

AN AUSTRALASIAN SPECIES OF *CRASSULA* INTRODUCED INTO BRITAIN

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ABSTRACT

A species of *Crassula* found growing in a pond at Greensted, Essex, in 1956, was identified as *Crassula recurva* (Hook. f.) Ostenf., non N.E.Br., a native of Australia. A study of the latter and related species has shown that *C. recurva* is synonymous with *Crassula helmsii* (T. Kirk) Cockayne, a plant described from New Zealand. It is suggested that *Crassula helmsii* merits recognition as an established alien in Britain.

CRASSULA HELMSII (T. Kirk) Cockayne in Trans & Proc. New Zealand Inst. **39** : 349 (1907) – A. Berger in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, **18a** : 389 (1930). *Tillaea verticillaris* sensu Hook., *Jc. Pl.* **3** : 295 (1840), *excl. descript.*; non *Tillaea verticillaris* DC. (1828). *Bulliarda recurva* Hook. f. in Hook., Lond. J. Bot. **6** : 472 (2) (1847), *nom. nud.* *Tillaea stuartii* F. Müll. ex Hannaford, Jottings in Australia : 45 (1856), *nom. nud.* – F. Müll., Frag. Phyt. Australiae **11** : 118 (1881) *in synonym.* *Tillaea recurva* Hook. f., Bot. Antarct. Voy. **3** (1) : 146 (1860) – Bailey, Queensland Flora : 545 (1900) – Rodway, Tasmanian Flora : 47 (1903) – W. M. Curtis, Student's Flora Tasmania **1** : 182 (1956). Type : Tasmania, Gunn 393 (K, holotype; BM, isotype). *Tillaea helmsii* T. Kirk, Students' Flora New Zealand : 142 (1899) – Cheeseman, Manual New Zealand Flora : 141 (1906); ed. 2 : 480 (1925). Syntypes : New Zealand, South Island, Karamea, *Spencer*; near Greymouth, *Helms*. *Crassula recurva* (Hook. f.) Ostenf., Dansk. Bot. Ark. **2** (8) : 47 (1918) – Black, Fl. South Australia : 259 (1924), ed. 2 : 392 (1948) – Ewart, Flora Victoria : 557 (1930) – Blackall, How to Know Western Australian Wildflowers **1** : 178 (1954) – McBarron in Contr. N.S.W. National Herb. **2** : 171 (1955); non *Crassula recurva* N.E. Br. (1890).

Succulent perennial herb; stems creeping and rooting at the nodes, simple or branched from the base with few axillary branches, usually robust and erect when in shallow water but prostrate when on damp mud or sometimes completely submerged, to 30 cm. long, terete, glabrous. Leaves opposite, sessile, connate at the base, 4–15 (– 20) mm. long and 1–2 mm. broad, linear–lanceolate to ovate–lanceolate, entire, acute, fleshy, glabrous. Flowers solitary, axillary; pedicels 2–8 mm. long, as long as or shorter than the leaves, recurved, terete, glabrous. Sepals 4, 1.4 × 0.8 mm., connate at the base, oblong, subacute, recurved, fleshy, glabrous, green. Petals 4, 1.7 × 1.2 mm., ovate, obtuse, white to pale pink. Stamens 4, 1.3 mm. long, filaments pink, anthers black. Nectar scales 4, 0.6 × 0.3 mm., obovate–spathulate, whitish. Gynoecium composed of four whitish-green carpels, the styles erect at first, later becoming recurved and beaked. Follicles each with 2–5 seeds; seeds 0.5 × 0.2–0.3 mm., ellipsoid, often apiculate, brown, the testa smooth.

AUSTRALIA : “Throughout Australia except in the extreme north,” (Ewart, 1930, p. 557). In Tasmania the species is stated to be “widespread and frequent on the margins of swampy places” (Curtis, 1956, p. 182).

NEW ZEALAND : South Island, coastal areas; apparently local.

Swamps and similar wet habitats, usually growing in mud or in water. “Flowering November and December, rarely as late as February” (Ewart, 1930, p. 557).

