

Joel L. Schiff

Rare and Exotic Orchids

Their Nature and
Cultural Significance



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 Springer

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Preface

We cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well – for we will not fight to save what we do not love.

Stephen Jay Gould

In 1861, the year that Abraham Lincoln was inaugurated President of the United States, a Tiger orchid was planted across the world at the Singapore Botanic Gardens. It has seen the presidents of many countries come and go over the past 150 years, as that same original orchid is still thriving and currently on display for visitors of the twenty-first century and beyond. Similarly, some years later, a *Bulbophyllum ornatissimum*, purchased at an auction in 1887, found an agreeable home at the Glasnevin National Botanical Gardens in Dublin and has been growing there ever since.

An orchid produces new growth when the old growth withers and dies. Indeed, if properly cared for, this plant can grow indefinitely. This requires that the orchid grower replicate to a certain extent the growing conditions of its native habitat. Sometimes, those conditions are of steamy South American jungles or the montane rainforests of India, the highlands of New Guinea, the tropical dry forests of Mexico, or coastal lowlands of Brazil.

In a sense, orchids represent something we have lost. Many generations of our ancestors once lived in forested regions in close quarters with nature, but even for many of our grandparents, that might be only a distant memory. Yet traces of our natural heritage are still in our DNA, and so providing *Homo sapiens* with green sanctuaries is essential for coping with modern living.

Living as we do in our own urban jungle, many of us will never step foot in the places where such exotic orchids are endemic. Yet through the study and cultivation of such bizarre and beautiful plants, we can still honor the nature of these mysterious locations without ever leaving the familiarity of our own homes and gardens.

Orchids are like no other family of flowering plants. The endless diversity of form, color, and scent of their flowers; the unusual appearance of their vegetative growth – often with pseudobulbs beneath their leaves; and, of course, the unusual habit of a great many orchids (about 70%) found growing on the branches of trees as epiphytes, distinguish orchids as a fascinating group of flowering plants unlike any other on Earth.

For the above reasons, many people speak of growing orchids as they would of an intense addiction. Once you have started with a single plant, you quickly find yourself growing a second one, then three, then four, then before you know it, they have taken over your house and expanded into a separate greenhouse. Or perhaps you are among those who find themselves searching out or posting enumerable photographs of orchids on Facebook, Pinterest, Flickr, or other image and information-sharing websites such as the Orchid Board. In this day and age, you do not even have to grow orchids to become obsessed with them: an image of their exotic beauty alone is enough for some.

This book is intended for those who wish to embark on this long and slippery slope, or who perhaps already know a little about these unusual plants but now wish to deepen their knowledge in matters both technical and cultural. This is not a book about how to grow orchids – there are already many fine books on that subject. It is a book about the compelling and



Fig. 1 *Hummingbird Perched on the Orchid Plant*, painted by American artist Martin Johnson Heade (1819–1904), captures the exotic romance of the jungle (WikiCommons)



Fig. 2 Central Park in New York as viewed from above. The urge to be near nature is always there (Image courtesy Martin St-Amant/Wiki Commons)

complex history, biology, and etymology of these exotic breeds, touching upon a slew of other intriguing subjects along the way. And of course, it is also a book about sex, since orchids have mastered more procreative techniques than are found in the *Kama Sutra*.

This book does not attempt to cover the many thousands of orchid genera and species. Instead, it seeks to paint a portrait of this exotic world through a selection of some of the most interesting and unusual orchids on Earth. Perhaps the reader's favorite exotic orchid is not included. Yet many others will be, so enjoy this fascinating and unfamiliar journey.

Auckland, New Zealand
2017

Joel L. Schiff

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Nothing in science can account for the way people feel about orchids.

Susan Orlean in *The Orchid Thief*

Orchids are the most highly evolved and diverse flowering plant family on Earth. The origins of these plants date back millions of years. Exactly how old the family is, however, was a longstanding subject for debate, given that there were no remains in the ancient fossil record to work with. That is until recently, when scientists conducting research through Harvard University made an extraordinary discovery [1]. In 2005, a fossil of an extinct bee, *Proplebeia dominicana*, was recovered in the Dominican Republic. The bee specimen was dated to be 15–20 million years old (Fig. 1.1).

