



Characterisation of *Adelopetalum argyropus* (Orchidaceae; Malaxideae) with the description of two related new species and two new combinations

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Abstract

The *Adelopetalum argyropus* species complex is distributed across eastern Australia, Lord Howe Island, Norfolk Island, New Caledonia and New Zealand. We undertook morphological examination of living plants and fresh flowers, dissected flowers mounted on cards, dried and spirit-preserved herbarium specimens and made images of living flowers. We characterise *Adelopetalum argyropus* as endemic to Norfolk Island. Two previously confused species, one from mainland Australia, *A. continentale*, and another from Lord Howe Island, *A. howense*, are described here as new. Extinction risk is preliminarily assessed for the three taxa: *A. continentale* was severely impacted by the 2019–2020 bushfires on mainland Australia, whereas *A. argyropus* and *A. howense* are each restricted to small oceanic islands; Norfolk Island and Lord Howe Island respectively.

Key words: *Adelopetalum continentale*, *Adelopetalum howense*, Epidendroideae, Dendrobiinae, Lord Howe Island, Norfolk Island, *Bulbophyllum*, threatened orchid species

Introduction

Adelopetalum Fitzgerald (1891: 152) is a genus of small epiphytic and/or lithophytic orchids (Jones 2021) described first in 1891 based on a small endemic Australian species, *A. bracteatum* Fitzgerald (1891: 152), from the Tweed River on the border of New South Wales and Queensland. This species was transferred to the broader concept of the cosmopolitan genus *Bulbophyllum* Thouars (1822: table 3) by Bailey (1891). Later, Dockrill (1969) treated *B. bracteatum* in *Bulbophyllum* sect. *Macrouris* Schlechter (1912: 703), then Vermeulen (1993) included *Adelopetalum*, as a section, as one of more than 100 sections in *Bulbophyllum*. *Adelopetalum* was reinstated as a generic concept (Clements & Jones 2002) based on detailed study of living plants, including the type species for the genus, *B. nutans* Thouars (1822: t107) (Clements 8101, CANB 620118), whereas later revisions continued to treat *Bulbophyllum* in the broad sense, making it one of the largest flowering plant genera, with more than 2100 species (Pridgeon *et al.* 2014, Vermuelen *et al.* 2014, POWO 2024).

In Bulbophyllinae, *Adelopetalum* is unique in having its centre of distribution in Australia (Pridgeon *et al.* 2014, Vermeulen 1993, Simpson *et al.* 2023). *Adelopetalum*, as currently understood, includes 12 species that occur in eastern continental Australia, Norfolk Island, Lord Howe Island, New Caledonia and New Zealand.

Although *Adelopetalum* species show overall morphological similarity, in addition to their distinct geographic distribution, their morphological characterisation in *Bulbophyllum* has been described as weak and polythetic (Vermeulen 1993). Nevertheless, *Adelopetalum* can be morphologically differentiated from the most morphologically similar groups *Sestochilus* and *Macrouris* (*Bulbophyllum* sect. *Sestochilus* Schlechter (1912:698) and *Macrouris* Schlechter (1912: 703) (Vermeulen 1993)). Furthermore, *Adelopetalum* is geographically and phylogenetically distinct from these groups (Tharawa *et al.* 2024, Simpson *et al.* 2023).

Recent molecular analysis revealed *Adelopetalum* to be a highly supported and early diverging clade that emerged on the Australian continent in the Late Oligocene (ca. 23.6 Ma; Simpson *et al.* 2023). The analysis revealed a close relationship between *Bulbophyllum* sections *Adelopetalum* (Vermeulen 1993: 66) and *Minutissima* s.s. (Pfitzer in Engler & Prantl 1889: 180). (*Oncophyllum* (Jones & Clements 2001: 420)) and showed that together they are sister to all other *Bulbophyllum*. The *Adelopetalum* clade comprises ten species previously described as *Adelopetalum* (Clements & Jones 2002) plus *Bulbophyllum corythium* (Hallé 1981: 357), *B. lingulatum* Rendle in Rendle, Baker & Moore (1921: 247) from New Caledonia, and *B. pygmaeum* (Smith in Rees 1819: 411) Lindley (1830: 58) from New Zealand.

In this study, we maintain *Adelopetalum* at the generic rank (Clements & Jones 2002) based on species morphological similarities and evidence from recent molecular analysis (Simpson *et al.* 2023). Except for *B. pygmaeum* which was suspected as being of hybrid origin (Simpson *et al.* 2023), *Bulbophyllum* species resolved in the *Adelopetalum* clade (*B. corythium* and *B. lingulatum*) are transferred to *Adelopetalum* here.

The *Adelopetalum argyropus* species complex comprises a group of closely related species occurring in eastern continental Australia, Norfolk Island, Lord Howe Island, New Caledonia, and New Zealand. Species limits in the complex remain unclear with treatments so far recognising up to three species: *A. argyropus* (Endlicher (1833: 32)) D.L.Jones & M.A.Clem. in Clements & Jones (2002: 498) from the Australian mainland and Lord Howe Island, *Adelopetalum tuberculatum* (Colenso 1884:336) D.L.Jones, M.A.Clem. & Molloy in Clements & Jones (2002: 498) from New Zealand, and *Bulbophyllum corythium* (Hallé 1981: 357) from New Caledonia, which is transferred here to *Adelopetalum*. Divergence dating analyses showed that although most species of *Adelopetalum* evolved during the Miocene and Pliocene, divergence among species in the *A. argyropus* complex occurred during the Pleistocene (0.5 Ma; Simpson *et al.* 2023). Due to sampling limitations, species delimitation in the complex remained unresolved because it included only a single representative of each species. The study included a single representative of *A. argyropus* from the Australian mainland, whereas Lord Howe Island and Norfolk Island populations were not sampled. Further studies need to sample representative populations of each species and apply molecular approaches suited to resolving relationships among recently diverged taxa (e.g., Perez-Escobar *et al.* 2020).

