

Neotypification of *Potamogeton* × *fluitans* Roth and the distribution of this hybrid

Zdenek Kaplan

Department of Taxonomy and Biosystematics, Institute of Botany, Academy of Sciences, CZ-252 43 Průhonice, Czech Republic. kaplan@ibot.cas.cz

The identity of the name *Potamogeton fluitans* Roth has for a long time been uncertain. An analysis of the history of the name and its use is presented and the identity of the extant material ascribed to Roth discussed. The name *P. fluitans* is neotypified with a specimen from a population of the hybrid *P. lucens* L. × *P. natans* L. recently studied morphologically, anatomically and electrophoretically. Nomenclature of the hybrid is summarized and lectotypes for a further four names designated. Distribution of the hybrid is described and a list of representative specimens given.

KEYWORDS: distribution, herbarium, hybridization, nomenclature, *Potamogeton*, typification.

The name *Potamogeton fluitans* was introduced by Roth (1788), who based his description on plant material growing in “fossis profundis lente fluentibus et in Hunte fluvio Ducatus Oldenburgensis”. For more than a century after its first description *P. fluitans* was regarded as a single species, though occasionally subdivided into varieties (Koch & Ziz, 1814; Mertens & Koch, 1823; Koch, 1844; Reichenbach, 1845). Only in the late 19th century some botanists noted that it might include two quite different entities (Beeby, 1890; Fryer, 1890a, b; Bennett, 1893; Buchenau, 1894). This opinion was based upon the fact that some of the plants with the features given for *P. fluitans* are sometimes found freely fruiting but others remain consistently sterile in spite of abundant flowering.

The anatomical studies of Raunkiaer played the most important role in resolving the taxonomic difficulties of the broadly defined “*P. fluitans*”. First, he revealed the importance of characters of stem anatomy in the systematics of *Potamogeton* (Raunkiaer, 1896). Later Raunkiaer adopted this approach in a detailed investigation of the *P. fluitans* problem and distinguished and clearly defined two entities (Raunkiaer, 1903): the fertile species (now known under the name *P. nodosus* Poir.) with an endodermis of O-type and no bundles in the cortex, and a sterile hybrid intermediate between *P. natans* L. and *P. lucens* L. with a stem anatomy derived from that of its putative parents: the endodermis of U-type and well developed interlacunar and subepidermal bundles. Raunkiaer was followed by Fischer (1904, 1907) who in Germany detected additional *P. natans* hybrids hidden under the name *P. fluitans*, namely *P. ×schreberi* G. Fisch. (*P. natans* L. × *P. nodosus* Poir.) and *P. ×gessnancensis* G. Fisch. (*P. natans* L. × *P. polygonifolius* Pourr.). Hagström (1916) confirmed this taxonomic classifica-

tion, which superseded the morphologically defined unit “*P. fluitans*” based solely on general appearance.

In contrast to this satisfactory taxonomic solution, the nomenclature of the group remained uncertain because of difficulties with the interpretation of the earliest name of the group: *P. fluitans* Roth. Unfortunately, the original description (“*P. foliis inferioribus longissimis, lanceolatis, acuminatis, membranaceis; superioribus ovali-lanceolatis, coriaceis; omnibus petiolatis*”) does not provide enough data for an exact identification. That is why different authors applied this name to different taxa: some authors used it for the widespread fertile species (e.g., Koch, 1844; Raunkiaer, 1903; Glück, 1924; Soó, 1934; Glück, 1936; Soó, 1938; Ľopa, 1966), others for the sterile hybrid *P. natans* × *P. lucens* (e.g., Fryer, 1890a, 1897; Bennett, 1893; Dandy & Taylor, 1939; Dandy, 1958, 1975, 1980; Preston, 1995; Czerepanov, 1995; Wiegleb & Kaplan, 1998; Fant & al., 2001; Kaplan, 2002; Kaplan & Wolff, 2004; Kaplan & Zalewska-Gałosz, 2004). Others (e.g., Yuzepczuk, 1934; Galinis, 1963; Lashchenkova, 1974) rejected the name *P. fluitans* and followed Hagström (1916) who called the species *P. nodosus* and for the hybrid *P. natans* × *P. lucens* proposed a new name *P. ×sterilis* Hagstr.

