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New Records and Name Changes for the Orchids in the Solomon Islands

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ABSTRACT: One genus (*Anoectochilus*) and 12 species (*Agrostophyllum neoguineense*, *Anoectochilus papuanus*, *Arundina graminifolia*, *Bulbophyllum aemulum*, *B. bisepalum*, *B. nubigenum*, *B. ochroleucum*, *B. phreatiopse*, *Corybas solomonensis*, *Crepidium laevis*, *Didymoplexis striata*, *Epipogium roseum*) of orchids (Orchidaceae) are first recorded to the flora of the Solomon Islands during the 2012–2015 field expeditions. Geographic data, ecological and taxonomic notes and illustrations of those species are provided. A new combination (*Pinalia oligotricha*) and a new name (*Dendrobium bougainvilleanum*) are also proposed for fitting recent systematic alterations within Orchidaceae.

KEY WORDS: Flora, Orchidaceae, Solomon Islands, taxonomy.

INTRODUCTION

During the expeditions under the "Census and Classification of Plant Resources in the Solomon Islands" project in 2012–2015, one genus, eleven native species and one naturalized species of orchids (Orchidaceae) new to the country were discovered and identified. More than half (seven) of these species were thought as New Guinea endemics (Schuiteman and de Vogel, 2005; Schuiteman *et al*., 2010), which again improves the deep relationship between the Solomon Islands and New Guinea floras (Whitmore, 1966; Henderson and Hancock, 1988; Lewis and Cribb, 1991). Since many type materials of New Guinean orchids described by Schlechter were destroyed in Berlin during World War II (Cribb *et al*., 1988), and the authors have no chance to directly examine most remaining type materials, the species identification is mainly based on a comparative study of protologues, recent taxonomic treatments in adjacent countries, and virtual data offered by AMES (kiki.huh.harvard.edu/), K (http://apps.kew.org/herbcat/) and L (http://bioportal.naturalis.nl/). Herein, geographic data, ecological and taxonomic notes and illustrations of these species are provided. Voucher specimens of the mentioned collections are preserved in Solomon Islands National Herbarium (BSIP) with duplicates in TNM and TAIF. Digitalized specimen data and field images of these species are also presented in the "Flora of Solomon Islands" website (http://siflora.nmns.edu.tw/). A new combination and a new name are also proposed here based on recent systematic alterations within Orchidaceae.

TAXONOMIC TREATMENT

Newly Record Species

1. ***Agrostophyllum neoguineense*** W. Kittr., Bot. Mus. Leafl. 30: 98. *nom. nov.*, 1985. **Fig. 1-A**

Basionym: *Chitonochilus papuanum* Schltr., Fl. Schutzgeb. Südsee 134. 1905.

Type: PAPUA NEW GUINEA. Torricelli Mountains, ca. 800 m, Apr 1902, *R. Schlechter 14420* (holotype: B destroyed; isotypes AMES-00106714–6716 photo!, BISH, BRI photo!, W).

Distribution: Indonesia (Western New Guinea), Papua New Guinea and the Solomon Islands (Kolombangara).

Ecology: Montane rain forests alone stream, lower- to upper-trunk epiphytic, 600–700 m elev. Flowering observed in August.

Voucher specimens: **SOLOMON ISLANDS**: Western: Kolombangara Island, Conku Rano hut to crater waterfalls, 600–700 m, 5 Aug 2013, *T.C. Hsu et al. SITW03157* (BSIP, TAIF, TNM); same locality, 5 Nov 2013, *T.C. Hsu et al. SITW04552* (BSIP, TNM).

Note: *Agrostophyllum neoguineense* is distinguished from other known congeneric species in the Solomon Islands by a combination of linear-lanceolate leaves, relatively less compact inflorescences, and oblong-lanceolate, indistinctly 3-lobed lips.

