theoretical with the experimental results is shown to be absolutely perfect.

If the glass tested should possess the extreme aperture (170° , or upwards), the fluid balsam used in the experiment would give the reduced aperture within a few minutes of 88° ; the reduced angle changing much more slowly than the angle in air when near its limits.

It is to be observed that the investigation given above shows—what before examination might not be suspected—that the results are entirely independent of the kind of glass used for the objective-front. The index of the glass occurring both directly and inversely disappears from the compound ratio; so that the reduced aperture remains exactly the same, whatever may be the nature of the glass, or the value of its refractive index.

IV.—*The Structure of Eupodiscus Argus.* By SAMUEL WELLS.

PLATE XI. (Lower portion).

THE elucidation of the *Eupodiscus Argus* given by Mr. Slack in your December number did not agree with my previous observations; but as I had a supply of specimens obtained from sea-weed washings in Buzzard's Bay, on the south coast of this State, I made further examinations to see if I could discover the appearance represented by Mr. Slack. I looked at different valves dry and in balsam, covered and uncovered, using Beck's parabolic reflector, as well as Professor Smith's arrangement for opaque objects, the use of which was recommended by Mr. Slack in his paper.

The valve of this diatom is remarkable for its opacity, its thickness being about $\frac{1}{800000}$ " ; it presents, therefore, a beautiful appearance as an opaque object with a binocular. The structure of the outer or convex surface can be readily made out with a low power.

It is dotted with depressions irregular in size, shape, and arrangement; between these depressions the surface rises in ridges, which glisten and sparkle like fresh snow. No arrangement of light (except transmitted) varies this appearance. The depressions are unmistakable, and, as appears by the use of the binocular, and the examinations of the edges of fragments, are pockets extending nearly, but not quite, through the valve. In Fig. A I have endeavoured to represent the upper surface of a fragment, and in Fig. C a vertical section.

The average diameter of these depressions is about $\frac{1}{800000}$ ".

The inner or concave surface is much more difficult of resolution; its structure is quite different to that of the convex surface. It is nearly smooth, has no ridges, and (probably) no

Fig. 1.

Fig. 2.

*Lepisma
Saccharina*

Fig. 3.

Fig. 4.

A

B

C

granulation. It is covered with round dots, radiating irregularly from the centre, and leaving irregular blank spaces between the rows. It is probably this surface that is figured by Mr. Slack, who makes no mention of any difference between the two surfaces, but appears to have made the drawing from a specimen on Möller's typen platte. In my typen platte there are the eighteen-corner Eupodisci, and three others, and all were mounted *concave* side up, which is the easiest mode of making them stay in place.

A difficult question is now met, and that is, what is the nature of these dots? The solution of this question affects Mr. Slack's theory of the depositions of silica in spherules, and also the interpretation of appearances given by Mr. Wenham's "Reflex Illuminator." If we concede these dots to be spherules, then Mr. Slack has gained one side of the valve only, and must further show that the upper side is covered with them; perhaps he can succeed in this; but I think he must fail on the processes, which are as clear and smooth as glass rods.

If we examine these dots by light both from above and below, the transmitted light passes through the large depressions on the convex surface, and thus through four or more of the dots on the inner surface, making them brighter than their neighbours. We have then the appearance figured by Mr. Slack.

I can see them with a $\frac{1}{10}$, but get a very distinct view with a $\frac{1}{30}$, and Professor Smith's apparatus, and to my eye, with that light, they are slight depressions, like dents, with a white spot in the centre as if the bottom of the dent were slightly convex. The average diameter is about $\frac{1}{200000}$ ".

I have tried to represent them at B in a fragment more highly magnified than that at A.

The examination of other species of this genus cannot determine the structure of the *E. Argus*, for we cannot affirm the identity of structure of two species until we have satisfactorily determined that of each.

I have no opportunity of using the "Reflex Illuminator," and therefore send with this a slide of fragments mounted dry, which I think will prove instructive to anyone who wishes to investigate the subject, and has access to different modes of illuminators.

BOSTON, MASS., U.S.A.

[The reader should refer to Mr. Slack's letter on this subject in the present number. —ED. 'M. M. J.']