

NOTES ON VACCINIUM AND AGAPETES (ERICACEAE)
IN SOUTHEAST ASIA

P. F. STEVENS

AGAPETES D. Don ex G. Don subg. *Agapetes* and a number of sections of *Vaccinium* L. from mainland Southeast Asia, especially sects. *Galeopetalum* J. J. Smith, *Aëthopus* Airy Shaw, *Epigynium* (Klotzsch) Hooker f., and *Conchophyllum* Sleumer, are clearly closely related in a number of morphological and anatomical features. *Agapetes* and *Vaccinium* can be distinguished, albeit very unsatisfactorily, mainly by inflorescence and flower size (Stevens, 1972; *Agapetes* subg. *Paphia* (Seemann) P. F. Stevens is not immediately related). *Agapetes* subg. *Agapetes* usually has inflorescences with fewer than 15 flowers; the flowers sometimes have wings on the calyx and corolla, or sometimes on only one of these; and the corolla is usually tubular, more than 1 cm long, and with thick walls. *Vaccinium* species of the Southeast Asian mainland ordinarily have inflorescences with more than ten flowers; the flowers are generally un-winged; and the corolla is usually urceolate, less than 1 cm long, and with thinner walls.

During identification of material of the two genera, a number of previously undescribed or imperfectly known taxa of *Vaccinium* and *Agapetes* from the northwestern India–Burma–Vietnam–southern China area were found; these are described below. Huang (1983) has recently treated the genus *Agapetes* in Yunnan in considerable detail, and Fang and Pan (1981) described a number of new taxa of *Vaccinium* from China. Their findings are integrated with those presented here. Additional notes, mostly range extensions, are also given for a few species.

Since the distinction between *Vaccinium* sect. *Epigynium* and *Agapetes* subg. *Agapetes* ser. *Robustae* Airy Shaw subser. *Chartacea* Airy Shaw is rather slight and new taxa are described in both groups, a combined key to all the taxa recognized in these two groups is also presented.

The various taxa discussed are dealt with alphabetically by genus, section or series and subseries, and species. Full literature citations to species previously described are not given, but reference is made to the basionym and to a work where pertinent literature is traceable; overlooked or subsequent literature is also cited where necessary. In the descriptions “filament length” is the length by which the filament exceeds the anther. In all taxa described the receptacle-pedicel junction is articulated, and the fruit has a five-locular ovary with five inpushings of the ovary wall alternating with the five septae. All taxa also have a phellogen that is superficial in origin (i.e., arising just below the epidermis), and leaves that lack a hypodermis.

Four of the taxa discussed here, *Agapetes rubropedicellata*, *Vaccinium praeces*, *V. lamellatum*, and *V. brevipedicellatum* C. Y. Wu, combine the characteristics of the two genera in various ways. Two previously overlooked characters, unicellular hairs borne on epidermal papillae and mucilaginous seed coats, also occur in some of these taxa, as well as in some, but not all, species of both *Agapetes* subg. *Agapetes* and the related sections of *Vaccinium*; they are of limited distribution elsewhere in the Vaccinieae (both occur in South American taxa, which are not immediately related). Although it is becoming increasingly apparent that *Agapetes* subg. *Agapetes* is polyphyletic (as is discussed further), I have described species under that taxon below. Generic limits in tropical Vaccinieae as a whole are in considerable disarray, but we still need to know a great deal more about the basic variation in the tribe before radically rearranging these limits, as is needed.

PREVIOUSLY OVERLOOKED CHARACTERS USED IN CLASSIFICATION

INDUMENTUM

Many Vaccinieae have unicellular hairs and also multicellular, often glandular hairs with short to long stalks. Unicellular hairs are nearly always scattered evenly on a smooth epidermis, although in a few taxa (e.g., *Vaccinium didymanthum* Dunal, from South America, and *V. acuminatissimum* Miq., from Malesia) they may be aggregated around the bases of (or even borne on!) the multicellular glandular hairs. Some of the taxa described below have a minutely papillate epidermis, with the unicellular hairs borne singly or in small groups on the papillae.

The occurrence of hairs on the papillae can be considered a derived condition; they are known from only a few small-leaved species of *Agapetes* (e.g., *A. mannii* Hemsley, *A. forrestii* W. E. Evans) and many species of *Vaccinium* sect. *Conchophyllum*¹ in the Old World Vaccinieae. In the latter taxon these hairs occur in *V. manipurens* (Watt ex Brandis) Sleumer, which has the same flower type as *V. conchophyllum*, a species that lacks hairs on papillae. *Vaccinium triflorum* Rehder, a member of the section with the broader flowers, also has hairs borne in groups on papillae!

SEED TYPE

Variation in the structure of the seed has been almost completely neglected in tropical Vaccinieae. However, this has considerable systematic and ecological significance, as a survey in progress is showing.

¹As was shown earlier (Stevens, 1972), the species of *Vaccinium* sect. *Vitis-Idaea* (Moench) Koch endemic to Southeast Asia are dissimilar in details of anatomy and morphology from *V. vitis-idaea* L., the type species of the section. However, they agree in all these details with *V. conchophyllum* Rehder, the type of *Vaccinium* sect. *Conchophyllum*, and thus belong there. *Vaccinium* sect. *Conchophyllum* as so defined is rather heterogeneous, since the type species and the species transferred from sect. *Vitis-Idaea* have inflorescences borne near the ends of the twigs and have urceolate flowers, while the other members of the section (as delimited by Sleumer, 1941) have inflorescences often borne along the twigs and broader, urceolate-campanulate flowers.

The species described below as having a testa with thin-walled cells that become mucilaginous on wetting also have an embryo that dries a dark color; the embryo was probably green when living (Airy Shaw, 1968; Stevens, 1972). Although the walls of testa cells are thin (often ca. 3 μm thick or less), they have distinctive anastomosing bands of thickening running more or less down the long axes of the cells or sometimes slightly oblique to them. Between these thickened bands are elongated unthickened areas.

The more common testa type in the Vaccinieae also occurs in some of the species described here. The inner periclinal and anticlinal cell walls are much thickened; the thickenings sometimes almost obscure the cell lumen, being up to 30 μm wide on anticlinal walls. Unthickened areas are minute (less than 3 μm wide) and circular in surface view; they usually do not show any obvious patterning, although in a few taxa (but not in the ones discussed below) they may be in lines. The embryo is commonly, but not always, white. In both testa types the outer periclinal walls of the testa cells are very thin.

The mucilaginous seed is also probably a derived condition, although it has a rather wide distribution within the Vaccinieae. In Indo-Malesian Vaccinieae it is known only in several species of *Agapetes* and *Vaccinium* sects. *Aëthopus*, *Epigynium*, and *Rigiolepis* (Hooker f.) Sleumer (perhaps a modified type), and in some, but by no means all, species of sect. *Galeopetalum*, as well as in *V. piliferum* (Hooker f. ex C. B. Clarke) Sleumer, a species of uncertain affinity. It is also known in a number of Vaccinieae from South America, although the crustaceous testa frequently occurs there also; variation in South America may also be at the infrageneric level, despite the narrower generic limits adopted there.

SIGNIFICANCE OF CHARACTER-STATE VARIATION

The described pattern of variation in seed and epidermis is not congruent with the limits of *Vaccinium* and *Agapetes* as delimited here: some taxa of both genera have the derived character states. Other distinctive characters show the same pattern of distribution. Thus, pseudoverticillate leaves in the Vaccinieae occur in a number of the larger-leaved species of *Agapetes* and also in *Vaccinium* sect. *Epigynium*: expanded leaves separated by short internodes alternate with leaves reduced to scales and separated by long internodes. Such pseudoverticillate leaves can be considered a derived condition (cf. Sleumer, 1941); they are extremely uncommon elsewhere in the Vaccinieae. Characters such as the early development of lenticels and the presence of setular hairs or coarsely serrate leaf margins show a similar pattern of occurrence.

Many of these characters vary independently, and none occurs only in the group of species that has been called *Agapetes* subg. *Agapetes*, let alone in *Agapetes* sensu lato (including subg. *Paphia*—Stevens, 1972). *Agapetes* subg. *Agapetes* is still definable as only those Vaccinieae on mainland Southeast Asia that have large, thick-walled, often tubular corollas and few-flowered inflorescences. These characters are loosely functionally correlated: when flowers are large, one expects fewer of them in an inflorescence. In addition, distinguishing between *Agapetes* and *Vaccinium*—even using flower size—is becoming less easy, as is clear from the descriptions of the new taxa below.

