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The specific status of *Cyperus badius* and the subspecies of *Scirpoides holoschoenus* (*Cyperaceae*), with special reference to Sardinia

Abstract

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The status of variously described subspecies or varieties of *Scirpoides holoschoenus* is evaluated, with to the conclusion that only two subspecies should be recognized from the Azores to Turkestan and Punjab: *S. holoschoenus* subsp. *holoschoenus* and *S. holoschoenus* subsp. *australis*. Another subspecies occurs disjunctly in southern Africa: *S. holoschoenus* subsp. *thunbergii*. From the author's field work in Sardinia, it emerges that only *Scirpoides holoschoenus* subsp. *holoschoenus* occurs in Sardinia. *Cyperus badius* is considered a species of its own, showing considerable and constant differences from *C. longus*. The latter was not found in Sardinia, while *C. badius* is widespread.

Introduction

The nomenclature of *Scirpoides holoschoenus* (L.) Soják, has been subjected to considerable confusion in the literature, too much weight being given to the number of flowerheads. In the present paper I propose that only two subspecies be recognized from the Azores to Turkestan and Punjab: a western subspecies *Scirpoides holoschoenus* subsp. *holoschoenus* and an eastern and southern subspecies *S. holoschoenus* subsp. *australis* (Murray) Soják, the two differing by the tallness and robustness of the plant, and length and rigidity of the bract. Another disjunct subspecies very similar to *S. holoschoenus* subsp. *holoschoenus* from the Maghreb, occurs in southern Africa, *Scirpoides holoschoenus* (L.) Soják subsp. *thunbergii* (Schrad.) Soják.

Cyperus badius Desf. has usually been considered as a subspecies or variety of *C. longus* L. Only recently has it been given species rank, i. e. in Rothmaler (1994). A long standing familiarity in the field with both taxa allows me to clarify the situation.

The present paper is the outcome of field work undertaken mostly in the Mediterranean countries since 1964, and of a special interest for *Cyperaceae*. Research was carried out in Sardinia since 1998.

