
Carex hangzhouensis and Section *Hangzhouenses*, a New Species and Section of Cyperaceae from Hangzhou, Zhejiang, Eastern China

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ABSTRACT. *Carex hangzhouensis* C. Z. Zheng, X. F. Jin & B. Y. Ding, a new species of Cyperaceae from eastern China, is described and illustrated, and the distinguishing characters are discussed. Owing to its peculiar habit, *Carex hangzhouensis* does not fit into an existing section. Therefore, based upon this type, the new *Carex* sect. *Hangzhouenses* is identified, and a key to this and the related sections in eastern and southern Asia is provided.

Key words: *Carex*, China, Cyperaceae, section *Hangzhouenses*, Zhejiang.

Carex L. is the largest genus within the family Cyperaceae. The genus is cosmopolitan with over 2000 species distributed in various habitats (Nelmes, 1951; Ohwi, 1953; Dai et al., 2000). China has nearly 500 species of *Carex* (Dai et al., 2000). During the course of collecting and identifying *Carex* specimens collected in Zhejiang, new records, new species, and new varieties have been discovered (Zheng, 1989, 1993; Jin et al., 2003, 2004a, 2004b). Among the specimens of *Carex* collected in 1978 and 1986 in Hangzhou City, Zhejiang Province, some specimens are peculiar in their spike arrangement. However, the perigynia of these specimens are immature. We repeatedly attempted to find mature specimens at the type locality, Lingyin, Hangzhou City, and were finally successful in May 2003. Compared with other species of the genus, specimens with mature perigynia have a subracemose panicle, a terminal staminate spike, the lateral branched spikes arising from a utriculiform cladoprophyll with a single pistillate flower (a perigynium), and a unique achene shape.

All these features distinguish the taxon from other sections in *Carex* subg. *Indocarex* Baillon (Clarke, 1904; Kükenthal, 1909; Ohwi, 1936; Nelmes, 1951; Dai et al., 2000). Therefore, we identify the taxon as a new species and establish a new section based on it.

Carex* sect. *Hangzhouenses C. Z. Zheng, X. F. Jin & B. Y. Ding, sect. nov. TYPE: *Carex hangzhouensis* C. Z. Zheng, X. F. Jin & B. Y. Ding.

Haec sectio *Carici* sect. *Mundae* affinis, sed ab ea inflorescentiis subracemoso-paniculatis, spica terminali staminata basi eramosa, spicis secundariis lateralibus ex cladoprophylo saccato florem pistillatum solitarium evolutum gerente ortis, perigynio apice in rostrum curvum ore bidentatum contracto atque achenio apice in rostrum curvum brevem abrupte contracto differt.

Bracts shortly foliaceous, long vaginate; sheaths smooth, 1.5–2.5 cm long. Panicle subracemose; terminal spike staminate, long pedunculate, base of the staminate spike unbranched; lateral secondary inflorescences 1 to 3, racemose, each with 6 to 10 closely branched spikes, androgynous. Branched spikes arising from a sacculate cladoprophyll with a single developed pistillate flower. Perigynia glabrous, trigonous, multinerved, apex with a geniculate, bidentate beak. Achenes trigonous, concave on lateral surfaces, apex retuse with short persistent style base, base with vestigial rachilla.

The new species is distinguished within *Carex* by its lateral branched spikes arising from a sacculate cladoprophyll with a single developed pistillate flower. The laterally concave achene shape uniquely distinguishes the taxon. In particular, *Carex hangzhouensis* may be contrasted with other species in *Carex* sect. *Mundae* Kükenthal and sect. *Japonicae* Kükenthal, which are postulated as its closest putative relatives. Species in *Carex* section *Mundae* differ in their racemose inflorescences terminated by androgynous spikes as well as symmetrical perigynia with erect beaks that are neither dentate nor toothed. Species in *Carex* sect. *Japonicae* have spicate inflorescences with terminal androgynous spikes. Perigynia are symmetrical and have straight beaks, and the beaks are obliquely truncate. Characterizing the new species, the peri-

gynia of *Carex hangzhouensis* are asymmetrical, with a geniculate beak to 2 mm long. This beak is bidentate, with teeth evident, to ca. 5 mm long.

This new section is currently monotypic, distributed in Hangzhou, Zhejiang Province, eastern China.

Carex hangzhouensis is the sole species of its section, but shares its fertile cladoprophyll character with five species in eastern and southern Asia, namely, *C. satsumensis* Franchet & Savatier, *C. munda* Boott, *C. fragilis* Boott, *C. dissitiflora* Franchet, and *C. yulongshanensis* P. C. Li. *Carex satsumensis* belongs to section *Japonicae* and the other four species belong to section *Mundae* Kükenthal (Kükenthal, 1909; Ohwi, 1936; Nelmes, 1951; Li, 1990; Dai et al., 2000).

