hairs become factors of beauty on an aged head, they spoil the looks of youth. Pure white flowers are doubtless beautiful, some of them perhaps the most beautiful that Nature gives; and where, as in the Hyacinth, a plant has intrinsic grace of form, we are gladdened by the same grace repeated in many hues. But where the worth of a flower lies solely in the depth of its azure-blue or the fulness of its rich crimson, ought we then to clap our hands because, in some seedling, disease has replaced the pigment with bubbles of air?

With Siebold's Primroses my list of Primroses must at present end. I might speak of many more, and might treat more fully of many on which I have only lightly touched; but I think I have said enough. Nor need I dwell longer on their culture, save perhaps only to say this-that where big roots in process of time need dividing, or offshoots taking off, let the division and replanting be done if possible as soon as flowering is over. No wise man, I venture to think, would, if he could help it, plant a Primrose at a time when the winter days are shortening, when the plant should be at rest, securely anchored by firm roots against the pulls and thrusts of a soil which is one day frozen and the next thawed. We all know the sights which meet us when we survey our treasures after days of frost; we grieve as we look on some small chosen darling thrust up sideways on the bed, with its roots all bare. Whereas, if we plant in spring, or even in summer, shading and duly watering till the young roots have taken hold, we may smile at the winter frosts and storms.

One other point of cultural moment I should like to dwell on before I close. Nearly all the Primroses will, I believe, be found to be at least dimorphic; all those which I have examined, with certain exceptions, about which I do not feel quite clear, possess the two forms known as "pin-eyed" and "thrum-eyed;" that is, with styles longer than or shorter than the anthers. The pineyed forms are naturally rejected by the florist; their obtrusive stigmas come near at least to being an eyesore, but equally naturally they are used for breeding from. The prominence of their stigmas makes them convenient seed-bearers; but the breeder should always bear in mind that Mr. Darwin has conclusively shown that in these dimorphic plants the most abundant seed, the strongest seedlings, and the finest flowers, are gained by joining the two forms, by fertil ising the long-styled plants with pollen from shortstyled plants, or vice versa. Nor need the breeder shrink from thus using the less elegant pin-eyed mother, lest the "pin-eye" should be predominant in the offspring. His seedlings will be both of one kind and of the other, and if he joined two thrum-eye forms he would still have offspring in part pin-eyed, with this additional drawback-that the produce would be fewer, weaker, and less likely to contain noble desirable flowers. Dietes.

ENTADA SCANDENS.

THIS is one of the many climbing plants that give a decidedly tropical aspect to the vegetation of Jamaica. It climbs and rides lightly over every other form of vegetation that lies in its track, provided that the object is not too high. Mountain slopes, though studded with other trees and shrubs, at times present a complete mantle of the long thin shoots and glossy leaves of this scandent shrub. The wonder is that other plants under its dark covering live at all. It seems to be the fittest of the fit to live; it virtually treads all others down. It is to be seen in its strength and best form along the river courses. The long stout branches, like great cables, wreathe together every tree for many yards. The branches of one growing by the river here have travelled 150 yards in one direction and 50 yards in the opposite direction from the low trunk, which is close on 18 inches in diameter.* It is very anxious to go further, but is at present stopped short for want of trees or shrubs to clamber over. I have been told of one that had extended through and over trees for nearly a mile; but, believe me, this wants verifying.

Though a climber it is not a twiner, excepting in the sense that all plants nutate. It is a tendril-bearer, and its leaf-tendrils are, it seems to me, remarkably sensitive. They are either simple or forked, and when rubbed gently on the inner side they in a short time (five minutes or less) appear in motion, slowly at first, but in about ten minutes after manipulation they are moving at the rate of half an inch per minute, the speed gradually increasing until the object in their way is clasped, which is soon after accomplished.

The young shoots are thin and straight, but the stout old branches generally present the appearance reproduced in the accompanying sketch (fig. 82), as though they had twined round some object which afterwards died and dropped out of their rigid coils. This feature, so far as I can judge, is merely a result of contraction.

