

may be called the angularity of its appearance, both as a whole and in its subordinate parts. The face of the rock, in the progress of waste and decomposition, is everywhere furrowed or broken by lines, which at a distance seem to show its innumerable fissures of small columns or sharp pillars, resembling the slender columns of the Egyptian obelisks. These appear as isolated groups, ascending into pointed summits and serrated ridges, which form the most elegant mountain-tops, and which accumulate in the projections and recesses, towering successively behind each other, till the whole terminates at the summit of the mountains. Notwithstanding all this diversity of form and position, these rocks cannot be said to be rich in alpine vegetation, either in the number of species or number of individuals of a species.

Several botanical gatherings were made both on the 25th and the previous day above 3000 feet. These were submitted to the Rev. Eugene O'Hara, of Harlech, for examination, and the following is a list of the species which he detected:—*Coscinoceras Sædii*, *Euzoia carmelii*, *E. dioscori*, *E. triodon*, *E. tatarodori*, *Hemerocallis bifida*, *H. majus*, *H. Solani*, *Malva alpina*, *N. alpina*, *N. crumena*, *N. obovata*, *N. glabra*, *N. limosa*, *N. lanata*, *N. rhomboides*, *N. serena*, *N. viridis*, and *Saxifraga hirculus*.

On the morning of the 27th the Club broke up. Our party proceeded by an early boat to Balaclava, at Harlech, and thence by mail through Glisson, with its amusing scenery, and Inverness to Tynron, and thence by rail to Killybegs, and thence to Belleek, in Londonderry. In several places by the roadside about Inverness the *Drosera rotundifolia* was observed. On the 28th, Cooma-vaag, or the Cracked Rock, on the Brecknock mountains, was visited, where *Woodsia hypoleuca*, *Mnium alpinum*, *Hieracium pallidum*, *Gentiana nivalis*, and several other alpine plants were gathered.

The other party left Fort William later in the day on the 27th, and proceeded by Carrizary and Ardlara to Strathclyde, at the head of Loch Sander, in Argyshire. They ascended Ben Riephaid, a mountain the summit of which is 2800 feet above the sea, but they found it very unproductive. By the sides of the loch, however, a few good plants were collected, including *Malva palustris*, *Pinguicula lusitanica*, *Utricularia minor*, *Oxandria regia*, *Lichnaea Salicaria* (this plant was also observed in several spots by the side of the Cooma Canal, Drums argylla *Juncus montanus*, *Scutellaria galericulata*, *Nephrolepis arvensis*, and *Saxifraga anglica*. This party also returned by Belleek and Glisson, and so ended a very pleasant week's botanical excursion. Specimens of the plants collected during the trip were exhibited.

ARTIFICIAL FLOWERS AND FRUIT.

The first competitive exhibition of artificial flowers and fruit at the Crystal Palace may be regarded as a successful show, if the variety of materials out of which the so-called "flowers" are made be taken as the measure of success. Those who are anxious to see how caricatures of flowers can be manufactured out of the most dissimilar materials should certainly visit this collection. Here they will find wax, silver and iron, wood, ivory and paper, hair, leather and feathers, silk, wool and tin-plate, shell, marble and wax, employed in the construction of a large collection of highly-coloured ornaments, the botanical determination of which would surely puzzle the authorities at Kew. We have already noted our criticisms, but we doubt whether that is quite the correct word to use, since that word implies knowledge of the subject depicted, and power to produce it in an amusing form. The great majority of these flowers indicate on the part of the makers a surprising amount of ignorance of the form and structure of the objects which they have attempted to imitate. At the same time we must do them the justice to applaud their industry in the fabrication of their special materials.