Adelopetalum argyropus was originally described by the German botanist Endlicher (1833) as *Thelychiton argyropus* Endlicher (1833: 32) from material collected on Norfolk Island by the botanical artist Ferdinand Bauer in 1802. This species was understood to be distributed across Norfolk Island, Lord Howe Island and eastern continental Australia. Here, the definition of *Adelopetalum argyropus* s.s. is refined, and two new species, one from Lord Howe Island and another from continental Australia, are described as new based on unique morphological characteristics. In addition, we provide two new combinations in *Adelopetalum* based on phylogenetic studies (Simpson *et al.* 2023).

This study is based on the morphological examination of living plants and flowers in the field, examination of dissected flowers mounted on cards and dried and spirit-preserved herbarium specimens. Herbarium collections, spirit and dried or photographs, were examined from the following herbaria: BRI, K, CANB, CBG, NE, NSW and W. We reviewed the protologue of *Adelopetalum argyropus*, as *Thelychiton argyropus*, by Endlicher (1833), and the descriptions of these (and related) taxa in other sources (Green 1994, Banks 2009, Copeland & Backhouse 2022, Jones 2021).

Measurements in the descriptions are from living plants, dissected flowers on cards and high-resolution images of living plants. Notes on distribution, habitat and ecology were derived from herbarium labels and fieldwork by the authors in north-eastern New South Wales, south-eastern Queensland, Norfolk Island and Lord Howe Island. Suggested conservation status was evaluated using the IUCN Red List categories and criteria (IUCN 2022), with geographic range estimates made with the GeoCAT online tool (<https://geocat.iucnredlist.org/>).

Adelopetalum argyropus s.s. is limited to its type location on Norfolk Island. Although *A. argyropus* was previously treated in a broad sense (e.g., Green 1994, Vermeulen 1993, CHAH 2018), detailed study of representatives from across its distribution has revealed a complex of three species: *A. argyropus* from Norfolk Island, *A. continentale* D.L.Jones, M.A.Clem. & H.Zimmer endemic to continental Australia (south-eastern Queensland and north-eastern

New South Wales) and *Adelopetalum howense* D.L.Jones, M.A.Clem. & H.Zimmer endemic to Lord Howe Island. *Adelopetalum argyropus* s.s. has distinctive morphology, including an apparently autogamous flower. One of Bauer's original collections of *A. argyropus* s.s. (K000867047; Fig. 1) includes a pencil sketch of a plant and expanded floral parts, showing an apparently undifferentiated labellum. *Adelopetalum argyropus* is the only species in the genus for which autogamy has been proposed. Of the 11 orchids recorded for Norfolk Island, two others are thought to be cleistogamous or autogamous (Zimmer *et al.* 2023): *Thelychiton macropus* Endlicher (1833: 33) and *T. brachypus* Endlicher (1833: 33).