My reason for making the accompanying sketch was to show (that I might the better explain) the curiously contorted worm-like ridge, or keel, on the branch. When I first observed this feature I thought it might be a tunnel formed on the bark by tree-ants, which here form covered passages of bark, cemented with saliva, along the trunks and branches to their often huge rounded dwelling built of the same materials; but on closer inspection it was discovered to

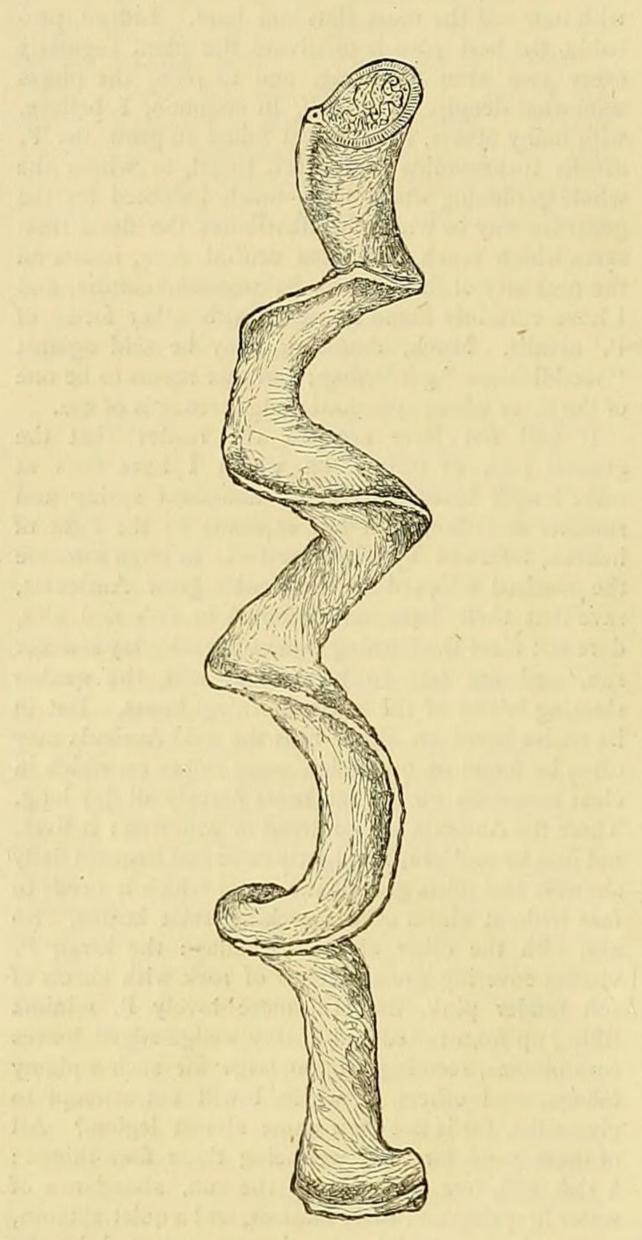


FIG. 82.—BRANCH OF ENTADA SCANDENS (THE "COCCOON" OF THE JAMAICA PEASANTRY).

Length, 2 feet 5 inches; diameter, 21 inches to 3 inches; actual length of eccentric pith, 6 feet 2 inches.

be something very different and quite natural to E. scandens. By severing one of the stout branches the real nature of the ridge was revealed. The tortuous ridge is the excentric pith of the stem. The branch wears its heart upon its sleeve for-well, at any rate for us to look at. This plant is perhaps the best living instance of excentric growth as a normal yet botanically abnormal growth. The ridge can be traced forward into branches that are about \(\frac{3}{8} \) inch thick, but entirely disappears, and assumes a natural place, in the centre of smaller growths. Before it disappears it follows in a zig-zag wriggling way the course of the laterals, by passing along the stem from the base of one lateral to the base of the next; and these being alternately placed, and somewhat distichously disposed on the stem, account in some measure for the course described by the excentric pith, as shown in the figure.

