—the banana ($4,932,390), and then but slightly. Even if the production of the California groves should reach in 1900 the total of 600,000 boxes, as predicted by one grower, this amount would still be insufficient to supply even the present demand, to say nothing of the then larger demand due to increased population. Moreover, the Florida crop begins to reach the markets when only the expensive “verdeni” are obtainable in Italy, and is largely marketed before the main Italian crop is ready to ship. As already mentioned, by obtaining still earlier varieties this advantage might be increased. In view of these facts any danger of overproduction must be considered as too remote to be worth notice at present.

In conclusion I would strongly urge that more attention be paid by Florida growers to lemon culture. It requires more skill, it is true, than any other citrus industry, but it yields larger returns. I look forward confidently to the time when the lemon crop of this State will equal in value that of the orange or grape fruit.

ORCHIDS.

Interesting Facts as to their Beauty, Habits and Culture. List of Varieties Best Adapted to Culture in Florida.

Paper prepared and read by Theo. L. Mead, of Oviedo, Fla.

[SEE MINUTES PAGES 1 TO 5 ITEM 19]

Mr. President, Ladies and Gentlemen: I have selected the natural order of orchids for my talk today and hope to make you share in the fascination which these plants exert upon those who study them closely. They are of small merely material use to mankind—the fragrant vanilla and one or two medicinal products of small importance are their only contributions to our physical wants, but by their strange and wonderful beauty of flower they have won the regard not only of civilized man but are highly prized and cherished by many so-called savages, who so appreciate the beauty of wild orchids growing near their huts that they refuse to part with them though offered the most tempting bribes by European collectors.

While we may find as great diversity of habit and ways of growth among the orchids as among most other plants, yet as a whole they form a very natural group, that is one whose members may be distinguished almost at a glance from members of other orders; and our first attempt in getting an idea of this group will be to locate them, so to speak, among their nearest allies. To begin with, they are endogens—the section across a stem shows woody threads scattered irregularly
through a pithy substance and no distinction between bark and wood. This of course makes it impossible to multiply orchids by grafting and budding as is so easily done in the exogens where the life and growth of the stem is concentrated and localized in the inner bark. The highest endogens are the palms and the lowest the grasses. Midway between these extremes we find a large group of natural orders including the pineapple family, the amaryllis, the iris, the banana, the canna and the orchid family. The cannas in particular will give us a hint as to how the orchids have come by their peculiar structure of flower which at first sight seems to be five-parted and so quite at variance with the rule of threes and sixes which one comes to expect as a matter of course among all the endogens. The fact is that the sets of three are really present in the five-parted orchid flower but so transformed that it requires dissection and the microscope to trace the changes and combinations that have taken place. If you will examine a canna flower you will find that the stamen has apparently become a petal, bearing pollen on one edge. In the orchid two stamens have not only become petals and lost their pollen altogether but have combined with a third real petal to form the so-called lip of the flower. Perhaps you will wonder how anybody can tell that this is what has happened, and this is the way the matter has been reasoned out. Each separate part of a flower has to have a special conduit for its nourishment very much as an arm or a leg needs its special artery for its support; these conduits in flowers are characterized by groups of spiral vessels which are easily recognized and orchid flowers have fifteen of them, corresponding to five whorls of three.

The characteristic so-called column of the orchid flower which bears not only the stigma and hence is the pistil, but also the stamen or stamens, has no less than seven of these ducts and is considered to be all that remains of three pistils and four of the six stamens which the remotest ancestor of the orchid tribe is believed to have possessed. Occasionally single plants are found in whose flowers partial reversion to the ancestral type has taken place and the two sides of the lip appear as separate petal-like organs or three stamens are present at the extremity of the column instead of one, and these monstrosities confirm the ideas that botanists had gained by dissection and comparison.

There are two great groups of orchids, the members of the first including all the cypripediums or ladyslipper orchids, having two stamens, the latter only one. The ladyslipper orchids are widely distributed over all lands and climates yet the most of the species are local and rare, and give the impression that this great group of orchids is in the gradual process of extinction. Indeed it is quite probable that one or two species already survive only in green houses, and others may disappear from their native countries where they barely held their own until the advent of the ruthless orchid collector. On the other hand the hybridizers of the genus have gone at their work so enthusiastically and successfully that the number of distinct hybrid forms now grown in greenhouses—about 1,000—far exceeds the number of known species of the genus inhabiting the earth, and new varieties containing the mixed blood of three, four and even five species are constantly being produced.

