

Studies in *Oberonia* 11: The genus *Hippeophyllum* reduced to *Oberonia*, with ten new synonyms of *Oberonia scortechinii* (Orchidaceae: Malaxideae)

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ABSTRACT. The genus *Hippeophyllum* Schltr. is synonymised under *Oberonia* Lindl. The following names are synonymised under *Oberonia scortechinii* Hook.f.: *Hippeophyllum alboviride* J.J.Sm., *H. biakense* J.J.Sm., *H. celebicum* Schltr., *H. halmaherense* J.J.Sm., *O. hamadryas* Ridl., *O. longifolia* Ridl., *H. micranthum* Schtr., *H. papillosum* Schltr., *H. sulense* J.J.Sm. and *H. wenzelii* Ames. *Oberonia scortechinii* is an epiphyte distributed from Malaysia through Indonesia, the Philippines, to New Guinea and the Solomon Islands at elevations of 0–500 m (rarely to 1000 m).

Keywords. Biodiversity, distribution, intraspecific variability, nomenclature, taxonomy

Introduction

The orchid tribe Malaxideae comprises approximately 13 genera of terrestrial and epiphytic orchids, distributed worldwide in tropical and subtropical regions. Five subtribes have been proposed, which were all considered to be synonyms of Malaxideae by Pridgeon et al. (2005). One such subtribe, Oberoniinae Aver., was introduced for three genera: *Oberonia* Lindl., *Hippeophyllum* Schltr. and *Risleya* King & Pantl. (Averyanov, 1991). It codified the recognised similarities between *Oberonia* and *Hippeophyllum*: equitant leaves and small flowers. *Risleya* has been moved from Malaxideae to Collabieae (Xiang et al., 2014).

The genus *Hippeophyllum* was introduced by Schlechter (1905) based on unspecified structure of the flower, the creeping rhizome, and the articulated leaves. It was viewed as a link between *Oberonia* (presumably due to the smaller flower and the habit with equitant leaves) and *Liparis* (presumably due to the relatively long and curved column). Up to about 14 species epithets have been included in *Hippeophyllum*, some of which have previously been reclassified under *Oberonia* (see below).

The status of the genus *Hippeophyllum* has been called into question by the molecular phylogeny of Hedderich (2016), which placed the one sample of *Hippeophyllum* amongst *Oberonia* species. The *Hippeophyllum* species are considered difficult to distinguish; the *Orchids of New Guinea* (ONG, 2022) website noted: ‘The species of *Hippeophyllum* are very similar indeed and badly in need of revision.’ This led to a critical examination of the cited diagnostic generic characters and the distinctness of all described species in the genus. While several phylogenies with

multiple species of *Oberonia* have been published (e.g., Cameron, 2005; Tang et al., 2015; Li et al., 2015, 2016, 2020), none have included a *Hippeophyllum* specimen. Two GenBank accessions for *H. micranthum* (HG970137.1: *matK* pseudogene, *trnK*; HG970115.1: ITS1, 5.8S, ITS2) have not been used in any publication. In comparison, there are 795 GenBank accessions for *Oberonia* species.

The number of species considered correct in *Oberonia* has been significantly reduced in recent years by critical examination of protologues and types (Bunpha et al., 2019; Geiger, 2016, 2019b, 2020, 2021; Geiger et al., 2020, 2021). In one extreme case, an entire section with eight species was shown to consist of a single species (Geiger, 2021).

Materials and methods

Photography

Light micrographs were taken with an SLR camera (Canon 5DsR with Zeiss 100 mm Makroplanar, Paul C. Buff Einstein 640 with softbox) and a Zeiss Discover V20 stereomicroscope with planapochromatic 0.63 \times and 1.5 \times lenses, motorised focus, a Zeiss Axiocam Hrc III, captured with Zeiss Zen Blue software. Z-stack processing was carried out with Zerene Stacker (Zerene Systems LLC, 2009–2022) with pMax algorithm. Additional details on macro- and micro-photography were provided by Geiger (2013).

Rehydrated flowers were photographed in herbaria mounted on a coverslipped histology slide placed on a black background (switched off smart-phone screen). A Canon 5DsR dSLR camera with the Canon MP-E 65 mm lens at 5:1 magnification and a Canon twin macroflash MT-26EX-RT illuminated the slide from the side, produced pseudo-darkfield images. Photos were focussed either by hand or with the aid of a tripod-mounted Hejnar 25 mm Micrometer Adjusting Macro Rail.

Ultraviolet reflectance imaging was carried out as detailed in Geiger (2019b). In brief, a full-spectrum modified Canon 5D mkII camera was fitted with a Nikon EL 80 mm lens on a bellows and a UV-pass filter. UV light was provided by a Metz CT45-1 electronic flash with front filter removed. Z-stacks were acquired with a Cognisys Stackshot. Files were processed in Zerene Stacker.

Drawings were cut out from the background, scaled and rotated for best comparison, and brightness/contrast was adjusted; some images were left-right reversed.

Scanning electron microscopy (SEM)

Fluid-preserved flowers were brought to 100% ethanol, then critical point dried in a Tousimis 812Auto using default settings. The dried flowers were mounted on double sided carbon tabs and sputter coated with gold in a Cressington 108Auto with rotary planetary stage. Flowers were examined in variable pressure of 30 Pa, accelerating voltage of 20 kV, probe currents of 50–200 pA depending upon working distance and magnification, and imaged with a Zeiss VPSE detector on a Zeiss EVO 40 XVP

or with a Zeiss C2DX detector on a Zeiss EVO10LS. All images were processed in Affinity Photo (Serif (Europe) Ltd, 1987). The distinction of holotypes and syntypes follows McNeill (2014, 2015). DLG stands for Daniel L. Geiger live collection, Santa Barbara, California; HOAG stands for Geiger herbarium & fluid collection, Santa Barbara, California.

Systematic treatment

Oberonia Lindl., Gen. Sp. Orchid. Pl.: 15 (1830), nom. cons. – TYPE: *Oberonia iridifolia* Lindl., nom. superfl., typ. cons. (Green, 1929) (= *Oberonia ensiformis* (Sm.) Lindl.).

Hippeophyllum Schltr. in Schumann & Lauterbach, Fl. Schutzgeb. Südsee, Nachtr. 107 (1905), **syn. nov.** – TYPE: *Hippeophyllum micranthum* Schltr., lectotype designated here.

Notes. Pridgeon et al. (2005) is the earliest traceable reference to a type species for *Hippeophyllum*, although they did not specify it with hic designatus, here designated or similar as would be required to effect a lectotypification under Art. 7.11 of the ICN (Turland et al., 2018). That designation has been adopted by Alrich & Higgins (2008, 2020), also without effecting the lectotypification. Comber (2001: 134) noted that one of the two species included by Schlechter (1905: *H. micranthum*, *H. hamadryas*) ‘subsequently turned out to be a true *Oberonia*’. I have not been able to find such a statement in the literature, and it is not clear which name Comber (2001) meant. As the two species are shown below to be synonyms, it highlights the confused generic concept of *Hippeophyllum*.

