

NOTES ON SOME RATAJ'S NAMES IN THE GENUS *ECHINODORUS* (ALISMATACEAE)

Jozef Somogyi

Abstract: Notes on the nomenclature and taxonomy of some taxa of the genus *Echinodorus* described by Karel Rataj (1925–2014) are given. Many of them have lacked a type specimen and their supposed types have never been deposited in the herbarium PR, even if that was so stated in the protologues. Unfortunately, as the types are cited in the protologues, the names have to be treated as valid according to the Code. The specimens labelled as “holotypes” of the names *E. africanus*, *E. gabrielii*, *E. janii*, *E. pseudohorizontalis*, *E. schlueteri*, *E. veronikae* and *E. viridis* appeared in the herbarium PR only lately. However, none of these specimens can be considered as a holotype. The true holotypes of *E. africanus* and *E. schlueteri* have already existed before. The names *E. gabrielii*, *E. heikobleheri*, *E. opacus*, *E. osiris*, *E. pseudohorizontalis* and *E. viridis* are typified here. It is impossible to typify the names *E. janii*, *E. multiflorus* and *E. veronikae*. One previously published information on *E. densinervis* is corrected in the appendix of this article.

Key words: *Echinodorus*, typification, nomenclature, taxonomy, Karel Rataj

Abstrakt: Poznámky k niektorým Ratajovým menám v rode *Echinodorus* (Alismataceae). Mnohým druhom rodu *Echinodorus*, ktoré opísal Karel Rataj (1925 – 2014), chýbajú typové herbárové položky, aj keď v protológoch je uvedené, že boli deponované v herbári PR. Žiaľ, keďže tieto neexistujúce typy sú citované v protológoch, je nutné takto publikované mená považovať za platné v zmysle Kódu. Položky označené ako „holotypy“ mien *E. africanus*, *E. gabrielii*, *E. janii*, *E. pseudohorizontalis*, *E. schlueteri*, *E. veronikae* a *E. viridis* sa objavili v herbári PR iba nedávno. Ani jednu z týchto položiek však nemožno považovať za holotyp. Skutočné holotypy *E. africanus* a *E. schlueteri* už existovali. Mená *E. gabrielii*, *E. heikobleheri*, *E. opacus*, *E. osiris*, *E. pseudohorizontalis* a *E. viridis* sú typifikované v tomto článku. Mená *E. janii*, *E. multiflorus* a *E. veronikae* nie je možné typifikovať. V dodatku uvádzam opravu už publikovanej informácie, týkajúcej sa druhu *E. densinervis*.

Introduction

Many taxa of the genus *Echinodorus* (Alismataceae) were described by Karel Rataj (Šumperk, Czech Republic). Unfortunately, several of these original descriptions are dubious with fictitious information or lacking types. A lot of cited holotypes have never been deposited in the herbarium PR, even if that was so presented in the protologues. Unfortunately, as the types are cited in the protologues, the names are valid according to the Art. 40.1 of the Code (McNeill et al. 2012). The latest Rataj's types, which were deposited in PR, belong to the names published by Rataj in 1981 (*E. africanus*, *E. schlueteri*). Although the Rataj's holotypes of the names published in the following years should be deposited in PR according the protologues, in fact they lack in PR. In 2004 only the Rataj's types (besides the genus *Helanthium*) of *E. africanus*, *E. horemanii*, *E. opacus*, *E. osiris*, *E. parviflorus*, *E. portoalegrensis* and *E. schlueteri* were really deposited in PR (Šída 2004 pers. comm.). Also later, in 2005–2009, when I was studying the Rataj's types, only the above mentioned type specimens were deposited in PR.

Lately, some of the lacking “holotypes” have appeared in the herbarium PR. However, it is not possible to find the date of their acquisition (Šída 2015 pers. comm.). These new specimens have unified design, which proves that all these specimens come from the same time; they were made additionally, much later as the protologues were published, and all of them originate from a cultivated material. All these specimens are labelled with two labels: the red one with the species name and the year of its publication, and the white one with the locality and collection date; sometimes also additional notes are provided on other white labels, or such additional notes are written directly on the herbarium sheet.

However, none of these specimens can be considered as a holotype. Rataj knew, that many of his new taxa lack the types, although they were stated in the protologues. Therefore he wanted to prepare them additionally and put them to PR. However, he forgot that *E. africanus* and *E. schlueteri* had already been correctly typified and their holotypes are really deposited in PR. Therefore he made the “new holotypes” also for these two taxa, similarly as for other species with really absent types.

The purpose of this article is to bring order to this confused situation. This is really necessary, all the more so because these “holotypes” were, unfortunately, already used for taxonomic conclusions (see e.g. Lehtonen 2016).

Methodical note

The protologues and texts of the labels of the herbarium specimens are cited in original version; orthographic errors are noticed only if it is necessary.

Results and Discussion

***Echinodoros africanus* Rataj (1981: 20)**

Holotype: PR 11524/745390.

