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TRAPA ASSAMICA (TRAPACEAE), A REMARKABLE NEW EXTANT SPECIES FROM THE INDIAN SUBCONTINENT

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Abstarct: *Trapa assamica*, a new extant species from the northeastern part of the Indian Subcontinent, is described, illustrated, and compared to its nearest relatives. It is easily distinguished from its congeners mainly by: its truncate-obpyramidal fruit with a highly protruding basal ring; slightly retrorse or divergent horns flattened apically and with characteristic triangular mat areas on their adaxial surface; reduced, truncate lower horns; stout, truncate tubercles between the lower and upper horns located always close to the base of upper horns; and an immersed basal scar.

Key words: *Trapa*, new species, description, fruit, morphology, distribution, Assam, West Bengal, India, Bangladesh

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Recent revisions of herbarium material in the Natural History Museum in London (BM) and the Botanic Garden and Botanical Museum Berlin-Dahlem (B) for a taxonomic monograph of extant and fossil representatives of the genus *Trapa* L. (Trapaceae) led to the discovery of a remarkable new species from the Indian Subcontinent, described below.

Trapa assamica Wójcicki, *sp. nov.* (Figs 1 & 2)

Fructus bicornis, truncato-obpyramidalis, collo incluso 21–24 mm altus, 36–44 mm latus; collum 1–2 mm longum, ca 5 mm latum, corona minuta; linea media bene conspicua; cornua superiora horizontaliter divergentia vel subreflexa, 15–18 mm longa; areolae impressae ambitu triangulares; cornua inferiora tuberculosa, truncata, subreflexa, ca 4 mm longa; inter cornua superiora et inferiora tubercula magna subelliptica adsunt; anulus basalis magnus, protrudens, ca 4 mm longus; cicatrix immersa; apertura basalis quadranguta, concava.

Leaves up to 95 mm long; lamina abaxially glabrous, adaxially hairy on nerves, transversely depressed trullate in outline, up to 34 mm long and 41 mm wide, with 3–4 pairs of secondary nerves, the upper margins regularly double dentate, incised up to 1/3 of the blade half-width. Fruits of medium size, truncate-obpyramidal, with one pair of horns; fruit 21–24 mm high (including neck), width of fruit at the level of the upper horns 36–44 mm; fruit about 1.6–1.8 times wider than high; fruit head pronounced, relatively narrow, 10–14 mm long, its upper end located below the line joining raised bases of the upper horns, bearing neck 1–2 mm long and up to 5 mm broad, usually not protruding beyond the line joining the bases of the upper horns; corona small, somewhat rectangular in outline; apical aperture with a ring of upward pointing hairs; surface of fruit head and neck finely ribbed; upper horns 15–18 mm long, slightly retrorse or divergent, characteristically abruptly raised at the base, gradually flattened apically, triangular in outline, gradually attenuate into straight elongate, thin, spine-like tips, with retrorsely barbed spines (harpoons) up to 7 mm long; characteristic irregularly triangular mat areas (*areolae impressae* – morphological structures present in some *Trapa* species at the base and/or adaxial part of the upper horns) on the adaxial surface of upper horns; lower horns reduced to truncate tubercles slightly depressed at the end, somewhat downward-pointing, up to 4 mm long, inserted slightly below the central part of the fruit, with pronounced cavity at the base; frame of the fruit (*linea* or *costa media* – protruding rib between

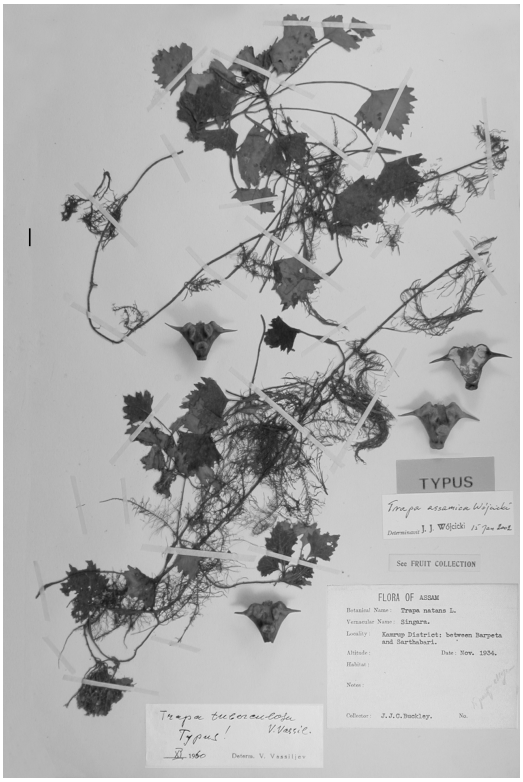

Fig. 1. Holotype of *Trapa assamica* Wójcicki, *sp. nov*. (*Buckley s.n*., BM).

