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Why is this flower an orchid?

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THE SPECIES ORCHID
SOCIETY OF WA

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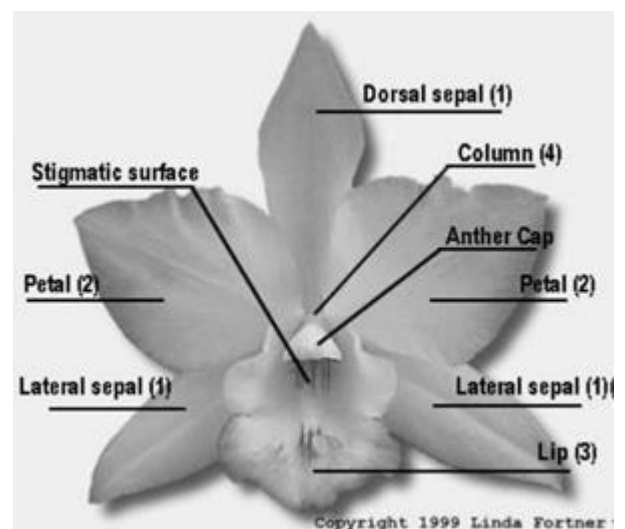
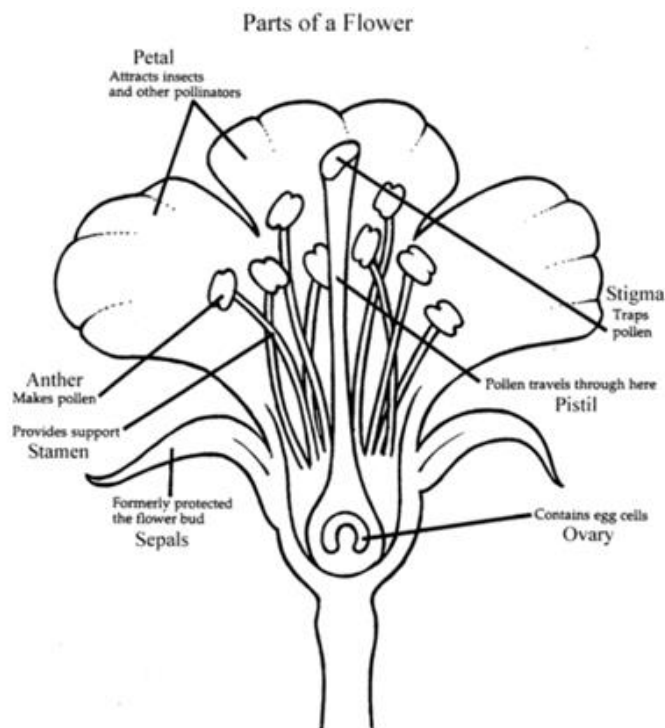
Orchids belong to the smaller of the two great groups of flowering plants - the monocotyledons (or monocots), which include lilies, orchids, palms and grasses. The larger group contains the dicotyledons (the dicots). The majority of common garden plants, most trees and broad-leaved flowering plants, such as roses and geraniums, are dicots.

Monocots are distinguished by having only one seed leaf in the embryo contained in the seed (dicots have two). Most of you will have grown peas or beans (which are dicots) at some time, and I am sure you all remember those two leaves breaking the ground surface as the young plants sprouted.

Monocots typically also have flower parts, such as sepals and petals, based on a plan of three (imagine a typical orchid flower), whereas dicots have parts based on a plan of four or five (or multiples thereof). Most monocots have leaves with parallel veins, while dicots usually have a mesh like pattern. The stems of monocots do not have a continuous cambium layer, or region of new growth, so they do not increase in stem thickness, produce annual growth rings or have woody stems, as do typical trees, which are dicots.

The primary characters that distinguish the orchids as a group are found in the flower.

At the bottom of an unspecialized non-orchid flower is the stem that supports it, called the pedicel. Directly above, and at the base of the flower itself, is a whorl of green, leaflike organs called sepals. Above and inside the sepals is a second whorl of coloured petals. These are the asexual parts ("asexual" means NOT sexual) and they are developed to protect the flower or to attract a pollinator. Inside (also arranged in whorls) are the sexual portions of the flower. First are the male stamens, which consist of a filament (the slender stalk that supports the anther) and an anther (usually an arrangement of four sacs filled with loose pollen grains). There may be several whorls of stamens. In the centre of the flower is the female pistil, which is composed of an enlarged portion (the ovary) topped by a stalk-like style with a stigma at its apex. The pollen in the anther is powdery and is usually carried from the anther of one flower to the stigma of another flower by a pollinating agent (moth, fly, bird etc.).



The usual orchid flower is also supported on a pedicel. The ovary, however, with its ovules, seems to be an integral part of the pedicel because it is embedded within the upper portion of the pedicel below the attachments of the petals. The orchid flower is thus said to have an inferior ovary. The sepals and petals are usually similar, often highly coloured, and in sets of three. One petal is developed as a landing platform for the pollinator and is called the lip (or labellum). Most orchids can be divided by a line from the top of the dorsal sepal to the centre of the lip, where the portion of the flower on the left side of the line can be seen as a mirror image of the right side. This is described as making the flower bilaterally symmetrical.

