

Notes on the treatment of Cyperaceae for Flora Iranica

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Abstract

Six new combinations, *Kobresia* subgen. *Compositae* (C.B.CLARKE) KUKKONEN, *K.* subgen. *Elyna* (SCHRAD.) N.A.IVANOVA sect. *Sibiricae* (N.A.IVANOVA) KUKKONEN and sect. *Nitentes* (N.A.IVANOVA) KUKKONEN, *K.* subgen. *Hemicarex* (BENTH.) KUKKONEN, *Kobresia laxa* NEES subsp. *hissarica* (PISSIAUK.) KUKKONEN, and *Schoenoplectus lacustris* (L.) PALLA subsp. *hippolytii* (V.I.KREZ.) KUKKONEN, are made. A new section, *Carex* subgen. *Carex* sect. *Setigeræ* KUKKONEN, is proposed. A new species, *Bolboschoenus glaucus* (LAM.) S.G.SMITH, is to be added to the Flora Iranica.

Key words: Cyperaceae; *Carex*, *Kobresia*, *Schoenoplectus*; Flora Iranica; taxonomy.

Zusammenfassung

Sechs neue Kombinationen, *Kobresia* subgen. *Compositae* (C.B.CLARKE) KUKKONEN, *K.* subgen. *Elyna* (SCHRAD.) N.A.IVANOVA sect. *Sibiricae* (N.A.IVANOVA) KUKKONEN und sect. *Nitentes* (N.A.IVANOVA) KUKKONEN, *K.* subgen. *Hemicarex* (BENTH.) KUKKONEN, *Kobresia laxa* NEES subsp. *hissarica* (PISSIAUK.) KUKKONEN, und *Schoenoplectus lacustris* (L.) PALLA subsp. *hippolytii* (V.I.KREZ.) KUKKONEN werden publiziert. Eine neue Sektion, *Carex* subgen. *Carex* sect. *Setigeræ* KUKKONEN, wird vorgeschlagen. *Bolboschoenus glaucus* (LAM.) S.G.SMITH wird für die Flora Iranica ergänzt.

Introduction

The present contribution contains the formal publication of the new combinations and the description of a new *Carex* section needed for the treatment of the Cyperaceae in K.H. RECHINGER, Flora Iranica (KUKKONEN 1996). This is the third set of notes, the two other sets being KUKKONEN (1984, 1995); the *Carex* treatment completed in 1984 has been slightly improved later. The genera are presented below in the order which will be followed in the forthcoming treatment of the family for Flora Iranica. The technical terms are used in accordance with KUKKONEN (1994).

In the treatment of the family Cyperaceae I have adopted in general a rather broad species concept and have as far as possible refrained from using infraspecific subdivisions. Few subspecies are recognized, mainly based on geographical distribution, and no varieties at all are accepted.

Results and Discussion

Bolboschoenus

The genus *Bolboschoenus* is accepted here despite the diverging view by STRONG (1994). After having sent the manuscript dealing with Cyperaceae for Flora Iranica to

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press it has been pointed out to me that the genus *Bolboschoenus* contains in the area more than the two species, *B. affinis* (ROTH) DROBOW and *B. maritimus* (L.) PALLA, given in the treatment. *B. maritimus* may also include *B. glaucus* LAM. (J. BROWNING and S.G. SMITH, pers. comm.). This long-neglected species was resurrected by SMITH (1995), who stated that it is widely confused with *B. maritimus* and is widespread in warmer parts of the Old World and sparingly introduced into North America. BROWNING et al. (1995) described its achenes from Koelz 7562, Pakistan, Kinghar (Jhimpir) Lake [NY], using scanning electron micrography, and BROWNING & GORDON-GRAY (1993) earlier described achenes from southern African material under "*B. maritimus* entity 2". BROWNING et al. (1995) further showed that *B. glaucus* and *B. maritimus* probably hybridize in California, U.S.A., where *B. glaucus* is introduced, and suggested that natural hybridization may underlie some of the problems of specific delimitation worldwide. Jane Browning (Univ. of Natal) is currently continuing her investigations on the taxonomy of this and other *Bolboschoenus* species.

