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Curcuma codonantha (Zingiberaceae) – A New Species from the Andaman Islands, India

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Abstract

Curcuma codonantha Skornickova, M. Sabu & Prasanthkumar *sp. nov.* from the Andaman Islands, India, is described and illustrated.

Introduction

Species delimitation in the genus *Curcuma* L., Zingiberaceae, is rather complicated due to superficial similarity of several species, lack of type material, the short duration of flowering and the necessity of studying fresh material. Approximately 100 species are distributed in tropical and subtropical Asia with a few species extending to Australia and the Pacific Islands. However, the economically important or ornamentally interesting species are found naturalized all over the tropics and elsewhere, because they are popular among gardeners. Several new species of *Curcuma* have been described from Asia during the past five years (Mood & Larsen, 2001; Sirirugsa & Newman, 2000). To date, in India about 30 species are reported and accepted (Karthikeyan *et al.*, 1989; Jain & Prakash, 1995; Skornickova & Sabu, 2002). Many of them were early described by Roxburgh (1810, 1820), while others were described or reported quite recently (Bhat, 1987; Mangaly & Sabu, 1988; Mangaly & Sabu, 1993; Sabu & Mangaly, 1988; Sivarajan & Balachandran, 1983; Skornickova *et al.* 2003; Velayudhan *et al.*, 1990 & 1991).

As part of the project 'Revision of Indian Zingiberaceae', we studied *Curcuma* extensively in the field in the Andaman Islands resulting in the documentation of ten species. Previously, only four species had been reported from the Andamans (Balakrishnan and Bhargava, 1984; Dagar and Singh, 1997; Srivastava 1998). While exploring the northern part of the Andaman Islands, flowering specimens of a *Curcuma* with a lateral spike, oblong-lanceolate, glabrous leaves and prominent bell-shaped flowers, which were strongly exserted from the bracts, were collected. Critical examination of fresh material showed that it did not match completely any other

Indian species of *Curcuma*. Due to presence of anther spurs the specimen belongs to subgenus *Curcuma* (*Eucurcuma* K. Schum.). After scrutinising original descriptions of all the Asian species so far known under the subgenus and, after consulting others working on the genus in Thailand and Myanmar, we are confident that this species is new. It is described and illustrated below.

