



Dendrobium nagataksaka (Orchidaceae: Epidendroideae), A New Species of Section *Spatulata* From Papua, Indonesia

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Abstract

Dendrobium nagataksaka, a new species of *Dendrobium* section *Spatulata* (Orchidaceae: Epidendroideae) from Papua, Indonesian New Guinea, is described and illustrated. The flower of this new species is morphologically close to *Dendrobium gouldii*, but differs in having longer midlobe relative to the sidelobes which it is as long as the sidelobes, a different shape midlobe, and a different shape keels on lip.

Key words: *Dendrobium*, *Spatulata*, Papua

Introduction

The genus *Dendrobium* Swartz (1799a: 82) is a conserved name with *D. moniliforme* (L.) Swartz (1799b: 85) as the type (Lavarack *et al.* 2006). *Dendrobium* is the second largest orchid genus after *Bulbophyllum* Thouars (1822: 107) (Cribb & Govaerts 2005). Most *Dendrobium* species are epiphytes and naturally distributed from Sri Lanka and India throughout tropical Asia, Japan, New Zealand and east to Tahiti (Schuiteman, 2011). Many *Dendrobium* species showed a broad range of adaptation as well as unique flower morphology, making this genus one of the most important horticultural commodities in commercial trade (Hinsley *et al.* 2018).

In order to ease classification, *Dendrobium* species have been divided into many sections. Among *Dendrobium*'s sections, *Spatulata* (Lindley 1843: 236) is one of those that are known to have many collectible species as ornamental plants. Most species in the section *Spatulata* have large and vigorous habit as well as relatively long-lasting inflorescences, which usually bloom once in the summer to several times in a year. Many species in this section have been widely used as parent plants for hybridization, since they usually give their progeny a curly or twisted sepals and petals (Widiastoety *et al.* 2010).

Dendrobium section *Spatulata* has been established by Lindley in 1843 with *Dendrobium antennatum* Lindley (1843: 236) chosen as its type (Cribb 1983). Prior to this article, this section consists of about 68 species, distributed from Java to the Philippines, New Guinea, Australia, and the Pacific Islands. Species of this section is easily recognized by its erect cane-like pseudobulbs with distichous leaves. There are three types of leaves in this section: linear-semiterete; narrowly-linear lanceolate; and broadly-ovate lanceolate. Their flowers usually have erect and twisted petals, which are often longer and narrower than the sepals. The lip is distinctly trilobed and has a callus of three to five ridges which are often raised toward apex (Cribb 1986; Pridgeon *et al.* 2014).

Many species of *Dendrobium* in section *Spatulata* are narrow endemics, such as *D. pseudoconanthum* Smith (1926: 53) in Sulawesi, *D. taurulinum* Smith (1920: 72) in Seram-Mollucas, and *D. capra* Smith (1910: 52) which is only occur in central to eastern part of Java. Most *Dendrobium* species of this section naturally grow in the lowlands below 1000 m, very often found as epiphytes on trees by the sea shore (Cribb 1986; O'Byrne 1994). In addition to that, some lowland species prefers hot, low humidity, and full sun habitat; such as *D. capra* which is morphologically-adapted to become drought-tolerant, as it only occupies specific habitats in the dry lowland teak forest in East Java (Metusala 2017).

New Guinea Island is known as the centre of diversity for the section *Spatulata* with nearly half of the total known species have been found from this island (Cribb 1986). In 2013, several plants of *Dendrobium* section *Spatulata* have

been collected from the lowland forests of West Papua (Indonesian New Guinea) and then brought back for cultivation in local nursery in Yogyakarta (Java, Indonesia). In 2018, several of those plants flowered and made it possible for proper examination and comparison. Detailed study on these living specimens has concluded that this taxon is an undescribed species in which the flower morphology resembles *Dendrobium gouldii* Reichenbach (1867: 901) and *D. lineale* Rolfe (1889: 381), but differing in several aspects. This taxon is here described as a new *Dendrobium* species from Papua-Indonesia.

Materials and Methods

Measurement and description of the new species were performed from 5 specimens (as samples) that were collected from their natural habitat in Asmat, West Papua, Indonesia, and have been cultivated in Yogyakarta (700–800 m) for more than 6 years. The morphological measurements were conducted with a loupe and a ruler accurate to 0.5 mm. The specimens were also compared with supposedly related species (*Dendrobium gouldii* and *D. lineale*). Detailed morphological studies were undertaken based on living plants, fresh flowers, herbarium and spirit specimens, and also from relevant literatures.

