

A Brief History of the Natural Genus *Vanda*

Seventeenth-century travelers to the Far East provided the first descriptions of vandas outside their native lands. In 1613, Alvim Semedo, a Jesuit who traveled in China, wrote of *tiao hua*, hanging flowers or air plants, which could exist for months suspended in air. These may have been vandas and aerides. The first plant referred to as *Vanda* to be recorded in Western literature, known in the vernacular as *Ponnampou-maravara*, was listed in *Hortus Indicus Malabaricus* (1703) by H. A. Rheede tot Drakenstein, a late-seventeenth-century governor of Malabar. Long known as *Vanda spathulata* (L.) Spreng. The plant is now designated as *Taprobanea spathulata*.

A German botanist working for the Dutch East India Company, Georg Eberhard Rumphius (1637-1706), recorded the first two species in the genus now known as *V. furva* (L.) Lindley, and *V. saxatilis* J. J. Smith. His work *Herbarium Amboinensis* (1741/50) appeared long after his death and was, of course, in non-Linnaean form. Linnaeus himself described one of Rumphius' species of *Vanda* as *Epidendrum furvum* in the second edition of *Species Plantarum* (1762).

The Genus *Vanda*

Even though Westerners continued to encounter vandas in Southeast Asia, the genus was not established until 1795 by Sir William Jones in *Asiatic Researches*, based on *Vanda roxburghii*; i.e., *V. tessellata* (Roxburgh) Hook ex. G. Don. Robert Brown in 1820 formally described this plant, referring it to Jones' concept; hence, in modern terms the genus is *Vanda* Jones ex R. Br. The generic epithet *Vanda* is from the Sanskrit word for the type species. The specific epithet honors Dr. William Roxburgh, the director of the Calcutta Botanical Gardens from 1793 to 1813.

William Roxburgh sent plants of this species and others to both Conrad Loddiges and Sir Joseph Banks and Banks flowered it for the first time in England in the autumn of 1817 in his stove at Spring Grove. Stoves were darkly painted greenhouses that were heated by furnaces to stifling temperatures in a misguided attempt to reproduce tropical conditions. *Vandas* were among the best adapted of tropical orchids to the abominably hot and humid conditions of these stove houses



Taprobanea spathulata was the earliest species discovered to be included in *Vanda*. Photo: Allan Hoffman

that were the first attempt at orchid culture in England. Their tendency to produce abundant aerial roots outside the primitive composts of the time saved them from untimely deaths due to fungal disease.

In the late 1830s, John Lindley began his work on the genus, describing *V. alpina* and *V. lamellata* in 1838, *V. cristata* in 1842, *V. hindsii* in 1843, *V. parvi-*

flora in 1844, and *V. coerulea* Griff ex Lindl. and *V. tricolor* in 1847. In 1848, Carl Ludwig Blume published *Rumphia*, an updating of Rumphius' respected work into Linnaean form, which added *V. furva*, *V. helvola*, *V. insignis*, *V. concolor*, and *V. limbata* to the known species. The genus had grown to a size and acceptance that warranted serious delineation.

Lindley's Concept of the Genus

Lindley published the first monograph of the genus in 1853 as one of his *Folia Orchidaceae*. He defines the genus as follows:

“The limits of this genus are very difficult to ascertain; they are here defined by a saccate or calcarate lip continuous with the column, a truncate rostellum, and two or four pollen-masses attached to a broad caudicle having a large circular gland. It is very near *Luisia*, which is better known by its habit than by any very satisfactory peculiarity of structure, except having a very short broad caudicle, and thin gland. Probably *V. Lowei* at least will be hereafter separated, if other species agreeing with it in its long drooping racemes and simple unguiculate lip should be discovered. The genus, as it now stands, may be divided into the following sections:

1. *FIELDIA*: Lip obscurely auriculate, incurved, entire, concave at the base, with a strong tooth at or above its middle. Pollen-masses four.
2. *EUVANDA*: Lip auriculate, straight, variously lobed, spurred, even or furrowed (usually with a tooth or callus in front of the spur).

