

Taxonomic, nomenclatural and chorological notes on several taxa of the genus *Echinodorus* (Alismataceae)

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Abstract: Taxonomic, nomenclatural and chorological notes on several taxa of the genus *Echinodorus* are given. A new species *E. maculatus* is described. The name *Alisma intermedium* (basonym of the name *E. intermedium*) is lectotypified. *Echinodorus major* and *E. martii* should be treated as two distinct taxa. The name *E. xinguensis* was invalidly published. It is also confirmed that *E. africanus*, *E. veronikae* and *E. viridis* (all belonging to the *E. uruguayensis* group) do not originate from Africa. The name *E. bleherae* should be written with a female suffix (-ae); this name is considered here as a synonym of the earlier name *E. grisebachii*.

Key words: *Alisma*, chorology, *Echinodorus*, nomenclature, taxonomy

Introduction

Despite several monographs published on the genus *Echinodorus* RICH. (HAYNES & HOLM-NIELSEN, 1994; KASSELMANN, 2001; RATAJ, 1975, 2004a) a number of taxonomic, nomenclatural and chorological problems remain unsolved. Some of the pending questions as well as the answers are presented in this article. The abbreviations of herbaria are cited according to HOLMGREN et al. (1990).

Echinodorus africanus RATAJ

According to KASSELMANN (1984), RATAJ (1986, 1990, 1998, 2001c, 2004a) and SADÍLEK (1981), *E. africanus* was originally collected and imported by Eduard PÜRZL (in RATAJ's publications often incorrectly as "PÜRZEL") from Cameroun. However, it is now clear that *E. africanus* does not originate from Africa (KASSELMANN, 1984; PÜRZL, 2003 & 2006 pers. comm.). Furthermore, the supposed photograph of *E. africanus* from Cameroun published by RATAJ (1990: Fig. 1) does not correspond to this species.

In this context, it is interesting that the label of the holotype specimen of the name *E. africanus* (PR 11524) reads: "Imported by Dr. RADA [correctly RADDA] (Wiena [correctly Vienna], Austria) from Cameroun and cultivated in Bot. Inst. ČSAV in Šumperk, Czechoslovakia. Cult., RATAJ, 5. 10. 1981". However, Alfred C. RADDA (2006 pers. comm.) did not remember that he imported this (or any other) material of the genus *Echinodorus* from Africa.

Echinodorus africanus belongs to the *E. uruguayensis* group; taxonomic status of this species is questionable.

It is to be also remarked that RATAJ (1998; 2001c; 2004a: 77, Fig. 4) published a photograph of a cultivated plant under the name *E. africanus*. However, the same photograph was earlier (RATAJ, 1974a, 1983: Fig. 55) published by him with the name *E. horemanii* RATAJ.

Echinodorus bleherae RATAJ

This name is cited as "*E. bleheri*" in numerous publications (e.g. HAYNES & HOLM-NIELSEN, 1994; BARTH & STALLKNECHT, 1990; GREGER, 1988; KASSELMANN, 1999, 2001; MÜHLBERG, 1980; RATAJ, 1973, 1975). RATAJ (1970: 265) really described the species *E. bleheri*, nevertheless, he clearly stated that he had selected the name in honour of Mrs. Amanda BLEHER. However, RATAJ made a mistake when he used a male suffix (see also RATAJ, 2004a). Article 32.7 of the Code (MCNEILL et al., 2006) states that validly published names with a wrong Latin suffix are to be corrected; thus the correct name is *E. bleherae*.

Echinodorus bleherae belongs to the *E. grisebachii* group and until the taxonomy of this group is not solved using modern taxonomic approaches (including molecular methods), the name *E. bleherae* should be considered as a synonym of the earlier name *E. grisebachii* SMALL.

Echinodorus intermedius (MART.) GRISEB. in Cat. Pl. Cub. 218, 1866
 bas.: *Alisma intermedium* MART. in ROEM. & SCHULT., Syst. Veg. 7(2): 1609, 1830
 lectotype (designated here): Brasilia, MARTIUS No. 1547 (M 0086252); the plant on the left (with No. 93).

In the course of investigations on *E. major* and *E. martii* (see below), a need to designate the lectotype of the name *Alisma intermedium* appears, since there are two plants mounted on the herbarium sheet considered by HAYNES & HOLM-NIELSEN (1994) to be the holotype of this name (see Art. 8.2; MCNEILL et al., 2006).

