What is so special about the orchidaceae? essay sample

According to Greek mythology, there once was a satyr named Orchis who was celebrating in the festival of the god of wine. Having had too much to drink, he attempted to rape a priestess and as a result was killed by angry villagers. Orchis' father prayed to the gods to bring his son back but the gods, being not especially fond of rapists, only returned Orchis as flowers. Thus, according to the Ancient Greeks, was the origin of orchids. However, with modern genetics and the theory of evolution, we know that it is unlikely that members of the Orchidaceae family are the restoration of a satyr.

However, this does not dampen the mystical fascination of humans with this family of flowering plants. Undeniably, the beauty of many members of Orchidaceae has mesmerized many and led to a huge floricultural industry in the trade of orchids and its hybrids. Vanilla, one of the most used flavourings, is derived from the seed capsules of orchids. Orchidaceae is a special family not only because of its cultural and commercial importance, but also due to its unique structure and diversity. Members of this family have also formed special relationships with other species of organisms that are non-human. Orchidaceae is a large and diverse family, making it perhaps one of the most special.

It is estimated that members of the Orchidaceae family make up one tenth to one sixteenth of all species of flowering plants (Dressler). In 1973 it was predicted that 17, 000 species existed (Willis) but that number has increased and it could now easily be between 20, 000 and 25, 000. This makes the Orchidaceae the largest family of flowering plants. However, this is not the only reason why they're special. Orchids produce many small and light seeds that are easily dispersed by wind. While most seeds only travel meters away

from its parent plant, some seeds can travel vast distances (e. g. cross the Atlantic Ocean from Africa to South America). It is perhaps because of this ability that Orchidaceae is such a cosmopolitan family.

Orchidaceae virtually exist in all habitats around the world apart from the arctic, Antarctica, and some extremely arid deserts. Due to this widespread diaspora, orchids diversified into many shapes and sizes. The range of the sizes of orchids is very large. The smallest orchid is perhaps the Platystele jungermannioides, which only grows to up to 7mm tall while the largest orchids are Grammatophyllum papuanum and Grammatophyllum speciosum, which grows to up to 3 meters long (Dressler).

Orchids also vary in their lifestyle, that is, on the ground (terrestrial) or on another plant (epiphytic). It is estimated that a quarter of orchids are terrestrial, five percent are capable of both lifestyles, and the remaining are epiphytic. As majority of orchids are epiphytes, special adaptations are required for it to absorb nutrients from its surroundings in the absence of soil.

Orchids have some special structural differences that separate them from other plants. As previously mentioned, many orchids are epiphytes. Therefore, their roots are different to normal roots as to allow them to absorb nutrients from its surroundings. Orchids that are epiphytes are able to acquire the nutrients it needs from the air, rain, and debris that settles around the plant. However, such nutrients are still absorbed through the roots. Many orchid roots have a special layer known as the velamen radicum.

The velamen radicum is an outer layer of cells on the roots that forms a spongy covering for the roots.

This in turn, helps the epiphytic plant catch and hold water, from which its nutrients come from. The velamen radicum, however, is not unique to orchids and also found in some members of the families Liliaceae and Araceae. Terrestrial orchids also contain these velamen radicum layers on their roots but their roots also form storage organs known as tuberoids. Terrestrial orchids usually have two of these tuberoids, which are spherical in shape. One of the tuberoids are leftover from a previous dormant season and the other is there for the next dormant season. The European genus of terrestrial orchids, Orchis, gains its name from these structures, which looks like testicles (the Greek word for testicle is órchis).

A most notable trait of the orchid is usually its flower. Orchid flowers are unique in a few senses. As in most flowering plants, orchid flowers' primary function is to attract pollinators. The methods used by orchids to achieve this is very diverse. Almost always there is a petal that is different from other petals. This petal is known as the labellum. The labellum is the median petal that faces the column. This lip can be used for multiple functions in different species of orchids. In some species of the genus Calopogon, when a bee lands on the flower, the lip (which is hinged) falls onto the bee (triggered by its weight) rubbing the bee against the column for pollination. Porroglossum takes this strategy a bit further and its hinged lip is activated by touch.

When the calluses (thick patches on labellum) of the orchids of this genus is touched, the hinged lip forces shut, forcing whatever insect inside it to exit

by the stigma, increasing chances of pollination. Other species of orchids have hinged parts as well such as in Bulbophyllum macrorhopalon, which contains hinged appendages in its flower that move in the wind, attracting flies for pollination. The flower is also used in the common way of attracting insects by producing scents and being colourful. However, as orchid pollen is not suitable for insects as food, orchids usually offer nectar in their flowers.

