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Correspondence on editorial matters and subscriptions for Reinwardtia should be addressed to:
HERBARIUM BOGORIENSE, BOTANY DIVISION,
RESEARCH CENTER FOR BIOLOGY–INDONESIAN INSTITUTE OF SCIENCES
CIBINONG SCIENCE CENTER, JLN. RAYA JAKARTA – BOGOR KM 46,
CIBINONG 16911, P.O. Box 25 CIBINONG
INDONESIA
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E-MAIL: reinwardtia@mail.lipi.go.id
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ETLINGERA TJIASMANTOI (ZINGIBERACEAE), A NEW SPECIES FROM CENTRAL SULAWESI

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MARLINA ARDIYANI
Herbarium Bogoriense, Botany Division, Research Center for Biology, Indonesian Institute of Sciences (LIPI), Cibinong Science Center, Jln. Raya Jakarta-Bogor Km. 46, Cibinong 16911, Bogor, Indonesia. Email: marl002@lipi.go.id; marlina.ardiyani@gmail.com

WISNU HANOYO ARDI
Research Centre for Plant Conservation and Botanic Gardens - Indonesian Institute of Sciences (LIPI), Jln. Ir. H. Juanda No. 13 PO. BOX 309, Bogor 16122, West Java, Indonesia. Email: wisn001@lipi.go.id

WAHYUDI SANTOSO
Herbarium Bogoriense, Botany Division, Research Center for Biology, Indonesian Institute of Sciences (LIPI), Cibinong Science Center, Jln. Raya Jakarta-Bogor Km. 46, Cibinong 16911, Bogor, Indonesia. Email: wahyudips@gmail.com

AXEL DALBERG POULSEN
Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh EH3 5LR, Scotland, United Kingdom. Email: axel@dalgbr.com

ABSTRACT
ARDIYANI, M., ARDI, W. H., SANTOSO, W. & POULSEN, A. D. 2020. Etlingera tjiasmantoi (Zingiberaceae), a new species from Central Sulawesi. Reinwardtia 19(2): 103–108. — A new species of Etlingera, Etlingera tjiasmantoi Ardiyani & Ardi, was discovered at Tentena, Central Sulawesi, and is described here. This species resembles Etlingera flexuosa A.D.Poulsen and Etlingera mamasarum A.D.Poulsen & Ardiyani but differs from both in having thecae dehiscing through their entire length and in the obovoid, glabrous and spineless fruits. The DNA barcode data, the line drawings of flower and fruit and the plate of E. tjiasmantoi were presented.

Keywords: DNA barcode, Etlingera flexuosa, E. mamasarum, Indonesia, Zingiberales.

INTRODUCTION
Etlingera Giseke (Zingiberaceae) consists of more than 100 species distributed from India, Indo-China throughout Malesia to the Pacific Islands (Poulsen, 2006, 2007, 2012; Poulsen & Docot, 2018). A revision of the genus in Sulawesi (Poulsen, 2012) included 46 species (of which 36 were new to Science). Subsequent fieldwork in 2016 at Mamasa, West Sulawesi, led to the publication of Etlingera mamasarum A.D.Poulsen & Ardiyani (Ardiyani & Poulsen, 2019). Sulawesi is therefore currently known to harbour 47 species of the genus.

Several field trips focusing on the ginger family in Sulawesi were conducted in 2008-2009 (Poulsen, 2012), Gunung Gandang Dewata National Park, Mamasa, West Sulawesi in 2016 (Ardiyani & Poulsen, 2019), Gorontalo in 2013 and 2017, and Mamasa, West Sulawesi in 2019 (Ardi & Thomas, 2020). Even so, large areas of Sulawesi remain unexplored and even though especially the lowland forests of Sulawesi have been highly fragmented, these are likely to harbour additional undescribed species.

Moreover, the identification of ginger collections relies on them being of sufficient quality including pickling flowers and fruits in spirit. This is a procedure most collectors would not always follow and new species may already have been collected but it is impossible to describe them in sufficient detail.