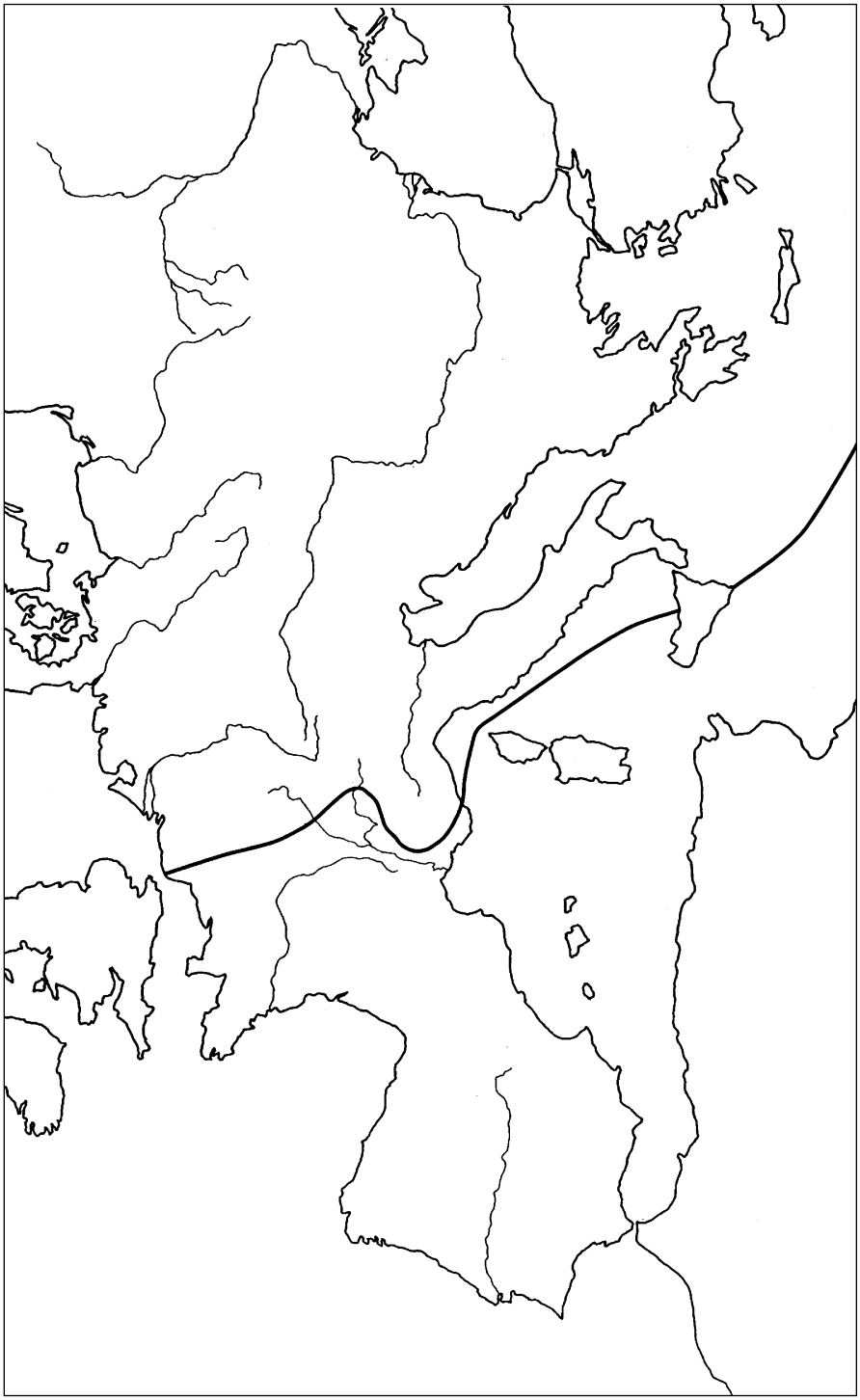

Fig. 1. Distribution of *Scirpoides holoschoenus*. West of heavy line *S. holoschoenus* subsp. *holoschoenus*; east of heavy line *S. holoschoenus* subsp. *australis*.

Fig. 2. *Scirpoides holoschoenus* subsp. *holoschoenus*. Sardegna: Olbia, 18.06.1998 (one spikelet or more and and inflorescence with divided rays (var. *globiferus*), all within 100 $m^{2.}$.

Genus: ***Scirpoides*** Séguier, 1754 (*Holoschoenus* Link, 1827).
Species: ***Scirpoides holoschoenus*** (L.) Soják, 1972. Synonym *Holoschoenus vulgaris* Link, 1827, basionym: *Scirpus holoschoenus* L., 1753.

Recent data from Sardinia (under seven different names!): Chiappini (1962-1963) as "*Scirpus holoschoenus* subsp. *holoschoenus* var. *australis*"; Arrigoni, 1964: 369 as "*Scirpus australis*"; Bocchieri (1989, 1997) as "*Scirpus holoschoenus*"; De Martis & Loi (1989: 338) as "*Schoenoplectus holoschoenus*", Ballero & al. (1993), De Martis, Sandolo & Loi (1996), as "*Scirpus holoschoenus*"*;* Camarda, I. in Camarda & Cossu (1988) as "*Holoschoenus romanus*"; Camarda & al. (1993), Mossa & al. (1996): 183, Mossa &

Fig. 3. *Scirpoides holoschoenus* subsp. *holoschoenus*. Tunisia, 9.06.1989 (bract shorter than inflorescence).

Bacchetta (1998) as "*Holoschoenus australis*". Becherer (1929) gives several localities for Sardinia for "*Scirpus globiferus*" and "*Scirpus holoschoenus* var. *macrostachyus*" which certainly can be referred to *Scirpus holoschoenus* subsp. *holoschoenus* according to the key, loc. cit. p. 139. Specimens of *Scirpoides holoschoenus* subsp. *holoschoenus* from many localities in my herbarium (see Appendix). Pignotti (2003) observes that "this widespread and highly variable taxon has been historically subdivided into several infraspecific and specific taxa, most of which are based on measurements of highly variable and largely overlapping characters". This author mentions five morphotypes for Italy: "*vulgaris*", "*australis*", "*panormitanus*", "*romanus*" and "*parlatoris*" but treats them as synonyms of *Scirpoides holoschoenus* and therefore are not differentiated on the map p. 318.

Subspecies: ***Scirpoides holoschoenus*** (L.) Ség. subsp. ***holoschoenus*** (L.) Greuter.
Synonyms: *Scirpus holoschoenus* L., 1753, *Scirpoides holoschoenus* Soják 1972, *Holoschoenus vulgaris* Link, 1827, *Scirpus globiferus* L.f. 1781, *Holoschoenus globifer* (L.f.) Reichb., 1830, *Holoschoenus globiferus* (L.f.) A. Dietr., 1833, *Scirpoides globifera* (L.f.) Soják, 1972, *Scirpoides holoschoenus* subsp. *globifera* (L.f.) Soják 1972, *Scirpus holoschoenus* L. subsp. *globiferus* (L.f.) Husn., 1906, *Scirpus holoschoenus* var. *globiferus* (L.f.) Parl., 1852.

