



Original Research Article

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Reappraisal of Tribe Cariceae (Cyperaceae) in India

Masood Akhtar¹ and R. C. Srivastava^{2*}

¹Department of Botany, Shibli National College, Azamgarh (UP), India

²Retired Scientist, Botanical Survey of India, Kolkata, India

*Corresponding author.

Abstract

Sedge Genus *Carex* (Cyperaceae), with c.2000 species, nearly cosmopolitan distribution and broad range of habitats, is one of the largest angiosperm genera and the largest in the temperate zone. Global Carex Group (2015) provided acceptable arguments and evidences for a broader circumscription of *Carex* to add all species currently classified in *Cymophyllus* (monotypic), *Kobresia*, *Schoenoxiphium* and *Uncinia* to those currently classified as *Carex*. *Carex* and these genera comprise tribe Cariceae (subfamily Cyperoideae, Cyperaceae) and form a well-supported monophyletic group in all molecular phylogenetic studies to date. *Carex* as defined by GCG 2015 in the broad sense comprises at least four clades. Three are strongly supported (*Siderostictae*, core *Vignea* and core *Carex*), whereas the caricoid clade, which includes all the segregate genera, receives only weak to moderate support. The caricoid clade is most commonly split into two clades, one including a monophyletic *Schoenoxiphium* and two small clades of species of *Carex s.s.*, and the other comprising *Kobresia*, *Uncinia* and mostly unispicate species of *Carex s.s.* Morphological variation is high in all but the *Vignea* clade, making it extremely difficult to define consistent synapomorphies for most clades. However, *Carex s.l.* as newly circumscribed by GCG 2015, is clearly differentiated from the sister groups in tribe Scirpeae by the transition from bisexual flowers with a bristle perianth in the sister group to unisexual flowers without a perianth in *Carex*. The naked female flowers of *Carex s.l.* are at least partially enclosed in a flask-shaped prophyll, termed a perigynium. *Carex s.s.* is not only by far the largest genus in the group, but also the earliest published name. GCG 2015 proposed 72 new combinations and 58 replacement names to treat all of tribe Cariceae as a single genus *Carex*. The Indian scenario is presented in this communication following GCG 2015 according to whom this broader monophyletic circumscription of *Carex* reflects the close evolutionary relationships in the group and serves the goal of nomenclatural stability better than other possible treatments.

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Introduction

Much has been accomplished towards an understanding of *Carex s.l.* since the publication of Kükenthal's (1909) monograph, from species discovery to detailed analysis of floral and inflorescence morphology to DNA-based phylogenetic trees. Species of *Carex s.l.* continue to be

discovered at a surprising rate even in well-explored areas, such as Europe, North America, Japan, Australia and New Zealand, and at even higher rates in China, South-East Asia, Africa and South America. Detailed studies of floral and inflorescence morphology have been conducted for most major groups of *Carex s.l.*, although more work is needed on the *Vigneastra* group and

Kobresia. At least one gene has been sequenced for more than half of the species in the tribe, and nuclear and plastid DNA regions, coding and non-coding, have been sequenced for more than half of these in ongoing phylogenetic studies. Despite this progress, there has been understandable hesitancy for anyone to reclassify a large and widespread group such as Cariceae unilaterally, despite frequent comments on the difficulty of distinguishing the genera in it. As a global group of Cyperaceae and Cariceae specialists, we think it is time to overcome the inertia of the traditional classification and make the required nomenclatural changes to recognize all species in the tribe as the genus *Carex s.l.* Much remains to be accomplished on a global scale to continue exploration and species discovery, to understand the ways in which genetic and environmental factors influence inflorescence variability within and between species, and to take advantage of the constantly expanding set of molecular tools and analytical methods to formulate phylogenetic hypotheses for the monophyletic genus *Carex s.l.*

The new broader circumscription of *Carex* proposed here is just the first step in the reclassification of the genus. The Global *Carex* Group is working towards a complete global sampling of species of *Carex s.l.*, sequencing multiple DNA regions per species, to aid in placing species into natural sectional groups in the genus. Molecular phylogenetic work already completed on *Carex* section *Ovales* (Hipp et al., 2006), section *Spirostachyae* (Drejer) L.H.Bailey (Escudero et al., 2007; Escudero and Luceño, 2009, 2011), section *Phyllostachyae* Tuck. ex Kük. (Starr et al., 1999) and section *Ceratocystis* Dumort. (Jiménez-Mejías, Martín-Bravo and Luceño, 2012; Derieg et al., 2013) illustrates the potential for clarifying the relationships at the sectional level with DNA analyses. Projects currently in progress by GCG include: an expanded phylogenetic analysis and new monograph of *Schoenoxiphium* as a section of *Carex*, a new molecular phylogenetic analysis of *Carex* subgenus *Vignea*, and additional work on the rest of the caricoid clade to elucidate natural groups in *Kobresia* and unispicate species. They are also working on reclassifications of sections *Glareosae*, *Phleoideae* (Meinsh.) T.V. Egorova and *Remotae* (Asch.) C.B. Clarke in the *Vignea* clade and sections *Aulocystis* Dumort., *Chlorostachyae* Tuckerm. ex Meinsh., *Hymenochlaenae s.l.*, *Porocystis*, *Phacocystis s.l.*, *Racemosae*, *Mitratae* Kük., *Rhomboidales*, *Laxiflorae* (Kunth) Mack., *Paniceae* G. Don, *Bicolores*, *Careyanae* Tuck. ex Kük., *Griseae* (L.H.Bailey) Kük., *Granulares* (O.Lang) Mack., *Rostrales* Meinsh., *Vesicariae*, *Paludosae*, *Carex*,

Lupulinae, *Squarrosae* J.Carey, *Sylvaticae* Rouy, *Rhynchocystis* Dumort. and *Indicae* Tuck. in the core *Carex* clade based on global sampling and informed by molecular data.

