

VACCINIUM HAMIGUITANENSE (ERICACEAE),
A NEW SPECIES FROM THE PHILIPPINES

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ABSTRACT

Vaccinium hamiguitanense, a new species from the Philippines, is described and illustrated. The new species is most similar to *V. gitingense* Hook. f. but differs by having smaller leaf blades, leaf blade margins with 2 to 4 impressed more or less evenly distributed crenations (glands) per side, inflorescences with fewer flowers, shorter pedicels that are puberulent and muriculate, and a glabrous floral disk. The new species is endemic to Mt. Hamiguitan Range Wildlife Sanctuary in Davao Oriental Province of Mindanao Island in Tropical Upper Montane Rain Forest and low ("bonsai") forest on clay derived from ultramafic rock. We assign an IUCN Red List preliminary status as Data Deficient.

ABSTRAK

Inilalarawan sa ulat na ito ang isang bagong species ng halaman mula sa Pilipinas, ang **Vaccinium hamiguitanense**. Kahawig ng bagong species ang *V. gitingense* Hook f., ngunit mas maliit ang mga dahon, bawat isa ay may 2 hanggang 4 na kapansin-pansin at halos pantay-pantay na mga umbok sa parehong gilid (mga glandula), mas kakaunti ang bulaklak kada kumpol, bawat isa ay mas maikli ang tangkay na pinalilibutan ng maliliit ngunit magaspang na buhok, at ang floral disk ay makinis. Ang bagong species ay matatagpuan lamang sa Mt. Hamiguitan Range Wildlife Sanctuary sa lalawigan ng Davao Oriental, isla ng Mindanao, partikular sa matataas na bahagi ng kagubatan at sa kagubatang "bonsai," kung saan ang lupa ay luwad at hango sa batong ultramafic. Binibigyan namin ng paunang status na Data Deficient ang bagong species sa IUCN Red List.

KEY WORDS: Endemic, IUCN Red List, Mindanao, new species, Philippines, *Vaccinium*

INTRODUCTION

The genus *Vaccinium* L. (Ericaceae: Vaccinoideae: Vaccinieae) comprises ca. 450–500 species distributed among all continents except Australia and Antarctica, with its center of diversity in Malesia (Sleumer 1966–1967; Fang & Stevens 2005; Vander Kloet & Dickinson 2009; Argent 2014). The taxonomic limits of the genus are still uncertain, with one treatment provisionally placing most of the Malesian species of *Vaccinium* in an expanded concept of *Agapetes*, rendering *Vaccinium* as comprising ca. 140 species (Stevens et al. 2004), and another segregating the mainly Bornean genus *Rigiolepis* (Hook. f.) Sleumer of ca. 23 species from *Vaccinium* (Argent 2019). DNA sequence data strongly suggest that the genus is highly para- or polyphyletic (Kron et al. 2002), but much more data will be needed to resolve the classification of *Vaccinium* and the Vaccinieae (Stevens et al. 2004). For the purpose of the present study, we follow the circumscription of *Vaccinium* as presented in Sleumer (1966–1967) and Vander Kloet & Dickinson (2009).

The two most comprehensive taxonomic treatments of *Vaccinium* for the Philippines are those of Copeland (1930) and Sleumer (1966–1967). Copeland's work focused specifically on the Philippines, whereas

Sleumer's more up-to-date work was part of the treatment of the genus for all of Malesia. As based on these publications and more recent species discoveries (Co et al. 2002; Salares et al. 2018), there are 34 species of *Vaccinium* currently recognized in the Philippines, 31 of which are endemic (Argent 2008; Pelser et al. 2011 onwards).

