For HUM Spring 2021

MY PANDEMIC PROJECT:

A GUIDE TO THE ORCHIDS OF RESERVA LAS GRALARIAS, Part I

By Jane A. Lyons

I realized in March 2020 when we were put under Covid-19 lockdown that it was going to be a long year. Of course, I did not realize how long, how bad, how sad it would eventually become, and that after thirteen full months the Covid pandemic would still be with us. I had a list of indoor and outdoor cleaning and maintenance projects that I was ready to work on, but I also knew I would need something for my brain to do during the long pandemic nightmare.

I had always been interested in the amazing orchids at Reserva Las Gralarias (RLG) and had taken many photos of them over the years, but I never really knew anything about them. I had known that, starting from scratch, I would need a long time to learn anything about botany as I really had little formal training in the subject. So, I just filed the photos and assumed when I was old and unable to guide tours and chase birds, then I would learn about orchids.

Tiny orchids in the genus *Stelis* are very common at RLG Photo by Jane A. Lyons

So, the pandemic seemed the perfect time to learn about orchids since tourism was basically destroyed by Covid. However, I was wrong about chasing birds and sitting around studying orchids. Birds are easy to see with binoculars while sitting in a chair. Plants, on the other hand, do not come to you. You do in fact have to go find them, which is much harder than watching birds from a distance. So, the RLG orchid project ended up being not only good for my brain but also good exercise for my body.

- **Why orchids?** Orchids are special for many reasons but are famous mostly because they are beautiful. I was, and still am, astonished to find orchids growing by the hundreds in the wild and along the roads in Ecuador.

Sobralia ecuadorana in bloom along our entry road Photos by Milton Delgado

This country, about the size of the US state of Nevada, is home to some 4500 species of orchids with new species being found regularly. In fact, one-third of all endemic plants in Ecuador are orchids. The majority of endemic orchids occur between 1500-3000 m elevation, especially in the montane cloud forest habitat, i.e., exactly where RLG is located. Of these endemic orchids in Ecuador, 85% are considered threatened, with 13% either endangered or critically endangered (inaturalist website, 18 March 2021).

The orchid industry – growing, selling, photographing, studying, etc. – in Ecuador is huge. With the artificial cultivation of orchids for some 150 years, growers world-wide have produced more than 100,000 cultivars and hybrids. (Wikipedia, "Orchidaceae", 14 March 2021). But the taxonomy is rather a mess, and new species and taxonomic changes are not uncommon. This makes it quite difficult to put a 'confirmed' name to many orchids

- **What is an orchid and what makes it so special?** Orchids are ancient. Based on a fossilized stingless bee that was carrying pollen from an orchid on its wings and became trapped in amber, it is known that the first orchids were extant between 15-20 million years ago. The family Orchidaceae is one of the two largest families of flowering plants, with over 28,000 species worldwide, and making up 10% of the world's plant species. (Wikipedia, "Orchidaceae", 14 March 2021). In general, orchids are perennial herbs lacking any permanent woody structure and also have specific structural components not found in other flowering plants. Probably the most famous orchid is the genus *Vanilla*.

Epidendrum cochlidium, found mostly at our upper Santa Rosa sites. Photo by Milton Delgado

- **Why are orchids important?** Orchids are much more than just pretty flowers. They support huge numbers of important pollinators which in turn may serve for pollination of other plant species as well as food for birds and other insectivores. We have found orchid pseudobulbs eaten and chewed on, so we know that some toothed critter(s) must use them for food, water, nutrients. We have seen slugs, large and small, eating the flowers and the leaves as well as larvae of butterflies and moths feeding on the leaves. Some pollinators that we have found in our orchid flowers are bees and flies of all sizes, tiny weevils, other unidentified insects. Interestingly, even though we have hundreds of hummingbirds in our gardens and along our trails, none has ever been seen pollinating an orchid nor even close to an orchid. Quite likely the complex structure of an orchid flower may invite only specific pollinators. So, beyond their beauty, native wild orchids and their pollinators are a very important part of the food chain.

