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Research article

Boswellia oropedionis (Burseraceae) sp. nov., a frankincense tree from Socotra, and notes on *B. ameero* and *B. bullata*

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The new species *Boswellia oropedionis* Thulin and M.H.Weber is described, illustrated by photographs and mapped. This tree is only known from a small population growing on level limestone on the Qatariyah plateau in southern Socotra and is the twelfth endemic species of *Boswellia* from the Socotra archipelago. It differs from *B. dioscoridis* Thulin by having 7–9-foliolate leaves with pubescent nerves on the upper side, and by having larger flowers and fruits. *Boswellia ameero* Balf.f. is shown to have broadly winged pyrenes, an unusual feature in the genus and unique among the species on Socotra. Two new localities are reported for *B. bullata* Thulin, which is shown to have mostly narrowly winged pyrenes.

Keywords: endemic species, taxonomy, Yemen

Introduction

The high and spectacular cliffs above the coastal plain (Qa'Arah) of southern Socotra (Fig. 1) are home to a number of rare endemic plants, such as *Scaevola socotraensis* H.St. John and *Erythroxylum socotranum* Thulin. In a few places, footpaths lead all the way up to the Qatariyah plateau above the cliffs and such a path was followed by MHW and SAMM on 21 May 2024. Some 60–80 plants seen of *E. socotranum* on the way up constitute the largest population known of this species, but the greatest surprise came after having reached the plateau, where a small stand of an unusual *Boswellia* was found that could not be identified with certainty. A small collection was made that was subsequently sent to MT, who made the judgement that it represented a hitherto unknown species. Previously, 11 species of *Boswellia*, all endemic, were known from the Socotra archipelago (Thulin 2020), the latest one to be formally described being the dwarf tree *Boswellia hesperia* Thulin, M.H.Weber and Rzepecky (Thulin et al. 2025). We here describe the tree from the Qatariyah plateau as a twelfth species of *Boswellia* from the archipelago and the 25th species in the genus as a whole, along with providing some notes on *Boswellia ameero* Balf.f. and *Boswellia bullata* Thulin.

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Figure 1. The cliffs above the coastal plain of southern Socotra, 21 May 2024. Photograph by Michael Weber.

Boswellia oropedionis Thulin and M.H.Weber sp. nov. (Fig. 2–6)

A species differing from *Boswellia dioscoridis* Thulin by having 7–9-foliolate leaves pubescent with crisped hairs along the nerves above (versus leaves mostly 11–17-foliolate and entirely glabrous above), petals 7.0 × 3.5 mm (versus 5.0 × 2.5–3.0 mm), stamens with filaments 3 mm (versus 1.5–2.0 mm) long and anthers 2.8 mm (versus 1.2–1.8 mm) long, disk 5.5 mm (versus 3.0–3.5 mm) in diameter, fruits 12–15 × 10–12 mm (versus 7–12 × 4–9 mm) and pyrenes 8.0–10.0 × 4.5–5.5 mm (versus 5.5–7.5 × 2.0–4.0 mm).

Type: Yemen, Socotra, Qatariyah plateau, near archeological site Di Tiq, 12°20′35″N, 53°45′30″E, 513 m a.s.l., 21 May 2024, fl. and fr., Weber and Mubarak 12 (holotype: UPS, isotype: Aden Univ.).

Etymology

The epithet 'oropedionis' (from Greek for 'of the plateau') refers to the habitat of the species.

Description

Tree, 4–5 m tall, with a somewhat expanded trunk-base; bark grey, flaking. Leaves crowded at shoot-apices, imparipinnate, 7–9-foliolate, 15–16 cm long; petiole 10 mm long, glabrous; rhachis not winged, glabrous; leaflets sessile, opposite, 15–65 × 15–45 mm, ovate-oblong to broadly ovate, the proximal ones suborbicular, truncate to shallowly cordate and ± asymmetric at base, obtuse at apex, with ± distinctly crenate and reflexed margins, green to dark purple above, pale green and sometimes tinged with purple below, with prominent venation, pubescent with crisped hairs along the nerves above, glabrous or subglabrous beneath. Flowers produced with the leaves, in glabrous many-flowered racemes or narrow panicles up to 20 cm long clustered at ends of short shoots; peduncle 5 cm long, sulcate; rhachis sulcate; pedicels 5–12 mm long.



Figure 2. *Boswellia oropedionis* sp. nov., from type locality, 21 May 2024. (A) tree, showing expanded trunk-base, (B) upper branches of tree, showing leaves, inflorescences and young fruits. Photographs by Michael Weber.