We recently referred to the successful career of the late Mr. Croxon as a horticultural builder, which was mainly attributable to his early education as a grower, and consequently to his knowledge of what plants required for their growth. In like manner most "manufacturers of artificial flowers make themselves acquainted with the construction of the flower

which they propose to copy before they set hands to attain a veridical result. Our remarks will be the better understood if we refer to the only really well-made group of flowers in the whole collection, that exhibited by Mr. Clara Moughty, of St. Helens, of 33, Chatham Street, Bedford Square. This group consisted of *Alchemilla*, *Edulis*, *Isanthophyllum*, *Asterium*, *Stephanotis*, *Oxycoccus*, *Pentstemon*, *Phlox* *sp.*, a species of *Francoisella*, and two species of *Dendrobium*, all accurately copied from Nature, and most tastefully arranged with a few equally well-made variegated leaves. The next best collection, though severely so natural, were those of Mr. H. Mason, and the pretze varieties of *Roses* shown by Mr. Edward Fox, of Market Street, Brighton; in these the foliage was nearly as true to Nature as the flowers, which it was then we can say for any other group in the exhibition, who no grower could look through without making the same remark. There was not so much fail to find with the shape of the leaves as with their colour, the rich dark green of well-grown *Cassia* was nowhere to be seen on plants bearing these flowers. A tall plant of "white dawn" in full bloom was decorated with flowers of richly coloured and more or less throughout. From these remarks we wish to exclude the flowers and foliage of the *Primula* and *Viola*, exhibited in small boxes "twig" baskets by Mr. Fox, of Brighton.

There was a very small display of fruit, which consisted of Apples and Pears, Plums, Apricots, Peaches, Nectarines, Cherries, Strawberries, and Nuts. The white *Juglans* Cherries, and the Plums shown by Mr. J. Johnson, of Notting Hill, were the best amongst them, but none of the rest were so good as they can be made.

We shall be very pleased if this first attempt at a show of this kind should result in an improvement on the part of the exhibitors generally, or if a number more experienced manufacturers to show upon another occasion. We regret to say that the general impression left on our mind by the majority of the exhibits was similar to that of the collector of choice violas on being shown a home-made article, and on being told, "I made this little out of my own seed, and I have wood enough left to make another."

FERTILISATION OF PLANTS.

(Continued from p. 321.)

MR. DARWIN devotes a portion of chapter 8 to "the transmission of the good effects of a cross," and shows that when a previously intercrossed, a crossed, and a self-fertilized plant are allowed to be fertilized naturally by insects, the good effects of the "cross" is seen in the greater fertility and vigour of the offspring of the first two than in that of the self-fertilized; and that this benefit may be lost, not only in the grandchildren, but for many years, as appeared from Mr. A. Knight's variety of *Ros*, which kept true for more than sixty years, during which time they retained their superiority, though invariably self-fertilized. This fact, as Mr. Darwin observes, is due to the "force of inheritance being very strong in plants." On the other hand, continued interbreeding between very closely related plants brings ultimately no benefit at all as far as fertility is concerned; and, with reference to other such interbreeding is closely analogous to self-fertilization; that it tends to produce great uniformity of form, but still much less so than the self-fertilized plants, for Mr. Darwin observed that the seventh to the tenth generations of *Ipomoea* were absolutely uniform in size of "tubers." That last sentence is not followed up, but is suggestive of queries. Why are wild flowers so uniform? They must be abundantly intercrossed, and as in Nature we often get a great variety of soils and climatic conditions within reasonable distances, we should think there would be abundant resources for crossing distant stocks, yet there are many species identical, not only in the same country, but in opposite hemispheres of the globe! However this "uniformity of specific type" may be explained, the practical benefit of Mr. Darwin's observations to horticulturists is plain, for, as he says—"We learn from them that we are slight shades of colour may be quickly and freely fixed, independently of any selection, if the conditions are kept as nearly uniform as is possible, and

so intercrossing [with less crossing with a new stock] be permitted."

