

The orchid diversity of Banggai Kepulauan, Central Sulawesi, Indonesia

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ABSTRACT. Few orchid studies have focused on the satellite islands of Sulawesi, including the Banggai Kepulauan Archipelago. This study aims to understand the diversity of orchid species in Banggai Kepulauan and to add data on the diversity of orchids in Sulawesi. We identified 28 species of orchids from Banggai Kepulauan, of which two are endemic to Sulawesi: *Dendrobium jubatum* Schuit. & de Vogel and *Dendrobium rhodobalion* Schltr.; four species are only distributed in the eastern part of Indonesia: *Cylindrolobus quadricolor* (J.J.Sm.) Rauschert, *Dendrobium lanceolatum* Gaudich., *Dendrobium purpureum* Roxb. and *Habenaria beccarii* Schltr.; three species are new records for Sulawesi: *Aphyllorchis acuminata* J.J.Sm., *Dendrobium acinaciforme* Roxb. and *Tainia trinervis* (Blume) Rchb.f.; and one species is a new record for Banggai Kepulauan: *Crepidium resupinatum* (G.Forst.) Szlach.

Keywords. Endemic, flora, new records, Orchidaceae

Introduction

Sulawesi is an island situated directly east of Borneo, west of the Maluku Archipelago, and south of the Philippines. Sulawesi is at the centre of a floristic mixture of elements from Asia and Australia (Van Steenis-Kruseman, 1950). The island is megadiverse with 7068 species of plants and fungi (Retnowati & Rugayah, 2019) and this number will continue to increase as floristic studies and fieldwork continue.

Orchid surveys have been carried out infrequently in Sulawesi. Schlechter (1911) collected in Minahasa and Toli-Toli, on Mt Klabat, Mt Lokon, Mt Mahawo, Mt Masarang, and in the mangroves of Toli-Toli. He recorded 234 species of orchids (Schlechter, 1911). Later, Schlechter reported that there were 321 species of orchids in Sulawesi and that 253 of these were endemic (Schlechter, 1925). Thomas & Schuiteman (2002) increased the number of orchids recorded from Sulawesi. They reported 540 species, of which 286 species are endemic to the island. In the latest report, there are 499 species of orchids in Sulawesi (Rustiami, 2019).

So far, orchid studies have focused on the mainland island of Sulawesi (Schlechter, 1911, 1925; Thomas & Schuiteman, 2002; Putri, 2006; Ramadanil, 2010; Lestari & Santoso, 2011; Managanta & Pangli, 2014; Braem, 2015; Broto & Pratama, 2015; Hiola et al., 2015, 2019; Pemba et al., 2015; Puspitaningtyas, 2017, 2019a, 2019b; Sulistiarini et al., 2017; Wibowo & Juswara, 2017; Fahlil et al., 2018; Yubu

et al., 2018; Lianarti, 2019; Metusala, 2019, 2020; Handoyo et al., 2020; Hartini & Aprilianti, 2020; Tikuallo et al., 2020; Wololi et al., 2021). Few collecting trips have been conducted on the satellite islands, and only two published orchid studies have focused on one of these, namely Wawonii Island, Southeast Sulawesi (Sulistiarini et al., 2007; Sulistiarini, 2008). No information is available for Banggai Kepulauan, Central Sulawesi, as yet.

A floristic exploration of Banggai Kepulauan was first carried out by D.W. Horst in 1899, although the number of collections made is unclear. Meanwhile, Kaudern in 1920, collected 20 species of plants in Banggai Kepulauan (Steenis-Kruseman, 1950). An exploration of Banggai Kepulauan by Rahmadi et al. (2014) prioritised faunal observations and not many plant specimens were collected. Therefore, the Research Center for Biosystematics and Evolution of the National Research and Innovation Agency of Indonesia (BRIN) conducted an exploration of Banggai Kepulauan in 2019. One of the aims of this exploration was to understand the diversity of orchid species there and to add data on the diversity of orchids in Sulawesi. This study can be used by stakeholders in Banggai Kepulauan to manage the island's flora.

