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Observations regarding the Flora of the Alpes Maritimes.

By PHILIP SEWELL.

(Read 10th July 1890.)

The following notes may present to the Society some picture of the rich alpine flora of the Maritime Alps, as seen in the neighbourhood of the Col di Tenda—a flora the more remarkable and interesting because, only 20 or 30 miles distant, that of the shores of the Mediterranean is almost African in its character.

As pointed out by Ardoino,* within this region, shut in between the northern bounds of the Maritime Alps and the sea, there is a flora, of over 2400 species, so much richer than that of the British Isles, whilst the area containing this wealth of species is not half the size of the island of Corsica.

New habitats for interesting rarities, such as *Fritillaria delphinensis*, known as *F. Burnati*, and also for *Primula Allioni* are recorded amongst our finds. The presence of this *Fritillaria* in considerable abundance is the more welcome to botanists because the Italian Government have prohibited access to its other known habitat—the slopes of the Col di Tenda, where they have erected extensive fortifications. Other notes as to fresh localities will, if of sufficient interest, be incorporated with Professor Penzig's forthcoming work on the "Flora of Liguria."

The disused Monastery of San Dalmazzo di Tenda, our station for a fortnight, is distant from the shore at Ventimiglia about 30 miles. It is just within the limits of the present Italian frontier line, and but a short distance from the famous pass leading from Liguria to the plains of Piedmont. From San Dalmazzo as headquarters, we were able in a few hours to reach either the sea-coast and its typical flora or the high altitudes of 8000 to 10,000 feet, where, at the time of our visit, was a considerable amount of snow; none of this, however, persists throughout the summer, except in the more shaded drifts.

The typical Mediterranean flora, as seen about La Mortola

* *Alpes Maritimes*, ed. ii., 1879.

and Ventimiglia, in shaded places among the olives, or along some of the river-sides, during the early summer months, presents a luxuriant growth of herbs, amongst which *Gladiolus*, *Narcissus*, *Allium neapolitanum*, *Arum italicum*, and *Arum ariseum* are prominent.

But the characteristic expanses of the country along the coast are the bare hill-sides, which are exposed during a rainless summer to the full glare of a scorching sun, where species of *Euphorbia*, *Cistus*, *Helianthemum*, *Galium*, *Thymus*, *Lavandula*, *Rosmarinus*, *Myrtus*, *Coris*, and species from several genera of *Leguminosæ*, amongst them the attractive but terribly spinous *Calcycotome spinosa* and *Spartium junceum*. Along the shore *Alyssum*, *Glaucium*, *Cineraria maritima*, *Moricandia*, *Diotis*, and other sea-beach plants occur, some of which are very widely spread throughout Europe. Plants growing upon the dry and scorched slopes have a distinct character of their own; their leaves are small, often linear, and rolled up at the edges, more commonly still they are coriaceous or fleshy; the whole plant is woody and low-growing, appearing truly as if it had a hard time of it, at least through the long summer. These characters particularly impressed us at the first, as so clearly offering resemblance to the character of plants such as *Ledum*, *Diapensia*, *Draba*, *Andromeda*, *Loiseleuria*, *Phyllodoce*, that we had noticed as especially characteristic of the exposed slopes of Lapland.* In the one case it is the hardship of a scorching sun and intense radiation, in the other it is freezing winds, but the effect upon the plants growing in these exposed places is the same, whether the difficulties they encounter in their struggle for existence be those associated with a frozen or with an arid zone. The plants of the more shady ravines—*Pistacia Lentiscus*, *Coriaria*, *Nerium Oleander*, *Myrtus*, *Coronilla*, *Arum*, *Serapias*, *Ophrys*, &c.—are no less characteristically southern. On the higher levels away from the sea the lemons, oranges, figs, and olives, the delight of all visitors to the Riviera, have disappeared. Choice gardens, such as that of Mr Hanbury at La Mortola, where so many semi-tropical plants exist, if transplanted to one of the valleys ten miles away from the sea-shore, would succumb to the frosts of the first winter.

* See *Trans. Bot. Soc. Edin.*, vol. xvii. p. 444.

The flora among the chestnuts, 2000 to 3000 feet above the sea, at Dalmazzo, is indeed a different one from that we have referred to as characteristic of the coast. The turf was rich with many gay species, but probably most noteworthy of all were the handsome flowers of *Lilium bulbiferum*, *L. Martagon*, *Anthericum*, and *Asphodelus*. Also specially, where great masses of rock cropped out, were *Sedum*, *Sempervivum*, and *Saxifraga*; among the last-named, *S. cuneifolia*, *S. Aizoon*, and *S. lingulata* were most abundant. So too was *Vincetoxicum officinale*, a plant rivalled in more wooded places by *Helleborus foetidus*, and in the one locality of the Miniera valley, by *Geranium macrorrhizon*.