Echinodorus major (MICHELI) RATAJ in Mitt. Bot. Staatssamml. München 6: 616, 1967
 bas.: *Echinodorus martii* β *major* MICHELI in A. DC Monogr. Phan. 3: 49–50, 1881
Echinodorus martii auct. (p.p.) non MICHELI: HAYNES & HOLM-NIELSEN (1994)
Echinodorus martii auct. non MICHELI: e.g. GREGER (1988), KASSELMANN (1999, 2001), RATAJ (2004a)

Echinodorus martii MICHELI in A. DC Monogr. Phan. 3: 49–50, 1881
Alisma intermedium auct. non MART.: SEUBERT (1847)
Echinodorus intermedius auct. non (MART.) GRISEB.: RATAJ (1967, 1973, 1975, 2001b, 2004a)

HAYNES & HOLM-NIELSEN (1994) considered *E. martii* and *E. major* (bas.: *E. martii* β *major*) to be a single taxon (*E. martii*). RATAJ (1967, 1973, 1975, 2001b, 2004a), however, regarded them as two separate species. RATAJ (1967, 1973, 1975, 2001b, 2004a) erroneously named *E. martii* as *E. intermedius* (MART.) GRISEB. However, HAYNES & HOLM-NIELSEN (1994) considered the name *E. intermedius* as a synonym of the earlier name *E. subalatus* (MART.) GRISEB. I have studied the specimen, which according to HAYNES & HOLM-NIELSEN (1994) represents the holotype (MARTIUS No. 1547, M 0086252) of the name *Alisma intermedium* MART. (basionym of the name *E. intermedius*) only as the digital image, however, the specimen does not belong to *E. martii*, it represents a different taxon. In this context, it should be noted that the specimen M 0086252 was revised and determined by RATAJ in 1967 as *E. subalatus* (annotation on the specimen). This specimen was cited as “Jequetinhonha, MARTIUS 1547 (M)” by RATAJ (1975) also in the list of studied specimens of *E. subalatus*. In his work of 2004 RATAJ (2004a) incorrectly named *E. major* as *E. martii*.

Echinodorus major is well-known and widespread among aquarists (often under the name *E. martii*), whereas *E. martii* is not cultivated. HAYNES & HOLM-NIELSEN (1994) informed that *E. martii* is sold under the German commercial name “Amazonas Zwerg-Schwertpflanze” (= Amazonas dwarf-swordplant) (!).

However, this information is wrong as this commercial name is used for some taxa of *Echinodorus* subg. *Helianthium* (ENGELM.) FASSETT.

Echinodorus martii is documented only by two herbarium specimens collected by POHL (M 0088673, BR) (HAYNES & HOLM-NIELSEN, 1994; RATAJ, 1967, 1975, 2001b, 2004a). I did not have possibility to study the specimen from BR [the lectotype of the name *E. martii*, designated by HAYNES & HOLM-NIELSEN (1994)], as it was not possible to find it (STOFFELEN, 2005 pers. comm.); I have studied the specimen from M (isolectotype). A detailed illustration, as well as morphological description of *E. martii* (as *Alisma intermedium*) were published also in SEUBERT (1847: 106, Tab. 14). In the case of *E. major* I have studied the lectotype (P 00512049) [designated by HAYNES & HOLM-NIELSEN (1994)] and isolectotype (P 00512050) of the name *E. martii* β *major*, as well as living plants from several nurseries. In HAYNES & HOLM-NIELSEN (1994: 22, Fig. 9 A–E) a drawing of the herbarium specimen of *E. major* (IRWIN et al. 16684, NY) was published.

Echinodorus martii differs from *E. major* by emerged leaves, which are erect, with a thinner and longer peduncle and with narrower blades with acute base and acute apex; the leaf blades remain rigid after pressing. The emerged leaves of *E. major* form usually a low ground rosette. They have a thicker and shorter peduncle and broader blades with usually truncate base and obtuse apex, the leaf blades remain tender after pressing. Divergence of inner pair of veins from the main vein is in *E. martii* closer to the blade base than in *E. major*. Scapus of emerged plants of *E. martii* is thinner and longer than in emerged plants of *E. major*. RATAJ (1967, 1973, 1975, 2001b, 2004a) stated also the difference in size of flowers (*E. martii* 0.7–0.9 cm; *E. major* 1.5 cm). I support the view that *E. major* and *E. martii* are two distinct taxa.