3. *LAMELLARIA*: Lip auriculate, straight, variously lobed or entire, spurred, bearing from one to three perpendicular plates.
4. *ANOTA*: Lip without auricles, contracted and lobed at the point, spurred, with a pair of hairy elevated veins.
5. *CRISTATAE*: Lip auriculate, straight or recurved, quite naked, saccate or excavated at the base.”

Of these five sections, two are referred by twentieth-century botanists to other genera: *Fieldia* to *Vandopsis* and the related genus *Dimorphorchis*, and *Anota* to *Rhynchostylis*. With the four species of these two sections eliminated, from a modern view 21 remained in the genus as defined by Lindley in 1853. This would include the species of section *Cristatae* which have been placed in the genus *Trudelia* but have recently been shown by DNA evidence to be properly in *Vanda*. Of Lindley’s species, three are now referred to other genera: *Vanda cathcartii* is now reckoned *Esmeralda cathcartii*; *V. Sulingii*, *Armadorum sulingii*; and *V. teres*, *Papilionanthe teres*. Lindley’s *V. suavis* considered a variety of *V. tricolor* by some botanists, is here returned to species status. By the mid-nineteenth century, only 15 to 16 valid species of *Vanda* were known.

Lindley’s concept of the genus was well formed and well founded but still evolving. He later relegated 7 other species previously attributed to the genus—including 5 species he had previously included in *Vanda*—to four other genera.

With Lindley’s synopsis of the genus, *Vanda* became a clearly established concept from the mid-nineteenth century onward. His sections *Euvanda*, *Lamellaria*, and *Cristatae* form the modern basis of the genus, with only the last section subject to redefinition by Leslie Garay as *Trudelia*, a concept contradicted by DNA evidence which places this group in fact closest to the type species *V. tessellata*. The attribution of species that properly belong in other genera to *Vanda* continued well into the twentieth century, but Lindley’s basic concept of the genus has prevailed. All of the species generally accepted as *Vanda* by contemporary botanists fit Lindley’s definition and could



Phalaenopsis hygrochila was long thought a species of *Vanda*. Photo: Alan Hoffman

be placed roughly in one of his sections but DNA offers a more expansive analysis yielding 14 sections. The more expansive view of the genus based on DNA evidence also includes the plants formerly placed in the genera *Ascocentrum*, *Christensonia*, *Eparmatostigma*, and *Neofinetia*.

Additions to the Genus

In the 1850s and 60s, three more valid species were added to the genus: *V. lilacina* Teijsm. & Binn. in 1862, *V. bensonii* Bateman in 1866, and *V. denisoniana* Benson & Rchb.f in 1869. From the nineteenth-century horticultural perspective, *Vanda denisoniana* was the most significant of them. The pale-yellow *Vanda denisoniana* caused quite a stir as the novelty of a white *Vanda* aroused the orchid community. It was thought to be a “very chaste and desirable species” (Williams 1894) in Victorian England, and one clone received a First Class Certificate (FCC) in 1869 from the Royal Horticultural Society.

Most of the valid species published in the mid- to late-nineteenth century were described by Heinrich Gustav Reichenbach, the son of the famous German taxonomist, Heinrich Gottlieb Ludwig Reichenbach. After his friend Lindley’s death, Reichenbach became the undisputed premier of orchid taxonomy. In addition to *V. stangeana* and *V. denisoniana*, Reichenbach described *V. hastifera* in 1876, *V. sanderriana* in 1882, and *V. dearei* in 1886, most of these being published and illustrated in the *Gardeners’ Chronicle*, for which he wrote a weekly article from 1865 till 1889.

