

applied to many of the uses fulfilled by the *Thuja gigantea* ('Cedar') on the other side of the Cascades, such as making shingles, rails for fences, &c.

*Thuja gigantea*, Nutt., which, as already mentioned, is common and grows to a very large size near the sea-coast, is comparatively scarce in the interior, where it is only met with in damp, shady ravines, or near moist river-banks such as those of the Pend Oreille; but even there it seldom attains a size at all to be compared with that which it reaches on the western side of the Cascades.

*Juniperus Virginiana*, L., occurs occasionally in the form of a tree in Vancouver Island, as well as along the boundary up to the Rocky Mountains. The measurements of one at Esquimalt were—circumference at six feet above the ground, 5 feet 4 inches; length of same tree (which had been blown down) 46 feet. Lowest branch five feet from the ground.

*Acer macrophyllum*, Pursh, one of the ornamental trees of the western forests, was not observed to the eastward of the Cascade Range.

*Quercus Garryana*, Doug. (the only Oak seen), which is plentiful at the S.E. end of Vancouver Island, was not found on the mainland anywhere along the 49th parallel. It was seen in the neighbourhood of the Dalles, but did not extend much higher on the Columbia.

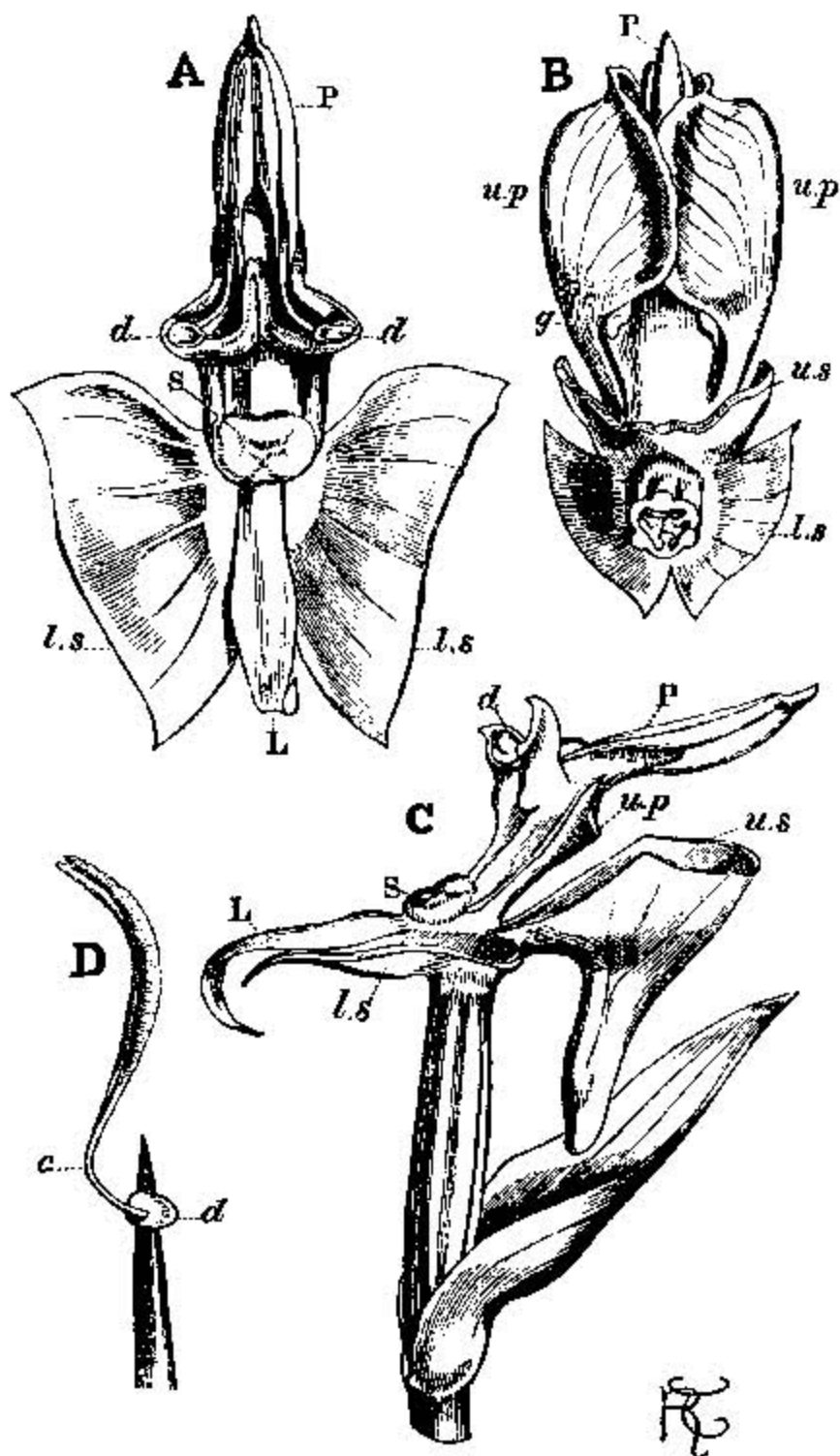
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On the Fertilization of *Disa grandiflora*, Linn. By ROLAND TRIMEN, Esq., of the Colonial Office, Cape Town: drawn up from Notes and Drawings sent to C. DARWIN, Esq., F.L.S., &c.