What is of interest here is not so much the bee but the orchid pollinia attached to the bee's back. This was determined to come from an orchid of the subtribe Goodyerinae and given the botanical name *Mellorchis caribea*. Using some sophisticated methods of analysis based on both the pollinia's morphology and the molecular genetics of related fossil plants, a date for the common ancestor of all present day orchids was calculated to be 76–84 (average 80) million years ago. Without giving an age, Charles Darwin said as much: "all Orchids owe what they have in common to descent from some monocotyledonous plant..." [2].

The above is remarkably consistent with very recent research (2016), by an international collaboration of fifteen "specialists in orchid systematics, phylogenetics, ecology, and biogeography," which came to the rather amazing conclusion that: "Orchids appear to have arisen in Australia between 102 and 120 million years ago ... then spread to the Neotropics via Antarctica between 79.7 and 99.5 million years ago, when all three continents were in close contact." [3]

Interestingly, this predates the extinction event of the dinosaurs 66 million years ago. Thus, some ancient orchids must have survived that mass extinction, after which they underwent an explosion of new orchid genera and species.

When we later discuss the crafty means by which some orchids are pollinated, the reader might be tempted to believe that these plants possess some kind of inherent intelligence. Indeed, in Chap. 4 we will see that when it comes to sex, various insects that do have a brain – albeit a small one – are no match for an ingenious orchid and millions of years of evolution. For example, some male insect species are not only duped into "mating" with an orchid and thereby pollinating it but even prefer to mate with the orchid flower instead of with females of their own species. Now that is cunning!

It should be mentioned that while orchids and other plants do not have a brain per se, they do have a very sophisticated *form of awareness* of their environment and in their ability to respond to it [4]. "[P]lants behave like little statisticians, making implicit inferences about their world through changes in their internal states," researchers Paco Calvo and Karl Friston maintain [5]. Whether this amounts to real intelligence or not in part comes down to how liberally one interprets the word "intelligence." However, some biologists do make claims for a *form of plant intelligence* [6] and have even gone on to create the new field of "plant neurobiology." Of course, this must be in a metaphorical sense, as plants do not have neurons, and admittedly, there is considerable controversy attending this whole issue. We will take an anthropomorphic view of orchid biology from time to

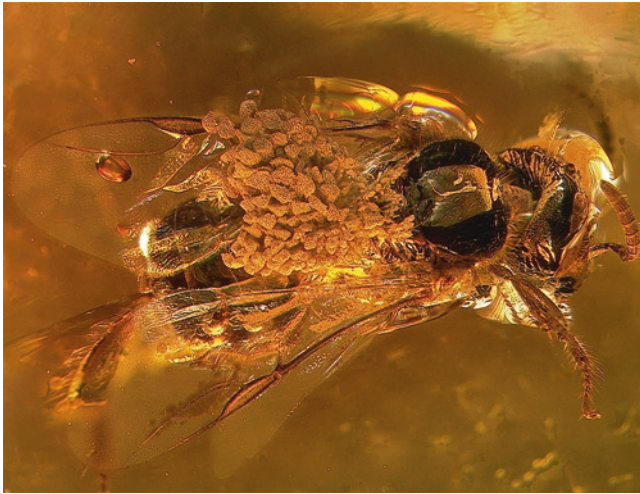


Fig. 1.1 The extinct fossil bee *Proplebeia dominicana* encased in amber with orchid pollinia attached to its back from the pollination of an ancient orchid species (Image courtesy Santiago R. Ramírez, Harvard University/UC Davis)

time, but only in a metaphorical sense in order to stimulate the reader's sense of wonder.

Ancient History

Seemingly the oldest known reference to orchids was made by the deified being and Father of Chinese medicine, Shen Nung (~2695 BC). In his *Materia Medica*, Shen mentions the medicinal properties of the *Dendrobium* orchid species.

Another ancient Chinese reference to orchids themselves (known as “lan”) comes from the *I Ching* (*Classic of Changes*), which dates back to between the ten and fourth centuries BC. Indeed, the Chinese philosopher Confucius (551–479 BC) had a special affection for the orchid and made several references to them in his writings:

The orchids grow in the woods and they let out their fragrance even if there is no one around to appreciate it. Likewise, men of noble character will not let poverty deter their will to be guided by high principles and morals.

