Curcuma roscoeana Wall. (Zingiberaceae) in India

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Abstract

Collections from the Andaman Islands, formerly determined to *Curcuma kurzii* King *ex* Baker or *C. petiolata* Roxb., match *C. roscoeana* Wall. A detailed description from living material, a colour plate, as well as historical and nomenclatural details are provided and lectotypes are designated for *C. roscoeana* and *C. kurzii*.

General Introduction

The genus *Curcuma* L., with an expected total of *c.* 120 species, occurs throughout tropical and sub-tropical Asia with a few species extending to Australia and the Pacific region (Škorničková *et al.*, 2004). It is of great economic and ornamental importance and at the same time is one of the genera within the family Zingiberaceae with polymorphic species, which has caused confusion with species delimitation.

The first author is revising *Curcuma* in India. To date some 30 species have been reported (Škorničková *et al.*, 1989; Jain and Prakash, 1995; Velayudhan *et al.*, 1996; Škorničková and Sabu, 2002), including several new taxa and new records (Škorničková Balachandran, 1983; Bhat, 1987; Mangaly and Sabu, 1988; Mangaly and Sabu, 1993; Tripathi, 2001; Škorničková *et al.*, 2003a, b; Škorničková *et al.*, 2004).

Our studies show that specific delimitation within the genus, synonymy and even the identities of some of the commonly cultivated taxa are quite confusing and that names are often misapplied. The main reasons include the following.

1. Many taxa described at the beginning of 19th century have scanty protologues and type specimens, if they were cited, are either lost or have deteriorated.
2. The characters used to delimit species in *Curcuma* are not obvious on herbarium sheets. This applies particularly to shape

and colour of the rhizome, position of the inflorescence, colour of the bracts, and floral characters such as the shape of the anther spurs, the colour and shape of floral parts.

3. Notes on herbarium labels made by people not familiar with the floral structure of this genus can be quite misleading.
4. Many species are superficially very similar and, without a detailed description based on living material, are difficult to determine.
5. The huge area of the Indian subcontinent and the rather high variability among seed-setting species result in some species being described repeatedly under different names.

These points demonstrate clearly that fieldwork and observation of flowering material, especially from the type locality or nearby, together with a search for original historical material are key to an accurate understanding of the genus *Curcuma*. During the course of our work we intend to address and clarify individual problems connected with the taxonomy and nomenclature of Indian representatives of the genus.

What is *Curcuma kurzii* King *ex* Baker?

Curcuma kurzii was described by Baker (1890) in *The Flora of British India*, under the heading 'imperfectly known species'. The description is based on King's manuscript and consist of two lines: 'nearly allied to *C. petiolata*, but leaves larger, petioles longer, scape longer, bracts more imbricating, and their tips less spreading. – S. Andaman Islds'. From this we presume that Baker was dealing with herbarium specimens and that he had had no opportunity of seeing live material of *C. kurzii*. It is not surprising that he found this plant closely allied to *C. petiolata* because in general habit these two species are indeed very similar and the fertile bracts of both species form rather deep pouches. Colours and delicate flower parts are very rarely preserved in herbarium material and, as we have confirmed, they are not present on the presumably original material collected by S. Kurz from South Andaman Island at CAL and K. Balakrishnan and Bhargava (1984), Srivastava (1998) and Tripathi and Prakash (1998) treated *C. kurzii* as conspecific with *C. petiolata* Roxb.

During our fieldwork in the Andaman Islands, April–June 2002, we collected sterile specimens of *Curcuma*, assuming that it would be *C. petiolata* based on the earlier work of Balakrishnan and Bhargava (1984). Rhizomes were successfully transplanted to Calicut University Botanical Garden and, in late November 2002, one of them flowered, followed by

others in the autumn of 2003 and in 2004. Though we found them identical to the description given by Balakrishnan and Bhargava (1984), they neither matched the protologue, nor the descriptions and colour drawings of *C. petiolata* given by Roxburgh (1820) and others (Roscoe, 1827; Hooker, 1870).