The character above described and illustrated is a specific one that has not yet found, and possibly never will find, a place in a descriptive Flora; but with the field botanist it will perhaps henceforth supersede all others in determining Entada scandens. George Syme, Castleton Botanic Gardens, Famaica.

GARRYA FREMONTI.

OUR esteemed correspondent, Mr. Webster, of the Gardens, Gordon Castle, sends us a flowering spray of this species with male catkins, and of which we give an illustration (fig. 83), for the purpose of comparison with the older and better known G. elliptica. It is a native of Oregon, California, and the Cascade Mountains, and has oblong or oblong obovate acute leaves, not so wavy at the edge as the commoner species. Mr. Webster adds that while G. elliptica has quite succumbed to the frost, G. Fremonti has not a twig injured :- "They are both growing near each other on the front of my house-aspect south. The plant of elliptica is fully 20 feet in height, has been planted about twenty-eight years. It had its top much injured in 1860 with 22° of frost; with that exception it never has been much injured by any frost until last January, when we had it at zero. The plant of G. Fremonti is not so large, but it has in every way been under the same treatment, and I have thought its hardier character worthy of making known."

KUBANKA AND SAXONKA WHEAT.

My second year's experiments with Kubanka and Saxonka Wheat were described in the Gardeners' Chronicle, vol. xiii., pp. 108, 172 (January 24 and February 7, 1880). They were made for the purpose of testing the opinion of the Russian farmers in Samara, a province on the Volga, that Kubanka Wheat repeatedly grown on poor soils is converted into Saxonka.

I may repeat that neither in the first nor second year's experiments did there appear to have arisen the slightest change in the character of the two Wheats. The grain of the first crop (1878) was pretty well ripened, especially that of the Saxonka, but the grain of the second crop (1879), owing to the extreme lateness of the season, presented about as wretched a sample as could be looked upon. In this case also the Kubanka was less fully matured than the Saxonka, the reason probably being that Kubanka is a larger seeded, stronger strawed form of Wheat than Saxonka, and requires longer time to arrive at full growth. Although both varieties were affected with red rust in 1879, yet they were not so badly affected as in 1878, apparently showing that when wetness of season goes beyond a certain degree, the conditions favouring rust begin to diminish.

On March 9, 1880, I planted in the corner of a field two rows of Kubanka seed of crop 1879, and two rows of crop 1878; also two rows of Saxonka of crop 1879 and one row of crop 1878. For comparison, I planted at the same place on March 13 two rows of ordinary spring Wheat with seed of crop 1878, and two rows of Rye with seed of crop 1879. On April 1, at the same place, I planted three rows of different varieties of Wheat, the seed being from New Zealand. And to test the effect of late sowing I put in on April 14 other two rows of Kubanka with seed of 1878, and two with seed of 1879, and two rows of Saxonka with seed of 1878.

The soil was in ordinary condition, but it is not a soil which can be regarded as a Wheat soil. The first sown ill-matured Kubanka seed of 1879 germinated very partially, and threw up very delicate plumules; the seed of 1878 produced a much better plant. No difference could be detected in the Saxonka rows between the seed of 1878 and 1879, showing clearly that the same unfavourable circumstances are less fatal to the embryos of Saxonka than to those of Kubanka. But although the Kubanka plants from the seed of crop 1879 were thin they came ultimately to be little inferior to the plants from the seed of 1878; those which grew having more room and more food than the thicker drills. The first sown Saxonka began to show ears about June 25, Kubanka ears appearing a few days later, while Rye and Bere beside them were a few days earlier. Flowering began upon the Saxonka about July 8, and upon the Kubanka about the 14th, at which date the Saxonka was well advanced. The spring Wheat and other unbearded varieties began pollination about the same time as the Kubanka. The latest sown rows flowered at a later period; but otherwise the lateness seemed to have produced no special result.