If you are in the company of good people, it is like entering a room full of orchids.
(Translation by Alice Poon).

Orchids have long been used in traditional medicine in the Himalayan Kashmir region (see Appendix I), and they continue to be used in tradi-

tional medicine in various parts of the world. A very comprehensive treatment of the medicinal use of orchids throughout Asia, India (where orchid extracts have been used for centuries in Ayurvedic medicine), and the Middle East, can be found in the authoritative text *Medicinal Orchids of Asia* by medical doctor Eng Soon Teoh. Only a few highlights are touched upon in the present text.

The European orchid experience originates from the Mediterranean region, where various species of an orchid genus that has ovoid shaped tubers growing beneath the ground are found. We owe its flavorful history to the great Greek scholar, *Theophrastos* (ca. 371–287 B.C.), who in volume nine of his magnificent ten volume *Historia Plantarum* (*Enquiry into Plants*) first connected orchid tubers with sexual enhancement in a way that has bewitched the minds of male western civilization ever since. Indeed, the genus bears the name *Orchis*, the Greek word for testicle. Incidentally, these tubers are used to store starch for food during the arid summer months and recent research indicates that there may be some connection with male sexuality as discussed in the sequel regarding recent research into the drink ‘salep’ (Fig. 1.2).

Of course, one had to be careful which round tuber was utilized, as the larger of the two gave men sexual vigor, whereas the smaller tuber had the opposite effect. The Romans were not to be left out when it came to aphrodisiacs, as Pliny the Elder in his *Historia Naturalis* wrote of the sexual stimulation to be had from the tubers of the so-called *Satyrium* plant. The name derives from the wantonly sexual mythical figure of Satyr from Greek and Roman mythology, who in the latter had horns like a goat. The *Satyrium's* mythical powers of lust have even passed into literature:

In the meantime, the satyrium which I had drunk only a little while before spurred every nerve to lust and I began to gore Quartilla impetuously, and she, burning with the same passion, reciprocated in the game. From: Satyricon by Petronius, Ch.26, 1st century A.D.

The one who gave the *Orchis* its sexual enhancer seal of approval for the next 1500 years was the Greek physician and herbalist Pedanius Dioscorides (ca. 40–90 A.D.) in his *De Materia Medica*. This authoritative pharmacopeia of herbal medicine

Fig. 1.2 Two species of *Orchis*, known as *Satyrium* in England at the time, from *The Herball, or Generall Historie of Plantes*, by botanist and herbalist John Gerarde (London, 1597)

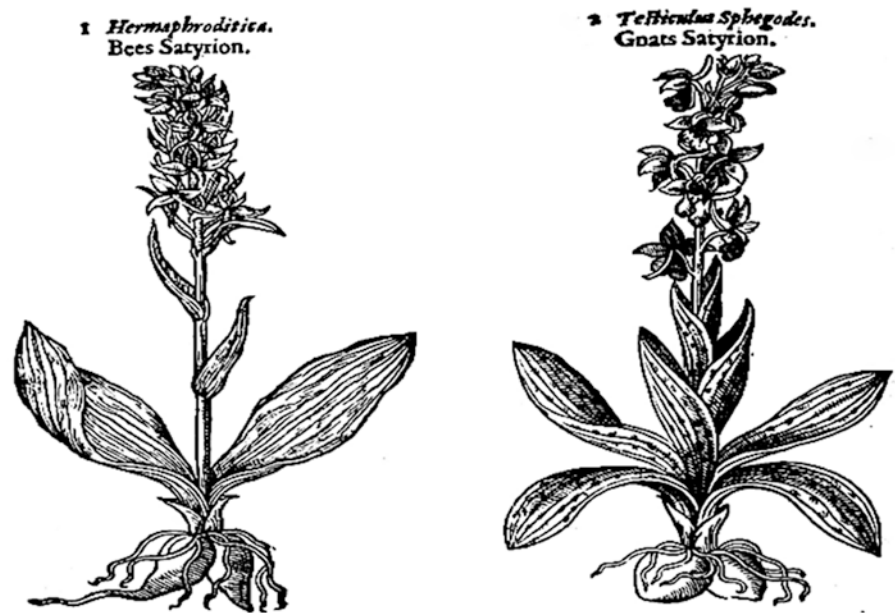


Fig. 1.3 A depiction of Dioscorides in a thirteenth-century Arabic edition of *De Materia Medica* (Image by permission of The Bodleian Library, University of Oxford, England)

was widely read and consulted during the Middle Ages and beyond (Fig. 1.3).