In contrast to the original description of *Curcuma petiolata*, our plants had no distinct coma, the whole inflorescence was bright orange-red, the bracts gradually becoming yellow-green towards the base, and the flowers were longer than the bracts and slightly exserted. Most strikingly, the bracts were arranged in rows. These characters led us to determine our material as the Burmese species *C. roscoeana* Wall. This was confirmed by consulting researchers recently working on the genus *Curcuma* and comparing our plant with photographs of *C. roscoeana* from Thailand and Burma, where this species is found in wild and is widely cultivated.

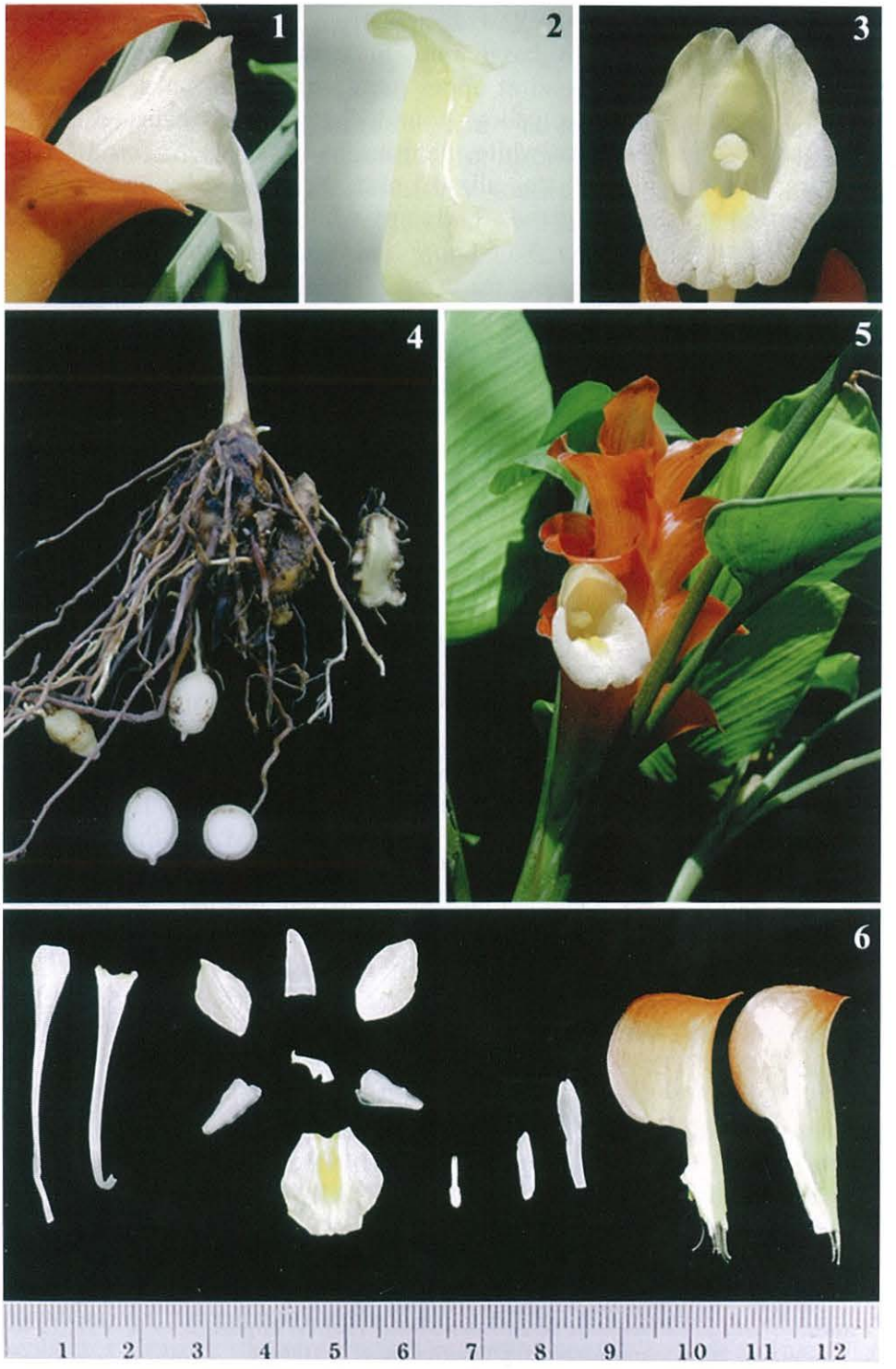
As other seed-setting taxa, it shows a considerable degree of variability leading to the opinion that there are no grounds for keeping *C. kurzii* as a separate species or even as a distinct variety. Thus, *C. kurzii* is treated here as conspecific with *C. roscoeana* Wall. and as such is an addition to the Indian flora. A detailed description is given to include characters observed from living plants (*Škorničková* and *Prasanthkumar 73309, 73310*), which flowered at CUBG during September-November 2002, 2003 and 2004 (Plate 1.).