In the Miniera valley plants of the alpine flora make their appearance at an elevation of 4500 and 5000 feet above the sea, where is an open wind-swept level in which, even in the middle of June, snow from the winter's avalanches may here and there remain. *Primula marginata* was abundant on the rocks on all sides, and near to the melting snow of the avalanches, where the turf was all pressed down and brown, were slopes enriched amongst other plants by a few individuals of *Rhododendron ferrugineum*, which had doubtless spread themselves from the great masses of this plant so predominant higher up the mountain sides among the pines. So, too, a few flowers of the remarkable yellow variety of *Fritillaria delphinensis*, known as *F. Moggridgei*, caused us to hunt more carefully, until 1000 feet higher up, acres of grassy slope, covered with the plants bearing their golden-coloured blossoms, were reached. At about the same altitude as the above-mentioned species we found amongst some rocky debris:—*Atragene alpina*, *Aconitum Napellus*, *Eranthis alpinus*, *Lonicera alpigena*, *Ruscetella Burseri*, *Linaria supina*, &c. At still higher altitudes in the valley, the grassy slopes were adorned with *Ranunculus pyrenæus*. But after reaching an elevation of 6500 feet, we found the snow too abundant to allow full examination of the commonest plants; though, on certain sunny slopes of debris facing the south, were several plants of special interest to us, such as *Silene acaulis*, which, in this locality, had a peculiarly compressed habit, not always seen in alpine regions, but which was the characteristic form met with by us on the shores of the Yugor Straits.

Lloydia serotina, mentioned by Ardoino as known in this neighbourhood, was a very characteristic plant along the northern shores of the Siberian tundra. The red snow plant was very abundant in distinct depressions in the drifts. Such depressions were, perhaps, caused by the greater absorption of heat where the plant was. The following plants were seen at this elevation of 7000 feet—about the sides of the dreary Laghi di Meraviglie. They were often curiously dwarfed forms; especially was this noticeable in *Anemone alpina* and *Ranunculus pyrenæus*:—*Ranunculus pyrenæus*, *Anemone alpina*, *Helianthemum vulgare*, *Viola calcarata*, *Draba aizoides*, *Cardamine resedifolia*, *Hutchinsia alpina*, *Silene acaulis*, *Cerastium alpinum*, *Mehringia muscosa*, *Astragalus*, *Hippocrepis comosa*, *Potentilla valderia*, *Sedum anacampseros*, *Sedum Rhodiola*, *Sempervivum*, 2 or 3 species, *Saxifraga exarata*, *Saxifraga moschata*, *Saxifraga lingulata*, *Saxifraga aizoides*, *Saxifraga bryoides*, *Saxifraga oppositifolia*(?) *Galium* sp.(?) *Gnaphalium dioicum*, *Cineraria alpina*, *Taraxacum officinale*, *Campanula pusilla*(?) *Thymus Serpyllum*, *Veronica saxatilis*, *Verbascum*(?) *Myosotis alpestris*, *Stachys alpina*(?) *Pedicularis rosea*, *Primula marginata*, *Primula integrifolia*, *Androsace carnea*, *Gentiana verna*, *Plantago alpina*, *Daphne Mezereum*, *Carex rupestris*(?) *Carex sempervirens*(?) *Gramineæ*, 2 or 3 species, *Polypodium vulgare*, *Aspidium Lonchitis*.

On a succeeding occasion we examined the botany of the side of the mountain exposed to the south, leaving the stream of the Miniera at an altitude of 5000 feet, and ascending to an altitude of 7500 feet—reaching the line of snow, which, however, was fast disappearing at a height of 6700 feet. Upon the summit was a rich expanse of *Gnaphalium Leontopodium*, and also of the following, some of which were seen at considerably lower elevations:—*Saxifraga oppositifolia*, *Saxifraga cæsia*, *Globularia cordifolia*, *Dryas octopetala*, *Draba Wahlenbergii*, *Potentilla verna*, *Potentilla maculata*. In the course of various observations as to the first appearance and the subsequent disappearance of various species, ranging in altitude from 6500 to 7500 feet, we found that it was after a break of 1000–1500 feet that damp slopes repeated the flora of the valley below. In both places the turf was richly covered with *Crocus*, *Gagea*, *Ranunculus pyrenæus*,

Gentiana, &c. Between was a dry steep upon which grew *Helianthemum*, *Helleborus*, *Erysimum*, *Saponaria*, *Astragalus*, *Cytisus*, *Genista*, and various species of *Carlina* and *Carduus*. The greater warmth of the more open position had indeed matured the plants of the higher level more than was the case among the plants of the same species in the lower valley. *Gagea* and *Scilla bifolia* were in fruit, whilst the grasses of the turf were much more advanced. Additions to the flora observed in the valley below were numerous, an especially good find being the exceedingly rare dark variety of *Fritillaria delphinensis*, known as *F. Burnati*, a plant which (as we have remarked) it is the more interesting to find because access to the only other known locality in the region is on the prohibited Col di Tenda.