The subspecies *holoschoenus* is recognized by its short, rigid and spiny bract, and its robust stems. The bract is often shorter than the inflorescence in northwestern Africa and in Sicily (bract 1 cm long in a specimen from Palermo). Specimens from the Cala di Osalla (Dorgali, prov. Nuoro), 5 km south of Orosei, Sardinia, have one or two flowerheads with a bract of 6 mm, hardly longer than the inflorescence. The flowerheads are generally more numerous than in the subspecies *australis*, but their number may vary from a single to several dozens. It is most instructive to note that near Olbia (Sardinia) I found in an area of about 100 m^2 a population comprising individuals of one to ten flowerheads and others with double ramification of the inflorescence, one inferior, the other superior ("*globifer*") and one specimen with the bract shorter than the inflorescence, similar to specimens from North Africa. Plants with double inflorescences were also found near the mouth of the Rio Pelau (Cardedu, prov. Nuoro), along the Rio Picocca (San Priamo, Muravera, prov. Cagliari) and near Santadi (SW Sardinia). The form "*globifer*" was described by Linné, and recognized by Reichenbach and Husnot (Becherer). Specimens from the Canary Islands have double inflorescences and numerous flowerheads, sometimes over fifty smaller flowerheads [up to 200 according to Pignotti (2003)]. They could be referred to as *Scirpoides holoschoenus* var. *globiferus* (L.f.) Parl. The rays of the inflorescence are sometimes ramified as in a specimen from San Lorenzo, Grand Canary Island.

Within the subspecies *holoschoenus*, the tallness of plants, number of flowerheads and their diameter result from edaphic conditions and cannot be described as varieties, less so as subspecies. Similar variations occur in many other plant species. *S. holoschoenus* subsp. *holoschoenus* tolerates drier ground than the subspecies *australis*. It may reach 250 cm in height. It is found in western and southwestern Europe, the Canary and Madeira islands, northwestern Africa east to Lybia. A robust specimen with a long bract from the Sinai may be intermediate, as is a robust plant with a 40 cm bract from Amsa Atalir (Algerian Sahara). In Europe, the subspecies *holoschoenus* extends from the Atlantic to western