Hybrid orchids are so highly valued
and their production requires such close attention and intelligent work, that careful memoranda have been kept in almost every instance so that the pedigree of most of these hybrids is as much a matter of record as that of celebrated race horses. Indeed only last year a catalogue was issued giving the names and synonyms and exact parentage of all the known hybrid orchids—some two thousand in number—and including the natural hybrids of which a few examples have been found growing wild along with the parent species.

The number of seeds produced by orchids is prodigious, but this shows rather an inferior organization than a superior one, and as Darwin points out, indicates not only low organization, but a poverty of contrivance, in great contrast to the wonderful adaptations which ensure the crossing of the flowers by insect agency, which I shall discuss later on.

The terrestrial orchids of northern regions, like the pogonias and yellow fringed orchids, common in our flat woods, have five or six thousand seeds to the pod, but the tropical tree-inhabiting species have far more. From an examination of several hundred pods which I have myself raised, I should estimate the average number at half a million seeds to the pod, and in a species of maxillaria, from South America, the pods have been estimated to contain a million and three-quarters, which, owing to the extreme smallness of the seeds, would be in bulk about a tablespoonful. A single plant of this prolific species often bears half a dozen pods at once, so that the children of one plant of this maxillaria, from the seeds produced in a single year, if they all reached maturity, would cover as with a continuous carpet 26,000 acres, allowing one square foot to every plant. The grandchildren of this one plant, again supposing all the seeds produced in one year to come to maturity, would crowd two plants into every square foot of the surface of the globe, land and sea alike, and leave enough over to similarly cover the moon and the planet Mars. It is perhaps hardly worth while to carry the computation on to the third generation, but if we imagine all the great-grandchildren of one single plant to survive, they would be enough in bulk to crush out every vestige of other life upon all three worlds under a solid mass of this maxillaria a thousand miles in thickness.

As on the contrary the number of plants of the species in any given district, seems to be about stationary, it follows that only one seed in ten millions succeeds once in every twenty years in becoming an adult plant, for if the successful seedlings were more than enough in number to replace the old plants that die from various causes, their total number would increase in geometrical ratio until the equilibrium was again restored.

An average orchid seed is shaped something like a grain of oats. It is about 1-80 of an inch long and 1-250 of an inch thick and it takes 20,000 of them to weigh a grain. Under the microscope the kernel is seen to be surrounded by a thin, nearly transparent husk. Being so small and light the breezes carry them almost like motes in the sunbeam, and on account of their numbers it would seem as though they must be carried to every possible situation for long distances from the parent plants, and doubtless this is the case. The seed, however, consists of an embryo only, with no laid up store of food for the germinating plant, and the processes of development are extremely slow and tedious.
When a seed has alighted in some suitable place, which must be damp, the kernel absorbs moisture from the surface on which it lies and slowly swells, after a week or two changing to a greenish color, and in the course of time assuming the shape of a boy's peg top. The upper blunt end then shows a tiny point in its center where ultimately a leaf will arise. At this stage the seed is about as broad as it is long, say 1-50 of an inch or less. Sometimes a whole year is consumed in reaching even this minute size, hardly visible to the naked eye. At other times other seeds apparently under exactly the same conditions as their neighbors will attain this peg top stage in two or three weeks and continue on what is called the thalloid state in which our peg top has spread out to a flattened disk perhaps 1-16 of an inch across with a few microscopic root-hairs on the under side, and after this a tiny leaf pushing upward from the center of the disk. Another leaf then appears in the axil of the first; when these two leaves are full grown and may be a quarter of an inch high, the first fleshy root appears from below the disk and our orchid has passed the perils of its infancy and has an excellent chance of continuing on to maturity. By this time a year at least has elapsed since the planting of the seed. In another year our aspiring plant will perhaps be an inch high and ready to push a second shoot or lead. So it goes on until perhaps in five years, perhaps eight, or perhaps not until the twentieth year, the plant is strong enough to bloom. Each year a new growth pushes from the base of the old one, a new set of roots is formed and generally an aged pseudo bulb, as these fleshy stems are called, withers away at the rear most end of the creeping rootstalk. In favorable seasons a side bud may also push beside the leading shoot and this new lead also continues year by year to produce a blooming bulb; or if the creeping rhizome is cut apart without disturbing the roots, one or more of the dormant buds may start and eventually become separate plants. As this slow process is the only method of multiplying the individual plants, it is perhaps not to be wondered at that specially rare and beautiful examples bring such sensational prices when offered for sale. Five hundred, or in exceptional cases, even several thousand dollars are sometimes paid for plants of moderate size that show some unique beauty of flower while the perhaps equally beautiful but more abundant ordinary type of the same species may be purchased for a dollar or two.