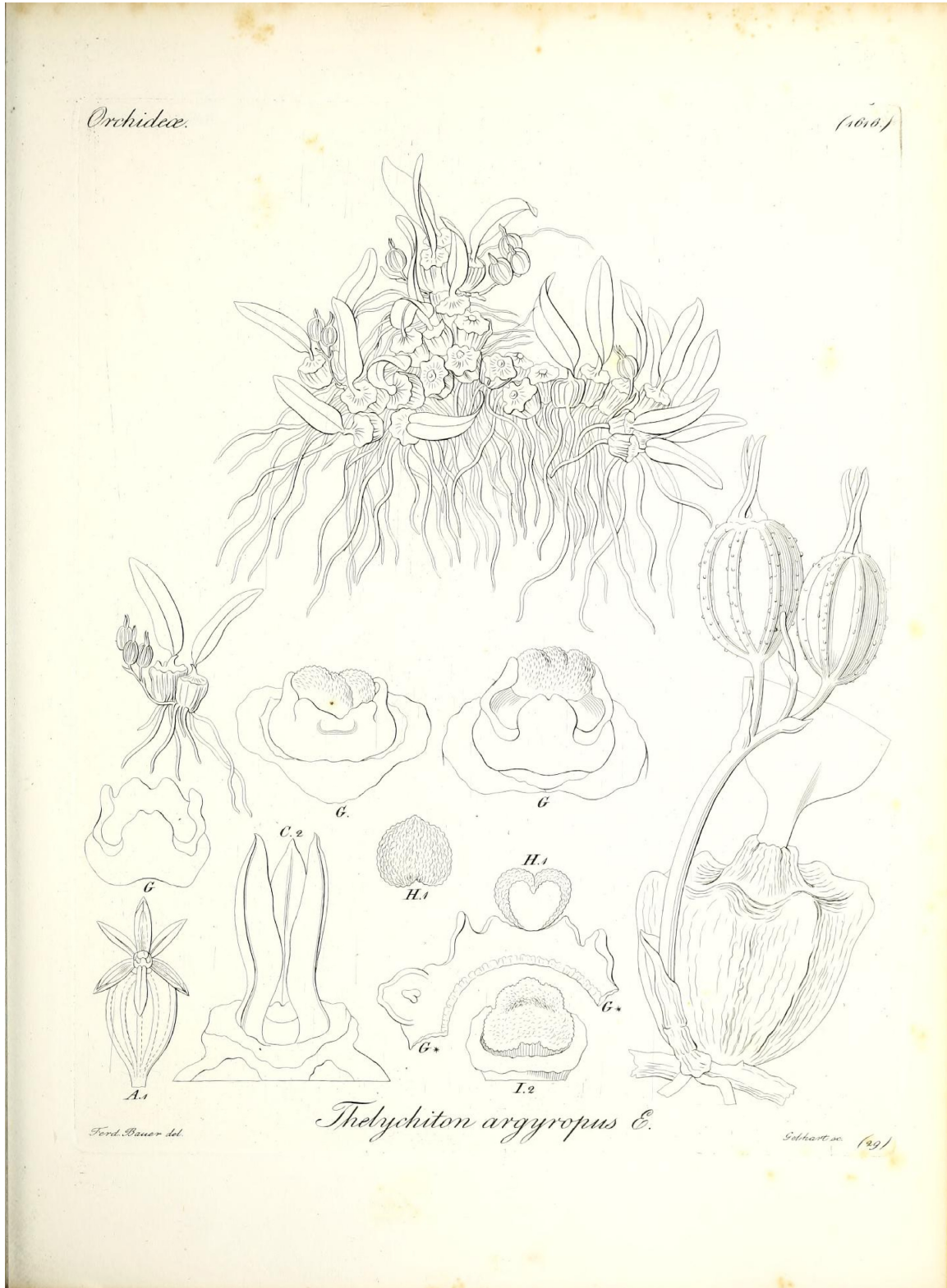


FIGURE 1. *Adelopetalum argyropus* (as *Thelychiton argyropus*) illustrated in plate 29 of part 3 of Endlicher's *Iconographia generum plantarum* (1837). BHL affirms that this work is in the public domain. Source: <https://www.biodiversitylibrary.org/page/41749924>.

Taxonomy

Adelopetalum argyropus (Endl.) D.L.Jones & M.A.Clem. (Figs 1–3)

Basionym: *Thelychiton argyropus* Endl.

TYPE:—AUSTRALIA. Norfolk Island: *Bauer s.n.* (lectotype, inadvertently designated by Clements (1989): W0046213!; isolectotype: K).

Homotypic synonym: *Bulbophyllum argyropus* (Endl.) Reichenbach (1876: 42) (1876).

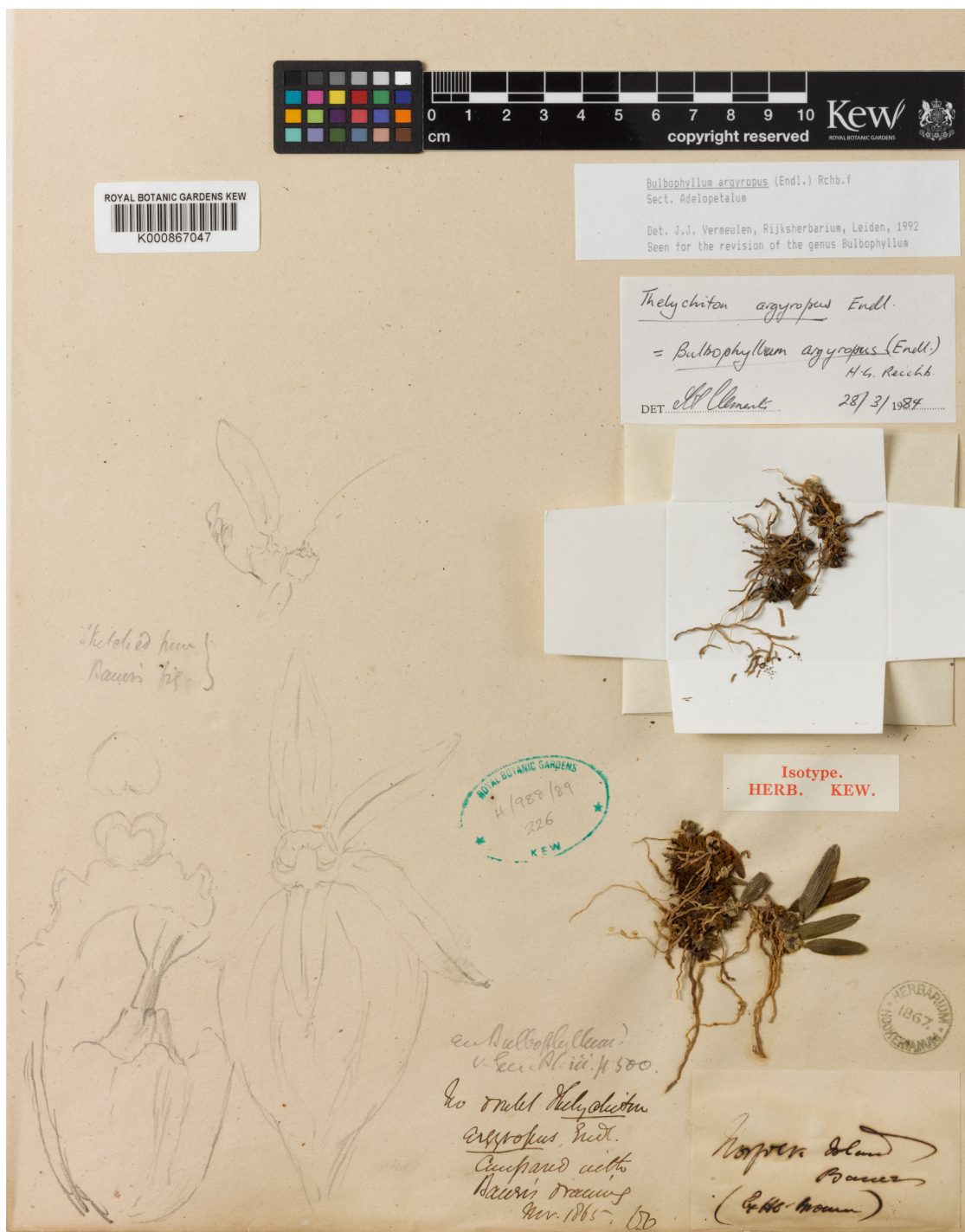


FIGURE 2. *Adelopetalum argyropus*, collected by Ferdinand Bauer from Norfolk Island (as *Thelychiton argyropus*). Royal Botanic Gardens, Kew, K000867047. Available online from <http://specimens.kew.org/herbarium/K000867047>. © RBG Kew.

