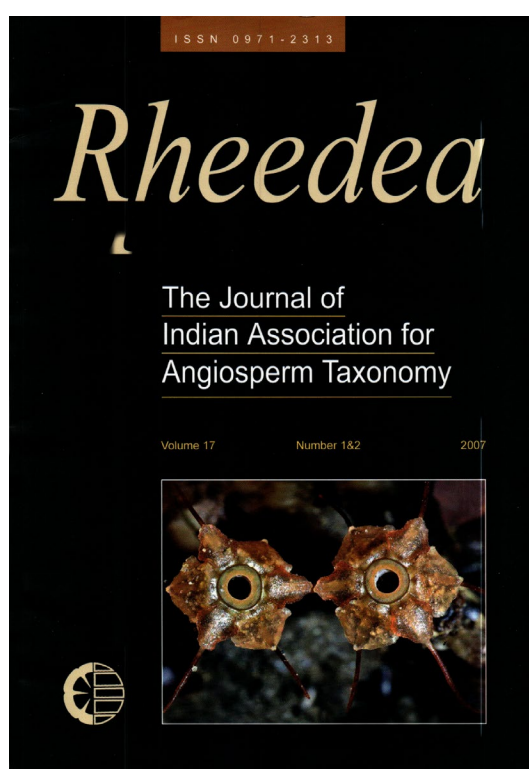




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Linnaeus' Orchids*

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Abstract

Linnaeus' work on orchids can be traced back to the year 1737 in the first edition of his *Genera Plantarum*. His first work devoted to orchids was published in 1740 and formed the basis for his account in *Species Plantarum* published in 1753, in which he gave each species a binomial name. Given the overwhelming number of orchids, he included surprisingly few in *Species Plantarum*. This reflected the European origin of modern botany and the concentration of extra-European exploration on other matters such as conquest, gold, and useful plants. Nevertheless, the scope of Linnaeus' work is broad, including plants from as far afield as India, Japan, China and the Philippines to the East and eastern Canada, the West Indies and northern South America to the west. Linnaeus captured the first flowering of plant exploration in this book, an occupation that he did much to stimulate through his adventurous students such as Afzelius, Förrskål, Thunberg and Persoon.

Introduction

2007 is the 300th anniversary of the birth of Carl Linné (Linnaeus) who was born on 23rd May 1707 in Råshult, southern Sweden, the son of Nils Linnaeus, a pastor. He enrolled at the University of Lund in 1727 but, on the advice of the botanist Rothman, moved to the University of Uppsala in September 1728. In 1729, he received his first appointment as lecturer in mineralogy at Uppsala. He began to write botanical books in 1730, his earliest major works being *Bibliotheca botanica*, *Classes Plantarum* and *Critica botanica*. In 1732, he visited Lapland, his first botanical expedition and the resulting *Florula Lapponica* (1735) was his first floristic account. In 1735, he travelled to Germany, Denmark and Holland, thriving centres of botanical research, where he met the influential botanists J.F. Gronovius, Boerhaave and J. Burman. In 1736, he made his first visit to England at the expense of his patron George Clifford (1685-1760), an Anglo-Dutch financier and plant lover whose living and preserved plant collections he was cataloguing: *Hortus Cliffortianus* published in 1738 is often considered the forerunner to Linnaeus' *Species Plantarum*. On this trip he met Philip Miller, the curator of the Chelsea Physic Garden. His influential *Genera Plantarum* was published in 1737 and went through four more editions in his lifetime (1742, 1743, 1753, 1754). In 1741, he was appointed Professor of

Medicine and Botany at Uppsala. His seminal work *Species Plantarum*, an attempt to catalogue the world's plants, was begun in 1748 and finally published in 1753. Orchids appear in both *Genera Plantarum* and *Species Plantarum*. He died on 10th January 1778 at the age of 70, but his work continued under the supervision of his son and his many students.



Figure 1. Carolus Linnaeus (1707-1778).

* We publish this invited article as a tribute to coincide with the birth tercentenary celebrations of Carolus Linnaeus – Editors.