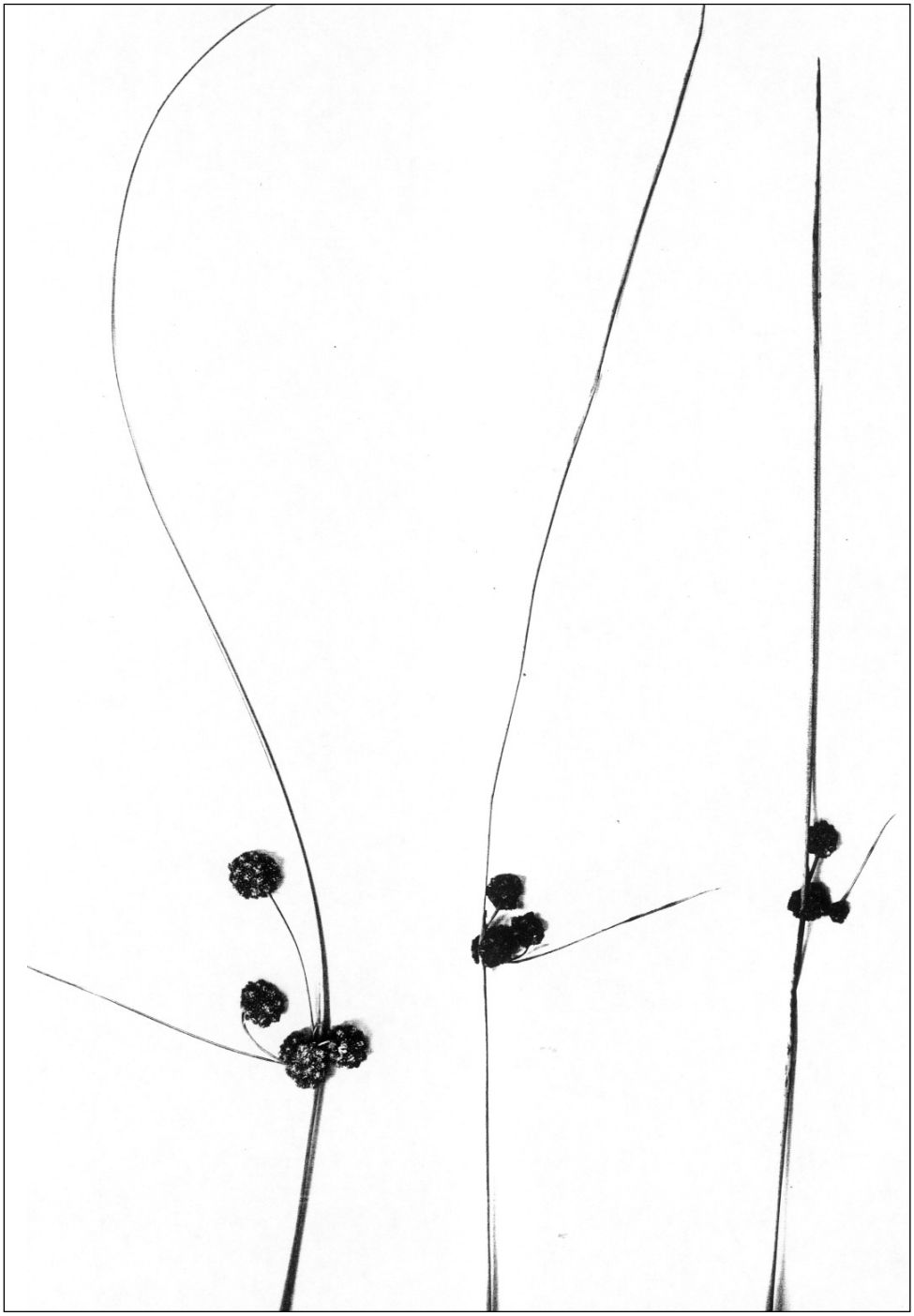

Fig. 4. *Scirpoides holoschoenus* subsp. *australis*. Pordenone: San Foca, 24.08.1998.

Switzerland, Liguria, Corsica, Elba, Sardinia and Sicily. It is possible that *S. holoschoenus holoschoenus* may occur in the Italian Peninsula, but all specimens I have examined belong to *australis* (list in appendix). *Scirpoides holoschoenus* subsp. *holoschoenus* appears to be the only subspecies occurring in Sardinia where it is widespread. Cultivated in identical conditions the two subspecies retain all their proper characters.

Scirpoides holoschoenus (L.) Soják subsp. ***australis*** (Murray) Soják, 1972. Synonyms: *Scirpus australis* Murray, 1774, *Holoschoenus australis* (L.) Reichb., 1830, *Scirpus holoschoenus* L. var. *australis* (L.) Sm., 1800, *Scirpus holoschoenus* L. var. *australis* (L.) Koch, 1844, *Scirpus holoschoenus* L. subsp. *australis* (L.) Arcany, 1882, *Scirpoides holoschoenus* subsp. *australis* (L.) Soják, 1983, *Holoschoenus vulgaris* Link var. *australis* Nyman, 1882, *Scirpus romanus* L., 1753, *Holoschoenus romanus* (L.) Fritsch, 1897, *Scirpoides romana* (L.) Soják, 1972, *Scirpus holoschoenus* var. *romanus* Koch, 1844, *Scirpus holoschoenus* L. subsp. *romanus* (L.) G. Mateo Sanz & R. Figuerola Lamato, 1987, *Holoschoenus australis* Reichb., 1830, *Holoschoenus romanus* (L.) Fritsch subsp. *australis* (L.) Greuter, 1967, *Scirpoides holoschoenus* (L.) Soják subsp. *australis* Soják, 1972, *Holoschoenus romanus* (L.) Fritsch var. *australis* (L.) Becherer, 1929, *Scirpus panormitanus* Parl., 1852, *Scirpoides holoschoenus* (L.) Soják subsp. *panormitanus* (Parl.) Soják, 1983, *Holoschoenus romanus* subsp. *panormitanus* Asch. & Gräbn., 1904, *Scirpus parlatoris* Biv., 1838.

The inflorescences of *Scirpoides holoschoenus* subsp. *australis* consist of one to ten flowerheads, but this subspecies is always recognized by its long, flexible bract (generally over 15 cm, and up to 64 cm), its stems thinner, the plants more slender and usually shorter, generally not surpassing 120 cm.

The specimens I have examined in the Geneva Conservatoire Botanique, from Germany, eastern Switzerland, the Piedmont, Sicily and eastwards to Afghanistan and Turkestan all belong to *australis*. Kukkonen (1998) gives only the subspecies *australis* for Iran and writes, p. 43: "*S. holoschoenus* subsp. *holoschoenus* is here understood to include robust plants, to more than 1 m, typically occurring in Europe on Atlantic and western Mediterranean coasts. Plants of this size are not known to occur in Flora Iranica area. *S. holoschoenus* subsp. *australis* is slender, mostly less than 50 cm, and with a wide area of distribution in Europe, N Africa and SW Asia; distinction may also be found in anatomical features [see Palla in W.D. Koch, *Syn. Deut. Schw. Fl.*, ed. 3: 2526-2528 (1907). Monoyer, Contr. à l'anatomie de Scirpus, *Mém. Soc. roy. Liège*, 3, 18: 185 pp. (1934)]".

Schmeil (1993) indicates *australis* from southern Belgium, and several localities in Germany, while Rothmaler (1994) writes "im Gebiet nur subsp. *australis*".

West of a line Belgium - Switzerland - southern Italy, *S. holoschoenus australis* is sporadic and is found mostly on sandy ground of the littoral, as also remarked by Pignotti (2003: 319) for *romanus* and *parlatoris*, especially in Portugal; only here between the Atlantic coast and the interior did I find intermediate specimens. It is noteworthy that most plants in the western part of the species range grow on littoral sand. Some plants from Gascony and Portugal tend to be robust like subsp. *holoschoenus* but have long bracts.