Taxonomic Treatment

Dendrobium nagataksaka Metusala, *sp. nov.* (Figs. 1,2,3)

Type:—INDONESIA. Papua: West Papua Province, Asmat. 10–300 m, *RIO 9011* (holotype: BO!) (detail locality is written on the specimen sheet but not shown here due to conservation importance).

Diagnosis:—*Dendrobium nagataksaka* is morphologically close to *Dendrobium gouldii*, but differs in having longer midlobe which it is as long as the sidelobes, obdeltoid to spatulate midlobe on a longer narrow claw, and 3 simple keels that terminating at basal third of the midlobe.

Epiphytic herb. **Roots** numerous from the rhizome and base of stem, velamen dirty white when old. **Stem** erect, up to 83 cm high, up to 1.7 cm in diam., more or less cylindrical, stiff, usually swollen in the lower third, leafy above the swollen section, leafy part of stem green, leafless stem greenish yellow. Sheath encircling stem tightly, greenish when young and becomes grayish brown when old, not long-persisting. **Leaves** deciduous, alternate-distichous, sub erect to 45°, fleshy, coriaceous, stiff, oblong to oblong elliptic, 12–16 cm long × 3.5–4.5 cm wide, waxy adaxially, green with yellowish longitudinal nerves, apex obtuse or unequally bilobed with lower lobe sometimes bidentate. **Inflorescence** one to several, arise from upper part of stem, erect to spreading, 25–36 cm long, 12–22 flowers; peduncle green, 0.4–0.5 cm in diam. at base, green; floral bract ovate to triangular, white to green. **Pedicel and ovary** terete, 4.5–5.5 cm long, white or light green with more green at ovary. **Flower** rather thin textured, 5.5–6.0 cm high × 3.0–3.5 cm wide, sepals spreading to decurved and strongly twisted, petals erect to sub-erect and twisted 1–3 times, sepals and petals white or purplish white or creamy white, labellum white with purplish or reddish nerves, ridges yellowish to greenish, column white suffused with purplish or reddish at base. **Dorsal sepal** oblong-linear, 2.9–3.0 cm long × 0.5 cm wide, undulate, acute to acuminate. **Petals** obliquely narrowly linear to linear-spatulate, 4.5–4.8 cm long × 0.2 cm wide at base and gradually wider to 0.4–0.5 cm near apex, acute to acuminate. **Lateral sepals** obliquely linear-triangular to oblong triangular, 3.3–3.6 cm long × 0.6–0.9 cm at the widest part, undulate, acute to acuminate. **Mentum** conical, 0.9–1.0 cm long, slightly curved near apex, apex obtuse or slightly retuse, greenish near apex. **Labellum** porrect, trilobed, when flattened 2.7–3.0 cm long × 1.5–1.8 cm wide at sidelobes; sidelobes obliquely oblong-triangular, 1.4–1.6 cm long, front margins irregular to erose, apex obtuse; midlobe obdeltoid to spatulate on a long narrow claw, 1.5–1.6 cm long × 0.4–0.5 cm wide at base and gradually broader to 1.1–1.3 cm at the widest part near apex, midlobe's claw is about half of the midlobe length, margins undulate, apex rounded or truncate with a small acute projection at the middle. Callus consists of 3 simple keels, lower at median, lie from base of the lip disc and extending towards the basal third of the midlobe, apex acute. **Column** short, 0.5–0.6 cm long; column foot slender, about 1 cm long; stigma oblong-trapezoid; stelia short and acute; anther cap cuculate, front view about rectangular in outline, greenish or yellowish, 1.0–1.5 mm high; pollinia comma-shaped, 4 in 2 pairs, 1 mm high, yellow. Sometime or even very rarely, among the flowers in the same inflorescence, there are few with deformed labellum. Their midlobes are ovate or oblong-lanceolate with acute apex.

