

A RE-EVALUATION OF A *CALDESIA* PLANT IN TAIWAN

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Abstract: Further investigation on the floral morphology of a newly found marshy monocot in our area has revealed that our plant is close to the Indian *Caldesia grandis* Samuel, instead of being conspecific with *C. parnassifolia* (Bassi ex Linn.) Parl. Taxonomic status of the plant described by Samuelsson (1930) remains uncertain with respect to the superficially known range of variation within *Caldesia*. The chromosome number of this plant is also reported.

In July 1976 the author found an aquatic monocot closely similar to *Caldesia* growing in a small marsh at Tsaopei, Yuenshanhsian, Ilan County, situated in northern Taiwan about 40 kilometers south of Taipei. The plant was previously unknown to our area. A report was made of the discovery based on sterile specimens (Lai 1976). It was identified being as conspecific with *Caldesia parnassifolia* (Bassi ex Linn.) Parl., since it closely matched a specimen identified as that species (NEW GUINEA: Western Highlands, leg. W. Vink 16512) which was deposited at the Herbarium of National Taiwan University (TAI) and was obtained by an exchange with the Rijksherbarium, Leiden.

Later, flowering materials were collected in August and September from the above mentioned locality. Closer investigation on the floral morphology (Plate II) revealed that our plant appears to be a species representing extreme intrageneric variation.

Our plant is an erect glabrous marsh herb, rooting in shallow water. Leaves radical, the blades 6-7 cm long measured along the midrib, 6-8 cm wide, patent, broadly elliptic to nearly suborbicular, coriaceous, apex obtuse and with a short protrusion, base normally truncate, in smaller specimens sometimes slightly cordate, with 9-11 parallel converging nerves towards both ends, the nerves being more conspicuous on the back; petioles 30(-55) cm long, 3(-6) mm in diameter, narrowly winged at the basal part. Scapes few or solitary, with panicles 40-60 cm high; flowers fasciculately 3-vericillate, bisexual, the pedicels 2-2.5 cm long, sustained at the base by a membranous, acuminate, lanceolate bract, lower ones up to 2 cm long, subsequent ones gradually smaller; petals 3, white, spatulate, 6-8 mm long, reflexed; sepals 3, green, ovate, deeply concave, 3-4 mm long, reflexed, persistent; stamens 12, 2.5 mm long, the anther basifixed; carpels in a small hemispherical head on a receptacle, 15-17 in number, nutlike, compressed, elliptic, including the style 3 mm long, with longitudinal ribs; the style slender, 1.5 mm long. Achenes very rare after anthesis, with a long and more or less curved beak. It often bears whorls of turions instead of flowers on the inflorescence axis. These are vegetative lateral branches 1-1.5 cm long or so, consisting of many imbricate, acute, lanceolate bracts and representing a type of vegetative reproduction (Sculthorpe 1967). After anthesis, turions are formed on the more or less prostrate stolon-like stem (Plate I). Flowering period from July to August. The chromosome number of this plant counting from the root tip is $2n=22$.

Specimens examined. TAIWAN. ILAN: Tsaopei near Shuanglienpei, Yuenshanhsian, Lai 8580, 8602, 8858. The habitat of this newly found plant is in a typical marsh which is ex-

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Plate I. *Caldesia grandis*. 1. Plant with a turion-bearing stem. 2, 3. Leaves. 4. C. s. of petiole. 5, 6. Turions. 7. Tip of a turion leaf.

remely acidic, the inhabiting peat moss *Sphagnum cuspidatum* Ehrh. ex Hoffm. gives it a pH value of about 3.8~4.4. The associating vegetation includes aquatic communities like *Brasenia schreberi* Gmel., *Cyclosorus interruptus* (Willd.) H. Ito, *Eleocharis dulcis* (Burn. f.) Trin., *Eriocaulon nantoense* Hay., *Polygonum thunbergii* Sieb. & Zucc., *Scirpus triangulatus* Roxb., *Utricularia bifida* Linn., *Carex phacota* Spr. and a *Sparganium* sp.

