DESCRIPTIONS of NEW and RARE DIATOMS. SERIES VIII.
By R. K. GREVILLE, LL.D., F.R.S.E., &c.

(Communicated by F. C. S. Roper, F.R.S.)

PLAGIOGRAMMA.

Plagiogramma Robertsonianum, n. sp., Grev.—Valve lanceolate, obtuse; costæ 2, central; striæ very fine, about 30 in '001". Length '0018" to '0030". (Pl. I, figs. 1, 2.)

Hab. Port Stephen, New South Wales; Dr. Roberts.

Unquestionably distinct, with finer striæ than in any species previously described. Indeed, under a moderately magnifying power, they are invisible. The frustules vary, to some extent, in shape and size; the more minute examples being somewhat elliptical, the larger ones narrower in proportion to their length, and, generally, slightly constricted below the apices, where a few very minute, raised points are situated. These come out most distinctly in the front view, but even then require careful adjustment.

CAMPYLODISCUS.

Campylodiscus ornatus, n. sp., Grev.—Valve nearly circular, much bent, with two bands of radiating canaliculi, the marginal one narrow, the inner one much broader, the canaliculi distant, with two rows of puncta between them; central space filled with faint, obscurely moniliform, radiating lines, and bordered with a row of oblong granules. Diameter '0056". (Fig. 3.)

Hab. On *Tridacna*, West Indies; F. Kitton, Esq.

An exquisitely beautiful diatom, having some relation to *Campylodiscus Horologium*, in its circular form, distant canaliculi, and intercanalicular puncta; but differing from it in the much-bent valve and in the double band of canaliculi, besides various minor points. In the inner band, which is about twice the breadth of the outer one, the long canaliculi alternate with very short, imperfect ones, while in the outer band they are all equal, and correspond in number with the perfect and imperfect canaliculi, taken together, of the inner band.

Campylodiscus Wallichianus, n. sp., Grev.—Valve circular, with a defined, broadly linear, central space; canaliculi about 48, concentric, with extremities very slender, and armed with minute spines. Diameter '0040". (Fig. 4.)

Hab. Dredged off St. Helena by Dr. Wallich, in from fifteen to forty fathoms. Harvey Bay, Queensland, and Port of France, New Caledonia, Dr. Roberts.

This most graceful species in some respects closely resembles my *Campylodiscus Normanianus*. The form of the central space is precisely similar, and the number of the canaliculi is about the same. It is, however, a much more delicate species. The canaliculi are far more slender; indeed, the sharpness and fineness of the lines are most striking at the first glance. Dr. Wallich correctly remarks, in his notes upon his St. Helena dredgings, which he has most kindly placed in my hands, that the canaliculi, when seen in a favorable point of view, exhibit themselves as the angular edge of elevated ridges. In an accurate sketch by him, now before me, the canaliculi pass quite across the central space, closely and very minutely beset with spinulæ; I have also seen a similar specimen from New Caledonia, but it is an exceptional case, as they rarely traverse more than a third of the distance, and often not so much. The irregularity, however, of the central markings in this genus are now too well known to have any influence over specific diagnosis.

Campylodiscus Robertsonianus, n. sp., Grev.—Valve circular, with an oval central space and prominent radiating costæ of equal length, the ridge of which is composed of minute, oblong cellules, in pairs. Diameter $\cdot 0050''$. (Fig. 5.)

Hab. Harvey Bay, Queensland; Dr. Roberts.

One of the most exquisite species of this charming genus. The valve is bent and concave. The costæ or canaliculi resemble sharply prominent ribs, along the crest of which are disposed longitudinally numerous minute, oblong cellules, in pairs, which in some lights might be hastily taken for short lines. The nearest ally of this remarkable species is unquestionably *C. diplostichus*, also a native of the Australian seas, where it was obtained from the stomachs of Ascidians by Dr. Macdonald. I am indebted to the kindness of Dr. Roberts, of Sydney, for a series of gatherings from the Southern Pacific, which, having very recently arrived, are mostly unexamined. I rejoice, however, in having an early opportunity of dedicating so well-marked a species to Dr. Roberts, who, from want of leisure, has been prevented from carrying out his intention of investigating the Diatomaceæ of the Southern Ocean.