Small to large, compact herbs with crowded sympodia. Roots thin, white, elongate, unbranched. Emerging shoots covered with white, felted, fugacious bracts. Pseudobulbs broadly oblong to obconical or turbinate (similar to a cupcake, “*poculum crustulam simile*”), 5.0–10.0 × 4.0–6.0 mm, margins with 4–5 weakly angular ribs, surface shallowly

grooved, scurfy from remnants of fugacious bracts, apex truncate with shallow to deep depressions. Leaf single, petiole 1–2 mm long; lamina narrowly to broadly elliptic, 10.0–30.0 × 3.0–6.0 mm, dark green, rigid, shallowly grooved adaxially along the midrib, underside with a weak central keel, apex obtusely apiculate. Racemes arising from base of a pseudobulb, 20.0–30.0 mm long, shallowly curved; sterile bract basal on peduncle, narrowly ovate-lanceolate, 6.0 × 2.5 mm, green ageing brown, apex acuminate; peduncle much longer than rachis, 0.7 mm wide, pale green, bearing numerous minute translucent/whitish silica-like warts. Floral bracts ovate-lanceolate, pale green, basally sheathing the pedicel, 1.5 × 1.0 mm. Pedicels 1.0 mm long, green, smooth, incurved at apex. Ovaries obovoid, straight, 1.5 × 1.0 mm, green, with numerous minute translucent/whitish crystal-like warts. Flowers 1–4, not opening widely, porrect to weakly decurved, 4.0 × 2.5 mm, cream to greenish white. Sepals and petals not opening widely, labellum not longer than sepals. Dorsal sepal porrect, oblong-elliptic, 4.0 × 1.2 mm, external surface weakly and irregularly verrucose, apex acute to mucronate. Lateral sepals free, weakly divergent, ovate-oblong, 4.0 × 1.4 mm, external surface weakly and irregularly verrucose, apex subacute to mucronate. Petals porrect to weakly divergent, mostly overlapped by the sepals, oblong-elliptic, 3.0 × 1.0 mm, apex subobtuse to subacute. Labellum lamina entire, petaloid, cream to greenish white, narrowly elliptic, 3.0 mm long. Column 1.0 mm wide with prominent stigmatic cavity, partially covered from base by central lobe. Anther cap cordate, possibly colluviate. Capsules broadly elliptical, 6.0 × 5.0 mm, ribs with minute translucent/whitish silica-like warts. (Fig. 1)

Etymology:—From *argyros* (silver), *-pous*, *podos* (foot), referring to silvery scales on young pseudobulbs (probably scurfy remnants of fugacious bracts).

Flowering:—May (authors' observations), August–September (Green 1994).

Distribution:—Norfolk Island.

Habitat:—Epiphytic in upland hardwood and pine hardwood ridge forests, in areas with above-average air circulation (based on authors' observations; Zimmer 2023). Host species include *Didymocheton bijugus* (Labillardière 1825: 54) Holzmeier & Mabberley in Holzmeier *et al.* (2021: 1259) (sharkwood).



FIGURE 3. *Adelopetalum argyropus*. A, C. Flower. B. Habit. Photos taken *in situ* on Norfolk Island. Photos by H. Zimmer and M. Clements.

Conservation status:—Endemic to two sites with total land area of 34.6 km². Extent of occurrence and area of occupancy are estimated to be 12 km², meeting the geographic range threshold (<100 km² for IUCN Red List criterion B1) for assessment as critically endangered. It is at risk of continuing decline due its restricted habitat (moist upland hardwood forest on Norfolk Island) and the impacts of climate change, in particular drought. Mean annual rainfall on Norfolk Island has declined 11% between 1970 and 2020 (CSIRO 2020).

Additional specimens examined:—17 Oct. 1993, *Christian & Cochran* ESW48 (CBG 9602070); 18 May 2022, *Clements* 13711 (CANB 999452); 30 Nov 1996, *Zeising* 350 (CANB 616544); *Bauer s.n.* (W0046213). [<https://plants.jstor.org/stable/10.5555/al.ap.specimen.w0046213>]; *Bauer s.n.* (K000867047) [<https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000867047>].

Adelopetalum continentale D.L.Jones, M.A.Clem. & H.Zimmer, *sp. nov.* (Fig. 4)

TYPE:—AUSTRALIA. New South Wales: Cottan-Bimbang National Park [precise location withheld], 9 Apr 2023, *Bruhl* 3799 & *Quinn* (holotype: CANB 959724; isotypes: NE 114414, NSW).

Bulbophyllum tuberculatum sensu Clemesha (1979), not *Bulbophyllum tuberculatum* Colenso (1884: 336).

The new species is similar to *Adelopetalum argyropus* but differs by its ovoid to conical or transversely elliptic pseudobulbs with a flat apex (globose to obconical or turbinate pseudobulbs in *A. argyropus*, the apex with shallow to deep depressions), flowers opening widely (not in *A. argyropus*); lateral sepals widely divergent, cream to pale yellow with a contrasting protruding yellow to pale orange labellum (weakly divergent in *A. argyropus*, not longer than sepals, cream to greenish white); also to *A. howense* but differs by its porrect to weakly decurved flowers (versus pendent flowers), shorter, narrower lateral sepals tapered to a drawn-out subacute apex (3.5–4.0 × 2.0 mm at widest point versus 4.5 × 2.3 mm in *A. howense* with an obtuse apex) and slightly narrower, yellow to pale orange labellum (versus dark orange).