During field work in June of 2015 and 2019 in Mt. Hamiguitan Range Wildlife Sanctuary in Davao Oriental, Mindanao Island, Philippines, the authors encountered a species of *Vaccinium* that did not key out in the species keys of Copeland (1930) and Sleumer (1966–1967) and matched none of the descriptions in these works. On further morphological comparison of our collections with type material of Malesian *Vaccinium* at JSTOR Global Plants (<https://plants.jstor.org>), herbarium specimens at BRIT, CAS, and CMUH, and images of *in situ* plants online, we concluded that the species is new to science. The new species status is also supported by a photograph of a plant on PhytoImages (Nickrent et al. 2006 onwards) taken at Mt. Hamiguitan by L. Co in 2011 labeled “*Vaccinium* plant7” but which is clearly this species. It is described and illustrated below.

TAXONOMIC TREATMENT

***Vaccinium hamiguitanense* P.W. Fritsch, sp. nov. (Figs. 1–2).** TYPE: PHILIPPINES, MINDANAO ISLAND, Davao Oriental: Municipality of San Isidro, Barangay La Union, Mt. Hamiguitan Range Wildlife Sanctuary, between second Lantawan and pygmy forest, at the peak, 1641 m, 6.73998°N, 126.1821°E, 23 Jun 2015 (fl), P.W. Fritsch 2027 (HOLOTYPE: PNH!; ISOTYPES: BRIT554024!, CAS490410!, CMUH!).

Haec species *Vaccinio gitingensi* Elmer simillima, sed ab eo foliis parvioribus ad margine crenulatis, floribus inflorescentiae paucioribus, pedicellis brevioribus puberulis muriculatis, disco glabro differt.

Shrubs, terrestrial, evergreen to 1.5 m tall, densely branched. Branchlets with white, erect, straight trichomes to 0.14 mm long, mature branchlets dark maroon, slightly compressed and often ridged, 0.5–0.9 mm thick, not lenticellate, outer surface grayish, peeling on older branchlets; perennating buds compressed-ovoid, to 0.8 mm long, with several obscurely overlapping scales. Leaves persistent on older branchlets, densely crowded, spirally arranged; petiole *in vivo* green or often red, 1.2–1.8 mm × 0.5–0.6 mm, 1.8–2.6 times as long as wide, with white erect straight trichomes to 0.14 mm long, glabrescent on leaves of old branchlets, in cross-section abaxially rounded, adaxially nearly flat; leaf blade elliptic or slightly obovate, larger leaves on each branchlet 8.8–16.0 × 4.0–6.5 mm, coriaceous, both surfaces bright pink when young, glabrous except occasionally puberulent at base, smooth, abaxial surface without punctae, light green *in vivo*, light brown *in sicco*, adaxial surface green *in vivo*, dark brown *in sicco*, base cuneate, margin crenulate by 2 to 4 impressed more or less evenly distributed crenations (glands) per side, thinly recurved, apex obtuse to rounded, often emarginate, the very tip with a gland and often a few cilia, impressed marginal glands 2 to 4 per side, scattered along length of margin, ca. 0.14 mm diam., midvein slightly raised abaxially, planar or sulcate adaxially, secondary veins 1 to 4 on each side of midvein, the first one or two pairs arising from the base, the remainder along the midvein, arc-ascending, slightly raised or obscure abaxially, obscure adaxially, tertiary veins faintly evident or obscure. Inflorescences axillary or usually pseudoterminal, racemose and developing beyond confines of perennating bud, 1 per axil, ca. 1.6 cm long at anthesis, (2-) 4- to 6-flowered; rachis white-puberulent and occasionally scattered orange-muriculate with glandular trichomes up to 0.06 mm long; bracts subtending pedicels ± foliaceous, persistent, greenish and often flushed red *in vivo*, brown *in sicco*, narrowly elliptic to suborbicular, planar or occasionally cucullate, 5.9–8.3 × 3.5–4.0 mm, coriaceous, margin entire or crenulate by 1 or 2 impressed crenations (glands) per side, apex obtuse to subrounded or slightly emarginate, often with a few cilia at very tip. Flowers articulated at junction with pedicel, 6–7 mm long. Pedicel nodding, 2.5–3.5 × 0.5–0.6 mm at anthesis, white-puberulent and orange-muriculate; bracteoles caducous, 2, borne at base of pedicel, narrowly deltoid to oblong, planar or nearly so, 0.14–0.54 mm long, puberulent, margin entire, apex sharply acute. Hypanthium green or flushed pale red and shining *in vivo*, cupuliform, 1.1–1.2 × 1.9–2.4 mm, glabrous or scattered white-puberulent; calyx limb 1.1–1.3 mm long, glabrous; calyx lobes broadly deltoid, 0.5–0.6 mm long, glabrous both sides, margin ciliate on upper half, eglandular, apex acute, the very tip eglandular or with a small gland. Corolla in bud closed and strongly 5-ribbed in line with petal midveins, at anthesis gamopetalous for ca. 1/3 of total length, white, broadly urceolate, 4.6–5.0 × ca. 2.6 mm, outside glabrous except on lobes, inside glabrous;

