

## Research Article

# A new record of *Euphorbia atoto* (Euphorbiaceae) in Bangka Belitung and notes of *Coptosapelta hammii* (Rubiaceae) for Borneo

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## Abstract

*Euphorbia atoto* (Euphorbiaceae) and *Coptosapelta hammii* (Rubiaceae) have been recently collected from Belitung Islands, east of Sumatra, west Malesia. The discovery of *Euphorbia atoto*, combined with specimens kept in BO, is a new record for Bangka and Belitung Island, while *C. hammii* is considered to be an important rediscovery of a species thought to be endemic. Further examination of previously collected materials of *C. hammii* shows that this species has also been collected from Borneo, which means this species is no longer endemic to Belitung. Descriptions, photographs, notes on uses and a brief discussion are given.

**Keywords:** heath forest, plant diversity, Sumatra, west Malesia

## Introduction

Bangka Belitung is one of the largest island complexes that lies outside the mainland of the Sumatran phytogeographical region. It takes its name from the two largest islands situated southeast of Sumatra, viz in the Karimata Strait. Both islands are situated between Sumatra and Borneo and Belitung Island is more or less located between Sumatra and Borneo.

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In these islands, there are plenty of heath forests. It is one of the most unique ecosystems in Indonesia. The main constituent of the substrate in the heath forest is quartz and sand. The uniqueness of vegetation in the heath vegetation especially the one in Belitung was observed a long time ago by Valetton (1908a). He thought this vegetation is unique because most species have not been found in Java, one of the nearest island with good knowledge on the diversity of plants. Due to its peculiar stature, similar to the disturbed forest in appearance, heath vegetation sometimes was not considered as an important forest type in Indonesia (see Sulistyaningsih et al., 2019). Such kind of physiognomy, such as the small size of trees compared to other types found in the rainforest, e.g. dipterocarp forest, may be caused by the properties of the substrate which affect the availability of resources needed by plants, such as water (Becker, 2006).

After the 2000s, there was an increase in interest towards the diversity in these islands, particularly for plants. In Belitung, the now already established Belitung Geopark is perhaps one of the most important factors. The existence of widespread heath vegetation on this island also played quite a significant role in attracting scientists.

Some studies in plant diversity, ecology or even ethnobotany have been carried out (Oktavia, 2015; Oktavia et al., 2015; Rizqiani et al., 2018; Sulistyaningsih et al., 2019). Some of them yielded important discoveries that contribute to our knowledge of plant diversity either for Bangka Belitung, Sumatra or even Malesia. A good example is the discovery of *Archidendron borneense* (Benth.) Nielsen and *Syzygium claviflorum* (Roxb.) Wall. ex Steud. on Belitung Island (Sulistyaningsih et al., 2019).

During our study, we found that two noteworthy plant species had recently been collected from the islands. The first is *Euphorbia atoto*, which is the first record for Bangka Belitung Islands. The second is *Coptosapelta hammii*, a species previously reported as a Belitung endemic, which based on a further examination either from literature or herbarium, is no longer a Belitung endemic because it has been collected from Borneo. Its distribution is discussed.

## **Materials and Methods**

Materials used in this study were collected in 2019 during a plant exploration to Belitung Islands carried out by the Ecology and Plant Resources Division, Department of Biology, Faculty of Mathematics and Natural Sciences, IPB

University, Bogor, Indonesia. Plants were collected and preserved as dried herbarium specimens. The morphological description are based on dried materials supplemented by field notes for living characters. A further examination of specimens was also made in the Herbarium Bogoriense (BO), supplemented by digital images and database available in L (bioportal.naturalis.nl), K (apps.kew.org/herbcat), P (science.mnhn.fr/institution/mnhn/collection/p/list) (acronyms follow Thiers, 2019-continuously updated), and University of Brunei Darussalam (ubdherbarium.fos.ubd.edu.bn/).