In the 1890s, Joseph Dalton Hooker added two species to the genus, *V. pumila* (1890) (now *V. flavobrunnea*) and *V. thwaitesii* (1898). In his *Flora of British India*, he divided the genus into 3 of Lindley’s sections, *Euvanda*, *Anota*, and *Cristatae*, eliminating Lindley’s section *Fieldia* and combining *Lamellaria* with *Euvanda*.

Robert Allen Rolfe’s additions to the genus began in the 1890s with the publication of *V. roeblingiana* and *V. celebica* and



Vandopsis lissochiloides was included in *Vanda* by Lindley in his section *Fieldia*. Photo: Allan Hoffman

continued into the first two decades of the twentieth century with the publication of *V. gibbsiae* in 1914 and *V. luzonica* Loher ex Rolfe in 1915. Johannes Jacobus Smith was also active in this period and on into the 1920s and 30s, publishing *V. foetida* (1906), *V. arcuata* (1907), *V. lombokensis* (1925), *V. saxatilis* (1926), and *V. devoogtii* (1932).



Rhynchostylis gigantea was included in *Vanda* by Lindley in his section *Anota*. Photo: Allan Hoffman

In addition to Rolfe and Smith, other botanists described

the bulk of the remaining valid species of *Vanda* during the early part of the century. Friedrich Richard Schlechter described *V. leucostele* and *V. sumatrana* in 1911; Achille Eugène Finet, *V. liouvillei* in 1912; Henry Nicholas Ridley, *V. punctata* in 1923; and Oakes Ames and Eduardo Quisumbing, *V. merrillii* in 1930.

With the exception of Richard Eric Holttum's *Vanda scandens*, no new species were added to the genus for over three decades until *V. subconcolor* was published by T. Tang and F. T. Wang in 1974. Ten years later, in 1984, came the publication of a species, *V. javierae* D.Tiu. *Vanda ustii* Golamco, Claustro & de Mesa, *V. bidupensis* Aver. & Christenson, were added to the genus in the next decade. One more species was added to the genus by Eric Christenson, who transferred *Aerides flabellata* to the genus as *V. flabellata* (Rolfe ex Downie) Christenson. The rather singular *V. spathulata* was assigned to its own genus by Christenson, who refers it to a new genus *Taprobanea*. In 1997, the author published *Vandas: Their Botany, History, and Culture*, the first modern attempt to treat the genus comprehensively.

The early 21st century has produced a considerable expansion of the genus as the result of discovery and herbarium and DNA research. The work of D. Metusala, P. O'Byrne and J.J. Vermeulen added *V. frankieana*, *V. jennae*, and *V. metusalae* to the genus. Chinese scientists, L.H. Zou, Z.J. Liu, Jiu X. Huang, S.C. Chen, added *V. funingensis*, *V. malipoensis*, and *V. xichangensis*. Dr. Leonid Averyanov has added *V. bienii*, and *V. gracilis*. The research team of L.M. Gardiner, M. Motes and D.L. Roberts added *V. alicae*, *V. cootesii*, *V. longitepala*, *V. mariae*, *V. mindanaoensis*, and

V. perplexa. Under the direction of Dr. David Roberts, Lauren Gardiner analyzed the DNA of all available *Vanda* species. The result of this research led the team to the modern concept of the genus *Vanda* divided into 14 sections, first presented in her doctoral dissertation and followed in this volume. The DNA evidence of Dr. Gardiner's study and others reveals that the former genera, *Ascocentrum*, *Christensonia*, *Eparmatostigma*, *Neofinetia*, and *Trudelia* are all part of the genus *Vanda sensu lato* and this conclusion is formally accepted in *Genera Orchidacearum* 6. Research for this volume has led to six more species described, one variety elevated to species status, one species reduced to a *forma*, two species reduced to subspecies, and one species transferred from *Rhynchosstylis* to *Vanda* and two species reduced to synonymy. With these changes the genus now comprises 87 species. More *Vanda* species may well be discovered, particularly as parts of the Philippines and the Indonesian archipelago as well as Indochina are still not fully explored. Hopefully, the accurate depictions of the known species presented in this volume will prove of great value to future researchers in identifying and describing new species.