The protologue reads: “Patria: Cameroun. Holotypus: Cult. in Bot. Inst. ČSAV Šumperk, Rataj 5.10.1981 (PR)”. On the holotype specimen (PR 11524/745390) there are two labels; the first one reads: “Imported by Dr. Rada [correctly Radda] (Wiena, Austria) from Cameroun and cultivated in Bot. Inst. ČSAV in Šumperk, Czechoslovakia. Cult., Rataj, 5.10.1981.” The second one (headed as “Czechoslovak Academy of Sciences, Botanical Institute, Research Centre for the Ecology of Water Plants, Šumperk-Temenice Czechoslovakia”) reads: “*Echinodoros africanus* sp.n. Holotypus, Det. Karel Rataj 1981” [equally headed label is also on the holotype specimen of the name *E. schlueteri* (PR P4 T 4517/615708); this species was also described in 1981 in the same publication as *E. africanus*]. The data on the importer and locality in Africa given on the label are completely fictitious (Somogyi 2006). This specimen (PR 11524/745390) represents the true holotype of the name *E. africanus* and has been really deposited in PR.

Rataj had probably presumed, that the type of *E. africanus* also lacks; he forgot, that this holotype has already existed, and therefore he made a “new type”. This new specimen was lately deposited in PR (PR 745397/5662). The red label reads: “Holotypus, *Echinodoros africanus* Rataj sp.n. 1981”. The white label reads: “Col: Eduard Pürzel [correctly Pürzl], Cameroun, 36–38 Km south of flumen Nyong, 1976”. However, this specimen is not mentioned in the protologue and is much younger. Moreover, the (terrestrial) plant on this sheet does not belong to *E. africanus* and represents most probably an artificial hybrid with involvement of *E. uruguayensis* Arechav. As I saw in 2001–2005, such hybrid

plants were cultivated in Rataj's nursery in Šumperk and they were incorrectly labelled as *E. africanus*.

Taxonomic status of *E. africanus* is not clear; this taxon is apparently very closely related to *E. uruguayensis*, but it is not certain if *E. africanus* is conspecific with *E. uruguayensis* or if it is an artificial hybrid with involvement of *E. uruguayensis*. The first plant of this taxon appeared in the plant collection of Vladimír Sadílek in Brno (Czech Republic); he meant that this plant was given to him by Eduard Pürzl (Vienna, Austria) and originated from Cameroon (Sadílek 1981). Sadílek (1981) mentioned this taxon as a “new Alismataceae from Cameroon”. However, the plant does not come from Pürzl in reality (Somogyi 2006). The statement of Sadílek (1981), that this plant originates from Africa, is a mistake (Somogyi 2006). Sadílek cultivated most probably *E. uruguayensis* together with other species of the genus *Echinodorus*. Following my long-time experiences with cultivation and hybridization of various *Echinodorus* taxa, I think that *E. uruguayensis* was spontaneously hybridized with another *Echinodorus* in Sadílek's collection. A “new Alismataceae” spontaneously germinated from an achene (the seedlings can grow surprisingly rapidly) and Sadílek considered it to be the plant from Cameroon. I presume that *E. africanus* is a spontaneous hybrid, arisen in the greenhouse of Sadílek.

In the 1980s I saw *E. africanus* at Rataj in Šumperk and I cultivated this material, too. However, in the 1990s *E. africanus* disappeared from the Šumperk collection. In 2007 I saw *E. africanus* in the Botanical Garden of Munich (Germany), where it was personally brought by V. Sadílek (Bogner 2007 pers. comm.); I got a plant (cut off the rhizome of the mother plant) from Josef Bogner to my culture. Recently, *E. africanus* is not grown more in this botanical garden (Bogner 2017 pers. comm.). Probably the last living material of the true *E. africanus*, originating from Sadílek, grows in my culture. The plants, which are sold as *E. africanus*, belong to other hybrids with involvement of *E. uruguayensis* or to *E. uruguayensis*.

Rataj published several pictures with the name *E. africanus*, however, only one of them (Rataj 1990b: Fig. 2; 2004a: 77, Fig. 3) really represents *E. africanus* (emersed plants). The photographs published in Rataj (1986: on the front side of the cover; 1998: Fig. 102; 2001a: 49; 2003: 26; 2004a: 76, Fig. 1; 2004a: 77, Fig. 2) are not reliably identifiable (the photographs of flowers and the photograph of adventitious plant in the inflorescence). All other pictures published by Rataj as *E. africanus* (e.g. Rataj 1986: 23; 1988: 28; 1990b: Fig. 1; 1998: Fig. 101; 2001a: 48; 2003: 26; 2004a: 77, Figs. 4, 6) do not correspond to this taxon (see also Somogyi 2006). One of them (Rataj 2004a: 77, Fig. 6) represents the assumed hybrid, to which belongs also the “new type” (PR 745397/5662). The photograph of a submersed plant of *E. africanus* with typically numerous, narrow leaves was published by Sadílek (1981).

***Echinodorus gabrielii* Rataj (1990a: 14–15 as “gabrielii”)**

Neotype (designated here): PR 745391/5663.