Campylodiscus crebrecoatus, n. sp., Grev.—Valve nearly circular; canaliculi imperfectly radiating, very numerous, 6 in $\cdot 001''$, forming a broad, marginal band, the outer portion being bent back, so as to form a ridge along the middle of the band; central space elliptical, closely filled with fine transverse costæ, interrupted by a narrow median line of blank space. Longest diameter $\cdot 0037''$. (Fig. 6.)

Hab. Port Jackson, New South Wales; Dr. Roberts.

In a mounted slide presented to me by Dr. Roberts I find the beautiful *Campylodiscus* now described. In the dry preparation the valve is of a dark-blue colour. The canaliculi are fine and sharp, and the separation between the marginal band and the central space is marked by a very narrow blank line. The ridge which runs along the middle of the band of canaliculi is so prominent that, at first sight, there appears to be a solution in the continuity of the canaliculi, which, however, is not the case. The costæ in the centre are not in the slightest degree moniliform. It is a robust species for its size.

Navicula Lewisiana, n. sp., Grev.—Valve elongated, linear oblong; striæ very fine, parallel; median line terminating considerably within the apices in a linear, elongated nodule, the base of which rests in a socket. Length '0076" to '0122" (Fig. 7.)

Navicula, n. sp.? or sporangium of *N. rhomboides*? Lewis, 'Notes of Diatom. of the U.S. Seaboard,' p. 6, pl. ii, fig. 3.

Navicula, n. sp.? or sporangium of *N. rhomboides*? or *N. fossilis*, Ehr. Lewis, in 'Mic. Journ.,' n. ser., vol. ii, p. 161.

Hab. India (Sunderbunds); Dr. Wallich. Mud from oysters, St. Mary's River, U.S.; tidal mud from Savannah River, U.S.; marsh at Fernandina, Florida; Dr. F. W. Lewis. Mouth of the River Berbice; Dr. Abercrombie. Sierra Leone, in gathering communicated by Frederick Kitton, Esq.

Of this diatom Dr. Lewis remarks that "it is nearly allied to *Nav. rhomboides* and *crassinervia*, more particularly to var. β of the first named, and, perhaps, notwithstanding its marine habitat, ought to be regarded as a variety of one or other of these species." Dr. Lewis, however, at the same time registers it as a doubtful new species, and I am myself certainly disposed to consider it as really distinct. With regard to mere figure, the frustules of both *Nav. rhomboides* and *crassinervia* are decidedly lanceolate, whereas those of the diatom now before us have the sides nearly parallel at the middle, and although gradually narrowing as they approach the apex, are still, at that part, broadly rounded. And I am not aware that we have any authority for assuming that the sporangial condition would cause so radical a change in the frustular form. In the absence of any such evidence, it appears to be a safer proceeding to treat it as new. But the difference in form is, indeed, the least argument in favour of such a conclusion. The terminal nodules alone constitute an essential peculiarity. They are situated at a considerable distance from the apices, are elongated, apparently cylindrical, and are, besides, connected in so curious a manner with the

median line, as to render an observation on that organ expedient before proceeding with my description. The term central or median line is, at present, used with great latitude, and seems to be held to include, not only the truly simple central line, which extends longitudinally throughout the valve, but also, in various instances, two additional lines which run close to and parallel with it. In the present case it becomes necessary to distinguish between them, and, until a better name be suggested, I shall call these additional lines the extra-median lines. In *N. Lewisiana* the true median line, which is very slender, passes to the base, and, as it were, supports the terminal nodule. The extra-median lines are very much stronger, incrassated, and somewhat convex opposite the central nodule, and on reaching the terminal nodules suddenly expand, increase in bulk, and embrace the lower part of the nodule exactly as a porte-crayon holds a pencil—a comparison which I perceive, from Dr. Wallich's notes, we have both made independently of each other. The frustule is diaphanous, even under considerable magnifying power, and the striæ strictly transverse and parallel, and so fine that they cannot be exhibited by the engraver. According to Dr. Lewis, they are 50 to 60 in '001", while Dr. Wallich makes them 85 in '001". I confess that I have been unable to estimate them satisfactorily. In the 'Microscopical Journal' (vol. ii, p. 155, n. ser.) is a partial reprint of Dr. Lewis's original pamphlet, in which this species is referred, with a question, to *N. fossilis*, Ehr., as well as to *N. rhomboides*, a suggestion which does not occur in the original pamphlet itself. That diatom, however, has, I believe, never been described, and we only know it by the figures in 'Mikrogeologie' (pl. 10 I, fig. 6). Judging from these figures, it is a minute species, with the striæ visible and highly oblique, a few radiating ones being very conspicuous opposite the central nodule. It seems quite clear, therefore, that it has no affinity with the very fine and curious diatom under consideration.