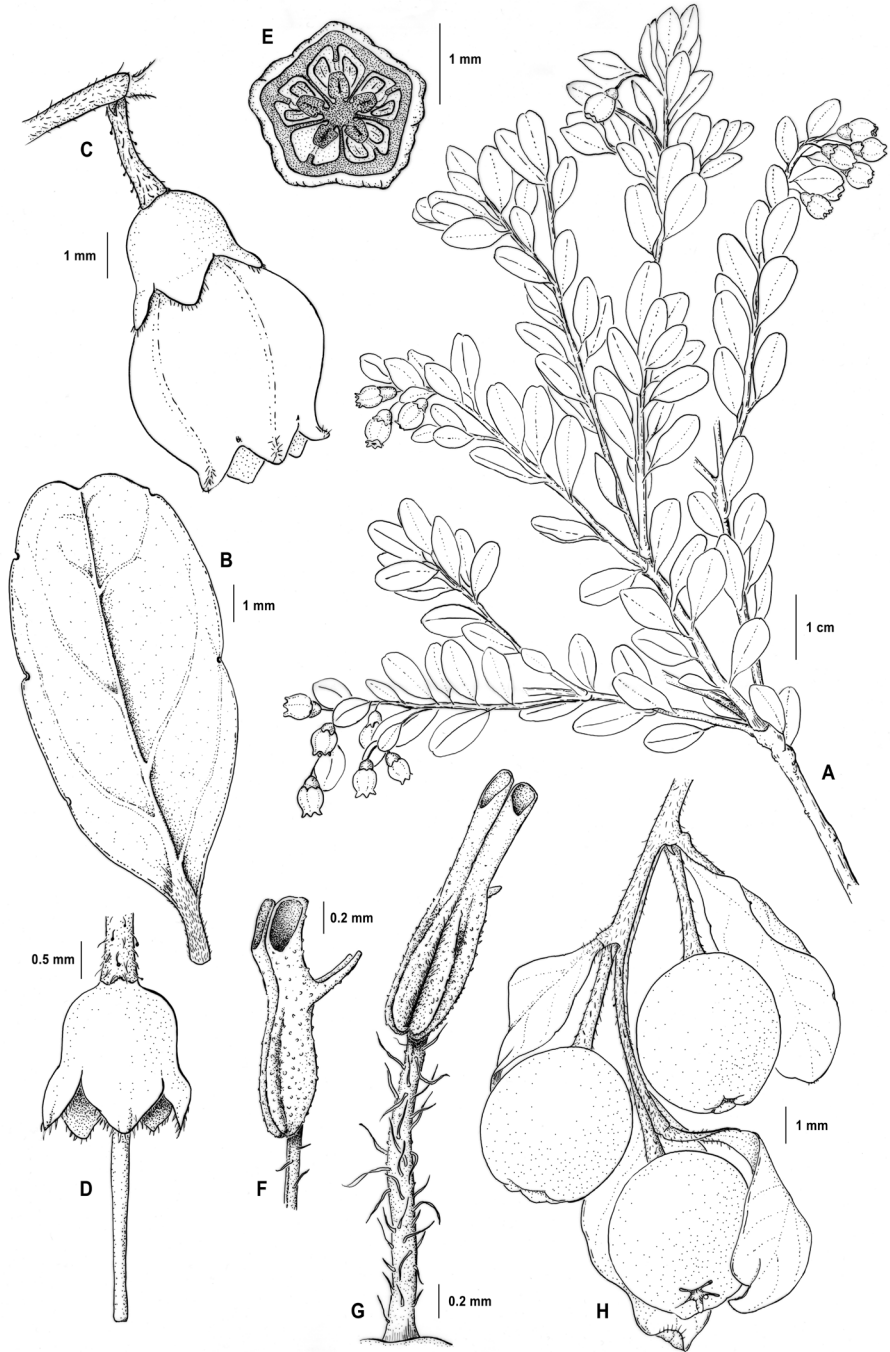


FIG. 1. *Vaccinium hamiguitanense*. A. Flowering branchlet. B. Leaf, abaxial view. C. Pedicel and flower. D. Distal portion of pedicel, hypanthium, calyx, and style. E. Ovary in cross section showing axile placentation and five locules, each locule with incomplete false partition emanating from ovary wall and two locules shown in each of four of the locules. F. Distal portion of filament, and anther, oblique-lateral view. G. Stamen, ventral view. H. Infructescence showing bracts, bracteoles, and fruit. A foliaceous bract subtends each pedicel, and the bracteoles can be seen as minute narrowly deltoid structures at the bases of the two proximal pedicels. A–G based on P.W. Fritsch 2027 (BRIT, CAS) and images of the living plants; H based on P.W. Fritsch 1984 (BRIT, CAS) and images of the living plants. Illustration by Samantha Peters.

