Two new species of *Commicarpus* (Nyctaginaceae) from the Horn of Africa

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The new species *Commicarpus altus* Thulin from central Somalia and *C. ogadenensis* Thulin from southeastern Ethiopia are described, illustrated and mapped. Both species are shrubs with succulent leaves and white flowers, and they have previously been treated as forms of the widespread and variable *C. plumbagineus* (Cav.) Standl. *Commicarpus altus* is found on gypseous or saline ground at elevations of 125–150 m a.s.l., whereas *C. ogadenensis* seems to be entirely confined to gypsum at 350–550 m a.s.l. *Commicarpus altus* differs from *C. plumbagineus*, apart from being a shrub with succulent leaves, by having a glabrous perianth and a joint on the pedicel well below the anthocarp. *Commicarpus ogadenensis* differs from both *C. plumbagineus* and *C. altus* by having five (versus three) stamens.

Keywords: *Commicarpus*, Ethiopia, gypsum, Nyctaginaceae, Somalia, taxonomy

Introduction

Thulin (1993) recognized 12 species of *Commicarpus* Standl., in the account of the genus in Flora of Somalia, four of which had been described a few years earlier (Thulin 1990). One plant, a slender shrub growing up to at least 4 m high on gypseous or saline ground in central Somalia, caused problems. It was first thought to be a new species, but as it agreed with *C. plumbagineus* (Cav.) Standl. in having white flowers with a prominent perianth-tube and three stamens, it was finally regarded as a shrubby form of this very widespread and variable species. This taxonomy has now been reconsidered, and the plant in central Somalia is described below as *C. altus*.

Gilbert (2000) treated nine species of *Commicarpus* in his account for Flora of Ethiopia and Eritrea, all of them also occurring in Somalia. Friis et al. (2016) described two new species from gypsum outcrops in eastern Ethiopia, one of them being an up to 3.5 m tall shrub, and provided an overview of the 14 species then known from Somalia, Ethiopia and Eritrea.

However, during field work in Ogaden in southeastern Ethiopia in 2006 and 2007, another shrubby gypsum plant had been collected in two localities by the present author, along with Hassan Yusuf Kaaariye and Friedrich Wilhelm. This again agreed with *Commicarpus plumbagineus* by having white flowers with a prominent perianth-tube and was provisionally identified as another shrubby form of this species. As the

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material was poor and scanty, it was left without further study. However, Hassan Yusuf Kaariye has recently been back to one of the localities and managed to take good photographs of the plant. This stimulated a new study of the available material and this Ethiopian species is described below as *C. ogadenensis*.

The Horn of Africa region in the sense of Thulin (2004), now with about 20 species of *Commicarpus* recorded, is clearly a center of endemism and diversity for the genus. Gypsophily or gypsum-tolerance is common among xerophytic members of Nyctaginaceae (Douglas and Manos 2007), and *Commicarpus ogadenensis*, and to some extent *C. altus*, add to the list. Other examples of gypsophilous species of *Commicarpus* in the Horn of Africa region are *C. macrothamnus* Friis & O. Weber in Ethiopia (Friis et al. 2016) and *C. reniformis* (Chiov.) Cufed. in Somalia and Yemen. The single African member of the otherwise North American genus *Acleisanthes* A. Gray, *A. somalensis* (Chiov.) R.A. Levin (syn. *Selinocarpus somalensis* Chiov.), is a gypsium endemic in Somalia (Thulin 1993, 2006).

**Commicarpus altus** Thulin sp. nov. (Fig. 1, 2)

This species differs from *C. plumbagineus* (Cav.) Standl. by being a slender shrub (versus herb or subshrub, woody towards base only) with succulent (versus herbaceous) leaves, glabrous (versus sparsely to densely pubescent) perianth and pedicels with a joint 1–2 mm below the base of the anthocarp (versus with joint at base of anthocarp).

**Type:** Somalia, Galguduud Region, 2–10 km S of El Bur along road towards El Dere, ca 4°38′N, 46°37′E, 13 May 1983, 150 m a.s.l., M. Thulin & A. M. Warfa 4654 (holotype: UPS No. V-983266, isotypes: EA, FT, K).

