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New orchid species of *Sigmatodactylus* (Orchidoideae; Diurideae) and a new record of *Cryptostylis carinata* from central Palawan, Philippines

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Abstract

Two new species of *Stigmatodactylus* from Palawan Island in the Philippines are described and illustrated. The taxa, which represent the first records for the genus *Stigmatodactylus* in the Philippines, are restricted to the ultramafic peaks of central Palawan. *Cryptostylis carinata*, originally described from New Guinea, is also documented, representing a first record for this species in Palawan.

Buod (Pilipino)

Inilarawan at iginuhit sa artikulong ito ang dalawang bagong species ng *Stigmatodactylus* mula sa isla ng Palawan sa Pilipinas. Ito ang pinakaunang tala ng genus *Stigmatodactylus* sa Pilipinas at matatagpuan lamang sa ultramafic na bundok sa gitnang Palawan. Ang ultramafic na bundok ay may mataas na mga sangkap na Magnesium at Iron. Inihayag rin sa sulating ito ang unang tala sa Palawan ng 1 species na *Cryptostylis carinata*, na unang naitalâ sa bansang New Guinea.

Keywords: Acianthinae, Diurideae, Malesia, Orchidoideae, Philippine flora

Introduction

Though often highly localised and rarely encountered in appreciable numbers, *Stigmatodactylus* Maxim. ex Makino (1891: 81) is comparatively widespread across eastern Asia, but particularly within the Malesian biogeographical region. The eleven species recognised to date (WCSP 2015, Ong & Tan 2015) can be found in northern India (Rao 1987), Japan, China and Taiwan (Makino 1891, Chen *et al.* 2009), Java (Schlechter & Smith 1905), Peninsular Malaysia (Ong & Tan 2015), Borneo (Wood & Chan 1993), Sulawesi (Schlechter 1911), Maluku, New Guinea, and Bougainville and Guadalcanal in the Solomon Islands (Kores 1991, Pridgeon *et al.* 2001, Chen *et al.* 2009, WCSP 2015). There are no records from the Philippines; the name *Stigmatodactylus palawensis* Tuyama (1939: 57) is a synonym of *Disperis neilgherrensis* Wight (1851: 1719), a taxon collected from the sovereign state of Palau.

Unlabeled orchid specimens passed to the authors by the late Clemencio Peña at Palawan State University herbarium (PPC) were identified as belonging to the orchid genus *Stigmatodactylus* by the first author during a 2007 residence. *In situ* studies of living material were subsequently made, showing that, in addition to being novel records for the Philippines, the *Stigmatodactylus* taxa are immediately distinguishable from all other members of the genus by differences in inflorescence, sepal, petal, labellum and column morphology, all of which are significant characteristics in this genus (Guillaumin 1948, Dockrill 1969, Hallé 1978, Kores 1991). The stable and unique characteristics of the populations, which do not co-localise, indicate that the taxa do not represent varieties or aberrant ecotypes of any known species. As the only members of the genus known to occur on Palawan, and indeed in the Philippines, it was possible to rule out immediate hybrid origins and conclude that the taxa each represent new and undescribed species.

Two new species of *Stigmatodactylus* are here described from the Mount Beaufort Ultramafics geological terrane, a series of outcrops of Eocene origin (Okubo 1989) that account for the greater part of the mountains Palawan. The new *Stigmatodactylus* species both occur upon peaks of the Mount Victoria Massif, Municipality of Narra, which represents the largest contiguous exposed land area of this terrane and includes a number of mountains of >1000 m,

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including Brow Shoulder, Mount Shumkat, Sultan Peak and the eponymous Mount Victoria, each with distinct floral components. The Mount Victoria Massif is currently unprotected, subject to industrial mining in two locations (pers. obs.) and largely botanically unexplored. Numerous new species have been identified in the mountain complex in recent years, underscoring the unusual and highly endemic nature of the transitional flora of the island and highlighting the importance of biological research and the urgent need to implement environmental protection of this biologically megadiverse area (Robinson *et al.* 2009, Fleischmann *et al.* 2011, McPherson *et al.* 2011).

Twelve *in situ* observational studies were carried out between 2007 and 2015 within this mountain complex and elsewhere in Palawan, during the course of which other novel orchid observations were made, of which the presence of *Cryptostylis* Brown (1810: 317) is documented here.