Conservation of Species Vandas

One danger that looms over *Vanda* species is the rapid destruction of their habitats due to logging and the expansion of agriculture in the Old World tropics but the current lack of horticultural interest in the species themselves and in their primary hybrids exacerbates this danger for vandas. The decline in horticultural popularity of the species is easily apparent. Species and varieties of vandas that would have caused sensations in Victorian England have been introduced recently without creating the least interest in horticultural circles. Moreover, horticulturally significant species such as *Vanda insignis* have for a while virtually disappeared from cultivation.

This shortsightedness could easily lead to the elimination of many species that have never been widely grown in any case. Some species are also being driven out of cultivation by hybrids that those unfamiliar with the species assume to be "superior" forms. This appears clearly to be happening with *V. coerulea*, *V. luzonica*, *V. merrillii*, and *V. tessellata*. Indeed, as a group, *Vanda* species are perhaps more seriously endangered than any other large-flowered genus of orchids. One can only hope that their intrinsic beauty will again come to be appreciated before it might be gone forever. The task of ensuring that these handsome species plants are preserved in cultivation is one for both horticulturists and botanical gardens.

The Sections of *Vanda*

By the middle of the 19th century, the genus *Vanda* was sufficiently known and established for John Lindley to categorized it by sections. Of Lindley's five sections, two have now been recognized as separate genera: *Fieldia* as *Vandopsis* and *Anota* as *Rhynchostylis*. Of the three remaining, his section *Euvanda* has been expanded and divided and *Lamellata* and *Cristatae* still stand. In 1994, Eric Christenson added three more sections: *Longicalcarata*, *Obtusiloba* and *Deltoglossa*. In 2007, W. Suarez and J. Cootes added section *Dactylobata* and in 2012, Motes and W.E. Higgins added *Roeblingiana*. Modern DNA molecular analysis was first done comprehensively by Lauren Gardiner and published in *Renziana* in 2013, expanding the genus by the inclusion of species previously described as *Ascocentropsis*, *Ascocentrum*, *Eparmatostigma* and *Neofinetia* as sections and added the new section *Testacea*. The species attributed to *Trudelia* were returned to *Vanda*, further expanding the genus. Her molecular research established the affinity of *V. sandariana* and *V. lamellata* with the species previously place in section *Roeblingiana* and she placed those two species in that section. Reflection yielded the fact that Lindley's section *Lamellaria* had precedence and was the proper appellation but the section *Roeblingiana* is also retained here to emphasize the distinct lip morphology of those three species and their obvious affinity with one another.

As more molecular analysis is done, more precise definitions of the relationships between species will be discovered and sectional limits will need to be modified. The organization of this book by sections is intended to facilitate the recognition of the differences between related species and aid recognition of the morphological and molecular characteristics which separate related species.