Hippeophyllum is here synonymised under *Oberonia*. In a four-gene molecular phylogeny with approximately 55 *Oberonia* samples (Hedderich, 2016) the one sample of *Hippeophyllum* was deeply nested amongst *Oberonia* species. The *Hippeophyllum* material was provided by this author and is of the same genotype as the specimens shown here in Fig. 3–5. The *Hippeophyllum* material resolved as sister to *Oberonia dissitiflora* Ridl. and three nodes deep and not on a long branch. All nodes had strong bootstrap support and posterior probabilities and the placement of the species was not affected by a specific gene or a combination of genes. Accordingly, the reciprocal monophyly condition of the two genera is not met and *Hippeophyllum* is placed here into synonymy of *Oberonia*.

Morphological characters do not support a distinct genus *Hippeophyllum* either (Fig. 1–5). *Hippeophyllum* was established based on the presence of a creeping rhizome, the long column, and the shape of the lip. The creeping rhizome is known in traditional *Oberonia* species such as *O. aporophylla* Rchb.f., *O. rhizomatosa* J.J.Sm. (for synonyms of those species see Geiger, 2021), *O. longitepala* J.J.Wood, *O. insularis* Hayata, *O. seidenfadenii* (H.J.Su) Ormerod and *O. ngoclinhensis* Aver. (the status of which is still uncertain). These little-known rhizome-bearing *Oberonia*

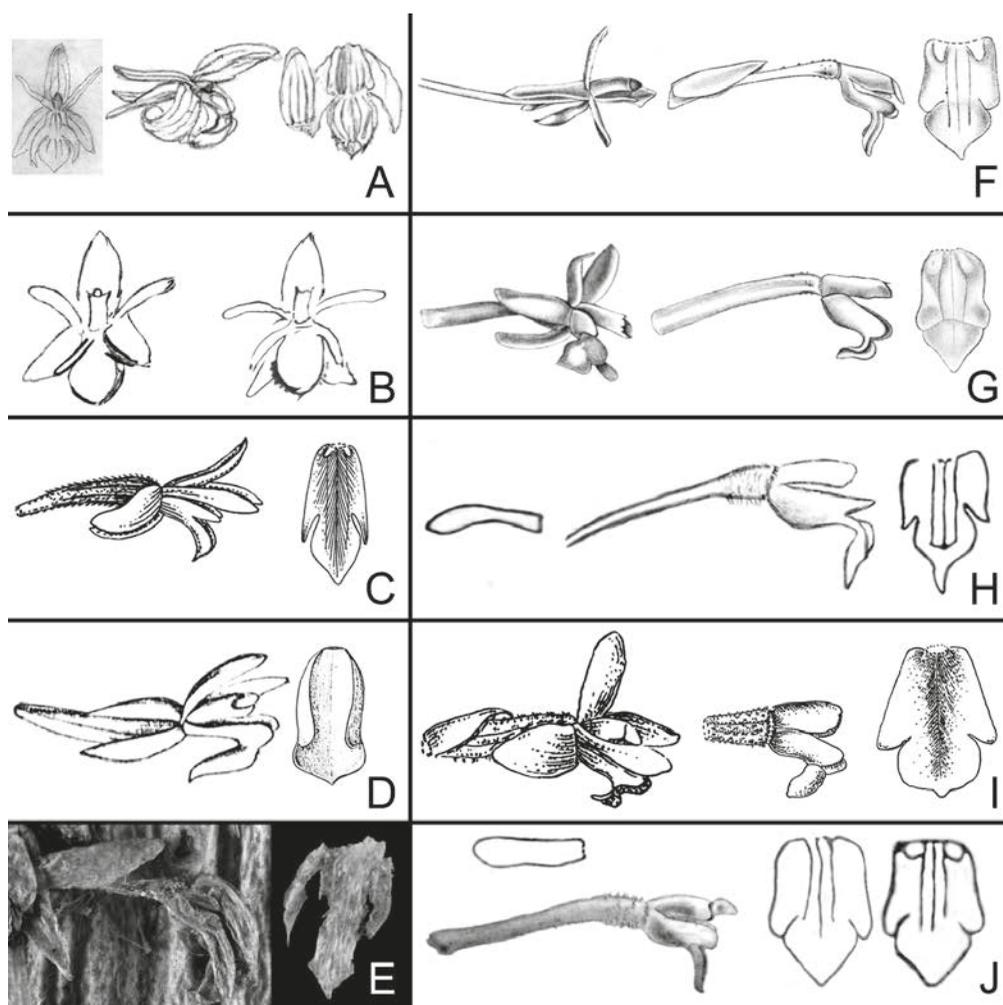


Fig. 1. Floral drawings of *Oberonia scortechinii* Hook.f. and its synonyms. **A, B.** Face view. **C–E.** Lateral view of entire flower and isolated lip. **F–J.** Entire flower in side view (or petal), side view of pedicelled ovary, lip and gynostemium, plus isolated lip. **A.** *Oberonia scortechinii* drawings by J.D. Hooker on syntype sheet K000943037 (left) and K000943038 (right). **B.** *Oberonia longifolia* Ridl. drawing on syntype sheet SING0047516. **C.** *Hippeophyllum celebicum* Schltr. from Schlechter (1923: pl. 18, fig. 70). **D.** *Hippeophyllum micranthum* Schltr. from protologue (Schlechter, 1905: pl. 6). **E.** *Hippeophyllum wenzelii* Ames isotype SING0141461. Flower on herbarium sheet, lateral view (left); rehydrated lip (right). **F.** *Hippeophyllum alboviride* J.J.Sm. from Smith (1915: pl. 71, fig. 123). **G.** *Hippeophyllum biakense* J.J.Sm. from protologue (Smith, 1929: pl. 50, fig. 25). **H.** *Hippeophyllum halmaherense* J.J.Sm. from drawing by J.J. Smith at K. **I.** *Hippeophyllum papillosum* Schltr. from Schlechter (1923: pl. 70, fig. 253). **J.** *Hippeophyllum sulense* J.J.Sm. from drawing by J.J. Smith at K.



Fig. 2. Habit of two synonyms of *Oberonia scortechinii* Hook.f. Notice identical overall morphology, presence of leaf abscission scars (black arrows) and rhizome (white arrows). **A.** *Hippeophyllum wenzelii*, Wenzel 20 (isotype SING0141461). **B.** *Oberonia longifolia* Ridl., Ridley s.n. (syntype SING0047516). Habit images of other type specimens available in online catalogues of respective collections (BM, K, L).

species have been found in herbarium collections mis-identified as *Hippeophyllum* sp. despite lacking the long column or *Hippeophyllum*-type lip shape (Geiger, pers. obs.). The flowers of *Oberonia aporophylla*, *O. rhizomatosa*, *O. insularis*, *O. seidenfadenii*, and *O. ngoclinhensis* are of typical *Oberonia* shape. Accordingly, the presence of a creeping rhizome cannot be viewed as a character distinguishing *Hippeophyllum* from *Oberonia*.