Calyx broadly cup-shaped, glabrous, 2 mm long, with (4–)5 short, broadly triangular lobes. Petals (4–)5, greenish white, flushed pinkish outside, 7.0 × 3.5 mm, spreading, narrowly ovate, with a subacute incurved apex, glabrous on the outer surface, minutely papillose on the inner surface and along margins. Stamens (8–)10, inserted at the base of and between

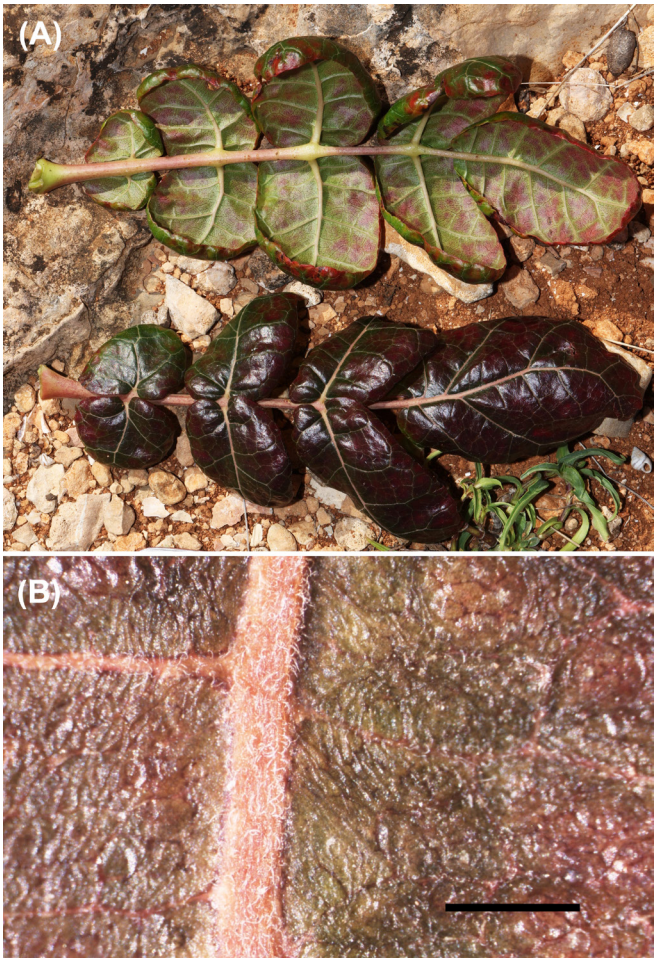


Figure 3. *Boswellia oropedionis* sp. nov. (A) leaves, showing lower (above) and upper (below) sides, from type locality, 21 May 2024, (B) detail of upper side of leaf showing indumentum on nerves, scale = 1 mm. Photographs by Michael Weber (A) and Mats Thulin (B).

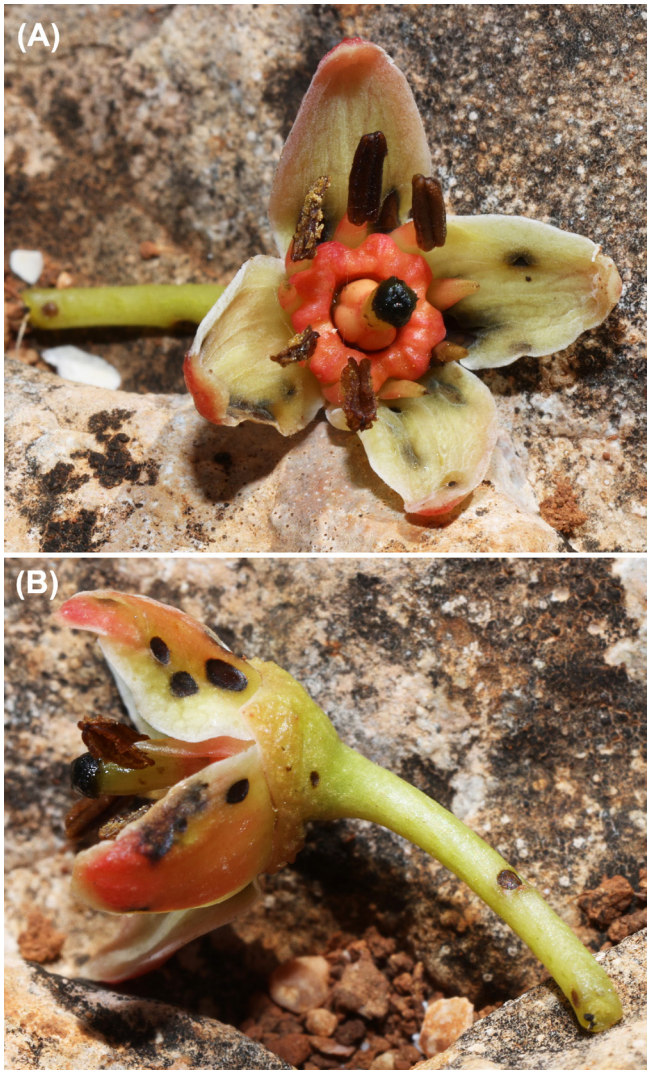


Figure 4. *Boswellia oropedionis* sp. nov., from type locality, 21 May 2024. (A) flower, top view, (B) flower, side view. Photographs by Michael Weber.