Materials and methods

A floristic exploration was conducted in June–July 2019 in Peleng and Bakalan Islands of Banggai Kepulauan, Central Sulawesi, specifically in the districts of Buko, Bulagi, Bulagi Utara, Bulagi Selatan, Peling Tengah, Liang, Tinangkung, Tinangkung Selatan, Tinangkung Utara and Totikum Selatan (Fig. 1).

The collection of orchids followed the methodology of Van Balgooy (1987). The collections were photographed when flowering and then dried as herbarium specimens and stored at Herbarium Bogoriense. Spirit samples of flowers were also prepared using a mix of glycerin 40%, ethanol 96%, and distilled water at a ratio of 1:70:29 (Rugayah et al., 2004). Sterile specimens were also collected for a permanent record of all orchids in Banggai Kepulauan. Identification was carried out by consulting relevant literature and online resources, such as Comber (1990, 2001), Seidenfaden & Wood (1992), SOF (2015), and POWO (2021), as well as by matching with the orchid collections in Herbarium Bogoriense.

Information on the distribution of every orchid species was recorded and their endemic status was determined. All data were analysed and presented descriptively. Full descriptions of the newly recorded species were drafted, together with notes on the habitat and conservation status in Indonesia. Photographs of some species are also included.

Orchid diversity in Banggai Kepulauan

Twenty-eight species of orchids were found in Banggai Kepulauan (Table 1). Of these, three collections have only been identified to genus level due to incomplete

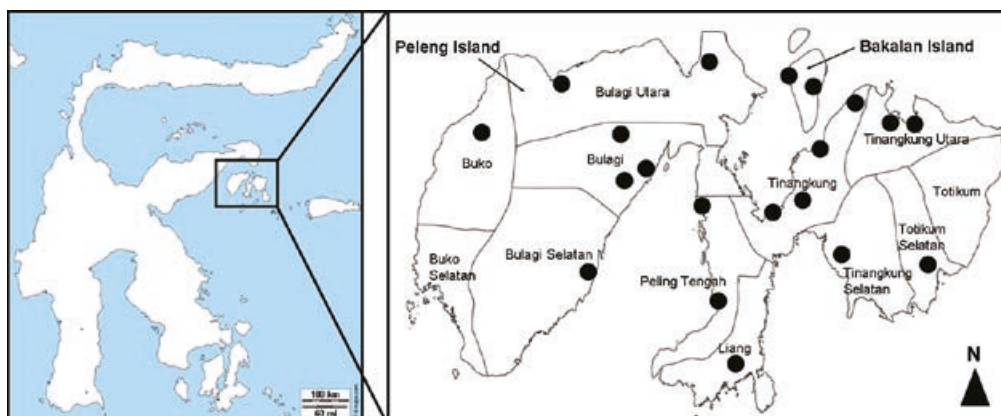


Fig. 1. Map of plant collection areas in Banggai Kepulauan, Central Sulawesi. Black dots mark the collecting localities.

specimens: *Dendrobium* sp. (Diah Sulistiarini & Deni Sahroni 1438), *Liparis* sp. (Diah Sulistiarini & Deni Sahroni 1452) and *Renanthera* sp. (Diah Sulistiarini & Deni Sahroni 1452). The *Dendrobium* sp. is similar to *D. acinaciforme* Roxb., which has flat and laterally compressed leaves, but the leaves of *Dendrobium* sp. are narrower and longer. The *Liparis* sp. is similar to *Liparis parviflora* (Bl.) Lindl. but has different leaves (*L. parviflora*: lanceolate-oblong, acute vs *Liparis* sp.: obovate-oblong, obtuse). The *Renanthera* sp. is similar to *Renanthera elongata* (Blume) Lindl. based on leaf shape, but the *Renanthera* sp. has longer leaves and a more unequal tip.

The orchids of Banggai Kepulauan comprise about 5% of the total orchid diversity of Sulawesi at about 499 species (Rustiami, 2019). The orchids of Banggai Kepulauan are less diverse than on other smaller satellite islands. Wawonii Island in Southeast Sulawesi (650 km²) (Rugayah et al., 2003), for example, is smaller than Banggai Kepulauan (2488.79 km²) (BPSKBBK, 2018) but has 91 orchid species (Sulistiarini, 2008) (versus 28 species in Banggai Kepulauan). The orchid inventory of Wawonii Island, however, began in 2003 (Sulistiarini, 2008). We believe that the orchids of Banggai Kepulauan are under-collected and more exploration may yield many new records there.