Since many taxa with the distinctive character states discussed above are placed in different genera because of differences in flower size but are similar in other characteristics (see also Airy Shaw, 1935), the evidence very strongly suggests that large flowers are of polyphyletic origin in Southeast Asian *Vaccinieae*, and that *Agapetes* subg. *Agapetes* is a group that represents a grade or level of organization. As might be expected of such a group, its limits coincide only with the character used to circumscribe it, and it has little predictive value. This idea is more likely than the suggestion that characters of indumentum, seed, and leaf are all of polyphyletic origin within both *Agapetes* and *Vaccinium* and agrees with the notion that ornithophily is a factor of major significance in the evolution of montane tropical Ericaceae (Stevens, 1976, 1982).

KEY TO VACCINIUM SECT. EPIGYNIUM AND AGAPETES SUBG.
AGAPETES SER. ROBUSTAE SUBSER. CHARTACEA²

1. Leaves pseudovercillate, all fully developed leaves of an innovation separated by less than 1.5 cm.
 2. Lamina entire. *V. ardisioides* Hooker f.
 2. Lamina serrate or serrulate.
 3. Inflorescences corymbose/subumbellate; bracts at base of inflorescence inconspicuous, deciduous or not.
 4. Inflorescence axis, pedicels, and flowers pubescent. 10. *V. praeces*.
 4. Inflorescence axis, pedicels, and flowers glabrous.
 5. Lamina (10-)13-18 cm long; inflorescence axis 4-10 cm long, if less, with flowers along its length.
 6. Inflorescence axis 8-10 cm long; corolla urceolate, 6-7 mm long. *A. dispar* Airy Shaw.
 6. Inflorescence axis less than 5.5 cm long; corolla cylindrical, at least 1 cm long.
 7. Upper surface of lamina with raised venation; inflorescence axis 4-5.5 cm long; corolla ca. 1.2 cm long. ... 4. *A. rubropedicellata*.
 7. Upper surface of lamina with venation not raised; inflorescence axis less than 2.5 cm long; corolla ca. 2 cm long. *A. miniata* (Griffith) Hooker f.
 5. Lamina 4-10 cm long; inflorescence axis less than 2 cm long, with flowers congregated at end.
 8. Lamina coriaceous, with prominent continuous submarginal vein; ovary smooth. *V. bulleyanum* (Diels) Sleumer.
 8. Lamina chartaceous, continuous submarginal vein absent; ovary with 10 fleshy, longitudinal lamellae ("wings"). 8. *V. lamellatum*.
 3. Inflorescences long-racemose; bracts at base of inflorescence sometimes conspicuous and persistent.
 9. Lamina (7.5-)11-19 cm long; inflorescences prominently bracteate at base. *V. nuttallii* Sleumer.
 9. Lamina 3-10.5 cm long, if as large as in *V. nuttallii*, then inflorescences not prominently bracteate at base.
 10. Lamina 3-6 cm long, upper surface drying brownish green. 9. *V. leucobotrys*.
 10. Lamina 4-10.5 cm long, upper surface drying dark- or blackish-green.
 11. Lamina subcoriaceous, with lateral veins and midrib on upper surface impressed. *V. venosum* Wight.

²Only the taxa with numbers are treated in this account.

- 11. Lamina chartaceous, with lateral veins and midrib on upper surface slightly raised.
- 12. Lamina 3–4 cm wide, with lateral veins spreading at ca. 80° from midrib; pedicels ca. 2 mm long. *V. kingdon-wardii* Sleumer.
- 12. Lamina 1–2.5 cm wide, with lateral veins spreading at ca. 60–70(–80)° from midrib; pedicels (3.5–)5–12 mm long.
- 13. Corolla pubescent inside; petiole (1–)2–3(–4) mm long. 12a. *V. vacciniaceum* subsp. *vacciniaceum*.
- 13. Corolla glabrous inside; petiole 1–2 mm long. 12b. *V. vacciniaceum* subsp. *glabritubum*.
- 1. Leaves clearly separated by internodes, although often restricted to upper half of innovation.
- 14. Petiole ca. 2 mm long; lamina to 8(–15) cm long.
- 15. Lamina less than 5 cm long, base more or less cuneate; bracts at base of inflorescence inconspicuous. *V. scopulorum* W. W. Smith.
- 15. Lamina 4–8(–15) cm long, base rounded; bracts at base of inflorescence conspicuous, persistent. 11. *V. subdissitifolium*.
- 14. Petiole (4–)8–13 mm long; lamina usually over 8 cm long.
- 16. Stem pale and smooth, not obviously lenticellate; petiole 4–6 mm long; lamina coriaceous. *V. kachinense* Brandis.³
- 16. Stem dark, becoming clearly lenticellate; petiole at least 8 mm long; lamina chartaceous.
- 17. Corolla cylindrical, at least 12 mm long.
- 18. Corolla ca. 1.2 cm × ca. 1.5 mm; anthers shorter than filaments, with long hairs. *A. leptantha* Airy Shaw.
- 18. Corolla 1.4–2.5 cm × at least 3 mm; anthers much longer than filaments, glabrous. 3. *A. angulata*.
- 17. Corolla urceolate, up to 12 mm long.
- 19. Corolla 9–12 mm long; inflorescences from foliate axils. 7. *V. jacobeanum*.
- 19. Corolla 3–4 mm long; inflorescences from defoliate axils. *V. acuminatum* D. Don ex G. Don.

RANGE EXTENSIONS AND PREVIOUSLY UNDESCRIBED TAXA⁴

AGAPETES SER. LONGIFILES AIRY SHAW

1. *Agapetes inopinata* Airy Shaw, Kew Bull. **14**: 229. 1960.

Vaccinium glandulosissimum C. Y. Wu ex W. P. Fang & Z. H. Pan, Acta Phytotax. Sin. **19**: 109. 1981; *Agapetes glandulosissimum* (C. Y. Wu ex W. P. Fang & Z. H. Pan) S. H. Huang, Acta Bot. Yunn. **5**: 148. fig. 1. 1983. TYPE: China, Yunnan, Tsang-yuan [Cangyuan], 1600 m, C. W. Wang 73251 (holotype, PE; isotype, A!).

DISTRIBUTION. Burma and China (Yunnan).

Wang 73251 is the only collection of *Agapetes inopinata* known to me from China; the species was previously known only from Burma. *Wang 73251* agrees with the isotype specimen of *Agapetes inopinata* (*Kingdon-Ward 8788*, A!) very

³Despite its urceolate corollas and the facies of species in sect. *Epigynium*, *Vaccinium kachinense* is a member of sect. *Galeopetalum*; its relationships are unclear.

⁴Herbarium abbreviations follow those given in Holmgren, Keuken, and Schofield (1981).

well, although it has a slightly longer (to 1.3 cm, vs. ca. 9 mm in the type) corolla. In both specimens the glandular indumentum on the flowers and inflorescence is so dense (and presumably sticky) that the flowers tend to stick together.

2. ***Agapetes pensilis*** Airy Shaw, Bull. Misc. Inform. **1935**: 52. 1935; Hooker's Ic. Pl. **33**: t. 3256. 1935; S. H. Huang, Acta Bot. Yunn. **5**: 150. 1983. TYPE: Burma, Valley of the Seinghku, 2400–2700 m, 25.ix.1926, *Kingdon-Ward 7458* (holotype, K; isotypes, A!, K).

Agapetes dulongensis S. H. Huang, Acta Bot. Yunn. **5**: 150. 1983. TYPE: China, Yunnan, Taron-Taru Divide [Du-long-jiang], Lungnan [Gongshan], 2300 m, 28.viii.1938, *T. T. Yü 20038* (holotype, KUN; isotypes, A!, E!).

DISTRIBUTION. Burma and China (Yunnan).

Agapetes dulongensis is distinguished from *A. pensilis* by its smaller, ovate to suborbicular leaves that are described as being puberulent above and glandular-hirsute below. The leaf surface is bullate-rugulose, and the lateral nerves are obscure. In *A. pensilis* the leaves are described as being 1–1.6 × 0.5–1.1 cm, ovate to elliptic-oblong, the surface rugulose above and flat below, both surfaces with a few short hairs but more or less pubescent when young. The illustration of *A. pensilis* in Hooker's *Icones Plantarum* shows the lower surface, at least, to be rather densely covered with fine hairs.