Of course, he was not the first botanist to describe orchids. European orchids were described and often illustrated by engravings from wood blocks in many of the renaissance herbals. Tropical orchids began to be recognised, illustrated and described in the works of Kaempfer, Morison, Petiver, Plukenet, Sloane and van Rheede.

Linnaeus' first summary of the orchids appeared in 1737 in the first edition of his *Genera Plantarum*. He listed and described eight orchid genera viz.: *Orchis*, *Satyrium*, *Serapias*, *Herminium*, *Neottia*, *Ophrys*, *Cypripedium* and *Epidendrum*. The inclusion of *Cypripedium* in the orchids is significant because it has two stamens, whereas all the others have only a single anther. However, in the other genera, Linnaeus considered each anther locule to be a stamen, hence their inclusion with *Cypripedium* in Linnaeus' Class XX Gynandria Diandria. In 1742, he added a further genus *Limodorum* in the second and subsequent editions of *Genera Plantarum*.

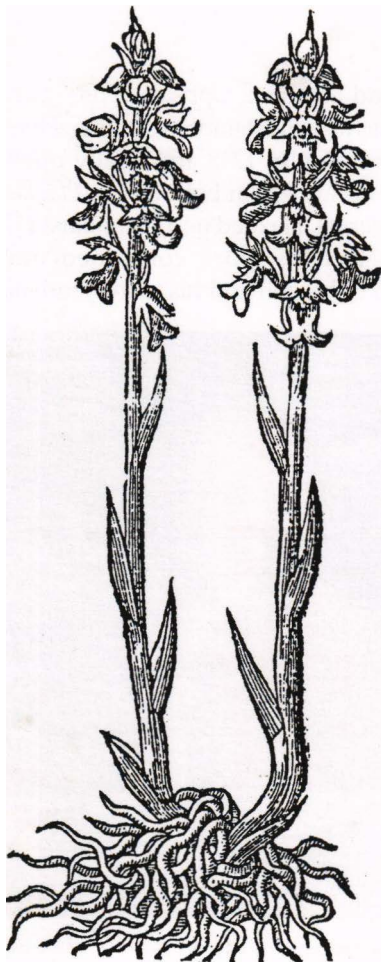


Figure 2. *Neottia nidus-avis* (L.) Rich. – Illustration from Matthias de Lobel's (1538-1616) *Stirpia adversaria nova* of 1570.

Linnaeus' early and often overlooked monograph on orchids, entitled '*Species Orchidum et affinium plantarum*', appeared in 1740 in *Acta Societatis Regiae Scientiarum*. Oakes Ames, the eminent American orchid specialist, annotated the copy at Harvard as follows: "This is the oldest comprehensive treatment on orchids". Its obscurity can be traced to its use of the old Latin names rather than binomials and because it was superseded by his later account of orchids in his *Species Plantarum* (1753) in which binomials were used. In it he described 36 species in nine genera. He relates all of the species to those published by earlier authors, grouping those that refer to the same species. In all, he refers to over 70 previous publications, mostly herbals or accounts of expeditions. Amongst the most frequently referred to are the works of Bauhin, Brunfels, Caesalpino, Clusius, Commerson, Dalechamp, Dodoens, Fuchs, Gronovius, Kaempfer, L'Obel, Morison, Petiver, Plukenet, Rudbeck, Sloane and Tournefort. Most were later honoured by Linnaeus with genera named in their honour.

A few more orchids (see Table 1) were included in *Species Plantarum* of 1753. This publication is now used as the starting point for all plant nomenclature because he consistently applied binomial names to the plants included in the work. It is often stated that Linnaeus was the first to use binomials but that is not the case. For example, the Swiss botanist Caspar Bauhin (1560-1624) used them almost a century and a half earlier in his *Pinax theatri botanici* (1596), but he was not consistent and many plants were listed under their longer Latin descriptive names.