Curcuma roscoeana Wall. Pl. Asiat. Rar. I. (1829) 8, t. 9 – *Hitchenia roscoeana* (Wall.) Benth. in Benth.& Hook.*f.* Gen. Pl. 3 (1883) 643. – *Hicheniopsis roscoeana* (Wall.) Loes. Nat. Pflanzenfam. ed. 2, 15(A) (1930) 572. – **Type:** Wallich. Pl. Asiat. Rar. t. 9. (lectotype; designated here).
Curcuma coccinea Wall. *ex* Baker, in Hook. *f.*, Fl. Brit. Ind. 6 (1890) 216, *nom. nudum* (in syn.) *C. kurzii* King *ex* Baker, in Hook. *f.*, Fl. Brit. Ind. 6 (1890) 216, ***syn. nov.*** –**Type:** Andaman Islands, South Andaman, Smith Point, *S. Kurz s.n.* (K!, lectotype, designated here; CAL! [Acc. No. 467218], isolectotype); Andaman Islands, South Andaman, without exact locality, *S. Kurz s.n.* (K!, G!; putative isolectotypes).
C. petiolata auct. non. Roxb. Balakrishnan & Bhargava. J. Bombay Nat. Hist. Soc. 81 (1984) 512; Srivastava S.K. Indian J. Forest. Add. Series X. (1988)16; Tripathi & Prakash. J. Econ. Taxon. Bot. 22 (1998) 468.

Rhizomatous herb, to 90 cm tall. *Rhizome* ovoid without branches (rarely with one branch, which later turns into another main rhizome), *c.* 3–4 x 1–2 cm (increases with age), light brown externally, sheathed by bases of the leaf sheaths, which leave vertical scars after decaying, creamy-yellowish

inside, not aromatic. Roots many, penetrating deeply into soil terminating with small ovate tubers 0.5–2 x 0.5–1.5 cm, 2–15 cm from the main rhizome, externally light brownish, glabrous, white internally. *Leafy shoot* 30–90 cm, *pseudostem* 15–25 cm long formed by leaf sheaths and a few sheathing bracts (conspicuous especially at the beginning of the season, later drying and decaying), softly pubescent, hairs 0.2 mm long, green with deep red-violet tinge, *ligule* obscurely bilobed, 1.5–2.5 mm long, greenish translucent, hairy on the margin, hairs 0.5 mm. *Leaves* 3–4 at the beginning of the season, later to 8, *petiole* 7–25 cm long, shorter in the first leaves, gradually longer in older leaves, deeply channelled, green or with reddish-violet tinge, glabrous; *lamina* oblong-ovate, *c.* 16–35 x 5.5–13 cm (first leaves smallest), glabrous on both sides, adaxially green, with prominent veins *c.* 0.7–1 cm apart, abaxially pale green; margin hyaline, white, 0.2 mm broad, tip *c.* 1.5 cm long, acuminate, base rounded to cordate, slightly oblique, midrib green, glabrous. *Inflorescence* always central. *Peduncle* 15–28 cm, green, glabrous, most of it hidden within the pseudostem. *Spike c.* 8–15 x 4–7 cm, cylindrical, consisting of 15–45 bracts arranged in 3–5 serial rows, base of spike attenuate formed by deep pouches of lowermost fertile bracts. Size of the spike and number of bracts and rows increase with the age of plants. *Coma bracts* similar in colour and size to fertile bracts, sterile *c.* 5–7, spirally arranged. *Fertile bracts* obovate-spatulate, *c.* 3.5–4.5 x 2.5–3 cm, deep orange-red in upper part gradually becoming yellow–greenish at their base (character which can be often seen in herbarium specimens as highly glossy yellowish patch at the base of bracts, provided plants were processed by the dry method) lower half forming deep funnel-shaped pouches subtending cincinnus of 2–4 flowers, upper part spreading, glabrous or shortly hairy, usually more hairy outside, margin shortly hairy, hairs 0.2–0.3 mm long. *Bracteoles* one per flower, 5 x 3 mm, hyaline, creamy-white, glabrous. *Flowers* 4.5–5.5 cm long, cream-white with yellow in the centre of lip, slightly exserted from the bracts. *Calyx* 14–16 mm long, translucent white, glabrous, obscurely 3-toothed, unilaterally split 4–5 mm. *Corolla tube* 3–3.5 cm, creamy white, glabrous, dorsal corolla lobe 0.9–1.1 x 0.5–0.7 cm, obtuse, creamy white, glabrous, lateral lobes 0.9–1 x 0.4–0.6 cm, creamy white, glabrous. *Labellum* 1.4–1.6 x 1.7–2 cm, slightly emarginate, split *c.* 1 mm, creamy white with deep yellow patch in the centre, yellow-coloured area raised and swollen, forming a channel in the middle of labellum (especially at the basal part of the labellum). *Lateral staminodes* unequally rhomboid, 12–15 x 8–9 mm, creamy white, glabrous. *Anther c.* 5