Materials & Methods

All *de novo* georeferencing, as well as data derived from herbarium specimens, was in all cases verified in the field. Measurements were obtained using a Garmin Oregon 600 GPS unit with dual GPS and GLONASS telemetry enabled. Measurements were made with a minimum of 10 averaged waypoint readings over the course of a one-hour period, with an estimated accuracy of +/- 2 m. Summit elevations were standardised against established figures where available. Size measurements were made using a Mitutoyo vernier caliper.

Taxonomy

Stigmatodactylus dalagangpalawanicum A.S.Rob., *sp. nov.* (Figs. 1, 2)

Type:—PHILIPPINES. Palawan: Mount Victoria Massif, 1600 m, emergent from moss and leaf litter in thin humus layer overlying rocky ultramafic soil, 25 Jul 2007, *Robinson AR002* (holotype: PPC!; transfer to PNH requested).

Stigmatodactylus dalagangpalawanicum is distinguished from *S. richardianum* by its larger, flattened labellum, which is almost orbiculate with a finely erose crenulate margin, its larger, deeply channeled callus with its notched tip and short, truncated lateral margin projections, its larger, more robust plants, and the comparatively large flowers that are conspicuously red, but colourless towards the outer part of the sepals and petals.

Description: Terrestrial herbs, ca. 9.0–15.5 cm tall from apex of tuber to inflorescence apex. Tuber globose to ovate, ca. 3.0–4.5 mm, covered with capillary roots to 0.1 mm long, true roots few, emergent from tuber and subterranean portions of stem, 0.5–2.5 cm long. Stem erect, terete, green, glabrous, 5–8 cm long, up to ca. 1.5 mm diameter at the base, emergent from cataphyll, 3–5 mm, clasping base of stem. Leaf cordate, variably auriculate with a narrow sinus to perfoliate, ca. 1.3(–1.5) × 0.8(–1.1) cm, glabrous, green, venation darker, somewhat conspicuous, apically anastomosing. Inflorescence erect, terete, narrowing distally to ca. 0.55 mm, peduncle 3.5–8.0 cm, rachis 0.8–2.8 cm, green, with 1–7 flowers, 1–2 open simultaneously; floral bracts leaf-bearing, cordate, sessile, 4–6 mm 3–5 mm, with an acuminate tip. Flowers facing outwards, resupinate, sepals and petals spreading widely, ca. 1.77(–2.00) × 1.10(–1.72) cm, somewhat translucent. Pedicel-ovary narrow, green, glabrous, 5–7 mm long, 0.5–0.8 mm in diameter, terete, finely 6-ribbed longitudinally. Dorsal sepal erect, subulate and tubiform from involution of opposing margins, ca. 0.8–1.1 0.6 mm, but up to 1.1 mm wide at the base where opposing margins are not involute. Lateral sepals linear-subulate, narrowly ovate in section, descending, each ca. 30º from vertical, ca. 5.5–9.5 mm long. Petals subulate, almost 90º from vertical, straight to arcuate, ca. 5.35–8.45 mm long. Labellum purplish red, sometimes fading to a pale margin, petals and sepals predominantly pale, proximally flushed red, column basally red, otherwise green, flushed red immediately above anther cap, callus exterior reddish, becoming distally colourless, callus interior deep purplish red. Labellum immobile, flat, orbiculate, unlobed, ca. 0.7–0.89 mm in diameter, glabrous, surface minutely sinuate-papillate, margins markedly erose crenulate, apex in some blooms apiculate to acuminate. Callus 2–3 × 0.6–0.8 mm at base, basally fused to column for ca. 1/3 its length, thereafter deeply channeled, margins diminishing towards notched apex, lateral margins with a short, truncated projection, ca. 0.3 mm long, close to where the callus parts from the column. Column at ca. 90º to labellum, ca. 6.5–8.5 mm long, ca. 0.6 mm in diam., straight for ca. 2/3 of its length, then curved by ca. 55°, keel running ventrally along column from base, terminating in blunt-ended projection at a point 1/3 from base,