Not only do the *Orchis* tubers have a male sexual association, but the flowers of the species *Orchis italica* supposedly bear more than a passing resem-

blance to male figures. According to the *Doctrine of Signatures*, which was widely used among herbalists and supported by religious figures over the centuries, ailments afflicting certain parts of the body were to be treated by herbs that resembled the afflicted part. For example, the flowers of the herb Eyebright (*Euphrasia officinalis*), which look somewhat like eyes, were thought to treat eye complaints such as conjunctivitis, bloodshot eyes, and itching. This notion has even persisted into the twenty-first century regarding herbs such as Eyebright, which, as it so happens, does contain compounds that have been found to reduce inflammation [7]. Could it be that *Orchis italica* itself is expressing the notion that by consuming its tubers one will become similarly endowed? (Figs. 1.4 and 1.5).

Even today, a beverage known as *salep* (or *sahlab*), made from powdered *Orchis* tubers and milk, remains popular throughout the Middle East and India as it has been for centuries. It was even consumed in England in the 18th and 19th centuries, where it was known as Saloop and was less expensive than tea or coffee. According to *A Modern Herbal* by Mrs. Grieve:

... it was considered so important an article of diet as to constitute a part of the stores of every ship's company in the days of sailing ships and long voyages, an ounce dissolved in 2 quarts of boiling water, being considered sufficient subsistence for each man per day, should provisions run short [8].



Fig. 1.4 Perhaps a man will become as equally endowed as the flowers of this *Orchis italica* by consuming its testicular-like tubers (Image courtesy Luis Nunes Alberto/Creative Commons)

Often made from *Orchis mascula* and *Orchis militaris*, salep is a thick coffee substitute still regarded by some as a sexual tonic and prescribed for various sexually related complaints, if no longer for “disorders stemming from acrimony in the juices.” Additionally, a salep-flavored ice cream known as *dondurma* is popular in Turkey, and it can even be found in the author’s favorite Turkish restaurant down the road.

So strong was the belief that orchids were somehow entwined with sexual matters that by the nineteenth century, the English art critic John Ruskin described their flowers as “prurient apparitions.” He would have been referring to their general appearance, which one can interpret as sexually suggestive. It is fair to say however, that Ruskin might have been biased by the times and by a few

sexual issues of his own, having failed to consummate his 6-year marriage. Perhaps a little glass of salep would have helped (Fig. 1.6).

In 2009, an Indian study was conducted in order to investigate the reputed aphrodisiacal properties of salep [9]. In the study, adult male mice (specially bred for research purposes) were split into three groups. The first group was fed a 1% dose of gum acacia in water, the second group received powdered tubers of the medicinal terrestrial orchid *Eulophia nuda* (syn. *Euph. spectabilis*), and a third group was fed the powdered tubers of *Orchis latifolia* (syn. For *Dactylorhiza incarnata*), used for making salep. Note that the related species *Dactylorhiza hatagirea* (syn. *Orchis hatagirea*) appears in Appendix I as an aphrodisiac under Condition #11 (Figs. 1.7 and 1.8).

The results of this scientific study were as follows: No behavioral or physiological change was observed in the control group, but mounting behavior of the male mice was somewhat increased in the *Eulophia nuda* fed group and significantly increased in the *Orchis latifolia* group; increases in testosterone levels in the experimental groups, with up to 20% higher for the mice fed on *Orchis latifolia*; increased sperm count in the experimental groups, again more so with those mice fed *Orchis latifolia*; and lowered cholesterol as an added benefit in the experimental groups. The latter could be due to the substance *glucomannan*, a starchy polysaccharide that is a source of dietary fiber. It has been shown to reduce total cholesterol and may play a role in the treatment of type 2 diabetes. It should be mentioned that while these results seem promising, there are associated health risks with currently available glucomannan supplements, and so these supplements should be avoided. While animal studies are not always predictive of human response, there just may be something to the ancient beliefs about salep after all.