Actual identity of the name can be determined only from the type material. Extensive search for a voucher from the type locality, the Hunte River, has been undertaken by several researchers, including Raunkiaer, Fischer, Graebner, Hagström, Wiegleb, and Kaplan, but no potential type material has been located.

Raunkiaer (1903) found altogether four specimens, one in BREM and three in LE, which could be original. They bear labels ascribing them to Roth and are named *P. fluitans*. I have studied all of them recently and agree with Raunkiaer that they belong to the fertile species

with the endodermis of O-type and a cortex without bundles. However, it cannot be proved that these are the specimens upon which the description validating the name was based. None of them has a locality or a date on the label. Some statements on the labels (e.g. “haud frequens apud nos”) indicate they were collected later when more localities of “*P. fluitans*” were known. That is why these collections cannot be regarded as original material, as defined by the *ICBN* (Art. 9.2, Note 2, Greuter & al., 2000), and cannot be used for lectotypification.

At present, in the absence of material demonstrably used by Roth for validating the name, there are three possible solutions. First, the name *P. fluitans* can be typified using one of the alleged authentic specimens. However, the specimen may not have been used by Roth to describe his taxon. This typification would change the current application of *P. fluitans*, and the name *P. nodosus* Poir., which is unambiguously interpreted and well established in recent literature, would lose its priority and be replaced by the problematic *P. fluitans*. This seems to be the worst alternative as it would cause further (and also entirely new) difficulties in the interpretation of new records.

Another possibility is to reject the name *P. fluitans*. Then *P. ×crassifolius* Fryer would have to be adopted for the hybrid *P. natans* × *P. lucens* as it is the next available name. However, the type specimen bearing this name is an extreme form of the hybrid, so that it was first proposed by Fryer (1890a) for the hybrid “*P. natans* × *P. zizii*”, which was interpreted by Hagström (1916) as a triple hybrid among *P. gramineus*, *P. lucens* and *P. natans*. The identity of the name *P. ×crassifolius* with the hybrid *P. natans* × *P. lucens* was revealed only recently by Dandy (1958, 1975) and confirmed by Preston (1988). The name *P. crassifolius* has never been adopted as the correct name in this sense, and it is not advisable to do so.

The last possibility is to maintain the recent use of the name *P. ×fluitans* and associate it with a taxonomically unambiguous specimen of the hybrid *P. natans* × *P. lucens*. This solution would ensure nomenclatural stability. Since Hagström (1916) in his worldwide treatment of the genus rejected the ambiguous name *P. fluitans* Roth for the species in favour of the taxonomically clear *P. nodosus*, the name given by Roth has rarely been adopted for the widespread fertile species. The use of the name *P. nodosus* by Hagström was followed in all subsequent important large-scale taxonomical studies: by Dandy (1937) for Africa, by Yuzepczuk (1934) in the Flora of the Soviet Union, and by Ogden (1943) in a revision of the broad-leaved pondweeds of North America. Nowadays, the name *P. ×fluitans* is generally used for the hybrid between *P. natans* and *P. lucens*, and so adopted in the *Flora Europaea* (Dandy, 1980), the list of vas-

cular plants of the former Soviet Union (Czerepanov, 1995), a recent revision of British *Potamogeton* (Preston, 1995), and in the world-wide account of *Potamogeton* species and hybrids (Wiegleb & Kaplan, 1998). In the context of the above, I consider the preservation of the current usage of the name as the most convenient. This solution is also supported by the fact that the hybrid was recently confirmed in the Hunte River system (Wiegleb & Kaplan, 1998). I therefore propose the specimen cited below as the neotype of the name *P. fluitans* Roth. This plant is from a clone with morphology intermediate between *P. lucens* and *P. natans*, species that both grew together with the hybrid in the locality. Besides morphological features, the identity of the plant was confirmed by studies of stem anatomy (Kaplan, 2001) and by isozyme electrophoresis (Kaplan & al., 2002). A brief summary of the nomenclature of *P. ×fluitans* follows.