Species of the other sections of *Carex* subg. *Indocarex* differ in that they have lateral spikes extending from a sterile (empty) cladoprophyll (Nelmes, 1951). A key to the above-mentioned sections follows:

KEY TO *CAREX* SECT. *HANGZHOUENSES* AND RELATED SECTIONS IN EASTERN AND SOUTHERN ASIA

- 1a. Inflorescence spicate; spikes densely arranged; bracts unshathed sect. *Japonicae*
- 1b. Inflorescence racemose or paniculate; spikes loosely arranged; bracts long sheathed.
 - 2a. Inflorescence racemose, terminal spike androgynous, base branched; perigynia symmetrical, with a smooth, erect and truncate beak; achenes not concave on lateral surfaces sect. *Mundae*
 - 2b. Inflorescence paniculate, terminal spike staminate, base unbranched; perigynia asymmetrical, with a scabrous, geniculate and bidentate beak; achenes concave on lateral surfaces sect. *Hangzhouenses*

Carex hangzhouensis C. Z. Zheng, X. F. Jin & B. Y. Ding, sp. nov. TYPE: China. Zhejiang: Hangzhou City, Lingyin, Feilaifeng Mt., on rocks in forests, 50 m, 30°14'26"N, 120°05'56"E, 13 May 2003, X. F. Jin & F. J. Wu 0702 (holotype, HZU; isotype, PE). Figure 1.

Haec species *Carici yulongshanensi* affinis, sed ab ea inflorescentiis secundariis quaque ex spicis secundariis 6 ad 10 constante, squamis staminatis oblongis ca. 8 mm longis, pistillatis late ovatis ca. 8.5 mm longis 3-nervis glabris apice in aristam ca. 3 mm longam desinentibus.

Herbs perennial; rhizomes short; culms densely caespitose, 30–60 cm tall, tenuous, trigonous, glabrous. Leaves longer than culms, plane or margins involute, 2.5–4 mm wide. Bracts shortly foliaceous, shorter than inflorescences, long vaginate; sheaths smooth, 1.5–2.5 cm long. Panicle subracemose;

secondary inflorescences 1 to 3, racemose, lateral; terminal spike and uppermost secondary inflorescence binate, others solitary. Terminal spike staminate, clavate, 4–5.5 cm long, peduncle 3.5–7 cm long; each secondary inflorescence with 6 to 10 closely branched spikes; branched spikes androgynous, arising from a sacculate cladoprophyll with a single developed pistillate flower, terminal staminate spike 1.5–2 cm long, much longer than lateral spike; lateral spike apex with 4 to 6 staminate flowers, pistillate spike with a single perigynium. Lowermost peduncle to 8 cm long. Staminate scales oblong, ca. 8 mm long, membranous, stramineous, apex obtuse, mucronate; pistillate scales broadly ovate, ca. 8.5 mm long, subcoriaceous, green, 3-veined, glabrous, apex acuminate, shortly aristate; arista 3 mm long. Perigynia obovoid, obtusely trigonous, 6.5–7 mm long, brownish green, glabrous, multiveined, base attenuate, apex contracted with a geniculate beak; beak ca. 2 mm long, margin scabrous; teeth ca. 0.5 mm long, bidentate. Achenes ellipsoid to obovoid at maturity, sessile, trigonous, castaneous, concave on lateral surfaces, 3.5–4 mm long, apex retuse with a short persistent style base; style base incrassate; stigmas 3; vestigial rachilla ca. 2 mm long.

Flowering and fruiting April–May.

This new species is similar to *Carex yulongshanensis* P. C. Li, from which it differs in having the inflorescence subracemose paniculiform, the terminal spike staminate, the base unbranched, each lateral secondary inflorescence base with 6 to 10 closely branched spikes, staminate scales oblong, ca. 8 mm long, pistillate scales broadly ovate, ca. 8.5 mm long, veins glabrous, apex aristate, arista 3 mm long, perigynia glabrous, beak bidentate, achenes concave on lateral surfaces, apex retuse with a short persistent style base.

Paratypes. CHINA. **Zhejiang:** Hangzhou City, Lingyin, Feilaifeng Mt., on rocks in forests, 30 m, 1 May 2003, X. F. Jin & H. Wang 0657 (HZU 2 sheets), 0658 (MO), 0665 (HZU), 0666 (HZU), 18 Apr. 1986, C. Z. Zheng 3913 (HZU), 1 May 2003, H. Wang 0369 (HZU), 0371 (MO), 4 May 2003, H. Wang 0378 (HZU 3 sheets), 13 May 2003, X. F. Jin & F. J. Wu 0703 (HZU); Hangzhou City, Nangaofeng Mt., in forests, 5 Apr. 1978, C. Z. Zheng s.n. (HZU).

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Figure 1. *Carex hangzhouensis* C. Z. Zheng, X. F. Jin & B. Y. Ding. Drawn from the holotype and isotype (X. F. Jin & F. J. Wu 0702). —A. Habit of plant. —B. Pistillate scale, perigynium with style branches and staminate flowers exerted. —C. Staminate scale. —D. Pistillate scale. —E. Perigynium. —F. Achene. —G. Rachilla and perigynium.

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