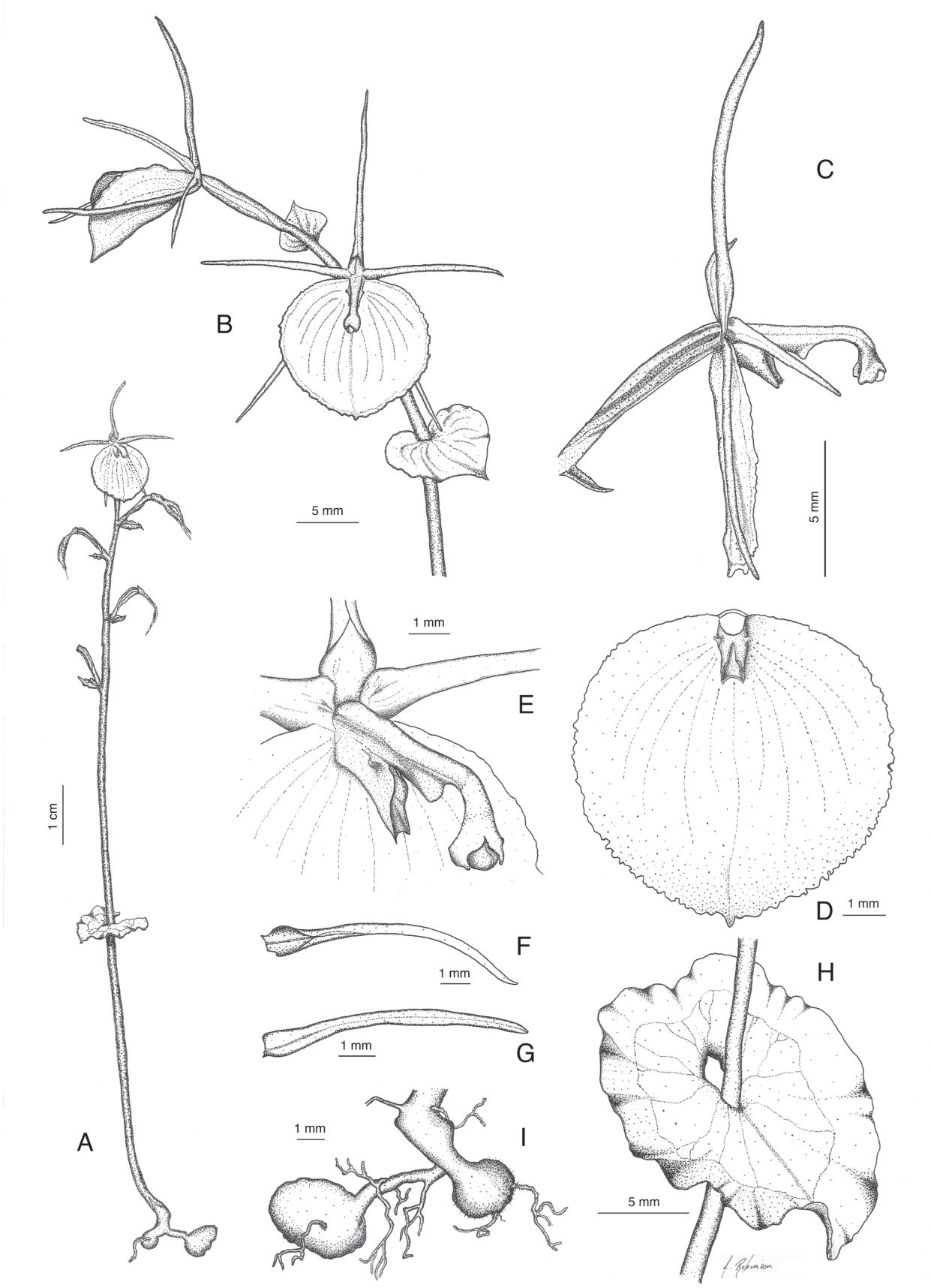

FIGURE 1. *Stigmatodactylus dalagangpalawanicum* (from *Robinson AR002* and living material studied *in situ*). A. Flowering plant; B. Flower from front; C. Flower from side; D. Labellum from front; E. Oblique view of column; F. Dorsal sepal; G. Petal; H. Leaf; I. Tubers, previous and current season. Drawing by A. S. Robinson.

FIGURE 2. *Stigmatodactylus dalagangpalawanicum* growing *in situ* in the Mount Victoria massif.