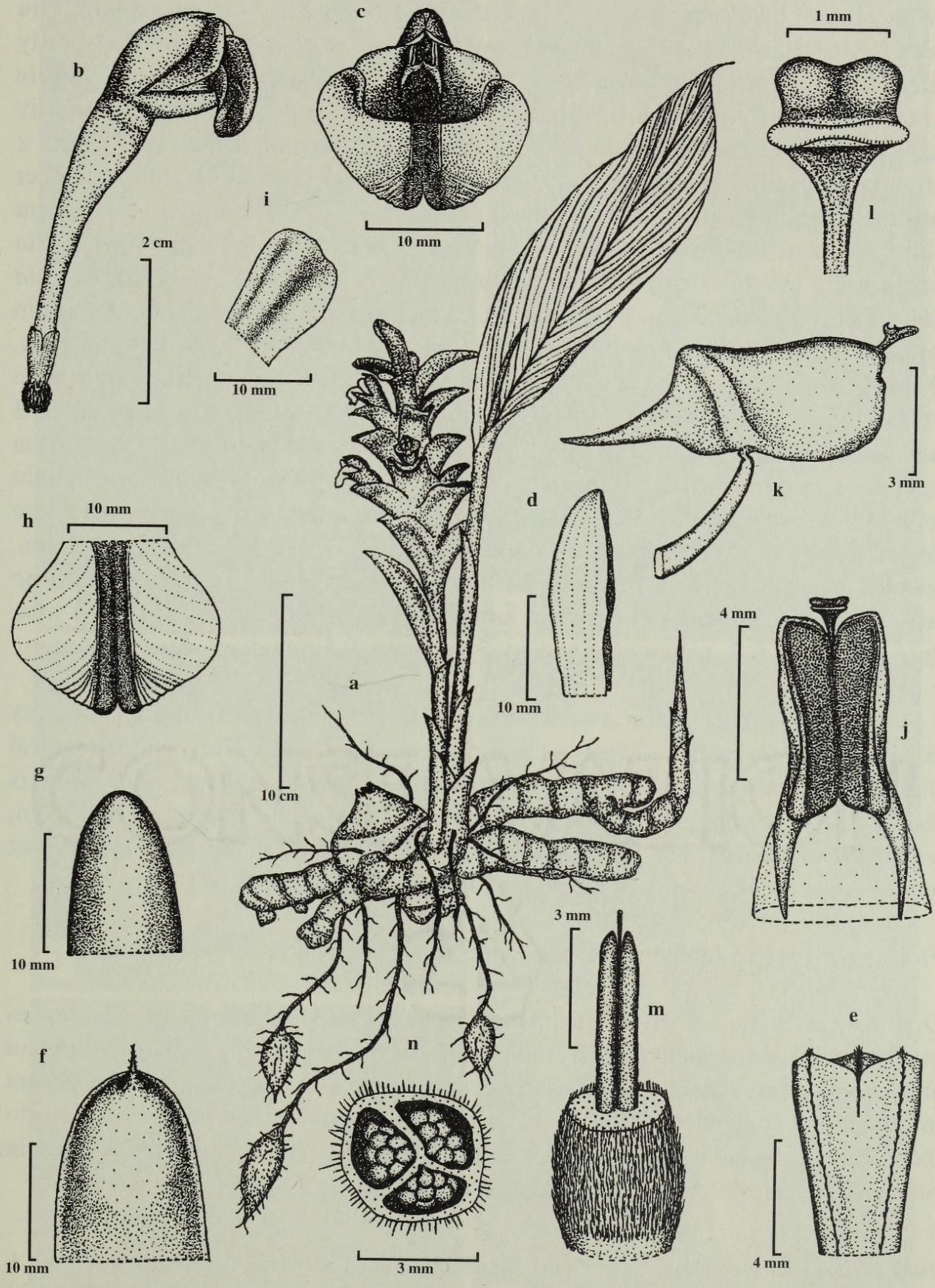
Curcuma codonantha Skornickova, M. Sabu & Prasanthkumar, ***sp. nov.***

Curcumae aeruginosae Roxb. similis rhizomatis figura et colore cremeo, foliis viridibus macula purpurea secus costam carentibus, coma rosiore bracteis apicaliter macula brunneopurpurea, floribus campanulatis e bracteis fertilibus exsertis differt. **Typus**: India, Andaman Islands, North Andaman, Diglipur District, Kalighat, Alt. 15 m, 13° 09' N 92° 57'E, 22.V.2002, *Skornickova & Prasanth Kumar 73319* (holo MH; iso K, CALI, SING).

Figure 1, Plate 1.

Rhizomatous herb, up to 1.50 m tall. *Rhizome* 3.5–6 x 3–6 cm, sessile tubers present 5–13 cm long, 1.5–2 cm in diam., sometimes almost on the soil surface, light brown outside, skin glabrous, creamy-yellowish inside, aromatic (camphoraceous), bitter in taste, scales triangular, papery, brown, glabrous, present on main rhizome and sessile tubers, in soil usually quickly decaying and leaving scars; root tubers 3–5 x 1.5–2 cm, elliptic, white inside, on 2–3 mm-thick roots c. 5–20 cm away from main rhizome. *Leafy shoot* up to 1.50 m tall, *leaves* 3–6; pseudostem 20–45 cm long, sheathed by 2–4 reddish-green bracts (clearly visible only at the beginning of the season, later drying and decaying), innermost as long as the pseudostem, outer ones gradually smaller in length, 3–4 cm broad; ligule 3 mm, hyaline, greenish translucent, 2-lobed, hairy along the margin, hairs 0.5 mm long; petiole 10–30 cm long, winged and gradually tapering into lamina; lamina lanceolate or oblong-lanceolate, 35–75 x 8–14 cm, green, paler on the lower surface, margin translucent white, hyaline, 0.5 mm wide; upper surface mostly glabrous, but slightly hairy at the apical part of the leaf, especially on veins and near margins, hairs 0.3 mm long, lower surface glabrous; tip acuminate c. 1–1.5 cm hairy, base oblique, attenuate, gradually tapering into 1.5–2 mm-wide wings along the petiole. *Inflorescence* vernal, lateral. *Peduncle* 14–23 cm, 0.7–1.5 cm diam., covered with 4–6 reddish-green sheaths, glabrous, the innermost longest, structurally similar to the fertile bracts above, outer sheaths gradually smaller, broad 3–4 cm.