It is clear that most keys to the subspecies or varieties are based on the number of flow-

erheads. The form *australis* has been separated, e.g. in Pignatti, only on account of the number of flowerheads ("generally 3") and the form *panormitanus* from the same character (a single flowerhead). The fact that the same plant of the subspecies *holoschoenus* having stems with double inflorescences and some with only one flowerhead in the same localities (Olbia, Rio Picocca, Quirra: Flumini Tintinau), and a very large clump reaching 250 cm with some stems bearing only one flowerhead (Rio Bérchida) would be enough to invalidate the status of *australis* as a subspecies. The recent data reported from Sardinia under seven different names are a reflection of the confusion caused by too much value being accorded to the number of flowerheads, and, as a consequence, inadequate keys. The taxa correctly identified in the literature as *romanus* and *panormitanus* should therefore also be attributed to *australis*. No other character has been used to differentiate these forms (*australis, romanus, panormitanus*) from *S. holoschoenus* subsp. *holoschoenus*. Becherer (1929) discussed the presence or absence of perianth bristles but the data are contradictory and unusable as a diagnostic character.

To sum up, the combination of characters short spiny bract and robustness of the plant is diagnostic of *S. holoschoenus* subsp. *holoschoenus* in the field. Herbarium specimens may pose some identification problems, since the robustness of the plants or flexibility of the stems are sometimes difficult to appreciate on exsiccata. Intermediate specimens occur only in the the Iberian peninsula, Portugal, southern France and presumably in the Maghrebian littoral. Sicily is the only island where both subspecies occur; I have seen several specimens of *S. holoschoenus* subsp. *australis* and one of *S. holoschoenus* subsp. *holoschoenus*. It would be interesting to know if Sicilian *australis* is restricted to littoral sand and *holoschoenus* to the interior.

Chromosome number: "*Holoschoenus vulgaris*" 2n ca. 42. Material from Lybia [Chaudry & al. in Löve, 1971a, cited by Hess, Landolt & Hirzel 1976, vol. 1: 715]; not available for *S. holoschoenus* subsp. *australis*.

Selected iconography: Valdés & al. (1987), Pignotti, 2003: 316 (*S. holoschoenus* subsp. *holoschoenus*), Rose (1989), Jávorka (1979) (*S. holoschoenus* subsp. *australis*), Hess & al. (1976), Lauber & Wagner (2000) (both subspecies). All three illustrations in Pignatti (1982) represent *S. holoschoenus* subsp. *australis* with the elongated bract and the number of flowerheads numbering 1 to 6.

Key to the subspecies of *Scirpoides holoschoenus*:

Plant robust, bract short (usually under 15 cm), rigid, spiny, flowerheads one to several dozens

S. holoschoenus subsp. *holoschoenus*

Plant slender, bract long (usually over 15 cm but is proportionate to the size of the plant), flexible, not spiny at tip, flowerheads one to ten