0.3–0.6 mm long, vestigial column wings emergent after projection, becoming deeply pronounced, to 0.4 mm, and angular, hyaline, subtending column apex on each side, column apex broadly clavate, rostellum blunt, ca. 0.3 × 0.4 mm, occasionally darkly coloured, stigma ovate, concave. Anther cap creamy white to slightly red suffused, cucullate, suborbiculate, with a median notch. Anther bilocular, pollinia 4, mealy, ovoid, butter yellow. Capsule narrowly oblong, ca. 4 mm in diameter, 9 mm long, 6-ribbed.

Conservation status: This species is known from three small populations across a 2 km transect in closed canopy upper montane forest. The total population across all three sites comprises ca. 18 mature individuals. Direct observations satisfy the IUCN Red List Criteria B2ac(iv);D (IUCN, 2001) as CR (Critically Endangered). The occurrence of this taxon in the surrounding forest above 1400 metres can be inferred, potentially satisfying the criteria for an EN assessment, but the ephemeral nature of *Stigmatodactylus* populations and their apparent sensitivity to environmental disturbance nonetheless puts them at high risk.

Distribution and Ecology: Growing terrestrially in humus layer overlying ultramafic rock in upper montane, closed canopy forest below summit scrub zone. The known populations of *Stigmatodactylus dalagangpalawanicum* comprise fewer than 20 documented individuals growing within a narrow elevational range of 1400–1700 m. Plants grow singly or in sparsely scattered groups beneath stunted summit trees, 2.0–3.5 m tall. June temperatures achieve 25 ºC in the shade during the day, 12–14 ºC at night, with frequent clouds and periodic rains (pers. obs.). Associated genera include *Leptospermum* (Myrtaceae), *Vaccinium* (Ericaceae), *Rhododendron* (Ericaceae) and *Quercus* (Fagaceae).

Phenology: Inflorescences bearing flowers observed in June, July, October, November and December, suggesting a tendency to flower following the rainy spring months into the start of the dry season, which is most pronounced from January through to April. Exploratory root excavation in October showed no apparent tubers, although they have been noted at other times of year, suggesting that these are newly produced at the end of each growing season; the noted absence of tubers in other perennating *Stigmatodactylus* taxa (Kores 1991, Schlechter 1911) may thus be a function of timing, although this cannot be stated with certainty in the absence of multiple observations.

Etymology: The specific epithet, *dalagangpalawanicum*, is the Tagalog (Filipino) words *dalaga ng Palawan* (maiden of Palawan), a reference to the pretty and diminutive form of the plants and a name now adopted by the local Tagbanua tribe for the plant since our research began. This designation is made in particular honour to the second author, Elizabeth Gironella, in the year following her official retirement after decades of work as curator of the herbarium at Palawan State University.

Stigmatodactylus aquamarinus A.S.Rob. & E.Gironella, *sp. nov.* (Figs. 3, 4)

Type:—PHILIPPINES. Palawan: Mount Victoria Massif, 1460 m, in mossy pads on matted tree roots and steep rock walls, 25 Jul 2007, *Robinson AR003* (holotype: PPC!; transfer to PNH requested).

Stigmatodactylus aquamarinus is distinguished from *S. lamrii* (Wood & Chan 1993: 274) by its labellum that is slightly oblong, retuse with an apiculate tip and an irregularly minutely serrulate margin, by its broader, unequal falcate petals, broader basal callus that is cuneate from above with two filiform protrusions at right angles to its axis and a glossy dark purple lingulate appendage that runs dorsally from the midpoint to the apex where its tip is slightly deflexed, and by its more obviously amplexicaul to perfoliate leaf.