Description of the Sections

Section/group	Species	Key morphological characters	Geographic distribution
<i>Vanda</i> 10 species	<i>V. bidupensis</i> Aver. & Christenson <i>V. concolor</i> Blume <i>V. esquirolii</i> Schltr. <i>V. fuscoviridis</i> Lindl. <i>V. gracilis</i> Aver. <i>V. motesiana</i> Choltco <i>V. petersiana</i> Schltr. <i>V. tessellata</i> (Roxb.) Hook. ex G. Don <i>V. thwaitesii</i> Hook. f. <i>V. wightii</i> Rchb. f.	<ul style="list-style-type: none"> ▶ Small side lobes on labellum, sometimes pointed in shape ▶ Fleshy labellum ▶ Rounded column 	Mainland Asia and adjacent islands, Sri Lanka, Indian sub-continent, Himalayas, southern China, Indochina
<i>Ascocentropsis</i> 3 species	<i>V. hienii</i> (Aver. & V.C. Nguyen) Kumar & S.W. Gale <i>V. malipoensis</i> L.H. Zou, J.X. Huang, & S.J. Lui <i>V. nana</i> L.M. Gardiner	<ul style="list-style-type: none"> ▶ Brightly colored flowers on short spikes. ▶ Side lobes closed over entrance to spur 	Vietnam
<i>Ascocentrum</i> 10 species	<i>V. ampullacea</i> (Roxb.) L.M. Gardiner <i>V. aurantiaca</i> (Schltr.) L.M. Gardiner <i>V. aurea</i> (J.J. Sm.) L.M. Gardiner <i>V. christensoniana</i> (Haager) L.M. Gardiner <i>V. curvifolia</i> (Lindl.) L.M. Gardiner <i>V. garayi</i> (Christenson) L.M. Gardiner <i>V. insulara</i> (Christenson) L.M. Gardiner <i>V. karinae</i> Motes <i>sp. nov.</i> <i>V. miniata</i> (Lindl.) L.M. Gardiner <i>V. rubra</i> (Lindl.) L.M. Gardiner	<ul style="list-style-type: none"> ▶ Diminutive size and compact growth habit ▶ Small brightly colored flowers ▶ Nectar filled spur ▶ Bird pollinated 	Himalayas, southern China, Indochina, through to Philippine and Indonesian archipelagos
<i>Cristatae</i> 6 species	<i>V. alpina</i> (Lindl.) Lindl. <i>V. cristata</i> Wall. ex Lindl. <i>V. flavobrunnea</i> Rchb. f. <i>V. griffithii</i> Lindl. <i>V. longitepala</i> D.L. Roberts, L.M. Gardiner & Motes <i>V. sathishii</i> Motes <i>sp. nov.</i>	<ul style="list-style-type: none"> ▶ Fleshy labellum ▶ Labellum with minimal spur ▶ Tepals yellow-green in color ▶ Often with deep red/purple markings on labellum 	Himalayas, one species in Indonesia

Section/group	Species	Key morphological characters	Geographic distribution
<i>Dactylobata</i> 10 species	<i>V. aliciae</i> Motes, L.M.Gardiner & D.L.Roberts <i>V. celebica</i> Rolfe <i>V. crassiloba</i> Teijsm. & Binn. ex J.J.Sm. <i>V. frankieana</i> Metusala & P.O'Byrne <i>V. gibbsiae</i> Rolfe <i>V. hastifera</i> Rchb.f. <i>V. lindenii</i> Rchb.f. <i>V. mindanaoensis</i> Motes, L.M.Gardiner & D.L.Roberts <i>V. saxatilis</i> J.J. Sm. <i>V. scandens</i> Holttum	<ul style="list-style-type: none"> ▶ Distinct appendages (lobules) on labellum midlobe 	Philippine and Indonesian archipelagoes
<i>Deltoglossa</i> 25 species	<i>V. arcuata</i> J.J.Sm. <i>V. bartholomewii</i> Motes <i>sp. nov.</i> <i>V. cootesii</i> Motes <i>V. dearei</i> Rchb.f. <i>V. devoogtii</i> J.J.Sm. <i>V. emiliae</i> Motes <i>sp. nov.</i> <i>V. floresensis</i> Motes <i>sp. nov.</i> <i>V. foetida</i> J.J.Sm. <i>V. furva</i> (L.) Lindl. <i>V. helvola</i> Blume <i>V. hindsii</i> Lindl. <i>V. insignis</i> Blume <i>V. jennae</i> P.O'Byrne & Verm. <i>V. limbata</i> Blume <i>V. lombokensis</i> J.J.Sm. <i>V. luzonica</i> Loher ex Rolfe <i>V. mariae</i> Motes <i>V. merrillii</i> Ames & Quisumb. <i>V. metusalae</i> P.O'Byrne & J.J.Verm <i>V. perplexa</i> Motes & D.L.Roberts <i>V. punctata</i> Ridl. <i>V. suavis</i> Lindl. <i>V. sumatrana</i> Schltr. <i>V. tricolor</i> Lindl. <i>V. ustii</i> Golanco, Claustro & de Mesa	<ul style="list-style-type: none"> ▶ Cylindrical column with thickened base ▶ Lip triangular 	Indonesian and Philippine archipelagos