- Potamogeton* × *fluitans*** Roth, Tent. Fl. Germ. 1: 72. 1788, pro sp. ≡ *P. natans* β. [var.] *fluitans* (Roth) Cham., Adnot. Fl. Berol. 4. 1815. ≡ *P. natans* γ. [subsp.] *fluitans* (Roth) Schübl. & G. Martens, Fl. Württemb. 109. 1834. ≡ *P. oblongus* (“spielart”) a. [var.] *fluitans* (Roth) G. Mey., Chloris Han. 520. 1836. – Type: Czech Republic: Bohemia: Distr. Turnov: small fishpond at WSW margin of Arnoštice settlement near □ehrov village, 247 m, 18 Sep 1997, Z. Kaplan 97/915 (neotype: PRA, designated here, photo in Kaplan, 2001: 335).
- = *P. ×crassifolius* Fryer, J. Bot. 28: 321, t. 299. 1890. – Type: [Great Britain:] “Cambridgeshire, Co. 29: District 7., The Engine Drain; Mepal”, 7 Jul 1890, A. Fryer 1656 (lectotype: BM, designated by Preston 1988; isolectotypes: BM, C, G, LD, S, Z).
- = *P. fluitans* var. *sublucens* Baagöe ex Aschers. & Graebn., Synops. Mitteleur. Fl. 1: 308. 1897. – Type: [Denmark:] “Gudenå, Jyllandia” [= Gudenå (river), near Grønæk, Viborg, Jutland], 24 Jul 1895, I. Baagöe (lectotype: UPS, designated here; isolectotypes: C, UPS).
- = *P. crassifolius* f. *verrutus* Fryer, Potamoget. Brit. Isles 9. 1898. (“verruta”) – Type: [Great Britain:] “Cultivated plant from Westmoor, Doddington, Cambridgeshire”, 6 Sep 1890, A. Fryer 1735 (lectotype: BM, designated by Preston 1988).
- = *P. ×noltei* G. Fisch., Mitt. Bayer. Bot. Ges. 37: 472. 1905, nom. illeg. (“Noltei”), non A. Benn. 1890. ≡ *P. noltei* f. *pernatans* G. Fisch., Ber. Bayer. Bot. Ges. 11: 57. 1907. ≡ *P. ×harzii* G. Fisch., Mitt. Bayer. Bot. Ges. 3(5): 104. 1914. ≡ *P. fluitans* proles *raunkiaeri* G. Fisch., Mitt. Bayer. Bot. Ges. 3(5): 103. 1914. ≡ *P. ×sterilis* f. *pernatans* (G. Fisch.) Hagstr., Kungl. Svenska Vetenskapsakad. Handl. 55(5): 275. 1916. ≡ *P. fluitans* f. *harzii* (G. Fischer) G. Fischer, Mitt.