The orchid species with the highest population numbers in Banggai Kepulauan are *Dendrobium lanceolatum* Gaudich. and *Spathoglottis plicata* Blume. *Dendrobium lanceolatum* grows on the cliffs along the road in Banggai Kepulauan. This orchid has white flowers with purple veins and lips with wavy and purplish edges. *Spathoglottis plicata*, meanwhile, has two colour variations in Banggai Kepulauan, white and pink, and both grow in the same area on Gangsang Hill, Tinangkung Selatan District (Fig. 2). *Dendrobium purpureum* Roxb. with pink flowers is distributed from Sulawesi to New Guinea (Govaerts et al., 2021). In Banggai Kepulauan, it is only found in Taman Kehati Kokolomboy. We also observed *Trichoglottis geminata* (Teijsm. & Binn.) J.J.Sm., an epiphytic orchid that is widely distributed in the Malesian region and is only found in Tinangkung of Banggai Kepulauan. This species is characterised

by strap-shaped leaves arranged alternately all along the stem and the inflorescences are located opposite the leaves, supporting one greenish or yellowish flower with transverse red or pink stripes on the sepals and petals and the middle of the white lip has a purplish spot. *Aerides inflexa* Teijsm. & Binn., meanwhile, was first discovered in the Gowa area, Makassar, South Sulawesi based on a *Tolson* specimen that is now possibly stored in Leiden (Wood & Cribb, 1994; they say 'holo. ?L'). In Banggai Kepulauan, a vegetative specimen of this species was found in the forest around Lake Paisu Pok. It was identified based on the monopodial stem and strap-shaped leaves and by matching with photos from GBIF (<https://gbif.org/species/2811142>).

Two endemic species have also been found, *Dendrobium jubatum* Schuit. & de Vogel and *D. rhodobalion* Schltr., a sterile specimen of the former in Mandok Village, Bulagi Utara, and a sterile specimen of the latter with yellow stems and oval leaves in the forest around Lake Paisu Pok. *Cylindrolobus quadricolor* (J.J.Sm.) Rauschert and *Habenaria beccarii* Schltr., species previously only known from mainland Sulawesi and Maluku (Thomas & Schuiteman, 2002; Govaerts et al., 2021), have been found in Banggai Kepulauan. *Cylindrolobus quadricolor* is an epiphytic orchid found in the forest around Lake Paisu Pok hanging from trees, with alternate, opposite, lanceolate, and pointed leaves all along the stem, and solitary flowers located in the axils of the leaves. They are white with a reddish brown pedicel.

There are three new records for Sulawesi, namely *Aphyllorchis acuminata* J.J.Sm., *Dendrobium acinaciforme* and *Tainia trinervis* (Blume) Rchb.f. *Aphyllorchis acuminata* was previously listed as endemic to Maluku (Thomas & Schuiteman, 2002). *Crepidium resupinatum* (G.Forst.) Szlach. was reported from Sulawesi by Margonska et al. (2012). This species, however, is a new record for Banggai Kepulauan although there are taxonomic problems which will hopefully be resolved with molecular studies (Margonska, 2021, pers. comm.). Two species originally described from Java have also been found in Banggai Kepulauan, viz. *Bulbophyllum laxiflorum* (Blume) Lindl. and *Habenaria medusa* Kraenzl.