Nearly all orchid fanciers nowadays are trying their hands at the raising of seed obtained by hybridizing different species, but the plants are so delicate in their early stages and so subject to attack by all sorts of insects and moulds or parasitic fungi, so apt to be smothered by algae or other low plants to which the constant moisture necessary for the seedling, affords conditions for luxuriant growth, that a hybrid orchid is always a prize and generally a source of pride and self-congratulation to its fortunate producer. So far, I have succeeded in growing two or three seeds out of each million planted, but hope to do better than that some of these days.

The mode of germination of which I have spoken, the seed passing through an intermediate or thalloid state before the appearance of leaves or roots, is not without parallel among other orders of plants. The crinums or so-called lilies of our gardens produce fleshy bulb-like seeds which
in germinating push out a sprout the end of which buries itself in the ground and swells into a genuine bulb, often as large as the seed it comes from, before sending a shoot up into the air. The orchid simply omits the needless sprout and gradually becomes a sort of tuber without altering its position.

We may consider the epiphytal or tree-inhabiting orchids as having been crowded off the ground by the fierce struggle for standing among terrestrial plants and finding space suitable for growth upon the branches of the forest, they have left the vulgar competition of more earthly things and established themselves among the winged fairies of the air, visited only by butterflies and bees and such ethereal creatures.

But you must remember that no real solidity of character can be acquired by a man or plant without effort and struggle and the wresting of the good from surrounding evil.

Let us see what has happened to the orchid tribe in consequence of being restricted in companionship to these idle creatures of the air. The flowers it is true have responded in the most wonderful way to the stimulus of insect visits and service of carrying pollen from one plant to another, but the flowers are simply necessary preliminaries to seeds and the seeds themselves offer no reward to any creature for their planting and distribution. They are so small that no creature cares to gather them and none of the larger animals could get at them in any case.

Let us have the orchids for a moment, as they retire from competition, and betake themselves to the fastnesses of the air and see what some of their competitors were doing down below. Let us take for example the ancestor of all the grasses; this humble plant was plumping up its tiny kernel with a little store of starch and gluten and thus becoming a prey to mice and other creatures who gathered more than they could eat of the best kernels and thus distributed the plant in favorable situations which otherwise it could not have reached. These favored plants again offered better kernels and more tempting inducements to their despilers, returning good for apparent evil and receiving back the good they did in heaped up, pressed down and overflowing measure till now the grasses are dominant everywhere from the equator to the Arctic snows, as bamboo overtopping all but the loftiest trees and as wheat and other grains, supporting whole races of men, and in return having millions of acres devoted to their exclusive use. The orchids on the other hand have given honey and sweet, pulpy morsels to the bees and butterflies, and in return have become miracles of delicate beauty, but having done nothing for more intelligent and higher creatures, their seeds have scarcely advanced upon the windsown spores of the ferns and horsetails that flourished ages ago in the carboniferous time; in spite of their myriad numbers, they are so little efficient in perpetuating their kind that we value most orchids as greatly for their rarity as we do for the rare beauty they have acquired in doing good in the limited sphere where they had opportunity, for it is thought nowadays that variation is in response to stimulation that the visit of the insect causes a freer flow of sap to the parts thus irritated, and this fuller nourishment renders possible the change and enlargement which by slow accumulated degrees
have given us the beauties and marvels of which I am about to speak.

With hardly any exceptions orchids have adapted themselves to cross fertilization by insects, and in the whole tribe of ladyslipper orchids one general plan prevails, which is illustrated by the flower I hold in my hand.