Indian *Kobresia* species

In accordance with this recent approach (GCG 2015), the Indian *Kobresia* species may now be referred as under:

1. *Carex alatauensis* *Journal of the Linnean Society*, 179, 1–42.2015. *Elyna humilis* C.A.Mey. ex Trautv., *Trudy Imp. S.-Peterburgsk. Bot. Sada* 1: 21. 187. 1871. *Kobresia humilis* (C.A.Mey. ex Trautv.) Serg. in Schischkin, *Fl. URSS* 3: 111. 1935. *Kobresia royleana* (Nees) Boeckeler var. *humilis* (C.A.Mey. ex Trautv.) Kük. in Engler (ed.), *Pflanzenr.* 38(IV, 20): 46. 1909; non *Carex humilis* Leyss. (1761). *Kobresia persica* Kük. & Bornm., *Oesterr. Bot. Z.* 47: 133. 1897; non *Carex persica* Nelmes (1939). *Kobresia royleana* (Nees) Boeckeler var. *parvinux* T. Koyama, *Acta Phytotax. Geobot.* 16: 168. 1956.

Distribution: Central Asia, north-western China.

Etymology: The type of the *Elyna humilis* C.A.Mey. ex Trautv., was collected from the Alatau Mountains in Central Asia.

2. *Carex bhutanensis* S.R.Zhang, *Journal of the Linnean Society*, 179, 1–42.2015. *Kobresia prainii* Kük., *Bull. Herb. Boissier*, sér. 2, 4: 50. 1904; non *Carex prainii* Kük. (1903). *Kobresia utriculata* C.B. Clarke, *Bull. Misc. Inform. Kew, Addit. Ser.* 8: 67. 1908; non *Carex utriculata* Boott (1939). *Kobresia prainii* Kük. var. *elliptica* Y.C. Yang in C.Y. Wu, *Fl. Xizang*, 5: 387, f. 217. 1987.

Distribution: Eastern Himalaya (Nepal, Sikkim, Bhutan) to south-western China.

Etymology: The type of the replaced name, *Kobresia prainii* Kük., was collected in Bhutan.

3. *Carex bistaminata* (W.Z.Di & M.J.Zhong) S.R.Zhang. *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia bistaminata* W.Z.Di & M.J.Zhong, *Acta Bot. Boreal.-Occid. Sin.* 6(4): 275. 1986. *Kobresia myosuroides* (Vill.) Fiori ssp. *bistaminata* (W.Z.Di & M.J.Zhong) S.R.Zhang, *Novon*, 9: 453. 1999. *Kobresia kashgarica* Dickoré, *Stapfia*, 39: 79. 1995.

Distribution: From Karakorum to western China.

4. Carex bonatiana (Kük.) Ivanova, Bot. Zhurn.SSSR 24: 501. 1939. *Kobresia bonatiana* Kük., Bull. Géogr. Bot. 22: 250. 1912. *Kobresia fragilis* C.B. Clarke, J. Linn. Soc., Bot. 36: 267. 1903. *Schoenoxiphium fragile* (C.B. Clarke) C.B. Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 67. 1908. non *Carex fragilis* Boott (1858). *Carex curvata* Boott, Ill. Gen. Carex 1: 2, pl. 5. 1858, non Knaf (1847). *Kobresia curvata* C.B. Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 68. 1908. *Schoenoxiphium clarkeanum* Kük., Bull. Herb. Boissier, sér. 2, 4: 49. 1904. *Kobresia clarkeana* (Kük.) Kük. in Engler (ed.), Pflanzenr. 38(IV, 20): 48. 1909; non *Carex clarkeana* Kük. (1904). *Kobresia clarkeana* (Kük.) Kük. var. *megalantha* Kük., Bull. Géogr. Bot. 22: 249. 1912. *Kobresia hispida* Kük., Acta Horti Gothob. 5: 39. 1930. *Kobresia yuennanensis* Hand.-Mazz., Symb. Sin. 7: 1256. 1936. *Kobresia curticeps* (C.B. Clarke) Kük. var. *gyirongensis* Y.C. Yang in C.Y. Wu, Fl. Xizang. 5: 391, f. 222. 1987.

Distribution: Nepal, India (Sikkim), Bhutan, south-western China.

Note: The correct name for this species if the segregate genus is recognized is *Kobresia fragilis*.

