

*Descriptions of NEW SPECIES of BRITISH DIATOMACEÆ, chiefly  
observed by the late Professor GREGORY. By ROBERT  
KAYE GREVILLE, LL.D., F.R.S.E., &c. Q.J.M.S. 1859. Plate VI.*

TOWARDS the close of the year 1857, my lamented friend, the late Professor Gregory, was engaged in the examination of some Diatomaceous gatherings, the results of various dredgings made by Professor Balfour in Lamlash Bay. He had detected a considerable number of forms which he believed to be undescribed; and with reference to their publication I had completed drawings of a portion of the series, when he was attacked by his last illness. It does not appear that he had reduced any of his observations on these new species to writing; at least, I have not been able to find a single memorandum on the subject. So that, however desirous I may be to secure to the name of my late friend the credit due to his discoveries, I fear that, even with the aid of his collection, which has been most kindly presented to me by his widow, I shall perform this duty very imperfectly. It unfortunately happens that, in some cases, the slides which contained the objects to be drawn were returned to him for description, and I have neither been able to find the original slides (in the absence of any distinctive mark or label), nor additional examples of the forms in question. The present communication consequently does not contain a notice even of all the species of which I had made drawings. The wonderful memory possessed by Professor Gregory rendered *him* independent of temporary notes. The careful study he bestowed upon the forms which came under his eye, fixed every character, however minute, in his mind, and it was not until he had completed his investigations that he sat down to record them. By his death Science has lost a most successful explorer, as well as one of the most patient and indefatigable of microscopic observers.

1. *Cocconeis pinnata*, Greg. MSS.

Valve oval; striæ concentric with the extremities, robust, moniliform, distant, not reaching the median line, but leaving a narrow-elliptical blank space; length  $\cdot 0014''$ ; striæ 11 in  $\cdot 001''$ . (Pl. VI, fig. 1.)

Marine. Lamlash Bay, in the Island of Arran. Dredged by Professor Balfour in 1857.

Among the new forms detected by Professor Gregory in  
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the Lamash Bay gatherings, were two or three species of *Cocconeis*; and I find that, in his correspondence with our mutual friend, Mr. Norman, of Hull, he referred to two of them under the provisional names of *pinnata* and *crassa*. Of the latter I have as yet discovered no trace; but, with regard to the former, although I have no certain clue to guide me, I think I may safely venture to assume that the form now described is the one so named by him. It is a beautiful little species, well distinguished by the short, strong, moniliform, distant striae, and by the narrow-elliptical blank space which longitudinally occupies the middle of the valve. I have the drawing of another apparently new and fine species, but the slide containing it was returned, and I have been unable to find it.

### 2. *Cocconeis arraniensis*, Grev.

Valve oval; striae concentric with the extremities, slender, faint, moniliform, contiguous, reaching to the median line; length  $\cdot 0016''$ ; striae 30 in  $\cdot 001''$ . (Fig. 2.)

Marine. Dredged in Lamash Bay, by Professor Balfour, 1857.

In working through some of Professor Gregory's slides, this minute and inconspicuous form attracted my attention. It appears to be undescribed, and I do not know any species with which it is at all likely to be confounded. Under a moderate power of the microscope it is difficult to distinguish its structure satisfactorily. Compared with other species of the genus, the moniliform striae are slender and faint; and, in consequence of their being placed close together, the eye is caught as much by the sharp lines caused by the juxtaposition of the striae, as by the striae themselves; and it is not until a higher power is used that the structure is cleared up.

### 3. *Coscinodiscus Normanni*, Greg. MSS.

Areolation forming numerous fasciculi of radiating lines or rows of areolae, each fasciculus composed of about six rows; areolae equal, except at the margin, where they become suddenly smaller and faint; margin smooth; diameter of disc  $\cdot 0016''$  to  $\cdot 0036''$ ; areolae about 24 in  $\cdot 001''$ . (Fig. 3.)

Marine. In the stomach of Ascidiæ, Hull. George Norman, Esq.