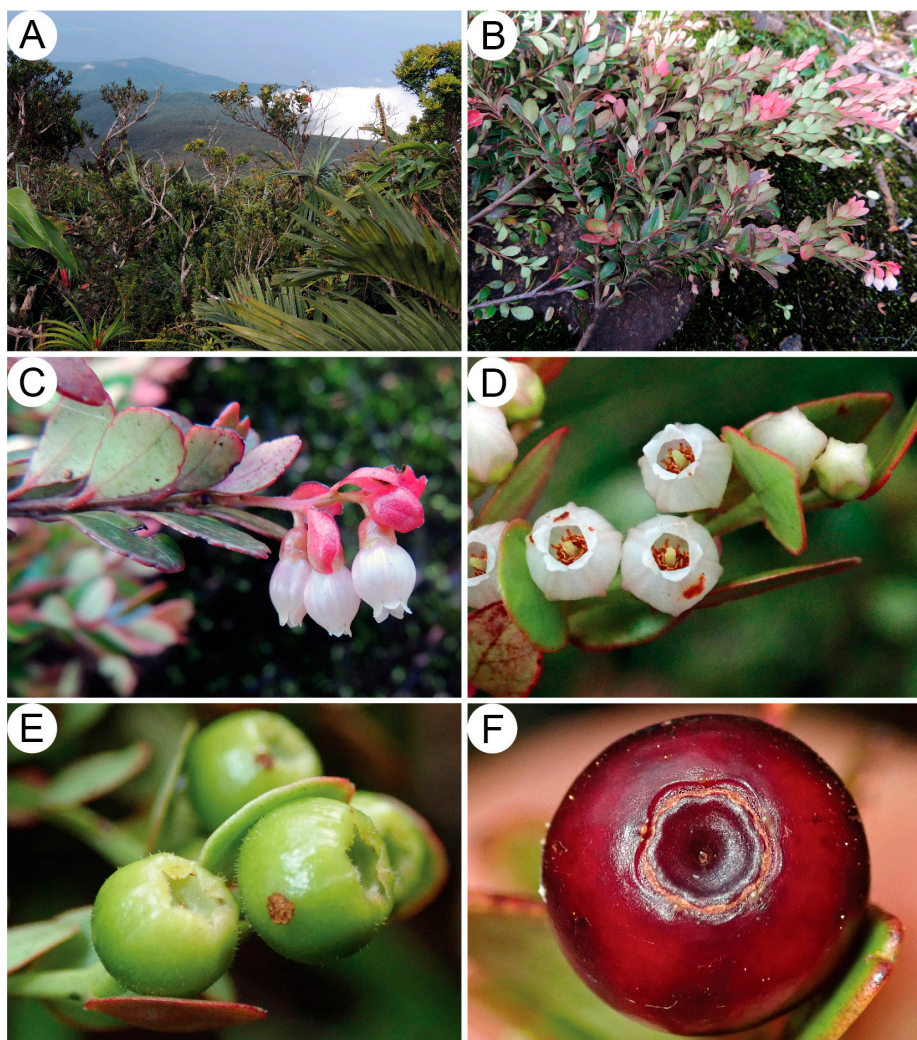


FIG. 2. Images of living *Vaccinium hamiguitanense* and its habitat. **A.** Habitat at peak of Mt. Hamiguitan of low ("bonsai") forest. **B.** Habit with leaves predominantly in abaxial view. **C.** Branchlet with inflorescence. **D.** Inflorescence with flowers in bud and (in apical view) at anthesis. **E.** Immature fruit with persistent bracts. **F.** Submature fruit, apical view. Note small glands at apex of appressed persistent calyx lobes. B, C, P.W. Fritsch 2027; photographs by P.W. Fritsch. D–F, *Plants and Lichens of the Southern Philippines Survey 725*; photographs by J.G. Opiso.

corolla lobes 5, ovate, ca. 1.0×0.5 mm, white-setose abaxially on midvein, apex obtuse. Stamens 10, monomorphic, distinct from each other, 2.8–3.5 mm long; filaments linear, 1.9–2.0 mm, white-villous on all sides, also sparsely echinulate in lines, with trichomes to 0.34 mm long; anthers 1.2–1.9 mm long, anther cells echinulate, 0.7–1.0 mm long, tubules parallel, broadly cylindric, 0.6–0.8 mm long, about as wide as cells, opening by oblique ventrally oriented apical pores, pore apex rounded, spurs slightly upcurved, 0.2–0.4 mm long. Ovary 5-locular but appearing somewhat pseudo-10-locular with false partitions extending ca. 0.16–0.20 mm from inner wall; ovules in two columns per locule, each column separated by false partition; disk glabrous; style not exserted from corolla, 3.5–4.0 mm long, glabrous. Infructescence with persistent bracts (persisting even after mature