The size of the flowers of *Hippeophyllum* is larger than those of most *Oberonia* species, but some species such as *O. longitepala* have even larger flowers. Accordingly, flower size cannot be adduced to distinguish *Hippeophyllum* from *Oberonia*.

The slightly curved and long column (c. 2.5× as wide as long) reminiscent of *Liparis* is an autapomorphy for *Oberonia scortechinii*. The similarity to *Liparis* was already noted by Hooker (1888) in the protologue. In traditional *Oberonia* species the column is 1–1.5× as long as wide. While autapomorphies are suitable to identify species, they are of no value in elucidating relationships. Given the lack of other distinguishing features and due to the phylogenetic position nested amongst *Oberonia*

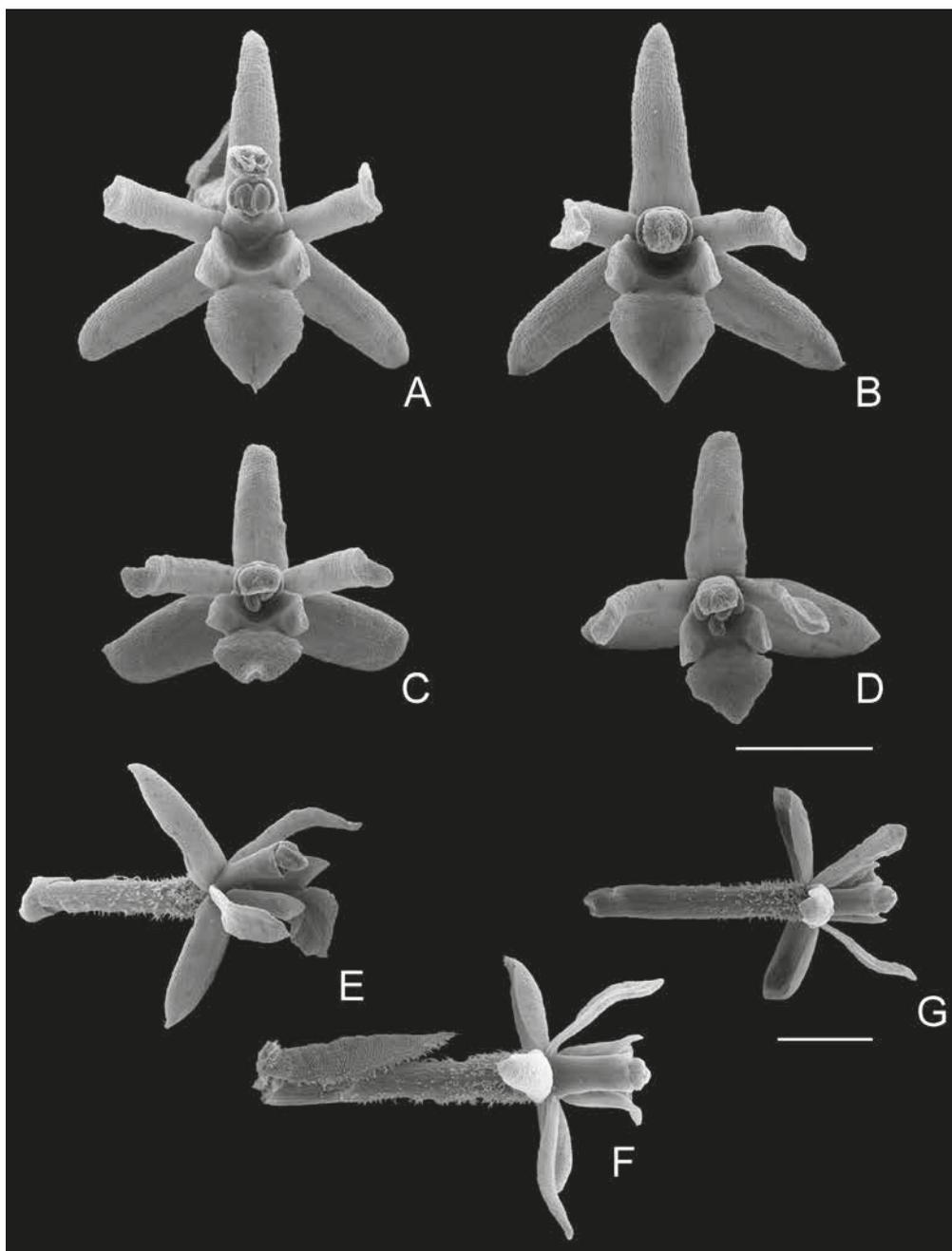


Fig. 3. *Oberonia scortechinii* Hook.f. SEM images of entire flowers. **A–D.** Face view. **E–G.** Dorsal view. A, B, E, F from *Peterson ex cult.*, HOAG119. F: with floral bract. C, D, G from Sulawesi, SBGO 5169 [SING0137964]. Scale bars: 1 mm.