When the descriptions of the two species are compared with fragments of the type specimen of *Agapetes pensilis*, the specimen of the paratype of *A. pensilis*, and the isotype of *A. dulongensis* (all at A), numerous discrepancies become evident. It can be seen from the TABLE that the differences in vegetative characters used to separate the species break down. The type specimen of *A. pensilis* differs from the other two specimens in lacking glandular-setular hairs on the lower surface of the leaves. It is, however, covered with long, unicellular hairs similar to those found on the upper surface of all specimens. Such unicellular hairs are found, albeit sparsely, on the under-surfaces of the leaves of both *Handel-Mazzetti 9352* (a paratype of *A. pensilis*) and *T. T. Yü 20038*. There are no obvious differences in anatomy in the leaves of the three specimens examined, although *Handel-Mazzetti 9352* and *T. T. Yü 20038* both have a zone around the edge of the leaf that is only three cells thick but up to 0.15 mm wide; this zone is present but much less evident in *Kingdon-Ward 7458*. The floral characters of the two type specimens are very similar.

The only variation of any possible importance is in the indumentum on the underside of the leaf. I do not think it wise to recognize taxa, even at the varietal level, on this character until its occurrence is better understood. Therefore, *A. dulongensis* is reduced to synonymy under *A. pensilis*.

AGAPETES SER. ROBUSTAE AIRY SHAW SUBSER. CHARTACEA AIRY SHAW

3. ***Agapetes angulata*** (Griffith) Hooker f. in Bentham & Hooker f. Gen. Pl. **2**: 571. 1876; *Ceratostemma angulatum* Griffith, Ic. Pl. Asiat. pl. **503**.

Leaf characters used to distinguish *Agapetes dulongensis* from *A. pensilis*.

CHARACTER	<i>Agapetes dulongensis</i>		<i>Agapetes pensilis</i>	
	HOLOTYPE*	ISOTYPE (A)	PARATYPE (A)	HOLOTYPE†
Length (mm)	5-7	6.5-10	(8.5-)9-11.5	7.5-14
Indumentum				
Pubescence on upper surface	Present	Present	Present	Present
Glandular-setular hairs on lower surface	Present	Present	Present	Absent
Wrinkles on surface	Distant	Dense	Dense	Subdistant
Lateral veins	Not evident	Not evident	Obscure	Evident to obscure

*Details taken from the protolog.

†Details taken from five leaves of the type; leaf length given as 10-15 mm in protolog.

1854. See Merrill, *Brittonia* 4: 157. 1941, and Airy Shaw, *Kew Bull.* 13: 481. 1958, for additional references and typification.

DISTRIBUTION. India (Assam) and Upper Burma.

DESCRIPTION OF INFLORESCENCES AND FLOWERS. Inflorescences corymbose to subumbellate, the axis 0.4-1.5 cm long, 5- to 15-flowered, glabrous; bracts ovate, 0.7-1.5 mm long (also inconspicuous bracts at base of inflorescence); pedicels 0.9-2.2 cm long, slender, slightly expanded at apex, glabrous, the bracteoles inserted near base of pedicel, 1-1.5 mm long. Receptacle obpyramidal, 1.5-1.7 mm long, slightly 5-angled, glabrous; calyx limb 1.6-2.5 mm long, divided almost to base or to $\frac{3}{4}$ of its length into 5 triangular lobes, glabrous; corolla 1.5-2.7 cm long, rather thinly fleshy, red to reddish yellow, with deeper-colored horizontal bands, glabrous, with 5 triangular lobes 3.5-5 mm long; stamens 10, the filaments 0.5-1 mm long, with sparse unicellular hairs, the anthers weakly connate by their tubules, the thecae 3.5-4 mm long, rounded to acute and somewhat downward-pointing at base, granulate, the tubules 1.3-1.7 cm long, opening by introrse slits 5-6 mm long, the spurs small (ca. 0.05 mm long) or absent; disc glabrous; style 1.5-2.1 cm long.

SPECIMENS SEEN. **Burma:** Nam Tesang, 762 m, *Toppin* 6356 (κ); Kachin State, Sumprabum Subdiv., surrounds of Hpuginhku Village, ca. 1525 m, *Keenan et al.* 3789 (A, E, κ), 3797 (E); banks of Hpuginhku R., at least 1220 m, *Keenan et al.* 3921 (A, E, κ); between Ning W'Krok and Kanang, 1219-1525 m, *Keenan et al.* 3341 (E), ca. 1525 m, *Keenan et al.* 3939 (A, E, κ), at least 1525 m, *Keenan et al.* 3950 (A, E, κ); E aspect of Gwe-Kya-Kat-Bum, 1220-1525 m, *Keenan et al.* 3366 (A, κ); North Triangle, Arahku, 1219 m, *Kingdon-Ward* 20606 (E). **India.** ASSAM: Lohit Valley, *Kingdon-Ward* 19143 (BM); Mishmi Hills, Glo Lake, Kamlang Valley, 1067 m, *Kingdon-Ward* 18461 (A).

Agapetes angulata is a rather variable species, especially in floral characters, hence the description of the inflorescence and flowers. It is less variable veg-

etatively, although the twigs vary from strongly ridged and angled to subterete. It is not possible to recognize infraspecific taxa.

4. *Agapetes rubropedicellata* P. F. Stevens, sp. nov.

A *Agapetes leptantha*, qua floribus similibus habet, in foliis grandioribus pseudoverticillatis et corollis antherisque glabris, et a *A. acuminata* in foliis subsessilibus pseudoverticillatis et corollis maioribus cylindricis, non urceolatis, et a *A. dispar* in foliis leviter parvioribus, calycibus parvioribus et corollis maioribus cylindricis, non urceolatis, differt.

Shrub ca. 1.8 m tall or small tree to 3.6 m tall. Twigs terete, 2–2.5 mm wide, with small, subadpressed, multicellular hairs, lenticellate when older; buds with narrowly subulate perulae ca. 2 mm long. Leaves pseudoverticillate, verticils 6–12 cm apart and with 5 to 7 leaves, leaves in intervening region reduced to scales to 6 mm long; petiole very short; lamina subovate to elliptic, (7–)8.5–13.5 × (1.7–)2.6–4.6 cm, acute at apex, narrowed toward rounded base, serrulate, chartaceous, glabrous, drying dark brown above and brown below, with 11 to 16 pairs of broadly ascending lateral veins, midrib and venation raised and prominent above and slightly less so below. Inflorescences from foliate axils, corymbose-umbellate, with 7 to 16 flowers, the axis 4–5.5 cm long, with flowers restricted to distal 1–1.5 cm, glabrous; bracts narrowly subulate, to 2 mm long, with subsessile glandular marginal hairs (bracts at base and along axis inconspicuous); pedicels 1–2.2 cm long, glabrous (in fruit rather abruptly expanded and ca. 2 mm thick at apex), the bracteoles basal, ca. 1.5 mm long. Receptacle ca. 1.3 × 1.3 mm, glabrous; calyx limb 1.3–1.5 mm long, divided to base into 5 triangular lobes, glabrous; corolla (old) cylindrical, ca. 1.2 cm × 2.2 mm, glabrous, lobes ca. 1.3 mm long; stamens 10, the filaments 4.3–4.4 mm long, with unicellular hairs, the anthers ca. 8 mm long, the thecae 2.3–2.4 mm long, rounded at base, granulate, the tubules ca. 5.8 mm long, opening by introrse slits ca. ½ their length, the spurs absent; disc glabrous; style ca. 1.35 cm long. Fruits (submature) ca. 4 × 4 mm, red; seeds ca. 1.4 mm long, the testa with thin-walled cells, becoming mucilaginous on wetting, the embryo blackish.

TYPE. Burma, Kachin State, Sumprabum Subdivision (lat. ca. 26°40'N, long. ca. 97°20'E), between Hpuginhku and N'Dum Zup, 5000–6000 ft [1524–1829 m], 15 Jan. 1962, *Keenan et al.* 3253 (holotype, E!; isotypes, A!, K!).

DISTRIBUTION. Known only from Burma.

ADDITIONAL SPECIMENS SEEN. **Burma:** Kachin State, Sumprabum Subdiv., near Hpuginhku village, ca. 1525 m, *Keenan et al.* 3830 (A, E, K).