Three orchid species are known to be widely cultivated in Banggai Kepulauan, namely *Cymbidium finlaysonianum* Lindl., *Phalaenopsis amabilis* (L.) Blume and *Vanilla planifolia* Andrews. The first two are planted by residents in their gardens, while the last species is cultivated for its fruit. Sastrapradja et al. (1976) mentioned that *Phalaenopsis amabilis* and *Spathoglottis plicata* are widely cultivated as ornamental plants in Indonesia. In addition to its role as an ornamental plant, the leaves of *Phalaenopsis amabilis* are reported to be edible (Arditti, 1992) and were reportedly eaten as vegetables by the Javanese in ancient times (Latif, 1960). However, in Banggai Kepulauan this orchid is only grown as an ornamental. Heyne (1987) mentioned that in Maluku the stems of *Dendrobium purpureum* (called *anggrek kesumba* by local people) and the pseudobulbs of *Grammatophyllum scriptum* (L.) Blume (called *anggrek bunga putri* by local people) were used to treat inflammation of the nails. Examples of orchid species found in the Banggai Kepulauan are presented in Fig. 2–4.

More precise typification of the names of the new records below should await monographic studies of the taxa.

Table 1. List of orchids species collected from Banggai Kepulauan.

Species	Distribution in Banggai Kepulauan	Distribution in the world	Note
<i>Aerides inflexa</i> Teijsm. & Binn.	Paisu Pok Lake, Bulagi Utara	Borneo to Sulawesi (Govaerts et al., 2021)	-
<i>Aphyllorchis acuminata</i> J.J.Sm.	Taman Kehati Forest, near Kokolomboy Sub-Village, Leme-leme Darat Village, Buko	Maluku and Sulawesi (Govaerts et al., 2012; report in this paper)	New record for Sulawesi
<i>Bulbophyllum laxiflorum</i> (Blume) Lindl.	Pemda Forest, Tinangkung	Indochina to W and C Malesia (Govaerts et al., 2021)	-
<i>Crepidium acuminatum</i> (D.Don) Szlach.	Bukit Kautu, Tinangkung	Tropical and subtropical Asia to N Australia (Govaerts et al., 2021)	-
<i>Crepidium resupinatum</i> (G.Forst.) Szlach.	Along the road near Saiyong Village to Gansal Village, Tinangkung	Indonesia; Papua New Guinea; Oceania: Solomon Islands, Vanuatu, Fiji, Tonga, Samoa, New Zealand, and French Polynesia Islands (Margonska et al., 2012)	New record for Banggai Kepulauan (Margonska, pers. comm.)
<i>Cryptostylis arachnites</i> (Blume) Hassk.	Taman Kehati Forest, near Kokolomboy Sub-Village, Leme-leme Darat Village, Buko	Tropical and subtropical Asia to SW Pacific (Govaerts et al., 2021)	-
<i>Cylindrolobus quadricolor</i> (J.J.Sm.) Rauschert	Danau Paisu Pok, Bulagi Utara	Sulawesi to Maluku (Govaerts et al., 2021)	-
<i>Cymbidium bicolor</i> ssp. <i>pubescens</i> (Lindl.) Du Puy & P.J.Cribb	Tabing Village, Tinangkung Selatan	Andaman, Nicobar Islands to W and C Malesia (Govaerts et al., 2021)	-
<i>Cymbidium finlaysonianum</i> Lindl.	Ambelang Village, Tinangkung; Batang Village, Tinangkung Utara; Danau Paisu Pok, Bulagi Utara	Indochina to Malesia (Govaerts et al., 2021)	-
<i>Dendrobium acinaciforme</i> Roxb.	Luk Sagu, Tinangkung Utara	Assam, Cambodia, SE China, E Himalaya, Hainan, Laos, Malaya, Maluku, New Guinea, Thailand and Vietnam (Govaerts et al., 2021)	New record for Sulawesi
<i>Dendrobium jubatum</i> Schuit. & de Vogel	Mandok Village, Bulagi Utara	Sulawesi (Govaerts et al., 2021)	Endemic to Sulawesi

Table 1 (continued).