In the protologue Rataj informs, that this species was discovered in southeastern Brazil by Michael Bleher from the company Lotus Osiris; the holotype is cited as follows: “Collegit Michael Bleher in Brasilia, Porto Alegre, plantae cult. in Bot. Inst. Šumperk, 15.8.1989 (PR).” This holotype specimen has not been deposited in PR.

Lately a specimen (PR 745391/5663) was deposited in PR; the red label reads: “Holotypus, *Echinodorus gabrielii* Rataj 1990”. The white label reads: “Col: Michael Bleher, Brasilia, Porto Alegre, 15.8.1989.” However, this text does not agree with the protologue. Although the holotype has to be a cultivated plant, this additional specimen pretends

to be a plant from nature (even though the data on the collector and locality are completely fictitious). This specimen is evidently much younger than the protologue.

Echinodorus gabrielii was named to the honour of Pavel Gabriel, a Czech aquatic plant grower; but in the protologue the information on this dedication is absent. However, this dedication was in general known among the aquarists, who knew Rataj and Gabriel, but this dedication was published only later in Rataj (2001c) and indirectly also in Rataj [2004b: 53 (see at *E. cv. Pavel Gabriel*), 54 (see at *E. cv. Punctatus*)].

The collector and locality data given in the protologue are completely fictitious. In reality, Rataj got this plant as a new and unnamed species from Mr. and Mrs. Gabriel (Pavel and Naděžda); therefore it was naturally named to the honour of Pavel Gabriel. In the year 2001 I visited Mr. and Mrs. Gabriel and their waterplants nursery in Kostelní Lhota (Czech Republic) and they provided me with the information on the origin of *E. gabrielii*: Around the years 1986–1987 Boris Panjukov from the Botanical Garden of Moscow visited Gabriels' nursery and gave to Gabriels a bit of the seeds originating reportedly from the island Marajó in Brazil. Several plants of different species were grown from these seeds, among them also a single plant of an unknown species of the genus *Echinodorus*, which later produced an atypical inflorescence – an umbel. When this plant was reproduced by the adventitious plants from the inflorescence, Gabriels gave the original plant to Rataj, who described this new species as *E. gabrielii*. However, the right origin of *E. gabrielii* remains unknown up to now and all known plants originate from culture.

For the first time I saw this species at Rataj in Šumperk in the 1980s (before it was described). I cultivated this material, too. As it is a very well identifiable species and its interpretation has been always clear (in the protologue there are the photographs of the species; other pictures were published e.g. in Rataj 1991b; 1998: Figs. 97, 111; 2002b: 31; 2004a: 132–133), I decided to typify the name *E. gabrielii* by the Rataj's specimen PR 745391/5663.

***Echinodorus heikobleheri* Rataj** (2004a: 38–39 and Fig. on the front side of the cover) Neotype (designated here): Cultivated in the Karel Rataj nursery in Šumperk, Czech Republic; 19.10.2016, leg. Jozef Somogyi (W). Isoneotype in WU.

The protologue reads: “Holotyp: Brazil, Nort Roraima near Guyana, Igarapé de Alemãoa, 12.8.2002, H. Bleher (PR).” This holotype specimen has not been deposited in PR.

I saw *E. heikobleheri* in Rataj's collection in Šumperk in 2002–2005 (for the first time shortly after it was imported by Heiko Bleher) and this material was in accordance with the photographs published in the protologue. I cultivated this material, too. According to Ludmila Pohlnerová (2016 pers. comm.), a member of the staff of the Karel Rataj nursery, there were cultivated only two mother and two young plants in the nursery in October 2016. I used these two young plants as a neotype and an isoneotype.

The name *E. heikobleheri* is a synonym of the earlier name *E. grisebachii* Small.

***Echinodorus horemanii* Rataj** (1970: 214–215 as “*horemani*”)

Holotype: PR 270203/10233.

The protologue reads: “Holotype: Brazil, Paraná, Ponta Grossa, 8.11.1967 [correctly 11.8.1967 – see below], Horeman, PR: 270203.” These data are in accordance with the text on the label of the holotype specimen (PR 270203/10233).

Thomas Horeman participated on an expedition to Brazil together with Joachim Schulze and Michael Bleher (Schulze 1968c: 309). Schulze (1968c: 309) informed that

the expedition took place in August 1967. Schulze published also photographs of his herbarium specimens, which were collected during this expedition, e.g. *E. opacus* (Schulze 1968b: Fig. 6 – on the right) and *E. osiris* (Schulze 1968a: Fig. 3 – on the left as *E. spec. rubra*). On the labels of both these specimens there is the date of collection given as 11.8.1967. Therefore, the correct collection date of the type specimens of *E. horemanii*, *E. opacus* and *E. osiris* (all of them collected by Horeman) is 11.8.1967 and not 8.11.1967 (orthographic error) as it is given on their labels as well as in the protologues. Similarly, on the labels of the specimens of *E. amazonicus* Rataj (= *E. grisebachii*) (PR 270188/10236) and *E. horizontalis* Rataj (PR 270187A/10235) (both of them collected by Horeman), which were collected during the same expedition [see also Schulze 1968d: Fig. 21 (as *E. brevipedicellatus*), Fig. 24 (as *E. muricatus*)], there is the collection date given as 26.8.1967.