Figure 1. ***Curcuma codonantha***. a. Habit; b. Flower (side view); c. Flower (front view); d. Bracteole; e. Calyx; f. Dorsal corolla lobe; g. Lateral corolla lobe; h. Labellum; i. Lateral staminode; j. Anther (front); k. Anther (side); l. Stigma; m. Epigynous glands and ovary; n. Ovary (cross section). Based on the type material *Skornickova & Prasanthkumar 73319*. Del. J. Skornickova.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Spike 12–20 x 6–8 cm, formed by c. 30–35 bracts including coma. *Coma* forming 1/3–1/4 the length of the inflorescence, coma bracts 7–9, c. 5–6 x 2.5–3 cm, bright pink with darker brownish-violet patch on the tips, lower side almost glabrous, upper side shortly hairy, hairs 0.2 mm long, lower coma bracts fertile, 3–4 uppermost sterile. *Fertile bracts* 3.5 x 4–4.5 cm, green, tips sometimes tinged with red, upper side very shortly hairy, lower side quite glabrous. *Cincinnus* with 4–6 flowers. *Bracteoles* 1.7–2.5 x 0.6–1.4 cm, hyaline, translucent white, glabrous. *Flowers* 6 cm long, yellow, longer than the bracts, exserted 1.5–2 cm from the bracts. *Calyx* 8 mm long, translucent white, 3-dentate, unilaterally split for about 3 mm, hairy, hairs 0.4 mm long. *Corolla tube* 3.2–3.5 cm, towards base light yellow, towards lobes pink, glabrous. *Corolla lobes* pink, glabrous, dorsal lobe 2 x 1.3 cm, mucronate, mucro 4–5 mm, lighter in colour (whitish pink), hairy, hairs 0.3 mm long, lateral lobes 1.5 x 0.9 cm, pink, glabrous. *Labellum* 2 x 1.8 cm, emarginate, yellow, deep yellow in the centre with whitish lines on the outside border (golden median band), middle lobe emarginate, 3 mm deep. *Lateral staminodes* 12 x 9 mm, light yellow, with short glandular hairs on inner side. *Anther* spurred, 8 mm, anther thecae whitish, 4–5 mm long, filament light yellow, 4 mm long, constricted, 5 mm at base, 2 mm at upper part. *Anther spurs* 3 mm long, whitish yellow, divergent, but slightly incurved. *Ovary* trilocular, 3–4 x 3 mm, densely hairy, glabrous at the base, hairs 0.3–0.4 mm long, ovules many. *Stigma* exserted c. 1–1.5 mm from between anther thecae, white, ciliate, 1.4 x 1.4 mm. *Epigynous glands* 2, yellowish-green, c. 5 mm long, 0.5 mm diam. *Fruits* not seen.

The plant description is based on observation of material from the type locality as well as measurements of fully-grown plants in the Calicut University Botanical Garden. The leafy shoot at the beginning of season, when the plant is flowering, is about 60–70 cm with only 2–3 leaves. Later in the season, the plant grows to 1.50 m with about six leaves. The green-reddish sheaths covering the pseudostem are most prominent at the beginning of the season, later they dry and decay.

Flowering: May to June, inflorescences occur together with the first leaves.