Figure 5. *Boswellia oropedionis* sp. nov., from type locality, 21 May 2024, showing infructescence with young fruits. Photograph by Michael Weber.



Figure 6. Fruit of *Boswellia oropedionis* sp. nov. with beginning dehiscence (left) and pyrene (right), from Weber and Mubarak 12. Scale = 1 mm. Photograph by Mats Thulin.

the lobes of the disk; filaments 3 mm long, linear, widened towards the base, glabrous; anthers 2.8 mm long, oblong in outline, glabrous. Disk concave, 1.5 mm high and 5.5 mm in diameter, (8–)10-lobed, smooth, pinkish. Pistil 5 mm high, with 4–5 furrows, glabrous; style 2.5 mm long; stigma truncate-capitate. Fruits 4–5-locular, 12–15 × 10–12 mm, subglobose to broadly pyriform, glabrous; pyrenes 8.0–10.0 × 4.5–5.5 mm, subcruciform in outline, narrowing to both ends, trigonous, not or narrowly winged.

Distribution and habitat

Boswellia oropedionis is known only from a single population of approximately five trees on the Qatariyah plateau in southern Socotra (Fig. 7), at 513 m a.s.l. This limestone plateau is level, largely barren and almost devoid of other trees or shrubs in the area of the new species (Fig. 2A). The tree to the left in the background of Fig. 2A is *B. ameero*. Further to the west on the Qatariyah plateau there are denser stands of trees which, according to Madĕra et al. (2024), include *B. ameero*, *Boswellia elongata* and *Boswellia popoviana*. It is likely that also *B. oropedionis* occurs in these stands and that it has a wider distribution on this botanically little explored and rather inaccessible plateau.

The high cliffs above the coastal plain would seem to make this area difficult for settlement and today the Qatariyah plateau has few permanent inhabitants, although goats are

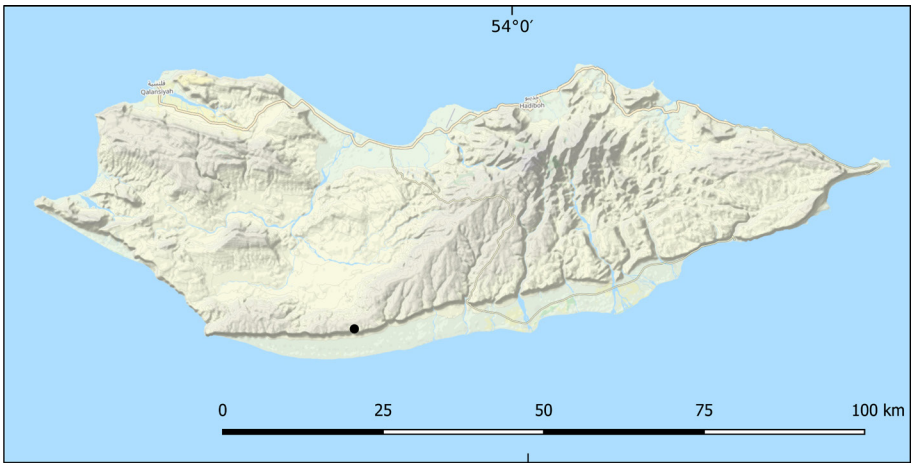


Figure 7. Map of Socotra, showing distribution of *Boswellia oropedionis* sp. nov.

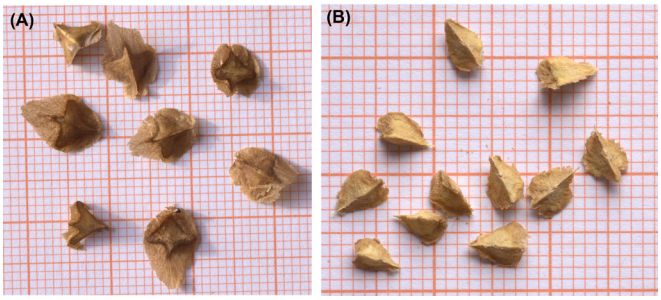


Figure 8. Pyrenes of *Boswellia*. (A) *B. ameero*, 27 Apr. 2023, mountainside 3 km south of Wadi Ayhaft settlement, 12°34′51″N, 53°59′11″E, (B) *B. bullata*, 25 Apr. 2023, from near Gishub,12°20′19″N, 53°38′08″E. Photographs by Michael Weber.

regularly being taken there for grazing. However, there are several archeological sites on the plateau that are believed to be pre-Islamic, although lack of surface finds makes a more precise dating impossible (Weeks et al. 2002). The type locality of *B. oropedionis* is situated close to Di Tiq, an archeological site composed of 'a number of well-constructed dwellings built of worked and square stone' (Weeks et al. 2002: 111), and some distance to the east is the larger site Dihub. Local tradition tells about ancient cultivation on the plateau and 'well-known and formerly built-up tracks lead from the escarpment down to the plain below' (Weeks et al. 2002: 120). The area is still important for the production of aloe from the endemic *Aloe perryi* Baker (Miller and Morris 2004), and may have been so since ancient times (Weeks et al. 2002).