The name *E. horemanii* is a synonym of the earlier name *E. uruguayensis*.

***Echinodoros janii* Rataj (1988: 30)**

Type: nonexistent

The protologue reads: “Holotypus: Cult. in Bot. Inst. Šumperk (Patria Paraguay?), 1.6.1988, Rataj (PR).” This holotype specimen has not been deposited in PR.

Lately a specimen (PR 745392/5664) was deposited in PR; the red label reads: “Holotypus, *Echinodoros janii* Rataj sp.n. 1978”. However, *E. janii* was not described in 1978, but in 1988. The white label of this specimen reads: “Ex: Hortus Botanicus Asunción, Paraguay, 1975.” These data do not agree with the protologue. The healthy terrestrial plant with inflorescence, which is on the sheet PR 745392/5664, does not agree with the protologue and is in a strong conflict with it, as the protologue reads: “Formae terrestriales abortivae...” Furthermore, this plant represents an artificial hybrid, *Echinodoros* ‘Rubin’, which was created by Hans Barth (Dessau, Germany) and has been sold since 1993 (Barth 1993; in this publication there is also the photograph of a submersed plant of *E.* ‘Rubin’). Therefore this specimen cannot be designated as a type of the name published in 1988.

Rataj (1998: Fig. 100; 2004a: 67, Fig. 1) published a drawing under the name *E. janii*, however, the same drawing was published already previously as *E. osiris* (Rataj 1968: Fig. 37). Similarly, the photograph published in Rataj (1998: Fig. 99) as *E. janii* was published in Rataj (1991a, 2002b: 30) as *E. horemanii*. The drawings named in Rataj (2004a: 67, Figs. 2, 3) as *E. janii* are not identifiable. The photographs presented as *E. janii* in Rataj (2004a: 68, Figs. 4, 5, 6; 69, Fig. 9) represent in fact *E.* ‘Rubin’ or its seedlings (on the cited Fig. 9). Vice versa, one of two photographs published here as *E.* ‘Rubin’ (Rataj 2004a: 69, Fig. 7) represents a different artificial hybrid in reality; the second one (Rataj 2004a: 69, Fig. 8) really represents *E.* ‘Rubin’. No indubitable picture of *E. janii* has been published and it has been not possible to identify this confused taxon and typify its name.

In the 1980s I saw *E. janii* at Rataj in Šumperk. The beautiful submersed plants resembled a broad-leaved, red form of *E. uruguayensis*. Such plants, which were originally called by Rataj as *E. janii*, disappeared from Rataj’s nursery in Šumperk in the 1990s. As I saw in 2001–2005, the plants of *E.* ‘Rubin’ were cultivated in Rataj’s nursery in Šumperk and they were incorrectly labelled as *E. janii*; I cultivated this cultivar, too.

***Echinodoros janii* Rataj (2002a: 30), nom. illeg.**

Type: nonexistent

The protologue reads: “Holotypus: ex Hortus Botanicus Asunción, Paraguay, 1977 (PR).” This text in the protologue is very similar to the text on the white label of the specimen

PR 745392/5664 (“Ex: Hortus Botanicus Asunción, Paraguay, 1975”) and implies that this specimen could be made around 2002 at the earliest.

This name is, of course, a later homonym (with another type as *E. janii*, 1988) and illegitimate name [Art. 53.1 of the Code (McNeill et al. 2012)], however, again without an appropriate type specimen, because in the protologue there is mentioned as collection date the year 1977 and not 1975 as it is written on the white label of the putative holotype specimen PR 745392/5664.

***Echinodorus multiflorus* Rataj** (1989a: 23–25)

Type: nonexistent

The protologue reads: “Holotypus: Cult. in Bot. Inst. CSAV Šumperk, Rataj 16.9.1987 (PR).” This holotype specimen has not been deposited in PR.

In the 1980s I saw at Rataj in Šumperk the plants, which were called by Rataj as *E. multiflorus*. In the protologue and in Rataj (1989b: on the back side of the cover; 2004a: 96–97), there were published photographs of *E. multiflorus* agreeing with the plants seen in Šumperk. The plants of *E. multiflorus* disappeared from Rataj’s nursery in Šumperk in the 1990s. As there is no material of this species available, it is not possible to typify this name [see Art. 40.4 of the Code (McNeill et al. 2012)].

***Echinodorus opacus* Rataj** (1970: 215–216)

Lectotype (designated here): PR 270200A/10234. Isolectotype: PR 270200B/10234.

The protologue reads: “Holotype: Brazil, Paraná, Ponta Grossa, 8.11.1967 [correctly 11.8.1967 – see above at *E. horemanii*], Horeman, PR: 270200.” However, in the herbarium PR there are deposited two specimens marked with the number 270200 (270200A/10234 and 270200B/10234). Therefore it is necessary to select one of them as a lectotype of this name [see Art. 8.1, Art. 9.1, Art. 9.2 of the Code (McNeill et al. 2012)]. The data on the label of the lectotype specimen are in accordance with the protologue.