Professor Gregory's attention was first directed to this Diatom by Mr. Norman, who obtained it, as well as many other interesting species, from the stomachs of Ascidiæ. Believing it to be new, he bestowed upon it the name of its

discoverer,—a well-merited compliment. Mr. Norman had also, in 1856, obtained abundant specimens of a *Coscinodiscus*-like Diatom, by washing the mud which adhered to the roots and stems of *Dutch rushes* imported into Hull from Holland. This last form was doubtfully regarded by competent observers as *Coscinodiscus subtilis* of Ehrenberg; and as the question arose, whether the two forms above referred to were not identical, I have been necessarily led into an examination of the history and characters of *C. subtilis*. The species was first described by Ehrenberg, in his 'Essay on the Microscopical Organisms of South and North America;' and the localities he assigns to it are Peru and Vera Cruz. But of the two figures which he gives (tab. I, iii, fig. 18, and tab. III, vii, fig. 4), the second, that of the Vera Cruz form, is accompanied with a mark of doubt; and it must be confessed that the figures are most unlike each other. Kützing, in his 'Bacillarien,' merely repeats Ehrenberg's stations, and adds another representation, which, again, is too indefinite to be depended on; nor does he afford any additional information in his 'Species Algarum.' The late Professor Bailey, of New York, however, who was in direct communication with Ehrenberg, found in 1850, in various districts in the United States, a *Coscinodiscus*, which he named, without hesitation, *subtilis* of that author. In the earth of the rice fields of Georgia, particularly, he discovered it in vast abundance, and expressed his surprise, that it, and a large proportion of the forms which accompanied it, were such as only inhabit salt or brackish water; indicating the presence of salt water much further up the rivers than it now extends. ('Microscopical Observations made in South Carolina, Georgia, and Florida.')

Lastly, Ehrenberg, in his 'Mikrogeologie' (1854), extends the geographical distribution of the species very considerably, giving the following list of localities, with a figure to illustrate each: Canton, China, tab. XXXIV, vii, fig. 6. Sicily, tab. XXII, fig. 4. Richmond, Virginia, tab. XVIII, fig. 35; and tab. XXXIII, xvi, fig. 7. Assistance Bay, North Pole, tab. XXXV, xxiii, fig. 5. South Pole, tab. XXXV, xxii, fig. 5. California, tab. XXXIII, xiii, fig. 4. It is much to be regretted that none of the above-mentioned illustrations are characteristic; and they appear, besides, to differ very considerably from each other. Nevertheless, we may, I think, assume with some confidence, that the American form is the true *C. subtilis*. If we now compare this with the *Coscinodiscus* discovered by Mr. Norman, in the stomach of Ascidiæ, we must admit that, at first sight, the two species greatly

resemble each other. On closer observation, however, certain differences do constantly present themselves. In both, the most striking character is the beautiful radiation, which Professor Gregory aptly compared to that exhibited in the stars of some orders of knighthood. The lines thus formed by the areolation are grouped into what, in the absence of a better term, may be called *fasciculi*, and they appear to constitute a good discriminative character. In the Hull disc, these fasciculi, as they become well defined in their approach towards the margin, are composed of about six rows of areolæ; in the American disc, on the contrary, the fasciculi contain double the number of rows, and are themselves, consequently, proportionably less numerous. The line of separation between the fasciculi is also more evident, causing the appearance, under a low power, of a slight undulation of the surface, which effect is heightened by the straight oblique rows of the more regular areolæ. If the margin be brought into focus, the superior regularity of the areolation becomes still more apparent in the series of little intersecting arches which spring, as it were, from the inner edge of the border. These differences, not very great perhaps in themselves, yet arising, as they must do, from the structure of the valve, incline me to regard the two forms as distinct.

With regard to the disc found on the "Dutch rushes," I cannot speak with certainty. No doubt the general character of the areolation (including the radiating fasciculi) is very similar to that of *C. Normanni*. But Mr. Norman has pointed out to me the fact (which I have also since observed myself) that frustules in a state of union present, on the front view, a decided undulation, indicating, in this respect, some affinity with *Cyclotella punctata*. Sm. Syn. V, 2, p. 87, a fresh-water species.