S. holoschoenus subsp. *australis*

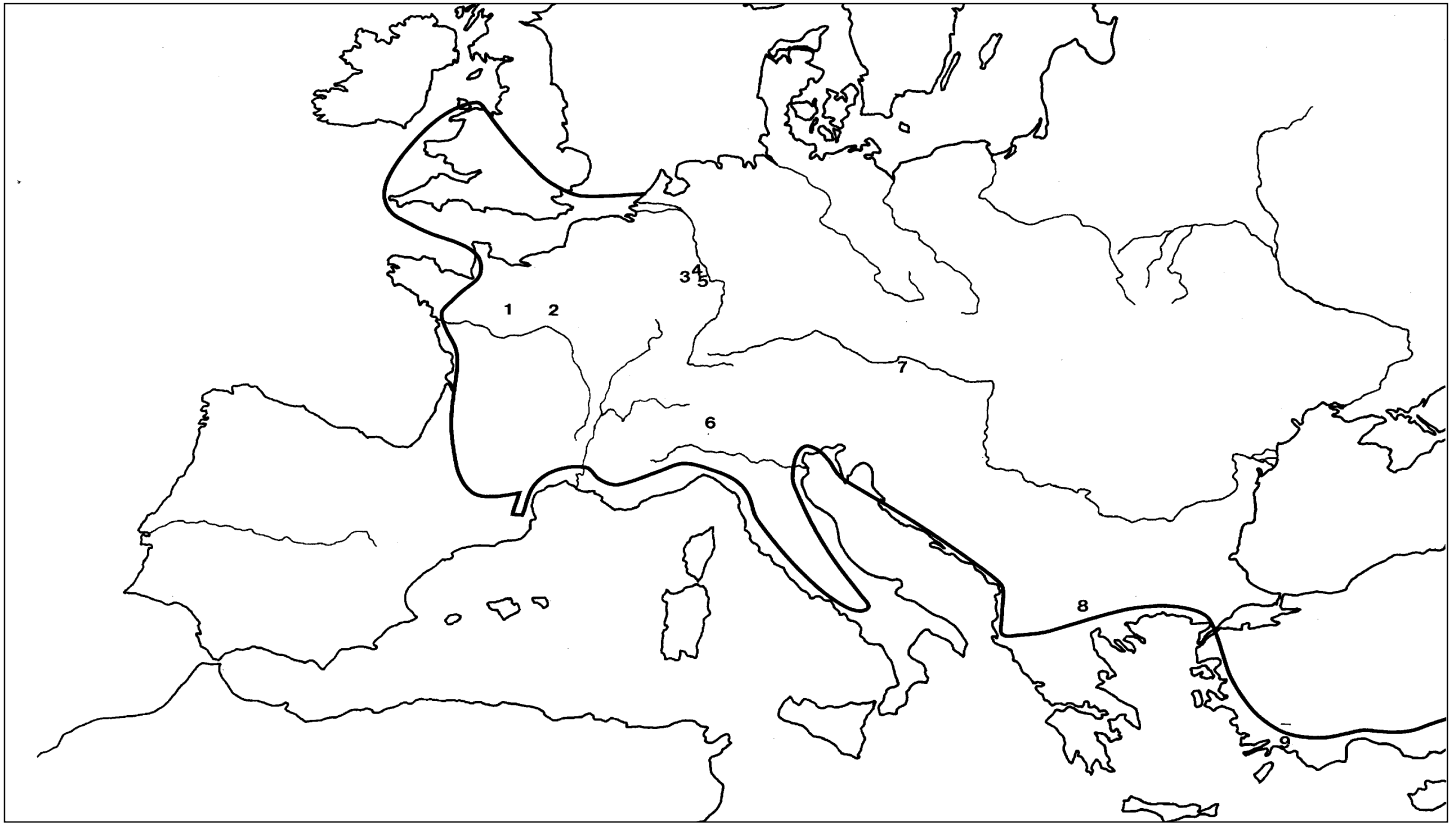

Fig. 5. Distribution of *Cyperus badius* in Europe and the Mediterranean, west and south of heavy line: coasts and islands of the Mediterranean, including Corsica and Sardinia. Atlantic coast, Iberia, Maghrebian coasts. Also Crimea (Casper & Krausch) and Georgia (coasts of Black Sea not shown for lack of available data). Continental localities: **France**: 1. Alençon. 2. Le Mans. 3. **Belgium**: Spa. **Germany**: 4. Burscheid bei Aachen. 5. Schleiden im Eifel. **Italy**: 6. Dervio (Lombardy). **Austria**: 7. Bad Vöslau near Vienna. **Macedonia**: 8. Demir Kapija. *Cyperus longus*: Central Europe. **Turkey**: 9. Köyceghiz and Karagedik (Desfayes).

Fig. 6. *Cyperus badius*. Sardegna: Rio San Giovanni, 13.06.1998 (exceptional form with very long and numerous spikelets).

Cyperus badius Desfontaines, 1798. Synonyms: *C. longus* L. var. *badius* (Desf.) Camb., 1827, *C. longus* subsp. *badius* (Desf.) Murbeck, 1899, *C. longus* subsp. *badius* (Desf.) Bonnier & Layens,1894, *C. myriostachyus* Ten., 1824-1827, *C. preslii* Parl., 1852, *C. thermalis* Dum. 1827.

This species is widespread in Sardinia. In Europe it is essentially a Mediterranean taxon, ranging from the Azores, Madeira, Canary Is., North Africa and the Iberian peninsula to Turkey and the Caucasus; it extends eastwards to SW Siberia, Kazakhstan Kyrgyzstan, Tadjikistan, Afghanistan, Pakistan (Kukkonen), India (Rothmaler) and south to Ethiopia (Kükenthal 1935, cited by Kukkonen 1998), Kenya, southern Africa and Madagascar (Herb. Geneva and Zürich). *C. badius* is easily told from *C. longus* by its small size (70

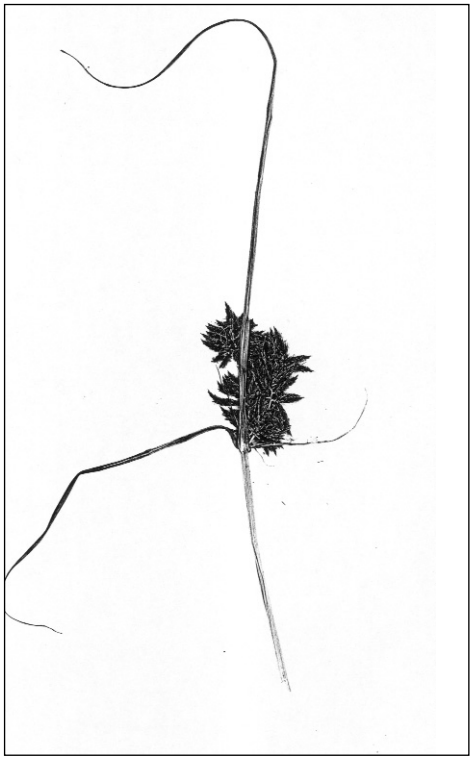

Fig. 7. *Cyperus badius*. Sardegna: Lago di Gúsana, 27.06.1999 (compact form).