During an exploration in March 2020 in Central Sulawesi by the first and second authors a collection was made of an Etlingera which did not match any of the 47 species currently known. We therefore propose a new species, which is described and illustrated in a colour plate and line
drawings below. We also provide its DNA barcode.

MATERIALS AND METHODS

Morphological observations were made using living collections in the wild and herbarium specimens in BO. Measurements were made using a ruler and a calibrated eye piece under a dissecting microscope. DNA barcoding markers of the type specimen are rbcL, the Intergenic Spacers between trnH and psbA (Kress & Erickson, 2007), and the Internal Transcribed Spacers (ITS) (Kress et al., 2005). The barcode procedures followed Kress & Erickson (2012). Sequencing were done in the 1stBase company. Sequences were deposited in the NCBI GenBank (Table 2).

RESULTS AND DISCUSSION

Etlingera tjiasmantoi Ardiyani & Ardi spec. nov. — TYPE: INDONESIA, Sulawesi, Central Sulawesi, Tentena Regency, road side between Tentena and Bada, 1,757 m, 01.79950° S, 120.47433° E, flowering and fruiting, 7 March 2020, M. Ardiyani 1007 with Wisnu H. Ardi, Prima Hutabarat, Zulfadli, Roland Putra, Ofin (Holotype BO). Figs. 1 & 2.

Etlingera tjiasmantoi is similar to E. flexuosa A.D.Poulsen and E. mamasarum A.D.Poulsen & Ardiyani in having entire ligules with ± emarginate apex, long petioles (around 4 cm), elongated elliptic to narrowly ovate laminas, pointed calyces, and ± pink flowers but E. tjiasmantoi differs from both in having thecae dehiscent along their entire length, to tube, inserted 1–2 mm below dorsal lobe; floral tube 12–15 mm long, pale pink, glabrous, tube inside glabrous; lobes pale pink, bright pink towards apex, glabrous, reaching 1–1.5 mm short of apex of anther; dorsal lobe 26 × 6 mm, spathulate, cucullate; lateral lobes 26 × 3.5 mm, narrower than dorsal lobe, spathulate, cucullate, attached straight to tube, inserted 1–2 mm below dorsal lobe; staminal tube 12 mm long, pale pink; labellum unevenly panduriform, 22 × 18 mm, bright pink, pale pink towards base, glabrous, lateral lobes involute, forming a semi-tube enclosing most of stamen, widest in middle, narrowing towards apex, central lobe slightly emarginate, margin unevenly serrate, recurved only when old, extending 4–5 mm (when flattened) beyond anther; stamen 18 mm long; filament 10 × 2.5 mm, pink; anther 7 × 3.5 mm, slightly broader at base, angled erect to 24°, pink, anther crest slightly emarginate; thecae dehiscent along their entire length, sericeous; ovary 2 × 3 mm, glabrous, whitish, slightly barrel-shaped; epignous gland 4 mm long, cylindrical, bilobed, split to base adaxially, less than a half from apex on opposite side, glabrous; style 4 cm long, glabrous; stigma 1 mm wide, white, club-shaped, ostiole transverse elliptic ca. 1 mm, facing forwards. Infructescence above ground, head to 12.5 × 13 cm, globose, bracts, bracteole and calyx rigid and persistent, with ca. 35 fruits per head; pedicel to 4 mm long, fruit 2.3 × 2 cm, obovoid, 3-angled, yellowish brown, cream-yellow towards base, glabrous, pubescent near base of calyx remnant; seeds 4 mm diam., irregularly elliptic to round, black, aril white.