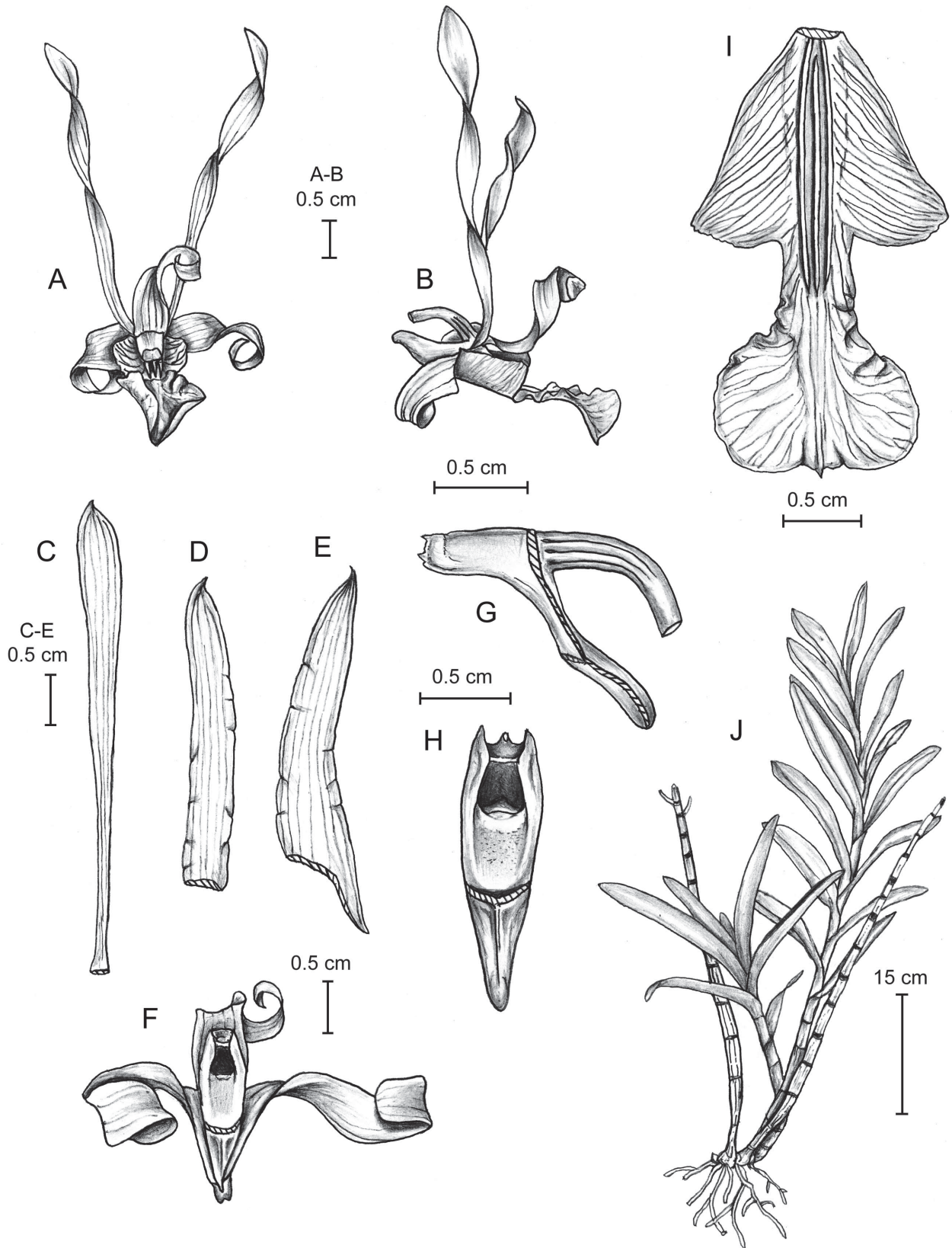


FIGURE 1. *Dendrobium nagataksaka*. **A—B**, flower (**A**, front view; **B**, side view). **C—E**, flattened sepals-petals (**C**, petal; **D**, dorsal sepal; **E**, lateral sepal). **F**, column with sepals. **G—H**, column and column-foot (**G**, side view; **H**, ventral view). **I**, flattened labellum (without lip's claw). **J**, plant. Drawn from living specimens by Destario Metusala.