Mr. Darwin gives a table (D.) of "the relative fertility of crosses, intercrossed, and self-fertilized percentage, the fertility being estimated by the number of seeds per capsule, number of capsules, or the weight of seeds per capsule, the last being the most valuable method. Estimating, therefore, five table D., all cross judged by capsules, as well as that by weight of seeds, and also debiting five cases of plants crossed by a new stock, there are left eleven instances for comparison between the intercrossed and self-fertilized; and if 100 be standard for the intercrossed, that of the self-fertilized is 95.9—i.e. 95.9 per cent, considering the data, is very nearly a ratio of equality, and had be intercrossed into table D. "Hira" and the "white variety of *Mimulus*," the ratio would have been probably, if not in favour of the self-fertilized, at least one of equality (see p. 50), for while *Ipomoea*, under a net, gives a ratio of 100 : 99, and another instance, unworked, gives a ratio of 100 : 89, we see at once that these must be considered which may vary the proportions to a considerable extent one way or the other. Indeed, Mr. Darwin himself says—"It should be observed that the results of this table cannot be considered as fully trustworthy, for the fertility of a plant is a most variable element, depending on its age, health, nature of the soil, amount of water given, and temperature to which it is exposed." Next, selecting from table D. the five cases of plants crossed by a new stock, the highest and lowest ratios are 100 : 30, and as 100 : 175, they mean being as 100 : 99.4, which shows a much more decided degree of fertility for crossed plants than that of intercrossed or self-fertilized.

The mean ratio deduced for the number of capsules produced by the plants of intercrossed and self-fertilized percentage would be very misleading, for the ratio varies from 100 : 5.5 to infinite equality; though the intercrossed plants double as a rule yield more than the self-fertilized. As they are more vigorous plants, this is what one would anticipate; but the seeds per capsule may be the same; thus, of *Molais* prostrata thirty intercrossed flowers produced twenty-seven capsules, each with five seeds; thirty-two self-fertilized flowers yielded six capsules; each, however, had also five seeds; hence their fertility is the same, but the proportion of capsules is 100 : 49.

Table E. gives the mean fertility of four plants crossed with a fresh stock, calculated as 100, and compared with those of intercrossed and self-fertilized respectively, as follows—*Mimulus* as 100 : 4 and 13; *Scutellaria* as 100 : 48 and 9; *Ipomoea* as 100 : 45 and 33; and *Pentstemon* as 100 : 54 and 45.

Table F. gives the relative fertility of the flowers of thirty of the "parent plants" when intercrossed and when self-fertilized. Of these six are equal, and four of the self-fertilized are most fertile. The ratios of fertility for the "climacogon" flowers of the *Vandellia* and of *Oenothera multiflora* are omitted from the table. They would have seemed the *Ipomoea* is the mean proportion, as they are so highly self-fertilized. Mr. Darwin says "100 : 67" as the ratio for the complex flowers of *Vandellia*, but on p. 95 he says he thinks that 100 : 100 would be more correct. Subtracting this case with the above, we have twenty left, which give an average ratio of 100 : 54; but, if we subtract 100 : 100 for the complex flowers of *Vandellia*, 100 : 100 for the climacogon flowers of the same plant, and 100 : 111 for those of *Oenothera* (deduced from the number of seeds given in p. 107), we get a total mean ratio of 100 : 94, which is, of course, practically 100; but this conclusion does not detract from the fact, that the whole number of intercrossed plants given in this table are more fertile than the self-fertilized in the proportion of two to one. Mr. Darwin observes that "this fertility ranges from [as to a fertility equaling (or exceeding) that of the [also] crossed plants. Of this fact no explanation can be offered." Moreover in table G., which is analogous to F., only meaning of descendants instead of the parent plants, the inferiority of the self-fertilized plants does not decrease, indeed in *Diocleis* it is steadily increased; so that Mr. Darwin observes, "There is, therefore, no evidence at present that the fertility of plants goes on diminishing in successive self-fertilized generations."

As the chapter is devoted to self-fertility and self-fertilization it will be better to defer further remarks until another issue, when my communication will deal with self-fertilization especially. *Gorge Howland*.