Linnaeus attempted to cover all of the world's known plants and listed 64 species of orchids in eight genera: *Orchis*, *Satyrium*, *Ophrys*, *Serapias*, *Limodorum*, *Arethusa*, *Cypripedium* and *Epidendrum*. *Herminium*, which he had earlier accepted, was subsumed in *Ophrys*. The bulk of these are temperate orchids from Europe, Siberia or temperate North America. However, a surprising number originated in tropical countries including India, Sri Lanka, Java, China, Japan, the Philippines and Jamaica.

Linnaeus' orchid genera

Linnaeus' genera are still recognised but each is circumscribed rather differently. Indeed, nowadays, his orchids fall into some 47, rather than eight, genera. The orchid account in *Species Plantarum* demonstrates clearly how little Linnaeus and his contemporaries knew about tropical and southern hemisphere plants. He and his contemporaries had an essentially Euro-



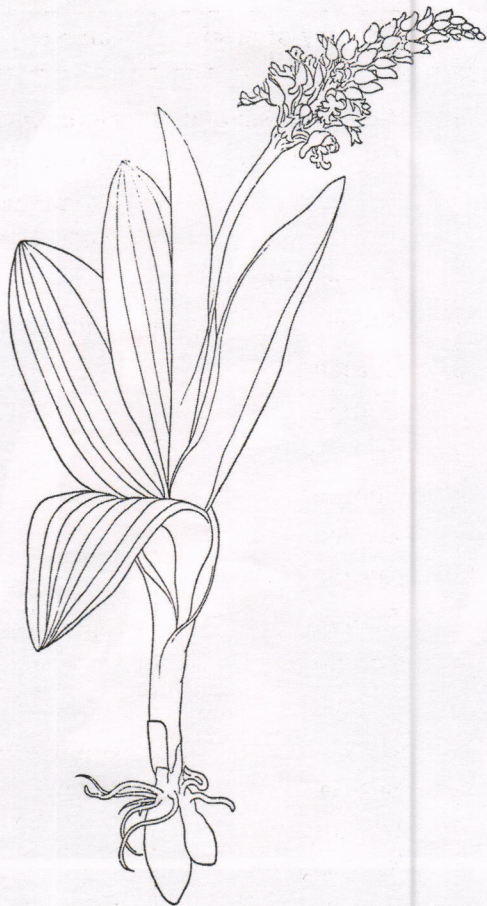


Figure 4. *Orchis militaris* L., the type of the genus *Orchis* and of the family Orchidaceae: Illustration from *De historia stirpium* (1542) by Leonhard Fuchs (1501-1566).

centric view of the natural world. Even his knowledge of European plants was skewed towards those in central and northern Europe reflecting the difficulty of travel in southern and south-eastern Europe, the latter largely under the control of the Ottoman Turks.

His sources

Linnaeus travelled quite widely in northern and western Europe but never to the tropics. For information on tropical orchids he relied on the knowledge of earlier and contemporary authors and collectors who had travelled to Asia and the Americas. Several notable explorers collected plants and brought specimens, mostly pressed, back with them.

The German botanist J.G. Gmelin explored Siberia and discovered several orchids including *Cypripedium*

in India and Java. His collections included *Cymbidium ensifolium* in China and *Phalaenopsis amabilis* in Java (not India as stated by Linnaeus) (Figure 7 of Linnaeus' specimen *P. amabilis* in his own herbarium). Engelbert Kaempfer went even further afield and visited Japan where he collected *Dendrobium moniliforme*. En route, he collected *Arachnis flos-aeris* in Java. The impressive volumes of van Rheedé's *Hortus Malabaricus* (1703) listed a number of southern Indian orchids, including *Cymbidium aloifolium*, *Dendrobium ovatum*, *Rhynchostylis retusa* and *Vanda spathulata* which were originally named by Linnaeus.