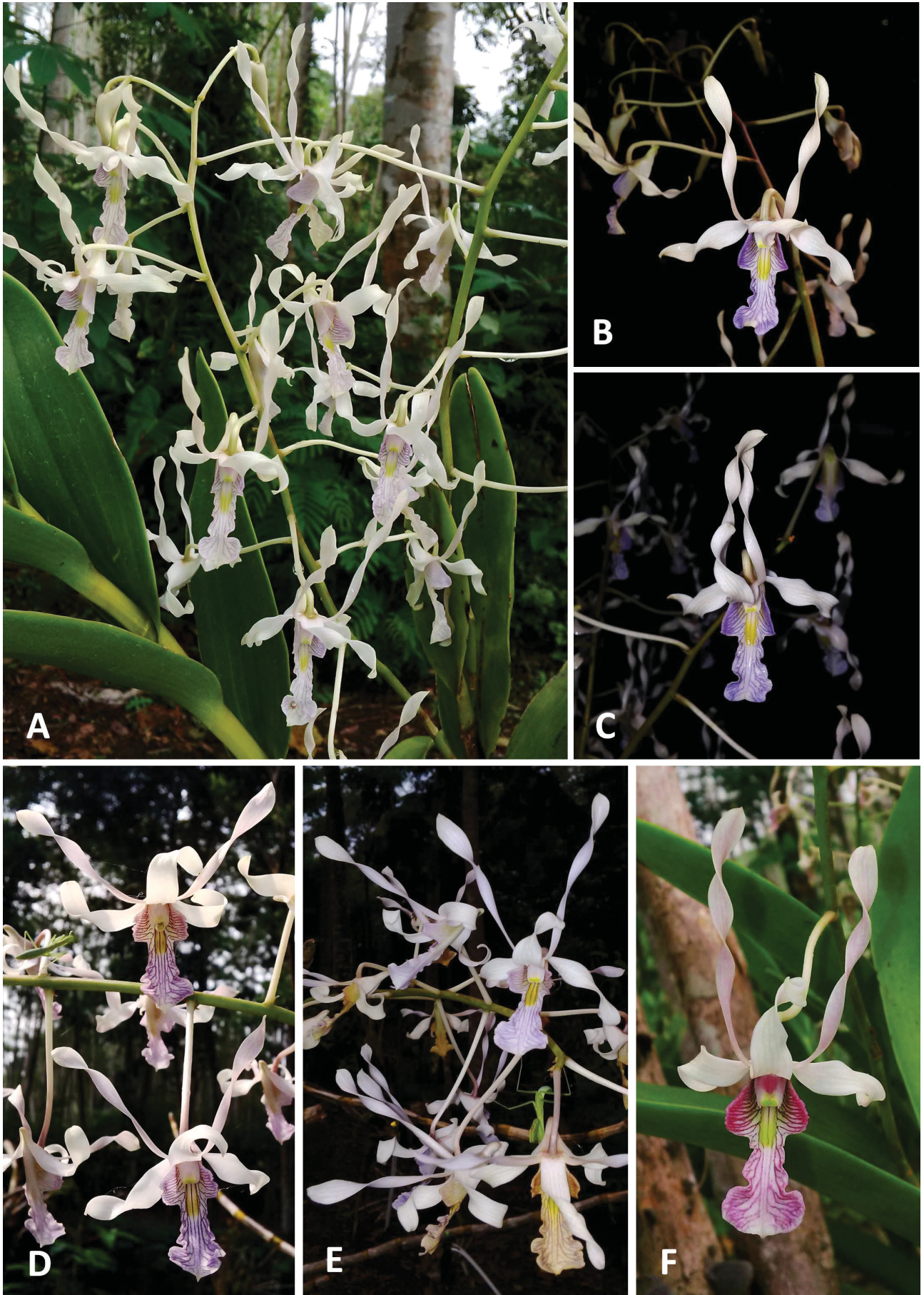


FIGURE 2. *Dendrobium nagataksaka*. A, Inflorescence. A—F, variation in flower shape and colour. Photos by Anton Tri Raharjo.