Description: Terrestrial herbs, ca. 11.5–21.0 cm tall from apex of tuber to inflorescence apex. Tuber subglobose, ca. 4–6 mm in diameter, pale brown, roots few, 0.4–2.5 cm long, emergent from tuber and below cataphyll. Stem erect, terete, green, glabrous, supple, 5.2–8.7 cm long, up to ca. 0.02 cm in diameter at the base, cataphyll 2–4 mm, enveloping base of stem. Leaf cordate, base auriculate to wholly perfoliate, ca. 1.1(–1.6) × 0.8(–1.2) cm, glabrous, green, margin sometimes minutely fimbriate. Inflorescence erect, terete, narrowing distally to ca. 0.45 mm, peduncle 6.5–12.5 cm, rachis 1.2–4.1 cm, green, with 1–3 flowers, usually 2, opening sequentially; floral bracts leaf-bearing, cordate, sessile to perfoliate, 3–5 × 2–4 mm, with an acuminate tip. Flowers facing outwards, resupinate, sepals and petals spreading widely, ca. 1.8–2.4(2.8) cm wide, translucent. Pedicel-ovary narrow, green, glabrous, 4–6 mm long, 0.4–0.7 mm in diameter, terete, longitudinally finely ribbed. Dorsal sepal erect to strongly arched backwards, linear-subulate and tubiform from involution of opposing margins, ca. 1.1–1.5 cm tall, 0.8 mm wide, slightly wider near the base where opposing margins are not involute. Lateral sepals small, ca. 5–7 mm long, linear-filiform, arched, descending to rear of labellum. Petals narrowly to broadly falcate, slightly unequal with a dorsal bias, flat, not horizontal, usually angled at 60–70º from vertical, ca. 0.9–1.5 cm long, conspicuously wide, up to 3.2 mm, but usually narrower. Labellum pale aquamarine to turquoise blue, usually with a faint, oblong flush of purple slightly above the centre, which in turn abruptly gives way to white towards the callus, petals and sepals more intensely coloured, proximally flushed purple