It is unclear, whether the lectotype and the isolectotype were really collected in nature. Schulze (1968c: 309) informs that during the expedition to Brazil (together with Thomas Horeman and Michael Bleher; see also above at *E. horemanii*) only one plant of *E. opacus* was found. Two photographs of this plant were published in Schulze (1968c: Figs. 12, 15). In Schulze (1968b: Fig. 6 – on the right) there is published also a photograph of Schulze’s herbarium specimen of *E. opacus* collected in nature. According to the date given on the label (11.8.1967), the plant on the sheet was collected during this expedition, but it seems to be not identical with the plant on the mentioned photographs. Furthermore, the lectotype and the isolectotype (collected by Horeman) are not in accordance with any of these depicted plants. It is possible that the type specimens originated from the material cultivated in the water tanks of the Brazilian company Lotus Osiris in reality (owner: Amanda Bleher, mother of the above mentioned Michael), which was also visited by the participants of the expedition (see Schulze 1968b: 277, 279).

***Echinodorus osiris* Rataj** (1970: 213–214)

Lectotype (designated here): PR 270189A/10237. Note: The fragments of the inflorescence are not a component of the lectotype specimen, they belong to a different species and were added most probably by Rataj from a cultivated material. Isolectotype: PR 270189B/10237.

The protologue reads: “Holotype: Brazil, Paraná, Ponta Grossa, 8.11.1967 [correctly 11.8.1967 – see above at *E. horemanii*], Horeman, PR: 270189.” However, in the herbarium PR there are deposited two specimens marked with the number 270189 (270189A/10237

and 270189B/10237). Therefore it is necessary to select one of them as a lectotype of this name [see Art. 8.1, Art. 9.1, Art. 9.2 of the Code (McNeill et al. 2012)]. The data on the label of the lectotype specimen are in accordance with the protologue.

***Echinodorus pseudohorizontalis* Rataj (2002a: 30)**

Neotype (designated here): PR 745393/5665.

The protologue reads: “Holotypus: Patria incognita, ex Aqua-Flora in Holandia, cult. in hortulani Rataj, Czek Republik, 10.4.2002 (PR).” This holotype specimen has not been deposited in PR.

Lately a specimen (PR 745393/5665) was deposited in PR. The red label reads: “Holotypus, *Echinodorus pseudohorizontalis* Rataj 1992”. However, this species was described in 2002. The white label reads: “Patria: Incognita. The plant comes from the nursery Aqua-Planta in Holland and propagated in Poland (ogrody wodne) under fully uncorrect name *Echinodorus horizontalis*.” The data on the labels of the specimen PR 745393/5665 are not in accordance with the protologue, and therefore this specimen is not a holotype. The plant on the herbarium sheet is in accordance with the photographs published in Rataj (2004a: 130–131) and with the plants, which I saw in 2002–2003 at Rataj in Šumperk. Therefore it is possible to designate the specimen PR 745393/5665 as a neotype of the name *E. pseudohorizontalis*.

This “taxon” is most probably only a mutation of an artificial hybrid originated from in vitro culture.

***Echinodorus schlueteri* Rataj (1981: 20)**

Holotype: PR P4 T 4517/615708.

The protologue reads: “Holotypus: Cult. in Bot. Inst. ČSAV Šumperk, Rataj 12.10.1981 (PR)”. On the holotype specimen (PR P4 T 4517/615708) there are two labels; the first one reads: “Rataj, 12.10.1981. Cult. in Bot. Inst. ČSAV Šumperk, Czechoslovakia”. The second one (headed as “Czechoslovak Academy of Sciences, Botanical Institute, Research Centre for the Ecology of Water Plants, Šumperk-Temenice Czechoslovakia”) reads: “*Echinodorus schlueteri* sp.n. Holotypus, Det. Karel Rataj 1981”. Equally headed label is also on the holotype specimen of the name *E. africanus* (PR 11524/745390), which was also published in 1981 (in the same publication as the names *E. schlueteri* and *E. inpai* Rataj). The specimen PR P4 T 4517/615708 represents the true holotype of the name *E. schlueteri* and has been really deposited in PR. This type specimen is in accordance with the plants, which I saw in the Šumperk collection (for the first time in the 1980s), as well as with the pictures published in Rataj (1987: 27–28, on the back side of the cover; 1989c; 2001b: 47; 2003: 30; 2004a: 102–103). I cultivated this species, too. For more detailed information on *E. schlueteri* see Somogyi (2014). *Echinodorus schlueteri* has been cultivated already since the end of the 1960s (Quester 2001: 93 as *E. aschersonianus*). According to Rataj (1987, 1989c) *E. schlueteri* can be reproduced by achenes without changing its morphological characters, and therefore, as it is not a hybrid, it was described as a new species.