## Results and Discussion

### *A New Record of Euphorbia atoto in Bangka Belitung Islands*

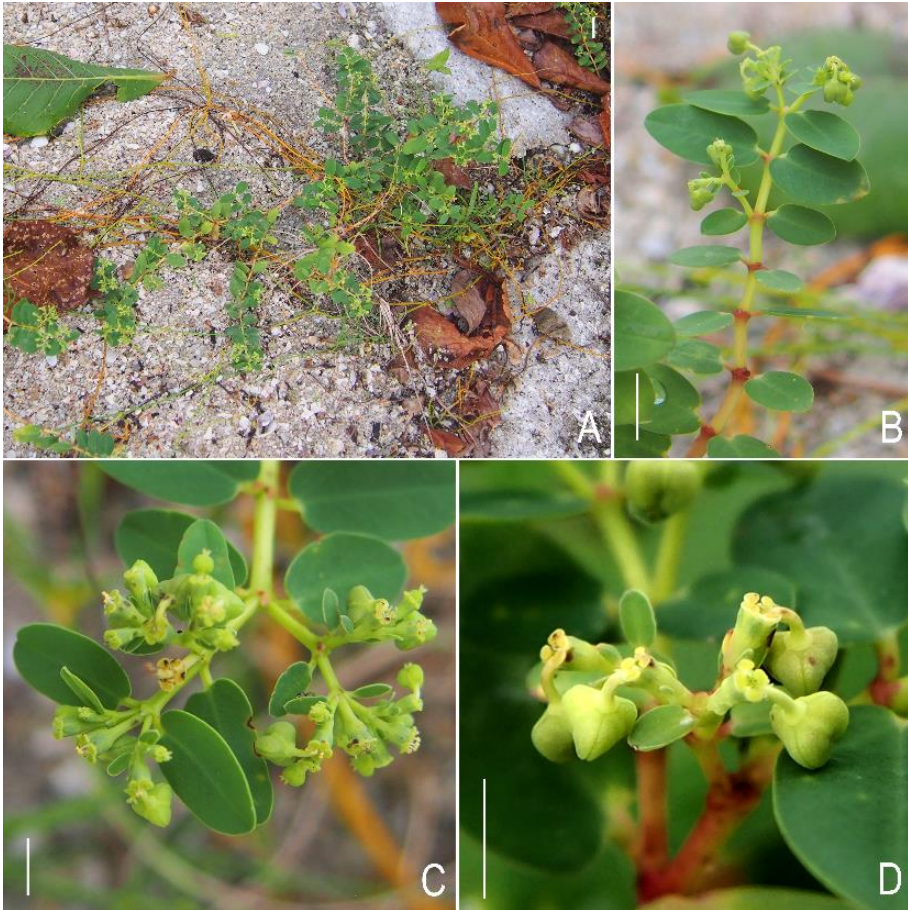
The Euphorbiaceae of Sumatra were revised by Airy Shaw (1981), who reported six species of *Euphorbia* of which three are native including *Euphorbia atoto*. The previous records of *Euphorbia atoto* in Sumatra included those from the southern mainland and islands in the west (Batu and Enggano). In BO, we found four specimens collected from Bangka that seems overlooked by Airy Shaw during the revision of Sumatran *Euphorbiaceae* (Airy Shaw 1981). Added with our recent collection from Belitung, therefore, these represents the first for Bangka Belitung Islands.

***Euphorbia atoto*** Forst. f., Fl. Inst. Austr.: 36 (1786); Backer & Bakhuizen f. Fl. Java 2 (1963) 503; A.R. Smith in Airy Shaw, Euph. Born.: 111 (1975); Airy Shaw, Kew Bull. 36(2): 295 (1981); Ma & Gilbert, Fl. China 11: 292 (2008). - Type: Society Islands. Tahiti, *Forster s.n.* (Lecto K! designated by Smith (1981), rejected by Florence (1996)). - Figure 1.

**Distribution:** Widespread from east India to Ryukyu Island (Japan) and southeast to Queensland (Australia) and Polynesia in the Pacific Islands. In Sumatra, this species was reported to occur in the south and islands in the west (Batu and Enggano) (Airy Shaw, 1981). It is here reported from several locations in Bangka and the northwestern part of Belitung Island.