Vernacular name in Australia : Swamp Stonecrop.

The Canterbury Museum, Christchurch, New Zealand, kindly sent a duplicate specimen of *Crassula helmsii* to the British Museum (Natural History), London, for examination. The specimen was collected by W. Townson from Westport and was from the Carse

Herbarium No. 752/1. A detailed study reveals that the plant is identical with specimens of *Crassula recurva* (Hook. f.) Ostenf., non N.E.Br., a species native to Australia. When Kirk (1899, p. 142) described *Tillaea helmsii* he wrote: "This species is closely related to the Australian *T. recurva*, Hook. f., but differs in the larger size, longer leaves and pedicels, more especially in the longer scales and in the acuminate sepals and petals.* I have only scraps of this species. Better specimens must be obtained before a satisfactory diagnosis can be drawn." The description by Cheeseman (1925, p. 480) is more detailed and some of the differences given by Kirk between *T. helmsii* and *T. recurva* are repeated; Cheeseman states that *T. helmsii* is "Very near to the Australian *T. recurva* Hook. f., which, however, is a larger plant, with more pointed leaves, and with the calyx-lobes and petals decidedly acuminate." It is true that some specimens of *Tillaea recurva* are taller and have longer leaves than the specimen of *T. helmsii* in the British Museum, but other specimens of *T. recurva* from Australia are about the same size as the specimen of *T. helmsii*. The leaves of specimens of both *T. recurva* and *T. helmsii* are acute and identical in shape and there is no justification for describing the leaves of *T. recurva* as "more pointed." Moreover, the sepals and petals of *T. recurva* are not "decidedly acuminate," although they occasionally appear to be so in dried specimens; an examination of living material reveals that the sepals are subacute and the petals obtuse. Thus there appears to be no justification for the continued separation of *T. recurva* and *T. helmsii* as different species.

The name *Crassula recurva* (Hook. f.) Ostenf. cannot be used since it is antedated by *Crassula recurva* N. E. Br., described from South Africa in 1890 (Brown, 1890, p. 684).

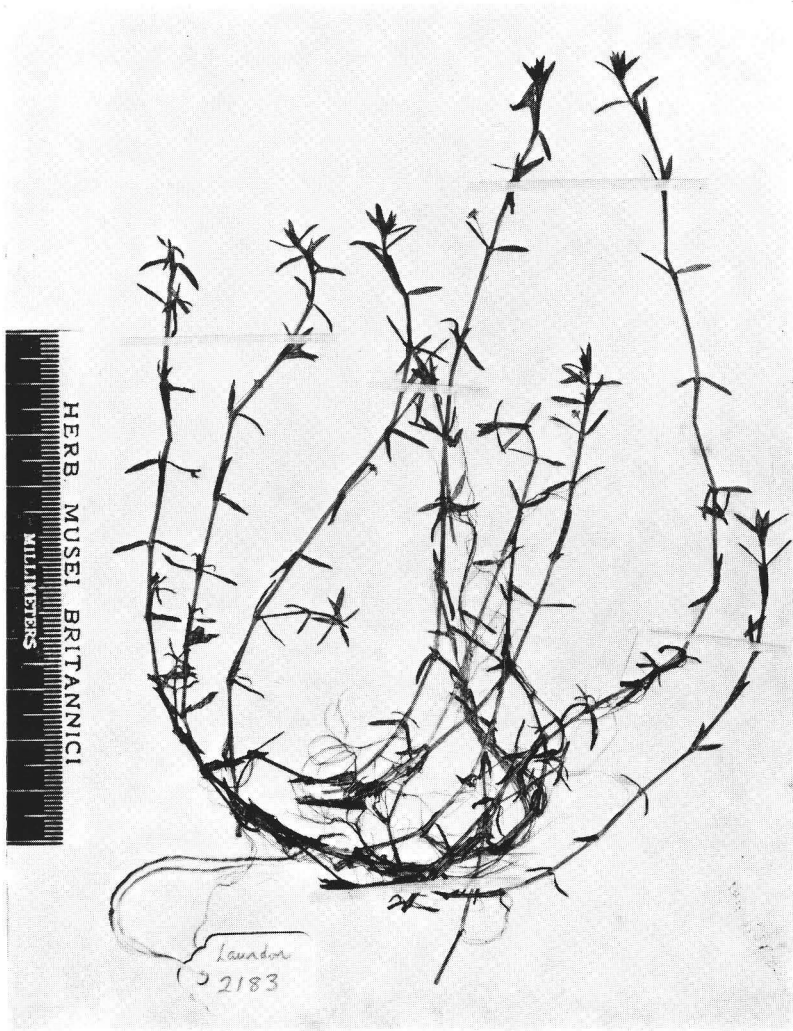
Tillaea stuartii appears to be a *nomen nudum*; the name is found on labels on a number of specimens of *Crassula helmsii* which were distributed by Müller, and in Müller (1878–1881), p. 118, "*T. stuartii*, F. v. M. First Report 11, anno 1853" is placed as synonymous with *Tillaea recurva* Hook. f. The "First Report" presumably refers to the "First General Report of the Government Botanist, Dr. F. Müller, on the Vegetation of the Colony of Victoria, in Australia; communicated by His Grace the Duke of Newcastle, Chief Secretary for the Colonies." dated "Botanic Gardens, Melbourne, 5th September, 1853," and published in Hooker's *Journal of Botany* Vol. 6 p. 123 in 1854. *Tillaea stuartii* is not mentioned in the text of the report but was probably included in the catalogue which is described as follows (p. 156): "[This Report is followed by a catalogue of all the known native plants of the Colony, systematically arranged, collected, and examined by Dr. Müller, between September, 1852, and August, 1853]." So far as can be discovered this catalogue was never published and therefore the name *Tillaea stuartii* was not published until 1856 (Hannaford, 1856, p. 45) but without any description.