upper and lower horns framing the fruit head) well developed; on the fruit frame between the bases of the upper and lower horns are tubercles, usually solid, truncate and slightly depressed, irregularly elliptic in outline, always close to the bases of upper horns; lower part of fruit body narrowly obtriangular in outline, truncate at base, its surface, on one side only, covered with five protruding longitudinal ribs; fruit base with a solid protruding smooth ring up to 4 mm high, covering immersed basal scar; basal aperture quadrangular concave in outline.

HOLOTYPE: Flora of Assam. Kamrup District: between Barpeta and Sarthabari, Nov. 1934, *J. J. C. Buckley s.n.* (BM and BM-Fruit Collection).

OTHER SPECIMENS SEEN. Indien: Calcutta, 16 April 1933, *K. Biswas s.n.* (B, ex herb. Glück); Indien [Bangladesh]: Sylhet, 5 March 1932, *K. Biswas s.n.* (B, ex herb. Glück).

ETYMOLOGY. The specific epithet refers to Assam, the region of the northeastern Indian Subcontinent where the type collection originated.

DISTRIBUTION. *Tapa assamica* is known so far from India (Assam and West Bengal) and northeasternmost Bangladesh (Fig. 3). It is probably endemic to the northeastern Indian Subcontinent.

Trapa assamica is a remarkable new species easily distinguished from its congeners by its truncate obpyramidal fruit, thick protruding basal ring, slightly retrorse or divergent upper horns abruptly flattened apically with characteristic trian-

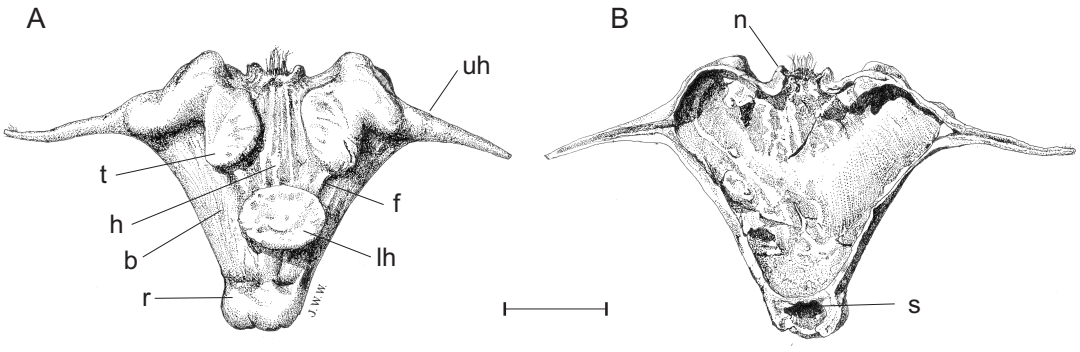

Fig. 2. Fruit of *Trapa assamica* Wójcicki, *sp. nov*. (drawn from holotype – *Buckley s.n*., BM). A – fruit, B – longitudinal section of A. b – body, f – frame, h – head, lh – reduced lower horns, n – neck, r – ring, s – immersed scar, t – tubercle, uh – upper horn. Scale bar = 1 cm.

gular mat areas on adaxial surface, and by its consistently present reduced truncate lower horns and pronounced truncate tubercles between lower and upper horns, located close to the base of upper horns (Figs 1 & 2). In addition, the fruits of *T. assamica* have an immersed basal scar and a basal aperture quadrangular concave in outline, characters unknown in other extant and extinct representatives of the genus *Trapa* (e.g. Flerov 1926; Glück 1936; Miki 1952; Vassilev 1949, 1954, 1965, 1973; Janković 1957, 1958; Mai 1985; Xiong *et al*. 1985; Givulescu & Ticleanu 1986; Kadono 1987; Wójcicki & Bajzath 1997; Verdcourt 1998; Wójcicki & Zastawniak 1998, 2002; Wójcicki *et al*. 1999; Kovar-Eder & Wójcicki 2001; Wójcicki 2001). The characteristically incised regularly double-dentate upper margins of the lamina also seem to be characteristic of this new species. Leaves with slightly similar lamina margin are known so far in distinct *T. acicularis* V. Vassil. (= *T. natans* L. var. *africana* Brenan), apparently endemic to Lake Victoria in East Africa (Brenan 1953; Vassilev 1965), but the diagnostic value of leaf characters is still doubtfull, requiring further detailed studies.