Large, compact herbs with crowded growths. Roots 1 mm across, white, spreading, unbranched. Emerging shoots covered with white, felted, fugacious bracts. Pseudobulbs ovoid to conical or transversely elliptic, 5–8 × 3–6 mm, green, surface irregularly verrucose, weakly furrowed or ribbed, apex truncate, flat, scurfy from remnants of fugacious bracts. Leaf single; petiole 1–2 mm long; lamina oblong to elliptical, 20–25 × 3–6 mm, dark green, rigid, midrib sunken, strongly ridged abaxially, margins recurved, apex subacute to apiculate. Racemes arising from base of a pseudobulb, wiry, 15–35 mm long, straight or irregularly curved, green to brownish; sterile bract basal on peduncle, narrowly ovate-lanceolate, 4 × 2 mm, whitish green, apex obtuse; peduncle much longer than rachis, 0.5 mm wide, both parts bearing numerous translucent/whitish silica-like warts. Pedicels 0.5–1.0 mm long, strongly curved, smooth or sparsely verrucose. Ovaries asymmetrically obovoid, 1.5–2.0 × 0.5 mm, green to brownish, ribs verrucose. Floral bracts 1.5 mm long, acute. Flowers 1–4, porrect to weakly decurved, opening widely, 3.0–3.5 × 4.5–5.5 mm, sepals and petals cream to pale yellow, basal 1/3 of labellum pale yellow, distal 2/3 of labellum pale yellow/ orange. Sepals spreading widely, petals remaining near dorsal sepal, labellum protruding prominently. Dorsal sepal porrect to incurved, narrowly ovate-lanceolate to narrowly cuneate when flattened. 3.5–4.0 × 1.3 mm, margins flat, entire, apex subobtuse. Lateral sepals free, widely divergent, 3.5–4.0 × 2.0 mm, at widest point near base, shallowly falcate, asymmetrically ovate-lanceolate when flattened with an expanded basal flange on the anterior margin forming a shallow pouch, midvein thickened, yellowish, exterior surface with irregularly scattered siliceous bumps, tapered to a drawn-out subacute apex. Petals incurved close to the column, partially enclosed by the dorsal sepal, elliptic-oblong to oblong in outline, margins pinched inwards or tapered in proximal 1/3, 2.0–2.3 × 0.8 mm, distal margins irregularly papillate, apex obtuse to subobtuse. Labellum claw attached to labellum base and apex of column foot, ligulate, 0.3 × 0.2 mm. Labellum lamina trilobed, narrowly elliptical to linguulate, tapered evenly from near midpoint to the apex, 3.0 mm long when flattened, yellow to pale orange and erect in the proximal third, distal two-thirds recurved more or less at right angles, dark yellow to orange; labellum at midpoint of lateral lobes 2.0 mm wide when flattened; lateral lobes erect, curved, 1.0 × 0.7 mm, outer margin broadly rounded; midlobe linguiform, 1.8 × 1.0 mm wide at base, 0.4 mm high (thick), convex, underside hollow, distal third recurved, tapered to an obtuse to subobtuse apex. Callus 1.0 × 0.7 mm wide, an obscure, oblong, plate-like area between the lateral lobes adorned with two shallow ridges. Column 1.2 × 0.7 mm, white, with broad, incurved wings 0.7 mm wide. Column foot tapered, 1.2 × 0.3 mm, distally incurved. Anther ovate, 0.25 × 0.20 mm wide, erostrate. Stigma 0.3 × 0.2 mm, sunken. Pollinarium not seen. Capsules asymmetrically ovoid, 5.0 × 3.5 mm, ribs prominent, with reddish warts, on curved, reddish pedicels.