Plate 1. ***Curcuma roscoeana Wall.*** from the Andaman Islands 1. Flower in bract (side view); 2. Anther (lateral view); 3. Flower (front view); 4. Rhizome; 5. Inflorescence (young plant, *c.* 2–3 years old); 6. Flower (dissected). (*Škorničková & Prasanthkumar 73309*). *Photo J. Škorničková.*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mm, yellowish white with yellow at apical part, anther thecae 3–4 mm long, whitish, dehiscing by basal pore, filament 2–3 mm long, 3.5 mm broad at base, 2.5 mm broad at upper part. *Anther spurs* absent. *Anther crest* 1.5 mm long, hyaline, yellow, rounded, terminally recurved. *Ovary* trilocular, 2–2.5 x 1.5–2 mm, white, glabrous, ovules many. *Stigma* 1.4 x 0.7 mm, translucent white, ciliate, cilia 0.3 mm, surrounded by anther crest, not exserted. *Epigynous glands* 2, creamy-white, 4–5 mm long, 0.5 mm diameter. *Fruits* not seen.

Specimens examined: INDIA, North Andamans: Sitanagar forest, 15.V.1982, *M.K. Vasudheva Rao 9032* (CAL, PBL); Laksmipur, 23.XI.1976, *N.G. Nair 4881* (PBL, L-digital image seen); Mayabunder, 6.XII.1992, *B.K. Sinha 16263* (PBL); Mayabunder Dt., Chainpur, 19.V.2002, Skornicková & *Prasanthkumar 73310* (CALI, SING); Mayabunder Dt., Chainpur, 19.V.2002, Skornicková & *Prasanthkumar 73309* (CALI); Middle Andamans: Bakultala, 6.XI.1979, *N. Bhargava 6406* (CAL, PBL, K); Mayabunder, 31.VII.1974, *N. Bhargava 1941* (CAL, PBL); South Andaman: Coatering Cave, *S. Kurz s.n.,* Acc. No. 467217 (CAL); Baboo ghat, 7.VII.1894, *King's coll. s.n.,* 3 nos (CAL); Saroah Creek, Baratang, 25.X.1979, *D. Basu 7351* (PBL); Andamans, *sine loc*: 22.VIII.1898, *G.H. Mann s.n.* Acc. No. *467212* (CAL); *sine loc., HBC s.n.* Acc. No. *467207* (CAL); Bom. Lung. Jang., X.1915, *Parkinson 678* (DD); Jharkhand: Singbhum, IX. 1900, *H.H. Haines 331* (K, CAL); Parasnath, 30. IX. 1873, *C.B.Clarke 20181* (CAL); Chota Nagpur, 4. IX. 1875, *J.J.Wood s.n.* (K); Western Bengal & Behar: *S. Kurz s.n.,* Acc. No. 467109 (CAL); BANGLADESH: *Sine loc., Griffith 5724* (K); BURMA (MYANMAR), Repu Irawaddi ad Scandwya, *Wallich* 6597B (CAL); Upper Burma, 1897, *Veitch & sons s.n.* (K); Rangoon District: Rangoon, *sine dat., M. Sellan s.n.* (E); Hanthawaddy, 25.VIII.1932, *Parkinson 14831* (DD); Prome Road, 24.VIII.1932, *Parkinson 14831* (DD); Kamaynt, 24.VIII.1932, C.E. *Parkinson 14629* (DD); Pegu, *McLeland s.n.,* 2 nos (K); Pegu, *sine dat., sine coll.*, 2 nos (CAL); Minbu District: Dwe Chaung, 23.XI.1937, C.E. *Parkinson 79677* (DD); Tenasserim, Tavoy Dt., Paungdaw, IX. 1961, *Keenan et al. 1502* (E, K); South Tenasserim, Leikpok Chaung Mergui, 1925, *Mr. Braybon's collector 223* (DD); Tenasserim and Andamans, *Herb. Helfer 5711* (CAL); Toungoo Dt., Dongzayit, 4.VII.1911, *J.H.Lace 5391* (CAL, E, K); *sine loc.* 1880 *D. Brandis s.n.* (DD); THAILAND: Chiang Mai, 1965, *Johnston s.n.* (BM); Chiang Mai, Queen Sirikit Bot. Garden, 10. VII. 1999, *C. Ngamriabsakul 41* (E); Hin Dat, Kanburi, 2. VII. 1926, *Put 73* (BM, K); Muang Ngao, Lampang, 15. VII. 1931, *Put 3996* (K); Maehongson, Khon Yuam, 5. IX. 1974, *Larsen & Larsen 34161* (K); Wangka, 2. – 4. VII. 1946, *Kostermans 799* (K); *sine loc.*: VI. 1854, No. 26 (CAL), *sine dat., sine coll.*