Spicer (1878, p. 110), Domin (1925, p. 704) and Berger (1930, p. 389) place *Tillaea recurva* as a synonym of *Tillaea intricata* (= *Crassula intricata* (Nees) Ostenf.), whilst the *Index Kewensis* Vol. 1 (1895), Bailey (1900, p. 545) and Rodway (1903, p. 47) place *T. intricata* under *T. recurva*. Ostenfeld (1918, p. 46) shows that *Crassula intricata* is not closely related to *Tillaea recurva* but is in fact very close to *Crassula colorata* (Nees) Ostenf. (*C. acuminata* F. M. Reader). Ostenfeld bases his conclusions on a study of the type collection of *C. intricata*, namely Preiss No. 1929 in the Lund herbarium, and also on his own collection of this species in Australia. It is also evident from the original description that *C. intricata* is quite unlike *Tillaea recurva*. Nees (1844 or 1845, p. 278) describes *Tillaea intricata* as having "floribus axillaribus sessilibus oppositis pentameris distantibus" and "Flores in angulis foliorum inferiorum aggregati . . ." Thus the flowers are very different from those of *T. recurva* which are solitary, pedicellate and 4-merous. The habitats in which the species are found are also quite different, *Crassula intricata* occurring in sandy places in the coastal area (Ostenfeld 1918, p. 47) whilst *Tillaea recurva* grows in swamps. Thus there is no justification for uniting the two species.

Crassula helmsii belongs to *Crassula* sect. *Tillaeoideae* Schönl. and to the *Crassula aquatica* (L.) Schönl. affinity. Sect. *Tillaeoideae* includes the old and ill-defined genera

*It is evident from the original description that Kirk has misworded this statement and that these characters refer to *T. recurva* and not *T. helmsii*.

PLATE 3



Crassula helmsii (T. Kirk) Cockayne from Greensted, Essex. Part of a herbarium specimen (Laundon 2183) in the British Museum (Natural History). 2/3 natural size.