The plants were now at their best, and the question of the experiment presents itself—Has any alteration taken place in their characters? The answer

^{*} I have stated that the plant growing here by the river side has extended 150 yards in one direction. It is probable, however, that the actual length from the roots to the extreme point of growth is more than double that. This will be explained by the remarks made in immediate connection with the figure. G. S.

must still be that no alteration has taken place; the Kubanka has not "degenerated" into Saxonka, nor has the Saxonka "improved" or returned into Kubanka. The Kubanka retains its purple anthers, thickset spikes, and long awns; while the Saxonka has still its yellow anthers, thinset spike, and shorter awns. I stated in my last report that the ears of Saxonka and of awny spring Wheat were identical; but when seen growing beside each other there appears a slight difference. Both are constructed on the thinset principle, but in general the spring Wheat has a longer ear than the Saxonka, and, the seeds being large, more divergent awns. Ears, however, may be selected from both varieties barely distinguishable. The two varieties are evidently closely related, whether the relationship is genetic or cosmical let time determine,

Zealand, although close beside the Russian, were not much affected with rust. Other fungi followed the rust, and the destruction of the Wheat was so complete that only specimens were kept. Some of the seeds, though having their coats shrivelled, attained considerable size. On examining these at the present date (February 28, 1881) I find that they are infested with mycelium in all directions. What is implied in this fact as regards the life-history of red rust cannot be here discussed.

The conclusions at which I have arrived from these three years' experiments have already been indicated. No transformation of the one form of Wheat into the other takes place. Want of food, poorness of soil, reduces the size of the plants but does not immediately alter their character. Did it frequently happen that so great a change as the alteration of Kubanka Wheat

higher than anything mentioned by M. Fabrecarrying corns eight-tenths of a grain in weight, a weight far exceeding that of the corns of Saxonka Wheat, but no change seems to be coming over the structure of the plant. The Kubanka variety of Wheat tillers well in good soil, throwing up strong stalks and prolific ears; but in poor soils Saxonka has greatly the advantage over it, being a Wheat the whole structure of which in the present age is slighter, and more easily ripened. Its early and complete ripening also brings the embryo further forward, and makes its regermination more certain than in the case of the later Kubanka, so that when the two varieties get mixed up together in the operations of ordinary and careless husbandry, the crop upon poor or exhausted soils, unable to grow the heavier Kubanka, will consist year after year of greater and