The sexual portions of the orchid flower are quite different from other generalized flowers. All the male organs and the female organs (the filaments, anthers, style, and stigma) are reduced in number and are usually fused into a single structure called the column. Most orchids have a single anther at the apex of the column. The pollen grains are bound together with a sticky substance in masses called pollinia. As a visiting insect backs out of the flower, the pollinia are picked up from the anther and stick to the body of the insect.

One of the characteristic differences between the orchid family and other advanced monocots is that the fertile stamen or stamens are all on one side of the flower opposite the lip.

The lip is oriented upward in the bud, but as it later develops, twisting takes place in the pedicel or ovary so that the lip is usually oriented downward by the time the flower opens, a process called resupination. The lip becomes a handy landing platform for pollinators.

Orchid seeds are extremely small and contain an embryo that lacks endosperm (starchy nutrient tissue). In nature, orchid seeds need the presence of a fungal mat called *mycorrhiza* in order to germinate. Happily, a method has been found in the laboratory where seeds can be germinated without the fungus, which is why so many orchid seedlings are now available.

It is interesting that all the special characters of orchid flowers, such as the joining of the male and female organs to form the column, the masses of pollen called pollinia, and the tiny seeds without endosperm, are found individually in other groups of flowering plants. However, it is through the combination of all these characters that we now know the family of flowering plants called the *Orchidaceae*.

The preceding is a reprint of an article by Noel Grant first published in the TOS Bulletin in February 2010

Now that we know a little more about the characteristics of orchid flowers, it is time to look at some familiar examples, and some that look nothing like the diagram above. However, they are indeed orchid flowers, each has six segments - three petals and three sepals (although some might be fused together).

Why then are they so different? The answer to this rhetorical question can be found in their unique relationship with their preferred pollinator. Following is just a small sample of the truly unique and fascinating orchid flowers that are at least part of the reason that many of us are fascinated (others might say obsessed) by orchids.

Some of these you will have seen in an earlier article on orchid pollinators, others even I have not seen in pictures or in situ. Australia has some truly unique orchids, highly adapted to specific pollinators and with most unusual flowers. *Caleana major*, commonly known as the Flying Duck Orchid is pollinated by sawflies and male



thynnid wasps that are attracted by a pheromone emitted from the flower similar to that of a female wasp. This terrestrial species comes from South-eastern Australia.

(Photo: http://saseedbank.com.au/species_information.php?rid=892)

Another interesting terrestrial is *Habenaria (Pecteilis) radiata* found in China, Japan, Korea and Russia. This species is widespread but is said to be difficult to grow in cultivation which is a pity as it is truly striking orchid.

Photo source: <http://robsrareandgiantseeds.com/1358-habenaria-radiata-the-white-dove-egret-flower-5-seeds-showy-rare/>



Members of the genus *Catasetum* often have different male and female flowers. *Catasetum osculatum* often has separate racemes of male and female flowers, while other such as *Catasetum schunkei* have male and female flowers on the same raceme. Other species will have predominantly male or female flowers.



Catasetum osculatum

Photo sources: <http://www.orchidspecies.com/orphodir/cataosculatum.jpg>

Catasetum schunkei

Photo source: <https://www.flickr.com/photos/145521145@N05/7328716684/in/photostream>



Early collectors and taxonomists were often so confused by this genetic characteristic that they were often identified as separate species.

The genus *Masdevallia* has flowers that seldom clearly exhibit 3 sepal and petals. In almost all members of this genus, the lateral petals and sepals are fused together. *Masdevallia lata* found from Costa Rica to Panama clearly exhibits this trait.



Masdevallia lata

Photo source: http://bluenanta.com/static/utills/images/species/spc_000121504_000029243.jpg

In Central and South America, we find many orchids that are highly adapted to their specific pollinators, and consequently, can be confusing for less experienced orchid growers to identify.

The genus *Lepanthes* has many small, insignificant but beautiful flowers. *Lepanthes caprimulgus* is a miniature species from Ecuador and Peru. The flower is named for its resemblance to the Nightjar (whip-pour-will) bird.

Photo source: <http://www.orchidspecies.com/lepcaprimulgas.htm>



An unusual genus from New Guinea is *Medicalcar decoratum*. This species grows into large mats of plant material and has upturned, cylindrical flowers in which it is somewhat difficult to identify all the flower segments.

Photo source: <http://orchidsinbloom-ron.blogspot.com/2014/01/medicalcar-decoratum.html>

The genus *Pleurothallis* has many species found in Central and South America. Generally, the insignificant flowers are somewhat difficult to recognise as an orchid. *Pleurothallis cyrpidioides* found in Ecuador and Peru is one such species.



Photo sources:

<http://www.orchidspecies.com/orphotdir/pleurocyrpidioides.jpg>

The genus *Stelis* (a member of the *Pleurothallidinae* family) also has many small flowers that does not look anything like the orchids that we cultivate. *Stelis glomerosa* from Ecuador has a 'globe-like' flower that gives rise to its common name, the Ball Stelis. Photo source: <http://www.orchidspecies.com/orphotdir/stelissps.jpg>



To finish off this brief pictorial review of some unusual orchid flowers, one needs look no further than the genus *Bulbophyllum*. There are many in this genus that challenge the orthodoxy of three sepals and three petals, one of which is modified to form the labellum.



Bulbophyllum tripudians from China, Laos, Myanmar, Thailand and Vietnam in one of several species that have arched flower racemes with flowers that move about with any air movement.

Photo source: <http://www.orchidspecies.com/bulbtripudians.htm>