fruit is gone), bracts planar or slightly cucullate, often incurved and touching fruit; fruit pseudo-10-locular, *in vivo* turning burgundy and then dark purple to black at maturity, subglobose, $3.8\text{--}8.0 \times 4.0\text{--}7$

mm, glabrous or sparsely puberulent, persistent calyx lobes incurved and appressed to disk, lobe apex with a small gland; disk ca. 2 mm in diameter, glabrous.

Etymology.—The specific epithet refers to Mt. Hamiguitan, to which the species is endemic.

Distribution, Habitat, and Phenology.—The new species is endemic to Mt. Hamiguitan Range Wildlife Sanctuary in Davao Oriental Province of Mindanao Island. It is known from Tropical Upper Montane Rain Forest and “bonsai” forest (i.e., predominant vegetation of densely crowned sclerophyllous trees and shrubs of low stature) on ridges and at the peak of Mt. Hamiguitan at 1081–1641 m elevation. It is common, growing at least in part in clay derived from ultramafic bedrock. The species is known to flower and fruit in June.

Additional specimens examined (Paratypes).—**PHILIPPINES.** MINDANAO ISLAND. **Davao Oriental:** Municipality of San Isidro, Barangay La Union, Mt. Hamiguitan Range Wildlife Sanctuary, between second Lantawan and pygmy forest, 1201 m, 6.73069°N, 126.1795°E, 22 Jun 2015 (fr), P.W. Fritsch 1984 (BRIT554026!, CAS490408!, CMUH!, PNH!); *ibid.*, along “Superferry Trail,” 1081 m, 6.72857°N, 126.17730°E, 17 Jun 2019 (fl, fr), *Plants and Lichens of the Southern Philippines Survey* 725 (BRIT!, CMUH!, PNH!).