The stigma is a broad button-like projection facing downward; on either side of this is fixed a mass of pasty, sticky pollen and around the whole is thrown the curious pouch with a fancied resemblance to a slipper. Some secretion is produced within this pouch which is attractive to certain small kinds of bees. These creatures enter the pouch by the large opening in front but are unable to come out in the same way, because the upper edges are turned over and act very much like a fish trap which the fish can enter but cannot leave. The bees, finding themselves unable to climb out the way they came, are obliged to pass up through one of the smaller passages, above, at either side of the stigma, and the anther is so placed that their backs necessarily become smeared with the viscid sticky pollen. Flying off to another flower of the same kind they repeat the whole proceeding, but this time they press past the stigma, part of the pollen is rubbed off on it, adhering on account of its sticky viscosity and the flower is fertilized, while a fresh supply of pollen is smeared upon the creature as it escapes past the anther into the open air.

A slight modification is shown by one ladyslipper orchid which is a native of the Isthmus of Panama. The side petals—the strings of the slipper as a lady remarked on seeing them—are lengthened out in an astonishing way so as to be sometimes nearly a yard long, their use has been conjectured to be to act as ladders for snails and slugs which in passing in and out of the flowers fertilize in the same manner as the bees just described.

In all the other tribes of orchids the rule is that the stigma is viscid and a prolongation or attachment on the stigma called the rostellum, secretes a gum or mucilage which serves to attach the pollen to the visiting insect to be afterwards pulled off by the superior stickiness of the stigma in the next flower visited.

Perhaps the simplest case is in these dendrobiums where the pollen forms a little waxy mass kept safely under a hinged cap until the insect, having entered the funnel shaped lip and pushed its head against what I may call the mucilage cup, attempts to back out, in an instant the hinged cup flies open leaving the pollen mass in contact with the smeared head of insect to which it adheres quite firmly. When the insect enters another flower, this pollen mass which adorns its forehead easily pushes past the pollen cap of the new flower, since it was not attached to the insect until it had retreated a little from the position it had to take to get the honey and so is pushed directly into the stigmatic hollow, which is not only very sticky, but of such shape as to tend to scrape off the pollen mass when the insect tries to retreat. As it retreats the pollen is carried from the flower as before and so the work goes on.

In the cattleyas there are four separate pollen masses under the cap and each mass has a little bit of elastic tape attached to it. The tips of these tapes just peep out under the cap and are glued to the insect's head or back just as the single pollen mass of dendrobium is. Sometimes it happens that the insect carries off only
one or two of them leaving the rest for the next comer. Sometimes it may carry off all four and leave them each in a single flower, thus fertilizing four seed pods instead of only one.

In the genus orchis, from which the whole family takes its name, the pollen is in two masses shaped like inverted soda water bottles with a little sticky disk of membrane where the cork ought to be. So when the insect backs out of the flower he is adorned with two club-like horns sticking straight up from the sides of his head. But if he entered the next flower with the horns in this position they would be thrust back into the places whence they came and the flower would go unfertilized. To obviate this difficulty the little disk of membrane, while remaining fast to the insect, is contractile, causing the club-shaped pollinium to sweep through an arc of 90 degrees, always in one direction, that is forward, so as to be in exactly the right position to touch the stigma of the next flower. The movement requires about thirty seconds, thus giving the insect time to fly to some other plant instead of leaving the pollen on another flower of the same spike which is less favorable to the seed production than cross fertilization with pollen from another individual of the same species. Indeed many orchids are entirely sterile with their own pollen and in some cases the pollen is actually poisonous to the plant that produces it, though capable of fertilizing the flowers of any other individual.

In another species of orchid the pollinia, instead of having separate sticky disks are both attached to a single saddle-shaped plate. When the proboscis of a moth comes in contact with this, the flaps of the saddle instantly curl around it and hold it tightly, while the contraction again carries the pollen masses 90 degrees to the front. In this species there are two stigmas instead of one and the pair of pollinia are so disposed on their saddle as to leave pollen on both of them at once.

Some orchids require a little time for the viscid matter to set firmly upon the insect visitor. In these cases the nectar instead of being free in the nectary, is contained in cellular spaces which have to be broken into by the exploring tongue of the creature which is thus delayed long enough for the cementing to take place.