Agapetes rubropedicellata is related to a group of species in *Agapetes* subser. Chartacea that all have rather similar leaf texture and margin. These species differ from each other mainly in whether or not the leaves are pseudoverticillate and sessile, and in the shape and size of the corolla. *Agapetes leptantha* has petiolate leaves much smaller (only 5–8 × 1–2 cm) than those of *A. rubropedicellata* and scattered along the stem, there are remarkable long hairs on the

anthers, and the inside of the corolla tube is hairy. The leaves of *A. acuminata* are scattered and petiolate, and the flowers are very small (only 3–4 mm long) and urceolate. *Agapetes dispar* has leaves similar in shape and arrangement to those of *A. rubropedicellata*, but the lamina is somewhat larger (13–18 × 6–9.5 cm), the calyx is longer (ca. 3 mm), and the urceolate corolla is only 6–7 mm long.

Agapetes rubropedicellata was collected in “subtropical hill jungle” (Keenan *et al.* 3830) at 1525–1830 m altitude; it was recorded as being locally plentiful. The Maru vernacular name was recorded (Keenan *et al.* 3253) as “Burn-Baing.”

AGAPETES SER. ROBUSTAE AIRY SHAW SUBSER. CORIACEA AIRY SHAW

5. ***Agapetes brandisiana*** W. E. Evans, Notes Roy. Bot. Gard. Edinburgh **15**: 201. 1927. See Airy Shaw, Kew Bull. **13**: 479. 1958, and S. H. Huang, Acta Bot. Yunn. **5**: 145. 1983, for additional references and typification.

DISTRIBUTION. Burma, China (Yunnan).

CHINESE SPECIMENS SEEN. YUNNAN: Tsang-Yuan, 1550 m, C. W. Wang 73261 (A); Keng-Ma, 1670 m, C. W. Wang 72913 (A); Lu-Se, 1750 m, H. T. Tsai 56821 (A).

These specimens are the only ones recorded from China, *Agapetes brandisiana* previously having been known only from the Bhamo district of Burma. The specimens cited agree fairly well with the type (in fruit: *Cubitt* 351 (holotype, E!)) and with the description of the flowers given by Airy Shaw (1935). The following additional details should be noted (where they differ from those in the earlier descriptions, these latter are included in parentheses):

Leaves scattered, or loosely aggregated into pseudoverticels; lamina more or less entire, with 2 or 3 pairs of glandular punctations near base that sometimes project notably (margin then serrulate), the fine venation between submarginal and marginal veins prominent. Inflorescences usually from defoliate axils, sometimes (*Wang* 73261) from foliate ones. Calyx lobes to 3.5 mm long, with middle nerve prominent; corolla 2.2 cm long (2.4–2.6 cm), lobes to 3 mm long (5–6 mm); stamens with filaments 1.7–2.2 mm long, with ± dense hairs at top [as Airy Shaw noted, filaments are strongly curved and adnate to base of corolla tube], thecae 4–4.5 mm long (5–6 mm), tubules ca. 1.7 cm long (1.8–2 cm).

VACCINIUM L. SECT. CONCHOPHYLLUM REHDER

6. ***Vaccinium papillatum*** P. F. Stevens, nom. nov.

Agapetes poilanei Dop in Lecomte, Fl. Gén. Indo-Chine **3**: 702. 1930; non *Vaccinium poilanei* Dop, 1930. TYPE: Viet Nam, col de Lô Gui Hbô, km 9, près de Chapa, 1000 m, 28 août 1926, *Poilane* 12603 (holotype, P!; isotype, A!).

Shrub 0.9–1.8 m tall. Twigs subterete or obscurely angled, 1.3–1.7 mm wide, with unicellular hairs arising from epidermal papillae; buds with ovate perulae 0.8–1.3 mm long. Leaves scattered; petiole 1.2–2 mm long, sparsely pubescent; lamina elliptic, 1–2.8 × 0.5–1.2 cm, rounded and retuse at apex, ± cuneate at base, entire, coriaceous, with 2 glandular punctations and 1 or 2 pairs of steeply ascending lateral nerves arising near base, midrib raised on both surfaces, the

upper surface glabrous, drying brown-green, veins \pm impressed, the lower surface with multicellular hairs throughout and unicellular hairs on and near midrib, drying brown, veins \pm raised. Inflorescences from foliate or rarely defoliate axils along twigs, corymbo-racemose, with 2 to 5 flowers, the axis slender, 0.6–1.8 cm long, sparsely pubescent; bracts ovate, 1–1.5 mm long; pedicels 4.5–6 mm long (in fruit 0.6–1 cm long, ca. 1.5 mm wide at apex), sparsely pubescent, the bracteoles subbasal, ca. 1.3 mm long. Receptacle 1.1–1.2 \times 1.1–1.2 mm, pubescent; calyx limb 1.5–2.1 mm long, divided almost to base into 5 triangular lobes, pubescent; corolla \pm campanulate, 4.5–5.5 mm long, ca. 4.5 mm wide when flattened, glabrous, with 5 triangular lobes ca. 1.5 mm long; stamens 10; the filaments ca. 0.5 mm long, flattened, fringed with hairs, the anthers ca. 4 mm long, rounded at base, minutely granulate, the connective with hairs, the tubules ca. 2.4 mm long, opening by introrse slits ca. 0.5 mm long, the spurs at anther-filament junction alternately suberect, ca. 0.7 mm long, and subspreading, ca. 0.9 mm long; disc glabrous; style ca. 5 mm long. Fruits ca. 4 \times 4 mm, greenish yellow or whitish pink; seeds ovoid, 1.3–1.5 \times 0.5–0.7 mm, the testa cells slightly elongated, with strongly thickened anticlinal walls and slightly thickened inner periclinal walls, the embryo 0.7–0.8 mm long, pellucid.

DISTRIBUTION. Vietnam and southwestern China.

ADDITIONAL SPECIMENS SEEN. **China.** YUNNAN: Si-chour-hsein, Ma-chia, 1300–1500 m, *K. M. Feng* 12451 (A); Faa-doou, 1500 m, *K. M. Feng* 12028 (A); Mar-li-po, Pan-chia-chu, 1700 m, *K. M. Feng* 12622 (A); Tung-ting, 1500–2000 m, *K. M. Feng* 13586 (A). **Vietnam:** Chapa, 1400–1500 m, *Chevalier* 29469 (P), ca. 1500 m, *Pételot* 3755 (P), 4999 (P); massif [de] Sa Fan tri Pan, ca. 1300 m, *Pételot s.n.*, ii.1931 (A, P).

Agapetes poilanei Dop was originally described from material in fruit, but the unicellular hairs borne on epidermal papillae and the short, broadly campanulate corolla of the species show its affinity to species in *Vaccinium* sect. *Conchophyllum*. *Vaccinium tonkinense* Dop and *V. emarginatum* Hayata of this section both have similar flowers and elongated inflorescence axes, but in neither are the unicellular hairs borne on epidermal papillae. Flowering specimens of *V. papillatum* are known only from Vietnam, but there is no doubt that this material is conspecific with the specimens cited from China. Since the epithet *poilanei* is occupied in *Vaccinium* (*V. poilanei* Merr.), a new epithet is required. The species was previously only imperfectly known, having been dealt with neither by Sleumer (1941) nor by Airy Shaw in his various papers on *Agapetes*, so a full description has been given above.

Three of the Chinese specimens (*Feng* 12028, 12451, and 13586), and *Chevalier* 29469, from Vietnam, have shoots with very characteristic subterminal, rosettelike structures. These are made up of numerous ovate perulae ca. 3.5 \times 2 mm that are fringed with unicellular hairs. The rosettes probably represent teratological buds that produce nothing but enlarged perulae, instead of the few small perulae followed by fully developed leaves produced by normal buds.

The type specimen of *Vaccinium papillatum* has swellings along the roots; the young plant is reported to have a tubercle.

VACCINIUM L. SECT. EPIGYNIUM (KLOTZSCH) HOOKER F.

7. *Vaccinium jacobeanum* P. F. Stevens, sp. nov.

A *Vaccinio vacciniaceo* in foliis subdissitis petiolatis laminis basibus decurrentibus subverticillatis (non subsessilibus, lamina basi cuneata vel rotundata) et corollis grandioribus 9–10(–13) mm longis (non 5–7(–8.5) mm longis), differt.