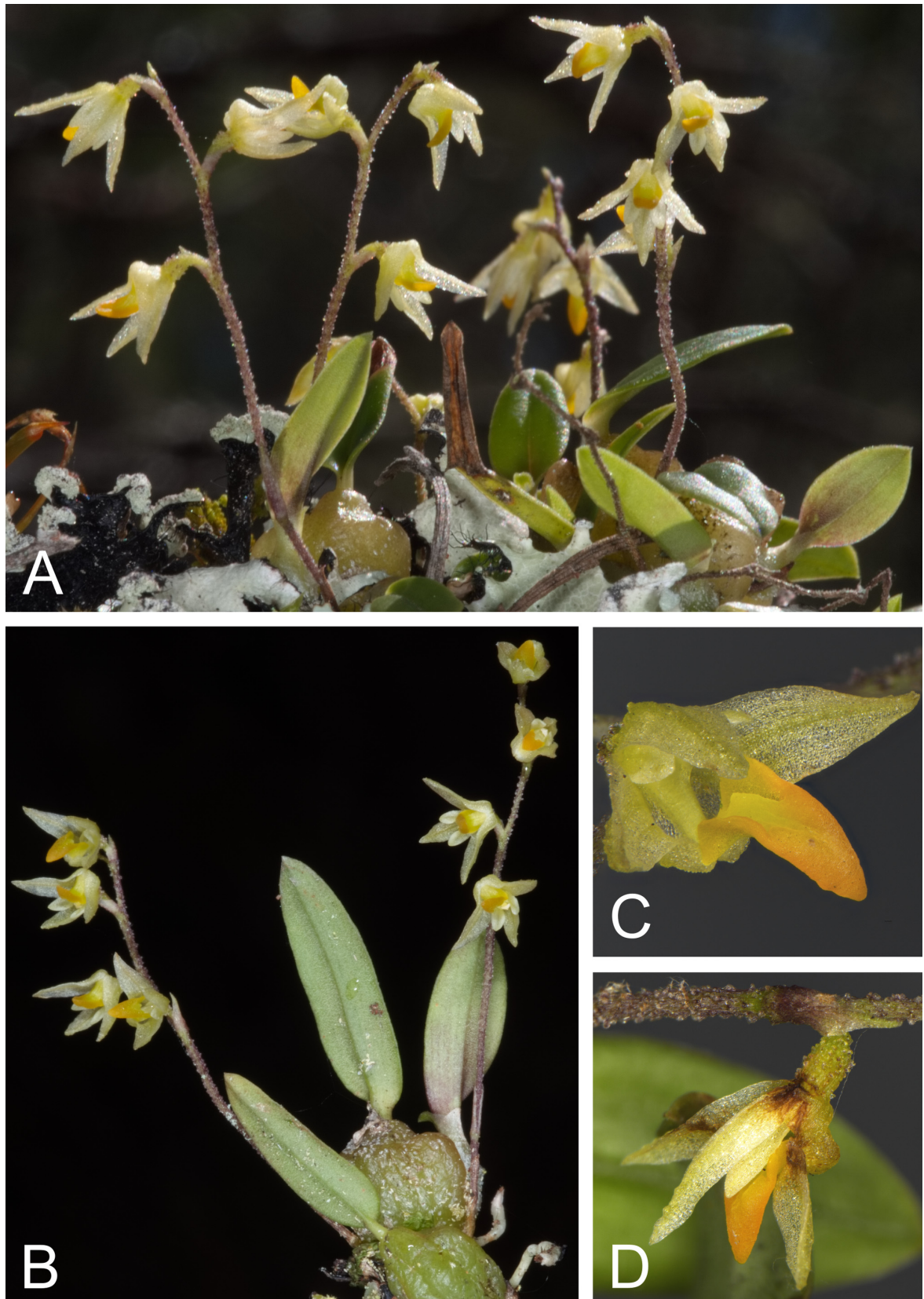


FIGURE 4. *Adelopetalum continentale*. A, B. Habit. C, D. Flower. Photos by J. J. Bruhl.

Etymology:—Referring to its distribution on mainland Australia as distinct from related species occurring on oceanic islands.

Flowering:—March–April, August–December.

Distribution:—Endemic to south-eastern Queensland (McPherson Ranges in the far south-east) and north-eastern New South Wales (Border Ranges, Comboyne Plateau, Cooperook Creek east of Dorrigo, Enfield State Forest, Cottan-Bimbang National Park south-east of Walcha and Gibraltar Range); ca. -1,200 m elev.

Habitat:—Epiphytic on trees (branches, high in the canopy), mostly in wetter forests, including rainforest and humid open forests, on *Exocarpos cupressiformis* Labillardière (1800: 155) (Cherry Ballart), *Elaeocarpus kirtonii* F.Mueller ex F.M.Bailey in Bailey (1886: 8) (White Quandong), *Pittosporum undulatum* Ventenat (1802: t.76) (sweet pittosporum), *Didymocheton mollis* (as *Dysoxylum mollissimum* subsp. *molle* (Miquel 1868: 18) Mabblerley in Mabblerley (1994: 309)) (Clemesha 1979), *Diospyros pentamera* (Woolls & Mueller in Mueller 1864: 82) Mueller in Mueller (1867: 35) (native ebony) (Walsh 1993), *Leptospermum brevipes* Mueller (1855: 45) (slender teatree) and *Banksia monticola* subsp. *integrifolia* K.R.Thiele in Thiele & Ladiges (1994: 406) (white mountain banksia). Populations in Lamington National Park, south-eastern Queensland, grow on the upper branches of tall trees in highland rainforest, where most plants have been found on fallen branches.

Herbarium records and online records of human observations (supported by images) of *Adelopetalum continentale* are scarce (< 20 records).

Conservation status:—Although having a broad extent of occurrence (estimated 28,000 km²), populations of this species are disjunct, resulting in an estimated area of occupancy of 48 km². The area of occupancy meets the geographic range threshold for listing as endangered. Moreover, several populations (Cottan-Bimbang National Park and adjacent Enfield State Forest, and Gibraltar Range National Park) were severely impacted by bushfires in 2019–2020, with declines in populations of >50%.

Illustrations:—Jones (1988, p. 504), as *Bulbophyllum argyropus*; Jones (2006, p. 420, Jones 2021, p. 696) as *Adelopetalum argyropum*; Copeland & Backhouse (2022, p. 19), as *Bulbophyllum argyropus*.

Additional specimens examined:—AUSTRALIA. New South Wales: ex Wauchope, 7 Jun 1982, *Clements. s.n.* (CBG 8302249); ex Wild Cattle Creek State Forest, 1 Mar 1984, *Taylor 2374* (CBG 8404132); ex Briggsvale, Dorrigo, 1 Mar 1995; *Leilkajis DLJ13856* (CANB 678644); w of Wauchope, 21 Jul 2009, *Sinclair ORG5613* (CANB 892477). Queensland: ex McPherson Range, 17 Mar 1995, *Leilkajis DLJ13872* (CANB 678650); Lamington NP, 17 Sep 1992, *Charlesworth ORG829* (CANB 650635); Lamington National Park, 3 May 2006, *leg. ign. ORG 5190* (CANB 737244).

Adelopetalum howense D.L.Jones, M.A.Clem. & H.Zimmer, *sp. nov.* (Fig 5)

TYPE:—AUSTRALIA. New South Wales, Lord Howe Island, 20 May 2001, *Hutton 830* (holotype: NSW494145).

Adelopetalum howense is similar to *Adelopetalum argyropus* but differs by its broadly oblong to broadly elliptical pseudobulbs with a flat to shallowly conical apex (globose to obconical or turbinate pseudobulbs in *A. argyropus*, the apex with shallow to deep depressions); flowers pendent, opening widely (flowers porrect to weakly decurved in *A. argyropus*, not opening widely); lateral sepals widely divergent, cream to pale yellow with a contrasting protruding deeply orange labellum (lateral sepals weakly divergent, cream to greenish yellow, labellum not longer than sepals). From *Adelopetalum continentale*, it differs from in its broadly oblong to elliptical pseudobulbs with a flat to shallowly conical apex (ovoid to conical or transversely elliptic pseudobulbs with a flat apex in *A. continentale*), pendent flowers (porrect to weakly decurved in *A. continentale*), longer, wider lateral sepals with a shortly obtuse apex (shorter, narrower and with a drawn-out subacute apex in *A. continentale*), and slightly wider, orange labellum (yellow to pale yellow-orange in *A. continentale*).

This is the concept of *Bulbophyllum tuberculatum* following Rupp (1935), not *Bulbophyllum tuberculatum* (Colenso 1884: 336). It is also the concept of *Bulbophyllum pygmaeum* following Jaede (1962), not *Bulbophyllum pygmaeum* (Smith in Rees 1819: 411) Lindley (1830: 58). Last, this is the concept of *Bulbophyllum exiguum* following Mueller (1875), not *Bulbophyllum exiguum* Mueller (1860: 72).