One species of ophrys has a little shining projection on each side of the base of the lip, which looks curiously like a drop of nectar, though really the flower has none to offer and I am glad to say that this fraudulent imposition on the part of this base and deceitful plant is frequently unsuccessful as only the unwary among insects are deceived and the majority of the flowers of this plant wither away unfertilized.

In pteristylis, an Australian orchid, two of the petals and one of the sepals form a hood over the column while the lip hangs out in front of this open door as a convenient landing place for insects. But the hinge-like base of this organ responds to a touch upon its tip as a steel trap responds to a nibble at the bait, the whole gangway swiftly rises, hurling the incautious insect into the flower and then closing the entrance like a door, remaining thus for half an hour. A narrow passage is left above for the escape of the insect, so placed and arranged that the insect will be duly smeared with glue and decorated with one or more pollinia before it can regain its freedom. Upon its visiting another flower it will be again imprisoned, will escape by
a human hair, a little drop of liquid is shot out almost with a little explosion. In two or three seconds the drop sets hard, cementing the pollinia to the intruder. The insects alight on the lip of the flower and lick up the nectar slowly crawling up until their heads touch the sensitive crest. This then explodes and the pollenia are then instantly cemented to their heads. A flap at the same time curves over the stigma protecting it from being fertilized immediately; after a lapse of a considerable time this flap curves away again thus making it reasonably sure that the pollen will be brought from some other flower.

In dendrobium chrysanthum the lip is very elastic like India rubber and the pollen cap has an elastic hinge so that when disturbed by an insect it springs away from its place scooping out the pollen mass and tossing it on the insect which has already been smeared with glue. If the insect happens to be very quick in making its retreat so that the pollen misses it, the pollen mass is caught upon a protuberance of the lip just below, and the elasticity of the lip is such that as the insect effects its escape the rebound of the lip tosses the ball of pollen up again into the saucer-shaped adhesive stigma and the flower is fertilized in spite of the failure to impress the services of the insect.

In the remaining tribe of the orchids, the vandeae, there are two pollen masses to each flower attached by strong elastic cords to the pedicel which connects them with an adhesive disk. So the pollen of one flower can fertilize at most only two others and usually it fertilizes but one. As Darwin suggests, it is a precious object which the plant cannot afford to waste, and the strong elastic cords serve to prevent the pollen from being torn off during the narrow passage way, the pollen will be left upon the stigma and the fertilization will be thus affected. One observer cut off this trap door arrangement from a dozen flowers so that visiting insects were not compelled to crawl through the narrow passage provided for their escape and not one of those flowers produced a pod.

A Guatemalan orchid, the sobralia, keeps an unlicensed dram shop for its customers, which seem to be bumble bees. A bumble bee entered a flower of this showy orchid growing in a British hot house; when she emerged the large pollen masses were sticking to the middle of the back near the tail. The bee looked about and seeing no other flower re-entered the same one, took another dram and soon returned, minus her decorations and in a disgraceful state of intoxication. She stretched out her legs and lay for a time on the lip of the flower as if dead, but finally recovered her senses and flew away.

In spiranthes, or ladies' tresses, a little orchid common in our flat woods, the pollen may be removed by a visiting insect as soon as the flower is open but the entrance is so narrow that the pollen cannot possibly be pushed back into one of the flowers. After a few days the column moves so as to give a wider space so that they can be readily fertilized. This insures the transfer of the pollen from one plant to another for the bees that frequent the flowers always begin at the older blooms at the bottom of the spike and work their way up to the just expanded ones at the top. Thus the pollen is carried from those at the top to the older flowers of the plant next visited.

In the twayblade, or orchid of our northern woods, when the crest at the tip of the column is touched ever so lightly, even by
the active motions of the usually powerful insects to which it becomes attached. The strength of these elastic cords is such that in artificially fertilizing a flower by placing the pollen on the stigma they are apt to be pulled out again if the disk and pedicel to which they are attached are removed, but Darwin notes that an insect would be apt to move off sideways and the friction against the sides of the stigma, together with its adhesiveness are together sufficient to break the cords and leave the pollen on the stigma; and I have further noticed that at the very front of the stigma there are two deep grooves or notches hidden until the anther has been removed, in which these threads catch when the insect moves off in the most direct manner so that the pollen masses must inevitably be stripped off inside the stigmatic cavity before the insect can regain his liberty.