I have attempted in vain to render the frustule of *N. Lewisiana* stationary under examination, in order to obtain a drawing of the front view. That, however, given by Dr. Lewis, "linear and slightly inflated," appears to be correct. In one or two immaterial points this species is subject to irregularity. The terminal nodules vary in length, and the forceps-like receptacle is sometimes closed upon the nodule, while at others it slightly expands. The size of the frustule is also uncertain. The specimens from Sierra Leone are the largest I have seen, one in my possession being nearly a

third longer than the individual figured. Those kindly communicated by my friend, Dr. Abercrombie, of Cheltenham, from Berbice, are generally small, and occur along with fine varieties of *N. permagna* of Bailey, which I hope to illustrate in a future paper. In the same gathering is also a long *Pleurosigma*, apparently intermediate between *P. Balticum* and *P. longinum*. (Brightwell, 'Mic. Journ.,' vol. vii, p. 180, plate ix, fig. 7.)

Navicula Johnsoniana, n. sp., Grev.—Valve somewhat convex, elliptical-oblong, with slightly produced, obtuse extremities, and a transversely rounded, stauros-like blank space in the centre; striæ very oblique, conspicuously lineato-punctate. Length '0034" to '0040". (Fig. 8.)

Hab. New Zealand; C. Johnson, Esq. Harvey Bay, Queensland, in a dredging communicated by Dr. Roberts.

Again I have the pleasure of recording one of the many discoveries of my esteemed and venerable friend, Mr. Johnson, of Lancaster. It is only recently that he detected the present diatom in his New Zealand slides, and kindly presented me with one containing several specimens. I had, however, scarcely prepared my description before I recognised the same thing in an Australian dredging transmitted by Dr. Roberts, in which it appears to be exceedingly rare. It is a somewhat remarkable species, being intermediate between the genera *Navicula* and *Stauroneis*, and I have been mainly induced to place it in the former, on account of the nodule being sufficiently definite apart from the rounded blank space into which it expands on each side, and because this blank space is unequal, being always larger on one side than the other, as in many *Pinnulariæ*. The most striking feature in the valve is the conspicuous, remote, oblong puncta, and the very oblique striæ into which they are disposed. The median line is prominent, and there is a straight parallel row of puncta on each side. A difference exists between the New Zealand and the Australian examples. In the former the frustules are oblong, the puncta larger, and the striæ 16 in '001." In the latter the frustules are elliptical-oblong, the puncta much smaller, and the striæ 22 in '001". This is certainly a considerable discrepancy, but the recent study of these wonderful little vegetables has led to the conclusion that far too much importance was formerly attached to number in the markings, and that it would be desirable to establish characters, if possible, upon other grounds. I had prepared drawings of both forms; but not having room in the plate for both, I have given the Australian, on account of the more highly developed central-nodular

blank space. In the New Zealand frustulés it is very considerably smaller.

Navicula notabilis, n. sp., Grev.—Valve oval, with extra-median lines, and near them a parallel uninterrupted line of minute granules on each side, and with a band of marginal granules, composed of three or four longitudinal contiguous series, the intermediate wide blank space obscurely striated. Length '0020' to '0030'. (Fig. 9.)

Hab. Cook's Reef, Torres Straits; G. Norman, Esq.

A singularly rich and delicate species, totally distinct from all that I am acquainted with. The whole valve seems to be made up of microscopic strings of beads. Even the extra-median lines which run close to the true median line are very minutely punctate. Then comes another straight line of fine granules on each side, scarcely more distant from the extra-median lines than they are from each other, not contracted in the slightest degree opposite the central nodule, and converging just before reaching the ends. Between these lines and the margin the space is divided into two equal parts, the one being blank, or at least only obscurely transversely striated, the other filled up with about four rows of granules, following the curve of the margin. The two inner of these rows are distinctly defined; the others are more or less confluent. The only variation I have observed is in size and in the tendency of the smaller specimens to approach a circular form.