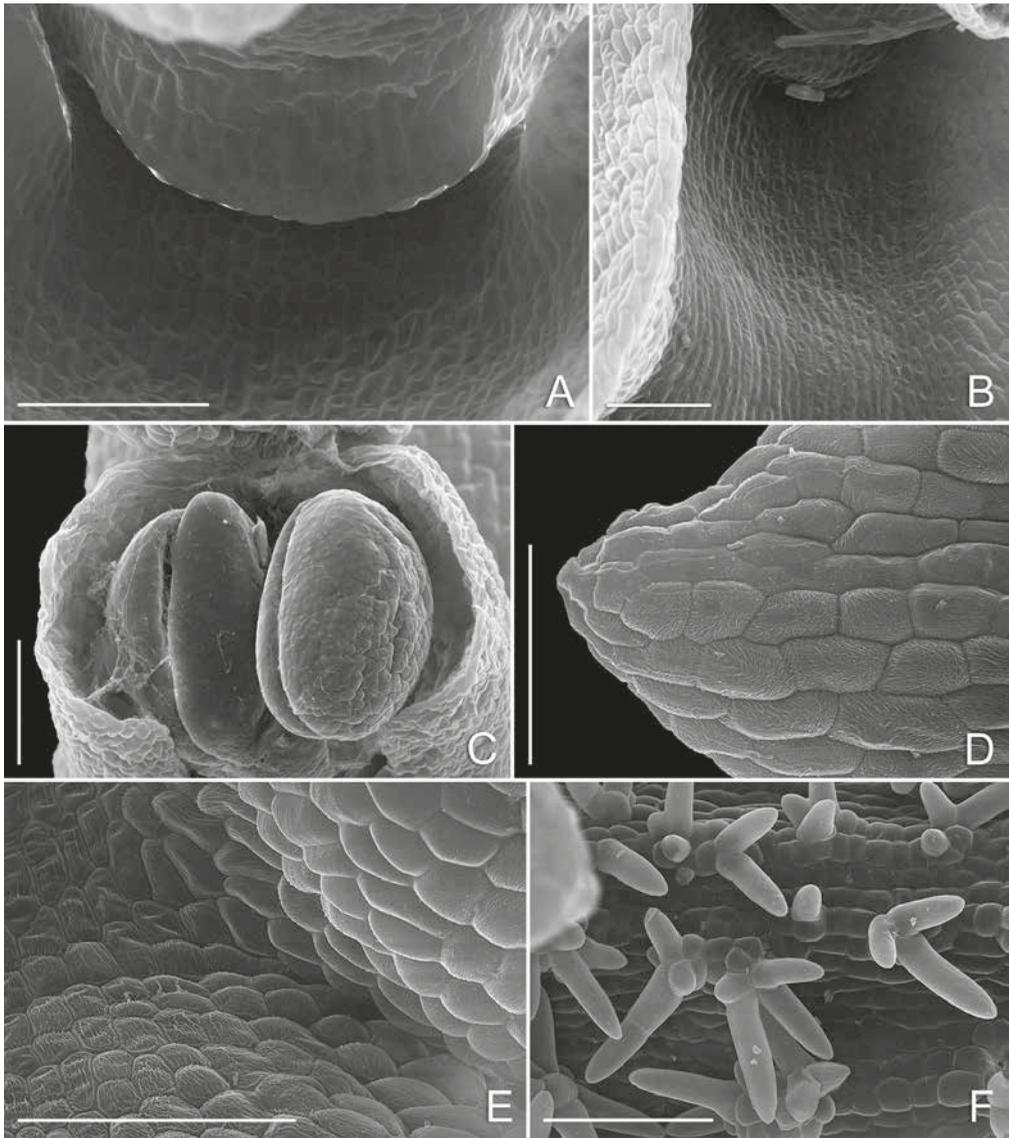


Fig. 4. *Oberonia scortechinii* Hook.f. SEM images of floral details. **A, B.** Sac. **C.** Two pollinaria with two pollinia each. **D.** Cells on tip of lip with fine rugulate sculpture. **E.** Transition of mesochile to lateral lobes with cells showing fine rugulate sculpture. **F.** Trichomes on distal portion of pedicelled ovary. A–D from *Peterson ex cult.*, HOAG119. E, F from Sulawesi, *SBGO 5169* [SING0137964]. Scale bars: 100 μ m.

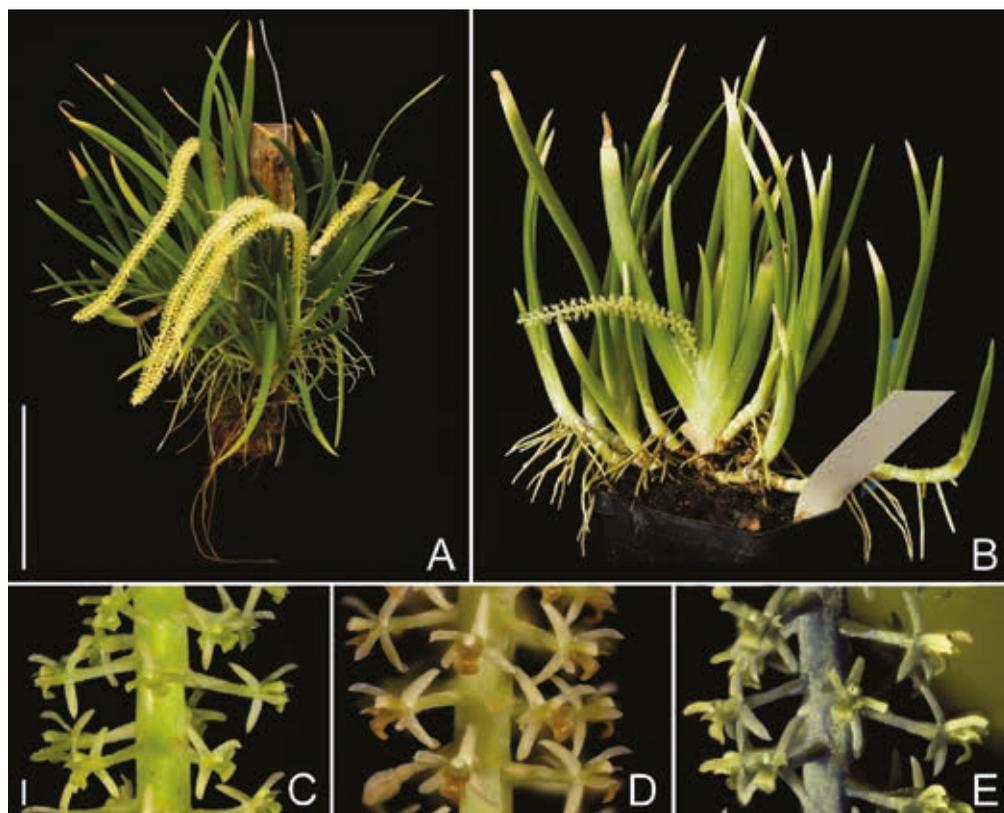


Fig. 5. *Oberonia scortechinii* Hook.f., images of live plants. **A.** Habit of mounted plant. From DLG436, HOAG118. **B.** Habit of potted plant. From DLG379, HOAG385. **C.** Portion of inflorescence with white-green flowers. From DLG371, HOAG211. **D.** Portion of inflorescence with cream-orange flowers. From DLG436, HOAG62. **E.** False colour insect vision image of flowers of D. Scale bars: A, B = 10 cm (upper left); C–E = 1 mm (lower left).

species, this single character does not justify separation at the genus level.

A few species either described in the genus *Hippeophyllum*, or at some point assigned to it, have previously been transferred to *Oberonia*: 1) *Oberonia chenii* Ormerod nom. nov. for *Hippeophyllum microphyllum* S.C.Chen (non *Oberonia microphylla* (Blume) Lindl. = *Oberonia rhizomatosa* J.J.Sm.); 2) *Oberonia pumila* (Fukuy. ex S.C.Chen & K.Y.Lang) Ormerod (= *Oberonia insularis* Hayata); 3) *Oberonia seidenfadenii* (H.J.Su) Ormerod; 4) *Oberonia sinica* (S.C.Chen & K.Y.Lang) Ormerod (= *Oberonia insularis* Hayata).

Oberonia scortechinii Hook.f., Fl. Brit. India 5: 683 (1888). – *Iridorkis scortechinii* (Hook.f.) Kuntze, Revis. Gen. Pl. 2: 669 (1891). – *Hippeophyllum scortechinii* (Hook.f.) Schltr., Bot. Jahrb. Syst. 104: 13 (1911). – TYPE: [Peninsular Malaysia, Perak], Kinta River, December 1880, *King's Collector 1128* (syntypes BM [BM000088481], K

[K000943037], SING [SING0137958] (Fig. 1A: left, 2B)); *ibidem*, January 1885, *King's Collector 7122* (syntype K [K000943038] (Fig. 1A: right)); s.l., *Scortechini s.n.* (syntype K [K000943039]).