Bulliarda DC., *Helophytum* Eckl. & Zeyh., *Tillaea* L. and several others, the merits of which are discussed by Schönland (1916, p. 41; 1929, p. 153) and Berger (1930, p. 388). There are species closely related to *Crassula helmsii* in New Zealand, South America and in Africa. *C. helmsii* closely resembles *C. granvikii* Mildbr., a species which occurs on the mountains in tropical Africa (see Hedberg, 1957, p. 100 & p. 278) but the latter has obovate petals and seeds which are minutely papillate.

In Australia *Crassula natans* Thunb. and *C. peduncularis* (Sm.) Meiger (*C. purpurata* (Hook. f.) Domin) are the only species of *Crassula*, apart from *C. helmsii*, with 4-merous, solitary, axillary flowers. *C. natans* is interesting in that it occurs also in South Africa, see Diels and Pritzel (1904, p. 210), Schönland (1916, p. 49) and Ostenfeld (1918, p. 40); it is a much smaller plant than *C. helmsii* and although some of its flowers are solitary it commonly has two flowers arising from the one axil; moreover *C. natans* has one seed in each carpel whereas *C. helmsii* has two to five. *C. peduncularis* occurs in New Zealand and South America as well as in Australia (including Tasmania); it is distinguished from *C. helmsii* and *C. natans* by the fact that many of its flowers are on long pedicels which are over twice as long as the leaves, whilst other flowers are sessile. *C. peduncularis* is often known as *C. bonariensis* Cambess. The latter name cannot be used for it is based on *Bulliarda bonariensis* DC. (1801, p. 2) which is a *nomen nudum*, whilst *Crassula bonariensis* was not described by Cambessèdes until 1829 (Cambessèdes 1829, p. 195), which was twelve years after the same species had been described by Smith (1817) as *Tillaea peduncularis* based on the same type-collection. Cambessèdes (1829, p. 195) cites *Tillaea peduncularis* Sm. in the synonymy of *Crassula bonariensis*; thus the latter is illegitimate. Some authors regard the South American and Australasian populations as distinct species, calling the latter element *Crassula purpurata* (Hook. f.) Domin. I cannot agree with this view, since the Australasian and South American plants appear to be identical in all important characters, and I am fully convinced that these plants should be united under the name *Crassula peduncularis* (Sm.) Meiger.

THE INTRODUCTION OF *CRASSULA HELMSII* INTO BRITAIN

Living material of *Crassula helmsii* has been sold, under the name *Tillaea recurva*, by Perry's Hardy Plant Farm, Enfield, Middlesex, since 1927. Perry's (1960, p. 17 & p. 23) list the species under their "Submerged Oxygenating Aquatics" and under their "Collections of Plants for the Outdoor Pool. Collection 9. Six Best Oxygenating Aquatics for Outdoor Pool." The species does not appear to be sold by any other horticultural firm in England and the plant is not generally used for aquaria. It would therefore appear probable that introductions of the species in Britain have originated from plants grown by Perry's of Enfield.

The following specimens of *Crassula helmsii* have been seen from Britain :

- v.c.18. SOUTH ESSEX : Greensted, pond in field next to Greensted church, Nat. Grid 52/539029, XI. 1956, *C. Bignell Pratt* s.n. (ex Herb. Lousley) (BM); 24. XI. 1956, *D. McClintock* s.n. (ex Herb. Lousley) (K); 31. VIII. 1960, *Laundon* 2183 (Plate 3) (AK, BM, BRI, CANB, DPU, F, MEL, NSW, P, PERTH), 2185 (BM), 2186 (BM).
21. MIDDLESEX : Enfield, cultivated at Perry's Hardy Plant Farm, 8. IX. 1960, Communicated by Perry's (A, BH, BM, BP, C, G, LIL, S, TI, UPS, US, WELT).
62. NORTH-EAST YORK : Sheriff Hutton with Cornbrough, in mud on the edge of a pool at Sheriff Hutton, VIII. 1960, *Mrs. M. Tulloh* s.n. (BM).