Schoenoplectus

The species treated in the genus *Schoenoplectus* have until recently often been included in the collective genus *Scirpus* (e.g. EGOROVA 1976, 1991, KERN 1974) at the sectional or subgeneric level. The genus *Schoenoplectus* is here accepted following OTENGYEBOAH (1974) and RAYNAL (1973, 1976a, 1976b). The twelve species included in the Flora Iranica are treated under four sections. The genus name is conserved with the type *S. lacustris* (L.) PALLA.

Schoenoplectus lacustris is considered to include three taxa, subsp. *lacustris*, subsp. *hippolytii* (V.I.KREZC.) KUKKONEN and subsp. *tabernaemontani* (C.C.GMELIN) Á. & D.LÖVE, which in recent floras are variably treated either on the species or subspecies level. The three taxa are combined by intermediates which are considered to be of hybrid origin and, consequently, the subspecific level is being accepted (BAKKER 1954; cf. however e.g. SMITH 1969, 1995).

The three taxa are accepted in accordance with the latest results obtained by EGOROVA (1976, 1991). Two of these occur in Europe (e.g. SCHULTZE-MOTEL 1967, DE FILIPPS 1980). The Asiatic *Schoenoplectus lacustris* subsp. *hippolytii* is sometimes included in *Scirpus validus* VAHL (OVCZINNIKOV 1963, TIMOHINA 1990). KOYAMA (1958) made a distinction between *S. validus* and *Scirpus tabernaemontani* and considered plants from southeastern Asia, Pacific Islands and North America to belong *S. validus*, "while all European plants are of the former race" (i.e. *S. tabernaemontani*). According to KERN (1974) *S. validus* is "widely distributed in the countries bordering the Pacific Ocean". This statement is accepted here and the name *Schoenoplectus lacustris* subsp. *hippolytii* is being applied to Central Asiatic plants.

As the taxonomic treatment of the species is still unsettled, the distribution of the infraspecific taxa cannot be given with certainty. They are, however, considered here as being restricted to Eurasia (KOZHEVNIKOV 1988). Modern monographic experimental revision is required.

The three subspecies of *Schoenoplectus lacustris* are to a large extent sympatric in Eurasia. However, only the area of subsp. *tabernaemontani* may extend as far as Japan in the east (cf. however KOZHEVNIKOV 1988) and in the south to Israel and Syria. Both

subsp. *lacustris* and *tabernaemontani* occur all over Europe, but the area of the former extends only up to C. Asia. Subsp. *hippolytii* covers the smallest area, being restricted to the dry areas from the Caucasus to the central Asian mountains.

In addition, there are also intermediates between *Schoenoplectus lacustris* and *S. triqueter* (L.) PALLA. The stem of *S. lacustris* is terete, but in *S. triqueter* triquetrous; the presumed hybrid is intermediate in this respect. The hybrid is morphologically closest to the subsp. *hippolytii*, which is also the most common of the three subspecies in the area. Of course, definitive, empirical proof is lacking. CLARKE (p. 658, 1893) called the hybrid "var. *carinata*".

The subspecies *Schoenoplectus lacustris* and the presumed hybrid are best defined with the key:

- | | | |
|----|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| 1 | Stigmas mostly 3, glumes pale brown, smooth | subsp. <i>lacustris</i> |
| 1* | Stigmas mostly 2, glumes pale or reddish brown, with, at least, some reddish barbs | 2 |
| 2 | Glumes pale brown - reddish brown, midnerve area smooth or with reddish barbs, sides mostly smooth | 3 |
| 2* | Glumes reddish brown, midnerve area and sides reddish barbed | subsp. <i>tabernaemontani</i> (C.C.GMEL.) Á. & D.LÖVE |
| 3 | Distal part of stem terete, all veins equal | subsp. <i>hippolytii</i> (V.I.KREZ.) KUKKONEN |
| 3* | Distal part of stem obtusely trigonous, veins at edges larger than others, bract often with distinct midvein | <i>S. lacustris</i> x <i>S. triqueter</i> |

Schoenoplectus lacustris subsp. *hippolytii* (V.I.KREZ.) KUKKONEN comb. et stat.n.

≡ *Scirpus hippolytii* V.I.KREZ., Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS 7: 28 (1937)

≡ *Schoenoplectus hippolytii* (V.I.KREZ.) V.I.KREZ. ex GROSSH., Fl. Kavkaza 2: 16 (1940).

