

New records of aquatic monocots for the Flora of Thailand: *Nechamandra alternifolia* (Roxb. ex Wight) Thwaites (Hydrocharitaceae) and *Potamogeton octandrus* Poir. (Potamogetonaceae)

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ABSTRACT. In the course of revising the aquatic flora of Thailand, some noteworthy herbarium specimens were found; those are *Nechamandra alternifolia* (Roxb. ex Wight) Thwaites (Hydrocharitaceae) and *Potamogeton octandrus* Poir. (Potamogetonaceae), which are new to the country's flora. The taxonomic notes on the species to distinguish them from the related species in Thailand and neighboring areas are provided.

KEY WORDS: aquatic monocots, *Nechamandra* Planchon, *Potamogeton* L., Thailand.

INTRODUCTION

Aquatic monocots of Thailand, mostly in Alismatales, have been published in 2001, 2005, 2008, and 2012, including Acoraceae (one genus of two species: Boyce, 2012), Alismataceae (three genera of four species: Haynes, 2001a), Araceae (two genera of eight species: Boyce et al., 2012), Aponogetonaceae (one genus of one species: Haynes, 2001b), Cymodoceaceae (two genera of two species: Haynes, 2001c), Hydrocharitaceae (eight genera of 16 species: Haynes, 2001d), Lemnaceae (four genera of four species: Landolt, 2001), Limnocharitaceae (two genera of two species: Haynes, 2001e), Pontederiaceae (two genera of four species: Chayamarit, 2005), Potamogetonaceae (one genus of three species: Haynes, 2001f), and Typhaceae (one genus of one species: Simpson, 2008). Here I add two more aquatic monocots to the flora of Thailand; those are *Nechamandra alternifolia* (Roxb. ex Wight) Thwaites (Hydrocharitaceae) and *Potamogeton octandrus* Poir. (Potamogetonaceae). The former species has never been recorded from Thailand, while the latter one was suggested to occur in the country but no detailed information was provided (Guo et al., 2010).

NEW RECORDS

Nechamandra alternifolia (Roxb. ex Wight) Thwaites in Enum. Pl. Zeyl.: 332. 1864.— *Vallisneria alternifolia* Roxb. ex Wight in Hook., Bot. Miscellany, 2(6): Suppl., 344, t. 11. ante 10 Sept. 1831, based on Roxburgh mss. in Mus. East India Co., n. 996.— *Lagarosiphon alternifolius* (Roxb. ex Wight) Druce, Rep. Bot. Exch. Club Brit. Isles, 1916: 630. 1917. Type: India, Roxburgh, *Icones Fl. Ind. unpublished plate n.996* (K). — *Serpicula longifolia* Rottler, nom. in sched. India, “Trankebar 1798” (K) — *Nechamandra roxburghii* Planch., Ann. Sci. Nat. Bot., Sdr. 3, 11: 78. 1849.— *Lagarosiphon roxburghii* (Planch.) Benth. in Benth. & Hook., Gen. Pl., 3: 451. 14 April 1883, nom. illeg, based on *Vallisneria alternifolia* Roxb. ex Wight. Fig. 1.

Herbs submerged. *Plants* monoecious. *Stems* elongated, slender, much branched. *Leaves* alternate but usually opposite at base, irregularly arranged, densely crowded toward ends of stems, linear, 2–7 cm × 1–1.5 mm, apex acute, lacking a prominent midvein, parallel veins present, slightly sheathing at base, margin minutely serrulate with teeth. *Flowers* unisexual. *Male inflorescence*

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pedunculate, 60–100 flowered; spathe 2-united, ovate, membranous, bifid at apex, ca 5 × 4 mm. *Staminate flowers* minute, slender pedicel ca 0.6 mm; sepals 3, transparent, ovate, 0.5–1 × 0.4–0.7 mm; petals 3, subequal to sepals; stamens 3, opposite to sepals; filaments slender, very short, ca 0.3 mm. *Female* spathe tubular, ca 5 mm, sessile, 1-flowered. *Carpellate flowers* solitary, sessile, with filiform hypanthia; sepals 3, transparent, ovate, 0.5–1 × 0.4–0.7 mm; petals 3, subequal to sepals; stamens 3, opposite to sepals; ovary oblong, 5–10 mm, flattened, margin serrulate on each side; styles 3, retuse at apex, densely papillate. *Fruits* ovoid-oblong or linear. *Seeds* numerous, oblong, minute. 2n = 16 (Cook & Luond, 1982; Ito et al., 2009).

Thailand.— CENTRAL: Pathum Thani [Along the way in the young delta, 30 July 1973, *Murata & Fukuoka T-17324* (BKF)].

Distribution.— Sudan, Yemen, Sri Lanka, India (type), Nepal, Bangladesh, China, Myanmar, and Vietnam (Fig. 2).

Ecology.— Given the author’s field experience in Myanmar (Ito et al. 2009), *Nechamandra*

alternifolia occurs presumably as submerged plants. Only female individuals have been collected in Thailand so far.

Vernacular.— N/A.

Note. — The monotypic genus *Nechamandra* is distinguished from the related genus, *Vallisneria* by the sessile (or very nearly so) female spathe, filiform hypanthium, narrowly conical to ovoid mature fruit, and horizontally borne stamens (Cook & Luond, 1982). In the Flora of Thailand, other species that resemble it morphologically include *Blyxa japonica* (Miq.) Maxim. ex Asch. & Gürke and *Hydrilla verticillata* (L.f.) Royle. From the former species, which has similar vegetative morphology, i.e., elongated stems with alternate leaves, *N. alternifolia* can be distinguished by its unisexual flowers, ovate smaller petals (ca 1 mm), and leaves lacking prominent midveins (Wang et al., 2010) as well as irregularly arranged leaves; from the latter one, which shares similar flowers, *N. alternifolia* differs by having alternate leaves (Cook, 1996; Wang et al., 2010).

