by whom it will be distributed. In habit and general character it is said to resemble the well-known popular variety called Vesuvius, differing only in having the blooms invariably striped. Mr. Cannell in his characteristic style remarks that "its sale and propagation will never cease until it is seen in every window." A cutting, it appears, has been stolen, and a reward is offered for its discovery.

FLORENTINE GARDENS.

Florence: *March* 2, 1876.—Situated at a low level, and completely sheltered by hills, Florence in the advance of vegetation presented a greater contrast to the North Lombardy plain than two degrees of lower latitude would represent, for spring was here at least a month earlier than at Trieste and the northern Italian cities; and the *fiorigi*, or flower-women, both in the flower-markets and streets, were already well supplied with the early produce of the delicious

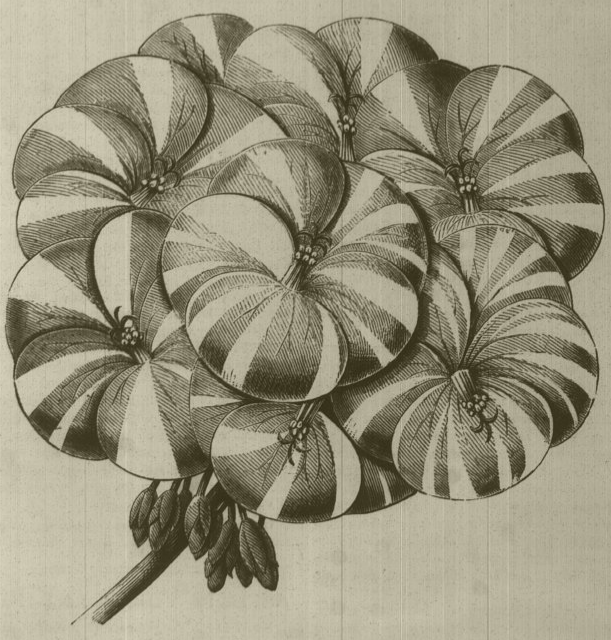

Fig. 32.—Pelargonium (zonal) New Life.

climate. Seen from the surrounding heights, the huge dome of the cathedral, with its many-coloured campanile, and the towers of the churches rise out of the dense variegated mass of the mediæval city, which dies away into the surrounding grey hills through a bright halo of white villages and villas spreading up on all sides amidst Olive gardens, sombre groups of Cypressus, and light fleecy patches of Almond trees in full flower. One of the most striking features to the new-comer is the laying out of the squares or piazzas, in which the horticultural features harmonise so thoroughly with the surroundings, as to put to shame our own efforts at city gardening, which in our West Central squares goes little beyond the fencing-in of an unhealthy deciduous thicket by a forbidding iron railing.

In the Florentine squares the development of distinct features is aimed at. Crowding is always avoided, and the symmetrical disposition of a few trees and plants, generally in association with sculpture and fountains, brings all into pleasant harmony with the architectural surroundings. Chamærops Fortunei, C. humilis, and tall Yuccas are contrasted with Thuja aurea and other Coniferæ of massive form; and a further contrast to the whole is obtained by the introduction of feathery masses of Ferula and Araucaria excelsa as central features.

Our English climate would of course limit the available selection, but with Yuccas, Thujas, Araucaria imbricata, Retinosporas, and other Coniferæ, associated with Ferula, Gunnera scabra, and the common Rhubarb, just such effects could be obtained as are so pleasant to the eye in the Florentine squares.

Florence is rich in public gardens. The Cascine, a continuation of the Lung Arno, is a noble promenade, well-kept, and perfect as regards planting and simple dignity of effect, though there is nothing special to note in a purely horticultural sense. The establishment, including the Muses de Storia Naturale and the Botanical Garden, is the central point of attraction to the naturalist visiting Florence, and for its size is one of the most complete and best ordered in Europe. It has been of gradual growth by additions made to the *specola*, or observatory, founded under the Medicis. The botanical collections include a fine series of wax models prepared by MM. Calamai and Tortari, under the direction of Professor Amici, also a good collection of wood sections, fossil plants, &c. The first nucleus of the natural history collection was formed by Pietro Leopoldo and Targioni, by the former of whom the garden was founded a few years after the museum. The formation of the splendid main herbarium (L'Herbier Central) is due to Professor Parlatore, the present director, who commenced it about the year 1844, and to this has recently been added, in a separate adjacent gallery, the fine private herbarium of the late Philip Barker Webb.

