In conclusion I must express my thanks to Messrs. Smith and Beck for the prompt assistance that they have afforded me in the construction of the instrument, and also for the free use of such apparatus, selected from their stock, as might be useful to me in conducting my experiments.

A Short Description of some New Forms of DIATOMACEÆ from Port Natal. By GEO. SHADBOLT. (Read May 25, 1853.)

THE constantly increasing interest evinced in the examination of the elegant forms of the Diatomaceæ has recently received an additional impetus from Messrs. Smith and Beck's publication of the first volume of the long expected 'Synopsis of the British Species,' by the Rev. W. Smith, F.L.S.

A work of the kind alluded to will supply a want that has been much felt by microscopists, both as a record of what has already been accomplished in this branch of study, and also as a foundation for a general system of classification and nomenclature, for not only is the latter in the most deplorable state of confusion, but by far the greater number of the foreign species are only capable of being referred to by their "local habitation," being destitute of the other appendage generally considered so necessary.

Under these circumstances I propose conferring a provisional name on such new species as I am about to describe, trusting to the indulgence of any prior claimant to this right, whom I may unintentionally supplant, and promising to withdraw such name on cause being shown.

About twelve or fifteen months back I was supplied, by the kindness of Mr. Geo. Busk, with a gathering of Diatomaceæ from "Port Natal" so rich that I shall not attempt to give a detailed account of the forms already known, but, merely noticing a few of the most prominent of these, describe more particularly those species that are, so far as I am aware, entirely new, endeavouring by the respective designations to recall them to the mind, by fixing upon some prominent peculiarity of appearance in each as the foundation for such distinction.

From the prevalence of certain forms (although I am not at all acquainted with the facts of the case) I should be inclined to pronounce the locality whence they are derived as subject to *marine influence*, and at the same time probably not far from the mouth of some river, and it is also evident that the specimens are undoubtedly recent.

Mixed with the *Diatomeæ* are some other bodies, which are scarcely capable of being classed with them, although, like

the spicula of many of the sponges (of which there is a goodly proportion), they are of a siliceous character, such as the *Dictyocha*, and also a form to which my attention was directed by Mr. Busk, and which I purpose identifying by the name of *Bacteriastrum*, from *Βακτηρία*, a stick, and *Αστέρον*, a star.

By the kind assistance of another of our members, Mr. Capron, I am enabled to lay before you drawings of these most interesting bodies (of which may be distinguished three species), as also of most of the other novelties.

From the tenuity of their structure the various *Bacteriastrea* are better observed without being mounted in balsam; they consist of a central irregular annular portion (not unlike the connecting membrane which may be observed in the *Diatomææ* during self-division), surrounded by from eight to twelve rays, each many times longer than the diameter of the central portion, and the construction of these rays affords a good specific distinction, viz. 1st, *B. furcatum* (fig. 1), the marginal rays forked; 2nd, *B. curvatum* (fig. 2), marginal rays entire and curved in one direction; 3rd, *B. nodulosum*, marginal rays entire, straight, and covered with small protuberances like a knotted stick. This last species is by far the most rare.*

A form tolerably abundant and quite distinct from anything I have ever met with from any other locality I propose to call *Euphyllodium*, from *εὕ*, and *φυλλον*, having somewhat the outline of a spatulate leaf (fig. 3). It is characterised as follows: viz. valve symmetrical, convex, divided by a median rectilinear rib, reticulations of an irregular oblong form, disposed in regular and elegant curves around centres formed by the terminations of the median rib. I have noticed but one species, which I have called *C. spathulatum*. There was at first some doubt in my mind whether this might not belong to the genus *Cocconeis*, but the very distinct appearance of the median line, and the absence of anything that could possibly represent the inferior valve, which in the latter genus is generally (I believe always) somewhat different from the superior one, and likewise the marked character of the outline, satisfied me that this supposition was incorrect. It is not unlike the aspect of the genus *Podosphænia*, but here again there are differences so distinct as to satisfy me that it cannot be referred to it with propriety; for instance, there is no reflexure of the valve, and the markings are not moniliform striæ, but rather tessellate in character.

* Since writing the above, I have made out most unquestionably that this pseudo-annular portion is a distinct cell, and not a mere annulus.

Of the genus *Triceratium* there are no less than five new species, one old, and one doubtful, making seven in all.