(BM); VIII. 1862, *sine coll.* (BM); 1845-47, Galathea Expedition, *Herb. Wallich 841* (C, KIEL).

Distribution: So far only known to occur wild in Myanmar, Thailand and India, but widely cultivated elsewhere for its ornamental value and bred as a cut flower and pot plant. The only confirmed field observations of *Curcuma roscoeana* in India are from the Andaman Islands. It is interesting to note, however, that we have found in CAL and K four herbarium specimens of *C. roscoeana* collected from forests in Jharkhand and West Bengal/Behar by different collectors between 1875 and 1900, which bear the remark 'bracts orange red' or 'spike uniform dark yellow orange' and the shape and arrangement of the bracts leaves no doubt as to their identity. Since then, the species has not been recollected from these areas, even though we made an effort to search near to these localities. Another interesting find at K is a specimen of *C. roscoeana* (*Griffith 5724*) collected in East Bengal (Bangladesh) as part of the Herbarium of the East India Company and distributed by RBG Kew during the years 1863-64. As far as we can ascertain, this is the only evidence of *C. roscoeana* from Bangladesh, but it is not clear if it was collected from wild.

Lectotypification

Wallich described *Curcuma roscoeana* in *Plantae Asiaticae Rariores* (1829) but did not designate type specimens nor cite any herbarium material. The description of *C. roscoeana* is accompanied by a plate (No. 9), an excellent colour icon, where the whole plant as well as the dissected flower are depicted. The type locality is given as "Pegu et ad oram Tenasserim'.

Wallich's specimens can nowadays be found in about 46 herbaria, the main set being deposited at K-W (Stafleu and Cowan, 1988). His '*Catalogue*' or more correctly '*Numerical List*' (1829–1832 + supplements 1847–1849) lists all *Curcuma* species between numbers 6594–6613. They were thus published in 1832 (Anon., 1913). There are two entries for *C. roscoeana*, 6597A collected in Rangoon and 6597B marked as Repu Irawaddi ad Scandwya (Burma), both collected in 1826 as per entry in the *Numerical List*. Forman (1997), writing on typification of Roxburgh's names, explained that, for the purpose of interpreting the name of the species, there are many instances where the illustration is far superior to the corresponding specimen and therefore the drawing would be much preferable as the type. While studying Wallich's collections in various herbaria, we have encountered the problem that some of Wallich's duplicates bearing the same number do not always belong to just one

