the shape of the seed as a fundamental feature to distinguish these two species, then some specimens which are at present classified as belonging to *D. peltata* (because they have hairy sepals), would have to be regarded as belonging to *D. auriculata*, even though their other features do not support such a separation. The presence or absence of indumentum on the sepals is of secondary importance and the variation in the shape of the seeds is such that there is too much overlap of character states to support maintenance at a species level.

The best solution, based on an assessment of the wide range of variation within population (e.g. as found in Australia and New Guinea) and accounting for the existence of distinctive sympatric populations (e.g. as found in Australia) in parts of the geographical range, is to recognise two infraspecific taxa on a combination of characters. The morphological differences observed between these two taxa represents infraspecific variation. Accordingly, *D. auriculata* is here reduced to a subspecies of *D. peltata*. The key to the subspecies summarizes the diagnostic features, while emphasizing the degree of overlap.

***Drosera peltata* Thunberg, Dissert. 2 (1797) 295.**

Lectotype (here proposed): *Herb. Thunberg 7720* (UPS—specimen with hairy sepals on right side of sheet; Fig. 1A); possible iso. *W. White s.n., anno 1793*, Port Jackson, New South Wales, Australia, in *Herb. J.E. Smith 557. 15-1* (LINN), the upper two smaller specimens on *Herb. Willdenow 6260* (B) and *Herb. Jacquin s.n., Botany Bay* (W).

Synonyms: *D. lunata* DC.; *D. muscipula* Royle; *D. peltata* vars α *genuina* Planchon & *β gunniana* Planchon; *D. gracilis* Planchon; *D. foliosa* Planchon; *D. auriculata* Planchon; *D. lobbiana* Turcz.; *D. peltata* var. *typica* C.B. Clarke; *D. circinervia* Colenso; *D. stylosa* Colenso. (For full citation see under subspecies.)

Small herb, up to 47 cm high. *Stem* erect, simple or sometimes branched, glabrous, red, developed from a more or less globose subterranean tuber. *Stipules* absent. *Leaves* red, lower surface glabrous, upper surface with stalked glandular hairs, 1-6 mm long, the longer ones towards the margin; basal leaves in a rosette, often reduced, 4-12 mm long, not peltate, petiole compressed, up to 0.3 mm wide, wider than those of cauline leaves, blade orbicular, diameter 2-6 mm; cauline leaves peltate, 4-15 mm long, upper leaves of stem often in groups of 2-6, petiole (2-) 5 (-9) mm long, spreading or recurved, glabrous, blade suborbicular, lunate, diameter 2-3 mm. *Inflorescence* terminal or subterminal (if subterminal, then produced laterally from the distal nodes), ascending, 30-100 mm long; peduncle laterally compressed, (5-) 20-30 (-45) mm long, glabrous; (2-) 4-6 (-8)—flowered; pedicels laterally compressed, 4-12 mm long, glabrous (sometimes hairy at the base of the calyx in subsp. *peltata*); bracts narrow-lanceolate or lanceolate, c. 1 mm long, margin entire or serrate (in lanceolate bracts). *Sepals* ovate-elliptical, 3-6 x 0.5-1.5 mm, outer surface hairy to glabrescent with non-glandular marginal hairs, or glabrous with margin irregularly toothed. *Petals* obovate, 5-8 x 1.5-3 mm, white or pink, apex obtuse. Staminal filaments c. 3 mm long; anthers c. 0.4 mm long. Styles 3, 0.5-1 mm long, upper half usually several times divided. *Capsule* ovoid-ellipsoid, up to 3 mm long. *Seeds* narrow, linear to \pm ellipsoid, surface \pm scrobiculate, apiculate.

Distribution

This species occurs from Sri Lanka and Nepal, throughout S.E. Asia, to Japan and Australasia.