5. Carex borealipolaris S.R. Zhang, Journal of the Linnean Society, 179, 1–42. 2015. *Kobresia sibirica* (Turcz. ex Ledeb.) Boeckeler, Linnaea 39: 7. 1875. *Elyna sibirica* Turcz. ex Ledeb., Fl. Ross. 4(2): 262. 1852; non *Carex sibirica* Willd. ex Kunth (1837). *Kobresia arctica* A.E. Porsild, Sargentia 4: 15. 1943, non Meinsh. (1901). *Kobresia macrocarpa* Clokey ex Mack., N. Amer. Fl. 18: 5. 1931. *Kobresia bellardii* (All.) Degl. ex Loisel. var. *macrocarpa* (Clokey ex Mack.) H.D. Harr., Man. Pl. Colorado 641. 1954; non *Carex macrocarpa* Phil. (1858). *Kobresia smirnovii* N.A. Ivanova, Bot. Zhurn. S.S.S.R. 24: 480. 1939; non *Carex smirnovii* V.I. Krecz. (1935). *Kobresia hyperborea* A.E. Porsild, Bull. Natl. Mus. Canada 121: 103. 1951; non *Carex hyperborea* Drejer (1841). *Kobresia hyperborea* A.E. Porsild var. *alaskana* Duman, Bull. Torrey Bot. Club 83: 194. 1956. *Kobresia hyperborea* A.E. Porsild var. *lepagei* Duman, Bull. Torrey Bot. Club 83: 194. 1956. *Kobresia schoenoides* (C.A. Mey.) Steud. var. *lepagei* (Duman) B. Boivin, Naturaliste Canad. 94: 525. 1967.

Distribution: Subarctic to north-western USA.

Etymology: The species is circumboreal, and common in the North Polar area. The epithet refers to the distributional pattern of the species.

6. Carex brandisii (C.B. Clarke ex Jana & R.C. Srivast.) O. Yano, Journal of the Linnean Society, 179, 1–42. 2015. *Kobresia brandisii* C.B. Clarke ex Jana & R.C. Srivast., J. Jap. Bot. 89: 205, f. 1 & 2. 2014.

Distribution: Western Himalaya (India).

7. Carex breviprophylla O. Yano, Journal of the Linnean Society, 179, 1–42. 2015. *Kobresia gandakiensis* Rajbh. & H. Ohba in H. Ohba & S. B. Malla (eds.), Himal. Pl. 2: 132, f. 4h-o. 1991; non *Carex gandakiensis* Katsuy. (2008).

Distribution: Nepal to India (Sikkim).

Etymology: This species is characterized by a prophyll that is shorter than the nutlet.

8. Carex capillifolia (Decne.) S.R. Zhang, Journal of the Linnean Society, 179, 1–42. 2015. *Elyna capillifolia* Decne. in Jacquemont, Voy. Inde. 4(Bot.): 173. 1844. *Kobresia capillifolia* (Decne.) C.B. Clarke, J. Linn. Soc., Bot. 20: 378. 1883. *Elyna spicata* Boiss., Fl. Orient. 5: 394. 1882, non Schrad. (1806). *Kobresia brunnescens* Boeckeler, Beitr. Cyper. 1: 40. 1888. *Kobresia elata* Boeckeler, Beitr. Cyper. 2: 32. 1890. *Kobresia macrolepis* Meinsh., Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 276. 1901. *Elyna macrolepis* (Meinsh.) Fomin & Woronow, Opred. Rast. Kavk. 1: 173. 1909. *Kobresia capilliformis* Ivanova, Bot. Zhurn. SSSR 24: 484. 1939. *Kobresia thomsonii* Maxim. ex Ivanova, Bot. Zhurn. SSSR 24: 486. 1939, pro syn. *Kobresia oviczinnikovii* T.V. Egorova in Grubov, Pl. As. Centr. 3: 33. 1967, syn. nov. *Kobresia yushuensis* Y.C. Yang, Acta Biol. Plateau Sin. 2: 6. 1984.

Distribution: From Caucasus to western China.

9. Carex cercostachys Franch., Bull. Soc. Philom. Paris, 8, 7: 27. 1895. *Kobresia cercostachys* (Franch.) C.B. Clarke, J. Linn. Soc., Bot. 37: 267. 1903. *Kobresia stiebritziana* Hand.-Mazz., Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 57: 54. 1920. *Kobresia nepalensis* (Nees) Kük. var. *stiebritziana* (Hand.-Mazz.) R.C. Srivast., Novon 8(2): 203. 1998.

Distribution: Bhutan, India (Sikkim), south-western China.

10. Carex clavispica S.R. Zhang, Journal of the Linnean Society, 179, 1–42. 2015. *Kobresia duthiei* C.B. Clarke in J.D. Hooker, Fl. Brit. India 6: 697. 1894; non *Carex*

duthiei C.B. Clarke (1894). *Kobresia rostrata* C.B. Clarke ex Ivanova, Bot. Zhurn. SSSR 24: 500. 1939, nom. nud., pro syn.; non *Carex rostrata* Stokes (1787).

Distribution: Himalaya, south-western China.

Etymology: The inflorescence of the species is a clavate spike.

11. *Carex coninix* (F.T. Wang & Tang) S.R. Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia coninix* F.T. Wang & Tang, *Acta Phytotax. Sin.* 1: 182. 1951. *Kobresia pusilla* Ivanova, Bot. Zhurn. SSSR 24:496. 1939; non *Carex pusilla* Arv.-Touv. (1872). *Kobresia helanshanica* W.Z. Di & M.J. Zhong, *Acta Bot. Boreal.-Occid. Sin.* 5 (4): 311, f. 1. 1985. *Kobresia daqingshanica* X.Y. Mao, *Acta Sci. Nat. Univ. Intramongol.* 19(2): 341, f. 1. 1988. *Kobresia arakorumensis* Dickoré, *Stapfia* 39: 77. 1995, syn. nov.

Distribution: Karakorum, Western Himalaya, northern and western China.

