of the island, filling the hollows in the plains, and sometimes, in the course of a few hours, obliterating all traces of pathways, and thus bewildering the newly-arrived traveller. I was in the leeward side of the island when the first sand-shower occurred, and the residents differed in opinion as to its source, some saying that it came from the beach and sand-hills on the windward side of the island; while others, more correctly, as I consider, attributed its origin to the African Desert. I had soon an opportunity of ascertaining that they did not originate on the island itself, for I witnessed a sand-shower of considerable density over the sea *to windward of the island, between which and the African coast no land intervened*; and I therefore came to the conclusion that that coast was its source."

4. "Analogy between the serial arrangements of the Leaves of Plants and Crystalline Forms," by Mr. William Mitchell.

MISCELLANEOUS.

On the Causes of the Opening and Closing of Stomates.
By Hugo von Mohl.

In this memoir Von Mohl corroborates by actual experiments the general impression, the truth of which had not been demonstrated, that stomates shut when the guardian-cells collapse, and open when they become turgid.

The opening of the stomate is guarded by two crescent-shaped cells, the guardian-cells, which generally take the following form. On their external surface each bears a cuticular projection, which is usually formed by a thin membrane; in other cases, however, it consists of the cell-wall considerably thickened, or the cell-wall is sometimes even thick enough to form a salient protuberance. The edges of these projections unite at both ends of the stomate, so as to make an orifice above the true opening of the stomate; this orifice may be wider or narrower than the true opening. It leads into a continuation of the true opening, filled with air, and lying above the opening; this Von Mohl calls the anterior cavity, or antechamber (*Vorhof*), and the opening, the orifice of the antechamber. It is bounded on both of its lower sides by the upper part of the lateral surfaces of the guardian-cells, these surfaces being concave horizontally and convex vertically. Turned towards the stomatic cavity, on the lower side of the guardian-cells, there lies in most plants another projection like that on the upper side, but generally smaller, by which a posterior cavity, corresponding to the anterior cavity, is separated from the cavity of the stomate.

A transverse section usually shows that the thickness of the walls of the guardian-cells is very unequal in different places; the part of the wall contiguous to the epidermal cells is generally rather thin, so that these cells must prevent the guardian-cells from swelling out at this par-

Having cut through the epidermal cells, so as to discharge their contents, and thus prevent them from exerting any lateral pressure on the guardian-cells, it was found that when placed in *water* (which they imbibe), the guardian-cells increased the space between them very perceptibly; but when placed in a *solution of sugar* (into which they exude a portion of their contents), they closed it completely. By changing from water to a solution of sugar, the same opening might be alternately opened and closed. Another series of experiments on *intact* leaves showed that this action of the guardian-cells is impeded by the pressure of the epidermal cells, in proportion as they come into contact with the former. This is also shown by the fact, that when this pressure is taken off by emptying the epidermal cells of their contents (which may be done by immersing the latter in a solution of sugar), the guardian-cells always open. As the epidermal cells contain more sap than the guardian-cells, the same result is obtained by letting a leaf wither off. The orifices of intact leaves cut off in the morning were found to be closed; when exposed to the sun for several hours, they opened again, but closed with rapidity when immersed in water,—showing that the power of the guardian-cells is increased, in comparison with that of the epidermal cells, by the influence of light and heat, quite independently of the humid state in which they may occur. This, the author thinks, can hardly be explained except by assuming that when the guardian-cells are exposed to the influence of these agents, they form such combinations as are able to induce a powerful endosmosis, and are more or less decomposed when light is withdrawn; for, as is well known, the guardian-cells, like the cells of the parenchyma, contain chlorophyllaceous matter.

Direct comparative measurements show that the projecting part of the guardian-cells, beyond the anterior cavity, contracts but slightly, so that the process is effected chiefly by the change in the form of the boundaries of the true opening.

The guardian-cells expand most in a vertical direction, and thus change their transverse diameter from a circular to an elliptical form, so as to draw in the thinner portion of the lateral surface which lies free in the opening of the stomate. This explains why the opening is not closed when these cells are distended by the water which fills them.—*Botanische Zeitung*, 1856, No. 40, and *Silliman's Journal*, March 1857.

Descriptions of new Norwegian Annelides. By M. Sars.

Family Telethusa.

Genus *Notomastus*, Sars, n. g.

Lobus capitalis conico-acuminatus. Os subtus; pharynx exsertilis breviter clavata, papillis obsita. Anterior corporis pars cylindrico-subfusiformis, e segmentis duodecim medio sulco in annulos duos divisis, primo absque et cæteris undecim utrinque fasciculis binis setarum capillarium, mamillis pedalibus carentibus, composita. Posterior corporis pars longior et tenuior, e segmentis constans numerosis