We often find in this group of orchids the same peculiarity I have before mentioned that the masses rotate through a quarter of a circle after they have been detached so as to assume the exact position necessary to reach the stigma of another flower, but sometimes the motion takes several hours, thus making it quite certain that the insect will have flown to a different plant, for some of these orchids produce spikes six or eight feet long with hundreds of flowers, and it is a great advantage in the production of seed to have the pollen come from a distinct individual and not merely from another flower in the same spike. In some species the pedicel is so elastic that when first removed it springs straight upwards—thus tossing off the other cap whose protection is no longer needed and then slowly moves forward into position to fertilize the stigma.

In Madagascar there is a star-like white waxy orchid bloom whose nectary is a foot long and contains honey only at the extremity. This caused Mr. Darwin to predict that a sphinx moth with an immensely long proboscis—longer than anything the entomologists had dreamed of hitherto—would be found to be the carrier of pollen from flower to flower of this species. This prediction was ridiculed by some entomologists; nevertheless in due time the insect was thereafter discovered and found to act in the manner described. Some of the orchids of this tribe have thin, leaf-like pollen masses, the stigmatic chamber opens by such a narrow cleft that it seems almost impossible to insert the pollen masses even intentionally. They are left sticking by their edges in this cleft but as it opens out wider inwardly and the part of the sheet of pollen already inside swells from absorbing moisture the remainder is gradually pulled inside and swallowed up in the stigmatic cavity.

In another species where the stigma is an open cup-shaped cavity this begins to close over after the pollen has been left upon it and in a day or two not only has the opening entirely disappeared, but two arm-like appendages of the flower have also curled over it to hug the precious morsel tight and prevent any possible injury to it.

One orchid of the island of Trinidad is fertilized by a native bee which has a tongue twice as long as its body but as the orchid offers no nectar, but only sweetened pulp, the bee has to use its jaws instead of its tongue which is tucked away underneath its body and projects beyond its tail—in fact this is the sort of a tongue that could a tail unfold. The pulp is so placed that the bee has to back up to the
flower and the pollen becomes attached to the wriggling tongue tip to be transferred in due course to the stigma of another flower.

In coryanthes, another South American orchid, the part corresponding to the lip of other orchids hangs down like a bucket with a spout. Two appendages of the flower stand directly over the bucket and secrete so much liquid, which is almost clear water, that the falling drops fill the bucket and even overflow by the spout. This spout is closely overhung by the column so that an insect forcing its way out of the bucket through the spout would first brush against the stigma and then carry off the pollen masses. Above the bucket is a fleshy substance attractive and somewhat stupefying to bees which dispute with each other in great numbers for a place to gnaw this pulp, and partly by the contest and partly intoxicated, they tumble down into the bucket below, the water wets their wings so they cannot fly out and are compelled to crawl out through the spout. The first bee will have the pollen glued to its back and generally returns to the same or another flower leaving the pollen on its stigma as it escapes a second time. Sometimes there are so many bees assembled that there is a continuous procession of them through the passage.