Lousley (1957, p. 14) states that *Tillaea recurva* "has also been found by Mrs. Welch near Southampton in an artificial pond." The pond referred to is at the Glen Eyre Hall, University of Southampton. In a letter to Mrs. Welch, Professor Mangham states (1957) that "our Head Gardener obtained all the plants there [at the pond] from either, 1. Perry, Enfield, Middlesex, or 2. Stewart, Ferndown, Dorset." Since *Tillaea recurva* does not appear on Stewart's lists it is probable that the plants came from Perry's. The evidence leaves no doubt that the species was planted in this locality.

Lousley (1961, p. 18) also records that *Tillaea recurva* "was reported in October [1960] by F. H. Jones from a pond at Sidcup [Kent]. Here it is known to have been introduced with *Pontederia* purchased from a well known firm of nurserymen". Mr. Lousley informs me that the nurserymen are Perry's.

There is evidence that the specimens from Sheriff Hutton with Cornbrough were also planted. Lousley (*in litt.*) states that he received specimens collected at this locality and "when I enquired I was told that it came from an ornamental pond stocked with ornamental aquatics."

The species was first collected at Greensted near Chipping Ongar, Essex, on 18th Aug., 1956, by E. B. Bangerter, and Mr. and Mrs. P. C. Hall on an outing of the London Natural History Society. The specimens were determined by Miss D. Hillcoat of the British Museum (Natural History) as referable to *Tillaea recurva* Hook. f. Later in the same year the plant was collected at the pond by C. Bignell Pratt and D. McClintock. The records were published by Lousley (1957, p. 14) and Kent & Lousley (1957, p. 347). The latter state that "this species was probably deliberately planted." From the information contained in a letter from Mr. Lousley it is evident that this is an assumption. In 1960 I made enquiries at Greensted in order to ascertain whether the species has been deliberately planted, and the evidence was found to be conflicting. A local resident said that water-lilies and other plants were introduced into the pond by its owners many years ago and had now died out. The present owners of the pond, Dr. and Mrs. Tugendhat, and the previous owner, Miss J. Price, who have between them been familiar with the pond over the past forty years, said they have introduced no plants into the pond. Thus there appears to be no direct evidence that *Crassula helmsii* was planted at Greensted. It appears likely that the plant was introduced into the pond accidentally and has since established itself. The Tugendhat family say that the *Crassula* has been in the pond for at least six years, and was very extensive before the pond was dredged a year or two ago.

In August, 1960, *Crassula helmsii* formed a dense 'mat' covering several square yards in extent in the north-west corner of the pond, the stems arising from the shallow water. Here the species was flowering profusely. On the opposite side of the large pond, the south side, two forms of *C. helmsii* were present. One was a prostrate form, (Laundon 2186, BM), rarely flowering, and with shorter leaves than usual, which was frequent on damp mud near the edge of the water. The second form (Laundon 2185, BM) was completely submerged and sterile and had longer, narrow, less-fleshy leaves than the erect form at the other end of the pond. This submerged form was occasional and grew in company with *Ceratophyllum demersum* L. (Laundon 2184, BM) (frequent), *Callitriche* sp. (scarce), *Potamogeton crispus* L. (scarce) beneath a floating mass of *Lemna minor* L. (abundant). In view of the fact that there is no evidence that the *Crassula* was deliberately planted in the pond, the fact that no other alien aquatics or *Nymphaea* spp. appear to occur in the pond as one would expect if the pond had been stocked with plants, and the fact that the *Crassula* has spread around the whole of the pond and has flourished there for many years, it is suggested that *Crassula helmsii* merits recognition as an established alien in Britain.

Crassula helmsii is liable to be confused with *C. aquatica* (L.) Schönl. (*Tillaea aquatica* L.). The latter species was known in Britain only from a pool near Acle Dam, Yorkshire, and is now believed to be extinct. *C. aquatica* is a much smaller plant than *C. helmsii*, rarely exceeding 5 cm. in height, the leaves only 3–5 mm. in length, and the flowers are sessile in the leaf-axils, not on pedicels 2–8 mm. long as in *C. helmsii*.

Crassula helmsii flowers in August and September in Britain.

ACKNOWLEDGMENTS

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