Oberonia hamadryas Ridl., J. Bot. 24: 322 (1886), **syn. nov.** – *Hippeophyllum hamadryas* (Ridl.) Schltr. in Schumann & Lauterbach, Fl. Schutzgeb. Südsee, Nachtr. 108 (1905). – TYPE: New Guinea [Papua New Guinea], Sogeri Region, Central Province, South Cape, 1885–1886, *Forbes s.n.* (syntype BM [BM000088344]).

Hippeophyllum micranthum Schltr. in Schumann & Lauterbach, Fl. Schutzgeb. Südsee, Nachtr. 108 (1905), **syn. nov.** – TYPE: Kaiser-Wilhelmsland [Papua New Guinea], on trees in the forests at the Nuru, December 1901, *Schlechter 13809* (syntype B, presumed lost).

Oberonia longifolia Ridl., J. Straits Branch Roy. Asiat. Soc. 50: 127 (1908), **syn. nov.** – TYPE: [Malaysia], Sarawak, Bau District, Buso, Bukit [Hill] Tendang, Busau, September 1905, *Ridley s.n.* (syntype SING [SING0047516] (Fig. 1B, 2B)); [Malaysia], Samarhan District, Kuap/Quop, March 1908, *Hewitt s.n.* (syntype repository unknown).

Hippeophyllum celebicum Schltr., Repert. Spec. Nov. Regni Veg. 10: 26 (1911), **syn. nov.** [non *Oberonia celebica* Schltr. = *O. bifida* Schltr.]. – TYPE: [Indonesia], Celebes [Sulawesi], on trees near Tomohon (Minahassa), 1000 m, November 1909, *Schlechter 20492* (syntype repository unknown); [Indonesia], Celebes [Sulawesi], on trees near Lansot (Minahassa), 700 m, December 1909, *Schlechter 20628* (syntypes E [in bud only], G [G293105], K [K000943036], L [L.1512875], NSW [NSW936417], S [S-G-6873]).

Hippeophyllum papillosum Schltr., Repert. Spec. Nov. Regni Veg. Beih. 1: 180 (1911), **syn. nov.** [non *Oberonia papillosum* Schltr. = *O. monstrosa* (Blume) Lindl.]. – TYPE: [Papua New Guinea], in the mountain forests near Pema, 300 m, May 1909, *Schlechter 19406* (syntype B, presumed lost).

Hippeophyllum alboviride J.J.Sm., Repert. Spec. Nov. Regni Veg. 11: 135 (1912), **syn. nov.** – TYPE: [Indonesian New Guinea], at the middle Tor, 25 m, 11 October 1911, *Gjellerup 744* (syntype L [L.1512873]).

Hippeophyllum wenzelii Ames, Philipp. J. Sci., C 8: 413 (1914 ['1913']), **syn. nov.** [non *Oberonia wenzelii* Ames = *O. lunata* (Blume) Lindl.]. – TYPE: Philippines, Leyte, Dagami, on trees, 60 m, 21 December 1912, *Wenzel 20* (holotype AMES [AMES00102075]; isotypes BM [BM000088385], SING [SING0141461]). (Fig. 1E, 2A)

Hippeophyllum javanicum J.J.Sm., Bull. Jard. Bot. Buitenzorg, sér. 3, 1: 97 (1919), nom. nud.

Hippeophyllum halmaherense J.J.Sm., Bull. Jard. Bot. Buitenzorg, sér. 3, 8: 41 (1926), **syn. nov.** – TYPE: [Indonesia], Halmahera, *Teysmann s.n.* (syntype repository unknown).

Hippeophyllum sulense J.J.Sm., Bull. Jard. Bot. Buitenzorg, sér. 3, 8: 42 (1926), **syn. nov.** – TYPE: [Indonesia], Soela Island, Taliaboe [Taliabu Island], Tandjong [Tanjung] Saloe, *Van Hulstijn & Atje 112* (syntype L [L0537676]).

Hippeophyllum biakense J.J.Sm., Nova Guinea 14: 366 (1929), as '*biakenae*' (sic: see notes), **syn. nov.** – TYPE: [Indonesia], Schouten Islands, Biak Island, near Bosnek, January 1913, *Gibbs 6283* (syntype repository unknown); [Indonesia], Schouten Islands, Biak Island, near Wari, September 1915, *Feuilletau de Bruyn 386* (syntype L [L.1512874]).

Perennial epiphytic herb (Fig. 3–5). **Rhizomes** creeping, 1–5 cm long (Fig. 5A, 5B). **Roots** thin but stiff, arising along entire rhizome, denser under shoot (Fig. 2, 5A, 5B). **Growth** upright, acaulescent. **Leaves** equitant, opposite, with basal abscission scar, narrow linear, acuminate, 4–20 × 0.8–1 cm in floriferous growths. **Inflorescence** typically exceeding leaves, sterile peduncle short, distal end with sterile portion of variable length (0.5–3 cm). **Flowers** in indistinct whorls to scattered, non-resupinate, floral axis tilted slightly towards distal end of inflorescence; sepals and petals light green, white or cream; lip green, yellow or orange (Fig. 5C, 5D). **Bract** slightly more than half length of pedicelled ovary, ovate, acuminate, upper surface with granules or short hairs, margins hirsute (Fig. 3F). **Pedicelled ovary** long for genus, about as long as width of flower (2.3–2.7 mm), round, without axial ridges, density of scattered hairs increasing distally (Fig. 3E–G, 4F). **Sepals** narrow triangular, median sepal slightly narrower than lateral sepals (Fig. 3A–D). **Petals** narrow linear, blunt. **Lip** trilobed, sac shallow (Fig. 4A, 4B), mesochile with two triangular side lobes pointing distally, epichile linguiform, acute, curved downwards. Cells predominantly with fine rugulate surface sculpture (Fig. 4D, 4E). **Gynostemium** very long for genus (c. 1 mm: Fig. 3E–G), at least twice as long as wide, reaching tip of lateral lobes of lip, slightly tapering towards anther, no column wings. Four pollinia of Malaxideae type, reniform, slightly unequal size, forming two pollinaria (Fig. 4C).

Distribution. Peninsular Malaysia through Indonesia (Sumatra, Batu Islands, Borneo, Java, Bali, Sulawesi, Halmahera, Indonesian New Guinea, Biak), Papua New Guinea, to the Solomon Islands and the Philippines. There are no records from either New Britain or New Ireland, most likely a sampling artefact.

Ecology. On tree trunks (*Hevea brasiliensis* Müll.Arg., *Neonauclea* sp., *Tektona* sp.), near streams and in open forest. The species appears to flower throughout the year, with only the month of April lacking any herbarium record with open flowers. The

limited number of samples did not permit a check of seasonality in subregions. The majority of elevation records are from 0–500 m, with a few up to 1000 m (Sulawesi: syntypes of *H. celebicum*).

Cultivation. The species can be grown on mounts (wood, bark: Fig. 5A) or potted in medium size bark (c. 1 cm: Fig. 5B) in intermediate to warm conditions in bright light with good humidity (60–80% RH). It grows relatively rapidly for *Oberonia* and is one of the more robust species in cultivation (Geiger, pers. obs.).