**Description**

Slender shrub, up to at least 4 m tall if scandent, free-stands and ± erect plants up to about 3 m tall; stems terete, glabrous or puberulous with minute glandular ± crisped hairs when young, particularly near nodes, older stems glabrous, greyish or greyish brown. Leaves succulent; lamina ± broadly ovate to suborbicular, 6–40 × 5–40 mm, shortly acuminate to obtuse at the apex, broadly cuneate to truncate at the base, glabrous to minutely puberulous on both sides, subentire, indistinctly veined; petiole 2–12 mm long, sparsely to ± densely puberulous, canaliculate. Inflorescences axillary, umbellate, by reduction of upper leaves often forming a lax terminal panicle; peduncles up to 30 mm long, glabrous; umbels 3–7-flowered; pedicels elongating up to 10 mm in fruit, with a joint 1–2 mm below the anthocarp; bracts narrowly elliptic to oblanceolate, acute, 1.5 mm long, ciliate, caducous. Perianth (including anthocarp) 12–14 mm long, glabrous outside; perianth-limb (upper part of perianth) 10–12 mm long, funnel-shaped, white, 6–8 mm wide, 5-lobed, narrowing below into a 6–7 mm long tube; veins of limb 5, glandular puberulous at the tip. Stamens 3, long-exserted; filaments with free part ca 15 mm long, inserted ca 2 mm above base of upper part of perianth, glabrous; anthers 0.7–0.8 × 1.0–1.2 mm. Ovary shortly stipitate, the stipe surrounded by a short tube formed by the fused bases of the filaments; style 16–18 mm long, long-exserted, glabrous; stigma disk-shaped, 0.4 mm in diameter. Anthocarps clavate, 10-ribbed, 6.0 × 2.0–2.5 mm, tapering at the base, glabrous, crowned by a subapical whorl of 5 ± dark glands on ca 1 mm long stalks, and also with some smaller scattered sessile ± pale glands along the ribs.

**Distribution and habitat**

*Commicarpus altus* is known from the Galguduud, Hiiraan and Shabeellaha Dhexe Regions in central Somalia (Fig. 3), where it occurs on gypsumous and/or saline soils at elevations of 125–150 m a.s.l. The type locality in Galguduud Region is a gypsumous plain with saline depressions, where the sparse vegetation includes scattered bushes or small trees of species of *Commiphora, Terminalia, Senegalia* and *Vachellia*. The field layer includes, for example, *Chascanum elбуррене Thulin* (2005), *Indigofera gypsacea* Thulin (1992) and *Xylocalyx carrerea* Thulin (1987), all with more or less narrow distributions and, to various degrees, confined to gypsumous ground. According to Merla et al. (1979), the locality is within the area of the ‘Taleh Evaporite’, a geological formation mainly composed of anhydrite and dating from the early Tertiary. However, Abbate et al. (1994) restricted the Taleh Evaporites to northern Somalia, whereas the type locality of *Commicarpus altus* falls within the area of the ‘Mudug Beds’ with gysiferous sands and sandy clays, dating from Oligocene to early Miocene.

The two adjacent localities in Hiiraan and Shabeellaha Dhexe Regions are on silt plains, outside the gysiferous areas, with *Limonium*, *Suaeda* and small bush clumps and open patches of woodland with mainly *Euphorbia robecchii* and *Vachellia reficiens*. The presence of species of *Limonium* and *Suaeda* indicates saline conditions. The two localities fall within the area of alluvial deposits from the Wabi Shabelle River, dating from Pleistocene to present (Merla et al. 1979, Abbate et al. 1994).

**Similar species**

In the label information of the type collection, the plant is described as a slender scandent shrub, up to at least 4 m tall, growing in bushes, whereas the paratypes Kuchar 17238 and 17394 are described as, respectively, a brittle shrub to 3 m and a shrub to 2 m. This makes *Commicarpus altus* one of the tallest species in the genus (hence the specific epithet), and perhaps the tallest woody one. The much more robust *C. macrothamnus* in the Oromia Regional State of Ethiopia is a free-standing shrub up to about 3.5 m tall with purplish pink flowers (Friis et al. 2016). Another more or less woody species growing in central Somalia is *C. bhiranensis* Thulin, a species that can become an up to 2 m tall straggling shrub (Fide Kuchar 15982), but with pink or red flowers.