Note: The correct name for this species if the segregate genus is recognized is *Kobresia pusilla*.

12. *Carex curticeps* C.B. Clarke in J.D. Hooker, *Fl. Brit. India* 6: 749. 1894. *Kobresia curticeps* (C.B. Clarke) Kük. in Engler (ed.), *Pflanzenr.* 38(IV, 20): 47. 1909.

Distribution: Central & eastern Himalaya to southern Tibet.

13. *Carex deasyi* (C.B. Clarke) O. Yano & S.R. Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia deasyi* C.B. Clarke, *Bull. Misc. Inform. Kew, Addit. Ser.* 8: 68. 1908. *Kobresia schoenoides* (C.A. Mey.) Steud., *Syn. Pl. Glumac.* 2: 246. 1855. *Elyna schoenoides* C.A. Mey., *Verzeichn. Pfl. Cauc. Casp.*: 29. 1831; non *Carex schoenoides* Schrank (1789). *Kobresia pamiroalaica* Ivanova, Bot. Zhurn. SSSR 24: 481. 1939. *Kobresia pamiralaica* Ivanova in R.R. Schreder, *Fl. Uzbekist.* 1: 347, 540. 1941. *Kobresia septatonodosa* Koyama, *Acta Phytotax Geobot.* 16: 168. 1956. *Kobresia maquensis* Y.C. Yang, *Acta Biol. Plateau Sin.* 2: 4, f. 3. 1984. *Kobresia lacustris* P.C. Li, *Acta Bot. Yunnan.* 12(1): 14. 1990. *Kobresia glaucifolia* F.T. Wang & Tang ex P.C. Li, *Acta Phytotax. Sin.* 37(2): 153. 1999.

Distribution: From Caucasus to western China.

Note: The correct name for this species if the segregate genus recognized is *Kobresia schoenoides*.

14. *Carex esbirajbhandarii* (Rajbh. & H. Ohba) O. Yano, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia esbirajbhandarii* Rajbh. & H. Ohba, *J. Jap. Bot.* 62: 272. 1987.

Distribution: Nepal, (India?)

15. *Carex esenbeckii* Kunth, *Enum. Pl.* 2: 522. 1837. *Kobresia esenbeckii* (Kunth) Noltie, *Edinburgh J. Bot.* 50(1): 43. 1993. *Kobresia esenbeckii* (Kunth) F.T. Wang & Tang ex P.C. Li in W.T. Wang, *Vasc. Pl. Hengduan Mount.* 2: 2352. 1994, later isonym. *Carex trinervis* Nees in Wight, *Contr. Bot. India* 120. 1834, non Degl. (1807). *Kobresia trinervis* (Nees) Boeckeler, *Linnaea* 39: 4. 1875. *Hemicarex trinervis* (Nees) C.B. Clarke, *J. Linn. Soc., Bot.* 20: 382. 1883. *Kobresia seticulmis* Boeckeler, *Linnaea* 39: 3. 1875. *Holmia seticulmis* (Boeckeler) Fedde & J. Schust., *Just's Bot. Jahresber.* 41(2): 10. 1913 (publ. 1918). *Kobresia hookeri* Boeckeler, *Linnaea* 39: 4. 1875. *Hemicarex hookeri* (Boeckeler) Benth., *J. Linn. Soc., Bot.* 18: 367. 1881. *Carex mutans* Boott ex C.B. Clarke, *J. Linn. Soc., Bot.* 20: 383. 1883. *Carex polygyna* Boeckeler, *Beitr. Cyper.* 1: 40. 1888. *Kobresia hookeri* Boeckeler var. *dioica* C.B. Clarke in J.D. Hooker, *Fl. Brit. India* 6: 695. 1894. *Kobresia angusta* C.B. Clarke in J.D. Hooker, *Fl. Brit. India* 6: 695. 1894. *Kobresia foliosa* C.B. Clarke in J.D. Hooker, *Fl. Brit. India* 6: 696. 1894. *Kobresia trinervis* (Nees) Boeckeler var. *foliosa* (C.B. Clarke) Kük. in Engler (ed.), *Pflanzenr.* 38(IV, 20): 43. 1909.

Distribution: Himalaya to south-western China.

16. *Carex filispica* S.R. Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Hemicarex filicina* C.B. Clarke, *J. Linn. Soc., Bot.* 20: 384. 1883. *Kobresia filicina* (C.B. Clarke) C.B. Clarke in J.D. Hooker, *Fl. Brit. India* 6: 696. 1894; non *Carex filicina* Nees (1834). *Kobresia filicina* (C.B. Clarke) C.B. Clarke var. *subfilicinoides* P.C. Li, *Acta Phytotax. Sin.* 37(2): 155. 1999; non *Carex subfilicinoides* Kük. (1930).

Distribution: Eastern Himalaya (India), south-western China.

Etymology: The first part of the name, *fili-*, threadlike, from *filum*, a thread, here refers to the narrowly linear spike of this species.

17. *Carex fissiglumis* (C.B. Clarke) S.R. Zhang & O. Yano, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia fissiglumis* C.B. Clarke in J.D. Hooker, *Fl. Brit.*

India 6: 696. 1894. *Kobresia esenbeckii* (Kunth) Noltie var. *fissiglumis* (C.B. Clarke) Noltie, Edinburgh J. Bot. 50(1): 43. 1993.