It should be noted that there is also an orchid genus *Satyrium*, a name given by Swedish botanist Olof Swartz (1760–1818), one of the first to classify orchids. It consists of more than 80 terrestrial orchids found in Africa, India, Sri Lanka, and

Fig. 1.5 “Saloop, the subject of this etching, has superseded almost every other midnight street refreshment, being a beverage easily made, and a long time considered as a sovereign cure for headache arising from drunkenness. It is a celebrated restorative among the Turks, and with us it stands recommended in consumptions, bilious cholics and all disorders stemming from acrimony in the juices.” From *Vagabondiana or Anecdotes of Mendicant Wanderers through the Streets of London*, by artist and engraver John Thomas Smith (London, 1839) (Image courtesy Bishopsgate Institute)



Smithfield Saloop.

China, with over 30 species from southern Africa. The flowers are non-resupinate (to be explained in Chap. 2, but essentially, the flowers appear to be upside-down) in a variety of colors with the lip having two spurs like a Satyr, which may have been the origin of the genus's name (Fig. 1.9).

Another agreeable orchid-derived drink was Faham tea, made from the fragrant leaves of *Jumellea fragrans* (syn. *Angraecum fragrans*), which grows in mountainous forests on Réunion Island, a dollop of France in the Indian Ocean east of Madagascar. Unlike tea from China, which contained caffeine and thus may induce unwelcome

wakefulness, Faham tea was reported to have medicinal properties that were “free from the sleepless effect.” Moreover, it had “a most agreeable perfume; after being drunk it leaves a most lasting fragrance in the mouth, and in a closed room the lasting fragrance of it can be recognized long after.” [10] Introduced to France, the tea became quite popular in the late 19th and early 20th centuries. However, due to the problems obtaining large quantities of leaves from difficult terrain, the tea was quite expensive, which meant that Faham tea was not really a viable long-term proposition (Fig. 1.10).



Fig. 1.6 This *Phalaenopsis deliciosa*'s enticing pink lip, adorned with yellow with its protruding column and male anther at the top containing packets of pollen, would indeed be thought of as a "prurient apparition" by Ruskin, as would its tasteful name (Image courtesy Alain Brochart)

Returning to Asia, the first full book devoted to orchids comes from China, Chao Shih-Keng's, *Chin Chan Lan Pu*, written in 1233. It described 20 orchid species and their cultivation. Another orchid book followed shortly after in 1247: *Lan Pu*, by Lang Kuei-Lsueh, which described 37 species.

One orchid that has a special place in the culture of the Japanese is the small epiphyte *Neofinetia falcata*. This particular orchid plant has been cultivated in Japan since at least the seventeenth century and is sometimes called the "Samurai Orchid" in reference to the samurai who grew them, although it can be found in China and Korea as well. One way for a feudal lord to curry favor with the 11th shogun Ienari Tokugawa (in office 1787–1837), himself a great admirer of this species, was to bring him an interesting orchid specimen. Even in today's Japanese business culture, giving an orchid gift, particularly a *Phalaenopsis*, is common practice between corporations [11].

Originally, the Samurai Orchid was named *Orchis falcata* by the Swedish naturalist Carl Peter

Thunberg, who brought the plant back from his travels in Japan (1775–76). After being part of several different genera over the ensuing years, the genus *Neofinetia* was created in 1925 and named by the notable Chinese taxonomist Hu Xiansu, in honor of the French botanist Achille Finet (1862–1913), who had studied the orchids of Japan and China. Kew now lists this orchid as *Vanda falcata*, with *Neofinetia falcata* as a synonym, whereas on The Plant List, it is just the reverse. Let us persist with *Neofinetia* in honor of Finet. Besides *falcata*, there are now two other recognized species of the *Neofinetia* genus. The flowers have a 3–5 cm nectar spur and a strong, beautiful fragrance, particularly in the evenings, that attracts two species of long-tongue hawkmoths for its pollination [12], as indicated by the table below (Fig. 1.11). The evolutionary aspects of a long nectar spur *vis-à-vis* the length of the pollinator's proboscis, including Darwin's hawkmoth, are discussed in Chap. 4.1.