(To be continued.)

the north end of the lake there was abundance of the alpine aquatic form of *Carex vulpaga*, and at a considerable distance from the shore *Isotria medeolae*, *Sagittaria arifolia*, and *Labella Dortmanna* were obtained by walking. On the north side there are patches of beautiful gravel composed of stratified granite and porphyry, with which the mountain abounds. Leaving the lake we continued the ascent till we reached a point about 2700 feet, where there is a rocky ravine or gorge called Coire de l'Urthou, through which a small stream runs. This stream has its rise in the last spring that will before reaching the summit. It flows westward, and has a very abrupt and precipitous course. In the ascent from the lake to this point we gathered *Saxifraga aizoides*, *S. hypnoides*, *Gaultheria septentr.*, *Alchemilla*

revivax and the spring, which is 1705 feet above the sea, we gathered fine specimens of *Rhodiola prostrata*, *Aira alpina*, *Ranunculus acris*, *Alpinia form.*, *Veronica hederifolia*, *Salix herbacea*, *Cerastium pinnatifidum*, and *C. cespitosum*, the last being in considerable quantity and in fine flower. At a short distance above the spring, or about 3500 feet, Phoenicopsis vegetation and soil almost wholly disappears, and only lichens and a few mosses are seen on the large blocks of porphyry, with which the upper part of the mountain is covered. At 5000 feet we reached the verge of the precipice immediately overlooking Coire de l'Urthou, where there is a cairn. From this we proceeded along the top of these precipices, which face north-east, and from the back of the mountain. All the crevices were filled with snow. The summit was reached amidst

mingled with sensation of a different kind, when we take our attention from the alps to a distance to the spot on which we stand. On looking beneath us, a few paces from the summit, we see the edge of a frightful precipice, which cannot be approached without danger and from which the highest peaks descend with terror. What adds to the danger of this trembling plateau, the edge itself is wholly composed of loose fragments, which a little pressure is often sufficient to dislodge, and when of any considerable size, their own weight soon sends them the precipice with a rushing noise and tremendous crash. This sound, produced by the rattling of the stones as it happens excessively during its fall on the projecting points of the perpendicular rock, is rivetted among the surrounding cliffs, and filling the vast adjacent cavity, descends along the valley below. The effect, accordingly on the ear is grand and impressive, and has occasioned the common but perfidious assertion of heaving stones from the top of the precipice into the *Journal alpin.*"

The summit of the mountain, which is 4906 feet above the sea, is crowned by a cairn about 6 feet high. This was mounted by the party, who, standing shoulder to shoulder, shouted into space a shout which will never be forgotten by any who joined in it, viz., the health of Professor Dalton, the veteran President of the Club. Close by the cairn a single very minute plant of the stony *Saxifraga (Saxifraga rotundifolia)* was picked, thus being the highest flowering plant in Britain. A few feet below the summit, and on the very verge of the precipice, we met with a rare moss (*Andropogon sibiricus*), in great cushion-like masses.

The next day (16th) we visited the precipice or "snow corrie" on the north-east side of Ben Nevis. Our course was following the stone line, or as it is called in Gaelic, *Ain* a *Mhullach*, which takes its rise in Coire Lasa, a little to the south of the snow corrie. In the ascent we again observed many species of plants common to similar moorland and subalpine situations in the North of Scotland. Several species of mosses and lichens were collected, including *Hetero selaginella*, *Dicranum filicinum*, magnificent specimens of *Sphagnum compactum*, and *Cladonia salsolana*. At about 3000 feet above the sea we found in one of two spots abundance of *Carex vesicaria*, both in flower and fruit, along with *Protophila alpina*, *Epipactis atrorubra*, *Rubus Chamaemorus*, and *Haberia leucis*, a moss not usually found at such an elevation. On the snowfield north, or there nearest the point of ascent, little of interest was met with.