In certain curious and deep depressions occurring in this upper meadow, there was a constant succession of the three plants *Crocus albiflorus*, *Gagea Livitardi*, and *Ranunculus pyrenæus*. The *Crocus* was always lowest, its flowers pushing out from the discoloured turf from which the snow had only just melted; above this, on the shady side especially, was the *Gagea*, and above the *Gagea*, in greater profusion on the sunny side, was *Ranunculus pyrenæus*. Elsewhere, at the same altitude, although the presence of the *Crocus* was not observed, the darker colour of the green leaves in little isolated depressions in the meadow showed the persistent selection by the *Gagea* of positions of more than average moisture. On the other hand, the *Viola calcarata* preferred generally some slightly raised position whilst *Viola biflora* was conspicuous in the shade immediately about numerous large boulders. *Viola biflora* did not ascend to such altitude as *V. calcarata*, nor indeed did *V. palustris* or *V. hirta* in the region about Mont Blanc, where they were nevertheless seen at an altitude of close upon 7000 feet. It is of interest to note that, in Lapland, although *Viola biflora* may everywhere be seen associated with such damp-loving plants as *Veratrum*, and others of these mountains, yet *Viola calcarata* is unknown.

We ascended the mountain on the south side of the Miniera Valley that comparison might be made with the flora just described on the northern slopes. At a height of

6500 feet, snow was in such abundance as to prevent any examination of the flora. We left the valley at the same point from which we had set off previously. An almost entirely different flora was to be observed. As might be expected, *Vaccinium Myrtillus*, *Rubus Idæus*, *Paris quadrifolia*, *Soldanella*, *Tussilago*, and great masses of *Saxifraga cuneifolia*, were abundant. Higher than these, *Rhododendron ferrugineum* monopolised all the shadier places. Most interesting of all were some acres of *Fritillaria delphinensis*, var. *Moggridgei*, which gave an effective yellow colour to the whole slope upon which they were growing. *Ranunculus pyreneus* was the only other plant in any abundance upon this eastward facing slope.

A great expanse of rich green pasture for goats on mountains near to Mount Tanarello, especially attracted our attention. Above were the steep rocky summits, upon which, clearly enough localised, were patches dark with "Alpen-rose," where the more constant mists allowed of its growth at elevations between 6500-7500 feet. In the broad conspicuous belt of verdure were sheets of *Anemone narcissiflora* (*Anemone alpina* was a little lower down), *Trollius*, *Veratrum*, *Gentiana lutea*, *verna*, and *acaulis*; *Orchis pallens*, *conopsea*, *ustulata*, and other species, *Pedicularis rosea*, &c. *Meum athamanticum* was exceedingly plentiful, especially in a somewhat damp depression; we had seen it in other localities, in actual swamps associated with *Caltha*, *Trollius*, *Colchicum autumnale*, *Ranunculus repens*, and *Polygonum Bistorta*.

We may call attention to the following genera as apparently more or less distinctive of the alpine and sub-alpine flora about Tenda, or because they are otherwise noteworthy on account of their predominance or curious distribution. *Helleborus* was represented by *H. foetidus* and *H. viridis*; the former often reached altitudes of 6500 feet; at times, in rocky places amongst pines, it was quite the most prominent plant. Its range is more extensive than most plants that we observed, as it is a constant inhabitant of the steep and somewhat shaded places near to Mortola, within fifty feet of the sea-level. It is a denizen of pine woods in the north of England, but does not extend north of Belgium on the continent. *Chelidonium majus* we noticed