**Habitat and Ecology:** Coralline sandy beach and coral rock, including coconut plantation. In Belitung, this species grows in sand on granitic rock surfaces near the beach, below 5 m elevation. The large granitic rocks were quite frequent on the beach where this species grows.

**Notes.** *Euphorbia atoto* can be distinguished from other Sumatran species by the combination of the following characters: perennial herb or subshrub and by its non-succulent habit (Airy Shaw, 1981).



**Figure 1.** Morphology of *Euphorbia atoto*: A. Living plant. B. Branch. C. Inflorescence. D. Fruit (immature). Scale: A = 2 cm; B = 1 cm; C = 2 mm; and D = 5 mm. All from WA Mustaqim et al. ESDT 1.

The new records of this species in Bangka and Belitung possibly illustrate the lack or poor collecting efforts in both islands. This is probably because this is a coastal species which usually has a widespread distribution. The habitat recorded in Belitung Island is typical for the species, i.e. in the sandy areas near coasts (Ma & Gilbert, 2008). However, the sand where this species grows is derived from large granitic rocks, which seems to have never been mentioned in other literature. The elevation which is at c. 5 m is also typical for the species.

**Specimens examined:** Indonesia. Bangka Island, Soengai Liat, 10 m, 10 Nov 1917, *Bünnemeijer 1944* (BO!); *ibid.* Pulau Lepas, 50 m, 13 Dec. 1917, *Bünnemeijer 2455* (BO!); *ibid.* Tanjung Kalian, 11 Oct 1917, *Bünnemeijer 1557* (BO!); Bangka Archip. Ind., 25 Aug 1886, *Bokhorst 500* (BO!); Belitung Island, Tanjung Kelayang Beach, S2.56° E107.65°, *WA Mustaqim et al. ESDT 1* (BO!, FIPIA!).

*Update and Bornean record of Coptosapelta hammii*

The genus *Coptosapelta* Korth. consists of 16 accepted species. This genus is distributed in Myanmar, China including Taiwan, Indochina and many parts of Malesia. In Malesia, this genus has been recorded from Sumatra, Peninsular Malaysia, Java, Borneo, Philippines and New Guinea (Plants of the World Online, 2019).

On a few recent trips to Belitung Island, *Coptosapelta hammii*, a species hitherto known only from Belitung (Valeton, 1922; 1923; Govaerts et al., 2016; Plants of the World Online, 2019) was found. The species was described in 1908 by Theodore Valeton (1908b) based on Ham's collection gathered from Manggar and Budong (=Boedong) in 1907.

Accessing specimens both directly in BO or digital herbaria (K, L, P; acronym follow Thiers 2019, continuously updated), we noted that this species had also been recorded outside Belitung. Several collections had been gathered from Borneo, the first in 1937 but this was not reported (Govaerts et al., 2016; Plants of the World Online, 2019), except as listed material for Borneo *Tukirin 641* (L), which we did not find in BO in our last examination, in a palynological study by Verellen et al. (2004). It is formally reported here.

*Coptosapelta hammii* Valeton, Proc. Roy. Acad. Amsterdam 11: 129 (1908); *ibid.* 19: 281 (1922); *ibid.* 26: 373 (1923). - Type: Sumatra, Archip. Ind. Billiton W, around 1-31 Jan 1907, *Ham* SP 167 (lecto L, isolecto BO) (mentioned in Valeton 1922: 281).

