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AND BY

LONGMANS, GREEN, READER, AND DYER,

AND

WILLIAMS AND NORGATE.

1875.

1875  
V. 14

The author adds that probably the best is to apply  $113^{\circ}$  to  $122^{\circ}$  F. for a couple of minutes' time, also that even *Spirogyræ* thus treated preserve their spiral chlorophyl bands more or less well—being of the opinion, however, that different species require different degrees of heat.

It is very interesting, then, to find just similar species living and growing in Furnas Lake in a normal and characteristic condition, in temperatures probably very little, if at all, under those quoted by Nordstedt as successfully employed by him to "kill" and make a permanent preparation of the examples submitted thereto. Mr. Moseley suggests the growing of Oscillatoriaceous plants gradually submitted to more and more elevated temperatures, to see what degree of heat they could withstand without injury or death; but in the Azores material there were *not only* phycochromaceous Algæ, as might have been *a priori* expected, but likewise chlorophyllaceous forms, as well as flagellate and rhizopodous organisms, all living in good condition together and in the same "hot water."

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VI. Notes on Plants collected at St. Vincent, Cape-Verdes (July 27th to August 4th, 1873). By H. N. MOSELEY, M.A., H.M.S. 'Challenger.'

[Read April 16, 1874.]

THE island of St. Vincent is about twelve miles long by six broad. It has an irregularly oval form, and consists of a flat central tract more or less broken by low hills, surrounded by a range of high land. The low central district is evidently the bottom of an ancient crater, of the wall of which the high surrounding range is the remains. The range is composed of strata dipping outwards from the ancient centre of eruption. It is cut up by a series of deep valleys having a general radiate arrangement, into ridges of various heights, which are again cut up by secondary transverse valleys so as to culminate in a series of irregular peaks. Some of the ridges are of considerable height. The Green Mountain is 2483 feet in height; and one other mountain, to the extreme south of the island, 2218 feet. A large proportion of the hills are much lower, ranging from 700 to 1200 feet. A break in the surrounding range to the north-west forms the harbour of Porto Grande, in the mouth of which is a small island called Bird

Rock, a fragment of the range once continuous in this direction. At the time of our visit to the island there had been no rain for a year, and its appearance, as approached from the sea, was that of utter sterility, the rocks being black and bare, and the low hills covered with a bright red volcanic soil, which looked peculiarly arid and parched. The general look of the place was not unlike that of Aden or of some of the volcanic islands in the Red Sea. From the anchorage in Porto Grande some black tufts could be made out with some difficulty with a glass, which consisted of the small bushes of *Lavandula* (*L. rotundifolia*, Bth.), the most abundant plant in the island. On the summit of the higher hills a few *Euphorbia* (*E. Tuckeyana*, Steud.) bushes could be discovered in the same way. On the sandy plain stretching up from the shore inland is a thick growth of Tamarisk (*T. gallica*, L.) bushes, amongst which, at about half a mile from the shore, is a group of some half dozen small trees. These trees consist of a Tamarind (*Tamarindus indica*, Linn.), some thorny Acacias (*A. albida*), and a tree with white flowers on spikes (*Terminalia Catappa*, Linn.). They stand in an old enclosure in front of the ruins of a house, and, though not large (the largest, the Tamarind, being about 9 inches in diameter in the trunk), are green and flourishing, and show that much might be done by cultivation even in St. Vincent. In the description of St. Vincent in Horsburg's 'Directory' it is stated that "as much wood may be cut here in a short time as can be stowed away." It is possible, therefore, that there was at one time more vegetation on the island, and in consequence more rain. Near the shore a few succulent plants grow, and the dunes of calcareous sand are bound together by a coarse grass, apparently the same species that grows in a similar situation at Bermuda. The plains were covered all over with the spring fruit of a small creeping plant (*Tribulus cistoides*, L.) and another plant with downy seeds, both of which were chip-dry. Almost the only plants retaining any living and green leaves were the Lavandulas, on which was here and there a green sprout, put forth apparently in anticipation of the wet season. Plants of a small grass absolutely dry and brittle, but in full fruit, were also to be found on the plains. The island is said to become green after rain as if by magic; and at San Jago, where the rain had been earlier, the plains at about 500 feet elevation were covered with a splendidly green coat of seedlings; but a day's moderate rain, which oc-

curred on July 30th, had not produced any visible effect by August 5th, on which day we sailed. The bottom of the valleys and hill-slopes to the southward are covered with a dry hay-like grass; but the goats and cattle kept in this part of the island were dying in numbers from starvation.