Fig. 8. *Cyperus badius*. Sardegna: Fiume Coghinas, 22.06.1999.

cm or less), its compact inflorescence, the darker red-brown colour of its spikelets, and also by its ecological preference. Kukkonen (1998) writes "The species is often regarded at infraspecific level of *C. longus* but in all parts *C. badius* is smaller than it, the spike rachis is winged, the glumes dark-coloured and the nut is papillate". The inflorescence in *C. badius* measures up to 12 cm, usually 7 or 8 from the base of the bract. Its spikes are more compact with more numerous spikelets (exceptionally up to 58 in a specimen from Rio San Giovanni, NW of Olbia, Sardinia); the secondary rays are less than 1 cm, or often lacking in compact inflorescences with very short primary rays. *C. longus* is an entirely different, much taller plant (70 to 190 cm, usually over 100 cm), with very long inflorescence rays measuring 12 cm or more and reaching over 30 cm, with 8 to 14 loose spikelets; the secondary rays are much more developed (ca. 4 cm). The table in Collins & al. (1988), clearly shows there is no overlapping in measurements of the inflorescences, with the exception of the length of the spikelets; these can be longer in *C. badius* than those of *C. longus*. It is to be noted that there are no intermediate forms in Sardinia or anywhere else. The so-called intermediate forms are probably variations that, as judged by the specimens I have examined, are well within the sum of characters defining the two species. Cultivated in identical conditions by the author, the two species retain all their morphological characters.

Fig. 9. *Cyperus longus*. Vercelli, 12.08.1985.

C. badius is found essentially along streams and ponds while *C. longus* is more of a marsh plant. This is particularly true in the Mediterranean region. Near the coast I have seen *C. longus* only in Turkey (at Karagedik and between Köyceghiz and Fetiyeh, remarkably in a marsh as in central Europe, not on a river bank, while all *C. badius* were found on edges of streams on the littoral, or river mouths.

In Albania I found *C. badius* on the southwestern littoral while *C. longus* is widespread in the interior and in the northern part of the country. In Sardinia I have never found *C. longus*; it certainly does not occur there. Recent publications on Sardinian floras refer uncritically to "*Cyperus longus*" but evidently their authors were not familiar with the continental species.

Cyperus longus is given by Camarda (1984), *Cyperus longus* subsp. *longus* besides subsp. *badius* is given by Marchioni (in Camarda & Cossu 1988); and by Ballero & al. (1993); and *C. longus* subsp. *longus* is given as "frequent" by Camarda & al. (1993); the identifications were probably based on certain variations of *C. badius,* which are well within the range of *C. badius*. Collin's distribution map of *C. longus* and *C. badius* does not show any of the two taxa for Sardinia, and indicates only *C. badius* for Corsica. Y. Dardaine (*Monde des Plantes* 459: 20, 1997) indicates *Cyperus longus* subsp. *longus* from Solenzara, Corsica, but the specimens were presumably not critically examined; all Corsican specimens I have examined belong to *C. badius* (including my own collections). In Portugal only *C. badius* is recorded (Carvalho 1970).

It is interesting to note that the northernmost occurrences of the latter species in at least four localities were located near thermal springs: an den Thermen von Burscheid bei Aachen (Casper & Krausch 1980), Schleidenertal in der Eifel (Rothmahler 1994), Schwefelquellen beim Spa in Belgium, and Bad Vöslau bei Wien, Abfluss des Thermequellen (Herb. Zürich). The other non-littoral specimens examined (Herb. Zürich) are from Cher, Alençon, Le Mans (France), Dervio (Lombardia) et Demir Kapija (Macedonia).

Chromosome number: *Cyperus longus*: 2n = 42 (*in* LAUBER & WAGNER, 2000: 1264); *C. badius* 2n = 32 "compté sur une seule métaphase, à prendre avec prudence" G. Haldimann, in litt.

Selected iconography: *Cyperus longus*: Jávorka (1979: 52); Hess, Landolt & Hirzel (1976, vol. 1: 49); Rose (1989: 167); Lauber & Wagner (2000, No. 1265); *Cyperus longus* and *C. badius*: Casper & Krausch (1980: 317); Rothmaler (1994, 3: 650).

Key to the species *Cyperus longus* and *C. badius*:

Plant usually over 100 cm; longest primary inflorescence rays well over 10 cm; number of rays 7 or more	*Cyperus longus*
Plant usually under 70 cm; longest primary inflorescence rays under 10 cm; number of rays 7 or less	*Cyperus badius*

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Appendix

Specimens examined (Herbaria Geneva and Zürich. The specimens presently in my herbarium will eventually be housed in the Conservatoire botanique, Geneva).