However, the species that is most similar to *Commicarpus altus* is *C. plumbagineus*, the only other species in the Horn of Africa region with white flowers with a prominent
perianth-tube. *Commicarpus plumbagineus* is very widespread, ranging in Africa from Senegal in the west to Somalia in the east and South Africa and Madagascar in the south, and is also found in Jordan, Israel, Saudi Arabia, Yemen and southern Spain (Whitehouse 1996). *Commicarpus altus* differs from this species by being a slender shrub (versus scrambling herb or subshrub, woody towards base only) with succulent (versus herbaceous) leaves, flowers in umbels (versus in inflorescences often composed of both umbels and verticels), glabrous (versus sparsely to densely pubescent) perianth, and by having pedicels with a joint 1–2 mm below the base of the anthocarp (versus with a joint at base of anthocarp). The position of the joint on the pedicel clearly below the anthocarp (Fig. 2) is a difference not only from *C. plumbagineus*, but apparently from most other species in the genus.
Additional specimens examined (paratypes)
Somalia, Hiiraan Region: 2.8 km N from Jalalaksi turnoff on highway to Bulo Burte, 3°26′N, 45°31′E, 6 Dec 1986, 125 m a.s.l., P. Kuchar 17238 (UPS). Shabeellaha Dhexe Region: 1.5 km E of Biyo Kululo, 3°19′N, 45°30′E, 25 Aug 1987, 125 m a.s.l., P. Kuchar 17394 (UPS).

Commicarpus ogadenensis Thulin sp. nov. (Fig. 4–6)

Type: Ethiopia, Somali National Regional State (Harerge), 7 km E of Kebri Dehar, 6°45′N, 44°21′E, 4 Feb 2007, 550 m a.s.l., M. Thulin, Hassan Y. Kaariye & F. Wilhelmi 11594 (holotype: ETH, isotypes: K, UPS No. V-220620).

Figure 2. Commicarpus altus sp. nov. (A) portion of inflorescence, (B) anthocarp, showing glands and jointed pedicel. From holotype. Scales = 2 mm.

Figure 3. Map of Horn of Africa, showing distributions of Commicarpus altus sp. nov. (triangles) in Somalia and C. ogadenensis sp. nov. (circles) in Ethiopia.
The species differs from *Commicarpus plumbagineus* (Cav.) Standl. by being an erect and free-standing shrub (versus scrambling herb or subshrub, woody towards base only), with succulent (versus herbaceous) leaves, densely glandular pubescent (versus glabrous to pubescent) inflorescences and anthocarps, and by having five (versus three) stamens. From *C. altus* Thulin it differs by the densely glandular pubescent (versus glabrous) inflorescences and anthocarps, the five (versus three) stamens, and by having pedicels with a joint immediately below the anthocarp (not with joint 1–2 mm below the base of the anthocarp).