2. ***Anoectochilus papuanus*** (Schltr.) W. Kittr., Bot. Mus. Leafl. 30: 95. 1985. **Fig. 1-B**

Basionym: *Eucosia papuana* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 1: 76. 1911.

Type: **PAPUA NEW GUINEA**: Kani Mountains, ca. 1000 m, Feb 1908, *R. Schlechter 17361* (holotype: B destroyed; isotype: BO!, L photo!).

Distribution: Indonesia (Western New Guinea), Papua New Guinea and the Solomon Islands (Guadalcanal and Santa Isabel).

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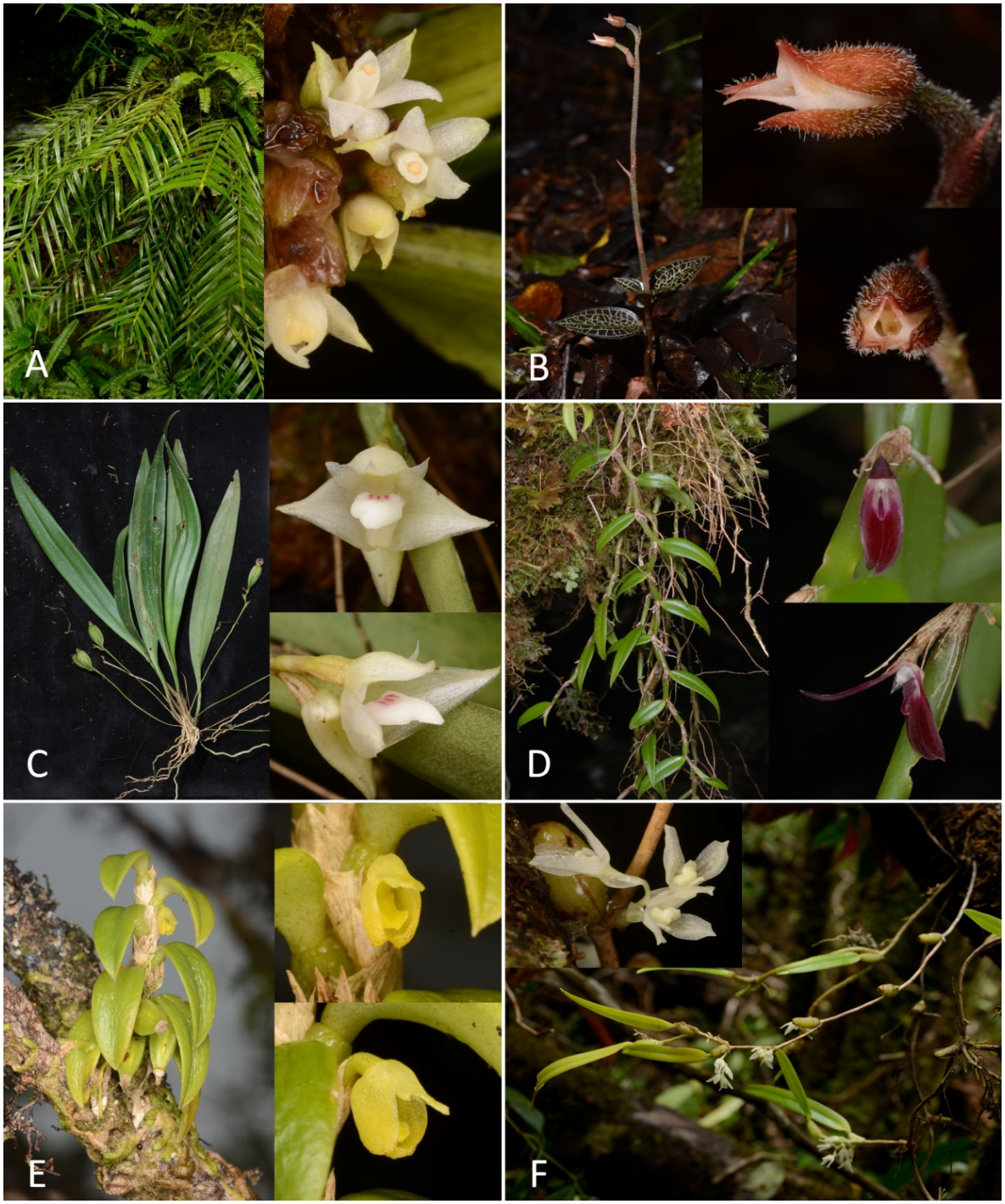