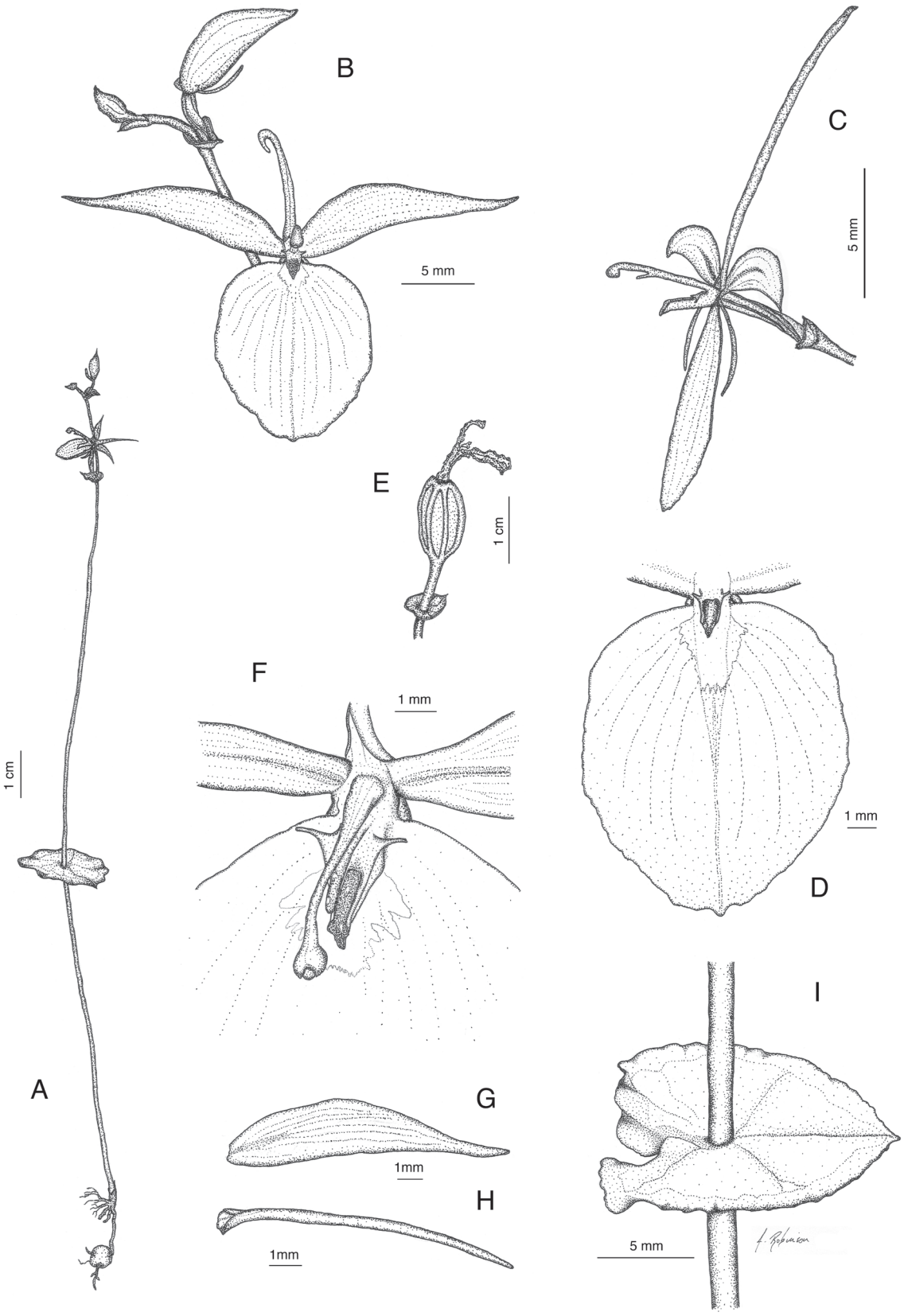

FIGURE 3. *Stigmatodactylus aquamarinus* (from *Robinson AR003* and living material studied *in situ*). A. Flowering plant; B. Flower from front; C. Flower from side; D. Labellum from front; E. Fruit; F. Oblique view of column; G. Petal; H. Dorsal sepal; I. Leaf. Drawing by A. S. Robinson.

FIGURE 4. *Stigmatodactylus aquamarinus* growing *in situ* in the Mount Victoria massif.

around the midrib, column a darker bluish-green, basal part of keel usually purple, becoming green towards appendage, callus exterior pale blue, margins and filiform appendages more darkly so, callus dorsal appendage invariably deep purple. Labellum immobile, flat, shortly oblong-obovate, unlobed, up to 1.35 cm long, 1.1 cm wide, glabrous, margins minutely to obviously erose-serrulate, rarely scalloped, apex slightly retuse, in some blooms with an apiculate tip. Callus broad, porrect, 2.8–3.2 mm long, ca. 1.6–1.9 mm wide at base, cuneate, basally fused to column for ca. 1/5 its length, dorsal appendage running from midpoint to apex, glossy purple, lingulate, ovate-applanate, 0.35–0.55 mm wide, deflexed apex narrowly obtuse, callus lateral margins with pronounced filiform appendages at widest point, ca. 0.5 mm long, though highly inconsistent in terms of degree, the callus may be 3-lobed, the aliform lateral lobes being more or less appressed to the labellum and deeply cut, hyaline, to 0.8 mm long, if fully developed always terminating at boundary between white patch and oblong purple flush of colour on labellum. Column narrow, ca. 3–5.45 mm long, ca. 0.2–0.4 mm wide, straight for ca. 3/4 of its length, then variably decurved, basal 2/3 with a ventral keel, terminating in a large dactyliform appendage, 0.5–0.8 mm long, column apex clavate, rostellum unknown. Anther-cap bluish white, cucullate, broadly elliptic, notched. Anther bilocular, pollinia 4, waxy, ovoid, white (observed prior to maturation). Capsule narrowly ovate, 6–14 mm long, ca. 5–6 mm in diameter, 6-ribbed.

Conservation status: This species is known from three small populations of just 1–2 individuals each. Direct observations satisfy the IUCN Red List Criteria B2ac(iv);D (IUCN, 2001) as CR (Critically Endangered). Despite numerous visits with successful sightings of its sister taxon, *Stigmatodactylus dalagangpalawanicum*, *S. aquamarinus* has not yet been observed at the same location more than once.

Distribution and Ecology: Growing terrestrially in moss pads overlying matted tree roots or steeply inclined ultramafic rock, generally occurring singly beneath closed canopy forest of upper montane trees 4–6 m tall or climbing bamboo; or in ultramafic rubble in open summit scrub, sheltered by large boulders. The known populations of *Stigmatodactylus aquamarinus* occur between 1430–1680 m.

Phenology: Plants and inflorescences bearing flowers observed in October, November and December, during the latter part of the wet season. Vegetative parts have been notably absent at other times of year, and the recurrence of plants at the same site in consecutive years has yet to be documented. This may suggest ephemeral colonisation of suitable sites, but data are too scant to be conclusive.