Conservation Assessment.—Because *Vaccinium hamiguitanense* has been collected from only a single locality, we categorize it as Data Deficient (DD) in accordance with the IUCN Red List Criteria (IUCN Standards and Petitions Subcommittee 2019). However, the collections made of the species have all been from within the boundaries of Mt. Hamiguitan Range Wildlife Range Sanctuary and this taxon has been afforded protection. It is a common species along the trails traversed by the authors at the elevations within which it grows, with at least 100 individuals seen.

Discussion.—*Vaccinium hamiguitanense* can be placed in *V. sect. Bracteata* Nakai sensu Sleumer (1966–1967) by its multi-flowered racemes, calyx lobes shorter than the hypanthium, corolla consisting of one homogeneous layer without a membranaceous wing at the sinuses, and anther tubules opening by short introrse pores. The sectional classification of *Vaccinium* has been revised by Vander Kloet and Dickinson (2009), with *V. sect. Bracteata* divided into several smaller sections. Using the key in their treatment, one can place the new species in *V. sect. Euepignyum* Schltr. by its perennating buds being monomorphic, one per leaf axil, and covered by > 2 scales; leaves persisting > 18 months and having palmate venation; inflorescence rachis being robust and bracteate; hypanthium being fused to the ovary; and ovary being pseudo-10-locular, the disk being scarcely if at all visible when in ripe fruit.

In the key to the Malesian species of *Vaccinium* sect. *Bracteata* in Sleumer (1966–1967), the new species would fall within lead 1 of couplet 1: subtending bract of each flower conspicuous, ± foliaceous, persisting for some time during anthesis, mostly so to the fruiting stage, and lead 1 of couplet 2: leaves manifestly cren(ul)ate or cren(ul)ate-serrate all along the margin. Under lead 1 of couplet 2, the species keys best to *V. gitingense* Elmer by its calyx lobes not being callose-thickened at the apex and lacking any apical or marginal glands (although some of the lobes can have a faint gland). However, the new species is distinguishable from *V. gitingense* by having smaller leaf blades (8.8–16 × 4.0–6.5 mm versus 15–35 × 8–15 mm), crenulate leaf blade margins (versus crenulate-serrulate), inflorescences 3- to 5-flowered (versus 5- to 10-flowered), pedicels 2.5–3.5 mm long at anthesis (versus 7–15 mm), pedicels puberulent and muriculate (versus glabrous), and a glabrous disk (versus pubescent). Under lead 2 of couplet 2, the species keys best to lead 1 of couplet 29 by having glabrous leaves 0.8–1.5 × 0.4–1 cm, calyx lobes not callose-thickened at the apex and lacking glands (although some of the lobes can have a faint gland), anther tubules as long as and as wide as the cells, and anthers with 2 spurs. However, it fits neither of the taxa under this lead (*V. scortechinii* King & Gamble and *V. miquelii* Boerl. var. *miquelii*) because they both have leaf blades with entire margins except for one pair of marginal glands within the lower third. The new species can be further distinguished from *V. scortechinii* by leaves abaxially without punctae (versus with punctae), hypanthium glabrous (versus pubescent), and corolla glabrous (versus densely pubescent on both sides). It can be further distinguished from *V. miquelii* var. *miquelii* by its leaves abaxially without punctae (versus with punctae), inflorescences 3- to 5-flowered (versus 10- to 20-flowered), hypanthium glabrous (versus pubescent), corolla glabrous inside (versus pubescent), and disk glabrous (versus pubescent).

