

Apes Central America. By J. W. Hoffman, Wharham, London: H. and A. Barker, 1875.

THIS is a thoroughly readable and exceedingly instructive narrative, by a capable observer, of a journey through a country but often visited by travellers, and of which English readers probably know little or nothing. Mr. Hoffman gives an interesting account of some of the wonderful views which exist in Central America, and we are convinced his work to our readers as possessing both novelty and interest.

LETTERS TO THE EDITOR

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The Contrivance of the Phloem of the Tree

The observations of my son Francis on the contrivance of the stem, protected from the glands of Diapycne,¹ after an hour and a half in the physiology of plants, that my confidence in them is valuable. I hope therefore that you will publish the appended letter from Prof. Cohn, of Berlin, whose every one will allow to be one of the highest authorities in Europe on such a subject. Prof. Cohn's remarks were not intended for publication, but he has kindly allowed me to lay them before your readers.

Extract from Prof. Cohn's Letter:—

"Immediately after the receipt of your very kind letter of July 11 I went to look at Diapycne, several species of which grow on *Forsydia glandulosa* and surrounding other trees in the garden. I got transverse sections of the top-like stems of young leaves, in the epidermis of these parts carefully removed from the young peridermis, into distilled water. I then had the pleasure of examining with my own eyes this most curious discovery. First I ascertained the anatomical structure of the periderm glands which are rather elegant and remarkable. From the basal cell runs the stalk-out, in the second story there are two cells, in the third four, and in the apparatus eight small cellular cells converging to the centre. But not my number here needs. I was surprised by seeing the hollow protuberances issuing from the apex of the glands; I saw quite a peculiar apparatus. The filaments are, in their extensibility, like the (topological) of some *Elodea* (e.g., *Arenaria* or *Elodea*). I followed their changes for some time, and watched quite intently, as I had described in the paper of Mr. Francis Darwin how the protuberances slowly lengthen out, break themselves back or swelling, and get twisted either at the summit or midway; I saw the glands on leaves glaze down the throat, and at last be locked into a globular mass adhering to the gland. I saw the protuberances always stay between the steps of two or more adjoining cells, but nearly as frequently between the lateral walls as on the apical surface. Generally there were many protuberances on the same gland, pressed forward out of different parts; sometimes I saw two diverging branches proceed from the same point like the pole of an anemone, each behaving independently in the changes. But the most curious appearance in these protuberances was a constant waving, undulating along their extension, sometimes down and sometimes with different, sometimes upward and quivering, but never ceasing; more delicate filaments appeared to me very like *Utricle*, on the other way flags of some *Elodea*. But finding a special description of the waving movements of the filaments in your own paper, I added most of my pupils if they saw anything remarkable in the filaments, without inquiring what, but they all took the same impression on myself. The only facts I have not yet been able to witness of your own observations are Figs. 3, 14, 15, and the condition of the protuberances; now have I yet been able to verify chemical changes, of which you say, but have made some good ones.

"Of course I am not, after two days' inspection, so far as

a definite judgment about the true nature of the filaments, protuberances. Putting aside the hypothesis of a possible filaments, there are two possibilities which will balance in my mind, as already stated by your own. (1) The protuberances are secretions of the cellular matter, absorbing water, but insoluble in it; the movements are explained (not vital ones), the changes in the filaments depending upon the imbibition, their contraction on the withdrawal of water by different reagents. There are such instances, e.g., *Mytilus*, which shows rather similar changes in water. Please also to report the experiments I performed at the meeting of the British Association last year: I saw a cylindrical glass containing soluble effluvia of alcohol (Wasserglas), diluted with half by volume of water, put a small piece of crystalline chloride of iron; from the fragment there grew a hollow solid-like growing upwards and moving very quickly, like an *Elodea*. But if you put into the solution a solution some protuberances of iron (the latter is usually in the form of a powder), but may easily be brought by gentle pressure on the filaments into round-like masses, then from the filaments there arise remarkable filaments, very delicate and transparent, very like the glass threads of *Hydrocharis*, which are in fact rather certainly all they reach the surface of the fluid.

"But I cannot deny that the general impression produced by Diapycne does not contradict the hypothesis that the changes of the filaments are the vital phenomena of protuberances protuberances.

"A French biologist (whose name I cannot just now remember) has proved many years ago (I think in an early number of the *Ann. de la Soc. Bot. de France*) that the water in the sap of Diapycne is not a simple collection of water in a vessel, but a secretion of the leaf tissue. It then he truly says, it is quite probable that the plants may have a special adaptation for this purpose. Indeed, I should not hesitate to agree with the vital theory, if there were any analogy known in plants. The further study of the phenomenon and the repetition of the chemical reactions which you are but already indicated, will, I hope, in a short time enable me to form a more decided judgment in this perplexing dilemma.

"In the meantime I am happy to congratulate Mr. Francis Darwin and yourself on account of the extraordinary discovery he has made, and the very scientific paper in which he has elaborated it, and which has added a series of quite unexpected facts to the physiology of plants."

In a subsequent letter, Prof. Cohn describes what appears to him as distinct points or pores in the cell wall of the glands from which the filaments seem to be protruded. He also mentions the very curious fact which he has discovered, that by adding iodine to the detached epidermis of the leaf cups of Diapycne the whole fluid contents of the epidermal cells turn blue like detached starch parts, although no starch grains are met with in any epidermal cell except in the corners.² He adds that the basal end of the gland becomes blue, while the rest of it and the secreted globules are stained yellow.

I may add that I have heard from Prof. Hoffmann, of Göttingen, that he has recently observed distinctly filament of a somewhat similar nature on the members of *Apocynaceae*. He has described them in the *Botanische Zeitung*, 1875, and appended them, *ibid.*, p. 10, tab. 3, fig. 10.

CHARLES DREWSEN

Down, Buckingham, August 15

Reflections between Sun and Earth

PROF. BALFOUR STEWART, in the last of his exceedingly interesting articles in *NATURE* (vol. viii. p. 13) on the supposed relation between the sun and the earth, which up with an appeal (which I should like to see promptly responded to by the German, as well as in all as being in favour of the establishment of some institution to keep a daily watch upon the boundary that is found to intervene with a more or less control over terrestrial magnetism and astronomy. He also mentions incidentally the discovery by Dr. H. Meyer that the boundary in Southern India has a period of recurrence which is nearly the same as that of our own frequency. This is so similar an exceedingly plausible hypothesis themselves, as the out of the six years of thought mentioned by Dr. Meyer at proceeding the years of history

¹ Prof. Cohn adds that the blue extension of the epidermis by iodine occurs in the leaves of *Chlorophytum*.

² I should mention that Prof. Cohn, in his paper, has published in his *Botanische Zeitung* (vol. viii. p. 13).