Within the genus *Caldesia* which is closely allied to *Alisma* the species have mostly been

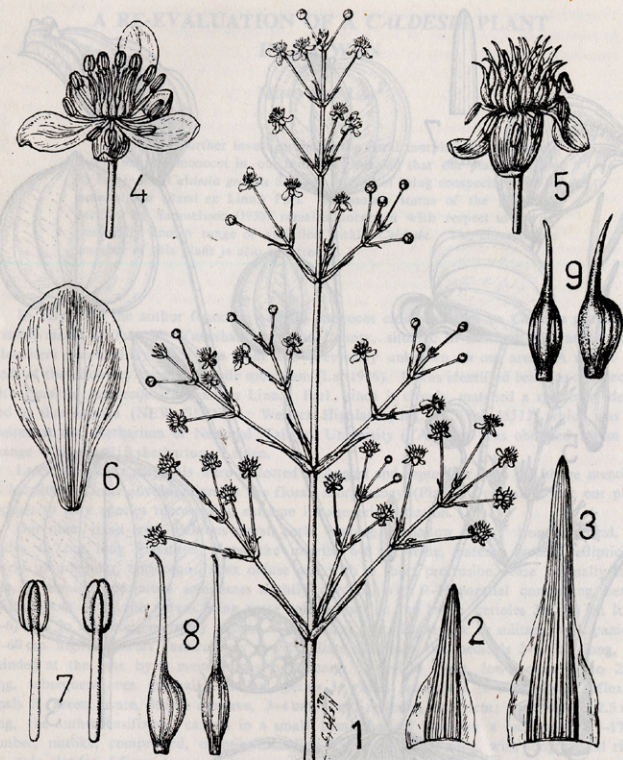


Plate II. 1. Inflorescence. 2, 3. Bracts. 4, 5. Flowers. 6. Petal. 7. Stamens.
8. Carpels. 9. Achenes.

described as having six stamens (in the species *C. parnassifolia* (Bassi ex Linn.) Parl., *C. reniformis* (D. Don) Mak. and *C. oligococca* (F. v. M.) Buch.; cf. Don 1825, Benthham 1878, Micheli 1881, Hooker 1894, Buchenau 1903, Hegi 1906, Hutchinson 1959, Makino 1961, Kitamura *et al.* 1964, Ohwi 1965, Hatusima 1971 and Baker & Bakhuizen van den Brink 1968). Otherwise, Samuelsson described an interesting 11-stamened species *C. grandis* from India in 1930. Micheli (1881) and Buchenau (1903) had also pointed out that in *C. parnassifolia* var. *major* (= *Alisma parnassifolia* var. *majus*) the stamens could be sometimes up to 9 in number.

Hartog (1957) accepted 6 up to 11 stamens and 2 to 9(-20) carpels as the generic character of *Caldesia*. *C. oligococca* is a relatively good autonomous species having pellucid-punctate leaves and spiny achenes. Hartog (*l. c.* p. 320) had an apparent intention to suppose that there was clearly no abundant basis for the separation between the European and the extra-European *C. parnassifolia*. He shared with many recent authors in treating *C. reniformis* as a synonym of *C. parnassifolia*. However, Bentham (1878) and Hooker (1894) retained the former as somewhat a distinct species separating it from *C. parnassifolia*.

After having made a general discussion on the interspecific as well as the intraspecific variations within the genus *Caldesia* in another short treatise (Lai & Chen 1976), the present author tends to reach a conclusion in redetermining our plant as being conspecific with Indian *Caldesia grandis* Samuel. (in *Svensk Bot. Tidskr.* 24: 116, f. 1, a. b. 1930). Cytological studies have revealed that our plant has exactly the same chromosome number $2n=22$ as *Caldesia parnassifolia* (cf. Datta 1965, Subramanyan & Kamble 1966).

Caldesia grandis differs from *C. parnassifolia* in the following notable features: 1. The number of stamens is normally up to 12 instead of 6; 2. the number of carpels is exceedingly more, which is about 12 to 20; 3. the leaf blades are nearly suborbicular in outline, base more or less truncate; 4. all parts coarser or larger, e.g. size of leaf blades and the lowest bracts. A closer morphological and cytological investigation is suggested in order to decide the precise value of the variation found as well as the intergeneric relationship with the American *Echinodorus*. In fact, the taxonomical status of the plant described by Samuelsson (1930) and the plant newly found in Taiwan necessitates a monographic investigation in order to increase the knowledge concerning the range of variation within this few-species genus *Caldesia*.

The present author still hesitates to conform the identity of Vink 16512 (TAI) (and also Vink 16868 (K) from Miss S. S. Hooper *in litt.*) from New Guinea which has 9-10 stamens as being conspecific with *C. parnassifolia*. It seems reasonable in treating a *C. grandis*-complex to include the plants from India, New Guinea and Taiwan. To his knowledge, this is the first record of *C. grandis* from outside India.

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