Specimens examined. NO LOCALITY: *Scortechini 1565* (SING [SING0137957]); Malay Islands, *Carr s.n.* (SING [SING0057727, SING0137966]).

MALAYSIA: **Perak:** Gunung Berong, via Kampong, Bertam, 300–360 m, *Mhd Shah & Mhd Ali MS 2888* (SING [SING0141393]); Sumpai Kriam estate, 0 m, *Spare 1322 SF 34452* (AMES [AMES02096903], P [P00404606], SING [SING0137953]). **Kelantan:** Ulu Kelantan, Gua Musang, *UNESCO 422* (SING [SING0141391]). **Pahang:** Tembehing, *Carr 138* (SING [SING0137952, SING0137955, SING0137959]). **Sarawak:** 18th mile Kuching-Segu Road, *Sinclair SF 38394* (SING [SING0137963]); Bau District, 5 km SW of Bau, 100 m, *Beaman 11913* (FLA [FLAS239050], L [L.4170761]).

INDONESIA: **Sumatra:** Lobang Angin, Bau Limestone Hills, *Yi et al. S 51270* (L [L0402831]); Nias, 0 m, *Batten Pooll s.n.* (SING [SING0137962]); Batoe [Batu] Islands, *Raap s.n.* (L [L.1512766]). **Kalimantan:** Bange, *Korthals s.n.* (L [L.1512768]). **Java:** *S.c. s.n.* (L [L.1512762, L.1512763, L.1512764, L.1512767, L.1512878]); Java?, *Backer 2182* (L [L.1512879]); Zandbaai [Thiletoek beach = Teluk Ciletuh], *Backer 14A* (L [L.1512765, L.1512877]); Javanica Bateelis, *Bakhuizen van den Brink 1003* (U [U.1459489]). **Bali:** *S.c. [C.H.B.] 213* (L [L.1512880]). **East Nusa Tenggara:** Orong, *Schmutz 4536* (L [L.1512775]). **Sulawesi:** Fumoga Bone National Park District, Gorontalo, Huhupito Camp on the Sungai Olma, *Milliken 903* (L [L.1512876]); Lake Matano, Mure, S side of lake a few km E of Soroake, *SBGO 4005* (L [L.1512774], SING [SING0097946]); Lake Towuti, Logging concession TWA 936, W shore of lake, 330 m, *SBGO 4045* (L [L.1512773], SING [SING0093520]); Road Malili to Soroako, 100–400 m, *SBGO 5169* (L [L.1512772], SING [SING0137964]). **Western New Guinea:** [Stouffars Rivers?], *Docters van Leeuwen 9991* (L [L.1512760]); Biak, near Kampong Saba, *De Wilde 1191* (L [L0571079]); N of Ayawasi village, *Yumte 90* (L [L.4405452]); [Waigeo Island], E bank of Majalibit Bay, 8 km NW of Waifor village, *Van Royen 5140* (L [L.1512776]). **PHILIPPINES:** **Luzon:** Albay, Mount Malinao, *Edano Phil Nat Herb 34574* (CANB [CANB78854], SING [SING0141411]); ibidem, 500m, *Edano 8421* (AMES [AMES02096687]). **Palawan:** Isabela (S. Madra), Sangcad, along Calumagan river, 650 m, *Gutierrez 61-317 Phil. Natl. Herb 78272* (AMES [AMES02096915], L [L.1512771]). **Pilillo:** NE, Lukutan, 50 m, *Fox 148 Phil. Natl. Herb 9067* (AMES [AMES02096914]). **Leyte:** Dagami, Panda, 200 m, *Wenzel 158* (AMES [AMES02096913]).

PAPUA NEW GUINEA: Koitaki, 500 m, *Carr 10018* (AMES [AMES02096909], CANB [CANB47740, CANB47741], L [L.1512782, L.1512783], SING [SING0137965, SING0137967]); Kaiser Wilhelmland auf Bäumen in den Wäldern by der Kanlo Etappe, 200 m, *Schlechter 16978* (AMES [AMES00100318, AMES00100319, AMES02096907], L [L.1512756, L.1512757], MO [MO923894], NSW); Warin near Gobi, 300 m, *Schlechter 19561* (AMES [AMES02096908], L [L.1512758, L.1512759], NSW); Road to Sirinumu Dam, 150 m, *Millar UPNG1050* (MEL [MEL697053], NSW [NSW434216]); Agupon, *Crutwell 880* (L [L.1512779]); Central, Wariata National Park, near Welcome House by lake, *Dodd & Howcroft s.n.* (L [L.1512755]).

SOLOMON ISLANDS: **West Province:** Kolombangara Island, Ringgi Village, *Hsu et al. SITW00912* (TAIF [TAIF421402]); Rendova Island, Ughele River, *Hsu et al. SITW03570* (TAIF [TAIF453118]); Kolombangara Island, Olisusu'u, *Hsu SITW13241* (TAIF [TAIF537572]).

Notes. Most type material consists of syntypes, and is lost as in the case of Schlechter types at B, or the repository is unknown, as in the case of *Hippeophyllum halmaherense*. I elect here not to designate lectotypes or neotypes as there are no nomenclatural problems that could only be solved with such nomenclatural acts.

All available evidence from the flowers shows no discriminating characters between the taxa that have been described (Fig. 1). The illustrated commonalities include: bract about half length of long pedicelled ovary; denser hairs towards distal portion of pedicelled ovary; petals narrower than sepals; long gynostemium; lip arched, trilobed, lateral lobes not reaching tip of pointed lip. Those characters agree with the SEM images based on two samples (Fig. 3). The flowers differ in size by approximately 10%, which is well within observed size differences in other *Oberonia* species (Geiger, 2020).

The slight shape differences in the various drawings can easily be accounted for by artistic licence and intraspecific variability. For instance, the separation of the lateral lobes from the mesochile of the lip is clearly seen in the lateral view of *Hippeophyllum alboviride* (Fig. 1F) and *H. biakense* (Fig. 1G) but in the top view of the lip, that separation is not evident. The statistical principles explained in Geiger (2021) apply here as well: with the few specimens available for each putative species, the small differences are more likely to represent intraspecific variability (if not error) than to indicate species-level differences. In light of known variability amongst other *Oberonia* species (e.g., *O. equitans* (G.Forst.) Mutel, *O. insectifera* Hook.f.: Geiger, 2019b; Geiger et al., 2020), those small differences are not sufficient to justify taxonomic separation. Differences in colour (yellow, white, green) are well within the known range found in other species of *Oberonia* (e.g., *O. mucronata* (D.Don) Ormerod & Seidenf., *O. punctata* J.J.Sm.). Additionally, data from horticulture show that the same genotype can produce both green and yellow flowers (Geiger, pers. obs.; Fig. 5).

The gynostemium amongst the described taxa now synonymised under *Oberonia scortechinii* shows no differences. It was used as a genus-level character but is here re-assessed as an autapomorphy of one species.