The botanical garden, immediately adjacent to the museum, though well-ordered, bears evidence of intermittent growth, and consists of semi-isolated patches and terraces rising up to and intermixed with the Boboli Gardens. The glass-houses, as in most Italian gardens, are defective in structure, and the cultural details are, in consequence, scarcely equal to those in English establishments of the kind.

In the cultivation of bulbous plants in pots and cold frames the garden greatly excels, and there is perhaps no other botanical garden in Europe that could exhibit so complete a collection of European bulbs in a thoroughly healthy condition. Amongst the Croci, of which there is a fine series, there is a species under the names of lagenæformis striatus and aureus striatus, to which I must draw the attention of Crocologists, as it accords with nothing that has heretofore been described, with a bright orange limb, the three outer divisions suffused externally with bronze. It somewhat resembles the plants in cultivation under the names of stellaris and sulphureus striatus, but the almost entire slightly indented scarlet stigma separates it from the aureus and mæsiacus group, and seems to connect it with susianus and reticulatus, between one of which and aureus it may possibly be a hybrid: there were a few patches of it grown for ornament in the King's garden, but I could ascertain nothing about its history or origin.

The botanic garden is too limited for an extensive collection of trees, but in a small open quadrangle fenced in by high walls under the Pitti Palace is an interesting collection of Chinese and Japanese species, including a grand specimen of Sophora japonica, various species of Camellia, Salisburia adiantifolia, Magnolia fuscata, M. Yulan, M. obovata, M. anonæflora, Cunninghamia sinensis, Daphne variegata, Chamærops excelsa, Laurus Camphora, Hydrangea quercifolia, Thea viridis, &c.

There are also a few good Coniferæ scattered about the garden, but the general collection of trees is meagre, and might be augmented with advantage. *Geo. Maw, F.L.S.*

THE PHYLLOXERA.

A gentleman the other day called my attention to a long article on the subject of the invasion of France by the Phylloxera, from the pen of Professor Planchon, of Montpellier, in the *Revue des Deux Mondes* for January 15 of the present year. From what this writer indicates, there is an opinion prevalent, which, however, he does not seem to vouch for, that some of the American foxy Vines resist the attacks of the insect. [See our issues for August 21, 1875, and June 3, 1876. Eds.] If this could be verified, say by the Scientific Committee of the Royal Horticultural Society, it would be worth while to grow such Vines as V. Labrusca, V. rotundifolia, or any other that might be found to be proof against the attacks of the pest, and inarch our own Vines on them, as Plums, Pears, Peaches, and other fruit trees are inarched or grafted. Some say that all the foxy flavoured Vines of America are exempt from attack.

It is not for me to say how the committee should proceed in the matter, but one certain way of getting at the truth would be to plant a Vine infested with the insect in a box, or pot, with one or other of these American Vines, and in the course of one season the proof either way would be absolute. If this question could be set at rest, and the fact certified, that such Vines as I have alluded to really resisted the insect, a boon of immense value would be conferred, not only on this country, but on Europe.

To practical men it is perfectly clear that though the sulphocarbonates, and other remedies proclaimed by French *savans*, may kill the Phylloxera, it is not possible to get it applied so as to secure this result. Any one who has seen and examined the vineyards of the Rhine, must know that the roots of the Vines extend into fissures of the rocks, where no insecticide can be got near them. If a remedy of universal application is ever discovered, it must be in the use of a stock that the insect won't feed upon; and whoever makes this discovery will immortalise his name. From what Mr. Tillery wrote the other day, I observe that he is making experiments with some infested Vines: let me call his attention to the subject in hand.