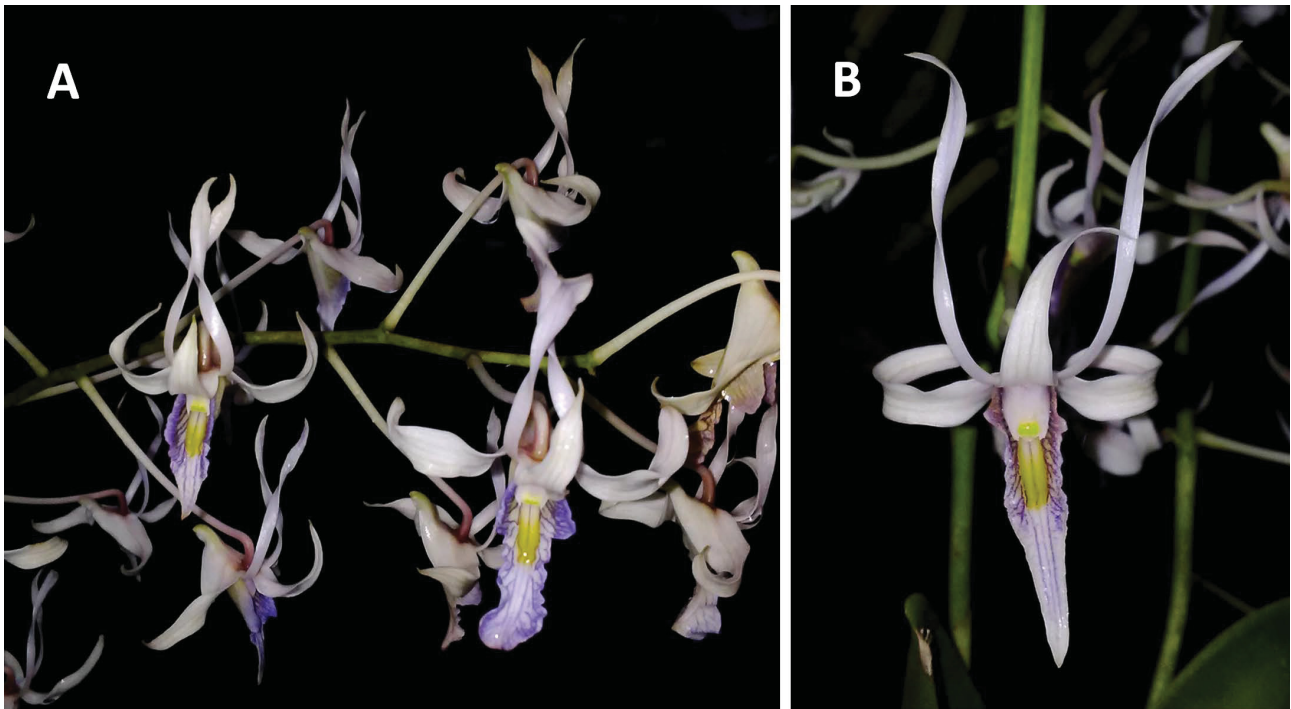


FIGURE 3. *Dendrobium nagataksaka*. **A**, deformed (left) and normal lip in the same inflorescence. **B**, another flower with deformed lip. Photos by Anton Tri Raharjo.