Epiphytic or terrestrial shrub 0.9–1.2 m tall. Twigs subterete, 1.3–3 mm wide, with multicellular setular hairs especially at base of innovations, becoming lenticellate. Leaves \pm scattered in upper half of innovation, in lower half reduced to narrowly triangular perulae to 1 cm long; petiole (0.7–)1–1.5 cm long, glabrous; lamina narrowly elliptic, (4–)7–16 \times (1.3–)1.9–3.2 cm, acuminate or narrowly acute at apex, decurrent at base, serrate, chartaceous, glabrous, drying blackish green above and dark green below, with 9 to 14 pairs of ascending lateral veins, midrib and venation raised above and slightly less so below. Inflorescences from upper foliate or perulate axils, racemose, with (7 to) 15 to numerous flowers, the axis (1.5–)3–8 cm long, glabrous; bracts narrowly ovate, to 4.5 mm long (bracts at base inconspicuous, ca. 2 mm long); pedicels 0.5–1 cm long, glabrous, not incrassate in fruit, the bracteoles subbasal, ovate, ca. 0.5 mm long. Receptacle ca. 1 \times 1 mm, glabrous; calyx limb 1–1.3 mm long, divided to base into 5 triangular lobes, glabrous; corolla tubular-urceolate, 9–10 mm long, yellow to green, glabrous, with triangular lobes ca. 1 mm long; stamens 10, the filaments ca. 3 mm long, with unicellular hairs, the anthers 5 mm long, the thecae ca. 2 mm long, \pm rounded at base, granulate, the tubules 2.8–3 mm long, opening by introrse slits ca. $\frac{1}{2}$ their length, the spurs minute, arising at junction of thecae and tubules, or absent; disc glabrous; style ca. 9.5(–12.5) mm long. Ripe fruits not known.

TYPE. Burma, Kachin State, Sumprabum Subdivision, ca. 26°40'N, 97°20'E, surrounds of Hpuginhku village, \pm 5000 ft [1524 m], March 1962, *Keenan et al.* 3774 (holotype, A!; isotypes, E!, K!).

DISTRIBUTION. Known only from Burma.

ADDITIONAL SPECIMENS SEEN. **Burma.** KACHIN STATE: Sumprabum Subdiv., summit of Kanat Bum, 2438 m, *Keenan et al.* 3449 (A, E, K); surrounds of Hpuginhku village, ca. 1524 m, *Keenan et al.* 3775a (E); between Ning W'Krok and Kanang, 1524 m, *Keenan et al.* 3954 (A, E, K), at least 1524 m, *Keenan et al.* 3951 (A, E, K); Sumprabum, 914 m, *Kingdon-Ward* 20471 (BM).

Although clearly allied to *Vaccinium vacciniaceum* (Roxb.) Sleumer, *V. jacobeanum* differs in the characters noted in the diagnosis. Note that the petiole proper may measure only 2–3 mm in length, with the prominent teeth on the upper part of what is apparently the petiole representing the extremely attenuate basal part of the lamina. *Vaccinium jacobeanum* is also close to *Agapetes leptantha* Airy Shaw, from which it can be distinguished by its slightly shorter corolla that has thicker walls and is twice as wide, and by its glabrous anthers that are less than half the total length of the stamens.

The specimen collected by Kingdon-Ward cited above has rather small leaves.

Vaccinium jacobeanum grows in subtropical hill jungle and open mixed deciduous and evergreen forest at altitudes of 914–2438 m. Flowering specimens have been collected in February, March, and July. The Jingpaw name for this plant is “Pin-lawng-Lap” (Keenan *et al.* 3449).

The specific epithet commemorates the collector, James Keenan.

8. *Vaccinium lamellatum* P. F. Stevens, sp. nov.

A *Vaccinio* bulleyano in foliis minoribus coriaceis nervis submarginalibus destitutis, receptaculis lamellis 10 longitudinalibus ornatis, et antheris valde granulatis, differt.

Epiphytic shrub. Twigs terete, 1.2–2.2 mm wide, glabrous or sparsely pubescent when young, becoming lenticellate; buds with ovate perulae ca. 3 mm long. Leaves pseudovercillate, 2 to 6 per verticil, intervening region (1–)4–9 cm long with leaves reduced to lingulate scales up to 6 mm long; petiole 1–2 mm long; lamina elliptic to subovate, $3\text{--}9.7 \times 1.3\text{--}3.8$ cm, acute at apex, rounded at base, serrulate, subchartaceous, glabrous, drying gray-brown above and brown below, with 7 to 10 pairs of ascending lateral veins, the midrib raised above and strongly raised below, notably more prominent toward margin. Inflorescences from axils of reduced leaves, corymbose-umbellate, with 5 to 12 flowers, the axis 0.7–1.4 cm long, with flowers restricted to distal part, (?)glabrous or with glandular multicellular hairs to 1 mm long; bracts subsistent, ovate, to 3 mm long, with marginal glands (bracts at base and along axis inconspicuous); pedicels 1.3–1.9 cm long (in fruit to 2.5 cm long, ca. 2 mm across at abruptly widened apex), glabrous, the bracteoles subbasal, ca. 2 mm long. Receptacle $1.5\text{--}2 \times 1.5\text{--}2$ mm, with 10 irregular, fleshy, longitudinal lamellae, glabrous; calyx limb 2.3–2.6 mm long, divided almost to base into 5 triangular lobes, glabrous, corolla urceolate, ca. 5.5×2.5 mm (ca. 1.3 mm wide at mouth), white, the lobes triangular, ca. 0.6 mm long, green; stamens 10, the filaments ca. 0.5 mm long, glabrous, the anthers 4.5–4.7 mm long, the thecae ca. 2.5 mm long, rounded at base, strongly granulate, the tubules ca. 2.3 mm long, opening by introrse slits ca. 1 mm long, the spurs absent; disc glabrous; style ca. 5 mm long. Fruits ca. 4.5×4.5 mm; seeds obovoid, ca. 2×1.2 mm, the testa with thin-walled cells that become mucilaginous on wetting, the embryo ca. 1 mm long, drying blackish.

TYPE. India, Manipur, Sirhoi, 6500–7000 ft [1980–2135 m], 10 April 1948, *Kingdon-Ward 17246* (holotype, A!; isotypes, BM!, NY!).

DISTRIBUTION. Known only from Manipur, India.

ADDITIONAL SPECIMENS SEEN. **India.** MANIPUR: Sirhoi, 2286 m, *Kingdon-Ward 17688* (BM, NY); Khaiyang, 2135–2438 m, *Kingdon-Ward 17393* (A, BM).

Vaccinium lamellatum is superficially similar to *V. bulleyanum* (Diels) Sleumer (*Agapetes bulleyana* Diels) but can easily be recognized by the characters mentioned in the diagnosis. *Vaccinium lamellatum* has a less coriaceous leaf blade that lacks the prominent intramarginal vein of *V. bulleyanum* but never-

theless has a very distinctive margin, since the fine venation at the very edge of the lamina is prominently raised on both surfaces. I do not know of any other species of *Vaccinium* with the ten irregular, fleshy lamellae on the receptacle that are found in *V. lamellatum*. The stamens of *V. lamellatum* differ considerably from those of *V. bulleyanum*, having prominently papillate thecae that are more or less rounded at the base (at least alternate stamens of *V. bulleyanum* are pointed at the base, with prominent papillae restricted to the base) and anthers that are abruptly incurved at the theca-filament junction.

The lamellate receptacle of *Vaccinium lamellatum* approaches that of *Agapetes miniata*, which has ten raised longitudinal lines; the latter species also has a subumbellate inflorescence. However, *A. miniata* has a leaf blade that is at least 10 cm long and a cylindrical corolla over 2 cm long; the latter character is responsible for the placement of *A. miniata* in *Agapetes*.

The field notes on the type specimen of *Vaccinium lamellatum* ("an epiphyte with water-storing tissue") suggest that it has a swollen stem base. The fruit color of *V. lamellatum* is not known.

9. ***Vaccinium leucobotrys*** (Nutt.) Nicholson, Ill. Dict. Garden. **4**: 130. 1886; *Epigynium leucobotrys* Nutt. Bot. Mag. III. **15**: t. 5103. 1859. See Sleumer, Bot. Jahrb. Syst. **71**: 478. 1941, for additional references and synonymy.

DISTRIBUTION. India (Assam), Burma, China (Tibet, Yunnan).

SELECTED SPECIMENS SEEN. **Burma**: above Zuklang, ca. 2438 m, *Kingdon-Ward 418* (A, NY); Adung Valley, 1829–2134 m, *Kingdon-Ward 9219* (A); North Triangle, Tagulam Bum, 2286 m, *Kingdon-Ward 21604* (A); Kachin State, Sumprabum Subdiv., Janrawng Bum, 2134–2743 m, *Keenan et al. 3179* (A, E).