Distribution: Central Himalaya (western Nepal) to south-western China.

18. *Carex gammiei* (C.B. Clarke) S.R. Zhang & O. Yano, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia gammiei* C.B. Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 68. 1908. *Kobresia williamsii* Koyama, Bot. Mag. (Tokyo) 86(1004): 279, pl. 3. 1973.

Distribution: Nepal, Bhutan, India (Sikkim), south-western China.

19. *Carex handel-mazzettii* (Ivanova) S.R. Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia handel-mazzettii* Ivanova, Bot. Zhurn. SSSR 24: 494. 1939. *Kobresia capillifolia* (Decne.) C.B. Clarke var. *condensata* Kük., Notes Roy. Bot. Gard. Edinburgh 7: 134. 1912. *Kobresia condensata* (Kük.) S.R. Zhang & Noltie, Fl. China 23: 274. 2010. *Kobresia royleana* (Nees) Boeckeler var. *himalaica* Rajbh. & H. Ohba in H. Ohba & S. B. Malla (eds.), Himal. Pl. 2: 150. 1991.

Distribution: South-western China (Sichuan, Tibet, Yunnan), Nepal, India (?)

20. *Carex harae* (Rajbh. & H. Ohba) O. Yano, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia harae* Rajbh. & H. Ohba, J. Jap. Bot. 62: 193 (1987), as ‘*harai*’.

Distribution: India, Nepal.

21. *Carex hughii* S.R. Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia graminifolia* C.B. Clarke, J. Linn. Soc., Bot. 36: 268. 1903; non *Carex graminifolia* Cherm. (1923).

Distribution: Western China, India (?)

Etymology: The epithet of the species is adopted to commemorate Rev. Fr. Hugh, the collector of the type of *Kobresia graminifolia* C.B. Clarke.

22. *Carex kanaii* (Rajbh. & H. Ohba) S.R. Zhang & O. Yano, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia kanaii* Rajbh. & H. Ohba in H. Ohba & S. B. Malla (eds.), Himal. Pl. 2: 135, f. 6. 1991.

Distribution: Nepal, Sikkim.

23. *Carex kokanica* (Regel) S.R. Zhang *Journal of the Linnean Society*, 179, 1–42. 2015. *Elyna kokanica* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 563. 1880. *Trilepis royleana* Nees, Linnaea 9: 305. 1834; non *Carex royleana* Nees (1834). *Kobresia royleana* (Nees) Boeckeler, Linnaea 39: 8. 1875. *Kobresia stenocarpa* (Kar. & Kir.) Steud. var. *royleana* (Nees) C.B. Clarke, J. Linn. Soc., Bot. 20: 381. 1883. *Elyna stenocarpa* Kar. & Kir., Bull. Soc. Imp. Naturalistes Moscou 15(3): 526. 1842; non *Carex stenocarpa* Turcz. ex Krecz. (1935). *Kobresia stenocarpa* (Kar. & Kir.) Steud., Synop. Pl. Glum. 2: 246. 1854. *Kobresia stenocarpa* (Kar. & Kir.) Steud. var. *simplex* Y.C. Yang in C.Y. Wu, Fl. Xizang. 5: 395, f. 224. 1987. *Kobresia paniculata* Meinsh., Trudy Imp. S.-Peterburgsk. Bot. Sada 18(3): 279. 1901. *Kobresia royleana* (Nees) Boeckeler var. *paniculata* (Meinsh.) Kük. in Engler (ed.), Pflanzenr. 38(IV, 20): 46. 1909. *K. minshanica* F.T. Wang & Tang ex Y.C. Yang, Acta Biol. Plateau Sin. 2: 1. 1984. *Kobresia royleana* (Nees) Boeckeler ssp. *minshanica* (F.T. Wang & Tang ex Y.C. Yang) S.R. Zhang, Novon 9: 453. 1999. *K. menyuanica* Y.C. Yang, Acta Biol. Plateau Sin. 2:3. 1984.

Distribution: Western Asia (Afghanistan), Central Asia, Himalaya, western China.

Note: The correct name for this species if the segregate genus is recognized is *Kobresia royleana*.

24. *Carex macrophylla* (Y.C. Yang) S.R. Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia filifolia* (Turcz.) C.B. Clarke var. *macrophylla* Y.C. Yang, Acta Biol. Plateau Sin. 2: 8, f. 5. 1984. *Kobresia macrophylla* (Y.C. Yang) P.C. Li in L.K. Dai & S.Y. Liang, Fl. Reipubl. Popul. Sin. 12:17. 2000. *Kobresia filifolia* (Turcz.) C.B. Clarke, J. Linn. Soc., Bot. 20: 381. 1883. *Elyna filifolia* Turcz., Bull. Soc. Imp. Naturalistes Moscou 28(1): 353. 1855; non *Carex filifolia* Nutt. (1818). *Kobresia capillifolia* (Decne.) C.B. Clarke var. *filifolia* (Turcz.) Kük., Finska Vet.-Soc. Föhr. 65(8): 1. 1902–1903. *Kobresia gracilis* Meinsh., Acta Horti Petrop. 18:276. 1901; non *Carex gracilis* Curtis (1782). *Kobresia pratensis* Freyn, Oesterr. Bot. Z. 40: 266. 1890; non *Carex pratensis* Hosé (1797).

Distribution: Northern China, Mongolia, Siberia.

Note: The correct name for this species if the segregate genus is recognized is *Kobresia filifolia*.