The cultivation of *Neofinetia falcata* in Japan has a very aesthetic element. The ordinary plants in the wild are termed *fūran*, meaning "wind orchid." However, there are some plants that, due to mutations, exhibit some exceptional property of leaf or flower, and these are the *fūkiran*, meaning "orchid of wealth and nobility." These highly esteemed specimens have a status comparable to that of a noble art form [13]. Recent varieties have appeared with a slightly pink stem and are also highly sought after (Fig. 1.12).

Nineteenth Century Orchid Mania

An interesting thing happened in seventeenth century Holland. The tulip, introduced a few years before the new century began, was becoming enormously popular, especially among members of the new mercantile class. Solid-colored forms and especially variegated forms were highly sought after, and as demand soared, prices did as well, sometimes to astronomical levels for single prized bulb. Futures contracts were developed whereby a buyer and seller would agree on a fixed price for bulbs, to be payable at the end of the tulip season. All manner of speculative practices bloomed, and

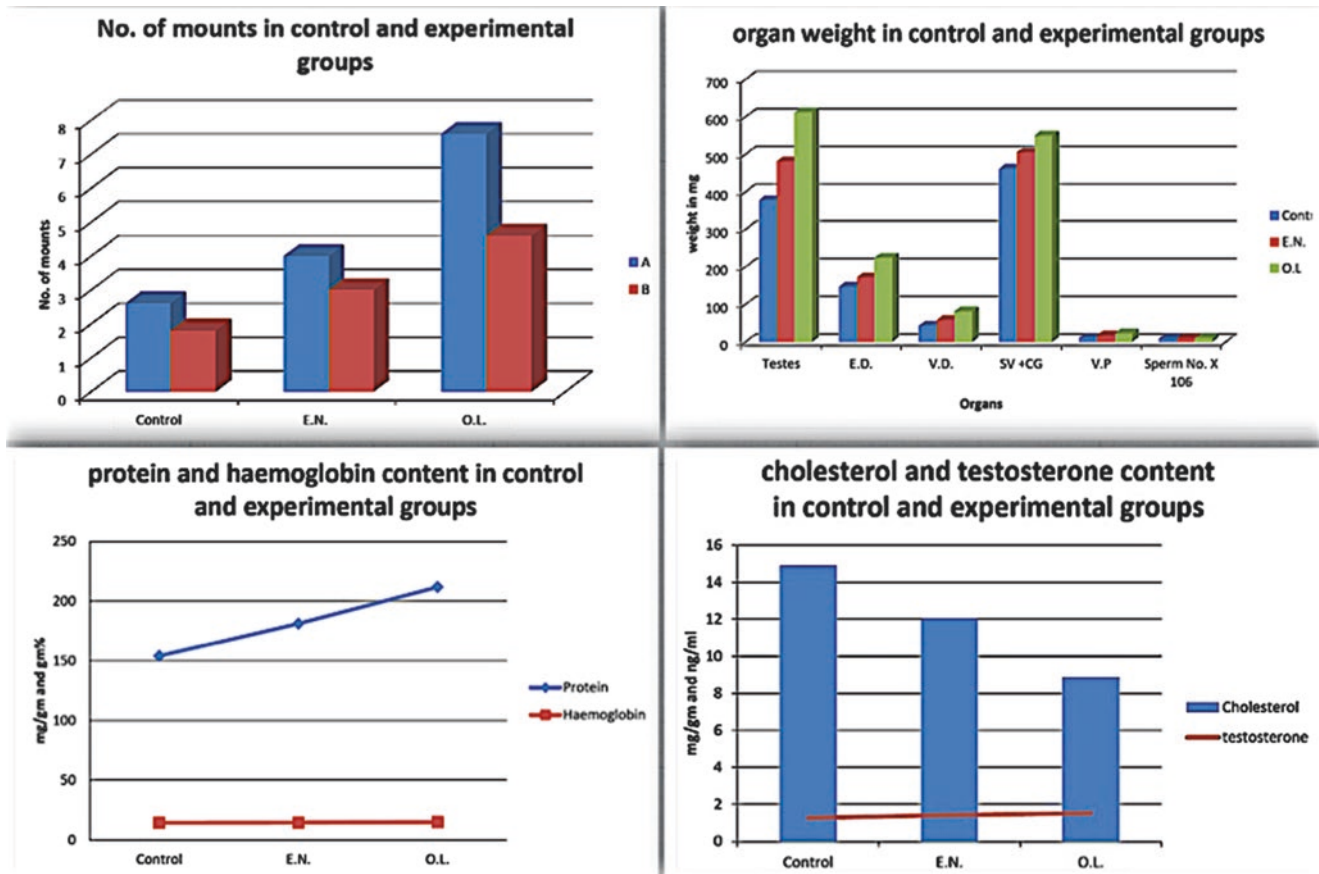


Fig. 1.7 Results from a 21-day study of the medicinal properties of salep reproduced with permission from: [9]. Here E.N. and O.L. represent a powdered feed made up from the ground tubers of the orchids *Eulophia nuda* and *Orchis latifolia* respectively. Six male mice were used in each of the Control, E.N., and O.L. groups. (A) – Records the first observation after 15 mins of drug administration; (B) – Second observation after 135 mins of drug administration (males and females were separated for 105 mins after first observation). Clockwise: The first chart shows increased mounting behavior for the mice fed *Orchis latifolia*; the second shows

increased organ weights of the testes, E.D. = Epidermis, V.D. = Vas deferens, SV + CG = Seminal vesicles with coagulating glands, V.P = Ventral prostate, including increased sperm count, for the O.L. group; the third chart shows increased levels of testosterone (good) as well as decreased levels of cholesterol (good) for the O.L. group; at the scale of the fourth chart the slight increases found in hemoglobin levels (good) are not conspicuous, and there was increased levels of blood protein (neither good nor bad), for the O.L. fed group. Reprinted with permission from [9].