Type: Kazakhstan, "plana montana Ustj-Urt occidentalis, in rivulo infra fontem Tamtschalj partis inferioris valleculae salsugineae Merety", 7. 9. 1926, F.N. Rusanov [LE!].

Stem 3 - 10 mm diam., finely papillate, glaucous green. Sheaths glaucous green, sometimes reddish. Inflorescence to 90 mm in diameter, spikes 2 - 5 together, some solitary; glumes 2.8 - 4.3 mm long, midnerve area often reddish barbed, sides smooth, obscurely nerved, often with reddish brown dots (seldom some barbs). Stigmas 2.

Kobresia

The genus is today considered to contain c. 50 species in the northern hemisphere (NOLTIE 1993). Most species are concentrated in the Central Asian mountains, where Noltie distinguishes eastern, Chinese, e.g. *Kobresia stiebritziana* HAND.-MAZZ., and western elements, e.g. *K. laxa* NEES. The genus is apparently concentrated in the Eastern Himalayas and W China. The old names were found to be in need of revision (e.g. CHILDYAL 1986, NOLTIE 1993) and a number of new species have been described recently (ZHONG & DI 1958, MAO 1988, KOYAMA 1978, YANG 1984, DI & ZHONG 1986, LI 1990, RAJBHANDARI & OHBA 1991, NOLTIE 1993, DICKORÉ 1995).

At present the hierarchical division of the genus *Kobresia* appears to be in an inadequate state (cf. *Eleocharis* in KUKKONEN 1990a). The division proposed here is primarily

based on the inflorescence structure bearing in mind the considerations presented by KERN (1958), i.e. the underlying idea is provided by the on-going reduction and specialization in these structures (cf. TIMONEN 1985, also e.g. WAGENITZ 1975), perhaps as a response to the geological changes referred to by KRECZETOVICZ (1936). An analysis within the sect. *Simplices* of subg. *Elyna* was attempted by KUKKONEN (1990b). The reduction is thought to concern both the parts and size of the inflorescence and the parts of a flower, including the number of stigmas. The intention here is to gently transform the existing taxonomy rather than create a new system, which would certainly require more work both in the field and laboratory.

The plasticity of the species is well known. The classical example is *Kobresia laxa*, where the size of the inflorescence is variable with the simultaneous change in proportion of staminate and pistillate flowers. This was formerly a reason to describe several taxa even on a specific level, *K. pseudolaxa* C.B. CLARKE, *K. afghanica* RAYMOND.

Another example is provided by the long transitional series of taxa starting with *Kobresia schoenoides* (C.A. MEY.) STEUD. in the Caucasus, extending eastwards through *K. pamiroalaica* N.A. IVANOVA and *K. smirnovii* N.A. IVANOVA to *K. sibirica* TURCZ. and eventually to the North American *K. hyperborea* A.E. PORSILD. The rather narrow zone covered by these taxa has been crossed by a few species only, the best known being the widely distributed *K. myosuroides* (VILL.) FIORI (cf. KUKKONEN 1990b) and *K. simpliciuscula* (WAHLENB.) MACK.

The most interesting new information uncovered by the recent revisionary work is the "apparent dioecy" shown by NOLTIE (1993). The new information also led to synonymizing several species (NOLTIE l.c.). This emphasizes the importance of careful field work, which in the future, I believe, will transform the scheme below, primarily based on the western elements of the genus *Kobresia*.

The classification proposed below closely follows the important and careful study of EGOVA (1983). EGOVA treated the thirteen species accepted by her to be present in the flora of the former USSR in two sections, *Simplices* and *Kobresia*, with 3 and 2 subsections, respectively. She did not use the subgeneric level and, on the other hand, the subsection level used by her is felt to be unnecessary at this stage.

Kobresia WILLD., Sp. Pl. 4: 205 (1805).

Typus: *Kobresia caricina* WILLD. [= *Kobresia simpliciuscula* (WAHLENB.) MACK.], sel. BÖRNER, Abh. Naturw. Ver. Bremen 21: 263 (1913).