The first I shall notice is of moderate size, and is distinguished by peculiarly delicate markings somewhat obscurely disposed about *three equidistant pseudo-nuclei*—*Tr. sculptum* (fig. 4).

Next we have one in which the markings appear like minute dots, closely crowded together, but disposed in a very regular manner from the axis of the valve; this is about the same size as the preceding, but the outline differs materially, each margin being arcuate with the concave surface outwards—*Tr. arcuatum* (fig. 5).

Another species of medium size is in form nearly the converse of the preceding, the margin being so inflated as to cause the triangular outline to approach that of the circle; hence *Tr. orbiculatum* as its specific designation (fig. 6). This species exhibits a structure similar to that of *Coscinodiscus radiatus*: the reticulations, however, are not so regularly hexagonal, but they are largest at the centre, and diminish in size gradually towards the margin of the valves.

I have noticed also a single specimen of what appears to be *Tr. alternans*, but, as it presents only its front view, it is difficult to determine.

The next I shall allude to is, however, the most important, being very remarkable and especially interesting from the front view exhibiting the disposition of the horn-like appendages (figs. 7 *a* and 7 *b*) and the mode of dividing. On the lateral view of the valves the most striking peculiarity is a sort of twistedness in the angles (fig. 7 *a*), which is very marked: the specific name proposed is to note this fact, viz. *Tr. contortum*.

The surface of each valve is adorned with short spines arranged in a tri-radiate double row, and at the termination of each double row is one *very long one*, being about one-third of the length of a side of the valve. These long spines are independent of and placed nearer to the axis than the horn-like processes from which the genus derives its name. Fig. 7 *b* shows a specimen undergoing self-division.

Another new species, much smaller than the last, is characterized by the reticulations being coarse and irregular in form, and the horns very large as compared with the size of the valve—*Tr. orassum*.

Another species is, I believe, a variety only of the *T. favus*, which has been called gibbosus.

The genus *Pleurosigma* has no less than *five* species, two being quite new, and both having the markings arranged dia-

gonally, that is, with (what the Rev. W. Smith considers) cells placed alternately in contiguous rows. The outline of the largest (fig. 8) is very clumsy and the ends obtuse, and the median line but slightly flexed—this I call “*validum* ;” the other, *P. inflatum*, on the contrary, is of a graceful outline, the apices acute, the flexure of the median line considerable, and is broad in proportion to its length (fig. 9). A third species is, I believe, also new; it was observed by Mr. Capron when making the drawings; but as I have not had an opportunity of examining it, I have not further noticed it. Specimens of *P. formosum* and *P. Hippocampus* are also found.

There are two new species of *Amphitetras*, viz. *A. ornata* and *A. tessellata*; the former (fig. 10) is of small size, the margins of the valves being considerably hollowed or emarginate and folded over so that each valve is not unlike in form to a collegian’s cap. The surface is elegantly but somewhat irregularly ornamented with delicate markings. *A. tessellata* (fig. 11) is of larger size, and the markings coarse and resembling a tessellated pavement.

There is a very striking and beautiful discoid valve, tolerably abundant, of the same genus as one commonly found in the guano from Callao, but which, I conceive, has never yet had a generic name. It differs in essential characters both from the *Coscinodiscus* and *Actinocyclus*, and its position would probably be midway between them.

It is possessed of a pseudo nucleus, is minutely embellished with delicate markings similar to those seen in *Pleurosigma angulatum*, &c., but in segments radiating from the centre, so that, in all probability, the front view would exhibit slight undulations. The absence of any distinct division between the segments, however, separates it from *Actinocyclus*. I propose for this form the generic name *Actinophænia*, from *ἄκτιν*, a ray, and *φᾶεινος*, glittering, with the specific designation *splendens*.

Fig. 12 is a new species of *Eupodiscus*, having four processes arranged regularly, and with the markings of a somewhat similar character to those in the last described species, forming an elegant cross; I have, therefore, named it *E. crucifer*.

Fig. 13 represents a *Campylodiscus latus*, also new, the canaliculi being wide apart and few in number.