taxon. Moreover, some of his sheets comprise mixed collections, which is, for example, obvious in the case of the *C. roscoeana* specimen 6597B deposited in CAL, where only one of the two plants on this sheet belongs to this species, the other being an undeterminable *Curcuma* species with a lateral inflorescence. Considering this confusion with specimens, we therefore propose to designate Plate 9 published together with the original description in *Plantae Asiaticae Rariores* as the lectotype of *C. roscoeana.*

After critical analysis of Wallich's original description and drawing of *Curcuma roscoeana* (Wallich, 1829), we cannot but admit that it fits our Andaman plant including important floral details such as the shape of the anther without basal spurs, but with a well-developed anther crest, which is precisely depicted in Wallich's drawing. Other drawings and descriptions of *C. roscoeana* were published in *Botanical Magazine* No. 4667 (Hooker, 1852), in 1854 by Lemaire in *Le Jardin fleuriste* and a short description without a drawing was published by Dammer (1890). It is interesting to note that the type locality of *C. roscoeana* (Pegu, on the coast of Tenasserim) is just opposite the Andaman Islands. The possibility of plants being introduced into the Andamans cannot be ruled out.

Apparently all specimens of this taxon from the Andamans collected by Bhargava and other workers between 1979–1992 and deposited in PBL (all determined as *C. petiolata*) are identical with several sheets from the Andamans deposited at CAL and K (determined as *C. kurzii* or *C. roscoeana*). They also match all other sheets of *C. roscoeana* deposited at BM, C, CAL, DD, E, K, KIEL and L. Some of the sheets designated as *C. kurzii* were collected by S. Kurz from the Andaman Islands and presumably represent the original material, which was accessible to King and subsequent workers. One sheet at K bears the remark "*C. kurzii sp. nov. King ms.*" Thus, we propose to designate this sheet as lectotype and the other Kurz collections as isolectotypes of *C. kurzii.*

Other historical sheets of this taxon from the Andamans worth mentioning are Dr. King's collections in 1894 designated as *C. kurzii* (CAL) and two other sheets collected by Mr. Mann and an anonymous collector annotated as *C. roscoeana* (CAL).

Recently, *C. petiolata* was reported from Arunachal Pradesh in NE India by Tripathi and Prakash (1998). Their description and illustration do not match well with either *C. petiolata* or *C. roscoeana*, neither does the specimen cited by them (*Tripathi 21838*, CDRI!). Thus, the presence of *C. petiolata* in India has yet to be confirmed. The differences between *C. roscoeana* and *C. petiolata* are shown in Table 1.

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Table 1. Comparison of important morphological characters of *Curcuma roscoeana* Wall., *C. petiolata* Roxb. and *C.* sp.*'petiolata' sensu* Tripathi and Prakash. Main diagnostic characters are in bold.

	C. roscoeana Wall.	*C. petiolata* Roxb.	*C.* sp.*'petiolata' sensu* Tripathi and Prakash
Main rhizome	Ovoid **unbranched**, (rarely with one branch), inwardly creamy-yellowish.	**Branched**, branches few and small, inwardly pale yellow.	**Branched**, branches few, inwardly pale yellow in centre, greyish towards margins.
Inflorescence	*Fertile bracts* **orange-red, with yellow at base, arranged in conspicuous 3-5 rows.** *Coma* **inconspicuous, uppermost sterile bracts orange-red.**	*Fertile bracts* **light green, bracts spirally arranged.** *Coma* **conspicuous, lilac coloured.**	*Fertile bracts* **yellowish, orange at the tip,** arrangement not mentioned. *Coma* **conspicuous, bracts pinkish-orange or pinkish-purplish.**
Flower	Longer than the bracts, **slightly exserted** from the bracts.	Small, **not exserted** from the bracts.	As long as or **shorter than the bracts.**
Anther	**Spurs absent. Anther crest present, prominent.**	**Spurs present. Anther crest present, small.**	**Spurs absent. Anther crest short** (as per description, but missing in illustration).

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