Rataj had probably presumed, that the type of the name *E. schlueteri* also lacks; he forgot, that this holotype has already existed, and therefore he made a “new type”. This specimen was lately deposited in PR (PR 745394/5666). The red label reads: “Holotypus, *Echinodorus schlueteri* [sic!] Rataj sp.n. 1981”. The white label reads: “Brazilia, Col. Michael Bleher, send from the nursery Lotus Osiris in Magé, – without nearerer locality. Cult. in Botanical Institute Šumperk, 12.10.1981.” (collector’s name is absent). Even though this text is not in direct contradiction with the protologue, the data on the labels of the

true holotype (PR P4 T 4517/615708) are much more in accordance with the protologue (almost equal text together with collector's name). The headed label of the Czechoslovak Academy of Sciences also confirms, that this specimen was made in the same time as the holotype of the name *E. africanus*, which was published in the same publication (Rataj 1981). The specimen PR 745394/5666 was made much later than the protologue was published. The specimen is backdated, what is clearly visible from the design of the labels. The specimen PR 745394/5666 ("new type") belongs to *E. schlueteri*.

In Western Europe there is *E. maculatus* Somogyi cultivated often under the name *E. schlueteri* (see this misapplication e.g. in Kasselmann 2001: 123–124). More information on *E. maculatus* was published in Somogyi (2006, 2014): This species originates probably from the achenes collected in nature in Argentina and imported around 1970 [the type material (holotype: W; isotypes: BRA, M, PR, WU) originates from culture]. As it can be reproduced by achenes without changing its morphological characters, it is not a hybrid, and therefore this taxon was described as a new species. In culture there is also the cultivar *E. maculatus* 'Leopard' distributed. It is remarkable that this mutation, which was found among the seedlings of *E. maculatus* in the former Hans Barth nursery (Dessau, Germany), can also be reproduced by achenes without changing its morphological characters (Barth 1988: 367 as *E. schlueteri* 'Leopard', 2003 pers. comm.).

In connection with the species *E. maculatus* and *E. schlueteri* it is necessary to correct also some other information recently published. Lehtonen (2016: 125) stated that the material of *E. maculatus* and *E. schlueteri*, which was used by him for DNA study, was obtained from me and originated from Rataj's nursery and was of the same origin as the types. However, in fact, I never gave any material of the genus *Echinodorus* to Lehtonen. This material was provided to Lehtonen by Heiko Muth from his collection (Lehtonen 2011 pers. comm. – e-mail dated 16.3.2011). Heiko Muth was a volunteer in the Old Botanical Garden of Göttingen. Muth's material of *E. schlueteri* originated from an aquarist (H. Hallmann through C. Quester) from the former German Democratic Republic (Muth 2005 pers. comm., 2007 pers. comm.). In 2006 Muth obtained also another material of this species from my collection, originating from the Karel Rataj nursery. Muth's material of *E. maculatus* originated exclusively from an aquarist (S. Engler) from the former German Democratic Republic (Muth 2005 pers. comm., 2007 pers. comm.).

***Echinodorus veronikae* Rataj (1988: 30)**

Type: nonexistent

The protologue reads: "Holotypus: Cult. in Bot. Inst. Sumperk (Patria Cameroun), 20.5.1988, Rataj (PR)." This holotype specimen has not been deposited in PR and also Kasselmann (2001: 84, 138) mentioned it was not possible to see and study this type.

Lately a specimen of putative holotype (PR 745395/5667) was deposited in PR. The red label reads: "Holotypus, *Echinodorus veronikae* Rataj sp. nova 1989". However, *E. veronikae* was described in 1988 and not in 1989. The white label reads: "leg. Arie de Graaf, North Cameroun, 1985." These data do not agree with the protologue. Furthermore, the plant on this sheet does not agree with the protologue and is in a strong conflict with it. The protologue reads: "Formae terrestriales: lamina apetiolata, 10–12 cm longa et 2–2,5 cm lata, coriacea." I got *E. veronikae* from Rataj to my culture in the 1980s and I can confirm, that the terrestrial form was in accordance with the protologue. On the sheet PR 745395/5667 there is a terrestrial plant with inflorescence and ca. 35 cm long leaves with very long petioles. It is most probably an artificial hybrid with involvement

of *E. uruguayensis*. As I saw in 2001–2005, such hybrid plants were cultivated in Rataj's nursery in Šumperk and they were incorrectly labelled as *E. veronikae*; I cultivated this material, too. The information on the locality and collector is completely fictitious (Somogyi 2006).

Directly on the the sheet of the specimen PR 745395/5667 there is a note with the name *E. viridis*. However, *E. viridis* was described much later, in 2002; this note also implies, that this “type” specimen was made additionally.

In the 1980s I saw *E. veronikae* at Rataj in Šumperk. This material was in accordance with the photograph of *E. veronikae*, which was published at first (as far I know) in Rataj (1994: 16). This only photograph of *E. veronikae* was published later e.g. in Rataj (1998: Fig. 104; 2001a: 49; 2003: 27; 2004a: 79, Fig. 4). The photograph of flowers published in Rataj (1990b: Fig. 4; 1998: Fig. 103; 2001a: 49; 2003: 27; 2004a: 78, Fig. 1) is not reliably identifiable. The photograph and drawings named in Rataj (2004a: 78, Figs. 2A, 2B; 79, Fig. 3) as *E. veronikae* represent in fact the same assumed artificial hybrid as the herbarium specimen PR 745395/5667.