Tufted perennials, seldom stoloniferous. Stem trigonous to terete, mostly smooth. Leaves from 1/4 to overtopping stem length, basal sheaths often conspicuous, blades from filiform, nearly unifacial to keeled, 3.5 mm wide; ligule present. Inflorescence from spike-like (called spike below) to small paniculodium. Flowers unisexual; sometimes distal part of inflorescence containing staminate and proximal part pistillate flowers or sexes divided in different parts of tussock. Utricles (prophylls) from open to nearly completely closed; rachilla with or without staminate flowers. Stamens 2 - 3, stigmas 2 - 3.

Key to subgenera

- 1 Inflorescence an open paniculodium Subgen. *Compositae*
- 1* Inflorescence compact paniculodium or spike-like 2
- 2 Inflorescence a compact paniculodium Subgen. *Kobresia*
- 2* Inflorescence narrow, superficially unbranched, i.e. rachilla sterile or bearing staminate and mostly only one basal pistillate flower 3
- 3 Rachilla with mostly one pistillate flower and one or more staminate flowers
..... Subgen. *Elyna*
- 3* Rachilla sterile; pistillate and staminate flowers in parts of same inflorescence, in different parts of the tussock or plants dioecious Subgen. *Hemicarex*

In the formal generic division proposed below the indicated species are merely examples.

1. Subgen. *Compositae* (C.B.CLARKE) KUKKONEN comb. et stat.n.

≡ *Hemicarex* BENTH. sect. *Compositae* C.B.CLARKE, Journ. Linn. Soc. 20: 384 (1884).
Lectotype: *H. laxa* (NEES) BENTH. & HOOK. f. [= *K. laxa* NEES], selected here.

= Section *Laxae* C.B.CLARKE, Kew Bull. Misc. Information, Add. Ser. 8: 137 (1908).

Type: *K. laxa* NEES.

Species: *K. laxa* NEES, *K. fragilis* C.B.CLARKE (see NOLTIE 1993).

The *K. laxa* complex undoubtedly includes *Schoenoxiphium hissaricum* PISSJAUK. IVANOVA (1939) transferred *K. laxa* into *Schoenoxiphium* and this made it necessary to assign the new species by PISSJAUKOVA (1950) to that genus. *Schoenoxiphium* is a genus of c. 30 species, with its speciation centre in the South African Drakensberg area and with one species extending north up to Yemen. *Schoenoxiphium*, as *Kobresia*, can readily be divided into several subgenera (KUKKONEN, unpubl.).

Kobresia laxa NEES subsp. *hissarica* (PISSJAUK.) KUKKONEN, comb.n.

≡ *Schoenoxiphium hissaricum* PISSJAUK., Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS 12: 72 (1950).

≡ *Kobresia hissarica* (PISSJAUK.) SOJÁK, Casop. Nár. Muzea 148: 194 (1979).

Type: Tadjikistan, "Jugum Hissaricum. In ditone fl. Varzob in fauce fl. Kondara, in regione arboreto fruticosa", 26. VI. 1946. Pissjaukova 341 [LE!].

2. Subgen. *Kobresia*

Type: *K. caricina* WILLD. [= *K. simpliciuscula* (WAHLENB.) MACK.].

Sect. *Kobresia*

Species: *K. humilis* (C.A.MEY.) SERG., *K. royleana* (NEES) BOECK., *K. simpliciuscula* (WAHLENB.) MACK.

K. humilis and *K. royleana* occur in the Flora Iranica area. These are treated collectively, and some specimens appear to be intermediate. They are nevertheless both considered to be a species. In both, the variation amplitude in respect to plant height and inflorescence size is wide. In the case of *K. humilis*, distigmatic and tristigmatic flowers were found even in the same inflorescence. The inflorescence of *K. humilis* is mostly small, mostly clearly branched, i.e. there is more than one utricle in the basal part of the lower inflorescences and the rachilla bears c. 5 or more male flowers. However, it

may be very small, spike-like, and resembles plants of the subg. *Elyna*. The basal sheaths of the tight tussock-forming species belonging to that subgenus are, however, strong, rigid and straight, whereas in subg. *Kobresia* they are softer and not as rigid.

3. Subgen. *Elyna* (SCHRAD.) N.A.IVANOVA, Bot. Zhurn. 24: 480 (1939)

≡ *Elyna* SCHRAD., Fl. germ. 1: 155 (1806).

Type: *E. spicata* SCHRAD. [= *K. myosuroides* (VILL.) FIORI].