However, some orchids such as Maxillaria will produce psuedopollen on their lips, which insects can use as food. Maxillaria also produces wax on its callus that is gathered by bees and used for nest construction. While most orchid flowers genuinely offer a reward of psuedopollen or nectar (or in the case of Maxillaria and bees, wax), some orchids have been known to not produce anything. These orchids still manage to attract pollinators to its flowers but instead, do not need to invest anything into producing a reward. Some orchid flowers such as those of Calopogon, Calypso, and Arethusa, there are yellow hairs that mimic anthers with pollen when in fact there is no pollen.

While mimicry of other pollen producing flowers exists within the Orchidaceae family, a more interesting form of mimicry is demonstrated by the genus Ophrys. Ophrys flowers mimics female insects, which attracts males and thus pollinates the flower. This is known as pseudocopulation. However, it’s not just how the flowers attract pollinators that make them special. Orchid flowers, instead of having separate filamentous stamen and gynoecium, only have one structure called the gynostemium.

The gynostemium is actually the gynoecium fused with stamens. These gynostemium (also known as columns) are arranged differently in different

species of orchids. Another curious thing about orchid flowers is resupination. Resupination is the orientation of the flower and is usually determined by the location of the labellum. If the labellum is on the lower side the flower is described as being resupinate.

If the labellum is on the upper side, the flower is described as being non-resupinate. Resupination varies from species to species of orchids. Some species may be completely resupinate/non-resupinate while other species may have resupinate male flowers and non-resupinate female flowers (or vice versa). However, orchids, in order to achieve the proper resupination, may sometimes twist their pedicel.

As previously established, it is clear that orchids interact with many other organisms (pollinators). However, their interaction is not limited to just pollinators, orchids interact with many other organisms. Orchids usually have a saprophytic stage in their seedling development; this stage may last longer in some orchids than others (Dressler). Such orchids that have a prolonged saprophytic stage are epiphytes, they cannot get their nutrients from the soil, and plants are incapable of acquiring nutrients from leaf litter. These orchids acquire their nutrients from mycorrhizal fungi that can break down leaf litter and produce carbon compounds for the plant.

An interesting animal that some orchids share a relationship with are ants. Ants and orchids in some situations seem to have formed a symbiotic relationship. Some orchids, such as the Acriopsis emarginata, excretes oil that attracts ants. The ants unknowingly carry the seeds of the Acriopsis emarginata back to its nest where the orchid grows. This is similar to several

other species of orchids in the American tropics in which “ ant gardens” can be observed. These other species of orchids produce seeds with elaiosomes, which are fleshy structures that attract ants.

The ants take these seeds back to their colony and after the elaiosome is consumed, the seed is taken to the disposal, which is rich in nutrients. The resulting orchid benefits not only from increased minerals but also protection, while the ants benefit from the roots of the orchid reinforcing the nest. Some other orchids such as Caularthron bilamellatum produce hallow pseudobulbs with openings in which ants can live. These orchids also gain protection and increased minerals from the ants.

Orchidaceae’s cultural and commercial significance makes it a very special family. Vanilla, produced from the seed fruits of two species of orchids (Vanilla panifolia and Vanilla tahitensis) is one of the worlds most used spices. It comes second as most expensive spice only after saffron. In 2011, 7508 tonnes of vanilla was produced (Faostat). Without vanilla, many baked goods may not possible to make and the world’s most eaten ice cream flavour would not exist.

Culturally, Orchidaceae is becoming increasingly special as more and more people become orchid hobbyists and grow these plants at home. Clubs such as the Richmond Orchid Club are sprouting around the world as people gather together to grow orchids and breed new hybrids. Even an orchid dedicated magazine called Orchids Australia has been created. There are not a lot of other plant clubs and magazines that focus on plant families.

It is without a doubt that Orchidaceae is a very special family of plants. Not only are they diverse in biodiversity, but they are also diverse in their methods attracting pollinators. This family of flowering plants that spans across the world is also spreading across the world as the focus of a new hobby. Its flowers are not only beautiful but also functionally interesting. Ultimately, this family provides the special taste of vanilla, which completes so many dishes and baked goods.