The first two specimens cited above have been included in *Vaccinium vacciniaceum* (Roxb.) Sleumer var. *hispidum* (C. B. Clarke) Sleumer (Sleumer, 1941; Merrill, 1941). However, they both agree with *V. leucobotrys* in having prominently and subpersistently bracteate inflorescences and ovate, usually green-drying leaves that are usually broadly rounded at the base; these characters readily separate *V. leucobotrys* from *V. vacciniaceum*.

The specimens cited above are the first record of the species from Burma. Although they were collected at somewhat lower altitudes (in Assam, Tibet, and Yunnan *Vaccinium leucobotrys* grows at altitudes of 2100–3300 m), they agree well with other specimens of the species.

10. ***Vaccinium praeces*** P. F. Stevens, sp. nov.

A *Vaccinio* bulleyano, *V. lamellato*, et *Agapetes* dispar, quibus in facie plus minusve similibus sunt, in inflorescentiis, pedicellis floribusque pubescentibus, differt.

Epiphytic shrub. Twigs \pm terete, 2.3–3 mm wide, with few multicellular glandular hairs, becoming lenticellate. Leaves pseudovercillate, 2 to 4 per verticil, the intervening stem 2.5–10 cm long, with leaves reduced to ovate to obovate scales up to 10×5 mm; petiole 1–1.5 mm long; lamina ovate to

elliptic, 7.5–ca. 14 × (3.3–)4–7.3 cm, acuminate at apex, rounded to slightly cordate at base, serrulate, subchartaceous, glabrous, with ca. 14 pairs of broadly ascending lateral veins, the upper surface drying gray-green, midrib depressed but raised in center, venation ± impressed, the lower surface drying olivaceous, midrib strongly raised, venation raised. Inflorescences from axils of reduced leaves, corymbose-umbellate, with ca. 20 flowers, the axis 2–2.5 cm long, with flowers restricted to distal part, subdensely pubescent; bracts subsistent, ovate, 2–2.5 cm long, with marginal glandular hairs (bracts at base and along axis inconspicuous); pedicels 1–1.5 cm long, slightly broadened toward apex, pubescent, the bracteoles basal, ca. 1 mm long. Receptacle ca. 1 × 1 mm, slightly 5-angled, pubescent; calyx limb 3.5–4 mm long, divided almost to base into 5 narrowly triangular lobes, pubescent, each lobe with prominent midrib; corolla urceolate, ca. 7 × 3.5 mm (ca. 2.2 mm across at mouth), slightly angled, green, pubescent outside, with hairs only toward apex inside, the lobes 5, broadly triangular, ca. 0.7 mm long; stamens 8 or 10, the filaments ca. 1.2 mm long, flattened, widened toward base where ca. 0.6 mm across, glabrous, the anthers ca. 3.9 mm long, the thecae ca. 1.6 mm long, rounded at base, granulate, the tubules ca. 2.3 mm long, opening by introrse slits ca. 0.9 mm long, the spurs absent; disc glabrous; style ca. 6.3 mm long. Fruits unknown.

TYPE. Burma, North Triangle (Tagulam Bum), 2410 m, 15 Nov. 1953, *Kingdon-Ward 21605* (holotype, BM!).

DISTRIBUTION. Known only from the type collection.

Vaccinium praeces is closely related to the group of species straddling the dividing line between *Vaccinium* sect. *Epigynium* (to which *V. praeces* is assigned) and *Agapetes* subser. *Coriacea*. From all these species (*V. bulleyanum* (Diels) Sleumer, *V. lamellatum* P. F. Stevens, and *A. dispar* Airy Shaw) it can be separated by its densely pubescent inflorescences and flowers. From *V. bulleyanum* it also differs in its larger, thinner leaves that lack a submarginal vein. Although *V. praeces* and *V. bulleyanum* have similar inflorescences, *V. praeces* has stamens with much longer filaments, those of *V. bulleyanum* being only ca. 0.5 mm long. *Vaccinium lamellatum* has leaves much smaller than those of *V. praeces*, and it also has a lamellate, rather than slightly angled, receptacle. *Agapetes dispar* is perhaps most closely related to *V. praeces*, but in addition to differing in inflorescence pubescence, *A. dispar* has a longer (8–10 cm) inflorescence axis, longer (2–2.5 cm) pedicels, and somewhat pubescent stamen filaments.

There is possibly another taxon in this circle of affinity. *Kingdon-Ward 3050* (E; ridge above Laktang, 2453 m; specimen in young fruit) has the inflorescence type and length—as well as the indumentum—of *Vaccinium praeces*, but there are probably only about ten flowers per inflorescence, and the calyx lobes are up to 6.5 mm long. The leaves are falsely whorled, and the blades have a distinct submarginal vein.

11. *Vaccinium subdisitifolium* P. F. Stevens, sp. nov.

Vaccinium vacciniaceum (Roxb.) Sleumer var. *hispidum* (C. B. Clarke) Sleumer, Bot. Jahrb. Syst. 71: 479. 1941, *pro majore parte, excl. spec. Assamica*; *V. venosum* Wight

var. *hispidum* C. B. Clarke in Hooker f. Fl. Brit. India 3: 452. 1882. TYPE: Sikkim, 4000–7000 ft [1219–2143 m], *Hooker s.n.*, *pro parte* (lectotype, κ !; isolectotypes, ϵ !, GH !, NY !). See also *V. vacciniaceum*.

Gaylussacia serrata auct. non Lindley: Griffith, Ic. Pl. Asiat. pl. 507. 1854.

A *Vaccinio* *vacciniaceo* in lamina basi plerumque late rotundata, non subcuneata vel anguste rotundata, foliis subdissitis, non pseudoverticillatis, perulis basi inflorescentiae persistentibus, non deciduis, et corolla 3–4.5 mm, non 5–7(–8.5) mm, longa, differt, et a *V. leucobotrys* in foliis subdissitis, non pseudoverticillatis, lamina plerumque suboblata vel obovata, non ovata, antheris prominente granulatis, non sublaevibus, et corolla intus glabra, non pubescentia, differt.

Epiphytic shrub. Twigs terete, 1.5–2.5 mm wide, pubescent and with multicellular setular hairs to 1.7 mm long, rarely glabrous, becoming lenticellate. Leaves \pm scattered along stem; petiole 1–2 mm long; lamina oblong to obovate, rarely ovate, (2–)3.3–8(–15) \times (0.6–)1.2–2.3(–4) cm, subacuminate at apex, broadly to narrowly rounded at base, serrate, chartaceous, glabrous, drying greenish brown to blackish above and brown below, with 6 to 16 pairs of ascending lateral veins, midrib and venation \pm raised above and below (venation sometimes inconspicuous below). Inflorescences from upper foliate axils, racemose or corymbo-racemose, with ca. 10 to numerous flowers, the axis 1.8–5.3 cm long, glabrous; bracts ovate, to 4 mm long, with setose margins (basal bracts persistent, scarious, conspicuous); pedicels 2.5–7 mm long, glabrous, the bracteoles subopposite, ovate to linear, to 3 mm long. Receptacle 1–1.5 \times 1–1.5 mm, \pm rugulose, glabrous; calyx limb 0.5–1.3 mm long, divided to base into 5 triangular lobes, glabrous; corolla urceolate, 3–4(–5) \times ca. 2.5 mm (ca. 1.2 mm wide at mouth), greenish white, glabrous, sometimes minutely papillate inside at mouth, with 5 triangular lobes ca. 0.6 mm long; stamens 10, the filaments ca. 0.8 mm long, widened and slightly connate at base, glabrous, the anthers 3–3.2 mm long, the thecae ca. 1.4 mm long, narrowed and acute at base, strongly granulate, the tubules 1.6–1.8 mm long, opening by introrse slits for $\frac{1}{2}$ – $\frac{1}{3}$ their length, the spurs absent; disc glabrous; style ca. 4.5 mm long. Fruits ca. 1.5 \times 1 mm, white or greenish white; seeds ovoid, ca. 1.5 \times 1 mm, the testa cells thin walled, becoming mucilaginous on wetting, the embryo ca. 1 mm long, drying blackish.

TYPE. India, Sikkim, 4000–7000 ft [1219–2143 m], *Hooker s.n.*, *pro parte* (holotype, GH !; isotypes, ϵ !, κ !, NY !).