Key to the Subspecies of *Drosera peltata*

1. Seeds \pm narrow-ellipsoid, occasionally oblong-cylindrical, 0.3-0.5 mm long; basal unbranched part of style 0.1-0.2 (-0.3) mm long; sepals 2-4 mm long, hairy or glabrous; petals 5-6 mm long a. subsp. *peltata*
1. Seeds narrow-linear to oblong-cylindrical, (0.5-) 1 mm long; basal unbranched part of style 0.3-0.5 mm long; sepals (3-) 4-6 mm long, glabrous; petals (5-) 7-8 mm long ... b. subsp. *auriculata*

a. subsp. *peltata*

D. peltata Thunberg, Dissert. 2 (1797) 295; Willd., Sp. Pl. 1, part 2 (1798) 1546, *p.p.*; J.E. Smith, Exotic Botany 1 (1805) 79, t. 41; in Rees, Cyclops. 12 (1819); DC., Prodr. 1 (1824) 319; Sprengel, Syst. 1 (1824) 956; Wight & Arnott, Prodr. Fl. Penin. Indiae Orient. (1834) 34; Wight, Illust. Indian Bot. (1840) 43-45, t. 20, f. D; Planchon, Ann. Sci. Nat. Bot. sér. 3, 9 (1848) 296; J.D. Hook., Fl. Tasman. (1855) 30; Benth., Fl. Australiensis 2 (1864) 465; Kurz, J. Asiat. Soc. Bengal 45, part 2 (1876) 310; Clarke, in J.D. Hook., Fl. Brit. India 2 (1879) 425; Tate, Fl. Extratropical South Australia (1890) 20; Moore, Fl. New South Wales (1893) 33; Trimen, Fl. Ceylon 2 (1894) 146; King, J. Asiat. Soc. Bengal 71, part 2 (1902) 48; Rodway, Tasmanian Fl. (1903) 48; Diels, Pflanzenreich 26 (1906) 110; Dixon, Plants of New South Wales (1906) 41; Backer, Schoolfl. Java (1911) 474; Sulman, Wildflowers of New South Wales 2 (1914) 59, t. 30; Merr., En. Philip. 2 (1923) 216; Ewart, Fl. Victoria (1931) 553; Steenis, Bull. Jard. Bot. Buitenzorg sér. 3, 13 (1933) 108; Vickery, Proc. Linn. Soc. New South Wales parts 3-4 (1933) 245, t. 8; Lloyd, Carnivorous Plants (1942); Backer, Bekn. Fl. Java, em. ed. 4 (1942) fam. 53; Black, Fl. South Australia, ed. 2, 2 (1948) 391; Steenis, Fl. Males. ser. 1, 4 (1953) 380; Acta Bot. Neerl. 2 (1953) 304; Fl. Males. ser. 1, 4 (1954) 599; Curtis, Student's Fl. Tasmania 1 (1956) 185; Gamble, Fl. Presidency of Madras 1 (1957) 320; Blackall, How to know Western Australian Wildflowers 1 (1959) 178; Haines, Bot. Bihar & Orissa 2 (1961) 359; Bakh. f., in Back. & Bakh. f., Fl. Java 2 (1965) 203; Eichler, Supplement, Black's Fl. South Australia (1965) 163; Galbraith, Wildflowers of Victoria (1967) 74; Erickson, Plants of Prey in Australia (1968) 44, pl. 11, f. 5 & 6; Cochrane, Fuhrer, Rotherham & Willis, Flowers & Plants of Victoria (1968) 122; Burbidge & Gray, Fl. Australian Capital Territory (1970) 190, f. 182A; Harris, Alpine Plants of Australia (1970) 86; Beadle, Evans & Carolin, Fl. Sydney Region (1972) 174; Willis, Handb. Plants in Victoria 2 (1973) 188; Wrigley & Fagg, Australian Native Plants (1979) 382; Conn, Brunonia 3 (1980) 213.

Type: Herb Thunberg 7720 p.p. (UPS—specimen with hairy sepals on right side of sheet), lectotype (refer p. 92).

D. lunata F. Ham. (née Buchanan) ex DC., Prodr. 1 (1824) 319; Sprengel, Syst. 1 (1825) 956; Hook., Icon pl. 1, 1 (1837) t. 54; Miq., Fl. Ind. Batavia 1, 2 (1858) 120; Forbes, Wand. (1885) 422; Wall. L.n. 1243; Mori, Enum. pl. Gorea (1922) 177.

Type: Herb. de Candolle, anno 1819, circa Sembu, Napalia (G-DC, microfiche seen).

D. muscipula Royle, Illustr. Bot. Himal. (1839) 75.

Type: n.v. (refer Notes, below).

D. peltata var. α *genuina* Planchon, Ann. Sci. Nat. Bot. sér. 3, 9 (1848) 297; *D. peltata* var. *typica* C.B. Clarke in J.D. Hook., Fl. Brit. India 2 (1879) 425; both varieties are *nomina invalida* (Stafleu *et al.*, 1978, Art 24.3).