The last example of cross fertilizing device to which I shall refer is perhaps one of the most remarkable of all. In the genus catasetum alone among orchids the male and female flowers are borne on separate plants though occasionally a plant may be found bearing both kinds on separate spikes and even a third variety of flower which is intermediate between the two, producing both pollen and ovules, but these hermaphrodite flowers are sterile and seem to be a reversion to the type of remote ancestors which like all other orchids bore perfect flowers. For a long time botanists thought the three kinds of flowers were not only separate species but belonged to different genera and were almost dumfounded when a plant turned up bearing all three kinds of flowers at once. The male flowers have a fleshy lip with a large cavity lined with crests of a sweet and nutritive pulp and overhung by a slender curling horn which is sensitive to the slightest touch, transmitting the irritation almost instantaneously upward to the anther which violently shoots out the pollen attached to a very large and very sticky disk which invariably lands with a resounding slap on the back of the unsuspecting insect—usually a hairy bumble bee, and sticks fast beyond any possibility of removal by any efforts of the insect. When the horn or antenna of the flower is touched by a bristle the pollen is thrown as much as a yard away and people touching the flowers in their greenhouses often have the pollen thrown in their faces. This violent ejection and the unusually large amount of viscid matter on the disk ensures the pollen’s attachment to the bristly hairy surface of the bee; no other part of the flower is sensitive except this horn and the flower may be freely jarred and poked and handled in almost any other part without disturbing the pollen, and the horn itself does not appear to move, so that it is not an action similar to the snapping of a trap when the trigger is meddled with but seems to be what for want of better name we call nervous impulse. If the tip of the horn is touched with a drop of boiling water or of sulphuric acid it is killed too quickly to respond, and the pollen remains in place,
but will be projected if the horn be irritated by a touch above the point injured by the heat or acid. In the corresponding seed bearing flower there is no horn and the anthers are rudimentary and drop off as soon as the flower opens and altogether it is of such a different appearance that it was natural to class it as belonging to a distinct genus before the facts were known.

In all other plants beside orchids the ovules are ready for fertilizing when the flower blooms but it is not so with orchids. The preparation of the ovules requires the expenditure of a large amount of nutritive material, and plant food is scarce where the orchids live, and the plant cannot afford to risk such a loss as would ensue if half a million ovules were developed and never fertilized. So the ovules do not begin to form until the flower is safely fertilized and has begun to wither away.

The pollen grains send out tubes which enter the stigmatic tissue and slowly grow downward for weeks and often for months before the ovules are ready for fertilization. In the genus vanda this takes place six months after the flower has faded; at that time the pollen tubes enter the cavity, coalesce with the ovules and the embryos begin to grow. Small as they are, even at maturity, their ripening requires twelve months more so that another crop of flowers has come and withered away for half a year before the first seeds are ripe.

After this review of the curious and wonderful characteristics of this group of plants I think you will agree with me that sober facts are stranger than fiction or the travelers' tales that have been written about these plants; though I will admit that a good many professional collectors and others have had robust imaginations on which they chiefly depended for accounts of their adventures. One tale recently going the rounds is entitled the Village of Demon Orchids and relates with much circumstantiality how the collector heard of a superb and incomparable orchid, acres of which grew together in constant bloom but giving out such an insupportable odor that every creature perished that attempted to approach them. He reached the spot but was obliged to survey the coveted prize from afar with a field glass, and even then hardly escaped to tell the tale. Of course there is not a word of truth in any part of this story. Another collector actually brought a very charming and new orchid, the eulophiella elisabethae from the interior of Madagascar, but to discourage any poaching on his preserves by other collectors, tells how as he journeyed towards the spot under the guidance of a native chief the chief's brother was pounced upon and torn to pieces by that terrible beast the protocryptoferox Madagascarensis. By the way, there isn't any such creature though protocryptoferox is the name of the small and comparatively harmless civet cat. Owing to the tribal laws the collector was immediately offered the choice between espousing the widow or being greased and burnt to appease the spirit of the departed. Being a gallant Frenchman he was incapable of slighting a lady and triumphantly proceeded with his new brother-in-law to gather all the plants and destroy what he could not gather—and he adds a hint that his truculent brother-in-law in Madagascar is quite ready to grease and burn any venturesome collector who may hereafter presume to poach upon his dear relative's preserves.

Perhaps the traveller's tale was suggest-
ed by the fact that an orchid collector was really carried off by a tiger while on a collecting trip in the neighborhood of Singapore and others have had to bargain with cannibal savages in New Guinea before being permitted to despoil their rocky burial places of a fine orchid that grew most abundantly in such localities.

CULTURAL DIRECTIONS.

The cultivation of orchids in Florida is not the difficult task that many people suppose. Some are as easily grown as geraniums though the treatment is not quite the same as that of ordinary house-plants.

Orchids mostly need a season of growth with plenty of water and a warm rather moist atmosphere, and a season of rest when they are kept cooler and dryer. Some bloom during growth, some at the beginning and some at the end of their resting season, so that by properly selecting the varieties, flowers may be had nearly all the year round from different plants needing practically the same cultural treatment.