Linnaeus recorded a number of orchids from the Americas in *Species Plantarum*. Twelve were North American and Canadian species, including *Platanthera psychodes*, *P. flava*, *Cypripedium acaule*, *C. parviflorum*, *Galearis spectabilis*, *Arethusa bulbosa* and *Spiranthes cernua*. He obtained his information from the publications of the Swedish botanist Gronovius, and publications of the English explorers Mark Catesby, Leonard Plukenet and Richard Morison. A few tropical American orchids were also listed, notably those collected by Sir Hans Sloane, the founder of the British Museum, who contributed

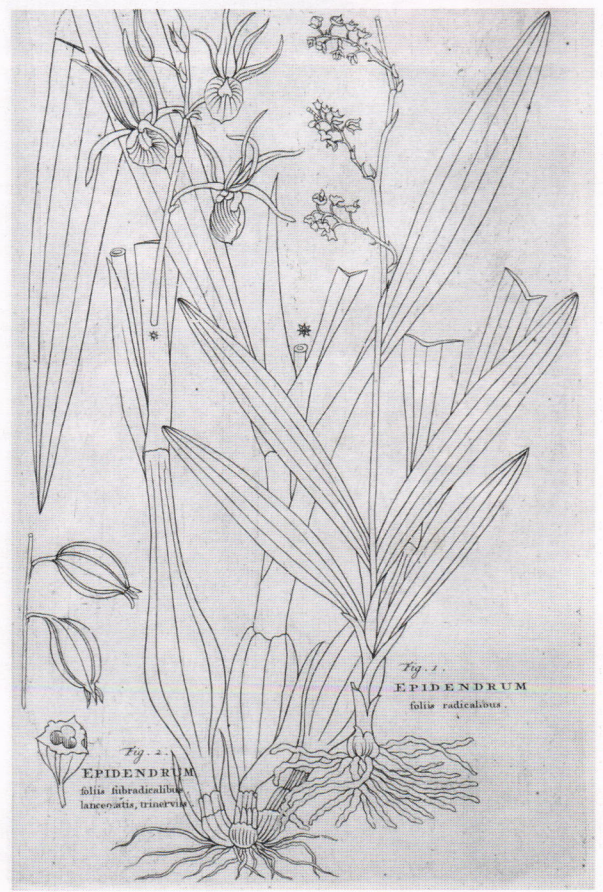


Table 1: Species of orchids listed in the first edition of Linnaeus' *Species Plantarum* (1753).

Linnaeus' species	Accepted name	Country of origin	Source
<i>Orchis susannae</i>	<i>Pecteilis susannae</i>	Amboina, Maluku	Hermann
<i>Orchis ciliaris</i>	<i>Platanthera ciliaris</i>	USA, Canada	Morison Gronovius Rafinesque
<i>Orchis bifolia</i>	<i>Platanthera bifolia</i>	Europe	
<i>Orchis cucullata</i>	<i>Neottianthe cucullata</i>	Siberia	Gmelin
<i>Orchis pyramidalis</i>	<i>Anacamptis pyramidalis</i>	Europe	
<i>Orchis coriophora</i>	<i>Anacamptis coriophora</i>	Europe	
<i>Orchis cubitalis</i>	<i>Peristylis cubitalis</i>	Sri Lanka	
<i>Orchis morio</i>	<i>Anacamptis morio</i>	Europe	
<i>Orchis ustulata</i>	<i>Neotinea ustulata</i>	Europe	
<i>Orchis militaris</i>		Europe	
<i>Orchis latifolia</i>	<i>Dactylorhiza incarnata</i>	Europe	
<i>Orchis maculata</i>	<i>Dactylorhiza maculata</i>	Europe	
<i>Orchis conopsea</i>	<i>Gymnadenia conopsea</i>	Europe	
<i>Orchis flava</i>	<i>Platanthera flava</i>	USA	Gronovius
<i>Orchis fuscescens</i>	<i>Tulotis fuscescens</i>	Siberia	Gmelin
<i>Orchis strateumatica</i>	<i>Zeuxine strateumatica</i>	Sri Lanka	
<i>Orchis abortiva</i>	<i>Limodorum abortivum</i>	Europe	
<i>Orchis psychodes</i>	<i>Platanthera psychodes</i>	Canada	Gronovius Kalmius Gronovius
<i>Orchis spectabilis</i>	<i>Galearis spectabilis</i>	USA	
<i>Satyrium hircinum</i>	<i>Himantoglossum hircinum</i>	Europe	
<i>Satyrium viride</i>	<i>Coeloglossum viride</i>	Europe	
<i>Satyrium nigrum</i>	<i>Gymnadenia nigra</i>	Europe	
<i>Satyrium albidum</i>	<i>Leucorchis albida</i>	Europe	
<i>Satyrium epipogium</i>	<i>Epipogium aphyllum</i>	Siberia	
<i>Satyrium repens</i>	<i>Goodyera repens</i>	Europe	
<i>Ophrys nidus-avis</i>	<i>Neottia nidus-avis</i>	Europe	
<i>Ophrys corallorhiza</i>	<i>Corallorhiza trifida</i>	Europe	
<i>Ophrys spiralis</i>	<i>Spiranthes spiralis</i>	Europe	
<i>Ophrys cernua</i>	<i>Spiranthes cernua</i>	USA, Canada	
<i>Ophrys ovata</i>	<i>Listera ovata</i>	Europe	
<i>Ophrys cordata</i>	<i>Listera cordata</i>	Europe	
<i>Ophrys lilifolia</i>	<i>Liparis lilifolia</i>	USA, Canada	Gronovius
<i>Ophrys loeselii</i>	<i>Liparis loeselii</i>	Europe	
<i>Ophrys paludosa</i>	<i>Hammarbya paludosa</i>	Europe	
<i>Ophrys monophyllos</i>	<i>Malaxis monophyllos</i>	Europe	
<i>Ophrys monorchis</i>	<i>Herminium monorchis</i>	Europe	