Moderately abundant in this gathering are specimens of a highly interesting nature, on which the generic name of *Asterolampra* has been conferred by Professor Bailey, of New York: one species, *A. marilandica*, has been figured in ‘the

American Journal of Science and Art,' vol. xlviii.; a copy of the paper is in the library of this Society, it having been presented by the late Mr. Edwin Quekett. The Port Natal species differs in many respects from *A. marilandica*, as the following description will show:—

Frustules disciform, slightly convex, cellular (?), elegantly marked around the margin with 7 or 11 segments of an elliptical or parabolic outline, radii proceeding from the centre to the apex of each segmental curve, and strengthened with bracket-like projections. The aspect is not unlike an ornamental wheel, the radii forming the spokes. The segments are regularly and minutely divided into dots or cells (?), but it is necessary to use a high power and careful manipulation to display them: when properly shown, however, nothing can well be more exquisitely beautiful. There is a very noticeable peculiarity in the number of the segments; in every specimen I have seen, being either 7 or 11 (a few only of the latter number), and in the normal state the two valves, as far as my observation extends, are, without exception, disposed alternately, that is, that a segment of the superior valve always corresponds to an interspace of the inferior one, and *vice versâ*. I have named this species *A. impar*, from the odd number of segments. Fig. 14 is a representation of this beautiful frustule.

A species of another genus, established by Professor Bailly, *Climacosphæna*, is shown at figs. 15 *a* and 15 *b*, *b* being the lateral view, and *a* the front view, in which the ladder-like divisions more resemble the links of a chain than in the only other species I have seen: I have consequently called it *Cl. catena*.

Two very interesting forms, by no means rare in this very rich gathering, belong to a genus that has been described under the names of *Zygoceros* and *Denticella*, the latter by Professor Bailly, and as they clearly differ from the former, as may be seen by the most casual observer on inspecting fig. 16, which is a single frustule of a true *Zygoceros*, moderately common in this collection, I shall adopt the latter designation. I have only seen them either single or in pairs, having just completed the process of self-division, having a somewhat persistent connecting membrane. Front views are shown of the two new species in figs. 16 and 17. The side view is more or less elliptical in outline at the junction of the two valves, but sections in almost every other plane parallel to this would present a different figure, owing to the protuberances shown in the front view. In both species there arise from the central inflations two slightly curved spines from each valve, which, as in *Triceratium*, &c., in the process of self-division,

are arranged across each other. The smaller of the two species (fig. 16), *D. simplex*, has but one central inflation, and the lateral expansions are symmetrically placed so as to give each valve the appearance of a sort of mitre or head-dress. It is marked with numerous well-defined dots or cells (?). The second species, *D. margaritifera* (fig. 17), has, besides the two lateral expansions, three intermediate inflations, the central one being considerably the largest, and the whole is covered by numerous pearl-like eminences similar in aspect to those so common in *Cosmarium* and other *Desmidiæ*. In both species the union of the two valves is marked by a sort of projecting band, which completely encircles the frustule.

In addition to those I have described there are very many other forms already familiar to observers of the *Diatomæ*, and doubtless some new forms which I have overlooked. I am well aware that the present is a most imperfect sketch of a highly interesting gathering, containing, as will be shown by the following summary, no less than 55 species, of which 20 are certainly new, and in addition 4 forms of Sponge spicula.

	Species.		Species.
Bacteriastrium . . .	3	of which are certainly new	3
Calophyllum . . .	1	" "	1
Triceratium . . .	7	" "	5
Pleurosigma . . .	5	" "	2
Amphitetras . . .	2	" "	2
Actinophænia . . .	1	" "	1
Eupodiscus . . .	3	" "	1
Asterolampra . . .	1	" "	1
Denticella . . .	2	" "	2
Campylodiscus . . .	1	" "	1
Climacosphænia . . .	1	" "	1
Navicula . . .	3		—
Stauroneis . . .	1		20
Pinnularia . . .	2		
Nitzschia . . .	1	And 4 forms of Sponge Spicules.	
Grammatophora . . .	3		
Tabellaria . . .	2		
Striatella . . .	1		
Zygoceros . . .	1		
Acanthes . . .	1		
Cocconeis . . .	2		
Doryphora . . .	1		
Podosphænia . . .	1		
Synedra . . .	1		
Coscinodiscus . . .	3		
Tryblionella . . .	1		
Meloseira . . .	1		
Biddulphia . . .	1		
Epithemium . . .	1		
Dictyochas . . .	1		