DISTRIBUTION. Foothills of the Himalayas in Bhutan and India (Sikkim and Assam).

ADDITIONAL SPECIMENS SEEN. **Bhutan:** *sine loco*, Griffith, Kew Dist. 2260 (BM, *pro parte*, ϵ), Kew Dist. 3641, *pro parte* (BM, GH , κ), Nuttall *s.n.* (κ). **India.** ASSAM: SE of Apa Tani valley, Subansiri Div. of N.E.F.A., 2134 m, Cox & Hutchinson 468 (ϵ , κ), 2377 m, Cox & Hutchinson 409 (ϵ , κ); Mishmi Hills, Glo, Kamlang Valley, 1219 m, Kingdon-Ward 18456 (A, κ , NY). SIKKIM: Tumlong, 1981 m, Clarke 27709A (κ), 27709C (BM); Pasheeting, 1676 m, Gamble 3666A (κ).

Vaccinium subdissitifolium can be separated from its two closest relatives, *V. vacciniaceum* (Roxb.) Sleumer and *V. leucobotrys*, by the characters given

in the diagnosis. *Vaccinium subdissitifolium* is in some ways intermediate between these two species, although its consistently more or less scattered leaves are characteristic of neither. In flower *V. subdissitifolium* is most similar to *V. leucobotrys* but differs in corolla indumentum (*V. leucobotrys* has hairs on the inner surface of the corolla) and in its more granulate anthers. In these two features *V. subdissitifolium* approaches *V. vacciniaceum*, especially subsp. *glabritubum*, and in leaf characters it is also perhaps more similar to *V. vacciniaceum* than to *V. leucobotrys*. Ranking of these and other taxa related to *V. vacciniaceum* (*V. venosum*, *V. nuttallii*, and *V. kingdon-wardii*) is difficult.

The inflorescence axis possibly elongates after flowering, as the field notes of Cox & Hutchinson 409 suggest.

Vaccinium subdissitifolium has been typified on the same collection as the type of *V. vacciniaceum* var. *hispidum*. However, in view of confusion surrounding the name *hispidum* (see *V. vacciniaceum*), a new name has been chosen at the species level. Specimens of *V. vacciniaceum* var. *vacciniaceum* are sometimes mounted with the type of *V. subdissitifolium*.

Kingdon-Ward 18456, from Assam, is a very robust specimen that has larger leaves than the others (measurements in the description in parentheses), and it also has twigs that are glabrous at maturity. However, it has persistent bracts at the base of the inflorescence and leaves that are scattered along the upper half of the innovation, so it is referred to this species.

12. *Vaccinium vacciniaceum* (Roxb.) Sleumer

12a. *Vaccinium vacciniaceum* (Roxb.) Sleumer subsp. *vacciniaceum*

Vaccinium vacciniaceum (Roxb.) Sleumer var. *vacciniaceum*, Bot. Jahrb. Syst. **71**: 479.

1941. *Ceratostem[m]a vacciniacea* Roxb. Fl. Indica, ed. 2. **2**: 412. 1932. TYPE: India, Assam, Garrow Hills, *Roxburgh s.n.*, 1813 (BM!).

V. vacciniaceum (Roxb.) Sleumer var. *hispidum* auct. non (Clarke) Sleumer: Sleumer, Bot. Jahrb. Syst. **71**: 479. 1941, *pro parte Assamica*.

Epiphytic or terrestrial shrub. Twigs terete, 1.4–2 mm wide, usually with setular hairs to 1 mm long at least at beginning of innovation, becoming lenticellate. Leaves pseudovercillate, 5 to 10 together, the intervening stem 2–10 cm long, with leaves reduced to narrowly triangular scales to 7 mm long; petiole (1–)2–3(–4) mm long; lamina narrowly elliptic, 3–11 × 0.9–2.1 cm, acute at apex, narrowly cuneate to ± rounded at base, serrate, chartaceous, glabrous, with 7 to 13 pairs of lateral veins, the upper surface drying black to dull green, midrib narrowly raised, venation raised, the lower surface drying brown or brownish green, midrib broadly raised, venation slightly raised. Inflorescences from foliate axils, racemose or corymbo-racemose, with at least 10 flowers, the axis 1.7–6 cm long, glabrous or very rarely with long-stalked subcapitate hairs; bracts deciduous, narrowly triangular, to 3 mm long (basal bracts inconspicuous); pedicels 7–13 mm long, slightly expanded at apex, glabrous, the bracteoles ± basal, linear to narrowly triangular, 0.8–1.3 mm long. Receptacle 0.8–1 × 0.8–1 mm, smooth, glabrous; calyx limb 0.7–1 mm long, divided almost to base into 5 triangular lobes, glabrous; corolla urceolate, 5–7(–8.5) × ca. 2 mm (1 mm across at mouth), white to greenish white or pinkish

yellow, with unicellular hairs inside especially toward mouth, the lobes triangular, ca. 0.6 mm long; stamens 10, the filaments 1.8–2.5 mm long, flattened and widened at base, subglabrous or with unicellular hairs, the anthers 3.3–3.7 mm long, the thecae 1–1.3 mm long, usually sharply verruculose, sometimes \pm smooth, the tubules 2–2.5 mm long, dehiscing by long introrse slits, the spurs absent or minute; disc glabrous; style 5.5–7 mm long. Fruits ca. 2 mm long (immature?), glistening white or yellowish; seeds (immature) ca. 1 mm long, testa with thin-walled cells that become mucilaginous on wetting.

DISTRIBUTION. Meghalaya, Nagaland, and Manipur, India, and the Chin area of Burma.

SELECTED SPECIMENS SEEN. **Burma:** Haka, 1981 m, *Dickason 7371* (A). **India.** MANIPUR: Sirhoi, 1829–2438 m, *Kingdon-Ward 17269* (BM); Ukhrul, 1576 m, *Kingdon-Ward 17125* (A, BM); Japoo, 1829 m, *Watt 6226* (P); Khaujiang, 2134–2438 m, *Kingdon-Ward 17395* (BM). MEGHALAYA: Khasia Hills, Shampung, 1524 m, *Badul Khan s.n.*, v.1980 (P); below Upper Shillong, 1372 m, *Cox & Hutchinson 553* (E, K); Pynursla, 1286 m, *Cox & Hutchinson 317* (E, K); Lushai Hills, Lakher Country, 2134 m, *Lorrain s.n.*, vi.1928 (K); Blue Mtns., 2100 m, *Koelz 33038* (E); Khasia and Jaintia Hills, Upper Shillong, 1829 m, *Ruse 61* (A); Cherrapunjee, 1200 m, *Chand 5341* (E). NAGALAND: Kohima, Naga Hills, 2100 m, *Koelz 25446* (E); Puhiratadza, 1981–2347 m, *Prain s.n.* (E); Pulebudze, 2286 m, *Bor 2998* (K); Kanku Range, 1981 m, *Bor 2943* (K).

Dickason 7533 (A; Haka, Burma) has bracts more conspicuous than those of the other specimens, and there are also numerous long-stalked, capitate hairs on the inflorescence axis. Although a conspicuously and subpersistently bracteate inflorescence is characteristic of *Vaccinium leucobotrys*, that species has an entirely glabrous inflorescence axis.

A few specimens (e.g., *Ruse 61*) have almost smooth anther thecae, but this seems to be uncorrelated with other variation.

12b. ***Vaccinium vacciniaceum*** (Roxb.) Sleumer subsp. ***glabritubum*** P. F. Stevens, subsp. nov.

V. vacciniaceum (Roxb.) Sleumer var. *vacciniaceum* Sleumer, Bot. Jahrb. Syst. 71: 479. 1941, *pro parte*.

V. vacciniaceum auct. non (Roxb.) Sleumer: Sen Gupta, Rec. Bot. Surv. India 20: 137. 1973.

V. serratum auct. non (Don) Wight: Biswas, Pl. Darj. Sikkim Himal. 1: 498. 1966.

A subsp. *vacciniacea* in tubo corollae intus glabro, petiolo 1–2 mm longo, et in lamina basi plus minusve anguste rotundata, differt.

As in subsp. *vacciniaceum*, but corolla tube glabrous inside, petiole 1–2 mm long, and lamina \pm narrowly rounded at base.

TYPE. Nepal, Arun Valley, Maghang Kola, E of Num, 9000 ft [2743 m], 30 April 1956, *Stainton 167* (holotype, A; isotype, BM).