<i>Ophrys alpina</i>	<i>Chamorchis alpina</i>	Europe	
<i>Ophrys camtschatea</i>	<i>Neottia camtschatea</i>	Siberia	
<i>Ophrys anthropophorum</i>	<i>Orchis anthropophorum</i>	Europe	
<i>Ophrys insectifera</i>		Europe	
<i>Ophrys myodes</i>	<i>Ophrys insectifera</i>	Europe	
<i>Ophrys adrachnites</i>	<i>Ophrys sphegodes</i>	Europe	
<i>Serapias helleborine</i>	<i>Epipactis helleborine</i>	Europe	
<i>Serapias latifolia</i>	<i>Epipactis helleborine</i>	Europe	
<i>Serapias longifolia</i>	<i>Cephalanthera longifolia</i>	Europe	
<i>Serapias palustris</i>	<i>Epipactis palustris</i>	Europe	
<i>Serapias lingua</i>		Europe	
<i>Limodorum tuberosum</i>	<i>Bletia purpurea</i>	USA	Plumier
<i>Arethusa bulbosa</i>		USA, Canada	Gronovius Plukenet
<i>Arethusa ophioglossoides</i>	<i>Pogonia ophioglossoides</i>	USA, Canada	Gronovius, Plukenet, Morison
<i>Arethusa divaricata</i>	<i>Cleistis divaricata</i>	USA	Gronovius, Catesby
<i>Cypripedium calceolus</i>		Europe	
<i>Cypripedium calceolus â</i>	<i>Cypripedium parviflorum</i>	USA, Canada	Plukenet, Morison
<i>Cypripedium calceolus ã</i>	<i>Cypripedium acaule</i>	USA, Canada	Morison
<i>Cypripedium calceolus ä</i>	<i>Cypripedium guttatum</i>	Siberia	Gmelin
<i>Epidendrum vanilla</i>	<i>Vanilla mexicana</i>	Jamaica, tropical Americas	Plukenet, Catesby
<i>Epidendrum domesticum</i>	<i>Belemcanda chinensis</i>	Java	Kaempfer
<i>Epidendrum flos-aeris</i>	<i>Arachnis flos-aeris</i>	Java	Kaempfer
<i>Epidendrum tenuifolium</i>	<i>Cleisostoma tenuifolium</i>	India	Rheede
<i>Epidendrum spathulatum</i>	<i>Vanda spathulata</i>	India	Rheede
<i>Epidendrum ovatum</i>	<i>Dendrobium ovatum</i>	India	Rheede
<i>Epidendrum nodosum</i>	<i>Brassavola nodosa</i>	Jamaica	Hermann, Sloane
<i>Epidendrum carinatum</i>	<i>Dendrobium carinatum</i>	Philippines	Petiver
<i>Epidendrum aloifolium</i>	<i>Cymbidium aloifolium</i>	India	Rheede
<i>Epidendrum guttatum</i>	<i>Oncidium guttatum</i>	Jamaica	Sloane
<i>Epidendrum retusum</i>	<i>Rhynchostylis retusa</i>	India	Rheede
<i>Epidendrum amabile</i>	<i>Phalaenopsis amabilis</i>	'India'	Osbeck
<i>Epidendrum ensifolium</i>	<i>Cymbidium ensifolium</i>	China	Osbeck
<i>Epidendrum moniliforme</i>	<i>Dendrobium moniliforme</i>	Japan	Kaempfer