Echinodorus maculatus SOMOGYI, spec. nov.

Diagnosis: Folia emersa plerumque (10–)20–45(–60) cm longa, folia submersa plerumque 10–20 cm longa. Lamina foliorum ovate lanceolata vel ovata, ad marginem (praecipue foliorum submersorum) frequenter undulata, basis cordata vel reniformis, apex apiculatus, puncta et lineae perlucidae praesentae; lamina foliorum juniorum (praecipue foliorum submersorum) rubro-fusco maculata. Inflorescentia simplex vel ramosa, flaccida.

Holotypus: Cultivated in the Karel RATAJ nursery in Šumperk, Czech Republic; 29. 4. 2005, leg. Jozef SOMOGYI (W) (Fig. 1). Isotypi in BRA, M, PR, WU.

Etymology: named after reddish-brown maculation on young leaves.

Echinodorus aschersonianus auct. non GRAEBN. ‘Rubromaculatus’: RATAJ (2004b)

Echinodorus aspersus hort., nom. nudum: e.g. CIRLING (1991)



Fig. 1. *Echinodorus maculatus* SOMOGYI, holotypus (W).

Echinodorus schlueteri auct. non RATAJ: e.g. BARTH & STALLKNECHT (1990), GREGER (1988), KASSELMANN (1993, 1999, 2001)

The species is generally widely cultivated and widespread among aquarists under several wrong names (see above) and therefore, as the most suitable taxonomic and nomenclatural solution, it is described here as a new species in spite of its unclear origin. The Hans BARTH nursery (Dessau, Germany) reported a mutation under the name *E. schlueteri* 'Leopard', however, it belongs also to *E. maculatus*.

Emersed plants of *E. schlueteri* RATAJ are distinguishable from *E. maculatus* by e.g. slighter habitus; leaf blades with flat, not undulate margins, with obtuse apex and without reddish-brown maculation; always simple inflorescence. On the other hand, emersed

plants of *E. maculatus* are of more robust habitus; the leaf blades are with acute apex and with reddish-brown maculation in young stage, frequently with undulate marginal parts; inflorescence is simple or branched. The holotype (PR, P4 T 4517) of the name *E. schlueteri* is in accordance with the plants, which are cultivated under the name *E. schlueteri* in the Karel RATAJ nursery, as well as with the protologue (RATAJ, 1981) of the name *E. schlueteri*.

Echinodorus maculatus corresponds to the plants, which are currently cultivated in the KAREL RATAJ nursery under the name *E. aschersonianus* 'Rubromaculatus'. However, this cultivar name is not in accordance with the rules of the Code (see Art. 19.13; BRICKELL et al., 2004).

The data of RATAJ (1974b, 1977, 1998, 2004b, 2001–2005 pers. comm.) imply the following history

on the origin of *E. aschersonianus* 'Rubromaculatus': Around 1970 RATAJ received achenes labelled as *E. aschersonianus* GRAEBN. coming from the natural site in the vicinity of the city Santa Fé in Argentina [the name *E. aschersonianus* is a synonym of the earlier name *E. uruguayensis* ARECHAV. (LEHTONEN, 2006)]. From the achenes, plants of different phenotypes were grown (possibly different species?); a form with reddish-brown maculation on young leaves was later called by RATAJ as *E. aschersonianus* 'Rubromaculatus'.

According to RATAJ (1998, 2004b, 2001–2005 pers. comm.), morphological characters of *E. aschersonianus* 'Rubromaculatus' are retained also after reproduction by achenes. As for the translucent marks on the leaf blades, there are contradictions in RATAJ's statements. RATAJ (1974b, 1977, 1998) stated that the plants grown from the achenes from Argentina did not have translucent marks on the leaf blades. RATAJ (2004b) reported that *E. aschersonianus* 'Rubromaculatus' originated from the achenes of *E. aschersonianus* from the natural site of Argentina, however, he further wrote about the presence of translucent marks on the leaf blades. In this context, it should be noted that the translucent marks on the leaf blades are not always visible, as their presence depends also on environmental factors (see also KAMINSKI, 2003).