Species	Distribution in Banggai Kepulauan	Distribution in the world	Note
<i>Dendrobium lanceolatum</i> Gaudich.	Alul Village, Bulagi; Saleati Village, Liang	Sulawesi to New Guinea (Govaerts et al., 2021)	-
<i>Dendrobium purpureum</i> Roxb.	Bulagi	Sulawesi to New Guinea (Kepulauan Aru) (Govaerts et al., 2021)	-
<i>Dendrobium rhodobalion</i> Schltr.	Paisu Pok Lake, Bulagi Utara	Sulawesi (Govaerts et al., 2021)	Endemic to Sulawesi
<i>Dendrobium</i> sp. (<i>Diah Sulistiarini & Deni Sahroni 1438</i>)	Desa Mandok, Bulagi Utara	Banggai Kepulauan	-
<i>Eulophia nuda</i> Lindl.	Bungin Village, Tinangkung (Bakalan Island)	Tropical and subtropical Asia to W Pacific (Govaerts et al., 2021)	-
<i>Grammatophyllum scriptum</i> (L.) Blume	Kampung Baru Village, Tinangkung Selatan	Sulawesi, Maluku, Borneo, Lesser Sunda Islands, Philippines, New Guinea, Solomon Island, and Fiji (Thomas & Schuiteman, 2002)	-
<i>Habenaria beccarii</i> Schltr.	Toi-toi Village, Bulagi Selatan	Sulawesi to Maluku (Thomas & Schuiteman, 2002)	-
<i>Habenaria medusa</i> Kraenzl.	Tinangkung Village, Tinangkung	Sumatra, Borneo, Java, and Sulawesi (Govaerts et al., 2021)	-
<i>Liparis</i> sp. (<i>Diah Sulistiarini & Deni Sahroni 1452</i>)	Puiso Pok, Bulagi Utara	Banggai Kepulauan	-
<i>Oberonia lycopodioides</i> (J.Koenig) Ormerod	Along the road to Alul Village, Bulagi	Indochina to Malesia (Govaerts et al., 2021)	-
<i>Phalaenopsis amabilis</i> (L.) Blume	Sosom Forest, Bulagi	Malesia to Papuasias (Govaerts et al., 2021)	-
<i>Renanthera</i> sp. (<i>Diah Sulistiarini & Deni Sahroni 1452</i>)	Paisu Pok Lake, Bulagi Utara	Banggai Kepulauan	-
<i>Spathoglottis plicata</i> Blume	Gangsang Village, Tinangkung Selatan	Tropical and subtropical Asia to Pacific (Govaerts et al., 2021)	-
<i>Tainia trinervis</i> (Blume) Rchb.f.	Taman Kehati Forest, near Kokolomboy Sub-Village, Leme-leme Darat Village, Buko	Borneo (Sabah), Philippines (Mindoro), Maluku (Ternate) to N and NE Queensland (Govaerts et al., 2021)	New record for Sulawesi

Table 1 (continued).

Species	Distribution in Banggai Kepulauan	Distribution in the world	Note
<i>Thrixspermum centipeda</i> Lour.	Batang Village, Bambang, Tinangkung Utara	Assam to S China and Malesia (Govaerts et al., 2021)	-
<i>Trichoglottis geminata</i> (Teijsm. & Binn.) J.J.Sm.	Bukit Kautu, Salakan, Tinangkung	C and E Malesia (Govaerts et al., 2021)	-
<i>Vanilla planifolia</i> Andrews	Totikum Selatan	S Mexico to Colombia (Govaerts et al., 2021)	Cultivated