This tiny *Porroglossum amethystinum* orchid, found along our Parrot Hill Loop trail, is known to attract small fly-like insects. Once the insect lands on the orchid flower, the hinged 'lip' is then snapped shut by the flower, trapping the insect inside the flower for some 30 minutes to ensure it collects the pollen inside. The lip then opens to release the insect, but it also closes at night and reopens at dawn to prevent nocturnal non-pollinators from being trapped.

Photo by Milton Delgado

In addition, each stage of an orchid's life is dependent on specific fungi. Fungi provide all nutrients for orchids in their early stages of development, making orchids a primary user of the carbon found in fungi (and originally from the air we pollute). This also explains why orchids grow best in a substrate that at least includes moss, which is a plant with no roots that collects water and hence attracts fungi.

Thus, orchids have symbiotic relationships with both pollinators and fungi which make them an important indicator of air quality and overall environmental health.

Photo by Jane A. Lyons

In this moss-laden tree trunk you can see the leaves of three different species of small orchids just beginning to bloom. The pollinators of these orchid flowers may provide good food for our famous frog, *Pristimantis mutabalis*, the Shape-shifting Rain Frog, which also inhabits this same ancient mossy tree and is known to be active during the day.

- **How do we study our orchids?** Our "method" is that we do not actively collect any orchid. We photograph the orchid in situ and may bring a flower or a plant found fallen on the trail to our patios and lab where we can study and photograph details of what we find. We photo-document the site, the full plant and the leaves as well as the flowers and also photo/video all pollinators we may see since most of them are unknown. As they develop, orchids may change shape and color over the course of their development, sometimes even daily, so we try to document all stages of their development.

Photo by Jane A. Lyons

For example (above), the flowers of the amazing genus *Stelis* start out as specks-on-a-stick among what look like weeds. Note speckled sticks inside the red circle above.

The specks very slowly grow into what appear to be simple juicy fruits. (above)

Then, as the *Stelis* buds slowly begin to open, they show the full flowers and take on the appearance of exotic jewels (photos below). Photos by Jane A. Lyons


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- **Identifying orchids**

  Orchids are often very challenging to identify since their specific flower structure, which holds the identification key, can be hidden deep inside the flower. Identifying to genus is not so complicated but identifying to species can become a matter of serious investigation and research into microscopic flower parts. Fortunately, there is much good reference material, but the complex and ever-changing taxonomy plus the thousands of hybrids can make the id process excruciatingly slow.

  Orchids are either terrestrial or epiphytic, or both in some cases. They have impressive root systems, below ground, above ground, among vegetation and growing in most any kind of substrate. Identifying the root system can help in identifying the genus.

Photo by Jane A. Lyons

This epiphytic *Cyrtochilum serratum* orchid (above) is growing high in a tree, with its aerial roots intertwined in the moss and a small branch. This orchid grows very large, and its weight will eventually break this branch. However, by that time its aggressive roots may have found a stronger branch to support the plant.

The upright green leaves of the plant of this orchid can be seen at the far right while its root system meanders along all the branches it can find, allowing the plant to grow long stems which support multiple flowers. This *Cyrtochilum serratum* orchid is along the fence at our front gate.

Photo by Jane A. Lyons

Below: *Govenia sodiroi* is a beautiful and fairly common terrestrial orchid at RLG found especially on our upper SR site. Its roots grow underground.

Photo by Jane A. Lyons

Sometimes plant size can be a good indicator of an orchid's genus.

Photo by Jane A. Lyons

Elleanthus spp. plants (above) are normally fairly large, while *Masdevallia* spp plants (next page) are normally quite small.

Tiny orchids much smaller than my thumbnail actually change color in order to signal to a pollinator that their pollen is ready for collecting. Below, the same *Masdevallia nidifica* fully opened, with tiny rain drops visible. Photos by Jane A. Lyons

Photo by Jane A. Lyons

Some orchids grow in large masses with many flowers, like this *Oncidium* sp.(above) and the two *Epidendrum* spp. (next page).