25. *Carex myosuroides* Vill., *Prosp. Hist. Pl. Dauphine* 17–18. 1779. *Kobresia myosuroides* (Vill.) Fiori in Fiori et al.,

Fl. Anal. Ital. 1: 125. 1896. *Elyna myosuroides* (Vill.) Fritsch ex Janch., Mitt. Naturwiss. Vereins Univ. Wien 5: 110. 1907. *Carex bellardii* All., Fl. Pedem. 2: 264. 1785. *Kobresia bellardii* (All.) Degl. ex Loisel., Fl. Gall. 2: 626. 1807. *Carex hermaphrodita* J. F. Gmel, Syst. Nat. 2: 138. 1791. *Kobresia scirpina* Willd., Sp. Pl. ed. 4, 4(1): 205. 1805. *Elyna spicata* Schrad., Fl. Germ. 1: 155. 1806. *Carex affinis* R.Br., Bot. App. 750. 1823. *Kobresia nardina* Hornem. in G. C. Oeder & al., Fl. Dan. 74. 1827. *Kobresia filiformis* Dewey, Amer. J. Sci. Arts 29: 253. 1836. *Elyna filiformis* Steud., Syn. Pl. Glumac. 2: 245. 1855. *Carex vulcanicola* Nakai, Bot. Mag. (Tokyo) 28: 327. 1914.

Distribution: Europe, northern Asia, northern North America, Greenland.

26. *Carex neesii* S.R.Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia nepalensis* (Nees) Kük. in Engler (ed.), *Pflanzenr.* 38(IV, 20): 46: 40, f. 9. 1909. *Uncinia nepalensis* Nees in Wight, *Contr. Bot. India* 129. 1834; non *Carex nepalensis* Spreng. (1826). *Carex linearis* Boott, *Ill. Gen. Carex* 1: 51, pl. 136. 1858, non Clairv. (1811).

Distribution: Western Himalaya to south-western China.

Etymology: The epithet of the species is adopted to commemorate Christian Gottfried Daniel Nees von Esenbeck (1776–1858) who published the first name for this species.

27. *Carex elachista* (C.B. Clarke) R.C. Srivast, *comb. et status nova*. *Kobresia nepalensis* (Nees) Kük. var. *elachista* (C.B. Clarke) Kük. in Engler (ed.), *Pflanzenr.* 38(IV, 20): 40. 1909. *Carex linearis* Boott var. *elachista* C.B. Clarke in J.D. Hooker, *Fl. Brit. India* 6: 713. 1894.

Distribution: India, Nepal.

28. *Carex nudicarpa* (Y.C. Yang) S.R. Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Blysmocarex nudicarpa* Y.C. Yang, *Acta Bot. Yunnan.* 4(4): 325. 1982. *Kobresia nudicarpa* (Y.C. Yang) S.R. Zhang, *Acta Phytotax. Sin.* 33(2): 160. 1995. *Kobresia macrantha* Boeckeler var. *nudicarpa* (Y.C. Yang) P.C. Li in L.K. Dai & S.Y. Liang, *Fl. Reipubl. Popul. Sin.* 12: 26. 2000. *Blysmocarex macrantha* (Boeckeler) Ivanova ssp. *nudicarpa* (Y.C. Yang) D.S. Deng, *Guihaia* 22: 120. 2002. *Kobresia macrantha* Boeckeler, *Beitr. Cyper.* 1: 39. 1888. *Blysmocarex macrantha* (Boeckeler) Ivanova, *Bot. Zhurn. SSSR* 24: 502. 1939; non *Carex macrantha* Boeckeler (1888).

Distribution: South-western China, Himalaya eastern Karakorum.

Note: The correct name for this species if the segregate genus is recognized is *Kobresia macrantha*.

29. *Carex ovoidispica* O. Yano, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia nitens* C.B. Clarke, *J. Linn. Soc. Bot.* 20: 379, pl. 30, f. 7. 1883; non *Carex nitens* Phil. (1873).

Distribution: India, Pakistan to Nepal.

Etymology: The specific epithet refers to the conspicuous ovoid spikes.

30. *Carex paramjitii* (Jana, Noltie, R.C. Srivast & A. Mukh.) O. Yano, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia paramjitii* Jana, Noltie, R.C. Srivast & A. Mukh., *Indian J. Plant Sci.* 3 (online): 106. 2014.

Distribution: India (Sikkim).

31. *Carex parvula* O. Yano, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia pygmaea* (C.B. Clarke) C.B. Clarke in J.D. Hooker, *Fl. Brit. India* 6: 696. 1894. *Hemicarex pygmaea* C.B. Clarke, *J. Linn. Soc., Bot.* 20: 383. 1883; non *Carex pygmaea* Boeckeler (1876). *Kobresia pygmaea* C.B. Clarke var. *filiculmis* Kük., *Acta Horti Gothob.* 5: 37. 1930; non *Carex filiculmis* Franch. & Sav. (1878). *Kobresia microstachya* Ivanova, *Bot. Zhurn. SSSR* 24: 488. 1939; non *Carex microstachya* Ehrh. (1784). *Kobresia koelzii* Kük. ex Ivanova, *Bot. Zhurn. SSSR* 24: 498. 1939, pro syn.

Distribution: From Himalaya (India) to northern and western China.

Etymology: The specific epithet refers to the dwarf habit.