The main distribution of *Nechamandra alternifolia* is restricted to India and adjacent areas, but



Figure 1. *Nechamandra alternifolia*: A. A female specimen, B. A close-up photo of a carpellate flower. Scale bar = 1 mm.



Figure 2. Distribution of *Nechamandra alternifolia*. Solid circles represent locality information provided (Cook & Luond, 1982; Wang et al., 2010; Ito et al., 2009). The new locality is indicated with open circle.

few specimens were collected in Africa (Cook & Luond, 1982). Together with the recent new locality report from Myanmar (Ito et al., 2009), the species distribution seems to be continuous from India to Southeast Asian countries, i.e., China, Myanmar, Thailand, and Vietnam. In Thailand, this rare species is known from only one locality, based on a single herbarium sheet.

Potamogeton octandrus Poir., in Lam., *Encycl. Méth. Bot.*, Suppl. 4: 534. 1816; Merr., *Trans Amer. Phil. Soc.*, n.s., 24(2): 69. 1935; Dandy, *J. Linn. Soc.* 50: 517. 1937; Ohwi, *Fl. Jap.* 121. 1965; Backer & Bakh.f., *Fl. Java* 3: 9. 1968; Yang, *Fl. Taiwan* 5: 30. 1978.—*Hydrogeton heterophyllum* Lour., *Fl. Cochinch.* 244. 1790. Type: Vietnam (Cochin-China), Loureiro s.n. (BM).—*Potamogeton javanicus* Hassk., *Verh. Natuurk. Ver. Ned. Ind.* 1: 26. 1856; Hook.f., *Fl. Brit. India* 566. 1894; Koord, *Exk. Fl. Java* 89. 1911; A. Benn., *Philipp. J. Sc.*, Bot. 9: 339. 1914; Hagstr., *Kungl. Svenska Vetenskapskad. Handl.* 55 (5): 131. 1916; Leach & Osborne, *Freshw. Pl. Papua New Guinea* 225. 1985. Type: Java, Indonesia.—*Potamogeton tenuicaulis* F. Muell., *Fragm. Phyt. Austral.* 1: 90: 244. 1858. Type: Australia, Gulf of Carpentaria, F. Mueller (MEL).—*Potamogeton pusillus* auct. non L.: *Illus. Fl. Arch. Ind.* 47. 1870. Fig. 3.

Annual or perennial plants, in fresh water. *Rhizome* inconspicuously present or absent. *Stems*

filiform, terete, ca 0.5 mm in diam., sparsely to densely branched; nodal glands absent; dormant buds axillary, narrowly fusiform, ca 10 mm, not swollen. *Leaves* dimorphic; stipules axillary, convolute, 4–13 mm, membranous, free from leaf base. *Submerged leaves* alternate, sessile, linear to filiform, 2–6 cm × ca 1 mm, 3-veined, lacunae conspicuous along midvein, apex acuminate. *Floating leaves* petiolate, usually alternate, approximately opposite just below peduncle; blade oblong, 1.5–2.5 cm × 7–12 mm, leathery, 5–7-veined, base rounded, apex acute or obtuse. *Spikes* with 4 whorls of opposite flowers; peduncles 1–1.5 cm. *Carpels* 4. Fruit obovoid, 1.5–2.5 mm, abaxial keel indistinct to distinct, obtuse to minutely undulate-toothed, with a short beak to 0.3 mm.

Thailand.— NORTHERN: Chiang Mai [Hang Dong District, en route to Khun Waang, 5 April 1978, *Grinhund* s.n. (BKF)].

Distribution.— Africa, Russian Far East, Mongolia, Korea, Japan, China, Taiwan, Pakistan, India, Nepal, Bhutan, Myanmar, Vietnam (type), Indonesia (type of *P. javanicus*), Papua New Guinea, and Australia (type of *P. tenuicaulis*).

Ecology.— According to the label information, *Potamogeton octandrus* occurs as submerged plants.

Vernacular.— Di pli nam (ตีปลีนัน) (Northern).

Note.— *Potamogeton octandrus* without mature fruits is easily confused with *P. cristatus*



Figure 3. *Potamogeton octandrus*: A. A specimen, B. A close-up photo of a spike. Scale bar = 5 mm.

Regel & Maack, but the sparsely placed flowers of a spike of *P. octandrus* is different from densely flowered spikes of *P. cristatus* (Kadono, 1994; Wiegleb, 2002). It is in most cases readily distinguished from the recorded *Potamogeton* species in Thailand, i.e., *P. crispus* L., *P. malaianus* Miq. (a synonym of *P. wrightii* Morong: Wiegleb & Kaplan 1998), and *P. nodosus* Poir., by having linear submerged leaves. It is still easily confused with some other *Potamogeton* species reported from the neighboring countries, e.g., *P. pusillus* L. and *P. trichoides* Cham. & Schldl. from Myanmar (Kress et al., 2003). In those cases, the presence of floating leaves, convolute stipules, and smaller turions (10 mm or shorter) can be useful to distinguish these species from *P. octandrus* (Kadono, 1994; Wiegleb & Kaplan, 1998; Guo et al., 2010).

Potamogeton octandrus is a widespread species in temperate zone, yet localities are limited in the tropics, e.g., Malesia where the records include only highland of Java and E highlands

provinces (Wiegleb, 2002). In Thailand, the species is known from only one locality, based on a single herbarium sheet.

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