In the centre of the disc of *C. Normanni* may be generally perceived a small irregular, interrupted, opaque circle; as if there were either minute prominences of some extraneous matter, or as if some of the areolæ were filled with it. But this appearance is not invariably present. It is most conspicuous under a low magnifying power.

Having found it difficult to convey a correct idea of the structure by means of a figure on the usual scale, I have enlarged the one given in the plate  $\times 800$  diameters.

#### 4. *Nitzschia arcuata*, Greg. MSS.

Front view of frustule linear, arcuate, rounded at the ends; side view lanceolate, obtuse; length  $\cdot 0038''$ ; puncta, about 20 in  $\cdot 001$ . (Figs. 4—7.)

Marine. Dredged in Loch Fine, by Professor Gregory, 1856. Lamlash Bay, Professor Balfour, 1857. In a dredging made the same year, off Invercloy, in Brodick Bay, by the Rev. Dr. Miles; Professor Walker-Arnott.

A very characteristic species, not to be confounded with any of the genus already known. It appears to be both local and rare, as it occurs in only two of the numerous Arran gatherings.

#### 5. *Nitzschia macilenta*, Greg. MSS.

Frustule linear, slightly sigmoid, truncated; side view linear, slender, gradually tapering towards the acute extremities, keel with a single row of sub-remote puncta; striæ very obscure; length  $\cdot 0150''$  to  $\cdot 0190''$ ; breadth  $\cdot 0004''$  to  $\cdot 0007''$ ; puncta about 8 in  $\cdot 001''$ . (Figs. 8, 9.)

Marine. Lamlash Bay, dredged by Professor Balfour, 1857.

A fine species, evidently allied to *N. sigmoidea*, but decidedly less sigmoid. The side view is very narrow. The puncta are separated from each other by irregular intervals, and are fewer than in *N. sigmoidea*. The striæ I have not succeeded in resolving, nor was Professor Gregory more successful. It is undoubtedly a marine species, and tolerably frequent in one of the Lamlash gatherings.

#### 6. *Navicula forcipata*, Grev.

Valve oval or oblong, marked by two continuous longitudinal linear blank spaces, which contract opposite the nodule, and then expand and converge concentrically towards the extremities, where they almost meet; length  $\cdot 0013''$  to  $\cdot 0030''$ ; striæ 35 in  $\cdot 001''$ . (Figs. 10, 11.)

Marine. Glenshira sand, Professor Gregory. Lamlash Bay, dredged by Professor Balfour. Cresswell, Northumberland, Dr. Donkin. Californian guano.

After a very careful examination of this little Diatom, I entirely agree with Professor Gregory in regarding it as undescribed. The examples which fell under his observation were very inferior to those which I have recently obtained, which accounts for his being led to compare the form with *Navicula pygmaea*. The finer specimens show that it is more nearly related to *N. Lyra* and *N. spectabilis*, as will be seen at once by consulting the figures. It must indeed be confessed that large individuals at first sight seem to approach very near to some small varieties of *N. Lyra*. I am, however, satisfied that the two species are really distinct. Perhaps the characters most to be depended on in our new form are —1. The greater number of striæ, about 35 in  $\cdot 001''$ ; while

in *N. Lyra* they are, according to Professor Smith, only 20 in '001" (rather under the mark according to my estimate). 2. The invariably converging points of the blank spaces. I may add, in addition, that there is a striking *flatness* in the valve of *N. forcipata*; and that the blank spaces are defined by hard, sharp lines of contour, caused apparently by an abrupt depression in the surface of the valve. This is so conspicuous, that, under a moderate magnifying power, the eye dwells rather on the two parallel dark *lines* than on the blank *space* they enclose. The general outline, also, of the valve is not variable, as in *N. Lyra*, being never, as far as I have seen, produced at the ends, but always presenting an uninterrupted symmetrical curve. The Northumberland examples are the finest which have come under my notice; those from the Clyde are, for the most part, much smaller, —many of them even minute,—thus exhibiting a range of size as extensive as in *N. Lyra* and its allies.

7. *Pinnularia semiplena*, Grev.