Compact herbs with crowded pseudobulbs. Pseudobulbs broadly oblong to elliptical, 3–6 mm long 3–5 mm wide, green, surface smooth, with five or six blunt ribs, shallowly furrowed between ribs, apex flat or shallowly conical. Leaf single; petiole 0.5–2.0 mm; lamina linear to elliptical, 15.0–25.0 × 3.0–6.0 mm, dark green, rigid, midrib sunken, ridged abaxially, margins flat, apex obtuse to apiculate. Racemes arising from base of a pseudobulb, 15.0–30.0 mm long, straight or curved, green to brownish; sterile bract basal on peduncle, narrowly ovate-lanceolate, 4.0 × 2.0 mm, brownish, apex obtuse; peduncle much longer than rachis, 0.5 mm wide, both parts bearing numerous translucent/whitish silica-like warts. Pedicels 0.5–1.5 mm long, curved, smooth or sparsely verrucose. Ovaries asymmetrically

obovoid, 1.0–1.5 × 0.8 mm, green, ribs verrucose. Floral bracts 1.5 mm long, acute. Flowers 1–4, nodding, opening widely, 4.0–4.5 × 4.0–5.0 mm, sepals and petals cream to pale yellow, basal third of labellum pale yellow, distal 2/3 of labellum dark orange. Sepals spreading widely, petals remaining near dorsal sepal, labellum protruding prominently. Dorsal sepal porrect to shallowly incurved, narrowly oblong-cuneate when flattened, 4.0 × 1.3 mm, margins flat, entire, apex subobtusate. Lateral sepals free, widely divergent, 4.5 × 2.3 mm across at widest point near base, broadly asymmetrically ovate-lanceolate when flattened with an expanded basal flange on the anterior margin forming a shallow pouch, midvein thickened, yellowish, exterior surface with irregularly scattered siliceous bumps, apex subobtusate. Petals incurved, partially enclosed by the dorsal sepal, more or less ovate-oblong in outline, 2.5 × 1.0 mm, distal margins irregularly papillate, apex obtuse to subobtusate. Labellum claw attached to labellum base and apex of column foot, ligulate, 0.3 × 0.2 mm. Labellum lamina trilobed, 3.3 mm long when flattened, pale yellow and erect in the proximal 1/3, distal 2/3 recurved more or less at right angles, dark orange; labellum at midpoint of lateral lobes 2.3 mm wide when flattened; lateral lobes erect, curved, 1.5 × 0.8 mm, outer margin broadly rounded; midlobe linguiform, 1.3 × 1.0 mm at base, 0.7 mm thick, basally grooved, convex, thick-textured underside hollow, distal 1/3 recurved, apex obtuse. Callus 2.0 × 1.0 mm, an obscure, oblong, plate-like area between the lateral lobes adorned with two ridges. Column 1.5 × 0.8 mm, white, with incurved wings 0.5 mm wide. Column foot tapered, 0.8 × 0.3 mm, shallowly incurved. Anther ovate, 0.25 × 0.20 mm, erostrate. Stigma 0.3 × 0.2 mm, sunken. Pollinarium not seen (Table 1).