Based on: *W. White s.n.*, anno 1793, Port Jackson, New South Wales, Australia, in *Herb. J.E. Smith 557. 15-1* (LINN).

D. peltata var. β *gunniana* Planchon, *loc. cit.*

Type: *Gunn 448*, anno 1842, Tasmania, Australia, in *Herb. Hook.* (K) (refer Notes, p. 98).

D. gracilis J.D. Hook. ex Planchon, *loc. cit.*; J.D. Hook., Fl. Tasmaniae (1855) 30, t. 5; Curtis, Student's Fl. Tasmania 1 (1956) 186.

Type: *Gunn 784*, anno? 1837, Tasmania, Australia, in *Herb. Hook.* (K) (refer Notes, p. 98).

D. foliosa J.D. Hook. ex Planchon, *op. cit.*, p. 298; J.D. Hook., Fl. Tasmaniae (1855) 31, t. 6.

Type: *Gunn 1027*, 7.xii.1842, Formosa, Tasmania, Australia, in *Herb. Hook.* (K) (refer Notes, p. 98).

D. lobbiana Turcz., Bull. Soc. Imp. Naturalistes Moscou 27, part 2 (1854) 343.

Type: *T. Lobb 364*, s. *dat.*, Singapore (?KW, ?LE, or ?Sing., n.v.).

Stem erect, (4-)5-17 (-38) cm high. Sepals 2-4 mm long, outer surface hairy or glabrous, margin fimbriate and entire, less often irregularly toothed. Petals 5-6 mm long. Unbranched basal part of style 0.1-0.2 (-0.3) mm long. Seeds \pm narrow-ellipsoid, occasionally oblong-cylindrical, ca. 0.5 mm long.

Distribution

This subspecies occurs from Sri Lanka and Nepal, throughout S.E. Asia to Japan, New Guinea and Australia. 160 specimens were examined.

Selected Specimens Examined

NEPAL: *Wallich s.n.*, anno 1819, Napalia (SING 52160); *Stainton 1201*, -.viii.1956, Tuapabu Khola, Tamur Valley (L).

THAILAND: *Garrett 377*, -.vi.1927, Dei-Angka, Dei-Pa-Maio (L); *Sleumer 4762*, -.ix.1963, Loie; Phu Krading (L).

INDONESIA: Java: *Steenis 11966*, s. *dat.*, Besoeki Jdjen, near Sempol (L); Bali: *Steenis 7947*, -.vii.1936, s. *loc.* (BRI); Celebes: *Bünnemeyer 10940*, anno 1925, Lombasang (L); Lombok: *Elbert 1066*, -.v.1909, Rindjani—Vulkangebirge N—Seite (L); Soemba: *Voogd 1866*, -.xii.1934, s. *loc.* (L); Timor: *Steenis 18390*, -.i.1954, Huato—Builico, NW of Mt Tatamailau (L).

PHILIPPINES: *Sinclair 9743*, -.vi.1958, Bokawan Road, above Guisab Valley (SING).

TAIWAN: *Tanaka & Shimada s.n.*, 3.iv.1933, s. *loc.* (L 934. 288-262).

JAPAN: *Fukuoka 6730*, -.vii.1964, Mt Abuyama, Takatsuki city (L, SING).

NEW GUINEA: Vogelkop: *Brass 9195*, -.viii.1938, Lake Habbema (BRI); Western Highlands: *Hoogland & Pullen 6032*, 27.viii.1956, Tomba (CANB).

AUSTRALIA: Queensland: *McKee 9274*, -.iv.1962, Gorge Creek, W of Mareeba on Dimbulah Road (BRI); New South Wales: *Borman s.n.*, -.xi.1906, Orange (L 910. 190-1534); Australian Capital Territory: *Burbidge 7603*, -.xi.1966, Mt Gingera (BRI); Victoria: *B.J. & H.M. Conn 705*, 31.x.1979, Mt Korong, E of Wedderburn (AD); South Australia: *Whibley 1552*, 1.xii.1964, c. 2 km W of Balhannah, Mount Lofty Range (AD); Tasmania: *Gunn s.n.*, s. *dat.*, s. *loc.* (L 902. 149-237).

Notes

1. *D. muscipula*: There are several specimens at K which may refer to the type of this taxon. The original labels of one sheet which has two specimens read: "17/1 *Drosera muscipula*" and are credited as belonging to "Hb. Falconer". No collector's name or collection number is given. Another label referring to several specimens on the same sheet reads: "*Drosera lunata* Sm., N.W. India, Herb. Royle." Yet another specimen identified as *D. muscipula*, was collected by Madden from Muhasoo near Simla, in India.