Fig. 1. Newly recorded orchids in the Solomon Islands. **A:** ***Agrostophyllum neoguineense*** (from *SITW03157*). **B:** ***Anoectochilus papuanus*** (from *SITW 5473*). **C:** ***Bulbophyllum aemulum*** (from *SITW01113* and *SITW04785*). **D:** ***Bulbophyllum bisepalum*** (from *SITW00930*). **E:** ***B. nubigenum*** (from *SITW04230*). **F:** ***B. ochroleucum*** (from *SITW02890*). Potographed by T.C. Hsu.

Ecology: Montane forest floor, terrestrial on litter, 800–1300 m elev. Flowering observed in July and fruiting in September.

Voucher specimens: **SOLOMON ISLANDS**: Guadalcanal: Guadalcanal Island, Haviha River to Valevahalo Camp, 1100–1300 m, 16 Sep 2015, *T.C. Hsu et al. SITW09887* (BSIP, SUVA, TNM). Isabel: Santa Isabel Island, Mt. Kobinitu, 800–1116 m, 16 Jul 2014, *T.C. Hsu et al. SITW05473* (BSIP, TAIF, TNM).

Note: The genus *Anoectochilus* is also first recorded in the Solomon Islands. *A. papuanus* is easily distinguished from other Goodyerinae taxa by the presence of pink reticulate veinlets on leaf surface and a simple, entire, ecallous lip completely free from column.

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3. ***Bulbophyllum aemulum*** Schltr., Fl. Schutzgeb. Südsee 195. 1905. **Fig. 1–C**

Type: **PAPUA NEW GUINEA**: Bismarck Mountains, ca. 1500 m, Jan 1902, *R. Schlechter 14056* (holotype: B destroyed).

Distribution: Indonesia (Western New Guinea), Papua New Guinea and the Solomon Islands (Kolombangara and Santa Isabel).

Ecology: Montane rain forests alone stream, mid-trunk to lower-canopy epiphytic, 230–1000 m elev. Flowering observed in September, October and December.

Voucher specimens: SOLOMON ISLANDS. Isabel: Santa Isabel Island, Mt. Kobinitu, 600–1000 m, 15 Oct 2015, *T.C. Hsu SITW09855* (BSIP, TNM). Western: Kolombangara Island, Vila River to Myles Falls, 230–330 m, 19 Oct 2012, *T.C. Hsu et al. SITW01113* (BSIP, TAIF, TNM); Kolombangara Island, Conku Rano hut to Inbu Rano lodge, 300–600 m, 31 Dec 2013, *T.C. Hsu et al. SITW04785*; Kolombangara Island, Villa River, 300–700 m, 4 Sep 2015, *T.C. Hsu et al. SITW10041* (BSIP, TAIF, TNM).

Note: Bulbophyllum aemulum, belonging to sect. *Intervallatae* (de Witte and Vermeulen, 2010), is remarkable among the *Bulbophyllum* species in the Solomon Islands by having ascending to short-hanging rhizomes, congested and much reduced pseudobulbs, acute leaves and distichously few-flowered inflorescences.

4. ***Bulbophyllum bisepalum*** Schltr., Fl. Schutzgeb. Südsee 196. 1905. **Fig. 1–D**

Type: **PAPUA NEW GUINEA**: Bismarck Mountains, ca. 1300 m, Jan 1902, *R. Schlechter 14048* (holotype: B destroyed).