As the hill-slopes are ascended from the plains, the plants become greener and more abundant. In ascending the Green Mountain I passed some small gardens in a narrow gorge at the commencement of the ascent. The gardens were at an elevation of about 200 feet above the sea-level. They contained sugar-cane, pumpkins, and a small date-palm; and maize was just being planted in them. There were a few cotton-bushes growing near. At 700 feet Euphorbias and the woody Composites commenced, and the hill-side was covered with coarse dry grass. At 1000 feet the small boraginaceous bushes (*Echium stenosphon*, Webb) with pink flowers commenced. At 1300 feet I found the first patch of moss and *Marchantia*, with a fern and a helix. At 1700 feet a *Statice* (*S. Jovis-barba*, Webb) was abundant on the cliff. The *Lavandula* grows right up to the top of the mountain, but is there fresh and green, instead of black and withered as below. The leafless trailing Asclepiad *Sarcostemma* (*S. Daltoni*, Dcne.) commenced at about 900 feet. I could not find a single plant of this species in blossom on the Green Mountain, but found one single inflorescence on an isolated plant growing at an elevation of 900 feet in the south-west of the island. At St. Jago the same plant grows on the cliffs close down to the sea, and at the time of our visit (August 7th) was there in full blossom, the season being much further advanced than in St. Vincent. All the plants which I saw on the Green Mountain appear to grow up to the summit. On the summit the land is all more or less under cultivation, maize, pumpkins, potatoes, tomatoes, &c. being grown there. With the seeds of these a considerable number of weeds has probably been introduced. The tomato appears to have run wild. I found it, apparently wild, dwarf, covered with fruit. Near a cottage, at about 2000 feet, is a double circle of large Agaves. Almost the whole of the inner circle (that is, about seventeen plants) had flowering spikes shooting out and already about 10 feet high.

The combination of effects due to difference of aspect with regard to the trade-wind and sun produces a marked difference in the altitudes at which plants can grow at various aspects in St.

Vincent. Thus *Aizoon canariense*, Linn., and a malvaceous plant, which on Bird Rock grow close to the sea-level on its windward and shady side, do not commence on the leeward sides of the hills of the main island till 700 or 800 feet. The *Euphorbia* shrubs and low woody Composites usually commence at about 800 feet elevation on the leeward sides of the hills, reaching down nearly to the sea on the other; but some *Euphorbia* bushes struggle down in the bottoms of dry water-courses to 200 feet on the leeward sides of the hills. And in one valley near the harbour, sheltered from the wind but shaded from the sun by its very steep almost perpendicular sides, and moistened by the close proximity of the mountain 1595 feet in height, the *Euphorbias* and Composites come right down to sea-level; but this is extremely exceptional. On the mountains on the southern side of the island the vegetation does not come so far down the windward slopes, since the wind is heated and dried before reaching them by passing over the hot central plain.

On the cliffs on the weather-side of the island I found a small yellow-flowered Crucifer (*Sinapidendron Vogelii*, Webb) and a patch of a small plant with white flowers (*Samolus Valerandi*, Linn.) growing round a small spring. The patch was about 4 feet in circumference and quite isolated; it absorbed the whole of the water yielded by the scanty spring. I saw this plant nowhere else in St. Vincent; and there is hardly any other spot where it could grow. It is abundant, however, by the stream in San-Domingo valley in St. Iago.

On Bird Island I found nine flowering plants all occurring also on the main island, but growing here at a lower level.

The rocks about tide-mark are covered with a broad band of a dense incrustation composed of calcareous Algæ, which forms a striking feature in the appearance of the island as seen from the sea, and is especially marked on Bird Island. This incrustation is of several colours, white, bright pink, or cream-colour. It assumes very varied forms, being simply incrusting, and following the form of the rock-surface on which it rests, or forming smooth rounded convex masses, or being covered with a close-set series of projections, sometimes of considerable length and with a sinuous arrangement. The incrustations are bored by mollusks such as *Lithodomus candigerus*; and the cavities between them and the rock are filled with small-sponges and *Bryozoa*. I collected specimens of those variously shaped incrustations, and have placed

with them a specimen of the fossil nulliporic nodules which abound in the curious limestone-bed described by Darwin in his 'Volcanic Islands' as existing in the cliffs of St. Iago.

At St. Vincent as complete a collection of plants as possible was made, every day being spent in search for specimens. At St. Iago the stay was very short, and only a few plants which happened to be met with were collected, those especially being chosen which had not been procured at St. Vincent. An attempt to ascend the high mountain of the island failed. Some water-plants and two ferns were gathered on the banks of the stream in San-Domingo valley.

VII. Enumeration of Algæ collected at the Cape-Verde Islands by H. N. MOSELEY, M.A., Naturalist to H.M.S. 'Challenger.'  
By Prof. G. DICKIE, M.D., F.L.S.

[Read December 18, 1873.]

ST. VINCENT (in shallow water):—

FUCACEÆ.

SARGASSUM VULGARE, *Ag.*

*Geog. distr.* Tropical and subtropical Atlantic; Spain; Portugal; Manila; Mauritius.

S. RIGIDULUM, *Ktz.*

*Geog. distr.* Rio Janeiro.

CYSTOSEIRA ABIES-MARINA, *Turn.*

*Geog. distr.* Mediterranean; Azores.

DICTYOTACEÆ.

PADINA PAVONIA, *L.*

*Geog. distr.* Widely diffused in both hemispheres.

ASPEROCOCCUS SINUOSUS, *Roth.*

*Geog. distr.* Mediterranean; Brazil; Gulf of Mexico; Red Sea; Mauritius; Australia; Falklands.

CHORDARIADEÆ.

MESOGLOIA BRASILIENSIS, *Mont.*

*Geog. distr.* Brazil.