[Read June 4, 1863.]

As none of the many various South African Orchids have been described in relation to their manner of fertilization, I have thought that a brief account of the structure of the *Disa grandiflora* might be acceptable.

In the great majority of Orchids the labellum, or lower lip, secretes nectar, and stands in front of the column which bears the stigma and pollen-masses. In the *Disa* the labellum is greatly reduced in size; the posterior sepal, on the other hand, is largely developed, and forms a spur which contains nectar. As the nectary thus stands at the back of the column (see fig. C) behind the stigma and pollen-masses, in a directly opposite position to that which it occupies in other Orchids, it may naturally be asked,



A. Column viewed in front, showing the labellum, with the two lower sepals partly cut off; the two upper petals and upper sepal wholly removed.

B. Back view of column, showing the two upper petals: the upper sepal is cut off so close that the nectary is not shown.

C. Side view of the column and ovarium, with the labellum viewed edgewise; with the upper petals and upper sepal partly cut away, with the spur or nectary left.

D. Pollinium, attached to a needle, viewed laterally.

P. pollinium.

d. disc of pollinium.

c. caudicle of pollinium.

S. stigma.

L. Labellum.

u. p. upper petals.

u. s. upper sepal with nectary.

l. s. lower sepals.

g. gateway or passage leading to the nectary, between the upper petals and the column.

How can insects effect the fertilization of the flower? This is effected with marvellous simplicity by a very slight change in the form of the two upper petals, and in the position of the viscid discs of the pollen-masses.

The upper sepal is of large size, with the basal margins folded inwards, and these, together with the two upper petals which overlap each other behind, enclose the column, so that insects, to reach the nectar, are compelled to approach the flower in front, in precisely the same manner as if the labellum secreted nectar. But as the column stands in the way of the nectary, insects must push their probosces or heads on either side of it, in order to reach the nectar. The flower is manifestly constructed to favour this action; for the two upper petals have narrow bases, which leave a small open gateway on each side of the column, as may be seen in the drawing (B) of these two petals and of the back of the column. In all common Orchids the two viscid discs, to which the pollen-masses are attached, stand close together or are some way removed from each other; but they always face either the base or the sides of the labellum. In the *Disa* the two discs are widely removed from each other, and face outwards from the labellum towards the margins of the column, as may be seen in the front view (A) of the flower.

It is impossible to doubt the meaning of this unusual position of the discs; for they are thus seated on the inner margins of the two gateways or passages which lead to the nectary. If a needle be inserted through one of these passages, it inevitably touches the extremely viscid disc of that side; and when the needle is withdrawn, the pollinium is withdrawn. In figs. A and C the position of the medial stigma, seated some way beneath the discs, may be seen; and in fig. D the shape of the elongated pollinium, attached to a needle, is shown, with the caudicle bent almost at right angles near to the disc. In most British Orchids, when the pollinia are removed from their cases, the caudicles undergo a movement of depression, caused, as described by Mr. Darwin, by the contraction of the discs; and at the same time they bend either outwards or inwards, always in strict relation to the position of the stigma. In the *Disa* there is no movement of this nature, but the end of the much-elongated pollinium bends downwards, from its weight, and is brought towards the centre of the flower by the crookedness of the caudicle; so that when a needle, with a pollinium attached to it, is inserted into the passage leading to the nectary, the end of the pollen-mass strikes the stigma and leaves pollen-grains on its sticky surface. Thus in the *Disa*, notwith-

standing the remarkable difference in the position of the nectary, every part of the flower, by the aid of very slight modifications, has become neatly coordinated to ensure fertilization through the agency of insects.

The *Disa* carpets with its narrow lanceolate leaves the margins of the almost dry watercourses on the southern spur of the Table Mountain. In February its superb flowers expand. When I examined the plants, most of the flowers were partially withered; but in the greater number, even in those quite withered, both pollinia were still in their cases; in not one instance had both been removed; but in several flowers one had been carried away. In some of the withered flowers the pollinia protruded from the anther-case; and in a few instances the upper sepal, in curling inwards, had touched the disc and had drawn out the pollinium: but I saw no case in which the pollen-grains had thus reached the stigma. Considering how well stored the nectary is with honey, it is surprising that the flowers are not more regularly visited; but as the nectar fills the lower part alone of the nectary, only insects with a long proboscis could reach it; and perhaps the larger moths are rare at the elevation at which this plant grows. The remarkably brilliant colours, however, of the flower probably indicate that it is attractive to some day-flying Hymenopterous or Lepidopterous insect. However this may be, the infrequency with which the pollen-masses are removed offers a nearly parallel case to that described by Mr. Darwin, of the extremely imperfect fertilization of the *Ophrys muscifera* in England.

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On the *Musci* and *Hepaticæ* from the Cameroons Mountain and from the River Niger. By WILLIAM MITTEN, A.L.S.

[Read June 18, 1863.]

THE species here enumerated appear to represent a Moss vegetation similar to that of tropical America; in a few instances they are apparently identical, but for the most part they are rather cognate forms; with those found at the Cape they appear to have but a small affinity. On the higher parts of the Cameroons Mountain the species are absolutely identical with those from the mountains of Abyssinia, intermixed with a few hitherto only known from the Island of Bourbon.