- Bayer. Bot. Ges. 4(10): 154. 1930. – *P. noltei* ser. *harzii* G. Fisch., Ber. Bayer. Bot. Ges. 11: 57 & 145. 1907, *nom. inval.* [cf. *ICBN* Art. 33.7; Greuter & al., 2000] – *P. noltei* var. *β. harzii* G. Fisch. ex Graebn. in Engl., Pflanzenr. 31 (IV.11): 137. 1907, *nom. inval.* (“Harzii”) [cf. *ICBN* Art. 26.2; Greuter & al., 2000] – *P. noltei* f. *harzii* G. Fisch., Mitt. Bayer. Bot. Ges. 3(5): 103. 1914, *nom. inval.* [cf. *ICBN* Art. 26.2; Greuter & al., 2000] – *P. fluitans* ser. *raunkiaeri* (G. Fisch.) G. Fisch., Mitt. Bayer. Bot. Ges. 4(10): 154. 1930, *nom. inval.* [cf. *ICBN* Art. 33.7; Greuter & al., 2000] – Type: [Germany:] “Oberfranken: Weiher bei Vollmannsdorf (Burgebrach)”, 286 m, 8 Jun 1905, G. Fischer & K. Harz (in *Flora exsiccata Bavarica no. 998*), ut “*P. Noltei* (*P. lucens* L. × *P. natans* L.) f. *subnatans* Fischer” (lectotype: M, designated here, photo: PRA; isolectotypes: BP, BRNM, G, G-BU, LD, M, PR); [Germany:] “Holstein u. Lauenburg”, *E. F. Nolte 1602* (syntype: BM, BP, BR, CGE, G, K, LE, P, PRC, S, UPS, W, WAG).
- = *P. noltei* f. *perlucens* G. Fisch., Ber. Bayer. Bot. Ges. 11: 57. 1907. – *P. noltei* ser. *genuinus* G. Fisch., Ber. Bayer. Bot. Ges. 11: 145. 1907, *nom. inval.* (“Harzii”) [cf. *ICBN* Art. 33.7; Greuter & al., 2000] – Type: [Germany:] “Pfalz”, *Kolb* (holotype: “Hb. Prantl.-Tubeufl”, not seen, not located in M).
- = *P. ×sterilis* Hagstr., Kungl. Svenska Vetenskapsakad. Handl. 55(5): 238. 1916. – Type: “Suecia: in provincia Upland, in effluvio lacus Fysingen ad Vallstanäs, 59° 34' 15" latit. bor., 6 met. s. m.”, 26 Jul 1887, D. Tiselius & G. Tiselius (in *G. Tiselius, Potamogetones suecici exsiccati, fasc. 1: 6*) (lectotype: S, designated here, photo: PRA; isolectotypes: BM, BP, BRNM, C, K, LD, LE, PRC, S, UPS, WU, Z).
- = *P. ×subrufus* Hagstr., Kungl. Svenska Vetenskapsakad. Handl. 55(5): 241. 1916. – Type: [Denmark:] “Gudenå, Jyllandia” [= Gudenå (river), near Grønbæk, Viborg, Jutland], 24 Jul 1895, I. Baagøe (lectotype: UPS, designated here; isolectotypes: C, UPS).
- *P. fluitans* f. *typicus* Tiselius, Potamog. Suec. Exs., fasc. 1: [sched.] no. 6. 1894, *nom. inval.* (“typica”) [cf. *ICBN* Art. 24.3; Greuter & al., 2000]
- *P. fluitans* var. *typicus* Baagøe ex Aschers. & Graebn., Synops. Mitteleur. Fl. 1: 307. 1897, *nom. inval.* [cf. *ICBN* Art. 24.3; Greuter & al., 2000]
- *P. ×olivaceus* Baagøe, Actes 1. Congr. Intern. Bot. Paris 516. 1900, *nom. nud.* – Authentic specimens: [Denmark:] “In amne Gudenå ad Kongensbro, Jyllandia” [= Gudenå (river), near Grønbæk, Viborg, Jutland], 28 Jun 1897, I. Baagøe (C); the same place, 1 Aug 1900, I. Baagøe (B, M, PRC, Z); 28 Jun 1900, I. Baagøe (M); 4 Aug 1900, I. Baagøe (C, LE), etc.
- *P. rothii* A. Benn. ex G. Fisch., Mitt. Bayer. Bot. Ges. 1(31): 362. 1904, *nom. inval.* (“Rothii”) [cf. *ICBN* Art. 34.1.a; Greuter & al., 2000]
- *P. fluitans* f. *genuinus* G. Fisch. ex Glück, Biol. Morphol. Unters. Wasser Sumpfgew. 4: 476. 1924, *nom. inval.* [cf. *ICBN* Art. 24.3; Greuter & al., 2000] [= *P. lucens* L. × *P. natans* L.]