Distribution: So far known only from the type locality. We have also seen this species in Havelock Island (south part of Andaman Islands), but unfortunately we were not able to collect it. Since most of the *Curcuma* species in the Andamans are recent introductions connected with migration of people from various parts of India to theAndaman and Nicobar Islands, it is doubtful if this species is native there. Thus, in future, the species may be found elsewhere in India.

Plate 1. *Curcuma codonantha*. 1. Habit; 2. Detail of inflorescence; 3. Coma (seen from above); 4. Rhizome with roots and tubers; 5. Detail of flower in subtending bract (side view). All photographs are of the type material *Skornickova & Prasanthkumar 73319*. Photo J. Skornickova.


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Table 1. Comparison of morphological characters of *Curcuma codonantha* and *C. aeruginosa*. (The diagnostic characters are in bold).

	C. codonantha sp. nov.	***C. aeruginosa* Roxb.**
Rhizome	*Main rhizome* c. 3.5–6 x 3–6 cm, sessile tubers present 5–13 cm, 1.5–2 cm in diameter. **Inwardly creamy-yellowish colour.** *Root tubers* 3–5 x 1.5–2 cm, white inside.	*Main rhizome* c. 10 x 5 cm, obovate-conical, sessile tubers 5–15 cm, 1.5–2.5 in diameter**. Inwardly aerugineous (bluish-green) colour.** *Root tubers* 2.5–5.5 x 1.5–2.5, whitish inside.
Leafy shoot	*Leafy shoot* up to 1.5 m, 3–6 leaves. ***Pseudostem* and peduncle sheathed by reddish-green bracts.** ***Ligule* 3 mm, 2-lobed, hairy along the margin**, hairs 0.5 mm long.	*Leafy shoot* up to 1.9 m, 4–6 leaves. ***Pseudostem* and peduncle sheathed by green bracts.** ***Ligule* 2 mm, obscurely 2-lobed, glabrous**.
Lamina	*Lamina* up to 35–75 x 8–14 cm, base oblique, attenuate. **Adaxially plain green with no coloration**, abaxially pale green.	*Lamina* up to 40–90 x 10–20 cm, base attenuate. **Adaxially green with dark purple cloud along the midrib on the distal half of the leaf**, abaxially pale green.
Inflorescence	Vernal, lateral, flowering in May. *Peduncle* 14–23 cm, sheathed by reddish-green bracts, spike c. 12–20 x 6–8 cm. *Coma* c. 1/3-1/4 of the inflorescence. Coma bracts bright pink with darker brownish-violet patch at the tips, c. 5–6 x 2.5–3 cm, lower side almost glabrous, upper side shortly hairy. *Fertile bracts* 3.5 x 4–4.5 cm, green, tips sometimes tinged with red, upper side very shortly hairy, lower side quite glabrous. *Cincinnus* 4–6 flowers.	Vernal, lateral, flowering in April -May. *Peduncle* 10–25 cm, sheathed by green bracts, spike c. 14–20 x 6–9 cm. *Coma* c. 1/3 of spike. Coma bracts pink or light pink, with no obvious patch at the tips, c. 5–7 x 1.22 cm, sparsely hairy on both surfaces, tip mucronate 0.2–0.3 mm. *Fertile bracts* 4.5–5 x 3.5–4.5 cm, green with tips tinged with red-purple, quite glabrous both sides. *Cincinnus* 4–6 flowers.
Flowers	***Flower* 6 cm, bell-shaped, well exserted from the fertile bracts.** *Bracteoles* 1.7–2.5 x 0.6–1.4 cm, hyaline, translucent white, glabrous.	***Flower* 5-5.5 cm, same length as fertile bracts, not exserted.** *Bracteoles* 1.7–2.5 x 0.7–1.5 cm, hyaline, whitish translucent, hairy at the tip.