The origin of *E. maculatus* remains unclear; it is not clear whether *E. maculatus* really descends from the achenes of the package from Argentina. Also *E. maculatus* can be reproduced by achenes without changing its morphological characters (BARTH, 2003–2004 pers. comm.; BARTH & STALLKNECHT, 1990; RATAJ, 2004b). According to BARTH (2004 pers. comm.), *E. maculatus* cultivated all over the world has its origin in the Karel RATAJ nursery.

It is to be remarked that RATAJ (1977: 188, upper photograph on the right) in his article on *E. aschersonianus* published a photograph (as *E. aschersonianus*), which was later published by him under the name *E. longiscapus* ARECHAV. (RATAJ, 1982: the other side of the cover, 1983: Fig. 54).

Echinodorus veronikae RATAJ

RATAJ (2004a) stated that *E. veronikae* originated from Cameroun and Burkina Faso and that the material, which was coded by DE GRAAF (1981) as *E. sp. AdG 73*, belonged to this species. A. DE GRAAF (1980, 1981) mentioned that *E. sp. AdG 73* was collected by DE WIT in Ouaga in Upper Volta (currently Burkina Faso) in September 1977. The herbarium specimens of *E. sp. AdG 73* (WAG 0026878, WAG 0026879) do not correspond to *E. veronikae*; they represent a different taxon. The specimens were collected by DE GRAAF from a cultivated plant material. According to the information on the labels, the plants were originally collected by DE WIT in Burkina (correctly Burkina) Faso, Kadiogo, Ouaga in 1977–79. *Echinodorus sp.*

AdG 73 clearly differs from *E. veronikae* by e.g. emerged leaves.

Echinodorus veronikae belongs to the *E. uruguayensis* group; taxonomic status of this species is questionable.

I have studied also the specimen WAG 0026881, which was collected by K. VAN SETTEN (coll. No. 412) from a cultivated plant material. According to the information on the label, the plants were originally collected by DE WIT in Ivory Coast, Ouaga in September 1977. However, Ouaga is not located in Ivory Coast, but in Burkina Faso. According to the information on the labels of the specimens of *E. sp. AdG 73* (WAG 0026878, WAG 0026879), it is clear that the specimen WAG 0026881 was collected from the same plant material as the specimens of *E. sp. AdG 73*, although the notes on the origin of the plants written on the labels of the specimens are different.

Echinodorus viridis RATAJ

RATAJ (2004a) reported that *E. viridis* originated from Cameroun and corresponded to the material, which was labelled by DE GRAAF (1981) as *E. sp. AdG 416*. A. DE GRAAF (1981) stated that *E. sp. AdG 416* was collected by DE WIT in Cameroun. On the cover of the journal *Aqua Planta*, where the contribution of DE GRAAF (1981) is published, a photograph of *E. sp. AdG 416* is presented. The photograph is in accordance with the herbarium specimen of *E. sp. AdG 416* (WAG 0026880). The specimen was collected by DE GRAAF from a cultivated plant material. According to the information on the label, the plants were originally collected by DE WIT not in Cameroun but in Ivory Coast, Abidjan, Adiopodoumé. Neither the plant on the photograph (see also SCHÖPFEL, 2005) nor the herbarium specimen is in accordance with *E. viridis*; they represent a different taxon. *E. sp. AdG 416* clearly differs from *E. viridis* by e.g. emerged leaves.

Echinodorus viridis belongs to the *E. uruguayensis* group; taxonomic status of this species is questionable.

It is interesting that DE WIT (1990) in his book on aquarium plants did not refer to the above mentioned plants of the genus *Echinodorus* from Africa. No label of the above mentioned specimens was written by DE WIT. If this material of the genus *Echinodorus* really originated from Africa, the plants were most probably cultivated or escaping from cultivation. In the case of the original occurrence in Africa, this fact would have been certainly mentioned in DE WIT's book.

Echinodorus xinguensis (RATAJ) RATAJ, nom. inval.

This combination was published by RATAJ (2001a: 51), however, because he did not fully and directly cite the reference to the place of valid publication of the ba-

sionym *E. quadricostatus* var. *xinguensis* RATAJ, the combination is not valid according to the Art. 33.4 of the Code (MCNEILL et al., 2006). Taxonomy of *Echinodorus* subg. *Helianthium* (ENGELM.) FASSETT is very complex and any new classification and nomenclatural issues should be based on multisource-data, including molecular ones.

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