everyone wanted in on the action. Prices escalated further as people began hoarding large quantities of tulips, only to sell them for a profit later on. According to History Professor Anne Goldgar's book on the phenomenon of tulipmania, "People in the 1630s and after found tulipmania a wonder, something to be marveled at, like a fireball, a child with two heads, or a plague of mice." [14].

In February 1637, the economic bubble formed by the tulip market collapsed, providing both historians and economists with a serious matter for study ever since. The specific economic and social

intricacies responsible for the collapse are still rather contentious.

A similar fever gripped Victorian England in the nineteenth century over orchids. In the preceding century, England had been introduced to a flowering terrestrial orchid (*Bletia purpurea*), sent from the Bahamas in 1731 (Fig. 1.13). During this period, a few others were being sporadically sent by explorers to Europe and coaxed into blooming. But beyond their scientific study, there was little interest in orchids. All that was about to change.



Fig. 1.8 The romantically enabling *Eulophia nuda (spectabilis)* (Image courtesy Toshiyuki Aoyama)



Fig. 1.9 *Satyrium erectum* from South Africa (Image courtesy Jean-françois Siraudeau)

In 1817–1818, gentleman and scientist William John Swainson returned from a natural history-collecting expedition in Brazil with a vast array of insects and plants. There are many versions of what happened next. Whether or not Swainson used orchids to “pack his lichens,” as horticultural journalist Frederick Boyle had written, is open to question, as Boyle was often unreliable. In any event, William Cattley, a merchant trader, horticulturist, and orchid enthusiast in Barnet near London was in receipt of an orchid specimen sent by Swainson. Cattley flowered the orchid, which was named *Cattleya labiata* in 1824 by the eminent English botanist Dr. John Lindley, thus creating the new genus of *Cattleya*. The *labiata* name



Fig. 1.10 *Jumellea fragrans* of Réunion island, the leaves of which were made into a deliciously fragrant tea in early twentieth century France. Note the nectar-containing spur at the back of the flower (Image courtesy Frédéric Henze)

derives from the species’ distinctively shaped lip. Lindley later noticed the affinity with the orchid, *Epidendrum violaceum* Lodd., which he renamed *Cattleya loddigesii*. It is interesting to note that *labiata* and *loddigesii* represent the two major forms of *Cattleyas*, the single-leafed unifoliate and the double-leafed bifoliate, respectively. Unfortunately, the location of the discovery of *Cattleya labiata* was lost for more than 70 years (Figs. 1.14 and 1.15).