The plants, which were originally called as *E. veronikae* by Rataj, disappeared from Rataj's nursery in Šumperk in the 1990s. As the interpretation of the name *E. veronikae* is unclear (we do not know, if this taxon is conspecific with *E. uruguayensis*, or whether it is an artificial hybrid with involvement of *E. uruguayensis*), it is not possible to typify this name [see also Art. 40.4 of the Code (McNeill et al. 2012)].

***Echinodoros veronikae* Rataj (2002a: 30), nom. illeg.**

Type: nonexistent

The protologue reads: “Holotypus: Col. Arie de Graaf, North Cameroun, 1985, cult. (PR).” This text is very similar to the text on the white label of the specimen PR 745395/5667 (“leg. Arie de Graaf, North Cameroun, 1985.”), which was made additionally in the same time as other additional “holotypes” (around 2002 at the earliest).

This name is, of course, a later homonym (with another type as *E. veronikae*, 1988) and illegitimate name [Art. 53.1 of the Code (McNeill et al. 2012)], however, again without an appropriate type specimen, because in the protologue there is mentioned that the holotype is a cultivated plant and according to the white label of the specimen PR 745392/5664 this putative holotype is a voucher plant directly from Cameroon.

***Echinodoros viridis* Rataj (2002a: 30)**

Neotype (designated here): PR 745396/5668.

The protologue reads: “Holotypus: Patria incognita, ex Ornamental Aquarium in Singapore, cult., 15.4.2002 (PR). Africa?” Such a holotype specimen has not been deposited in PR.

Lately a specimen (PR 745396/5668) was deposited in PR. The red label reads: “Holotypus, *Echinodoros viridis* Rataj 2002”. The white label reads: “Patria: Incognita. This plant comes from the nursery Oriental aquarium in Singapore under the name *Echinodoros uruguayensis*. Probably Africa – see the notice.” This text does not agree with the protologue and this specimen cannot be a holotype. The plant on this sheet, however, agrees with the plants, which I saw in 2001–2005 at Rataj in Šumperk, as well as with the pictures in Rataj (2004a: 80–81). Therefore it is possible to designate the specimen PR 745396/5668 as a neotype of the name *E. viridis*. I cultivated this material, too. The information on the origin from Africa is completely fictitious (Somogyi 2006).

The name *E. viridis* is most probably a synonym of the earlier name *E. uruguayensis*.

Appendix

Echinodorus densinervis Somogyi (2011: 149–152)

I would like to correct an information published in the protologue, where it is stated, that the Pohl's specimens (holotype and isotype) were originally deposited in Vienna (W), from where they were transferred in 1839 and 1859. However, in fact, both of these specimens were transferred in 1839.

Acknowledgements

I thank (in alphabetical order) Josef Bogner, Pavel Gabriel, Naděžda Gabrielová, Anton Lamboj, Samuli Lehtonen, Roman Letz, Vladyslav Mirutenko, Heiko Muth, Helmut Mühlberg, Ludmila Pohlnerová, Eduard Pürzl, Karel Rataj sen. and Otakar Šída for their help and support.

References

- BARTH, H., 1988: Wasserpflanzensorten – Aquariumpflanzen der Zukunft? *Aquarien Terrarien*, 35(11): 366 – 367, 389.
- BARTH, H., 1993: *Echinodorus* „Rubin“. Ein Edelstein im Aquarium. *Das Aquarium*, 27(4): 24.
- KASSELMANN, C., 2001: *Echinodorus*. Die beliebtesten Aquariumpflanzen. Ettligen, Dähne Verlag, 168 pp.
- LEHTONEN, S., 2016: Shutting down the chaos engine – or, identifying some problematic *Echinodorus* (Alismataceae) types. *Annales Botanici Fennici*, 53: 115 – 129.
- MCNEILL, J., BARRIE, F.R., BUCK, W.R., DEMOULIN, V., GREUTER, W., HAWKSWORTH, D.L., HERENDEEN, P.S., KNAPP, S., MARHOLD, K., PRADO, J., PRUD'HOMME VAN REINE, W.F., SMITH, G.F., WIERSEMA, J.H., TURLAND, N.J. (eds), 2012: International code of nomenclature for algae, fungi, and plants (Melbourne Code). *Regnum Vegetabile*, 154.
- QUESTER, C., 2001: *Echinodorus aschersonianus* Graebner, eine selten kultivierte Schwertpflanze. *Aqua Planta*, 26(2): 93 – 102.
- RATAJ, K., 1968: Alismataceae – žabníkovitě. In: Rataj, K., Hejný, S.: *Vodní rostliny v bytě*. Praha, Státní zemědělské nakladatelství, pp. 156 – 198.
- RATAJ, K., 1970: New species of the genus *Echinodorus* from South Brazil. *Folia Geobotanica et Phytotaxonomica*, 5: 213 – 216.
- RATAJ, K., 1981: Diagnózy třech nových druhů rodu *Echinodorus*. *Akvárium Terárium*, 24(6): 20.
- RATAJ, K., 1986: Šípatkovec africký *Echinodorus africanus* Rataj. *Akvárium Terárium*, 29(5): 22 – 24.
- RATAJ, K., 1987: Nový šípatkovec *Echinodorus schlueteri* Rataj. *Akvárium Terárium*, 30(6): 27 – 28.
- RATAJ, K., 1988: Schwertpflanzen aus Afrika. *Aquarama*, 2: 27 – 30.
- RATAJ, K., 1989a: *Echinodorus multiflorus* sp.n. Beschreibung einer neuen Schwertpflanze und Bemerkungen zur Haltung im Aquarium. *Aquarama*, 4: 23 – 25.
- RATAJ, K., 1989b: Šípatkovec mnohokvětý *Echinodorus multiflorus* Rataj. *Akvárium Terárium*, 32(2): 22 – 23.
- RATAJ, K., 1989c: *Echinodorus schlueteri*. *Het Aquarium*, 59(4): 99 – 100.