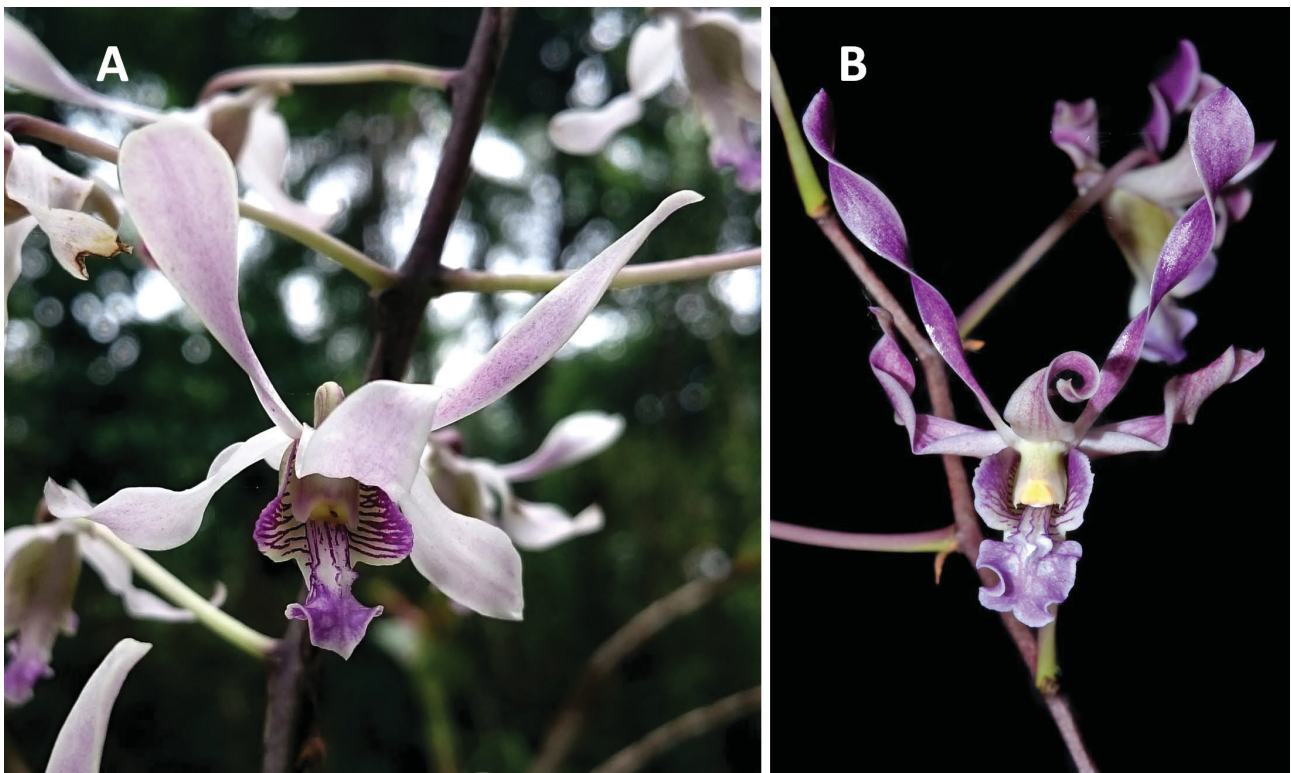


FIGURE 4. **A**, *Dendrobium lineale* and **B**, *Dendrobium gouldii*. Photos: *D. lineale* by Destario Metusala; *D. gouldii* by Frankie Handoyo.

Distribution and phenology:—The distribution of *Dendrobium nagataksaka* appears to be restricted to western part of the Indonesian New Guinea. Populations of this species have been discovered in Asmat Regency at 10–300 m. All these populations were found in windy and opened habitat with medium to high intensity of sunlight. Flowering recorded in early to mid February, late August to early September, and early November (Cultivation, Yogyakarta-Java Island 700–800 m). Other local collectors have informed that this species can also be found in Kaimana Regency.

Etymology:—The specific epithet “naga” (Bahasa Indonesia) means dragon and “taksaka” is the name of the ancient Indian, Javanese and Balinese mythical dragon. It refers to the shape of the flower which has erect petals and long protruding lip resembling the dragon’s head with long horns and long lip.

Cultivation:—*Dendrobium nagataksaka* has proved easy to cultivate at altitudes of 10–800 m above sea level. It is well-grown in the tree fern slab with a top dressing of sphagnum moss to prevent the roots drying-out. The light intensity is 50–90 percent with good air circulation. The plants are susceptible to attack by orchid weevil (*Orchidophilus atterimus*), which can cause the leaves drop off and young shoot damage.

Discussion:—This new species belonging to section *Spatulata* is morphologically close to *D. gouldii* and *D. lineale*. In the revision on *Dendrobium* section *Spatulata*, Cribb (1986) has discussed about the species complex in *D. gouldii*. It was concluded that there is a geographical separation between *D. gouldii* and *D. lineale*. *Dendrobium gouldii* only occurs in the Pacific Islands in the eastern of New Guinea and ranges from New Ireland, Bougainville, Solomon Islands, Malaita, Guadalcanal, and possibly to Vanuatu, whereas *D. lineale* is distributed along the north coast of the New Guinea mainland (O’Byrne 1994). Meanwhile, *D. nagataksaka* is so far recorded only from the western coast of Indonesian New Guinea.

Dendrobium nagataksaka differs from *D. gouldii* in having longer proportion of the midlobe in which it is as long as the sidelobes, obdeltoid to spathulate midlobe on a longer narrow claw (claw of the midlobe: 0.7–0.8 cm long), midlobe with widest part near apex, midlobe margins undulate, and 3 simple keels that terminating at about basal third of the midlobe. In contrast, *Dendrobium gouldii* has much shorter proportion of the midlobe compared to its sidelobes, lanceolate to sub-spathulate midlobe on a short oblong claw (claw of the midlobe: 0.2–0.3 cm long), midlobe with widest part at the basal third or mid part, midlobe margins erose, and 5 keels that terminating at about basal half of the midlobe - where the central three are raised into high erected triangular flap-like lamellae with acute apex.