While on this matter it may not be out of place to remark that smaller matters than the ravages of Phylloxera have attracted the attention of Government, and that it might be well if by an Order in Council, or in some other way, it was made compulsory on any one having the pest to report it at once, and to destroy the Vines within a given time. In this way it might be stamped out of the country, and kept out, if the importation of Vines was forbidden under a severe penalty. *W. Thomson, Tweed Vineyard, February*, 1877.

FERTILISATION OF PLANTS.

(*Continued from p.* 139.)

Petunia violacea.—A dingy purple variety was cultivated for five generations. The ratio of the average heights of the intercrossed to the self-fertilised was 100: 71; but in the third generation the difference was reversed, for the heights were then as 100: 131. Mr. Darwin's explanation (p. 275) is, that the seeds from which the self-fertilised plants of the third generation were raised, were not well ripened, which fact,

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he says, gave them an advantage (?), and refers to a similar case in Iberis, but in p. 192 he attributes the inferiority of the very same crossed plants of this third generation of Petunia to *their* not having been sufficiently ripened, and thus producing weakly plants compared with the self-fertilised, as (he again says) also occurred with Iberis; but on p. 103 we read:—"I record in my notes that the self-fertilised seeds [of Iberis] from which the self-fertilised plants were raised [and which were 5 or 6 inches taller than the crossed], were not so well ripened as the crossed." Hence, there are both errors of statement as well as adverse reasonings from the data! Mr. Darwin also accounts for the greater growth of the eighth generation of Ipomœa from their having been raised from unhealthy parents (pp. 38, 39). Surely, if it be beneficial to have unripened seeds and unhealthy parents, at least as far as height is concerned—and Mr. Darwin has selected that as his standard of superiority—natural selection ought to have prevented seeds from maturing, and encouraged the visits of aphides! But I think we may find another explanation. On p. 274 Mr. Darwin adds a very significant sentence:—"It is a remarkable fact that in one pot in which the plants of both lots grew extremely crowded, the intercrossed were thrice as tall as the self-fertilised." This implies that in the other pots they were not so crowded. Now, there is abundant evidence throughout the book that intercrossed and perhaps especially crossed plants, *i.e.*, with new stocks, show, as a rule, a very great superiority over self-fertilised plants when struggling in competition; but, when not crowded, or when grown in open ground, then the difference between their heights and weights is greatly reduced, and may be actually reversed. Indeed Mr. Darwin had already stated this fact in his *Animals and Plants under Domestication*, vol. ii., p. 128, in alluding to his method of culture:—"It is of importance that the two lots of seed should be sown or planted on opposite sides of the same pot, so that the seedlings may struggle against each other, for if sown separately in ample and good soil, there is often but little difference in their growth." I will return to this fact hereafter. Hence I would attribute the vigour shown by the self-fertilised plants of the third generation of Petunia to less crowding. And here I would venture to remark that Mr. Darwin's plan of sowing both intercrossed and self-fertilised seedlings in the same pot—though with the express object of imitating Nature, and thereby revealing the superiority of the former—would have been benefited had he also grown similar pairs in separate pots. Then, there is reason to know that the relative heights would have been much nearer uniformity. As it is, the absolute vigour of neither can be estimated, though the relative vigour is clearly in favour of the intercrossed. Mr. Darwin, indeed, himself elsewhere recognises the great importance of freedom of growth for self-fertilisation to be successful; for in speaking of an experiment with an equal-styled "perfectly self-fertilising red-flowered variety of Primula veris," he says:—"Judging from the previous generations, the extreme unproductiveness of the self-fertilised plants in this experiment was wholly due to their having been subjected to unfavourable conditions, and to severe competition with crossed plants; for had they grown separately in good soil, it is almost certain that they would have produced a large number of capsules."

Canna Warscewiczii affords another case resembling Pisum sativum, for this species is highly self-fertile, and "as plants are cultivated in pots, and are not exposed to competition, they have been long subjected to uniform conditions;" and Mr. Darwin adds, "we have no right to expect much or any good from intercrossing plants thus descended and thus treated." And no good did follow, except that the intercrossed plants yielded rather more seeds, viz., as 100:85. But the self-fertilised plants mostly flowered before the intercrossed.