Figure 6. *Cymbidium aloifolium* (L.) Sw.—Illustration from Henrik van Rheede tot Draakestein's (1637-1691) posthumously published *Hortus Malabaricus* of 1693.

Brassavola nodosa, *Oncidium guttatum* and *Vanilla* from Jamaica, and Charles Plumier who discovered *Bletia purpurea* and *Prosthechea cochleata* in the West Indies.

Orchids in Linnaeus' Herbarium (LINN)

Linnaeus' Herbarium, now housed in Burlington House in London, contains about 150 specimens arranged under ten generic names. Nowadays, the specimens would be allocated to over 40 genera. The majority are temperate species from Europe, North America and South Africa whereas a few are tropical. The number of South African orchids, in genera *Disa*, *Disperis*, *Eulophia*, *Habenaria*, *Pterygodium* and *Satyrium* is perhaps surprising, until it was realised that his student Anders Sparrmann, who visited the Cape, sent many plants to Linnaeus. Of the Asiatic species, *Cymbidium ensifolium* is represented by a fine, probably cultivated, specimen. Two sheets of *Phalaenopsis amabilis* survive (see Figure 7, photo of this specimen in Linnaeus' herbarium), in both of which the flowers are well-preserved. Two flowers of *Arachnis flos-aeris* are also preserved on separate sheets. Not all of the orchid specimens in Linnaeus' herbarium are the types of his orchid species. Indeed it is quite difficult to match up his specimens with his citations in *Species Plantarum* mainly because the annotations on the specimens are extremely sparse. Practically none have provenance or collector

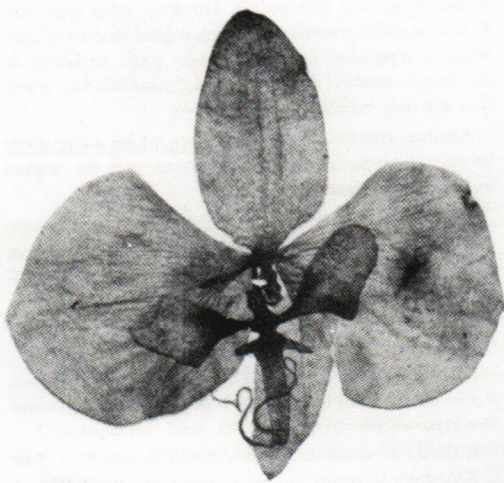


Figure 7. *Phalaenopsis amabilis* (L.) Blume—Specimen in Linnaeus' Herbarium at the Linnean Society, London.

information on them. Quite a few are, indeed, bereft of any annotations at all. Linnaeus had a pragmatic approach to his herbarium and freely exchanged specimens with his correspondents and pupils. If he acquired a better specimen than the one in his herbarium, then he would replace it and give away the earlier material. Nevertheless, his herbarium is full of interesting material. A detailed account of all of Linnaeus' plants and their typification has been published by Jarvis (2007).

Conclusion

The scientific naming and classification of orchids started over 250 years ago by Linnaeus, has progressed immeasurably since then. Nowadays, orchids are recognised as one of the two largest

families of flowering plants, whereas Linnaeus knew only about 113 by the time of his death. His relative ignorance of their diversity can be firmly placed on the Euro-centric origins of modern botany, the study of which he did so much to stimulate.

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