Unfortunately, there is no mention of any plant in the protologue and the description is inadequate to comment further on which, if any, is the type material. There are no collections at LIV.

2. *D. peltata* var. *gunniana*: There are three herbarium sheets of *Gunn 448* in Herb. Hook. at K. One reads: (a) "D. peltata 448/1842, Van Dieman Land, Gunn." On the same label in one corner is written "New Norfolk 2/11/39". Another herbarium sheet has two labels which read: (b) "Drosera peltata Sm. 448, Formosa, 4/11/43, very wet places." and (c) "D. peltata Sm. 448, Van Dieman Land, Penquite, 9/11/43." A third sheet has handwritten on the sheet: (d) "448, Van Dieman Land, Mr. Gunn." Since the protologue (Planchon, 1848) refers to "Formosa, Penquite (*sic* Penquite, see Burns & Skemp, 1961, map facing p. 18), New Norfolk; Gunn., no. 448, in herb. Hook.", the specimens listed above under 2(a), (b) and (c) are most likely to be the syntypes.

3. *D. gracilis*: There are three sheets with no. 784 in Herb. Hook. at K. One sheet has two labels which read: (a) "784/1837, Drosera gracilis J.D. Hook., Hampshire hills, 8/2/37." and (b) "Drosera gracilis Hook. f. 784, Nine ("or River") Marlborough, 1/2/45". The second sheet also has two labels which read: (c) "784/1842, D. gracilis, alt. 3388 ft., Arthur's Lake, 18/2/43, Tasmania." and (d) "Drosera gracilis Hook. f., 784, Marsh, Formosa, 4/11/44." The third sheet has one label with no. 784 on it and it reads: (e) "No. 784, Drosera gracilis Planch. Ann. Sci. Nat. III. 9: 297, Drosera peltata, Sm. Van Dieman's Land, R. Gunn, Sir W.J. Hooker, 1838." Since the protologue (Planchon, 1848) refers to "Van Dieman, loco dicto Formosa, ad Arthur's Lake alt. 3388 ped., Hampshire hills; Gunn no. 784", the specimens listed above under 3(a), (c), (d) and (e) are most likely to be the syntypes.

4. *D. foliosa*: There are two sheets in Herb. Hook. at K bearing the collection no. 1027. One sheet has three labels which read: (a) "1027, George Town, both sides of River, 23/10/44.", (b) "Drosera foliosa J.D. Hook., Van Dieman Land, Gunn, Tasmania, Fl. Tasmania, t. 6.", and (c) "D. foliosa J.D.H. 1027/1842, Formosa, 7/12/42."

The second sheet has a label which reads: (d) "1027 Drosera foliosa Hook. fil. Ann. Sci. Nat. III. 9. 298, Tasmania. R. Gunn, 1844." Since the protologue (Planchon, 1848) cites the type as "Hab. in insula Van Dieman loco dicto Formosa; Gunn, No. 1027 in Herb. Hook.", at least part of the first sheet is regarded as the type. It seems that the specimen which is referred to by label 4(c) is most likely to be the type.