In the key to Bornean species of *Vaccinium* in Argent (2019), the new species keys to *V. coriaceum* Hook. f. by its leaf blades < 20 mm long and 15 mm wide, leaf margins with at least a pair of glands (crenations of Sleumer 1966–1967), and inflorescence > 3-flowered. However, the new species is easily distinguished from *V. coriaceum* (var. *coriaceum* sensu Argent 2019) by its inflorescences 3- to 5-flowered (versus > 5-flowered), pedicels muriculate (versus not muriculate), anthers without gland-tipped trichomes (versus with gland-tipped trichomes), anther tubules about as wide as the cells (versus much narrower than the cells), anther pores obliquely cut (versus transversely cut), and disk glabrous (versus pubescent).

In the artificial key to the species of Philippine *Vaccinium* (Copeland 1930), the new species would key to *V. myrtoides* Miq. by the following characters: leaves < 3 cm long, flowers in racemes, racemes with a foliaceous bract subtending each pedicel, and pedicels 1 cm long or less, not longer than the flowers. The new species is easily distinguished from *V. myrtoides*, however, by its leaf margins crenulate by 2 to 4 impressed more or less evenly distributed glands (crenations of Sleumer 1966–1967) per side (versus 1 or 2 impressed glands in the lower third); inflorescences 3- to 5-flowered (versus 4- to 12-flowered); pedicels 2.5–3.5 mm long (versus 0.5–1.4 mm), muriculate (versus not muriculate); anthers with spurs (versus without); and disk glabrous (versus pubescent).

Vaccinium hamiguitanense is similar to plants from Dinagat Island, Province of Loreto, Cambinliw-Redondo Bonsai Forest, 10°21'10.20"N, 125°38'02.08"E, 24 Nov 2014, documented with photographic images by P.B. Pelser & J.F. Barcelona as displayed on Co's Digital Flora of the Philippines (Pelser et al. 2011 onwards) as "*Vaccinium* plant3." Although the images are lacking flowers, the fruiting branches are similar to the new species in their densely crowded small elliptic leaves with 2 to 4 marginal impressed crenations (glands) per side. These plants appear to differ from those from Mt. Hamiguitan at least by their apparently single-flowered inflorescences (which may place them in *V. sect. Oarianthe* Schltr.), persistent and much larger bracteoles (up to ca. 8 mm long), and puberulent hypanthium/fruit. The Dinagat plants may represent another undescribed species but apparently have yet to be collected in flower.

The discovery of this new species brings the number of currently recognized species of *Vaccinium* in the Philippines to 35. A key to Philippine *Vaccinium* species that updates the keys of Copeland (1930) and Sleumer (1966–1967) is needed (Argent 2008). Field observations suggest that there are still new species in the genus to be discovered and described (Pelser et al. 2011 onwards; Fritsch et al. 2016), and the species need assessment as to sectional classification based on morphological and DNA sequence evidence.

The new species is endemic to Mount Hamiguitan Range Wildlife Sanctuary. The only other species of *Vaccinium* documented from this range are *V. cf. barandatum* S. Vidal, endemic to the Philippines (24 June 2015, P.W. Fritsch 2048, sterile, BRIT!, CAS!, CMU!, PNH!) and *V. gitingense* Elmer, endemic to the islands of Mindanao and Dinagat in the Philippines (24 June 2015, P.W. Fritsch 2043, flower, fruit, BRIT!, CAS!, CMU!, PNH!). The Mount Hamiguitan Range Wildlife Sanctuary covers 6,834 ha located between 6°40'N to 6°47'N and 126°09'E to 126°13'E. It is known for its unique characteristics and the largest "bonsai" forest in the Philippines. The substrate in this forest type is derived from ultramafic bedrock, with high concentrations of iron and magnesium (Amoroso et al. 2009). Perhaps because of this unusual forest type and the general isolation of the range on a narrow peninsula, species endemism is high in the range, with 163 endemic species of vascular plants documented in 2009 (Amoroso et al. 2009) and with several new endemic species discovered since (e.g., McPherson 2010; Karger et al. 2012; Naive 2017). With much of the area still unexplored botanically, more plant species new to science are expected to be discovered in the coming years.

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