Distribution: Papua New Guinea and the Solomon Islands (Kolombangara).

Ecology: Cloudy and mossy forest, mid-trunk epiphytic, 1240–1600 m elev. Flowering observed in September and October.

Voucher specimens: **SOLOMON ISLANDS:** Western: Kolombangara Island, ascent of Mt. Veve from Poitete, 1240 m, 16 Sep 1991, *B.A. Lewis 56* (BSIP-SUVA); Kolombangara Island, Camp 2 to Mt. Tepalamenggutu, 1500–1600 m, 14 Oct 2012, *T.C. Hsu et al. SITW00930* (BSIP, TNM).

Note: Bulbophyllum bisepalum is very close to *B. stenochilum* Schltr. reported from Guadalcanal and Kolombangara (Lewis and Cribb, 1991), but the former has slightly larger flowers with expanded and slightly reflexed (vs. boat-shaped) connate lateral sepals.

5. ***Bulbophyllum nubigenum*** Schltr., Repert. Spec. Nov. Regni Veg. Beih. 1: 884. 1913. **Fig. 1–E**

Type: PAPUA NEW GUINEA: Bismarck Mountains, ca. 2400 m, Nov 1908, *R. Schlechter 18762* (holotype: B destroyed).

Heterotypic synonym: *Bulbophyllum singuliflorum* W. Kittr., Bot. Mus. Leafl. 30: 100. 1985 (*nom. nov.*). -Replaced basionym: *B. nemorosum* Schltr. (*non* Cogn.), Repert. Spec. Nov. Regni Veg. Beih. 1: 884. 1913. -Type: **PAPUA NEW GUINEA**: Dischore Mountains, ca. 1200 m, Jun 1909, *R. Schlechter 19698* (holotype: B destroyed).

*Distribution***:** Papua New Guinea and the Solomon Islands (Kolombangara).

Ecology: Cloudy and mossy forest alone ridge, canopy epiphytic, 1500–1790 m elev. Flowering observed in October.

Voucher specimens: **SOLOMON ISLANDS**: Western: Kolombangara Island, Camp 3 to Mt. Veve, 1500–1790 m, 15 Oct 2013, *T.C. Hsu et al. SITW04230* (BSIP, TAIF, TNM).

Note: *Bulbophyllum nubigenum* is remarkable by the very small habits (ca. 3–6 cm high), erect rhizomes, short 1-flowered inflorescence, and small (ca. 3 mm in diam.), slightly opened, yellowish green flowers. *B. singuliflorum* was treated as conspecific to *B. nubigenum* by Schuiteman et al. (2010) although they erroneously placed the earlier published name as a synonym.

6. ***Bulbophyllum ochroleucum*** Schltr., Fl. Schutzgeb. Südsee 212. 1905. **Fig. 1–F**

Type: **PAPUA NEW GUINEA**: Bismarck Mountains, ca. 1300 m, Jan 1902, *R. Schlechter 14047* (holotype: B destroyed; isotypes: BM, BR, K photo!, P).

Distribution: Indonesia (Western New Guinea), Papua New Guinea (including Bougainville) and the Solomon Islands (Guadalcanal, Kolombangara, Malaita, Nggatokae, Ranongga and Vella Lavella).

Ecology: Montane rain forests, upper trunk and canopy epiphytic, 300–1200 m elev. Flowers observed in July.