Etymology: The specific epithet, *aquamarinus*, is derived from the Latin *aqua* (water) and *marinus* (of the sea) = aquamarine, a reference to the unusual bluish to turquoise colour of the petals and sepals.

With the publication of *Stigmatodactylus aquamarinus* and *S. dalagangpalawanicum*, the total number of recognised *Stigmatodactylus* species now stands at thirteen. We place these in two groups that broadly reflect the species' geographic ranges. The groups are summarised in Table 1.

TABLE 1. The currently recognised species of *Stigmatodactylus* and distributions.

Species	Distribution
Indomalayan Group	
Stigmatodactylus aquamarinus A.S.Rob. & E.Gironella	Palawan (Philippines)
Stigmatodactylus dalagangpalawanicum A.S.Rob.	Palawan (Philippines)
Stigmatodactylus javanicus Schlechter & Smith (1905: 50)	Java (Indonesia)
Stigmatodactylus lamrii (Wood & Chan 1993: 274) Jones & Clements in Jones *et al.* (2002: 441)	Sabah (Malaysian Borneo)
Stigmatodactylus paradoxus (Prain 1896: 107) Schlechter (1911: 4)	Sikkim (India)
Stigmatodactylus richardianum P.T.Ong	Peninsular Malaysia
Stigmatodactylus serratus (Deori 1979: 175) Rao (1987: 255)	Assam (India)
Stigmatodactylus sikokianus Maxim. ex Makino (1891: 81)	S. Japan, S. Hunan, N. Fujian & Taiwan (China)
Papuasian Group	
Stigmatodactylus celebicus Schlechter (1911: 4)	Sulawesi (Indonesia)
Stigmatodactylus croftianus (Kores 1991:168) Kores (1992: 212)	New Guinea
Stigmatodactylus gibbsiae (Kores 1991:166) Kores (1992: 212)	New Guinea
Stigmatodactylus variegatus (Kores 1991:171) Kores (1992: 212)	New Guinea
Stigmatodactylus vulcanicus (Schodde 1967: 403) Maekawa (1971: 22)	New Guinea, Solomon Islands, Bougainville

New records

A new record for Palawan of an already described species of *Cryptostylis* is here documented. The majority of the approximately 24 previously described species of *Cryptostylis* are restricted to New Guinea, the apparent centre of diversity for this genus, with five also known from Australia and seven from western Malesia, Thailand and Taiwan, four of which occur in the Philippines but are not endemic (WCSP 2015). *Cryptostylis taiwaniana* Masamune (1933: 208) has been recorded from Sibuyan Island (pers. obs. 2007), Leyte and Mindanao (Melanie Schori, pers. obs. 2006), *Cryptostylis carinata* Smith (1912: 134) from Mindoro (O'Byrne & Schneider 2015), *Cryptostylis acutata* Smith (1921: 243) from Luzon and Mindanao (pers. obs., Pelser *et al.* 2011) and *Cryptostylis arachnites* (Blume 1859: 133) Hasskarl (1844: 8) from various islands across the Philippine Archipelago (Leonardo Co pers. com., pers. obs., Pelser *et al.* 2011).

Cryptostylis carinata is here recorded for the first time from Palawan. The species was first observed *in situ* by the authors in the mountains surrounding the Iwahig Penal Colony in 2012, where plants grew on a rotten log above ultramafic substrate at 950 m, flowering in June. Subsequent observations were made from Cleopatra's Needle (Kurt Tan pers. com. 2014), where plants were observed in a thin moss-humus layer growing directly on an inclined sandstone escarpment; and finally by the authors in the northernmost part of the Victoria Massif (2015), where plants grew at 1459 m in an upland swamp overlying ultramafic rock, primarily in sedges (*Cyperaceae*) and wetland grasses alongside the carnivorous sundew *Drosera ultramafica* Fleischmann, Robinson & McPherson (2011: 11). Formal identification was confirmed by Peter O'Byrne, who recently published the first record of this taxon on Mindoro, Philippines, also the first record made of *C. carinata* outside of New Guinea (O'Byrne & Schneider, 2015) and the first publication to document the species photographically. The Palawan plants are morphologically in agreement with the original description but differ in certain respects, the flowers being ca. 20% smaller and often orientated horizontally, the auriculate lobes at the base of the labellum less well developed than those of the type, with minor differences in the shape of the clinandrium and rostellum, the inflorescence ca. 30% longer and the leaves broader. Since the separation of taxa within *Cryptostylis* on the grounds of ecotypic variation is poorly characterised, it is felt that there are insufficient grounds for elevating this taxon to species rank. This species is fully illustrated here to facilitate the future identification of any additional populations (Figs. 5–7). In common with the Mindoro material, these plants are essentially terrestrial but may grow off the ground in moss mats on tree trunks and rocks.