32. *Carex prainii* Kük., *Bull. Herb. Boissier, sér. 2*, 4: 51. 1903. *Kobresia sikkimensis* Kük. in Engler (ed.), *Pflanzenr.* 38 (IV, 20): 47. 1909; non *Carex sikkimensis* C.B. Clarke (1894).

Distribution: Nepal to India (Assam).

33. *Carex pseudogammiei* S.R. Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia loliacea* F.T. Wang & Tang ex P.C. Li, *Acta Bot. Yunnan.* 12(1): 13. 1990; non *Carex loliacea* L. (1753). *Distribution:* South-western China (north-western Yunnan, western Sichuan).

Etymology: The species is morphologically similar to *Carex gammiei* (C.B.Clarke) S.R.Zhang.

34. *Carex pseudolaxa* (C.B.Clarke) O.Yano & S.R.Zhang, *Journal of the Linnean Society*, 179, 1–42.2015. *Kobresia pseudolaxa* C.B.Clarke, J. Linn Soc., Bot. 20: 381. 1883. *Kobresia laxa* Nees in Wight, Contr. Bot. India 119.1834; non *Carex laxa* Wahlenb. (1803). *Elyna laxa*(Nees) Kunth, Enum. Pl. 2: 534. 1837. *Hemicarex laxa*(Nees) Benth., J. Linn. Soc., Bot. 18: 367. 1881. *Schoenoxiphiumlaxum* (Nees) Ivanova, Bot. Zhurn. SSSR 24: 501. 1939. *Schoenoxiphium hissaricum* Pissjauk., Bot. Mater.Gerb. Bot. Inst. Komarova Akad. Nauk SSSR. 12: 72.1950. *Kobresia hissarica* (Pissjauk.) Soják, Nár. Mus.Odd. Prír. 148: 194. 1979 (publ. 1980). *Kobresia laxa* Nees ssp. *hissarica* (Pissjauk.) Kukkonen, Ann.Naturhist. Mus. Wien, B 98B (Suppl.): 91. 1996. *Kobresia afghanica* Raymond, Dansk Bot. Ark. 14: 17. 1965.

Distribution: India (Kashmir) to central Himalaya.

Note: The correct name for this species if the segregate genus is recognized is *Kobresia laxa*.

35. *Carex pseuduncinoides* (Noltie) O.Yano & S.R.Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia pseuduncinoides* Noltie, Edinburgh J. Bot. 50(1): 47, f. 1a–g. 1993. *Kobresia kansuensis* Kük., Acta Horti Gothob. 5: 38.1930; non *Carex kansuensis* Nelmes (1939).

Distribution: Bhutan, India, Nepal, western China.

Note: The correct name for this species if the segregate genus is recognized is *Kobresia kansuensis*.

36. *Carex rcsrivastavae* (Jana) E.H.Roalson, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia rcsrivastavae* Jana, Indian J.Fundam. Appl. Life Sci. 2: 256. 2012.

Distribution: India (Uttarakhand).

37. *Carex sanguinea* Boott, *Proc. Linn. Soc. London* 1: 285. 1846. *Kobresia sanguinea* (Boott) Raymond, Biol. Skr. 14(4):19. 1965.

Distribution: Eastern Afghanistan to western Himalaya.

38. *Carex sargentiana* (Hemsl.) S.R.Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia*

sargentiana Hemsl., J. Linn.Soc., Bot. 30: 139. 1894. *Kobresia robusta* Maxim. var.*sargentiana* (Hemsl.) Kük. in Engler (ed.), Pflanzenr.38(IV, 20): 36. 1909. *Kobresia robusta* Maxim., Bull. Acad. Imp. Sci. St.-Petersbourg, n.s., 29: 218. 1883; non *Carex robusta* F.Nyl. (1844).

Distribution: Western China, India (Sikkim).

Note: The correct name for this species if the segregate genus is recognized is *Kobresia robusta*.

Distribution: India, China

39. *Carex siamensis* (Ohwi) S.R.Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia siamensis* Ohwi, Acta Phytotax.Geobot. 23: 109. 1968. *Kobresia curvirostris* (C.B.Clarke) C.B.Clarke in J.D.Hooker, Fl. Brit. India 6: 699. 1894. *Hemicarex curvirostris* C.B.Clarke, J. Linn. Soc., Bot. 20: 384.1883; non *Carex curvirostra* Hartm. (1832).

Distribution: Eastern Himalaya to northern Thailand.

Note: The correct name for this species if the segregate genus is recognized is *Kobresia curvirostris*.