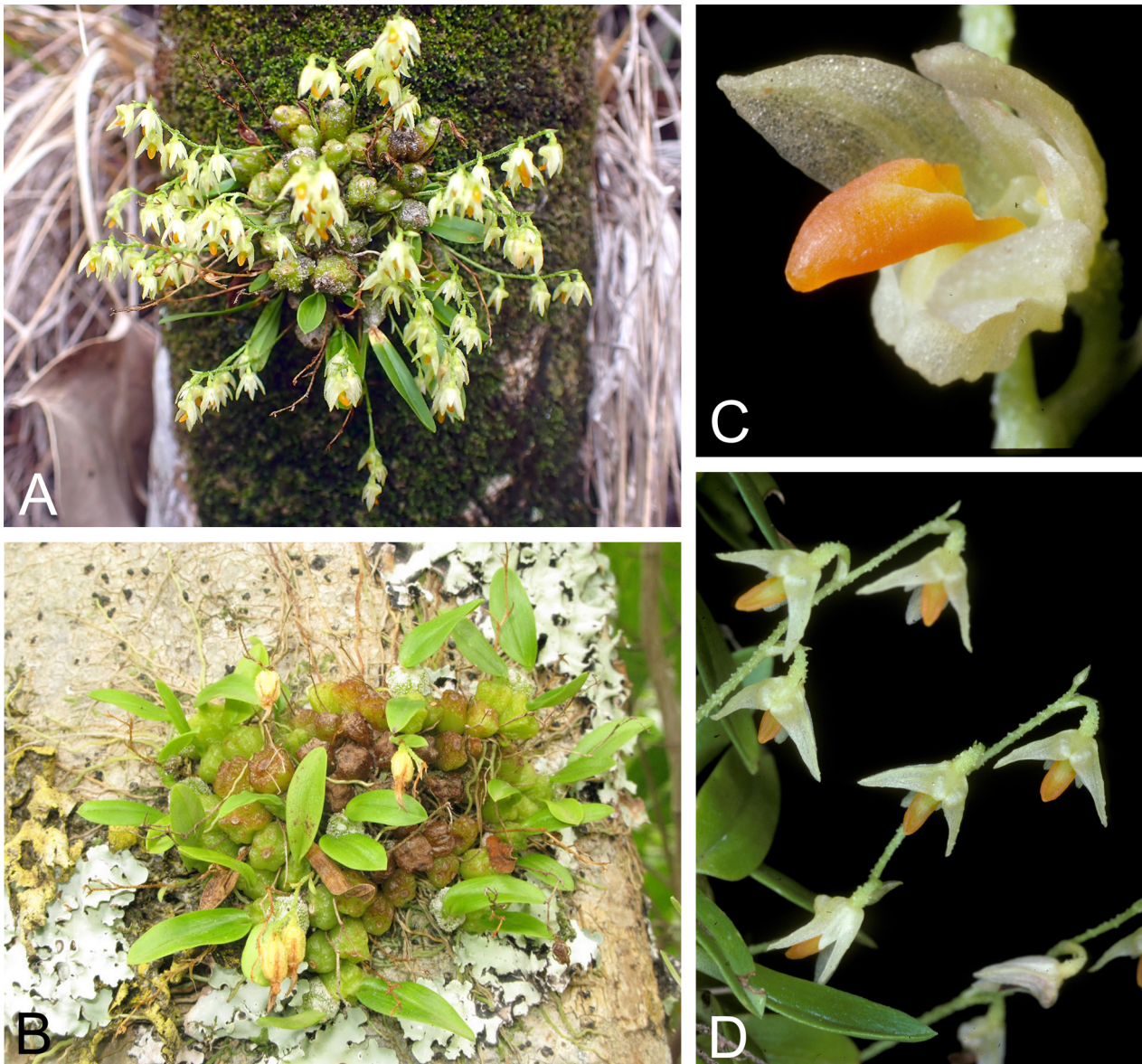


FIGURE 5. *Adelopetalum howense*. A, B. Flower. C, D. Habit. Photos by I. Hutton (A, B), D. Titmuss (C) and G. Walsh (D).

TABLE 1. Comparison of morphological characteristics among species within the *Adelopetalum argyropus* clade.

Character	<i>A. argyropus</i> s.s.	<i>A. continentale</i>	<i>A. howense</i>	<i>A. tuberculatum</i>	<i>A. corythium</i>
Pseudobulb	Broadly oblong to obconical or turbinate, pseudobulb apex with shallow to deep depressions	Ovoid to conical or transversely elliptical, pseudobulb apex flat to truncate	Oblong to broadly elliptical, pseudobulb apex flat or shallowly conical	Pyriiform with abundant white waxy extrusions on new pseudobulbs (gradually disappearing with age)	Globose, ellipsoid to obconical, small lumps towards apex, apex is flat, few or no waxy secretions
Leaf	Narrowly to broadly elliptical, green on both surfaces	Oblong to elliptical, green on both surfaces	Linear to elliptical, green on both surfaces	Oblong to oblong-elliptical, green, pink/red beneath	Narrowly ovate-elliptical to narrowly elliptical, green above, paler beneath
Raceme peduncle and rachises	Pale green aging brownish, verrucose	Green to brownish, strongly verrucose	Greenish to brownish, strongly verrucose	Pink/maroon	Maroon
Pedicels	Incurved distally, sparsely verrucose	Curved throughout, verrucose	Strongly curved, verrucose	Straight, tuberculate	Incurved, smooth
Ovaries	Green, verrucose	Green, verrucose	Green, verrucose	Green with dark reddish ribs	Pinkish green to green
Flowers	Porrect to weakly decurved, not opening widely	Porrect to weakly decurved, opening widely	Strongly nodding, widely opening	Porrect	Porrect
Flower colour	Cream to greenish-white	Cream to pale yellow	Cream to pale yellow	Whitish cream	Cream yellow to pale yellow
Labellum	Cream to greenish white, not longer than sepals, oblong to oblong-elliptical	Pale yellow orange, longer than sepals, narrowly elliptical to lingulate	Dark orange, longer than sepals, oblong to oblong-elliptical	Orange, elliptic with indistinct lateral lobes, thickened margins and a thicker more obtuse dark orange apex compared to the other species in this complex.	Orange yellow, lingulate with distinctly raised sidelobes and two short central calli
Lateral sepals	Relatively broad, weakly divergent, apex subacute to mucronate	Relatively broad, tapered to a drawn-out subacute apex	Broad, spreading widely with a short, obtuse apex	Broad, blunt	Narrow, spreading, apex subacute
References				Vermeulen (1993), p 203, Fig. 26; e.g, also Cheeseman (1914), plate 191.	Halle (1981), p 356, plate 2

Etymology:—In reference to Lord Howe Island.

Flowering:—April–June.

Distribution:—Lord Howe Island.

Habitat:—In closed rainforest and *Drypetes* (Vahl 1807: 49)–*Cryptocarya* (Brown 1810: 402) forest, lithophytic on basalt and epiphytic on hosts including *Guioa coriacea* (Radlkofer 1878: 326) Radlkofer (1886: 60) (island cedar) and *Sarcomelicope simplicifolia* (Endl.) Hartley (1982: 369) (bauerella, yellow wood).

Conservation status:—Endemic to Lord Howe Island, which has a total land area of 14.55 km². Extent of occurrence and area of occupancy are estimated to be 8 km², meeting the geographic range thresholds (<100 km² and <10 km² for IUCN Red List Criteria B1 and B2, respectively) for critically endangered. It may be at risk from climate change, which is predicted to affect these epiphytic orchids both directly and indirectly through impacts on their habitat in the southern mountains (Auld & Hutton 2004, Auld & Leishman 2015).

Additional specimens examined:—AUSTRALIA. New South Wales: 10 Nov. 1915, *Thompson s.n.* (NSW575587); 6 Sep 1963, *Beauglehole 5765* (CANB143397); 21 Oct. 1978, *Crisp 481* (CBG 7809790); 25 Nov 1985, *Hutton 59* (CBG 8317670); 25 Nov 2000, *Hutton 782* (NSW492009); *Errington 699* (NSW799778).

New Combinations:

Adelopetalum corythium (N.Hallé) M.A.Clem., H.Zimmer & D.L.Jones, *comb. nov.*

Basionym: *Bulbophyllum corythium* (Hallé 1981: 357, pl. 2).

Adelopetalum lingulatum (Rendle) M.A.Clem. & D.L.Jones, *comb. nov.*

Basionym: *Bulbophyllum lingulatum* (Rendle 1921: 247).

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