only in the grounds of the monastery of San Dalmazzo, although spoken of as *assez commun* in Ardoino's flora. Hooker describes it as native to Arctic Europe, but it was not one of the plants of which we saw any trace in Lapland or North Russia. The genera of Cruciferae, observed at high elevations, were very different from those characteristic of northern latitudes. The comparative absence of species of *Draba*, the presence of several species of *Iberis*, and the frequency of the gay yellow flowers of *Biscutella Burseri*, were distinctive features in the flora. The excessive predominance of *Cerastium* and *Stellaria* which characterised the northern alpine regions gives place to a greater number of genera of that family, many of them brilliantly red or crimson coloured, and widely distributed, as, for instance, *Dianthus* and *Saponaria ocymoides*. There was almost an entire absence of *Malvaceae* about Tenda. *Daphne Mezereum* was one of the most ubiquitous of the plants in the Alpine and sub-Alpine floras. *D. Laureola* was seen once in the gorge below San Dalmazzo. *Urtica*, so ubiquitous a plant throughout the world, reached a maximum elevation of 6000 feet, about some cattle troughs. The presence of *Maianthemum bifolium*, seen later on Monte Generoso, was exceedingly interesting to us. *Asparagus officinalis* did not extend much above San Dalmazzo; other members of this alliance, as *Paris quadrifolia*, *Polygonatum officinale*, and *P. verticillatum* were restricted to the Miniera Valley at an elevation of 5000 feet, or thereabouts. *Gagea Lidelardi* we have mentioned as one of the most abundant plants in damp places. *Tulipa australis* and *Scilla bifolia* we only observed once at an altitude of 6500 feet. There were two or three species of *Allium*. *Muscari comosum* was common in the meadows.

The Ferns collected by us were the following:—*Ceterach officinarum*, abundantly in the shadier places near the coast. *Polypodium vulgare*, actually up to 6500 feet about the snowy valley of the Laghi di Meraviglia; *P. Phegopteris* and *P. Dryopteris*, *P. Robertianum* (?); *Aspidium Lonchitis*, up to 7000 feet; *A. Filix-mas*, *A. fragile*, *Asplenium Adiantum-nigrum*, *A. Ruta-muraria*, near to Mortola; *A. septentrionale*, abundant about Tenda; *A. Trichomanes*, *A. Petrarchæ*,

near Mentone; *Adiantum Capillus-veneris*, *Allosorus crispus*, *Pteris aquilina*.

At Courmayeur, a famous Alpine village near the foot of Mont Blanc, and at the head of the most picturesque Val d'Aosta, we found an absence of the large flora of the lower zones, though there are traces of the flora distinctive of San Dalmazzo. Mr Hanbury believes that the varied floras of Tenda are richer than those seen in the Great Alps, and the results of our visit appear to favour this conclusion, though it was made in July, a later period of the summer than when we collected at Tenda. Round Courmayeur we collected various plants of the pine woods—*i.e.*, near to Mortola, *A. septentrionale*; abundant about Tenda, *A. Trichomanes*, *A. Petrarchæ*; near Mentone, *Adiantum Capillus-veneris*, *Allosorus crispus*, *Pteris aquilina*, *Pyrola uniflora*, *P. rotundifolia*, with *Neottia Nidus-avis*; nearer the mountain summit we picked up *Empetrum nigrum*, two species of *Vaccinium* and *Lycopodium Selago*, which we had not found at similar elevations in the region about Tenda. So, too, regarding the following, seen near to Courmayer, but not observed about San Dalmazzo:—*Anemone Baldensis*? *Campanula spicula*, *Epilobium Fleischeri*, *Silene Otites*, *S. campanula*, *Primula farinosa*, *Parnassia palustris*, &c. On the other hand, we missed in this mountain region the extensive patches of *Anemone narcissiflora* and *A. alpina*. Masses of *Ranunculus pyrenæus*, as well as of *Primula variabilis* and *P. officinalis*, characterised in a sparse way the green turfey slopes of only one locality.

Apparently a young plant of *Lilium bulbiferum*, which was first found growing abundantly along with *Asphodelus albus*, at an altitude of 5520 feet, ascended as high as 8000 feet. One plant of *Gentiana verna* was seen—a striking contrast to its profusion on the slopes of Col di Tenda; so, too, was *G. acaulis*, though not confined to a single specimen. Great patches of *Gentiana Burseri* were seen in flower up to an altitude of 6500 feet, on the slope opposite to the southern crags of Mont Blanc. Forming part of such patches were *Ranunculus aconitifolius*, *Veratrum album*, *Myosotis sylvatica*, &c. The steeper slopes higher up were covered almost solely by *Rhododendron ferrugineum* and *Vaccinium Myrtillus*, though mosses also abounded. At the foot of the Glacier of the Brenva, amongst the rock masses

of its terminal moraine, were *Epilobium Fleischeri*, *Linaria alpina*, *Sempervivum arachnoideum*, *Bellidiastrum Michelli*, *Biscutella Burseri*, &c., together with other less conspicuous *Cruciferae* and *Caryophyllaceae*.

The varied floras of these Alpine regions are well worth a thorough investigation by botanists, specially from the point of view of the botanico-geographical distribution of species.