Cyperus badius

France: Garonne, Gironde, le Cher en Indre-et-Loire, Aube, Castelnau, Le Lez (Montpellier), Aix, Canet, Cannes. **Portugal, Spain**: Andalusia, San Roque, Canary Islands. **Italy:** Liguria: mouth of the Pora, Savona, Giulia, Lucca, Roma, Pisa, Ischia, Campania, Melfì, Brugia, Ariano Irpino, Sicily, Palermo, Calabria. **Croatia***:* littoral. **Greece**: Rhodes. **Algeria, Morocco, Lebanon, Syria, Egypt, Ethiopia, Kenya, South Africa, Cape, Natal, Transvaal, Madagascar**: baie Antongil (Maroa).

My herbarium specimens from **Spain, Corsica, Sardinia***,* **peninsular Italy, Montenegro, Albania, Macedonia, Greece, Turkey**.

Cyperus longus

France: Jersey, Charente-Maritime, Loiret, Seine-et-Marne, Ain, Lyon. **Italy**: Vercelli, Lago di Varese, Lago di Garda, Riva, Padova, Trevisa; **Bosnia**: Mostar; **Greece**: Macedonia ; Turkey, Jordan, Syria: Damas. **Tien Shan**.

My herbarium specimens from **Switzerland, Italy, Montenegro**: Skadar. **Albania** (mostly SW littoral). **Turkey**.

Scirpoides holoschoenus subsp. *holoschoenus*

South England: Brannton Burrous near Barnstaple. **France**: Strasbourg, Vendée, Olonne, St. Nazaire, Noirmoutier, Loir-et-Cher (bract 15 cm), Bourges, Charente-Maritime, Lot, Bouillon, Cévennes, Lyon, Sciez (H. Savoie), Gap, Béziers, Narbonne, Montpellier, Aiguemortes, Marseille, Camargue, Agde, Cannes, Sète, Toulon, Var, Alpes-

Maritimes, Hyères, Nimes, Arles. **Switzerland**: Léman, Villeneuve. **Portugal**: Lisbon. **Spain**: Andalusia, Murcia, Jaen, Cáceres, Catalunya: delta del Ebro, Rosas, Monseny c. 1000 m a.s.l. **Mallorca. Corsica**: Solenzara, Porto Vecchio, Algajola, Biguglia. Elba. **Sicily**: Palermo. **Peninsular Italy**: Piemonte, Liguria: Camporosso (Vintimiglia). **Malta. Morocco**: Tanger. **Tunisia. Algeria**: Constantine, Hoggar, Philippeville (also with long bract), Lalla-Seti, Calla Khalidja, Hoggar, Amsa/Atalir (also with bracts reaching 40 cm), Medea 1220 m a.s.l., Blidah. **Lybia**: Cyrenaique, Tripoli (easternmost localities).

My herbarium: specimens from **Switzerland, France, Liguria, Corsica, Sardinia, Spain, Portugal.**

Scirpoides holoschoenus* subsp. *holoschoenus* var. *globiferus

Great Canarias islands: S. Lorenzo, Tenerife. **Sardinia**: Olbia, Rio Picocca, Rio Pelau.

Scirpoides holoschoenus* subsp. *australis

Germany: Potsdam, Magdeburg, Brandeburg, Silesia, Werder. **Switzerland**: Zurich, St. Gall, Ticino. **France**: Sète (dunes), Ste. Lucie, Bouches-du-Rhône: Camargue; Châteauneuf-lès-Matigues, Loire Inférieure, Gironde, cap Ferret, Bayonne (intermediate: bract 40 cm but plant robust like subsp. *holoschoen*us. **Ukraine**: Kiev. **Russia**: Sarepta (Astrakhan). **Greece**: Macedonia, Spingioti, Egean: Aliango, Kilios, Kos, Crete. **Cyprus. Turkey:** Istanbul, Taurus. **Armenia**. Caucasus. **Morocco**: Tanger (on sand), **Saharan Algeria**: Wadi el Arad, Amsa/Atalir. **Lybia**: Tripoli, Kabr es-Sit, Haurar. **Egypt**. Sinai. **Israel. Lebanon**: Beyrouth. **Jordan, Syria, Iraq, Kurdistan**: Suleiman. **Iran**: Mt. Elwend, Shiraz, Kuh Dahena (south Iran). **Afghanistan, Transcaspia, Turkmenistan**: Wannowsky. **Turkestan**.

My herbarium: **Portugal***:* Atlantic littoral. **Spain. Italy**: Aosta, Piemonte, Trentino, Pordenone, Basilicate. **Croatia**: Bacinska Jezero (Kardeljevo), Vransko Jezero, Pordica. **Montenegro**: Bota Kotorska, **Albania, Macedonia, Greece, Turkey**.