Rhizome short-creeping, 2.8 cm diameter, cream yellow, sericeous, rhizome scales to 5 cm long, reddish brown, apex mucronate, pubescent; stilt roots absent. Leaves shoots to 4.1 m long, in loose clump: ca. 20 cm between neighbouring leafy shoots, with ca. 16 leaves per shoot; base to 7 cm across, reddish brown, pubescent at the very base; sheath reddish brown, reticose, sericeous to pubescent, margin ciliate; ligule to 2.8–3.0 cm long, entire, apex truncate to slightly emarginate, reddish brown, hirsute in centre; petiole canaliculate, to 3.8–4.5 cm long, densely villose on near margin, yellowish green tinged brown; lamina narrowly ovate, 70 × 14 cm to 78 × 17 cm, length to width ratio 4.6–5, slightly plicate, dark green with reddish brown towards base of midrib, pale green towards apex, glabrous above, yellowish green beneath, midrib light green tinged red, pubescent beneath; base cordate, oblique; apex acuminate; margin sometimes reddish brown, densely hirsute. Flowering shoot 15.5–20 cm long, arising from rhizome, with up to ca. 90 flowers, up to 4 open at a time; peduncle 8 cm long, ascending, peduncular bracts to 3.5 × 1 cm, acute, mucronate, cream tinged pink; spike (including flowers) 9 × 7 cm to 12 × 6 cm, bracteal part ovoid and flat-topped, above ground, flowers reaching to 2.0–2.5 cm above the supporting bracts; sterile bracts 5 × 3 cm, brown tinged yellow, apex acute, mucronate, glabrous; fertile bracts 3.5–3.9 × 1.1–1.3 cm, narrowly obovate, boat-shaped, apex acuminate-caudate, mucronate, cream yellow, reddish brown towards apex, pubescent; pedicel ca. 2.5 mm long (between base of bracteole and ovary); bracteole 2.2–2.4 cm long, white to pink at apex, transparent with two fissures 1.2–1.8 cm long, glabrous, pubescent at the very base, apex bilobed, each mucronate to 1 mm, reaching 11 mm below apex of calyx. Flower 4.8–5.2 cm long; calyx 3.3–3.5 cm long, reaching 18 mm above base of stamen and 8 mm short of apex of corolla lobes, pink, with 3 fissures of 5.5–7 mm, glabrous, apex tridentate, two of them pointed, spreading laterally to opposite sides of the flower; floral tube 12–15 mm long, pale pink, glabrous, tube inside glabrous; lobes pale pink, bright pink towards apex, glabrous, reaching 1–1.5 mm short of apex of anther; dorsal lobe 26 × 6 mm, spathulate, cucullate; lateral lobes 26 × 3.5 mm, narrower than dorsal lobe, spathulate, cucullate, attached straight to tube, inserted 1–2 mm below dorsal lobe; staminal tube 12 mm long, pale pink; labellum unevenly panduriform, 22 × 18 mm, bright pink, pale pink towards base, glabrous, lateral lobes involute, forming a semi-tube enclosing most of stamen, widest in middle, narrowing towards apex, central lobe slightly emarginate, margin unevenly serrate, recurved only when old, extending 4–5 mm (when flattened) beyond anther; stamen 18 mm long; filament 10 × 2.5 mm, pink; anther 7 × 3.5 mm, slightly broader at base, angled erect to 24°, pink, anther crest slightly emarginate; thecae dehiscent along their entire length, sericeous; ovary 2 × 3 mm, glabrous, whitish, slightly barrel-shaped; epignous gland 4 mm long, cylindrical, bilobed, split to base adaxially, less than a half from apex on opposite side, glabrous; style 4 cm long, glabrous; stigma 1 mm wide, white, club-shaped, ostiole transverse elliptic ca. 1 mm, facing forwards. Infructescence above ground, head to 12.5 × 13 cm, globose, bracts, bracteole and calyx rigid and persistent, with ca. 35 fruits per head; pedicel to 4 mm long, fruit 2.3 × 2 cm, obovoid, 3-angled, yellowish brown, cream-yellow towards base, glabrous, pubescent near base of calyx remnant; seeds 4 mm diam., irregularly elliptic to round, black, aril white.
**Distribution.** Only known at the type locality in Tentena, Central Sulawesi.

**Habitat & Ecology.** Grows in secondary forest by the road between Tentena and Bada, near a waterfall and a stream at about 1,700 m asl.

**Etymology.** The epithet honours Mr. Wewin Tjiasmanto who funded the botanical trip to Central Sulawesi, and who is greatly concerned for wildlife, taxonomy, exploration and conservation.