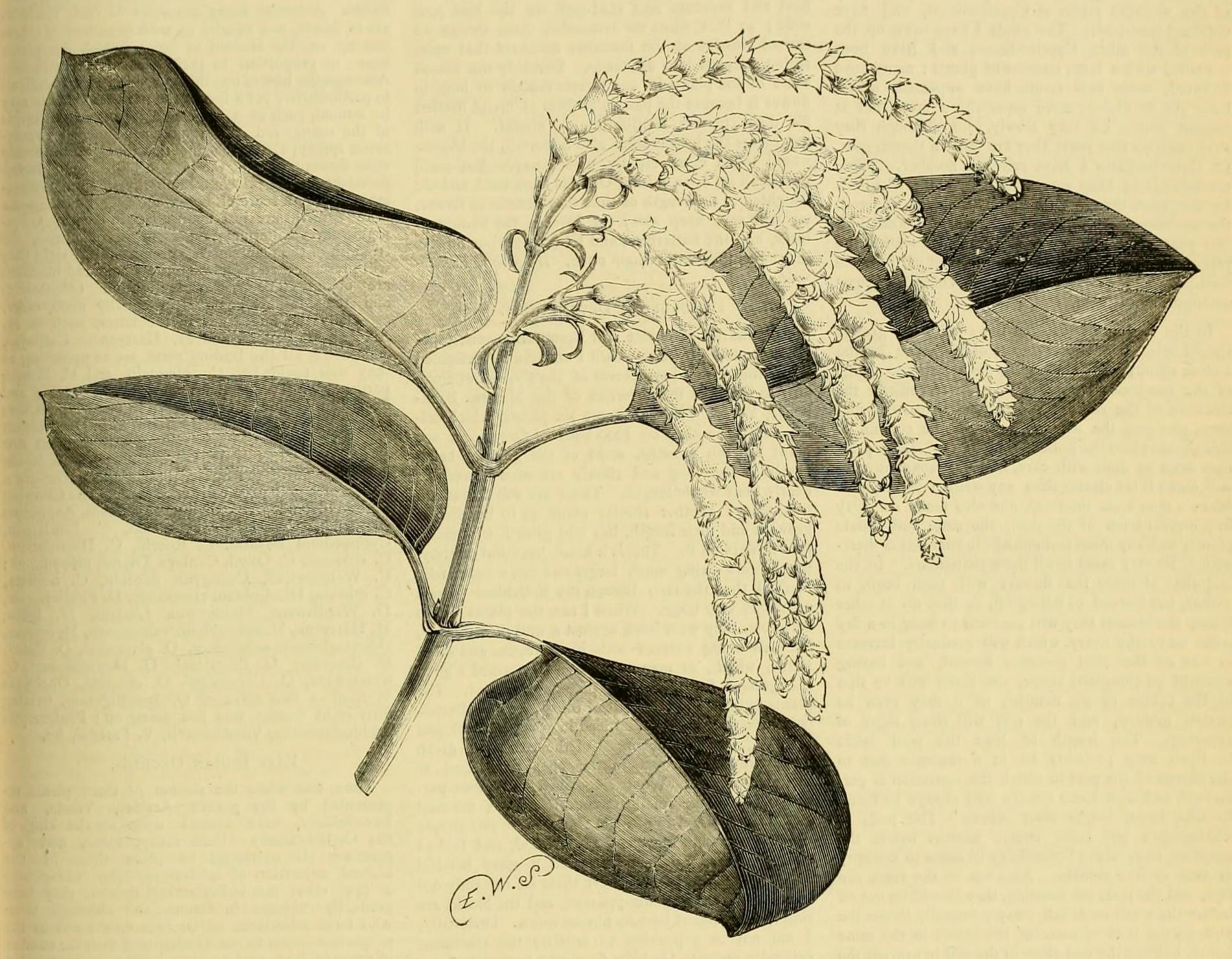


FIG. 83.—GARRYA FREMONTI: MALE CATKINS. (SEE P. 430.)

By July 14 the Saxonka was a good deal rusted, the Kubanka being at that time unaffected. Rusting came on in the same way with the crop of 1878, when by spreading newspapers and shaking the stalks I collected a pill-boxful of the spores. By-and-bye the Kubanka was also covered with rust. I had then some hope that if the rust had a certain date of development the late sown rows, which were still bright green, might escape. But no; whenever they came to the same stage of maturity the lines of rust also appeared. From a statement in Lawson's Manual (p. 15), that Continental Wheats, although affected with rust the first crop after importation, get over the disease, I concluded that the worst was past in crop 1878. This was not the case, for the rusting now proceeded till the whole of the plants of both varieties were utterly destroyed, not a sound ear or seed remaining. The spring Wheat and the New

into Saxonka took place by the adverse cultivation of a few years, the fact must have been verified absolutely long ere now. Such changes are not to be witnessed right off while the heat of enthusiasm looks on for a proof of evolution. I have been cultivating the wild Oat for many years, and it has not changed in one iota. I have been cultivating Ægilops ovata, Ægilops speltæformis, and other species of Ægilops for a few years. They sometimes live over two seasons. A. ovata, triuncialis, and others, frequently throw up nearly 200 spikes from a single seed; but not a spike of ovata has as yet given the faintest countenance to the contention of M. Fabre, that it was the immediate parent of some Wheat. And speltæformis would never be thought, on a cursory view by a farmer, to be anything but a rather dwarf form of some bearded Wheat. Many of the stalks have been from 3 feet to 3 feet 8 inches high-

greater proportions of Saxonka; and it will appear to the farmer who thought he began with a nearly pure stock of Kubanka, that Kubanka has been transformed into Saxonka. If a hybrid between these two forms could be produced resembling Saxonka, hybridising might be regarded as part of the explanation of the seeming transmutation. So far as my own experiments go, hybrid Wheats appear to be unattainable. Perhaps only those forms now exist which will not cross with each other. It is not very difficult to transfer the pollen of one Wheat to the styles of another. But will that produce a hybrid? If a Wheat's own anthers are discharged just at the natural time of flowering, upon its own styles, in a couple of hours or less many pollen tubes will be found to have entered the branches of the feathers. But the pollen of one variety (Kubanka) discharged on the styles of another variety (spring