The cypripediums or ladyslipper orchids need no resting time and should be watered abundantly all the year round. Cypripedium insigne is cheap and easily grown but prefers loamy soil; still a six-inch potful of soil will keep a good sized plant in good health for several years, if a little weak manure water is used occasionally. The flowers appear in December and last in good condition on the plant for two months. This is altogether the most easily grown cypripedium for Florida; its requirements are only proper soil, perfect drainage, plenty of water, half shade or other airy place and immunity from actual frost.

Phaius grandifolius the “Veiled Nun Orchid”—often catalogued as Bletia tankervillae—thrives in any rich mucky soil with an admixture of well decayed manure, either in pots or in a moist spot out of doors. Give half shade and protect from actual frost and it will grow like a weed. I had thirteen spikes this spring from a small outdoors clump, averaging at least a dozen flowers to the spike. This clump was protected during frosty nights by being covered with a blanket spread on a lath frame, on the coldest night—25 degrees—a lighted lantern was put underneath.

The other orchids which naturally live upon the branches of trees are best grown in fern-root. Blocks of wood on which they are often grown at the North are not advisable here; the roots are too much exposed to the ravages of cockroaches and they dry out too quickly. Besides the wood decays in a short time and decaying wood is rank poison to orchid roots of all kinds. Even cypress will not last more than a year or two when used for orchid baskets, and perforated flower pots are much better—with a little practice a hole 1½ or two inches in diameter may be chipped out of a five-inch pot by means of a sharpened nail and a tack hammer, and it will do as well as a perforated orchid pot made specially for the purpose. Galvanized poultry netting may be easily made into improvised hanging baskets. It will last better if painted and sprinkled with Portland cement while the paint is fresh.

For potting material nothing is better than the rootstocks and matted root fibres of the osmunda or “flowering fern” common in rich hammocks. Pieces of suitable size can be chopped off with a hatchet, the sand and earth shaken off and the orchid plants firmly attached by fine copper wire, if the plants are newly imported and without many roots; or, with already established plants, pieces of the fern root the size of an egg or larger can be placed in the new basket and after removing as much of
the old material as possible without seriously injuring the roots of the orchid, it may be firmly fixed among the fresh pieces of fern-root and the stems wired fast to prevent the plant from shaking about till the new roots have taken firm hold of the new material. The eyes at the base from which the new shoots are to come must not be covered, otherwise the new growth is likely to decay and the plant may be lost.

If the orchid is dipped daily in a bucket of water and hung up in half shade on a piazza or under a tree during the warm season, and dipped only once or twice a week after its growth has hardened up and until the new growths have become an inch or two two long, the next season, and if the plant is never allowed to be exposed to a night temperature of say less than 40 degrees, success may be expected with almost any cattleya or laelia, and many of the East Indian dendrobiums will succeed admirably. Avoid all orchids usually catalogued as “Cool orchids.” They come from cool mountain heights and rarely survive a Florida summer.

Dendrobium nobile is perhaps the best tree-orchid for the beginner. I have had them grow for years attached to tree trunks out of doors and the flower buds have endured a cold of 21 degrees for a short time without injury but it will not grow in a really satisfactory way unless cared for as recommended above.

To the beginner I would recommend the following list as easily grown and giving a succession of flowers through the year.

- Cattleya Trianae—Blooms in January.
- Dendrobium nobile—February.
- Dendrobium thyrsiflorum—March.
- Phaius grandifolius—April.
- Cattleya mossiae—May.
- Laelia purpurata—June.
- Cattleya leopoldi—July.
- Cattleya bowringiana—August.
- Laelia perrini—September.
- Cattleya labiata—October.
- Laelia anceps—November.
- Cypripedium insigne—December.

The substance of this paper was delivered as a lecture before the students of Rollins College a short time before it was read at the meeting of the Horticultural Society. Anyone wishing to pursue the subject farther will find almost all the known facts related at length in Darwin’s work “On the Fertilization of Orchids by Insects,” published by D. Appleton & Co.

Mr. Taber: I quote from a letter of Mr. Mead written to me personally. He wrote me that he had not had time for five months to go to the station one mile away—just attending to his orchids. Mr. Mead is a scientific crank—but it is just that kind of scientific cranks that make this Horticultural Society what it is.