Voucher specimens: **SOLOMON ISLANDS**: Guadalcanal: Guadalcanal Island, Valevahalo Camp, 700–800 m, 12 Sep 2015, *T.C. Hsu et al. SITW09941* (BSIP, SUVA, TNM). Malaita: Faisukui village, 400–750 m, 20 Aug 2015, *T.C. Hsu et al. SITW08612* (BSIP, TAIF, TNM); Western: Kolombangara Island, Imbu Rano Lodge to Patu Kolo Hut, 400–600 m, 16 Oct 2012, *T.C. Hsu et al. SITW00881* (BSIP, TNM); Kolombangara Island, Patu Kolo to Camp 2, 800–1000 m, 14 Oct 2012, *T.C. Hsu et al. SITW00917* (BSIP, TNM); Kolombangara Island, Camp 2 to Patu Kolo Hut, 600-1200 m, 30 Jul 2013, *T.C. Hsu et al. SITW02890* (BSIP, TAIF, TNM); Ranongga Island, Qiloe village to Mt. Kela, 400–600 m, 18 Aug 2013, *T.C. Hsu et al. SITW03251* (BSIP, TNM); Nggatokae Island, Mbiche Village to Mt. Mariu, 300–600 m, 9 Oct 2013, *T.C. Hsu et al. SITW04142* (BSIP, TNM); Vella Lavella Island, Eel camp to Mt. Tabisala, 312–775 m, 28 Oct 2013, *T.C. Hsu et al. SITW04426* (BSIP, TNM).

Note: *Bulbophyllum ochroleucum* is known from Bougainville (Schuiteman et al. 2010) and recorded in the political region of the Solomon Islands for the first time. It could be distinguished from the two known relatives, *B. cylindrobulbon* Schltr. and *B. manobulbon*, by having stiff, frequently erect or pendulous rhizomes and often 2-5-flowered inflorescences.

7. ***Bulbophyllum phreatiopse*** J. Vermeulen, Blumea 38: 151. 1993. **Fig. 2–A**

Type: **PAPUA NEW GUINEA**: Mt. Hunstein, ca. 1280 m, 10 Aug 1966, *Hoogland & Craven 10899* (holotype: L photo!; isotypes: AMES photo!, BRI, CANB, K, LAE).

Distribution: Papua New Guinea and the Solomon Islands (Kolombangara).

Ecology: Montane forest, mid- to upper-trunk epiphytic, 600–1200 m elev. Flowering observed in July and August.

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Voucher specimens: **SOLOMON ISLANDS**: Western: Kolombagara Island, Camp 2 to Patu Kolo Hut, 600–1200 m, 30 Jul 2013, *T.C. Hsu et al. SITW02888* (BSIP, TNM).

Note: *Bulbophyllum phreatiopse* is remarkable by the "*Phreatia*-like" inflorescence with many small white flowers and the presence of a triangular basal callus on the adaxial side of the lip.

8. ***Corybas solomonensis*** Van Royan, Phanerog. Monogr. 16: 123. 1983. **Fig. 2–B**

Type: **PAPUA NEW GUINEA**: Bougainville: *Craven & Schodde 175* (holotype: CANB; isotype: LAE).

*Distribution***:** Papua New Guinea (Bougainville) and the Solomon Islands (Rendova and Santa Isabel).

*Ecology***:** Cloudy and mossy rain forests alone ridge, terrestrial or tree-base epiphytic, 700–1116 m elev. Flowers observed in July and August.

*Voucher specimens***:** SOLOMON ISLANDS. Western: Rendova Island, Ughele village to Rendova Peak, 700–1000 m, 26 Aug 2013, *T.C. Hsu et al. SITW03523* (BSIP, TAIF, TNM); *SITW03525* (BSIP, TNM). Isabel: Santa Isabel Island, Mt. Kobinitu, 800–1116 m, 16 July 2014, *T.C. Hsu et al. SITW05487* (BSIP, TAIF, TNM); *SITW05488* (BSIP, TNM).

Note: *Corybas solomonensis* was previously only known from the type collection in Bougainville (Lewis and Cribb, 1991) and is recorded within the political region of the Solomon Islands for the first time. This species is distinguished from other known species in the country by a combination of sessile flowers, obtuse and cucullate dorsal sepals, and entire lips.

9. ***Crepidium laeve*** (Schltr.) Szlach., Fragm. Florist. Geobot. Suppl. 3: 128. 1995 (as "*levis*"). **Fig. 2–C**

Basionym: *Microstylis laevis* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 1: 112. 1912.