So far, the hybrid *P. ×fluitans* has been reported from several countries in the northern half of Europe: Great Britain, Denmark, Sweden, Netherlands, Germany, Czech Republic, Austria, Poland, Lithuania, Estonia, and Russia (e.g., Fischer, 1904, 1907; Hagström, 1916; Yuzepczuk, 1934; Galinis, 1963; Dandy, 1975; Pedersen, 1976; Ploeg, 1976, 1990; Mäemets, 1979, 1984; Wiegleb & Herr, 1984; Belavskaja, 1994; Preston, 1995; Kaplan, 2001; Zalewska-Gałosz, 2002). I have found no literature record on the occurrence of *P. lucens* × *P. natans* in Switzerland but have identified this hybrid in herbarium material. The selected representative specimens are:

Great Britain: Cambridgeshire, Co. 29, District 7, Mepal, The Engine Drain, 10 Jul 1890, *A. Fryer 1658* (BM, UPS). Dorset: tributary of Moors R. east of Trickett's Cross, West Parley, 3 Jun 1945, *A. H. G. Alston* (BM); 17 Aug 1946, *G. Taylor* (BM). South Hants: Moors River about Palmer's Ford, St. Leonards, 31 May 1942, *A. H. G. Alston* (BM). Moors River N. of road bridge S. of Hurn, S. Hants., vice-county 11, England, 25 Jun 1989, *C. D. Preston 89/88* (BM). Hunts, vice-county 31, drain, Wood Walton Fen, Wood Walton, 22 Jul 1955, *G. Taylor* (BM, K).

Denmark: Jutland: Vardeå, 17 Jun 1905, *J. Baagøe* (BM, BR, C, G, P, S, UPS). Jutland: Skern Å, betw. Clasonsborg [= Skarrild] and Felding, 19 Aug 1902, *J. Baagøe* (BM, BR, C, G, P, S, U, UPS). Jutland: Skernå, by Clasonsborg [= Skarrild], 9 Jul 1904, *J. Baagøe* (BM, BR, C, G, K, KRA, LD, P, S, U, UPS). Jutland: Gudenå, by Kongensbro, 28 Jun 1897, *J. Baagøe* (BM, BR, C, G, LD, LE, P, S, U, UPS, ZT); the same place, 1 Aug 1899, *J. Baagøe* (BM, BR, C, G, LD, P, S, U, UPS, Z). Jutland: Kleistrup Skalså at Randers, 24 Jul 1904, *J. Baagøe* (BM, BR, C, S).

Sweden: Upland, in effluvio lacus Fysingen ad Vallstanäs, 59° 34' 15" latit. bor., 6 m, 26 Jul 1887, D. Tiselius & G. Tiselius (in *G. Tiselius, Potamogetones suecici exsiccati, fasc. 1: 6*) (BM, BP, BRNM, C, K, LD, LE, PRC, S, UPS, WU, Z); the same place, 26 Jul 1887, *Gustaf Tiselius 47a* (C, LD, P, S, UPS, Z). Stockholm, Svartsjölandet, Wentholmen, Norrskog i Kronängens dike, 16 Jul 1846, *N. Lagerheim & C. Lagerheim* (S).

Netherlands: Elahuzen/Elahuizen, gemeente Hemelum Oldeferd, Gaasterland, prov. Friesland, 4 Jul 1972, *W. H. A. Hekking* (U). In eet sloot aan de Oostelyke

oever van het Zuidlaarder Meer, 21 Jul 1953, *E. W. Clason & Th. Reichgelt 13249* (BM).

Germany: Lower Saxony: Distr. Diepholz: Wagenfelder Aue River at E margin of Barver village, 20 Aug 1998, *Z. Kaplan 98/383* (PRA). Oberfranken: Weiher bei Vollmannsdorf (Burgebrach), 286 m, 8 Jun 1905, *G. Fischer & K. Harz* (in *Flora exsiccata Bavarica no. 998*) (BP, BRNM, G, G-BU, LD, M, PR). Weiher bei Vollmannsdorf, Ebrach – Bamberg, 11 Jul 1905, *G. Fischer* (ZT).