Other specimens examined:A previously uncatalogued herbarium specimen was identified and confirmed as *Cryptostylis carinata* by the second author: Palawan, Thumb Peak, growing as an epiphyte close to the ground in moss on logs in montane Myrtaceae forest, flowering in July, *JC005* (PPC!).

Discussion: The two genera addressed in this paper are congruent across much of their respective ranges (Pridgeon *et al.* 1999, 2001, 2003, eMonocot 2015), differing mainly in their centres of species diversity; *Cryptostylis* is predominantly Austro-Papuasian, whereas the understudied *Stigmatodactylus*, although decidedly patchy in its distribution, has two apparent lineages centred around the Papuasian and eastern Indomalayan regions (Ong & Tan 2015). As such, the new records for Palawan documented here are not entirely unexpected; the two genera are represented on neighbouring Borneo and, in the case of *Cryptostylis*, also in the Philippines, although the nearest congeners of *C. carinata* are of Papuan origin.

Palawan demonstrates biological elements from both the Sunda Shelf and Philippine ecoregions but has closer phytogeographical affinities with Borneo than to the rest of the Philippines (Heaney 1985, Davis *et al.* 1995, Wikramanayake *et al.* 2001). This is because the island, which was uplifted above the sea just 5–10 million years ago as a result of rapid geological processes that also gave rise to the Crocker Range on Borneo, including Mount Kinabalu (Collenette 1964, Hall 2002), has never been connected to the Philippine Archipelago. As such, a significant proportion of Palawan's floral and faunal colonisation is believed to have taken place via Borneo during geologically recent glacial maxima, such as during the late Pleistocene, when the two islands are reasoned to have been linked for thousands of years by land bridges (Huxley 1868, Hall 1998, Voris 2000, Sathiamurthy & Voris 2006), but with significant vicariance events of Philippine-derived lineages also taking place (Atkins *et al.* 2000).

In common with Sabah, where ultramafic outcrops are extensive (3500 km^2, or 4.6% of total landmass; van der Ent *et al.* 2015), a great proportion of the Palawan montane flora occurs on ultramafic peaks, which comprise the majority of the island's upland areas. Given the strong selection pressures exerted on plant life by the adverse chemical properties of ultramafic soils, rates of endemism are high (Brooks 1987, van der Ent *et al.* 2014). It is therefore of no surprise that inferred patterns of colonisation from Bornean-derived lineages continue to be supported by the observation of new and endemic taxa of Palawan, in this case predominantly ultramafic-growing orchid taxa with

FIGURE 5. *Cryptostylis carinata* drawn from *in situ* observations. A. Flowering plant; B. Ventral view of labellum; C. Flowers from side; D. Oblique view of labellum from front; E. Leaf. Drawing by A.S. Robinson.

FIGURE 6. *Cryptostylis carinata* growing in moss on a rotting tree trunk.

FIGURE 7. *Cryptostylis carinata* flower showing base of labellum and anthers.

ultramafic-associated congeners in Borneo and elsewhere in the Sunda Region. The development of such specialised, ultramafic 'eccentric endemics' (species with sister taxa that occur on other mountains outside of a given region, often characterised by high dispersal capacities; Merckx *et al.* 2015), certainly seems most likely to have stemmed from the arrival of ultramafic-specialised propagules from adjacent regions; colonisation by such pre-adapted taxa would clearly account for the low number of endemic genera and high species endemism seen in Palawan, a situation for which robust phylogenetic analyses will be able to provide much needed data. Despite a dearth of research endeavours there, increasing numbers of endemic species are being described from the unprotected Mount Victoria Massif, clearly underscoring its value and the urgency of implementing conservation measures in the region.

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