Wheat) produces no tubes, any more than the pollen of Rye.

It only remains for me to return my best thanks to Dr. Charles Darwin for entrusting me with this experiment, and to Dr. Asher for valuable information regarding farm practices in Samara. A. Stephen Wilson.

Orchid Notes.

RAISING SEEDLING ORCHIDS .- Judging from the inquiries I have received, since I sent you, a short time ago, a few notes respecting some Dendrobiums we had in flower-which were some of a batch I had raised from seed, that had been carefully watched and tended until we were rewarded with their first opening blooms - raising seedling Orchids is a sphere of labour upon which many are anxious to enter, and the few notes now given are chiefly for those whose desires tend in this direction. These are by no means the first seedlings I have succeeded in raising. I have operated upon many of the different forms of Cypripediums, and have obtained seed-pods. The seeds I have sown on the pots of the other Cypripediums, and have been rewarded with a large number of plants; many have flowered, some new forms have appeared, others have yet to bloom, more especially a cross that at present comes on very slowly, for although they have been up four years they are still in thumb-pots. Of Calanthes also I have raised a number. These are difficult to keep even after they are pricked off. In this case, though C. Veitchii produced the seed, the seedlings when they flower (as they have done for two years running) are the two forms of vestita, the yellow and the rose-coloured coming out of the same seed-pod, and so far no trace of Veitchii appears amongst any of them.

In the raising of Orchids from seed the grower should select two of any genus, or of genera having a close affinity; and should first get a clear knowledge of the component parts of the flower, chiefly the structure of the column and the pollen masses; and then, choosing the stronger one, on the column of this should place the pollen of the other. This operation must be done with care, and a personal attempt will make it far clearer than any written description. Make a note upon the label, and also make an entry in a pocket-book of the date, the male and female plants, and any other memoranda in connection therewith. Be very exact in all these particulars. In the majority of cases the flowers will soon begin to wither, but instead of falling off, as they do at other times, the blooms they will continue to hang in a dry state on to the ovary, which will gradually increase in size as the seed becomes formed, and having assumed an elongated shape, the seeds will be ripe in the course of six months, or it may even be twelve months, and the pod will show signs of cracking. The length of time the seed takes to ripen may probably be in a measure due to the season of the year in which the operation is performed, although some species will always be found to take much longer than others. The pods of Phalænopsis will hang twelve months before the seeds are ripe, whilst Calanthes will come to maturity in four or five months. As soon as the seeds are ripe, and the pods are bursting, they should be cut off before the small seeds fall away; carefully shake the pods on the pots of some of the plants in the same house, holding the pod close to the soil to prevent the seed being blown away. Lay the pod on one of the plants; in a day or two again take up the pod, shake it over some plants, as it will be found some more seed will have ripened; mark every pot on which the seed has been shaken, and also the special class of seed sown. Water carefully when the plant requires it, and nothing more can be done. I have always found the seed to spring up better if sown in this manner. If special pots are made up the chances of success are much less certain; at least so I have found it. In some cases six months will elapse ere any signs of life make themselves apparent; it may be that no young plants will be seen for twelve months; and even after the first are seen others will continue to spring up during the following months; so that a matter of eighteen months may pass by ere the whole of the plants can be seen. The little seedlings should not be disturbed the first twelve months; if during the second season they can be handled with safety they may be taken off and pricked round the

side of a pot or basket, which must be suspended from the roof, but not neglected so as to become very dry. If the seedlings, however, keep very small, they had better remain on the pot on which they were sown until they have formed a few little bulbs; for in the young stages the operation of removing them is one attended with considerable risk, and many may be lost if they are disturbed too soon. When once they are pricked off and commence to root they are almost sure to do well, and as the seasons pass round the growths become stronger, the bulbs stouter and more plump, and in the case of some the blooms may be looked for at four years after coming up; many, however, will require six years, and a longer time even than that will be necessary to wait ere some of the Cattleyas and stout bulbed orchids will flower.

