

January 18, 1855.

Sir BENJAMIN BRODIE, Bart., in the Chair.

The following communications were read :—

- I. "Note to a paper read before the Royal Society on the 11th of May, 1854." By J. W. GRIFFITH, M.D., F.L.S. Communicated by ARTHUR HENFREY, Esq. Received December 13, 1854.

In the paper referred to above, it was stated that the markings or dots upon the valves of the Diatomaceæ, are the optical expressions of depressions existing upon the valves.

All those authors who have paid special attention to the Diatomaceæ, have considered the markings to denote cells; among these we find Ehrenberg*, Kützing†, Ralfs‡, Smith§, and Quekett¶.

The evidence I adduced in regard to the more coarsely marked Diatomaceæ, as *Isthmia*, &c., being furnished with depressions and not cells, is, I believe, satisfactory and conclusive; and this view has been admitted in a paper since read before the Royal Society¶.

A different view has been taken of the nature of the *finer* markings, as those upon some species of *Gyrosigma*, by the author of the paper last quoted, as by previous authors; and the object of this note is to direct attention to the support which the extended view argued for by me in the paper above referred to, viz. that the finer markings also correspond to depressions, derives from analogy.

The structure of the Diatomaceæ, and their modes of reproduc-

* Die Infusionsthierehen.

† Die Bacillarien, and Spec. Algarum.

‡ Annals of Nat. History, 1843.

§ British Diatomaceæ.

¶ Histological Catalogue of the College of Surgeons; and Lectures delivered before the College of Surgeons.

¶ Proceedings of the Royal Society, June 15, 1854.

tion, are, as is well known, remarkable. So much so, that these organisms have been claimed by botanists as members of the vegetable, and by zoologists as belonging to the animal kingdom. The preponderance of evidence is decidedly in favour of their vegetable nature; but, be this as it may, they must all be classed together,—they form a perfectly natural family. Hence we have a strong argument in favour of the markings upon their valves being identical, and as these are evidently depressions in the genera and species with coarsely marked valves (*Isthmia*, &c.), we should expect from analogy that the same would apply to those with finer markings. And this view receives further support, from the fact, that under varied methods of illumination, corresponding appearances are presented by the markings when viewed by the microscope, from those which are very large, as in *Isthmia*, through those of moderate and small size, as in the species of *Coscinodiscus*, down to those in which they are extremely minute, as in the species of *Gyrosigma*, &c. The angular (triangular or quadrangular) appearance assumed by the markings, arises from the light transmitted through the valves being unequally oblique. This may be readily shown in the more coarsely marked valves (*Isthmia*, *Coscinodiscus*), which present the true structural appearance when the light is reflected by the mirror in its ordinary position, and the spurious angular appearance when the light is rendered oblique by moving the mirror to one side.

II. “Researches on the Theory of Invariants.” By WILLIAM SPOTTISWOODE, M.A., F.R.S. Received December 20, 1854.

Invariants may be regarded from two points of view, the permutational and the functional. According to the former they are considered as arising from a process of permutation, according to the latter as derivatives from other functions. In this paper the latter course is adopted; and the following is an outline of the method:—

Let
$$u = f(x, y, \dots a_{\alpha\beta\dots}, a_{\alpha\beta\gamma\dots})$$

be any homogeneous function of the degree n of the variables x, y, \dots , in which $a_{\alpha\beta\dots}, a_{\alpha\beta\gamma\dots}, \dots$ multiplied by their respective mul-