40. *Carex simpliciuscula* Wahlenb., *Kongl. Vetensk. Acad. Nya Handl.* 24(2): 141. 1803. *Kobresia simpliciuscula* (Wahlenb.) Mack., Bull.Torrey Bot. Club 50: 349. 1923. *Carex bipartita* All., Fl. Pedem. 2: 265. 1785, nom.rej. *Kobresia bipartita* (All.) Dalla Torre, Atlas Alpenfl. 2: 216. 1882. *Schoenus monoicus* Sm., Engl. Bot. t. 1410. 1805. *Kobresia caricina* Willd., Sp. Pl. ed. 4, 4: 206. 1805. *Carex lacustris* Balbis ex Willd., Sp. Pl. ed. 4, 4:206. 1805, pro syn. *Carex hybrida* Schuhr ex Willd., Sp. Pl. 4: 206.1805, pro syn. *Carex mirabilis* Host, Icon. Descr. Gram. Austriac.4: 44, pl. 78. 1809. *Elyna caricina* Mert. et Koch in Röbling, Deutschl.Fl. ed. 3, 1: 458. 1823. *Carex lobata* Willd. ex Kunth, Enum. Pl. 2: 533.1837, pro syn. *Kobresia simpliciuscula* (Wahlenb.) Mack. var. *americana* Duman, Bull. Torrey Bot. Club 83: 194.1956. *Kobresia filifolia* (Turcz.) C.B.Clarke ssp. *subfilifolia* T.V.Egorova, Jurtzev & V.V.Petrovsky, Bot. Zhurn.(Moscow & Leningrad) 66(7): 1042. 1981. *Kobresia simpliciuscula* (Wahlenb.) Mack. ssp. *subfilifolia* (T.V.Egorova, Jurtzev & V.V.Petrovsky) T.V.Egorova, Novosti Sist. Vyssh. Rast., 20: 84. 1983. *Kobresia simpliciuscula* (Wahlenb.) Mack. var. *subfilifolia* (T.V.Egorova, Jurtzev & V.V.Petrovsky) A.E.Kozhevnik., Sosud. Rast. Sovet. Dal'negu Vostoka, 3: 229. 1988. *Kobresia simpliciuscula* (Wahlenb.) Mack. ssp. *Subholarctica* T.V.Egorova, Novosti. Sist. Vyssh. Rast., 20:83. 1983. *Kobresia simpliciuscula* (Wahlenb.)

Mack.var. *subholarctica* (T.V.Egorova) A.E.Kozhevnikov, Sosud.Rast. Sovet. Dal'nego Vostoka, 3: 229. 1988. *Kobresia subholarctica* (T.V.Egorova) T.V.Egorova, Bot. Zhurn. (Moscow & Leningrad) 76(12): 1736 1991.

Distribution: Europe to Caucasus, subarctic America to western USA.

41. Carex squamiformis (Y.C.Yang) S.R.Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia squamiformis* Y.C.Yang, *Acta Biol. Plateau Sin.* 2: 9, f. 6. 1984, published as: 'squamiformis'. *Kobresia setschwanensis* Hand.-Mazz. ssp. *squamiformis* (Y.C.Yang) S.R.Zhang, *Novon* 9: 453. 1999.

Distribution: India, China.

42. Carex tibetikobresia S.R.Zhang, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia tibetica* Maxim., *Bull.Acad. Imp. Sci. St.-Petersbourg*, n.s., 29: 219. 1884. *Kobresia capillifolia* (Decne.) C.B.Clarke var.*tibetica* (Maxim.) Kük. in Engler (ed.), *Pflanzenr.*38(IV, 20): 36. 1909; non *Carex tibetica* Franch., orth. var. (1887).

Distribution: Bhutan, India, western China.

Etymology: The epithet is based on the replaced synonym, *Kobresia tibetica*. The species is mainly distributed in the eastern Tibetan Plateau.

43. Carex uncinoides Boott, *Ill. Gen. Carex* 1: 8, pl.23. 1858. *Kobresia uncinoides* (Boott) C.B.Clarke in J.D.Hooker, *Fl. Brit. India* 6: 698. 1894.

Distribution: Eastern Himalaya (Nepal to Bhutan), northern Myanmar, south-western China.

44. Carex vaginosa (Jana, R.C.Srivast & Bhaumik)O.Yano, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia vaginosa* C.B.Clarke in J.D.Hooker, *Fl. Brit. India* 6: 695. 1894. *Kobresia nepalensis* (Nees) Kük. var. *vaginosa* (C.B.Clarke)Kük. in Engler, *Pflanzenr.* 38(IV, 20): 40. 1909. *Kobresia nepalensis* (Nees) Kük. ssp. *vaginosa* (C.B.Clarke) Koyama in Hara *et al.*, *Enum. Fl. Pl.Nepal* 1: 113. 1978. *Kobresia nepalensis* (Nees) Kük.var. *vaginosa* (C.B.Clarke) R.C. Srivast., *Fl. Sikkim* 1:225. 1996. *Kobresia cercostachys* (Franch.) C.B.Clarke var.*capillacea* P.C.Li, *Acta Bot. Yunnan.* 12(1): 17. 1990.

Distribution: Nepal, India (Sikkim), south-western China.

45. Carex vibhae (Jana, R.C.Srivast & Bhaumik) O.Yano, *Journal of the Linnean Society*, 179, 1–42. 2015. *Kobresia vibhae* Jana, R.C.Srivast & Bhaumik, *Indian J. Plant Sci.* 3 (online): 110, pl. 5.2014.

Distribution: South-eastern Himalaya.India (Arunachal Pradesh)

46. Carex vidua Boott ex C.B.Clarke in J.D.Hooker, *Fl.Brit. India* 6: 713. 1894.*Kobresia vidua* (Boott ex C.B.Clarke) Kük. in Engler (ed.), *Pflanzenr.* 38(IV, 20): 40. 1909. *Kobresia prattii* C.B.Clarke, *J. Linn. Soc., Bot.* 36:268. 1903.

46. Kobresia harrismithii Kük., *Acta Horti Gothob.* 5:37. 1930.

Distribution: Himalaya [Nepal, India (Sikkim), Bhutan] to western China.

Conflict of interest statement

Authors declare that they have no conflict of interest.

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