The distinguishing characters used by various authors are absent, vague or incorrect (cf. examples discussed by Geiger, 2021). Ridley (1886, 1908) and Smith (1912) did not compare their species to any other. Schlechter (1905) distinguished his *Hippeophyllum micranthum* from *H. hamadryas* by the 'significantly smaller flowers' [bedeutend kleinere Blüten]. Schlechter noted 1.5 mm for the lip and 2.5 mm for the pedicelled ovary in *Hippeophyllum micranthum*, while Ridley (1886) did not provide any measurements for his *Oberonia hamadryas*, nor was there an illustration. Schlechter (1911a) distinguished his *Hippeophyllum papillosum* primarily by the more slender habit from *H. micranthum* and *H. hamadryas*, which is well-known to be variable in plants; Fig. 2 shows the common habits of two names

involved. Additionally, Schlechter noted the hairs on the pedicelled ovary as a distinguishing character, an outright error as it is present in all of the species that were distinguished (Fig. 1). He further distinguished his *Hippeophyllum papillosum* by flower colour, which is shown here to vary even within a single genotype. Last but not least, he presumed all species under consideration would be endemic in Papua New Guinea and did not compare *Hippeophyllum papillosum* to material from other regions. This same presumption of endemism was also encountered in the case of *Oberonia heliophila* Rchb.f. (Geiger, 2021). Schlechter (1911b) distinguished his *Hippeophyllum celebicum* from *H. scortechinii* in having narrower leaves, which is shown here to be continuously variable. He distinguished *Hippeophyllum celebicum* from *H. micranthum* by unspecified differences in the anther and the habit. Smith (1926) noted the similarity of his *Hippeophyllum halmaherense* to *H. javanicum* and *H. celebicum* but indicated the different shape of the midlobe of the lip. Figure 1 shows that the lip shape is indistinguishable between the taxa described under those names. Smith (1929) distinguished his *Hippeophyllum biakense* from his *H. alboviride* by the shorter pedicelled ovary, although no difference can be observed, by ‘the petals not enlarged towards the apex’, although again no difference can be observed, and by ‘anther with narrower appendix’, in which it is unclear what the appendix is. Figure 1F, 1G show identical flowers. Smith (1926) distinguished his *Hippeophyllum sulense* from *H. alboviride* and *H. biakense* by the length of the leaves and the inflorescence, although both characters are known to vary extensively, by the shape of the lip, although no difference can be observed (Fig. 1J vs 1F, 1G), and by the round anther, although no alternate state was given. Ames (1914) compared his *Hippeophyllum wenzelii* to *Oberonia cylindrica* Lindl. In this case, a new species is compared to a highly dissimilar one instead of to a truly similar one, possibly due to restricting the comparison to a geographic region (Philippines). It is an implicit assumption of endemism even though several species of *Hippeophyllum* from elsewhere had been described by 1914.

In some groups of *Oberonia*, such as *Oberonia* section *Platyacron* Schltr., somewhat similar flowers are found on plants with highly distinctive vegetative morphologies. However, all described species considered here share the creeping rhizome giving rise to an acaulescent growth with equitant alternating fleshy leaves, which are narrow, slightly falcate and acuminate (Fig. 2). The single, terminal inflorescence is typical for the genus *Oberonia*. There are some differences in the vegetative size, with *Hippeophyllum scortechinii* being applied to large specimens with leaves up to about 15–20 cm in length, while plants with smaller leaves of 10–15 cm have been assigned to various species such as *H. microphyllum*. Differences in size at flowering in other species of *Oberonia* have been documented (Geiger et al., 2020; Geiger, 2021), hence, the size differences amongst plants assigned to the various *Hippeophyllum* species is unsurprising and not taxonomically meaningful.

The distribution of all described taxa is well within the range of other species of *Oberonia*. *Oberonia scortechinii* is essentially a Malesian-West Melanesian species. Names have been given to specimens from various regions of its distribution: *Hippeophyllum scortechinii* (Malaysia), *H. hamadryas* (Java, Indonesia), *H. celebicum*

(Sulawesi, Indonesia), *H. sulense* (Talibu Island, Indonesia), *H. biakense* (Biak Island, Indonesia), *H. halmaherense* (Halmahera Island, Indonesia), *H. alboviride* (Indonesian New Guinea), *H. microphyllum*, *H. papillosum* (Papua New Guinea) and *H. wenzelii* (Philippines). Notice that most species are described from individual islands of Indonesia. As *Oberonia* has the smallest angiosperm seeds, wind dispersal amongst islands is easily accomplished (Barthlott et al., 2014; Geiger, 2014, 2020, unpubl. data; Geiger et al., 2020).

As pointed out previously (Geiger, 2021), the published descriptions mostly insufficiently distinguish new taxa from those previously published (e.g., Ridley, 1886; Schlechter, 1905, 1911a, 1911b, 1911c; Smith, 1910, 1912, 1926; Ames, 1914). In several cases, the species descriptions are merely specimen descriptions. It is further noticeable, that several species have been cited in the literature only sparingly, including simple listings with no more than a reference to the protologue; four out of ten of the published taxa are only known from the protologue: *Hippeophyllum longifolia* (only cited 3 times after the protologue), *H. micranthum* (3 times), *H. hamadryas* (twice), *H. papillosum* (twice), *H. alboviride* (once), *H. wenzelii* (once), *H. halmaherense* (only known from the protologue), *H. sulense* (likewise), *H. biakense* (likewise), *H. celebicum* (likewise). The dubious application of the names extends to herbaria visited where at best material is identified to species based on location, but many specimens are not identified to species at all and also include rhizome-bearing *Oberonia* s.s. species. *Oberonia scortechinii* as the oldest name has been used 20 times in the literature (Ridley, 1896, 1907, 1924; Kuntze, 1891; Smith, 1905, 1910, 1933; Schlechter, 1911c; Koorders, 1919; Merrill, 1921; Holttum, 1953, 1964; Chin, 1983; Comber, 1990, 2001; Seidenfaden & Wood, 1992; Millar, 1999; Senghas, 2000; Beaman et al., 2001; Teoh, 2021).

False-colour insect vision images show no striking patterns (Fig. 5E). The most significant contrast is between rachis and flowers, with the lip being darker than the remaining tepals. These patterns are identical to those found in other *Oberonia* flowers (Geiger, 2019b).

Hippeophyllum javanicum was introduced by Smith (1919) with ‘JJS Java II M, f 227’ with no key to what the abbreviations might signify; see also discussion in Comber (2001: 135). Comparison with other entries did not shed any light on the meaning of those notations; they might have been the physical location in the Bogor living orchid collection (anonymous reviewer, pers. comm.). Accordingly, *Hippeophyllum javanicum* is a nom. nud., which does not seem to have been validated subsequently. A drawing in K with annotations in Smith’s hand shows an earlier draft of Smith (1910: fig. 177) with the name *Hippeophyllum javanicum* JS and several specimens in L were identified by J.J. Smith with that name. The synonymy of *Hippeophyllum javanicum* with *H. scortechinii* was noted by Smith (1933).