Sect. *Sibiricae* (N.A.IVANOVA) KUKKONEN stat.n.

≡ Ser. *Sibiricae* N.A.IVANOVA, Bot. Zhurn. 24: 477 (1939).

≡ Subsect. *Sibiricae* (N.A.IVANOVA) T.V.EGOROVA, Nov. Syst. Pl. Vasc. 20: 70 (1983).

Type: *K. sibirica* (TURCZ. EX LEDEB.) BOECK.

Species: *K. schoenoides* (C.A.MEY.) STEUD. s.l., *K. sibirica* (TURCZ. EX LEDEB.) BOECK.

Species of the sect. *Sibiricae* are robust and the basal sheaths large. Inflorescences are also large, and several utricles often occur in the basal part of the lower inflorescences. The small plants approach superficially tall plants of the sect. *Simplices*. This is true especially in some specimens which are often named *K. tibetica* MAXIM. More material is needed to clarify this issue.

Sect. *Simplices* C.B.CLARKE, Journ. Linn. Soc. 20: 377 (1884).

Type: *K. myosuroides* (VILL.) FIORI, selected by T.V. EGOROVA, Nov. Syst. Pl. Vasc. 20: 70 (1983).

= Sect. *Elyna* (SCHRAD.) C.B.CLARKE, in HOOK. F., Fl. Brit. India 6: 696 (1894).

Species: *K. capillifolia* (DECNE.) C.B.CLARKE, *K. myosuroides* (VILL.) FIORI.

Sect. *Nitentes* (N.A.IVANOVA) KUKKONEN stat. nov.

≡ Series *Nitentes* N.A.IVANOVA, Bot. Zhurn. 24: 482 (1939).

Type: *K. nitens* C.B.CLARKE

Sect. *Pseudokobresia* C.B.CLARKE, in HOOK. F., Fl. Brit. India 6: 699 (1894).

Type: *K. macrantha* BOECK.

4. Subgen. *Hemicarex* (BENTH.) KUKKONEN stat.n.

≡ Sect. *Hemicarex* (BENTH.) C.B.CLARKE, in HOOK. f., Fl. Brit. India 6: 694 (1894)

≡ *Hemicarex* BENTH., Journ. Linn. Soc. 18: 367 (1881).

Type: *K. nepalensis* (NEES) KÜK., sel. BÖRNER, Abhandl. Naturwiss. Ver. Bremen 21: 263 (1913).

Species: *K. nepalensis* (NEES) KÜK.

Carex

Section *Setigerae* KUKKONEN, sect.n.

Type: *Carex setigera* D. DON.

= Sect. *Schizochlaena* V.I.KREZC., in Fl. URSS 3: 304 (1935), nom. illeg.

= Sect. *Montanae* (CAREY) H.CHRIST subsect. *Elongatibracteatae* T.V.EGOROVA, Bot. Zhurn. 70:1552 (1985).

Plantae perennes; rhizomatosae vel stoloniferae; folia culmum superantia; bracteae inflorescentiam superantes; spiculae 3 - 6, superiores 1 (- 2) masculinae, inferiores (1 -) 2 - 4 foeminae; utriculi ellipsoidei vel obovati, rostrum 0.2 - 1 mm longum. Stigmata 3.

Rhizomatous or stoloniferous plants of moderate size. Leaves 1 - 4 mm wide, longer than stems. Inflorescence with 1 (- 2) male spikes and (1 -) 2 - 4 female spikes. Bracts overtopping the inflorescence, with sheaths. Utricles 2 - 4 mm, ellipsoid or obovate, setaceous, beak 0.2 - 1 mm long. Stigmas 3. Forest species.

Species in or near Flora Iranica area: *C. hymenolepis* NEES, *C. schlagintweitiana* BOECK. and *C. grioletii* ROEM.

The group of species, whose core is formed by *C. setigera*-complex, was placed in the section *Trachychlaenae* [= *Glaucæ* (ASCH.) H.CHRIST] by KÜKENTHAL (1909) in accordance with DREJER's (1844) treatment. This seems unnatural; the species are more closely related to the sections *Acrocystis* DUMORT. and *Digitatae* (FR.) H.CHRIST. Especially characteristic for the members of the new section, apart from the fact that they are forest species, are the size and shape of their utricles and their long leaves and bracts.

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