**Phenology.** Flowering and fruiting recorded in March.

**Local name & uses.** Not available.
Conservation status. This species is currently only found in the type locality which is beside the main road between Tentena and Bada. The surrounding forests are still in good condition. Nevertheless, in the future, it is prone to land degradation due to anthropogenic activities since it is not in a protected area. The IUCN Assessment (IUCN, 2020) is categorized as Vulnerable D2.

Notes. *Etlingera tjiasmantoi* is mostly similar to *E. mamasarum* and *E. flexuosa* from which it differs by the anther dehiscence and glabrous, shiny and spineless fruits. In addition, there are differences between one of each of the two species (Table 1).

Table 1. Morphological characters of *Etlingera flexuosa*, *E. mamasarum* and *E. tjiasmantoi*. The character not shared with any of the other two is shown in bold.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Flower (extending above bract)</td>
<td>Extending 1.5–3 cm above the bracts</td>
<td>Reaching to 0.5 cm below the supporting bracts</td>
<td>Extending 2.0–2.5 cm above the bracts</td>
</tr>
<tr>
<td>Flower (orientation)</td>
<td>Flexed</td>
<td>Not flexed</td>
<td>Not flexed</td>
</tr>
<tr>
<td>Calyx (shape)</td>
<td>Pointed</td>
<td>Pointed, spreading laterally to opposite sides of the flower</td>
<td>Pointed, spreading laterally to opposite sides of the flower</td>
</tr>
<tr>
<td>Labellum (shape)</td>
<td>Ovate</td>
<td>Unevenly panduriform</td>
<td>Unevenly panduriform</td>
</tr>
<tr>
<td>Anther (shape)</td>
<td>Broadest in centre</td>
<td>Slightly broader at base</td>
<td>Slightly broader at base</td>
</tr>
<tr>
<td>Anther (angle)</td>
<td>Angled (140°-180°)</td>
<td>Erect</td>
<td>Erect to angled 24°</td>
</tr>
<tr>
<td>Theca (dehiscence)</td>
<td>In upper half (3–3.5 mm from bottom to 2.5–4 mm to 0.5 mm below apex)</td>
<td>Dehiscent for ca. 4 mm from 2 mm above base</td>
<td>Dehiscent along the entire length of the thecae</td>
</tr>
<tr>
<td>Ovary (shape)</td>
<td>Obconical to cylindrical (widest above the middle)</td>
<td>Barrel-shaped</td>
<td>Barrel-shaped</td>
</tr>
<tr>
<td>Fruit (shape)</td>
<td>Pyriform</td>
<td>Round</td>
<td>Obovoid 3-angled</td>
</tr>
<tr>
<td>Fruit (ornament)</td>
<td>Pubescent, soft-spiny in upper half</td>
<td>Pubescent esp. in upper part; spines in upper third, spines to 4 mm long, curved</td>
<td>Glabrous, pubescent near the base of calyx remnant, spineless</td>
</tr>
</tbody>
</table>

Fig. 3. Inflorescences of *Etlingera* species. A. *Etlingera flexuosa* (Poulsen et al. 2655, the type). B. *E. mamasarum* (Ardiyani et al. Sulbar 004, the type). C. *E. tjiasmantoi* (M. Ardiyani et al. 1007, the type). Photos by A. D. Poulsen, M. Ardiyani & W. H. Ardi.
Table 2. DNA barcoding of *E. tjiasmantoi*

<table>
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<tr>
<th>Species</th>
<th>NCBI GenBank Accession No.</th>
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<tr>
<td></td>
<td><em>rbcL</em></td>
</tr>
<tr>
<td><em>Etlingera tjiasmantoi</em></td>
<td>MT975342</td>
</tr>
</tbody>
</table>

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REFERENCES


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Herbarium Bogoriense
Botany Division
Research Center for Biology – Indonesian Institute of Sciences
Cibinong Science Center
Jln. Raya Jakarta – Bogor, Km 46
Cibinong 16911, P.O. Box 25 Cibinong
Indonesia