Trapa assamica is described on the basis of three collections. The complete specimen from BM selected here as its holotype was originally determined by its collector J. J. C. Buckley as *Trapa natans* L. (Fig. 1). On the herbarium sheet there is a revision label by V. Vassilev of November 1960 with an unpublished specific name '*Trapa tuberculosa* V. Vassil.' As Vassilev (1949) previously described another species from the Russian part of Manchuria under the similar name *Trapa tuberculifera*, I propose another specific name for the newly described species corresponding to the region of its origin. In the Fruit and Seed Collection of B there are two subsequent collections from Glück's herbarium of adjacent north easternmost Bangladesh and West Bengal, representing the same species. According to Glück the fruits from his holdings represent a new morphotype; on the labels attached to the specimens in his collection he gave them a new varietal name, '*Trapa bispinosa* Roxb. var. *tuberculosa* Glk.', following his concept of the *Trapa* genus

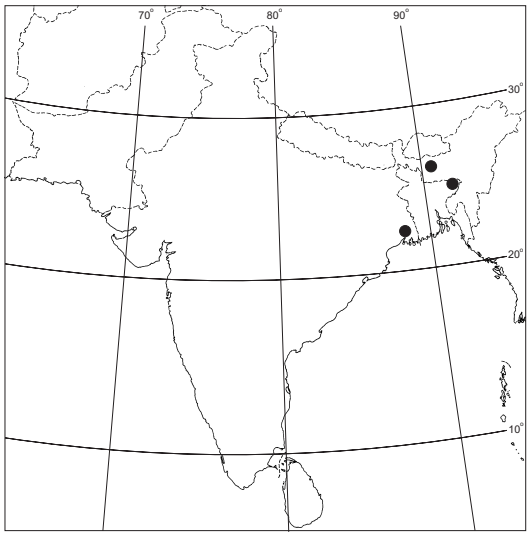

Fig. 3. Distribution of *Trapa assamica* Wójcicki, *sp. nov.*

(Glück 1933, 1936) for a prepared but unpublished monograph.

Trapa assamica probably is most closely related to *T. bispinosa* Roxb. described from peninsular India (Roxburgh 1819), which is widespread throughout the Indian Subcontinent and scattered in the Far East (Nakano 1914; Cuong & Vidal 1973; Li & Chang 1977; Kak & Durani 1988; Srivastava & Tripathi 1993), represented by very variable complex of wild and cultivated forms. Both species share reduced lower horns, but differ significantly in several characters. The fruit of *T. bispinosa* s.l. differs in having a wider body rounded at the base with very small basal ring (sometimes the ring is completely absent), stout and at least slightly ascending upper horns, and usually small tubercles inserted in the middle of the fruit frame between the upper and lower horns.

Reduced lower horns and tubercles between the upper and lower horns inserted close to the fruit base ally the new species with members of the *T. japonica* Flerov complex, including some other related taxa of enigmatic status described from the Far East (cf. Flerov 1926; Tzvelev 1993; Wójcicki *et al*. 1999). *Trapa japonica* s.l. differs dramatically, however, in having shallow obriangular fruits, upward pointing and at least slightly

subulate upper horns with well-pronounced mat areas at the base, and in the position of the reduced lower horns, inserted close to the fruit base.

Some of the variation observed in several fruits of the collection of about 200 specimens from Glück's herbarium housed in B, collected from Calcutta (*Biswas s.n.*), suggests putative hybridization between *T. assamica* and *T. bispinosa* s.l. commonly cultivated in the Indian Subcontinent for edible fruits (e.g. Daniel *et al*. 1983; Srivastava & Tripathi 1993). This problem is the subject of ongoing studies to be discussed separately.

Trapa assamica is another new extant species described recently (Wójcicki 2001) which contributes meaningfully to knowledge of the diversification and evolution of the Asiatic taxa of this complex genus.

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