b. subsp. *auriculata* (Backh. ex Planchon) Conn, *stat. nov.*

D. auriculata Backh. ex Planchon, Ann. Sci. Nat. Bot. sér. 3, 9 (1848) 295; J.D. Hook., Fl. nov.—zel. 1 (1852) 21; Handb. New Zealand Fl. (1864) 64; Benth., Fl. Australiensis 2 (1864) 465; Featon, Art. Alb. New Zealand 1 (1889) 33; Tate, Fl. Extratropical South Australia (1890) 20; Kirk, Student's Fl. New Zealand (1899) 146; Rodway, Tasmanian Fl. (1903) 47; Dixon, Plants of New South Wales (1906) 41; Diels, Pflanzenreich 26 (1906) 112; Cheeseman, Man. New Zealand Fl. (1906) 146; Laing & Blackwell, Plants of New Zealand (1907) 182; Cockayne, New Zealand Plants (1910) 113; Sulman, Wildflowers of New South Wales 2 (1914) 58; Cheeseman, Man. New Zealand Fl. (1925) 478; Black, Fl. South Australia 2 (1948) 390, f. 548; Curtis, Student's Fl. Tasmania 1 (1956) 185, f. 46; Allan, Fl. New Zealand 1 (1961) 202; Beadle, Evans & Carolin, Handb. Vasc. Plants Sydney District & Blue Mts. (1963) 149; Salmon, New Zealand Flowers & Plants (1963) 131, f. 408; Galbraith, Wildflowers of Victoria (1967) 74, t. 49; Cochrane, Führer, Rotherham & Willis, Flowers & Plants of Victoria (1968) 122, t. 367; Erickson, Plants of Prey (1968) 47, figs 1-4; Harris, Alpine Plants of Australia (1970) 86; Burbidge & Gray, Fl. Australian Capital Territory (1970) 190, f. 182B; Hodgson & Paine, Australian Wildflowers (1971) 78; Garnet, Wildflowers Wilson's Promontory Natl. Park (1971) 134, f. 445; Beadle, Evans & Carolin, Fl. Sydney Region (1972) 174; Willis, Handb. Plants in Victoria 2 (1973) 188; Blombery, What Wildflower is That? (1973) 123, f. 319; Australian Native Plants (1977) 245, f. 129A; Wrigley & Fagg, Australian Native Plants (1979) 381.

Type: Backhouse s.n., s. dat., "Dros. petiolaris Sieb. Herb. No. 176", 7 Sydney, New South Wales, Australia, in Herb. Hook. (K) (refer Notes, p. 99).

D. peltata Thunberg (as 'Sm. ex Willd.'): Willd., Sp. Pl. 1, part 2 (1798) 1546, *p.p.*; Labill., Pl. Nov. Holl. (1805) 79, t. 106. f. 2.

D. circinervia Colenso, Trans. New Zealand Inst. 26 (1894) 314, *nom. illeg.* (no Latin description—refer Stafleu *et al.*, 1978, Art. 36.1).

Type: Anon. s.n., anno 1885, Taupo, New Zealand (n.v.) (refer Notes, p. 99).

D. stylosa Colenso, *op. cit.* 28 (1896) 593.

Type: *H. Hills s.n.*, anno 1895, Ruahine Mountain-range, east side, New Zealand (*n.v.*) (refer Notes, p. 99).

Erect herb, (10-)20-30(-47) cm high. Sepals (3-)4-6 mm long, glabrous, margin irregularly toothed. Petals (5-)7-8 mm long. Unbranched basal part of style 0.3-0.5 mm long. Seeds narrow-linear to oblong-cylindrical, (0.5-)1 mm long.

Distribution

This subspecies occurs in the eastern states of Australia and on the main islands of New Zealand to a latitude of approximately 44°S. Approximately 180 specimens were examined.

Selected Specimens Examined

AUSTRALIA: Queensland: *Goy & Smith 445*, -v.1938, Camp Mountain (BRI); Australian Capital Territory: *Hartley 118*, 17.xi.1943, Black Mountain, Canberra (AD); Victoria: *Barker 1417*, 25.x.1971, c. 23 km SSW of Casterton (AD); *Phillips 299*, 29.x.1971, Foothslopes of Mt. Sturgeon, Grampians (AD); South Australia: *Alcock 2710*, 1.ix.1969, Ken Brinkworth Reserve, NW of Port Lincoln (AD); *Martensz 363*, 4.x.1970, Flinders Chase, Kangaroo Island (AD).

NEW ZEALAND: North Island: *Carrodus 38*, 26.x.1950, Day's Bay, Wellington (AD); *Chapman CHR 258642*, 22.x.1972, Wairoa-Gisborne Road (AD).

Notes

1. *D. auriculata*: In the protologue (Planchon, 1848), the type is cited as "Dros. petiolaris Sieb. Herb. no. 176 (in herb. Hook. cum speciminibus, D. peltatae commixta), non D. petiolaris Br." In Herb. Hook. at K, there are two sheets. One, which has two labels has (a) "D. petiolaris Sieb. Drosera auriculata J. Backhouse, Sydney, 9. nov. 1836." and (b) (which probably does not belong to the type) "D. petiolaris Sieb. var., Encounter Bay, S. Australia, Whittaker." (cited as one of the syntypes in the protologue). A second sheet has four labels, but only one concerns the type. This one reads: (c) "Sieber Fl. Novae Holl. No. 176." This latter collection is possibly the type.
2. *D. circinervia*: Type material of this taxon is not held at AK, K or WELT. Allan (1961) was also unable to locate any of Colenso's material.
3. *D. stylosa*: Type material of this taxon is not held at AK or WELT. One specimen at K (which has the name incorrectly spelt as "D. tristyllosa Col") has a printed label which reads: "New Zealand, Rev. W. Colenso. Presented, 1897." This may represent the type of this taxon.