Suberect *shrubs* or climbers, to c. 3 m length. *Stem* many angled, distinct in older stages, c. 2 mm diam., hirsute, hairs whitish, glabrescent with age. *Stipule* narrowly triangular lanceolate, 3-10 × c. 1 mm, hirsute, tapering toward the apex. *Leaves* elliptic, often subobovate, rarely elliptic-oblong or subovate, (2.3-) 5-9.3 × (1.1-) 2.9-4.5 cm, sparsely hirsute above, hairs dense on the midrib, glabrescent, hirsute beneath, especially along midrib and lateral veins, lately glabrescent; base cuneate, margin entire, apex acute to obtuse with short



**Figure 2.** Morphology of *Coptosapelta hammii*: A. Leafy branches. B. Flowers. C. Early fruiting stage. D. Submature fruit. Scale: A-B and D= 1 cm; and C = 0.5 cm. All from WA Mustaqim et al. ESDT 2.

acumen, or shortly acuminate; midrib immersed above, raised beneath; lateral veins 5-9 on each side of the midrib, arcuate especially near the margin. *Inflorescence* terminal, 4-6-flowered, lower flowers subtended by leaves, inflorescence axis to c. 2.6 cm long. *Flowers* 5-merous. *Calyx* velvety, hairs

white; ovary portion subglobose, 3.5-4 mm long and wide; limb deeply lobed, lobes linear, 6-9 × 0.5-2 mm, acute, hirsute outside. *Corolla* hirsutulous throughout the tube, cylindrical, slender, 5.4-6 cm long, limb obovate-lanceolate, 1.4-1.7 × 0.4-0.5 cm, apex obtuse or rounded. *Stamens* alternatipetalous, filaments short, c. 0.5 mm long, anthers linear, c. 5.5 × 0.6 mm, apex acute, filaments and connective hairy, hairs as the corolla tube, the upper half of the connective glabrous. *Style* very slender, c. 5.8 mm long, glabrous, stigma clavate, c. 0.4 mm long, blackish when dry, exerted for the majority of the length. *Capsule* ellipsoid, 1.7-2.2 × 1.1-1.5 cm, calyx limb persistent, erect. - Figure 2.

**Distribution:** Sumatra (Belitung Island) and Borneo (Kalimantan).

**Habitat and ecology:** Valeton (1923) recorded the habitat as sandy barren soil. From the recent field trip, it grows in a wider range of habitats, including padang vegetation and also forest or shrub vegetation on podzolic soil.

**Vernacular names and Uses:** *Akar bunga padang* (Kalimantan); *Akar segendai* (Sumatra: Belitong).

**Notes:** This species is recognized by the combination of the following characters: corolla tube more than twice the length of the lobes, anthers without hairs, and secondary veins ranging from 5 to 7 on each side of the midrib (Valeton, 1923).

Valeton described *Coptosapelta hammii* as a shrub, but it is actually quite variable in habit, i.e. from shrub to liana-like. The shrub-like appearance seems to be the result of adaptation to the padang habitat, where no host plants occur and where its growth is limited. Valeton categorized it as xerophilic. Our observations in Belitung Island confirmed this for plants growing in heath vegetation, possibly the result is an adaptation to the quite dry environment in the heath forest (Turner et al., 2000).

**Additional specimens examined:** Indonesia. Sumatra: Belitung Island, Cendil Village, WA *Mustaqim et al.* ESdT 2 (BO!, FIPIA!). Borneo: West Kalimantan, Singkawang, Pasir Pandjang, 4 Oct 1937, *Dunselman 67* (BO! PI-image seen [P03984061]); *ibid.* 1 July 1949, *Polak s.n.* (BO!); *ibid.* 15 Feb 1937, *Dunselman s.n.* (BO!); *ibid.* Muara Kendawangan Nature Reserve, S02°34'19" E110°22'07", 6 May 2001, *Tahan Uji 4337 (field no. 4239 and 4337)* (BO!). East Kalimantan, Bukit Tengkilang off 30 km NE of Palangkaraya, Central Kalimantan, 60 m, 30 Nov 1995, *Ambriansyah & Arifin A.A.996* (L!-image seen [L.290573], PI-image seen [P04951575], WAN); East Kalimantan, W. Kutei, Kelinjau River, near Nelan, 15 June 1954, *Kostermans 9598* (BO!). Indonesia: location not recorded, *s.coll.*,

*s.n.* (field number no 58) (K!-image seen [K001325114]); location not recorded, *s.coll.*, *s.n.* (field number no 40) (P!-image seen [P03984059]).

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