Valve linear-elliptical, subacute; costæ radiate, distant, very short in the middle, and becoming gradually longer towards the extremities, leaving an elongate, lozenge-shaped, central, blank space; length '0024"; breadth about '0006"; costæ 15 in '001". (Fig. 12.)

*Navicula angulosa*, var.  $\beta$ . Greg. 'Trans. Mic. Soc.,' v. iv, p. 42, Plate V, fig. 8\*.

Marine. Glenshira sand, Professor Gregory. Lamlash Bay, dredged by Professor Balfour.

Having had abundant opportunities of observing this form, especially in my recent examination of many of Professor Gregory's slides, I feel quite convinced that it is distinct from *Navicula angulosa*. I have not seen any approach towards an intermediate state. Indeed, I do not know any species more constant in regard to size and every other character.

8. *Achnanthes gregoriana*, Grev.

Front view of frustule broadly linear; striæ very fine; length '0060" to '0080"; breadth '0010" to '0015". (Figs. 13, 14.)

Marine. Lamlash Bay; dredged by Professor Balfour, 1857.

Although a considerable number of the scattered frustules of this species have occurred both to Professor Gregory and myself, no other view than the one represented in the plate has been observed. In point of size it rivals *A. longipes*, but

is widely separated from it in the character of the striation alone, to perceive which, requires not only a good object-glass, but delicate manipulation. As in many of its congeners the frustules vary greatly in both length and breadth. In Canada balsam they become so transparent as to be easily overlooked. *A. gregoriana* must be accounted rare, for among the many dredgings and gatherings which have been made in Lamlash Bay and its immediate neighbourhood, one alone, so far as I know, contains it; nor is it abundant even in that, as seldom more than three or four examples are found to occur in a slide. At the same time, there is every reason to conclude that its habits must be similar to those of the other species, and that a diligent search along the coast might be rewarded by its discovery in a living state—parasitic probably on other Algæ.

9. *Podosira lævis*, Greg. MSS.

Filaments composed of two (?) frustules, which are pale yellowish, transparent, glassy, somewhat compressed at the poles, very delicately and obliquely striated, and remotely and very finely punctate; cingulum firmly siliceous, distinctly striated; diameter of frustule '0018" to '0021". (Figs. 15, 17.)

Marine. Lamlash Bay; dredged by Professor Balfour, 1857.

This conspicuous, although minute little Diatom, was considered by my late friend, Professor Gregory, as a *Podosira*, and a few specimens, I believe, were distributed by him under the name now adopted. Like *P. Montagnei*, the filaments are probably composed of only two or three frustules; but none of the numerous discs or loose valves which I have examined, exhibit any indication of the absence of siliceous, or even of imperfect siliceous structure at the apex of the valves. Some doubt may therefore be entertained regarding its true generic position. The structure, when carefully examined under a good objective, is very beautiful, being singularly glassy and brilliant, and most delicately striate and punctate; characters best seen in the dry-mounted slide. In balsam they are not readily perceived. The puncta are equally scattered over the whole frustule, and resemble excessively minute prominent glands. The peculiarly brilliant manner in which the frustules transmit the light renders them conspicuous objects in the field of the microscope. The species appears to be scarce, having been observed, like the preceding one, in a solitary gathering. From three to half a dozen frustules not unfrequently occur in a slide; but very

rarely accompanied with the cingulum. In this case, again, we may look forward with some confidence to its being found in a living state, parasitic on some of the smaller sea-weeds.