*Type***: Papua New Guinea**: Kani Mountains, ca. 1100 m, Jan 1909, *R. Schlechter 19142* [lectotype (Margonska, 2005): L photo!; isolectotypes: B destroyed, AMES photo!, BO!].

*Distribution***:** Papua New Guinea and the Solomon Islands (Guadalcanal and Rendova).

Ecology: Montane rain forest, terrestrial on semi-shaded slope, 400–1000 m elev. Flowering observed in August and September.

Voucher specimens: SOLOMON ISLANDS. Guadalcanal: Guadalcanal Island, Valevahalo Camp, 800–1000 m, 9 Sep 2015, *T.C. Hsu et al. SITW09997* (BSIP, SUVA, TAIF, TNM). Western: Rendova Island, Ughele village to Rendova Peak, 400–700 m, 28 Aug 2013, *T.C. Hsu et al. SITW03566* (BSIP, TAIF, TNM).

Note: Among the known *Crepidium* species in the Solomon Islands (Lewis and Cribb, 1991; Szlachetko and Margonska, 2000), *C. leave* is most close to *C. latipetalum* (J.J. Sm.) Szlach. but distinguished by having linear petals and very long (2.5–3.0 mm), lanceolate basal auricles of lip. *C. laeve* and *C. latipetalum* are sometimes placed under *Pseudoliparis* (Margonska and Szlachetko, 1999; Margonska, 2009), but here we follow the system of Pridgeon et al. (2005) which is based on a combination of morphological and molecular data.

10. ***Didymoplexis striata*** J.J. Sm., Icon. Bogor. t. 104 B. 1906. **Fig. 2–D**

Type: **INDONESIA**: Java: Mt. Salak, *sine coll. & no.* (holotype: BO).

*Distribution***:** Indonesia (Java and Borneo) and the Solomon Islands (New Georgia and Kolombangara).

*Ecology***:** Montane rain forests, terrestrial (holomycotrophic) on forest floor with deep leaf litter, 300-600 m elev. Flowering observed in September and October.

*Voucher specimens***:** SOLOMON ISLANDS. Western: New Georgia Island, Vahole, 300–500 m, 26 Sep 2012, *T.C. Hsu & C.W. Chen SITW00553*; Kolombangara Island, Imbu Rano Lodge to Patu Kolo Hut, 400–600 m, 13 Oct 2012, *T.C. Hsu et al. SITW00768*; same location, 13 Oct 2013, *T.C. Hsu et al. SITW04202*.

Note: *Didymoplexis striata* is distinguished from *D. micradenia* (Rchb.f.) Hemsl., the only *Didymoplexis* species known from the Solomon Islands (Lewis and Cribb, 1991), by having a longitudinally shallowly striate perianth tube and an entire lip with a pale yellowish central callus.

11. ***Epipogium roseum*** (D. Don) Lindl., J. Linn. Soc., Bot. 1: 177. 1878. **Fig. 2–E**

Basionym: *Limodorum roseum* D. Don, Prodr. Fl. Nepal 30. 1825.

Type: **NEPAL:** 1818, *N. Wallich s.n.* (holotype: BM photo!; isotype: K).

Distribution: Widely distributed in Africa, Asia and Oceania.

Ecology: Montane rain forest, terrestrial (holomycotrophic) on forest floor with deep leaf litter, 300–775 m elev. Flowering observed in September and October.

Voucher specimens: SOLOMON ISLANDS. Western: Kolombangara Island, Villa River, 300–700 m, 4 Sep 2015, *T.C. Hsu et al. SITW10012*; Vella Lavella Island, Eel Camp to Mt. Tabisala, 312–775 m, 28 Oct 2013, *T.C. Hsu et al. SITW04412*.

Note: *Epipogium roseum* was estimated to occur in the Solomon Islands by Lewis and Cribb (1991) and is herein confirmed.