There are two more plants, *Eschscholtzia californica* and and *Reseda odorata*, I will remark upon, for I think Mr. Darwin has drawn erroneous conclusions from them.

If the reader will carefully peruse the first paragraph of chap. xii., pp. 436-7, I think he would be led to suppose that Reseda and Eschscholtzia were good examples to illustrate the "injurious effects of self-tilisation, for as [some individuals of] these are sterile with their own pollen, they have been long naturally crossed, and the artificial crosses in my experiments," says Mr. Darwin, "cannot have increased the vigour of the offspring beyond that of their progenitors. *Therefore the difference between the self-fertilised and crossed plants raised by me cannot be attributed to the superiority of the crossed, but to the inferiority of the self-fertilised seedlings, due to the injurious effects of self-fertilisation.*"

The last sentence, which I have italicised, is very misleading.

In the introductory remarks on Eschscholtzia (p. 109), the second sentence directly contradicts the above, for it runs as follows:—"A cross greatly increases the productiveness of the flowers of the parent plant." This is repeated on p. 275, in the words, "A cross does some good."

Mr. Darwin received seed from Brazil, where Eschscholtzia is "absolutely self-sterile," and, therefore, unlike English-grown plants, which are more or less self-fertile. It proved, however, to be not so sterile in this country; hence he was able to raise self-fertilised plants; the relative fertility of the intercrossed to the self-fertilised being as 100:15—where the "15" represents so much absolute gain, and that is considerable for a single generation; but in the next generation the relative fertility appears now as 100:86.7! Turning next to the comparative results between the heights of the first generations—*i.e.*, grandchildren of those grown in Brazil—the heights are as 100:101, and in the second generation as 100:116! Mr. Darwin observes on this:—"As the grand-parents absolutely required cross-fertilisation, I expected that self-fertilisation would have proved very injurious to these seedlings. . . . But the result showed that my anticipation was erroneous."

He next crossed the Brazilian plant with an English stock, and it would be inferred by analogy that great benefit should accrue; but the self-fertilised actually beat the crossed in height as 109:100, and in weight as 118:100; and Mr. Darwin further remarks that the self-fertilised were also apparently superior in hardiness. The only point, then, where the crossed were superior to the self-fertilised was in fertility; but when we remember that Eschscholtzia is absolutely self-sterile in Brazil, it is more surprising to find the ratio so near equality in two generations.

Surely, then, it is unfortunate that Mr. Darwin should have specially alluded to this plant as proving the "injuriousness" of self-fertilisation, for his own data not only fail to support his conclusion, but maintain exactly the reverse, for the acquirement of self-fertilisation is, *per se*, so much actual gain to the plant of a new and ready means of propagation; secondly, having acquired that, such plants, by gaining new constitutional elements by transportation to this country, became more vigorous than the normally intercrossed, or even than plants crossed with a new stock.

Eschscholtzia is not a unique case, for Reseda, likewise mentioned as supporting the idea of the injuriousness of self-fertilisation, also tells against such being the case.

Reseda lutea is sometimes absolutely self-sterile. Some plants, however, produced a few spontaneously self-fertilised capsules; propagating from these latter in pots, the results gave the mean ratio of heights as 100:85, and in open ground as 100:82. And Mr. Darwin adds:—"It is a singular fact that the tallest plant in the two rows was one of the self-fertilised." The ratios of their weights was still more striking—viz., of those in pots 100:21, but in open ground as 100:40.

Reseda odorata.—This species shows degrees of fertility from absolute self-sterility to full self-fertility. Arranging Mr. Darwin's results as follows:—I. Intercrossed plants from the highly self-fertile parents, compared with self-fertilised. *a* (in pots), heights were as 100:82, weights as 100:67; *b* (in open ground), height as 100:105 (weights not given). II. Intercrossed plants raised from a semi-self-sterile parent, and compared with self-fertilised plants, raised from the same parent. Mr. Darwin here makes a remark similar to that upon Eschscholtzia:—"I expected that the seedlings from this semi-self-sterile plant would have profited in a higher degree from a cross than did the seedlings from the fully self-fertile plant, but my anticipation was quite wrong." *a*, height as 100:92, weight as 100:99; *b*, height as 100:90 (weights not given).