Table 1. Continued:-

	Calyx 8 mm long, unilaterally split 3 mm, translucent white, 3-dentate, hairy. *Corolla tube* 3.2–3.5 cm, glabrous, towards base light yellow, towards lobes pink. *Labellum* 2 x 1.8 cm, emarginate, yellow, deep yellow in the centre, yellow towards margin. *Lateral staminodes* 12 x 9 mm, light yellow. *Anther thecae* 4–5 mm, anther spurs 3 mm, whitish-yellow, divergent. *Ovary* 3–4 x 3 mm, densely hairy. *Epigynous glands* c. 5 mm long, 0.5 mm diameter, yellowish-green.	*Calyx* 11–12 mm, dentate, unilaterally split 4–5 mm, whitish translucent with pink at the teeth tips sparsely hairy. *Corolla tube* 2.8–3.2 cm, glabrous, whitish yellow base, pink tinged towards lobes, lobes of rich pink colour. *Labellum* 1.8–1.9 x 1.9–2 cm, emarginate, deep yellow in centre, lighter towards margin. *Lateral staminodes* 14 x 7 mm, yellow. *Anther thecae* 4.5 x 0.7 mm, anther spurs 3 mm, white, divergent. *Ovary* 3.5 x 3 mm, hairy. *Epigynous glands* 4.5–5.5 mm long, 0.7 in diameter, yellowish green.

Habitat: Open moist places along stream banks.

Uses: Bengali settlers at the type locality use this species for the extraction of starch from the rhizomes. Extraction of starch, commonly known as East Indian arrowroot, has been reported for many *Curcuma* species all over India and it seems that people use any *Curcuma* species that grows locally.

Vernacular name: Bengalis living near the type locality call this plant *Shodhi*. The name *Sat'hi* or *Sotee* was mentioned by Roxburgh (1810) and *Shuthee* (Roxburgh, 1820) as the vernacular name for *Curcuma zerumbet* Roxb., which is nowadays usually treated as synonym of *C. zedoaria* (Christm.) Roscoe. Even though Roxburgh's description of *C. zerumbet* consists of only a few lines, it is obvious that it is not *C. codonantha*, since Roxburgh's *C. zerumbet* has a purple cloud down the middle of leaf and the flowers are shorter than their bracts. Also, from our fieldwork in Bengal over the past few years we have observed that the name *Sotee* or *Shuthee* is used for several different species of *Curcuma*.

Etymology: The epithet "codonantha" is derived from the Greek words "codon" (bell) and "anthos" (flower) referring to the peculiar bell shape of the flowers exserted from the fertile bracts, the most obvious character of this species.

Notes: The closest species to *Curcuma codonantha* is *C. aeruginosa* Roxb., which is commonly distributed throughout Kerala and is found in several localitites in the Andaman Islands. Distinguishing these species in the field might be difficult due to similar habit and coloration of flower parts, both have a deep yellow labellum and lateral staminodes with pink corolla lobes, and lateral spikes and they flower at the same time. The most obvious difference between them lies in the flowers, which in *C. codonantha* are bell-shaped and well exserted from fertile bracts, while they are the same size as the fertile bracts and do not extend beyond them in *C. aeruginosa*. They can also be told apart by the rhizome, which in *C. codonantha* is inwardly creamy-yellowish in contrast to the inwardly aerugineous (bluish-green colour) of *C. aeruginosa*; *C. codonantha* leaves are plain green, quite glabrous excepting on the prominent veins and margin areas at the distal half on the upper side of the lamina, which are sparsely hairy, while *C. aeruginosa* leaves are glabrous, have a deep purple cloud, which runs along the both sides of midrib and which is especially prominent at the distal half of lamina; and the coma bracts of *C. codonantha* are marked at the tips by a brownish-violet or red brownish patch unlike of those of *C. aeruginosa*, which are pink or light pink and although they can be somewhat darker at the tips, but do not have a prominent patch of such a deep colour (Table 1).

According to our observations in the field, *Curcuma* species that do not set seed and reproduce exclusively vegetatively by sessile tubers are uniform within a population as well as between populations. Characters like the red patch on the leaves, indumentum and coloration of flower parts or the inner colour of the rhizome, which may vary in the case of seed-setting species, are stable for non seed-setting species.

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