Considering the vast numbers that are annually imported, there can be no doubt that the seed ripens freely, and also germinates very abundantly, in their native habitats; but then they are at home-the whole of the conditions are favourable. The insect agency necessary for their fertilisation is at hand; the heat and moisture and seed-bed are the best possible; so that when we remember these things we cannot wonder at the immense numbers that must spring annually into existence. Probably the reason some of the plants in our houses remain so long in flower is because the particular form of insect needed for their perfect fertilisation is absent. If with the plants the insects were also imported, the blooms would much more rapidly pass away. But until we are all set upon raising Orchids from seed, and are delighted at the length of time they remain in flower, we will say, keep away the insects, the hummingbirds, and the butterflies, and let us enjoy our flowers as long as they will remain open. W. Swan, Fallow-

DENDROBIUM DEVONIANUM.

All admirers of chaste and beautiful flowers, especially Orchid growers, would I am sure be delighted to see the splendid specimens of the above Dendrobe now in bloom at the nurseries of the Messrs. Backhouse, York. There are some six plants, which collectively have close on 1200 buds of flower on; one plant has ten growths, some of the growths being nearly 4 feet long and closely set with flowers for nearly their whole length. There are 260 flowers on this plant; another similar plant as to number of growths and their length, has one growth with sixtyfour flowers on it. This is a most beautiful variety, the flowers being much larger and more beautifully marked than the rest, though the individual flowers on all are very large. When I saw the plants on the 24th inst. they were hung against a wall in a fernery, the wall being covered with Ficus repens and small Ferns, which, as may be imagined, formed a good background for the floral picture in front. The plants in question were part of the Constable Burton collection that has been noticed in your columns (see p. 250), and as specimens of the treatment given there are quite equal to the ones mentioned at the above page. What astonished me more particularly was the small amount, if any, of material that the plants had to grow in. They were just simply fastened to rough blocks of Elder wood, and looked as if they had at some time had a mere handful of sphagnum and peat to start them in, certainly not more. This has all disappeared, and the blocks are simply one mass of healthy fibrous roots. Personally, I am not in a position to criticise the treatment generally given to Orchids, from not having had any extensive experience in their culture; still, I cannot help remarking that, judging by the results of the treatment given at Constable Burton, position and atmospheric treatment have quite as much if not more to do with the success or otherwise of Orchid culture than the mere compost they are grown in, and that a more natural treatment would in the case of many species be, at all events, worth trying. I had the opportunity of seeing the whole collection a few days after they came into the Messrs. Backhouse's hands, end was much surprised to see the large masses of Cattleyas of sorts, Dendrobiums, Aerides, Saccolabiums, that were growing in roughly-made baskets and blocks of Elder, Elm, and Thorn. In some cases the small crates, as I may almost term them, were one mass of healthy wiry fibrous roots, not a particle of the usual compost to be seen. The large prices that some of the best plants have realised since they came into Messrs. Backhouse's hands are a proof that they were in fine condition generally. H. J. C., March 29.

MR. HARDY'S ORCHIDS.