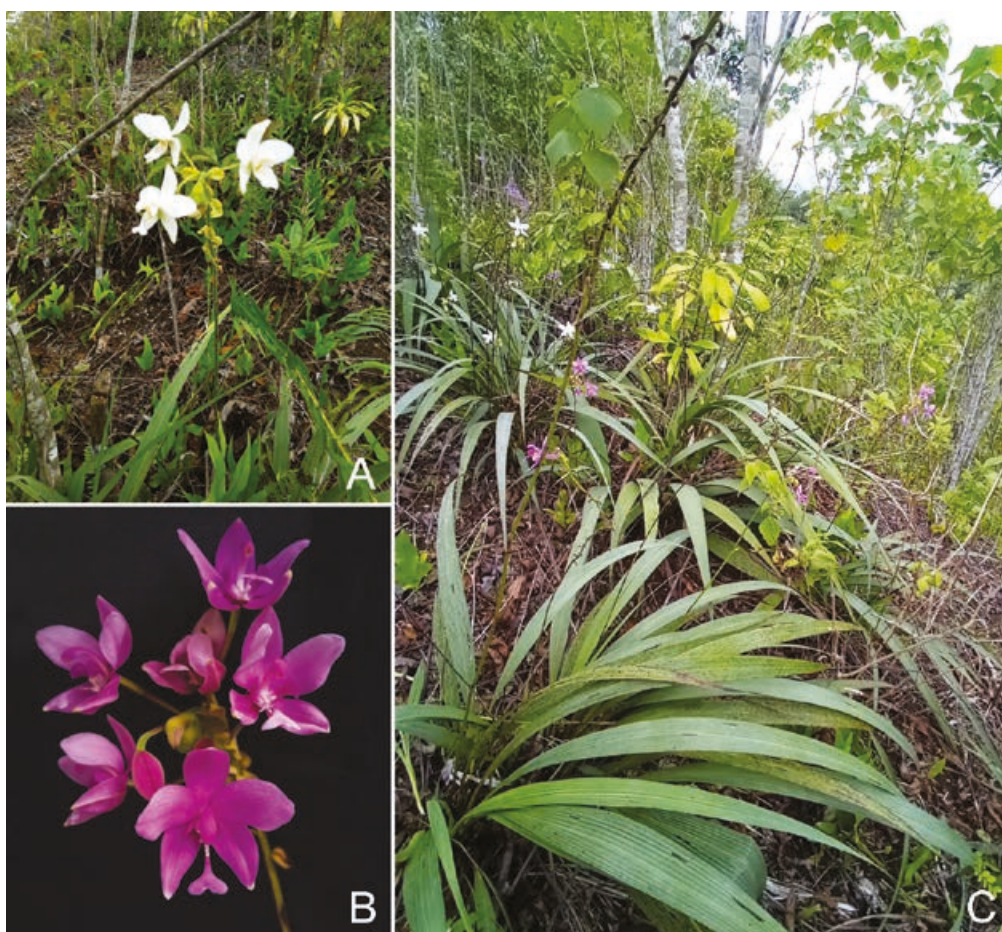


Fig. 2. *Spathoglottis plicata* Blume. **A.** White flowers. **B.** Pink flowers. **C.** Co-occurrence of both colour variants in Gangsang Hill, Banggai Kepulauan. (Photos: Deni Sahroni)



Fig. 3. Orchid species from Banggai Kepulauan. **A.** *Cylindrolobus quadricolor* (J.J.Sm.) Rauschert. **B.** *Dendrobium lanceolatum* Gaudich. **C.** *Cymbidium finlaysonianum* Lindl. **D.** *Grammatophyllum scriptum* (L.) Blume. **E.** *Habenaria beccarii* Schltr. **F.** *Phalaenopsis amabilis* (L.) Blume. (Photos: Deni Sahroni)

The new records

1. *Aphyllorchis acuminata* J.J.Sm., Bull. Jard. Bot. Buitenzorg, ser. 3, 9: 441 (1928). – TYPE: [Indonesia], Buru, Wai Eno, *Toxopeus s.n.* (L). (Fig. 4A)

Terrestrial, 50–150 cm high, roots thickened, puberulous. **Stem** straight, sheaths 5–8, clasping the stem. **Inflorescence** many-flowered, to 40 cm long, purple; bracts patent to reflexed, lanceolate, acute, pale purple. **Flowers** suberect, white, 5–8 cm apart; pedicel 13–14 mm long, purple; median sepal lanceolate, acute, glabrous, c. 1.2 cm long; lateral sepals lanceolate, acute, glabrous, c. 1.2 cm long; petals similar to the sepals, lanceolate, along the centre of the inner surface with a purple stripe, c. 1.2 cm long; lip with the hypochile short, c. 0.2 cm long, epichile c. 0.8 cm long, acute, inner part at the margin with yellow-brownish stripes; column semiterete, glabrous, c. 0.5 cm long.

Distribution. This species is now only known from Maluku and Banggai Kepulauan, especially on Peleng Island.

Habitat and ecology. The species was found in secondary forest at an elevation of 600–700 m.