The feverish period of Victorian Orchid Mania pretty much coincides with the reign of Queen Victoria (1837–1901), and indeed, she was an avid orchid lover herself. Orchids were rare, beautiful, mysterious, and from distant lands, all qualities that had a certain cultural – even snobbish – cachet for the aristocracy, who sometimes paid a fortune to acquire them and create large collections. The Queen herself was honored in 1896 with the naming of *Dendrobium victoria-reginea*, and in more recent times, Chadwick & Sons of Virginia, U.S.A., have taken to naming *Cattleya* hybrids after members of British royalty, including Princess Diana, Kate Middleton, and Queen Elizabeth II, as well as the wives of various US Presidents, among others (Fig. 1.16).

Of course, the mania was not solely confined to the aristocracy and upper classes. It spread among the new wealthy industrialists and mercan-

No.	Photographed species	order	Frames captured	Times visited	Pollinia attached	Visiting time
1	<i>Clubiona</i> sp.	Araneae	1	1	No	23:54
	<i>Drepanopteryx phalaenoides</i>	Neuroptera	8	2	No	1:29-1:41, 2:33
2	<i>Drepanopteryx phalaenoides</i>	Neuroptera	1	1	No	20:03
3	<i>Ceresium</i> sp.	Coleoptera	1	1	No	20:54
4	<i>Theretra nessus</i>	Lepidoptera	1	1	Yes	19:27
5	<i>Halyomorpha halys</i>	Hemiptera	6	1	No	22:58-23:00
6	<i>Ceresium</i> sp.	Coleoptera	52	1	No	01:07-01: 24
10	<i>Theretra japonica</i>	Lepidoptera	1	1	Yes	20:06
12	Mordellidae sp.	Coleoptera	20	1*	No	23:27-23:54*
13	<i>Polistes</i> sp.	Hymenoptera	2	1	No	09:53-09:54
17	<i>Mabra charonialis</i>	Lepidoptera	221	1	No	22:45-23:52
18	<i>Mabra charonialis</i>	Lepidoptera	36	1*	No	00:39-00:52*
20	<i>Geisha distinctissima</i>	Hemiptera	34	1	No	20:47-20:55
23	<i>Mabra charonialis</i>	Lepidoptera	4	1	No	21:29-21:30

* Observed the floral visitors intermittently with very short interval and thus considered as the same visit.

Fig. 1.11 List of floral visitors captured by interval photography to flowers of *Neofinetia falcata*. Numbers given are the total numbers of frames captured and times visited. The same species captured in consecutive frames were counted

as one visit. Among the different insects (spiders, beetles, moths, etc.) only the two species, *Theretra nessus* and *Theretra japonica*, of long-tongued hawkmoth had pollinia attached to them. Adapted with permission from [12].



Fig. 1.12 The delicate *Neofinetia (Vanda) falcata* is highly esteemed in Japanese culture. Note the slightly pink-tinged, 3–5-cm long nectar spurs. Only two species of long-tongued hawkmoth are known to be the pollinators (Image courtesy Sylvia Kappl)

tilists of the Industrial Revolution. During this time, prices inevitably dropped so that some orchids could be obtained for a few shillings, and thus, the emerging middle classes could benefit from the splendors of orchid growing as well.

The Orchid-Growers Manual, written by Benjamin Samuel Williams (1822–1890), provided much needed expert assistance with orchid cultivation, and it was to become the bible of orchid growers of all classes during this period. The first edition of this work (1852) contained excellent descriptions and notes for the care of “upwards of 260 orchidaceous plants” in cultivation, from *Acineta* to *Zygopetalum*. The thinking was spot-on (except for its male bias): “A knowledge of the different habitats of the various species is essential to the careful grower, so that he may, as far as his means permit, place them in circumstances similar to those in which they make their natural growth.” Notes on glasshouse construction, ventilation, growing media for epiphytes and terrestrials, insects, diseases, and propagation were also discussed, including a section not often found in orchid books today: “*Preparing orchids for traveling to a flower-show ... Oncidiums* travel well; they require a strong stake to each flower-spike ... *Sobralia macrantha* is a bad plant to travel, if not properly tied” (Fig. 1.17). Useful