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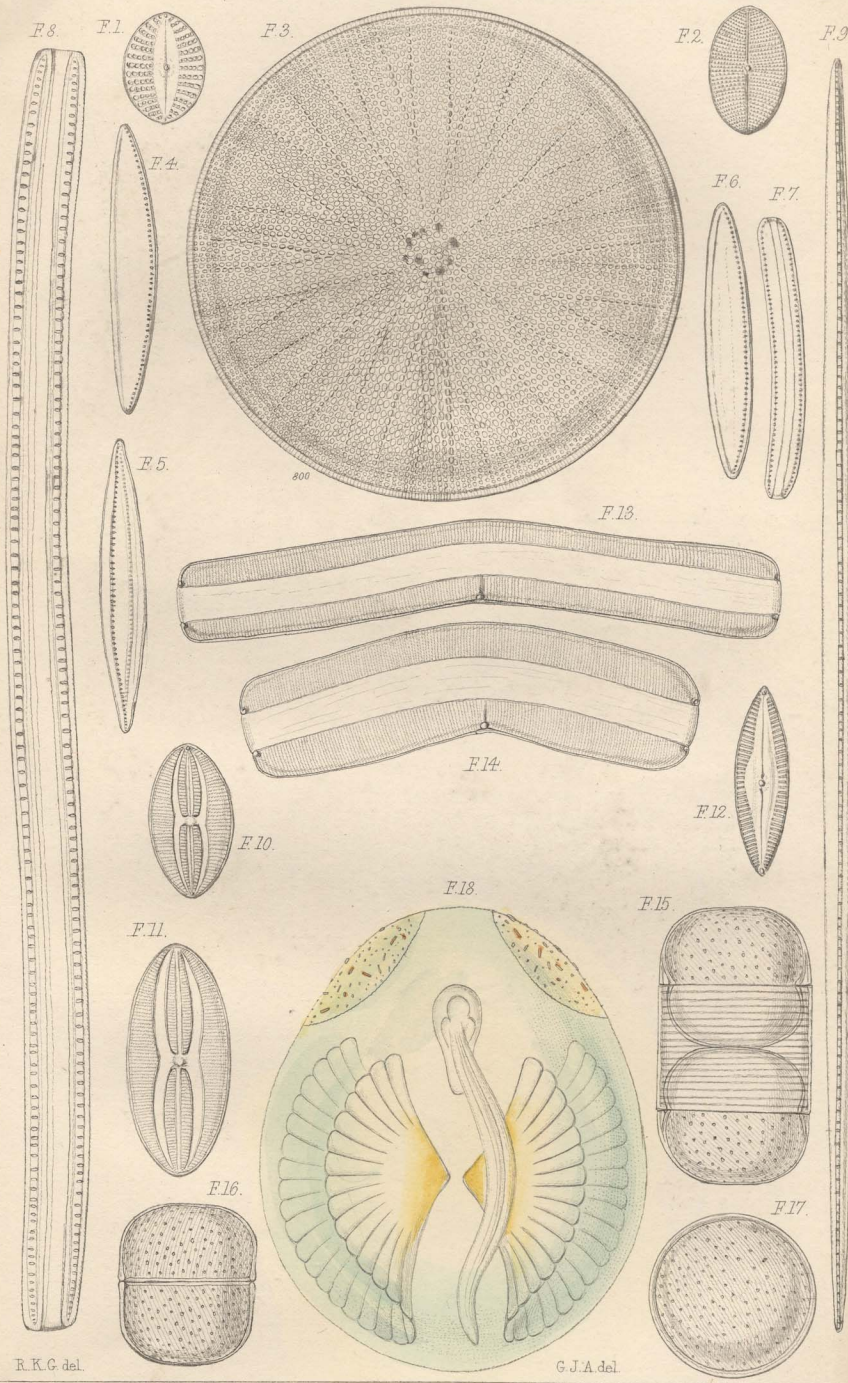
DESCRIPTION OF PLATE VI,

Illustrating Dr. Greville's paper on New British Diatomaceæ.

Fig.

- 1.—*Cocconeis pinnata*, Greg.
- 2.— „ *Arraniensis*, Grev.
- 3.—*Coscinodiscus Normanni*, Greg.
- 4—7.—*Nitzschia arcuata*, Greg.
- 8, 9.— „ *macilenta*, Greg.
- 10, 11.—*Navicula forcipata*, Grev.
- 12.—*Pinnularia semiplena*, Grev.
- 13, 14.—*Achnanthes Gregoriana*, Grev.
- 15—17.—*Podosira lævis*, Greg.

All the figures are  $\times 400$  diameters, except that of *Coscinodiscus Normanni*, which is  $\times 800$ .



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