Switzerland: Ct. St. Gallen: Uznacherriet gegenüber Schloss Grynau im Abflussgraben des Zweierseeli, inter parentes, 21 Jun 1919, *Walo Koch* (ZT). Kt. St. Gallen, Im “Seeligraben” Burgerriet Uznach, mit den Eltern, 412 m, 21 Jun 1919, *Walo Koch* (ZT); the same place, 17 Aug 1919, *Walo Koch* (PRA, ZT).

Czech Republic: Bohemia: Distr. Turnov: small fishpond at WSW margin of Arnoštice settlement near Čehrov village, 247 m, with both parental species, 18 Sep 1997, *Z. Kaplan 97/915* (PRA); 29 Jul 1999, *Z. Kaplan 99/144* (PRA); cultivated as *Z. Kaplan C913*, coll. 3 Sep 1998 (PRA); 29 Jul 1997, *J. Rydlo & D. Vacková* (ROZ). Bohemia: Distr. Nymburk: Sladovnik fishpond in the Helma forest 1.5 km N of Louceň village, 243 m, with both parental species, 1 Jul 2002, *Z. Kaplan 02/140* (PRA). Bohemia: Distr. Nymburk: Dolní Cihadešský fishpond in Čehuňská obora deer-park 1.8 km S-SSE of Knečický village, 245 m, with both parental species, 3 Jul 2002, *Z. Kaplan 02/182* (PRA); 1 Jul 2002, *J. Rydlo* (ROZ). Bohemia: Distr. Česká Lípa: eastern part of the Novozámecký fishpond near Zahrádky village, 250 m, with both parental species, 24 Aug 2002, *D. Turoňová* (in *herb. Z. Kaplan 02/268*) (PRA). Bohemia: Distr. Mladá Boleslav: lower fishpond 300 m W of Ovcáry settlement, 1.8 km NNE of Jabkenice village, 245 m, with both parental species, 11 Jun 1999, cultivated as *Z. Kaplan C1137*, coll. 12 Jul 2002 (PRA). Bohemia: Distr. Nymburk: small forest pond 150 m ESE of Nový pond 1.35 km N(-NNW) of Louceň village, 229 m a. s. l., with both parental species, 11 Sep 2004, *Z. Kaplan 04/319* (PRA).

Austria: Vorarlberg: Distr. Bregenz: ditch with running water at NNE margin of Fußach village near Höchst town, 397 m, 23 Jun 1998, *Z. Kaplan 98/129* (PRA); the same place, cultivated as *Z. Kaplan C983*, coll. 3 Sep 1998 and 1 Jul 1999 (PRA). Austria superior, In lacu prope Hallstatt, *Stapf* (in *Flora Exsiccata Austro-Hungarica no. 2682*) (B, BM, BP, BR, BRNM, C, G, G-BU, GOET, K, LD, LE, P, PR, PRC, S, W, WU-Hal, Z, ZT).

Poland: Stara Ukta, Krutynia River at station, 25 Jul 1986, *M. Środa* (OLS). Königsberg: Im Goldapflusse W. von Goldap, Kr[eis]. Goldap [= Gołdap, Prov. Warmińsko-Mazurskie], Jul 1891, *R. Schultz* (BRNU).

Russia: Ostpreussen, Kreises Insterburg, In der Angerapp [River] bei Insterburg [= Tschernjachowsk (= Chernyakhovsk), Prov. Kaliningrad], 5 Aug [18]93, *H. Kuehn* (BRNU). Tver prov., Ves’egonsk distr., below Liuber’ village, Renia River, 16 Jul 2001, *A. Bobrov & E. Chemeris* (IBIW, PRA); the same place, 26 Sep 2001, *A. Bobrov & E. Chemeris* (IBIW, PRA). Kostroma prov., Susanino distr., vicinity of Buyakovo village, Shatcha River, 18 Jul 2003, *A. Bobrov* (IBIW, PRA).

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