Photos by Milton Delgado

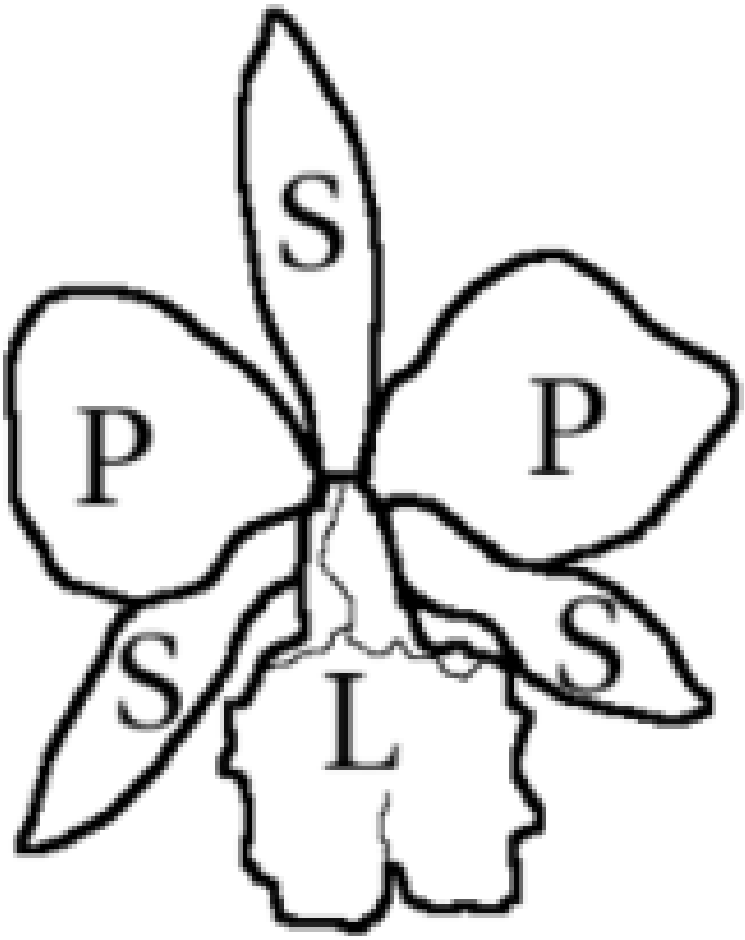
Orchid leaves, although always fairly simple, can help in identifying orchids as can other structures such as pseudobulbs.

But the main key to identifying an orchid is via its flower.

The main structural characteristic of an orchid flower is that it possesses bilateral symmetry, i.e., you can fold the flower vertically down the middle and each half will look the same.

A good example of this bilateral symmetry is seen above on this *Odontoglossum sp.* found near our Santa Rosa River Trail. Photo by Milton Delgado

The typical orchid flower structure is as below (drawing from Wikipedia "Orchidaceae"), looking directly at the 'face' of the flower. There are 3 sepals (S) arranged in a triangle and 3 petals (P and L) arranged in a different triangle. The lower petal is normally modified in some way and is called the labellum (i.e., the 'lip' of the orchid flower's 'face') and which normally serves as a landing pad and front door for invited pollinators. The sepals are on the outside ring while the petals are on the inner ring of the orchid flower's face. Often these flower parts may be fused or modified in some way.



This *Odontoglossum sp.* shows very well the basic orchid flower structure. Photo by Jane A. Lyons

On this beautiful and endemic *Chondrorhyncha embreei* you can easily see the red-dotted ‘landing platform’ on the lip that will lead the arriving pollinator to the flower’s pollen.

The sepals and petals and lip of the flowers are easy to find on this *Cyrtochilum geniculatum.*

Photos by Jane A. Lyons

In this *Dracula felix* orchid you can easily see the modified three large sepals and the smaller inner petals and small lip. There is a small fly on the lip looking for nectar. Photo by Ray So.

Note that our orchid project has been totally a team effort. Thanks to all of our orchid team, which includes volunteer Ray So, plus all of our RLG staff, Milton Delgado, Hilda Delgado, Segundo Imba and Karina Obando, all of whom, while conducting their regular work at the reserve as well as walking along the entry road, have been taking photos and data whenever they see an orchid and sharing all of their information.

We have now about 35 genera of orchids that we have found on the reserve, with 60+ species so far. This is no doubt only a fraction of what is on the full property considering that there are numerous zones we have never even visited, much less studied. Fortunately, we will be able to continue this very interesting project over time and keep all of our brains busy.

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WWW.GLOBALORCHIDS.INFO (used regularly).