- RATAJ, K., 1990a: *Echinodorus gabrieli* – šípátkovec Gabrielův. *Akvárium Terárium*, 33(1): 14 – 15.
- RATAJ, K., 1990b: Sekce Uruguayensii rodu *Echinodorus*. *Akvárium Terárium*, 33(2): 14 – 15.
- RATAJ, K., 1991a: Šípátkovec Horemanův a jeho červená forma. *Akvárium Terárium*, 34(10): 6 – 7.
- RATAJ, K., 1991b: *Echinodorus osiris* a *Echinodorus grisebachii* v akvaristice. *Akvárium Terárium*, 34(12): 12 – 13.
- RATAJ, K., 1994: Plevuňky pro akvárium. *Akvárium Terárium*, 37(12): 15 – 18.
- RATAJ, K. [sen.], 1998: Speciální část. In: Rataj, K. [sen.], Rataj, K. [jun.]: *Akvárium a rostliny*. Šumperk, Karel Rataj – přírodniny, pp. 20 – 150.
- RATAJ, K., 2001a: Echinodory a Flora Neotropica (4). *Akvárium Terárium*, 44(7): 47 – 51.
- RATAJ, K., 2001b: Echinodory a Flora Neotropica (6). *Akvárium Terárium*, 44(11): 47 – 52.
- RATAJ, K., 2001c: Zemřel Pavel Gabriel. *Akvárium Terárium*, 44(12): 22.
- RATAJ, K., 2002a: Echinodorusy i “Flora neotropiků”. *Akvarium* (Moscow), 5: 30 – 37.
- RATAJ, K., 2002b: Echinodorusy i “Flora neotropiků”. *Akvarium* (Moscow), 6: 25 – 31.
- RATAJ, K., 2003: Echinodorusy i “Flora neotropiků”. *Akvarium* (Moscow), 1: 26 – 33.
- RATAJ, K., 2004a: Nová revize rodu *Echinodorus* Richard, 1848 (Alismataceae). *Aqua, Journal of Ichthyology and Aquatic Biology*, Mimořádné vydání č. 1.
- RATAJ, K., 2004b: Odrůdy echinodorů. Šumperk, Karel Rataj – přírodniny, 75 pp.
- SADÍLEK, V., 1981: Eine neue Alismatácea [sic!] aus Kamerun. *Aqua Planta*, 6(2): 49 – 50.
- SCHULZE, J., 1968a: Neue *Echinodorus*-Arten aus Südbrasilien. *DATZ*, 21: 244 – 248.
- SCHULZE, J., 1968b: Neue *Echinodorus*-Arten aus Südbrasilien II. *DATZ*, 21: 277 – 281.
- SCHULZE, J., 1968c: Neue *Echinodorus*-Arten aus Südbrasilien III. *DATZ*, 21: 309 – 312.
- SCHULZE, J., 1968d: Neue *Echinodorus*-Arten aus Südbrasilien IV. *DATZ*, 21: 339 – 342.
- SOMOGYI, J., 2006: Taxonomic, nomenclatural and chorological notes on several taxa of the genus *Echinodorus* (Alismataceae). *Biologia* (Bratislava), 61(4): 381 – 385.
- SOMOGYI, J., 2011: *Echinodorus densinervis* spec. nova (Alismataceae) from South America. *Phyton* (Horn, Austria), 51(1): 149 – 152.
- SOMOGYI, J., 2014: Etwas über *Echinodorus schlueteri* mit Bemerkungen zu *E. reptilis*, *E. maculatus* und *E. xbarthii*. *Aqua Planta*, 39(4): 141 – 146.

Author’s address:

Dr. Jozef Somogyi, Donnerova 33, 841 04 Bratislava, Slovakia

E-mail: jozef.somogyi@gmail.com