Furthermore, *Dendrobium nagataksaka* differs from *D. lineale* in having larger flower, longer petals (4.5–4.8 cm) with acute or acuminate apex, obdeltoid to spathulate midlobe on a longer narrow claw, and 3 simple keels that terminating at basal third of the midlobe. Meanwhile, *D. lineale* has smaller flower, shorter petals (2.2–3.0 cm) with rounded to truncate apex, oblong midlobe, and 3 keels that terminating at about basal half of the midlobe, those keels are raised near apex into high oblong erect flap-like lamellae with blunt apex. A morphological comparison between *D. nagataksaka*, *D. gouldii*, and *D. lineale* is shown in Table 1.

TABLE 1. Morphological comparison between *D. nagataksaka*, *D. gouldii*, and *D. lineale*.

Characters	<i>D. nagataksaka</i>	<i>D. gouldii</i> (O’Byrne 1994: 246; Cribb 1986: 653)	<i>D. lineale</i> (O’Byrne 1994: 246; Cribb 1986: 655).
Leaves	12–16 cm long × 3.5–4.5 cm wide, oblong to oblong-elliptic, obtuse	7.5–15 cm long × 4.5–7 cm wide, oblong-elliptic or elliptic, obtuse to rounded	6–14 cm long × 2.5–7 cm wide, ovate or oblong-elliptic or elliptic, obtuse to rounded
Flowers	3–3.5 cm across	4 cm across	3–4 cm across
Dorsal sepal	2.9–3.0 cm long × 0.5 cm wide, oblong-linear, twisted, acute to acuminate	2–2.6 cm long × 0.5–0.6 cm wide, linear-lanceolate, twisted, acute	1.7–2.2 cm long × 0.5–0.7 cm wide, oblong to linear-lanceolate, often twisted, acuminate
Lateral sepals	3.3–3.6 cm long × 0.6–0.9 cm wide, obliquely linear-triangular to oblong triangular, acute to acuminate	2.2–3 cm long × 0.8–1.1 cm wide, obliquely oblong triangular to oblong-falcate, acute to acuminate	1.8–2.3 cm long × 1–1.3 cm wide, obliquely lanceolate-falcate, acute to acuminate
Petals	4.5–4.8 cm long, twisted 1–3 times, narrowly linear to linear-spathulate, acute to acuminate apex	2.1–4.0 cm long × 0.3–0.5 cm wide, twisted 1–3 times, linear-spathulate, obtuse to sub-acute apex	2.2–3.0 cm long, half or not twisted, spathulate, rounded to truncate apex
Labellum (flat shape, without lip’s claw)	Trilobed, 2.7–3.0 cm long × 1.5–1.8 cm wide	Trilobed, 1.8–2.4 cm long × 1.2–1.9 cm wide	Trilobed, 2–2.4 cm long × 1.4–1.7 cm wide
Sidelobes	Obliquely oblong-triangular, obtuse in front, margins erose	Obliquely oblong to obliquely elliptic, rounded in front, margins erose	Obliquely elliptic, rounded in front, margins erose

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TABLE 1. (Continued)

Characters	<i>D. nagataksaka</i>	<i>D. gouldii</i> (O'Byrne 1994: 246; Cribb 1986: 653)	<i>D. lineale</i> (O'Byrne 1994: 246; Cribb 1986: 655).
Midlobe	as long as sidelobes, obdeltoid to spatulate on a long narrow claw, widest part near apex, margins undulate	much shorter than sidelobes, lanceolate to sub-spatulate on a short oblong claw, widest part at basal third or basal half, margins erose	slightly shorter than sidelobes, oblong, margins undulate
Callus	3 keels that terminating at basal third of the midlobe, simple, acute	5 keels that terminating at basal half of the midlobe, central three prominent and raised near apex into high triangular erected flap-like lamellae, acute	3 keels that terminating at basal half of the midlobe, raised near apex into high oblong erected flap-like lamellae, blunt

Conservation status—Specimens of *Dendrobium nagataksaka* were recorded from few locations in Asmat and Kaimana in the western part of Indonesian New Guinea. The extent of occurrence of this species has been estimated at less than 5000 km². The natural population mostly in the lowland forests where the quality of habitat is threatened by land conversion. This new taxa is also predicted to be heavily threatened by over-collection since it has been sold online, even through social media. Therefore, we consider this species to be a category of “Endangered” according to the IUCN Red List Categories and Criteria (IUCN Standards and Petitions Subcommittee 2017).

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