Newly Naturalized Species

Arundina graminifolia (D. Don) Hochr., Bull. New York Bot. Gard. 6: 270. 1910. **Fig. 2–F**

*Type***: NEPAL**: Suembu, *Buchanan-Hamilton s.n.* (holotype: BM).

*Distribution***:** Widely distributed from Nepal, India and Bhutan through S China, S Japan and Taiwan to SE Asia as far east as Sulawesi and north as S Japan; introduced and naturalized in the Pacific islands and the Neotropics.

*Ecology***:** Seashore grassy slopes and wastelands around village, terrestrial. Flowering observed all over the year.

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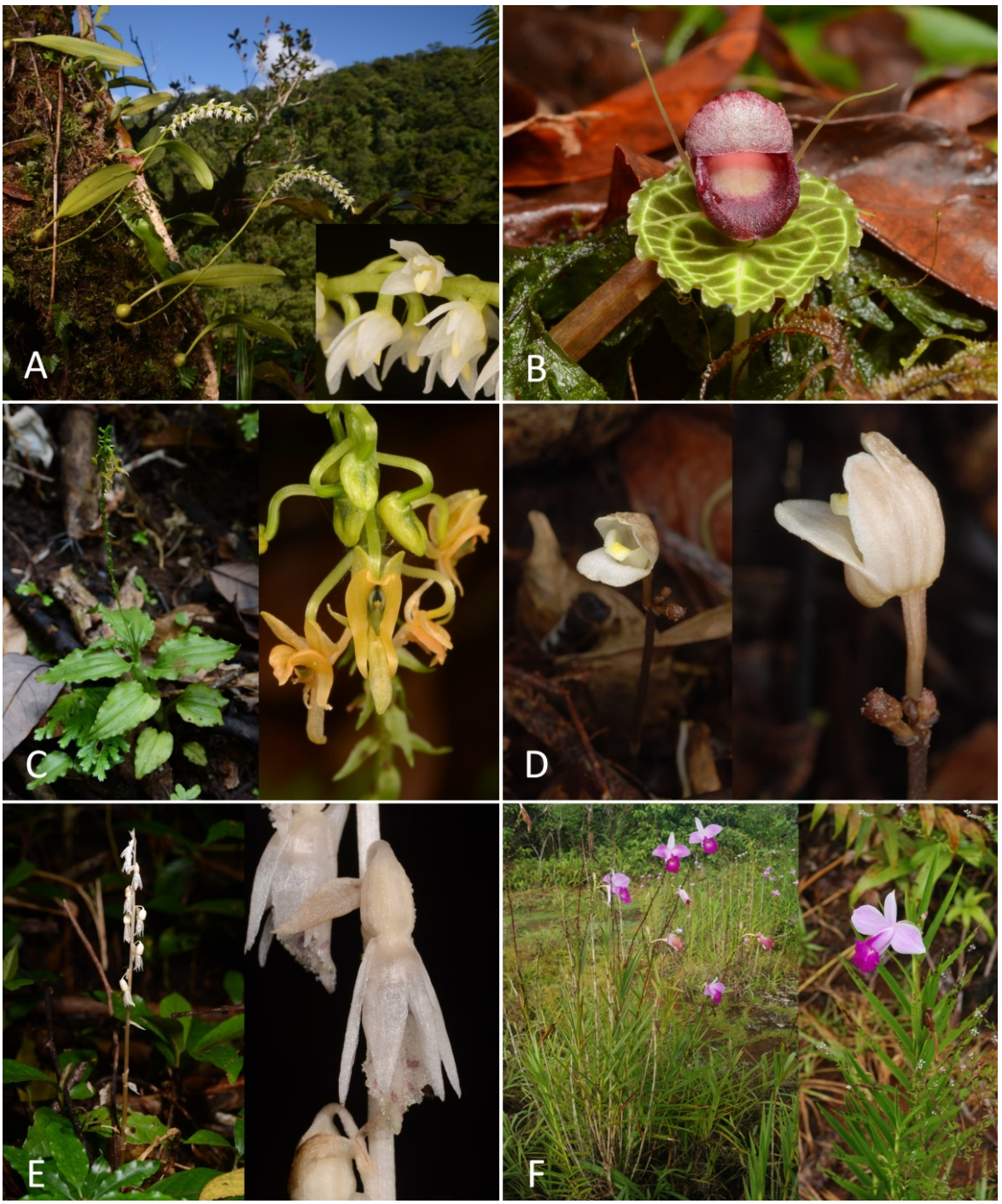