Specimen examined. Photos taken in Taman Kehati Kokolomboy, Leme-leme Darat Village, Buko District, Banggai Kepulauan Regency, Peleng Island, Central Sulawesi, 1°17'29.5"S 122°52'15.2"E, 600–700 m, 6 Jul 2019, by I Putu Gede P. Damayanto.

Notes. It is found in Banggai Kepulauan, specifically only on Peleng Island in Taman Kehati (Biodiversity Park) Kokolomboy, Leme-leme Darat Village, Buko District.

2. *Crepidium resupinatum* (G.Forst.) Szlach., Fragm. Flor. Geobot., Suppl. 3: 131 (1995). – *Epidendrum resupinatum* G.Forst., Fl. Ins. Austr. 61 (1786). – TYPE: Society Islands, *J.R. Forster & G. Forster s.n.* (BM). (Fig. 4B)

Terrestrial herbs up to 9 cm tall. **Pseudobulbs** small, each bearing 4–7 leaves, close together, covered with leaf sheaths, pale green. **Leaves** oblong to broadly lanceolate, 5–14 × 2.5–5 cm, acute-acuminate, thin-textured, oblique, veins prominent; petiole 2–5.5 cm long, at the base broadly clasping the stem. **Inflorescence** terminal, a raceme, up to 50 cm tall, bearing many flowers (more than 30); bracts c. 4 mm long, acute. **Flowers** non-resupinate, dark purple, 10–12 (from auricle apex to lip apex) × 6–7 mm; pedicel with ovary 4–5 mm long, twisted; median sepal obovate, 5–7 × 0.5–2 mm, obtuse; lateral sepals ovate, 4–6 × 2–3 mm, obtuse; petals linear, 5–6 × 0.5–1 mm, obtuse; lip 10–12 × 6–7 mm, orbicular with auricles 5–6 mm long, apex acute with 8-dentate margin; column rectangular, 1.5–2 × 1–1.5 mm, with lateral appendages near the apex; pollinia 4.

Distribution. This species was previously known from Papua New Guinea to the South Pacific. It has now also been found in Banggai Kepulauan (Tinangkung District), Central Sulawesi.

Habitat and ecology. The species was found in secondary forest at an elevation of 105–290 m.

Specimens examined. INDONESIA: **Central Sulawesi:** Banggai Kepulauan, Tinangkung District, 290 m, 29 Jun 2019, *Diah Sulistiarini & Deni Sahroni 1285* (BO); Tinangkung District, 30 Jun 2019, *Seni Kurnia Senjaya 12* (BO); Tinangkung District, along the road near Saiyong Village to the Gansal Village, 1°23'03.0"S 123°18'19.0"E, 105 m, 29 Jun 2019, *I Putu Gede P. Damayanto 788* (BO).

Notes. This species is a new record for Banggai Kepulauan (Margonska, pers. comm.).

3. *Dendrobium acinaciforme* Roxb., Fl. Ind. ed. 1832, 3: 487 (1832). – TYPE: [Indonesia], Ambon (no specimen traced). (Fig. 4C)

Epiphyte, fasciculate, erect, c. 35 cm tall. **Stem** for the basal 1–3 nodes terete, the part above flattened, c. 0.5 cm wide, covered with leaf sheaths. **Leaves** flat, laterally compressed, thick and fleshy, subfalcate, 3.5–9 × 0.8–1.2 cm, acute; sheath 1.5–3 cm long. **Inflorescence** in the upper part of the stem, at a node, bearing one flower. **Flower** resupinate, c. 9 mm wide, pale yellow; pedicel and ovary c. 0.5 cm long; median sepal narrowly triangular-oblong, subacute, c. 4.5 × 2.8 mm; lateral sepals obliquely triangular, subacute, c. 9.5 × 3 mm, mentum obtuse; petal oblong, subacute, c. 4 × 1.1 mm; lip oblong-spathulate, emarginate, undulate and slightly crenulate on front margins, c. 11 × 4.3 mm, callus plate-like, longitudinally extending to apex, 3-ridged; column c. 1.2 mm long, rostellum retuse, anther cap cucullate, oblong, truncate, glabrous; pollinia 4 (description of the flower partly from Yukawa & Ohba, 1999).