DISTRIBUTION. Nepal and Bhutan; collected once in China (southern Tibet).

ADDITIONAL SPECIMENS SEEN. **Bhutan:** Chukka Timpu, 1219 m, *Cooper 3783* (BM); SW Wangdi Phodrang, 1829 m, *Bowes Lyon 6060* (BM), 2286 m, *Bowes Lyon 6058* (BM);

Kinga Rapden, Mangde Chu, 1219 m, *Ludlow et al.* 18589 (BM, E); Rhine Lhakang, 1829 m, *Ludlow et al.* 20142 (BM, E); Sichulu [Sichula], *Biswas* 2014 (A); Mirik, 1676 m, *Biswas* 3740 (A). **China.** TIBET: between Shakti and Pangshen, Nyam Jang Chu, 1825 m, *Ludlow & Sherriff* 1240 (E). **India.** SIKKIM AND ADJACENT W BENGAL: Sureil, 1524 m, *Cave s.n.*, 19 April 1916 (A, E); Lebong, 1524 m, *Cave s.n.*, 8 May 1912 (E); Darjeeling, *Cowan s.n.* (K), *Polunin* 9532 (BM), 2134 m, *Clarke* 27535 (K); Senchal Forest, 2134 m, *Lace* 2223 (E), Dhobijhna Nursery, 1829 m, *Gamble* 10314 (K); below Darjeeling toward Jakaor, ca. 1829 m, *Herb. Lacaïta H vii* 452 (BM); Senchal, 2134 m, May 1879, *anon.* (NY); Gangtok, 1524 m, *Ludlow et al.* 4003 (A, BM, E); Roro Chu, 1676 m, *Stainton* 5306 (BM); Talung Chu, 914 m, *Bowes Lyon* 6029 (BM); Yoksam, 1981 m, *Bowes Lyon* 3003 (BM); Baboo Chola, 1219 m, *Griffith* 6870A (K); Kinseong [Kurseong], *Gamble* 3663A (K), 3665A (K); Dikchu, 613 m, *Biswas* 6739 (A); Singlik, 1366 m, *Biswas* 6810 (A); Reinak, 1524 m, *Clarke* 27917 (K); Kalimpong, 1372 m, *Ludlow & Sherriff* 15834 (BM, E); *sine loco*, 1219–2143 m, *Hooker s.n.*, *pro parte* (NY), 1829 m, *Cave s.n.*, 4 May 1920 (A). **Nepal:** Mechi Zone, Ilam Distr., Aulabari, 1700 m, *Nicolson* 3247 (BM); Ilam, Chintapu, 2134 m, *Stainton* 5780 (BM); W of Ilam, Mai Pokhari, 2134 m, *Williams* 395 (BM); Arun Valley, Dhoje, N of Chainpur, 2286 m, *Stainton* 120 (BM); Tamur Valley, Hellok, 1676 m, *Stainton* 5827 (BM).

Within *Vaccinium vacciniaceum* Sleumer (1941) recognized vars. *vacciniaceum* and *hispidum*. The type of var. *hispidum* and some specimens that he cited as belonging to that variety are described above as *V. subdissitifolium*, while other specimens are to be referred to *V. leucobotrys* and to *V. vacciniaceum* subsp. *vacciniaceum*. Specimens that he cited under var. *vacciniaceum* are to be referred to both subspecies of *V. vacciniaceum* recognized above.

The basis for the recognition of *Vaccinium vacciniaceum* var. *hispidum* was the presence of setular hairs at the beginning of an innovation, but the presence or absence of such hairs seems to be a rather trivial character. Within *V. vacciniaceum* as here circumscribed, the correlation of the absence of unicellular hairs on the inside of the corolla with a shorter petiole, a more rounded leaf base, and the geographic provenance of the specimen is almost perfect. The sole exception, a possibly mislabeled specimen collected by Hooker and Thompson in Khasia (E, GH, K, P), lacks hairs on the inside of the corolla tube and has a short petiole and a rounded leaf base.

VACCINIUM SECTION UNCERTAIN

13. *Vaccinium brevipedicellatum* C. Y. Wu, *Acta Phytotax. Sin.* **19**: 107. 1981.
TYPE: China, Yunnan, Mar-li-po [Malipo], 1200–1500 m, 22.xi.1947,
K. M. Feng 13561 (holotype, PE; isotype, A!).

Agapetes chapaënsis Dop in Lecomte, *Fl. Gén. Indo-Chine* **3**: 702. 1930; non *Vaccinium chapaëse* Merr. (1938). TYPE: Vietnam, massif de Za Yang Pueh, près de Chapa, 1 août 1926, *Poilane* 12735 (holotype, P!).

Agapetes chapaënsis Dop var. *oblonga* Dop in Lecomte, *ibid.* TYPE: Vietnam, massif de Lo nu Tong, près de Chapa, 2200 m, 29 juillet 1926, *Poilane* 12679 (holotype, P!; isotype, A!).

AMPLIFIED DESCRIPTION. Twigs with unicellular hairs borne on epidermal papillae. Leaves with lamina ovate to narrowly elliptic, 1.4–3 × 0.6–1.4 cm,

obtusely acuminate at apex, cuneate to rounded at base, entire, with 2 glandular spots near base, subcoriaceous, the upper surface sharply and shallowly transversely corrugated, drying greenish to grayish brown, the lower surface smooth, drying brown, the lateral veins 2 pairs, arising near base, steeply ascending, the midrib raised, sparsely pubescent toward base. Inflorescences from foliate axils, with 3 flowers, the axis up to 2 mm long, with glandular-capitate hairs to 1 mm long; pedicels to 1.5 mm long, with glandular-capitate hairs at apex. Corolla unknown; stamens 9 (really 10?), the filaments ca. 0.6 mm long, flattened, fringed with hairs, the anthers ca. 2.2 mm long, the thecae 0.9–1 mm long, \pm smooth, the tubules ca. 1.2 mm long, opening by introrse slits for about $\frac{1}{2}$ their length, the spurs arising from tubule-theca junction, 0.5–0.7 mm long, minutely papillate; disc glabrous; style ca. 3.1 mm long. Fruits purple-black, ca. 2.5 by 2.5 mm, with 10 longitudinal ridges when dry; seeds ca. 1.2×0.9 –1.05 mm, angled, brown, the testa cells with greatly thickened anticlinal walls and slightly thickened inner periclinal walls, the embryo ca. 0.75 mm long, \pm pellucid.

DISTRIBUTION. Vietnam and southwestern China.

ADDITIONAL SPECIMENS SEEN. **China.** YUNNAN: Mar-li-po, Hwang-jin-in, 1300–1600 m, K. M. Feng 13198 (A), 1400–1600 m, K. M. Feng 13014 (A).

Specimens of *Agapetes chapaënsis* have unicellular hairs borne on epidermal papillae that are common in species of *Vaccinium* sect. *Conchophyllum*, and they apparently also have very small flowers (the stamens and the style remained attached on a young fruit of Feng 13561). *Agapetes chapaënsis* hence is best placed in *Vaccinium*. The epithet *chapaënsis* is occupied in *Vaccinium* (*V. chapaënsis* Merr.); the epithet *brevipedicellatum* chosen for this species alludes to the short pedicels.

Vaccinium brevipedicellatum cannot really be assigned to a section since its corolla is not known, but it has affinities with both sect. *Conchophyllum* (in which Wu placed the species—the stamens and the unicellular hairs grouped on epidermal papillae are similar) and sect. *Aëthopus* (the pedicel indumentum and the inflorescence type are similar, but the stamens are different, those of *V. paucicrenatum* Sleumer lacking spurs). However, it differs from both groups in that the vascular tissue in the petiole forms a closed circle. In all the small-leaved species of *Vaccinium* sects. *Aëthopus* and *Conchophyllum* that have been examined, the vascular tissue in the petiole is arcuate.

All the specimens of *Vaccinium brevipedicellatum* cited have characteristically corrugated leaves. Leaf shape is variable, and there is little difference between the types of *Agapetes chapaënsis* vars. *chapaënsis* and *oblonga*. The leaf blades on the two specimens from Vietnam seen are narrower than those on specimens from Yunnan, and if varieties based on leaf shape are to be recognized, specimens from Yunnan may form one variety, those from Vietnam another.

When Wu described *Vaccinium brevipedicellatum*, he was unaware of the earlier names for this taxon in *Agapetes*. He did not describe either stamens or styles.

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