Passing northward, and climbing into all accessible places, we met with *Vaccinium alpinum*, *Thalictrum alpinum*, *Silene acaulis*, *Potentilla septentr.*, *Saxifraga oppositifolia*, *S. aizoides*, *Cheirica scabra*, *Salix reticulata*, *Oxyria melaleuca*, *Veronica hederifolia*, *Silene maritima*, *Artemisia maritima*, and *Carex alpina* sparingly. *C. alpina* was most plentiful, and very large, but most of the specimens had their fruit affected by *Utricularia aculeolata*, a fungus almost peculiar to *Cyperaceae*. *Stachys alpina*, *Draba saxana*, *Juncus trifidus*, and *J. triglochin* were noticed.

The only species of *Hieracium* met with were *H. anglicum* and a single specimen of *H. chrysanthum*. *Veronica saxatilis* was seen in one spot in 1841. This removes the query put after the plant in Watson's *Topographical Botany*. Few Ferns were observed, the only species worthy of note being *Aspidium Lonchitis* and *Hypnumophyllum verticillatum*. The two best plants collected were undoubtedly *Saxifraga rivularis* and *Juncus aculeolata*. The former was found in the first snow corrie, and the latter by the sandy side of a small stream proceeding from the second snow corrie. This is a new country for the *Juncus*, so far as botanical works go. It is noted, however, in a guide-book to the district, as being found on the mountains. In the upper snow corrie *Carex pella* was abundant and in fine flower, and some of the large blocks of stone were almost completely covered with patches of *Andropogon sibiricus* in bud. These snow corries and precipices are very grand, and at some points perfectly overwhelming when seen in this vast recess or in the wide angle of rock, at least 1200 feet high, reaching to the tops of its points with a threatening aspect, and commanding itself to a distance of more than a mile and a-half, with enormous projecting masses or ledges, which fill the great re-entrant angle of the mountain, as if in this vast recess or in the wide angle of rock. Of this stupendous and impressive effect the grand and singularly picturesque feature is what

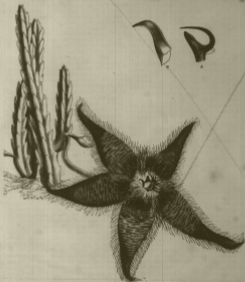


FIG. 54.—*SAXIFRAGA OPPOSITIFOLIA*. A, BOWEN AND ALA.; B, LINDLEY (MAGNIFIED).

alpinis, *Silene maritima*, *S. acaulis*, *Luzula spicata*, *Fus alpinis*, and *Cryptogramme crispis*. The rivine is only 200 or 300 feet in length, and is certainly the best remaining spot on this side of the mountain. Here we met with *Thalictrum alpinum*, *Sagittaria arifolia*, *Rhodiola rosea*, *Epipactis atrorubra*, *Alpinia form.*, *Artemisia alpina*, *Cochlearia officinalis*, *Polypodium alpinum*, beautiful specimens of *Cerastium Serotinum*, and *C. trigynum*, the last being in great abundance near the upper part of the ravine, and far 600 feet above it. The most remarkable plant of all was a form of *Saxifraga aizoides*, which grew in large mossy-looking patches, resembling *Marchia Saxifraga*, the leaves being so small, the branches so delicate, and the flowers usually as they are those of this plant. Several species of *Epipactis* were also collected, including *Epipactis atrorubra* and two varieties of *Saxifraga aizoides*. Between the upper end of the

trunks of dirt and rain, thick mist, and a fierce cold wind, which unfortunately prevented us from seeing fully one of the most beautiful prospects in Scotland. The leading characters that give the interest to this sublime and unvaried scene are elevation, immensity, and extent. On a clear day are seen mountain ranges in all directions, intermingled with extensive water surfaces; the view ranges from the Murray Firth and the mountains in the shores of Ross and Sutherland in the north and north-west to Ben Lomond and the island of Colonsay in the south and south-west, comprehending a distance of about 180 miles. The scene is one which can scarcely be equalled or at least surpassed in the diversity of magnitude and rolling diversity, and in variety and grandeur. The late Dr. Mackenzie, in speaking of what he saw from the summit says that, "the feelings excited at this commanding elevation are not, however, entirely on