Distribution. This species is found in northeastern India, Cambodia, southeastern China, the eastern Himalaya, southern China, Laos, Peninsular Malaysia, Maluku, New Guinea, Thailand and Vietnam (Govaerts et al., 2021—but see note below). There are no previous records of this species in Sulawesi. We observed the species in Banggai Kepulauan, Central Sulawesi, in Luk Sagu, Tinangkung Utara District.

Habitat and ecology. This species grows in secondary forest at an elevation of 2 m.

Specimen examined. INDONESIA: **Central Sulawesi:** Banggai Kepulauan, Tinangkung Utara District, Luk Sagu, 1 Jul 2019, *Diah Sulistiarini & Deni Sahroni 1403* (BO).



Fig. 4. New distribution records. **A.** *Aphyllorchis acuminata* J.J.Sm. **B.** *Crepidium resupinatum* (G.Forst.) Szlach. **C.** *Dendrobium acinaciforme* Roxb. **D.** *Tainia trinervis* (Blume) Rchb.f. (Photos: A, D, I Putu Gede P. Damayanto; B, C, Seni Kurnia Senjaya)

Notes. According to Yukawa & Ohba (1999), records of *Dendrobium acinaciforme* Roxb. from mainland Asia should be referred to *D. spatella*, leaving *D. acinaciforme* only in Maluku. The collection by Diah Sulistiarini & Deni Sahroni 1403 from Banggai Kepulauan is more similar to the collections from Maluku. For example, the collection from Banggai Kepulauan has been matched to the collection *Ramlamto 380* which was cited by Yukawa & Ohba (1999) as *Dendrobium acinaciforme*. In Banggai Kepulauan, this species has only been found in the secondary forests of Luk Sagu.

A type specimen has not been traced. If there are no extant specimens, the illustration in Rumphius, Herb. Ambon. 6: 110, t. 51, f. 2 could be chosen as the lectotype.

4. *Tainia trinervis* (Blume) Rchb.f., Bonplandia 5: 54 (1857). – *Mitopetalum trinerve* Blume, Mus. Bot. 2: 185 (1856). – TYPE: ‘In sylvis Tandite’, *Korthals s.n.* (L [L0062471]). (Fig. 4D)

Terrestrial, c. 30 cm tall. ***Pseudobulbs*** cylindrical, slightly swollen towards the base, with a scale at the node, persistent. ***Leaves:*** petiole 0.3–1.35 cm long; blade elliptic, 9.5–26.7 × 2.9–8.1 cm, acute. ***Inflorescence*** terminal, 28–69.9 cm long, bearing many flowers. ***Flowers*** resupinate; median sepal elliptic, 9–12.5 × 1.5–2 mm, obtuse, yellow-greenish; lateral sepals elliptic, 8.5–11 × 5–6.5 mm, obtuse, yellow-greenish; petals obliquely elliptic to triangular, 8.5–11 × 1.5–2 mm wide, obtuse, greenish yellow with brown spots on the margin; lip blade 3-lobed, median lobe almost triangular to orbicular, 2–3.5 × 4–5 mm, lateral lobes obliquely triangular, 1–2 mm long, adaxial surface with 3 keels; column top part truncate to semi-orbicular; pollinia 8.

Distribution. In Indonesia, this species is distributed in Kalimantan, Maluku and Papua. Recently, this species has also been found in Banggai Kepulauan, Central Sulawesi, in Taman Kehati Kokolomboy, Leme-leme Darat Village, Buko District.

Habitat and ecology. This species grows in secondary forest at an elevation of 646–700 m.

Specimen examined. INDONESIA: **Central Sulawesi:** Peleng Island, Banggai Kepulauan Regency, Buko District, Taman Kehati Kokolomboy, Leme-leme Darat Village, 1°17'21.8"S 122°52'11.7"E, 646–700 m, 3 Jul 2019, *I Putu Gede P. Damayanto & Agus Haryadi 857* (BO).

Notes. This species has only been found once in Banggai Kepulauan, in the secondary forest of the Taman Kehati.

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