Amongst the many collections of these favourite plants that have been formed in recent years there are few more important than Mr. Hardy's, at Timperley, Manchester, which keeps growing apace, not alone by the addition of new kinds as these become attainable, and by the addition and duplication of the finest forms of the best older species, but still more by the healthy progress which the collection generally is annually making. For although Orchids are amongst the slowest growing of cultivated plants yet when the joint requirements of treatment and suitable houses in which to grow them are present the progress they make is very different to that which is possible where either of the above essentials are wanting. Thick bulbs and stout leathery leaves having a due proportion of the peculiar bronzy tint indicative of rude health bear evidence of the satisfactory state of the collection, not alone as regards the bloom to be expected during the ensuing season, but, what is of even more importance, as indicating their continued healthy condition. Amongst many examples of such kinds as are in flower, and equally so with quantities of others coming on, the amount of bloom which the plants bear in proportion to their size is remarkable. Amongst the host of fine things coming on it is difficult to particularise, yet a few of the most remarkable may be named, such as a large and very strong example of the orange-red Ada aurantiaca, showing twentyseven spikes; Cattleya Skinneri, with eight immensely stout flowering heads, the biggest bulbs over 31 inches in circumference; Dendrobium thyrsiflorum Walkerianum, with a score of bulbs showing flower-some of the growths are just upon 2 feet in length. Odontoglossum vexillarium is present in quantities, the strength of the plants giving promise of the sight they will present when their exquisitely coloured blossoms are open. The cooler section of Odontoglots and the Masdevallias are in equally good order, especially the fine kinds of the latter, such as M. Lindeni, M. Veitchii and M. Harryana. Cattleyas, comprising all the leading sorts, are as promising as they well could be, C. Mendelii and C. Mossiæ particularly; Thunia Bensoniæ grows as strong and freely as a Willow. Over a path in one of the houses is hanging a row of baskets filled with Dendrobium crassinode and D. Findleyanum, with another row of different forms of D. Wardianum in pots on the opposite side of the house, that in themselves are a sight worth going some distance to see. The following were in bloom :- Arpophyllum giganteum, Angræcum eburneum, Cymbidium eburneum, C. Lowianum, Cypripedium Boxallii, C. Roezlii, C. Harrisianum, C. villosum, C. Lowii, Cattleya Trianæ, many forms; C. Warscewiczii, Coelogyne flaccida, C. ocellata, C. cristata, Dendrobium crassinode, D. Findleyanum, D. Wardianum, Masdevallia Lindeni, M. ignea, M. Harryana, Mesospinidium vulcanicum, M. roseum, Odontoglossum nebulosum, O. gloriosum, O. Rossii, O. cirrosum, O. Pescatorei, O. Dawsonianum, O. triumphans, O. Cervantesii, O. crispum, Oncidium Weltoni-a fine spike of O. lamelligerum, bearing forty-eight flowers, was just going off; Phalænopsis Luddemanniana, Vanda suavis, V. Parishii, &c.

EAST INDIAN ORCHIDS.

Time was when the section of these plants represented by the genera Aerides, Vanda, and Saccolabium, were looked upon as the kings of the Orchid family - their rarity, value, and appearance all combined to place them in the highest estimation of cultivators. But, along with a few other non-bulb-forming species, they have gradually declined in favour, and although those who form collections of Orchids now stand in the proportion of ten to one as compared with the number of growers that used to exist, still it is a somewhat rare occurrence to meet with a stageful of healthy plants of the kinds above-named. Mr. Findlay has for a long time been particularly successful with them at the Botanic Garden, Manchester; the centre stage of a good-sized span-roofed house is almost wholly occupied by a lot of specimens in excellent condition. The plants, which mostly consist of the best species of Vanda and Aerides, have attained a size to show their true character, that is, from 2 to 4 or 5 feet in height, with stout healthy leaves down to the pots, a state that in itself affords the best evidence of their good condition, for where this division of the Orchid family, after reaching the size these have, are found fully furnished with healthy foliage, it may invariably be accepted as conclusive of their well-being. The house in which they grow affords them a full volume of light, and there is no stint of air, which can be admitted in all weathers by a large swing light in the division that separates it from the adjoining house, which is used for standing the Orchids in whilst in bloom, associated with Ferns, Palms, and other things, and which is necessarily kept cooler and drier than the house wherein the plants are grown,