Now, comparing these two sets of results, a remarkable fact is seen, that in the first generation the plants from fully self-fertile and self-fertilised parents grown in pots (*a*) do not give such high results as the self-fertilised plants raised from semi-sterile parents under the same circumstances. But while the former show a vast improvement when grown in the open ground (I., *b*), the latter show none!

Now it is a general rule, as already stated, that self-fertilised plants cannot stand competition at all equal to intercrossed plants; but when planted in the open ground the contrast is greatly lessened, *i.e.*, the ratio becomes more nearly one of equality, in other words the self-fertilised recover vigour in a higher ratio than the intercrossed are improved by freedom of growth. So here, from I. (*b*) it is to be inferred that the self-fertilised have a greater "elasticity" of growth, so to say, than the intercrossed. This was likewise the case with the weights of Reseda lutea. II. (*a*) would seem to show that the vigour of the offspring from parents semi-sterile is relatively greater than that of the offspring from fully fertile parents when compared with the intercrossed plants of each kind; and had not Eschscholtzia showed a similar fact these results of Reseda could scarcely have been considered trustworthy.

Hence it is very unfortunate for Mr. Darwin's argument to have especially selected Reseda and Eschscholtzia, for they certainly do not prove any "injurious" effects to arise from self-fertilisation, but just the reverse!

The fact appears to me to be this:—The word "injurious" is a purely relative term. If a plant is so highly differentiated that it has not only become adapted to insect agency but also to be self-sterile, then, of course, to put its own pollen upon the stigma of a flower, rather than that of another plant, may be said to be, relatively to the latter process, at least useless if not injurious. But when we see a plant thus usually self-sterile becoming, under changed circumstances, self-fertile, this power of self-fertilisation is actually so much positive gain, as Mr. Darwin admits "the obvious fact, that the production of seed is the chief end of the act of fertilisation, and that this end can be gained by hermaphrodite plants with incomparably greater certainty by self-fertilisation." Now it is clear that many plants have become highly differentiated by adaptation to insects, and in becoming so, the pollen has physiologically changed correlatively to such a degree as to be useless on the flower's own stigma. This therefore is so much absolute loss to the plant, as it now has to depend, with less certainty, upon the chance visit of insects; but when the plant can recover its lost power, and especially when it can acquire fresh and new constitutional elements, then, as we see in Reseda and Eschscholtzia, the first result is the absolute re-gain of self-fertilisation, while this may be accompanied by an equality with, or even a superiority in vigour to, the intercrossed.

In a later communication I purpose continuing the subject of self-fertilisation. *George Henslow.*

ASPECTS FOR PLANT-HOUSES.

MR. BESTER'S arguments in favour of altering the aspect of span-roof plant-houses, from east and west, to north and south, strike me as being a little one-sided, and I fear the plants would think so too, if only one side of the house was exposed to the sun. It appears to me that a lean-to house placed against a wall would suit the plant nearly as well, and be much warmer. As regards the shading of the house in winter by the framework, I should think that the sun about noon-day shining comparatively perpendicularly, first on the east side, then passing over the ridge to the west side, would meet very little obstruction, and I do not think the sun would melt ice on the north side of a span-roof at all. Secondly, the fact of a house being warmer at 5 o'clock than at 10 on a summer morning may be due to the ventilation being closed at 5 o'clock and open at 10, rather than to the effect of the sash-bars shading the interior. Thirdly, as to the impossibility of closing span-roof houses facing east and west till late on a summer evening, owing to the sun shining full on the west side till late at night—that is a question between the sun and the advocates of the early closing movement; and as the sun is rather behind the times in the matter of shortening its working hours, the only thing to be done is to leave down the blinds on the west side, till Old Sol retires for the night. This is surely better than in a roof facing south, where the sun only gets shining into the interior for a few hours near noonday, owing to the sash-bars acting as a shade as soon as it gets a few degrees on either side of the

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