Fig. 2. Newly recorded orchids in the Solomon Islands. **A**: ***Bulbophyllum phreatiopse*** (from *SITW02888*). **B**: ***Corybas solomonensis*** (from *SITW03523*). **C**: ***Crepidium leave*** (from *SITW03566*). **D**: ***Didymoplexis striata*** (from *SITW04202*). **E**: ***Epipogium roseum*** (from *SITW04412*). **F**: ***Arundina graminifolia*** (from *SITW00721*). Potographed by T.C. Hsu.

Voucher specimens: **SOLOMON ISLANDS**: Western: New Georgia Island, Vahole, 0–20 m, 30 Sep 2012, *T.C. Hsu & C.W. Chen SITW00721*.

Note: *Arundina graminifolia* is previously known to be planted in Bougainville (Lewis and Cribb, 1991). A naturalized population is confirmed in the country for the first time.

New Combination

Pinalia oligotricha (Schltr.) T.C. Hsu, ***comb. nov.***

Basionym: *Eria oligotricha* Schltr., Fl. Schutzgeb. Südsee 181. 1906.

Type: **Papua New Guinea**: *R.Schlechter 14353* (holotype: B destroyed).

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Distribution: Papua New Guinea and the Solomon Islands (Guadalcanal, Malaita and New Georgia).

Note: This combination is made for fitting the re-circumscription of *Eria s.l.* based on morphology and molecular phylogenetic studies (Pridgeon et al., 2005). The six species of *Eria s.l.* recorded in the Solomon Islands (Lewis and Cribb, 1991) are now treated as *Aeridostachya robusta* (Blume) Brieger, *Bryobium eriaeoides* (F.M. Bailey) M.A. Clem. & D.L. Jones, *Pinalia fitzalanii* (F. Muell.) Kuntze, *P. kingii* (F. Muell.) Kuntze and *P. oligotricha* respectively. The genus *Eria s.str.* now no longer occurs in the Solomon Islands.

New Name

Dendrobium bougainvilleanum T.C. Hsu, ***nom. nov.***

Replaced basionym: *Diplocaulobium solomonense* Carr, Bull. Misc. Inform. Kew 380. 1934.

Type: **Papua New Guinea**: Bougainville, *J.H.L. Waterhouse 339* (holotype: K photo!).

Distribution: Papua New Guinea (Bougainville) and the Solomon Islands (Choiseul, Guadalcanal, Kolombangara, Malaita and New Georgia).

Note: The genus *Dendrobium* is recently re-circumscribed to include *Cadetia*, *Diplocaulobium* and *Flickingeria* based on molecular phylogenies (Schuiteman, 2011), and taxonomic alterations were mostly completed by Schuiteman and Adams (2011). The new combination "*D. solomonense* (Schltr.) Schuit. & Peter B. Adams" is, however, an illegitimate later homonym because the specific name is already occupied by *D. salomonense* Schltr. Both "*solomonense*" and "*salomonense*" are derived from the North Solomon Islands (now Bougainville of Papua New Guinea) and thus should be treated as homonyms based on Art. 53.3 of the Melbourn Code (McNeill et al., 2012). A new name for *Diplocaulobium solomonense* is here proposed based on the modern name of its type locality.

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