Hippeophyllum biakense was introduced by Smith (1929: 366) as *biakense* (sic), but in the caption of plate L (i.e., plate 50), figure 25, it was spelled *biakense*. Smith (1929) explicitly named the species for its provenance from Biak Island and the -ense suffix is grammatically correct. Although ICN Art. 60.1 and 60.9 emphasise retaining the original spellings even if erroneous, here it appears to be simple type-

setting error, as opposed to an intentional deviation by Smith. Accordingly, the correct spelling of the species epithet is *biakense*.

The least-known of the new synonyms is *Oberonia longifolia*. The protologue noted the horizontal rhizomes, the long slender leaves 8×0.25 inches ($= 20 \times 0.6$ cm), the long column, and the three-lobed lip. The syntype at SING agrees with all vegetative aspects of the protologue, but has no remaining flowers (Geiger, pers. obs.). All recognisable characters from the syntype and the description are identical to *Oberonia scortechinii*.

The sketch on the syntype sheet of the *Oberonia longifolia* flower (Fig. 1B) shows rather long and slender lateral lobes of the lip, similar to one of the drawings of *O. scortechinii* (Fig. 1A: left). In the case of *Oberonia scortechinii*, the lateral view (Fig. 1A: right) shows shorter lateral lobes and a curved lip as in all the other drawings (Fig. 1C, 1D, 1F–J) and in the SEM images and photographs (Fig. 3, 5). Additionally, examination of the flowers on the syntypes of *Oberonia scortechinii* showed the lateral lobes to be in agreement with the species concept advanced here. Given the previously demonstrated many errors in drawings (Geiger, 2019a, 2020; Geiger et al., 2020), the best explanation for those drawings is excessive artistic licence or even error. It appears that Hooker (1888: 683) based his ‘side lobes lanceolate longer than the small orbicular or rhomboid midlobe’ on the erroneous drawing.

Hippeophyllum wenzelii was never illustrated. Examination of types at AMES and SING did not reveal any significant differences. Flowers on the herbarium sheet show the distinct hairs on the distal end of the pedicelled ovary and the curved lip (Fig. 1E). Rehydration of a flower from the SING isotype (Fig. 1E; with kind permission from SING curatorial staff) was only moderately successful. The torn lip shows the three-lobed configuration.

Discussion

Geiger (2021) discussed the excessive splitting of microfloral orchids, noting the many species only known from a single or few specimens and a tendency towards the recognition of monotypic sections. In the case of *Hippeophyllum*, the entire genus is here recognised as a single species, which may seem extreme. It is notable that the same authors (Schlechter and J.J. Smith) who recognised numerous species and placed them in *Oberonia* section *Scytoxiphium* Schltr., but which are now synonymised under *Oberonia heliophila* (Geiger, 2021), are responsible for eight out of the ten synonyms of *O. scortechinii*. Geiger et al. (2020) synonymised ten names under *Oberonia equitans*, with yet another to be added to the list (*O. hispidula* Ames). At least a dozen names will be synonymised under *O. pumilio* Rehb.f., including *O. titania* Lindl. (Geiger, unpubl. data).

The value of horticultural data in systematics (Geiger, 2018) also comes to bear in this contribution. A variable flower coloration ranging from green to yellow/orange has been found to be displayed in flowers of the same genotype (Fig. 5C, 5D).

The present study runs counter to the common thread in biodiversity studies of orchids which have focused on describing new species. A search of *Phytotaxa* publications on orchids in 2022 found all 57 contributions introduced new names, while only one identified a new synonym. The same also applies to orchid monographs. Wood (2006: xxiii) in his work on the large genus *Dendrobium* Sw. noted the taxonomic changes including resurrection of four names, but only two new synonyms. It is difficult to trace synonymisations as they are not nomenclaturally marked with the synonymising author and publication, as is routinely the case for new species or generic transfers. Online registers such as *Plants of the World* (POWO, 2023) do not provide literature references to synonymisations but do provide them for protologues and generic transfers. Regionally restricted studies are more likely than monographic studies to oversplit species, which will eventually lead to them being synonymised. Fortunately, the most recent synonym of *Oberonia scortechinii* dates from 1929, whereas new species in the genus *Oberonia* introduced as late as 2021 are considered synonyms of already described ones (Geiger, unpubl. data).

Similar to the rhizome as a diagnostic character for the genus *Hippeophyllum*, the presence of the leaf abscission scar had been used to diagnose *Oberonia* subgenus *Oberonia* s.s. (= *Apotemnophyllum* Schltr., nom. illeg.). The molecular phylogenies of *Oberonia* by Cameron (2005), Tang et al. (2015), Hedderich (2016), and Li et al. (2020) did not recover species with a leaf abscission scar as monophyletic (e.g., *O. mucronata-ensiformis* and *O. heliophila*), and the presence of a leaf abscission scar in what had been considered the distinct genus *Hippeophyllum* strongly suggests that this character is not a good synapomorphy for subgroups within *Oberonia*. Note that the sample of *Oberonia setifera* Lindl. (which is a synonym of *O. brachystachys* Lindl. from India: Geiger et al., 2021) in GenBank is *O. setigera* Ames (which is endemic to the Philippines), presumably due to a misspelling. Other characters, such as the dual sac in *Oberonia* section *Labidous* Schltr., with about six species, the hammer-shaped lip and setaceous petals of *O.* section *Scyllae* Hook.f., with about eight names in need of critical evaluation, the terete leaves of *O.* section *Myosurus* Hook.f., with three species, the hairy flowers with wide epichile lobes of *O.* section *Platyacron* Schltr., with about a dozen species, and Ansari & Balakrishnan's (1990) still unnamed section III with about eight species, seem to support well-defined groupings. However, the vast majority of species, have not been satisfactorily arranged in more manageable groups.

ACKNOWLEDGMENTS. Staff at various collections consulted over the years were most supportive during visits and have provided material on loan (B: Nils Köster, Robert Vogt; BM: Ranee Prakash, Jacek Wajer; CANB: Mark Clements, Brendan Lepschi; E: Hannah Atkins, Suzanne Cubey; F: Christine Niezgodá; HUH/AMES: Irina Ferreras, Gustavo A. Romero, Michaela Schmull; K: André Schuiteman; L: Roxali Bijmoer, Ed de Vogel, Barbara Gravendeel, Christel Schollaardt; MEL: Wayne Gebert; MICH: Brad Ruhfel; MO: Donna Herrera, James Solomon; NSW: Katharine McCroll, Peter Weston; P: Marc Pignal; SING: Balizah Mohd

Ibrahim, Hubert Kurzweil, Serena Lee, Paul Leong; SOG: David Basler, Lucienne de Witte, Gabriel Dill; US: Rusty Russell, W: Ernst Vitek; WU: Walter Till; Z/ZU: Alexander Kocyan, Reto Nyffeler). Sean Lahmeyer and Brandon Tam (HNT) facilitated many loans. Kanchi Gandhi (HUH) kindly provided nomenclatural guidance. Two anonymous reviewers and the editor David Middleton helped to improve the manuscript with constructive comments. Junhao Chen and Felicia Tay shepherded the manuscript through production.

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