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References

- Allan, H.H. (1961). Droseraceae in "Flora of New Zealand" 1: 200-203. (Government Printer; Wellington).
- Beadle, N.C.W., Evans, O.D. & Carolin, R.C. (1972). Droseraceae in "Flora of the Sydney Region" 173-174. (A.H. & A.W. Reed; Sydney).
- Bentham, G. (1864). Droseraceae in "Flora Australiensis" 2: 452-470. (L. Reeve & Co.; London).
- Black, J.M. (1963). Droseraceae in "Flora of South Australia" (ed. 2): 389-390. (Government Printer; Adelaide).
- Burns, T.E. & Skemp, J.R. (1961). Van Diemen's Land correspondents. *Records of Queen Victoria Museum, Launceston* new series, 14: 1-142.
- Candolle, A.P. de, (1824). Droseraceae in "Prodromus systematis naturalis regni vegetabilis . . ." 1: 317-319. (Victoria Masson; Paris).
- Conn, B.J. (1980). A review of *Drosera* in Papuaia. *Brunonia* 3: 209-216.
- Diels, L. (1906). Droseraceae in Engler, A. & Prantl, K. (Eds), "Das Pflanzenreich" 26: 109-113. W. Engelmann, Berlin).
- Eichler, H.J. (1965). Droseraceae in "Supplement to J.M. Black's Flora of South Australia" p. 163. (Government Printer; Adelaide).
- Holmgren, P.K. & Keuken, W. (1974). Index herbariorum, ed. 6, *Reg. Veg.* 92.
- Hooker, J.D. (1855). Droseraceae in "The botany of the antarctic voyage of H.M. discovery ships Erebus and Terror in the years 1839-1843. III. Flora Tasmaniae" pp. 28-31, t. 5 & 6. (L. Reeve; London).
- Juel, H.O. (1918). "Plantae Thunbergianae" pp. 462. (Uppsala).
- Labillardière, J.J.H. de, (1805). "Novae Hollandiae plantarum specimen" 1: 79, t. 106, f. 1. (Huzard; Paris).
- Nelson, E.C. (1974). The locations of collection and collectors of specimens described by Labillardière in 'Novae Hollandiae plantarum specimen'—Additional notes. *Papers Proc. Roy. Soc. Tasmania* 108: 159-170.
- Planchon, J.E. (1848). Sur la famille des Droséracées. *Ann. Sci. Nat. Bot.* sér. 3, 9: 285-298.
- Smith, J.E. (1805). *Drosera peltata*. Peltate Sun-dew. *Exotic Botany* 1: 79-80, t. 41.
- Sprengel, K.P.J. (1824). Droseraceae in "Caroli Linnaei . . . Systema vegetabilium. Editio decima sexta" 1: 954-956. (Dietrich; Göttingen).
- Stafleu, F.A. (1967). Taxonomic literature. *Reg. Veg.* 52.
- Stafleu, F.A. *et. al.*, eds (1978). International code of botanical nomenclature. *Reg. Veg.* 97.
- Steenis, C.G.G.J. van, (1933). Contributions à l'étude de la flore des Indes Néerlandaises XXVII Droseraceae. *Bull. Jard. Bot. Buitenzorg* sér. 3, 13: 106-109.
- Steenis, C.C.G.J. van, (1953). Droseraceae. *Fl. Males.* ser. I, 4 (4): 377-380, figs 1-5, 7.
- Thunberg, C.P. (1797). Dissertatio botanica de *Drosera*. *Dissertationes academicae Upsaliae habitae* 2: 295.
- Wight, R. & Arnott, G.A.W. (1834). Droseraceae, in "Prodromus florae Peninsulae Indiae Orientalis" p. 34. (Parbury, Allen & Co.; London).
- Willdenow, C.L. (1798). Droseraceae in "Caroli a Linné species plantarum . . . Editio quarta" 1, 2: 1546. (G.C. Nauck; Berlin).
- Willis, J.H. (1973). Droseraceae in "A Handbook to Plants in Victoria" 2: 188-190. (Melbourne Univ. Press).