Section/group	Species	Key morphological characters	Geographic distribution
<i>Eparmatostigma</i> 1 species	<i>V. dives</i> (Rchb.f.) L.M.Gardiner	<ul style="list-style-type: none"> ▶ Small white flowers, on pendulous spikes. ▶ Stigma swollen. 	Laos, Vietnam
<i>Flabellata</i> 4 species	<i>V. coelestis</i> (Rchb.f.) Motes <i>comb. nov.</i> <i>V. flabellata</i> (Rolfe ex Downie) Christenson <i>V. lilacina</i> Teijsm. & Binn. <i>V. vietnamica</i> (Haager) L.M.Gardiner	<ul style="list-style-type: none"> ▶ Labellum attached to column foot 	Indochina
<i>Lamellaria</i> 2 species	<i>V. lamellata</i> Lindl. <i>V. sanderiana</i> (Rchb.f.) Rchb.f.	<ul style="list-style-type: none"> ▶ Flowers with distinctly marked lateral sepals and distinct lamellia on midlobe of lip 	Philippines and adjacent islands
<i>Longicalcarata</i> 2 species	<i>V. coerulea</i> Griff. ex Lindl. <i>V. coerulescens</i> Griff.	<ul style="list-style-type: none"> ▶ Blue coloration to tepals and labellum ▶ Long flower spikes, sometimes branched 	Himalayas, India, Nepal, Bhutan, China, Indochina
<i>Neofinetia</i> 1 species, 2 subspecies	<i>V. falcata</i> (Thunb.) Beer subsp. <i>falcata</i> Motes subsp. <i>nov.</i> <i>V. falcata</i> (Thunb.) Beer subsp. <i>richardsiana</i> (E.A. Christenson) Motes subsp. <i>nov.</i> <i>V. falcata</i> (Thunb.) Beer subsp. <i>xichangensis</i> (Z.J.Lui & S.C.Chen) Motes subsp. <i>nov.</i>	<ul style="list-style-type: none"> ▶ White flowers ▶ Long nectar filled spur ▶ Moth pollinated 	China, Japan, eastern Asia
<i>Obtusiloba</i> 5 species	<i>V. bicolor</i> Griff. <i>V. brunnea</i> Rchb.f. <i>V. denisoniana</i> Benson & Rchb.f. <i>V. gardinerae</i> Motes <i>sp. nov.</i> <i>V. vipanii</i> Rchb.f.	<ul style="list-style-type: none"> ▶ Orbicular side lobes on labellum ▶ Large, fleshy labellum ▶ Labellum often pandurate ▶ Minimal spur on labellum 	Indochina and adjacent Himalayas
<i>Roeblingiana</i> 3 species	<i>V. barnesii</i> W.E.Higgins & Motes <i>V. javierae</i> D.Tiu ex Fessel & Lückel <i>V. roeblingiana</i> Rolfe	<ul style="list-style-type: none"> ▶ Cylindrical column without thickened base ▶ Usually modified/embellished labellum midlobe 	Philippines, Luzon
<i>Testacea</i> 5 species	<i>V. bensonii</i> Bateman <i>V. funingensis</i> L.H.Zou & Z.J.Liu <i>V. liouvillei</i> Finet. <i>V. parviflora</i> Lindl. <i>V. testacea</i> (Lindl.) Rchb.f.	<ul style="list-style-type: none"> ▶ Compact plants ▶ Distinctly spurred labellum 	Indian subcontinent, Indochina

The Sections of the Genus