Notes on taxonomy

Boswellia oropedionis is most similar to *B. dioscoridis*, the only species of the genus on Socotra with completely glabrous leaves and inflorescences. However, in *B. oropedionis* the nerves on the upper side of the leaves are pubescent with crisped hairs (Fig. 3B) and the leaves are 7–9-foliolate (Fig. 3A) versus (9–)11 – 17-foliolate in *B. dioscoridis*. Also, *B. oropedionis* has larger flowers (Fig. 4) and fruits (Fig. 5, 6) than *B. dioscoridis*. The petals are 7.0 × 3.5 mm (versus 5.0 × 2.5–3.0 mm), the stamens have filaments 3 mm (versus 1.5–2.0 mm) long and anthers 2.8 mm (versus 1.2–1.8 mm) long, the disk is 5.5 mm (versus 3.0–3.5 mm) in diameter, the fruits are 12–15 × 10–12 mm (versus 7–12 × 4–9 mm) and the pyrenes are 8.0–10.0 × 4.5–5.5 mm (versus 5.5–7.5 × 2.0–4.0 mm). There are no records of *B. dioscoridis* from the Qatariyah plateau or its vicinity in southern Socotra. Instead, *B. dioscoridis* has its distribution in the eastern part of the island (Thulin 2020: Fig. 82).

Conservation

With only approximately five trees known from a single locality, *B. oropedionis* is here preliminary assessed as 'Critically Endangered' CR D according to the IUCN Red List Categories and Criteria (IUCN 2012). No young plants were seen and grazing by goats is an obvious threat to the regeneration. Although more trees of the species can probably be found on the Qatariyah plateau, it is likely that the assessment CR will stand.

Notes on *Boswellia ameero* and *B. bullata*

Boswellia ameero

Thulin (2020) described the pyrenes of *Boswellia ameero* as 'not winged'. However, as shown in Fig. 8A, the pyrenes of this species are in fact more or less broadly winged. The previous description was based on scarce and mostly old fruiting material, where the brittle wings of the pyrenes may have become detached. Broadly winged pyrenes are unusual in the genus and unique for *B. ameero* among the species on Socotra. Otherwise, broadly winged pyrenes are characteristic



Figure 9. *Bowellia bullata*, small trees growing on top of huge rock just off the coast, 29 Apr. 2023. Photograph by Michael Weber.



Figure 10. *Boswellia bullata*, from near Gishub, 25 Apr. 2023, showing portions of leaves, flower and fruits. Photograph by Michael Weber.

for the two Indian species, *B. serrata* Roxb. and *B. ovalifoliolata* N.P.Balakr. and A.N.Henry, whereas on the African continent only *B. globosa* Thulin in Somalia can match.

Boswellia bullata

Also in the description of *Boswellia bullata* by Thulin (2001, 2020), the pyrenes were described as 'not winged'. Again, this was based on scarce fruiting material, in this case probably of not fully mature fruits. As shown in Fig. 8B, the pyrenes of *B. bullata* are in fact mostly narrowly winged.

Boswellia bullata is restricted to the western part of Socotra according to Thulin (2020: Fig. 62). Two new localities can now been added to this map, one close to previously known localities at 12°37′25″N, 53°24′13″E (Weber and Mubarak 2, Aden Univ., UPS, 29 Apr. 2023), a population growing on top of a huge rock just off the coast (Fig. 9) consisting of unusually small trees, mostly less than 1.5 m tall. The second new locality is further to the south-east on cliffs near Gishub, at 12°20′19″N, 53°38′08″E (Fig. 10).

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Author contributions

Mats Thulin: Conceptualization (lead); Data curation (lead); Investigation (lead); Resources (equal); Visualization (equal); Writing – original draft (lead); Writing – review and editing (lead). **Michael H. Weber**: Conceptualization (supporting); Data curation (supporting); Investigation (supporting); Resources (equal); Visualization (equal); Writing – original draft (supporting); Writing – review and editing (supporting). **Sami Ali Mohammed Mubarak**: Conceptualization (supporting); Data curation (supporting); Investigation (supporting); Resources (equal); Visualization (equal); Writing – original draft (supporting); Writing – review and editing (supporting).

Data availability statement

There are no additional data for this paper.

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