**Description**
Shrub, 0.5–2.5 m tall, erect and free-standing; stems terete, densely pubescent when young with glandular hairs 0.1–0.4 mm long, older stems densely pubescent with eglandular ± crisped hairs, finally glabrous, greyish to greyish brown. Leaves succulent; lamina ± broadly ovate to suborbicular, 20–70 × 20–80 mm, subacute to obtuse at the apex, broadly cuneate to truncate at the base, ± densely pubescent with short crisped hairs on both sides or glabrescent, entire to very shallowly undulate, indistinctly veined; petiole 5–30 mm long, sparsely to densely pubescent with short crisped hairs, canaliculate. Inflorescences axillary, umbellate, by reduction of upper leaves often forming a lax terminal panicle; peduncles up to 60 mm long, densely glandular pubescent and ± sticky; whorls single, 5–10-flowered; pedicels 1–3 mm long, elongating up to 6 mm in fruit, densely glandular pubescent, with a joint at the tip; bracts narrowly elliptic to ± narrowly oblanceolate, acute, 3–6 mm long, pubescent with crisped and glandular hairs, caducous. Perianth (including anthocarp) 12–15 mm long, densely pubescent with mostly glandular hairs outside; perianth-limb (upper part of perianth) 9–12 mm long, funnel-shaped, white, with mouth of tube greenish inside, 10–15 mm wide, shallowly 5-lobed with ± emarginate lobes, narrowing below into a 5–8 mm long tube,
greenish outside; veins of limb 5, glandular pubescent at the tip. Stamens 5, long-exserted; filaments with free part 15–20 mm long, inserted ca 5 mm above base of upper part of perianth, white, glabrous; anthers 0.6–0.8 × 0.8–1.2 mm. Ovary shortly stipitate, in basal part of anthocarp, the stipe surrounded by a short tube formed by the fused bases of the filaments; style 20–30 mm long, long-exserted, white, glabrous; stigma disk-shaped, 0.3–0.4 mm in diameter. Anthocarps narrowly cylindrical to narrowly clavate, ribbed, 6.0–10.0 × 1.5–2.0 mm, tapering at apex and base, densely pubescent with glandular hairs and with scattered glands along the ribs.

Distribution and habitat

Commicarpus ogadenensis is known from two localities in southeastern Ethiopia (Ogaden) (Fig. 3), where the species occurs in open Senegalia–Vachellia–Commiphora bushland on gypsum. The type locality near Kebri Dehar is on a gypsum plain at an elevation of 550 m a.s.l. (Fig. 4) in an area called Ceelxaar (Hassan Y. Kaariye, pers. comm.), which is also the type locality for Ceropegia gypsophila Thulin (2009b). Other more or less local gypsum endemics found there are Kleinia gypsophila Lebrun and Stork (1990) and Euphorbia suborbicularis Thulin (2009a), the latter a photographic record by Hassan Y. Kaariye.

The second locality is an area of gypsum hills, about 120 km SW of the type locality, at an elevation of 350 m a.s.l. In geological terms, both localities are within the ‘Main Gypsum Formation’ of Merla et al. (1979), dating from the late Jurassic to early Cretaceous. More localities of the species are to be expected among the numerous
gypsum outcrops found in the region. In the geological map presented by Mengesha et al. (1996), the Main Gypsum Formation has a somewhat different extent compared to Merla et al. (1979), and the gypsum outcrops E of Kebri Dehar are not indicated.

**Similar species**

The material available of *Commicarpus ogadenensis* is poor and was provisionally identified as a form of *C. plumbagineus*, with which it agrees by having white flowers with a distinct perianth-tube (Fig. 4, 5B). However, the new species differs from *C. plumbagineus* by being an erect and free-standing shrub (versus scrambling herb or subshrub, woody towards base only), with succulent (versus herbaceous) leaves, densely glandular pubescent (versus glabrous to pubescent) inflorescences and anthocarps (Fig. 6), flowers in umbels (versus in inflorescences often composed of both umbels and verticels), and by having five (versus three) stamens (Fig. 4B). Among the species in the Horn of Africa region, the only other species that may have five stamens is *C. pedunculosus* (A.Rich.) Cufod., a species with bright pink or magenta flowers in head-like inflorescences. Further south in Africa, there are also, for example, *C. pentandrus* (Burch.) Heimerl and *C. greenwayi* Meikle, which may have five stamens, but both have pink to purple flowers (Whitehouse 1996).

*Commicarpus ogadenensis* differs from *C. altus* by its densely glandular pubescent (versus glabrous) inflorescences and anthocarps (Fig. 6), the five (versus three) stamens (Fig. 4B), and by having pedicels with a joint immediately below the anthocarp (not with joint 1–2 mm below the base of the anthocarp).

**Additional specimens examined (paratypes)**

Ethiopia, Somali National Regional State (Harerge): 0.5–1 km W of Karinga-egy along the road between Gode and Kelafo, 5°46’N, 43°51’E, 24 May 2006, 350 m a.s.l., M. Thulin, Hassan Y. Kaariye & F. Wilhelmi 11330 (ETH, UPS).

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