Navicula luxuriosa, n. sp., Grev.—Valve elliptical, somewhat obtuse; striæ composed of distinct oblong puncta, so arranged as to form longitudinal lines contracted opposite the nodule; the margin, as well as an intra-marginal line or ridge, also composed of close puncta. Length '0030' to '0038'. (Figs. 10, 11.)

Hab. Port Stephen, New South Wales, in a dredging communicated by Dr. Roberts.

It is utterly impossible for the pencil to convey any idea of the exceeding beauty of this little object. Under a moderately magnifying power the delicate striation is scarcely perceived; but the intra-marginal line at once strikes the eye, as well as the indication of wavy longitudinal lines. Under a higher power the surface of the valve is seen to be undulated; the intra-marginal line, especially, forming a prominent ridge, leaving a sort of channel between it and the margin. The median is accompanied by parallel extra-median lines, straight at the sides and converging towards the ends. Then follow three longitudinal, convex lines of puncta, contracted opposite the nodule, at which point they

occupy a space of about half the distance from the nodule to the margin. The only species which appears by description to approach this diatom is *N. costata*; but on consulting the figure given by Kützing ('Bacill.,' plate iii, fig. 56), it is evident that there is no connection whatever between them. The latter has no extra-median lines, and although the valve is said to be "longitudinaliter punctato-costata," the punctate character arises, not from puncta in the direction of the transverse striation, but from circular puncta arranged at intervals along either one or two longitudinal lines. The remarkable intra-marginal line of puncta so conspicuous in *N. luxuriosa* is wholly wanting.

Navicula? Cistella, n. sp., Grev.—Valve quadrangular, about twice as long as broad, the angles rounded and somewhat dilated; surface marked with delicately punctate, longitudinal lines; transverse striæ very fine, parallel. Length, '0015" to '0025". (Figs. 12—14.)

Cocconeis? quadrata; Roper, MS.

Hab. Dredged off Lyme Regis, in eight fathoms' water by the Rev. J. Guillemand, 1855; F. C. S. Roper, Esq. Harvey Bay, Queensland, in a dredging communicated by Dr. Roberts, of Sydney; not unfrequent.

It is not a little interesting that after I had described this ambiguous, minute diatom from the antipodes, I should be informed by my most obliging friend, Mr. Roper, that it was actually discovered some years ago on our own shores. The very accurate drawings made by himself in 1855, and now lying before me, leave no doubt to be entertained on this point. But the real nature of the frustule seems to have been doubtful from the first. Mr. Roper regarded it as possibly a *Cocconeis*. The late Professor Smith, to whom specimens were submitted, could make nothing of it, and would not venture to refer it to any genus. In now publishing it as a doubtful *Navicula*, my object is to attract such attention towards it as may lead to its generic settlement. Looking at the side view, it is certainly as much like a *Cocconeis* as a *Navicula*; but the front view, which Mr. Roper had not seen, seems to point more towards the latter. After all, that acute diatomist may be correct in his conjecture (*in litt.*), that it may belong to an unknown filamentous form. And, indeed, before I had communicated with him, I had myself remarked in my MS.,—"So little, indeed, does the frustule resemble a *Navicula*, that in hastily passing the slide across the field of view it might be taken to belong to one of the *Melosireæ*." It must be understood, therefore, that its present position is simply

provisional. The valve is somewhat opaque, and varies considerably in size and in relative length and breadth; the ends are very slightly convex, rounded and inflated at the corners, and the sides generally more or less convex opposite the central nodule, very rarely straight. The longitudinal lines are curved outwards opposite the nodule, in number about 21 in '001", and most exquisitely punctate. The transverse striae are fine, and require careful manipulation for their resolution. The front view has straight sides and ends, the angles rounded. The whole frustule is very solid and compact.

AMPHIPRORA.

Amphiprora oblonga, n. sp., Grev.—Large; front view oblong; wings not deeply constricted; greatest breadth at a point about half way between the constriction and the ends; curve of the lateral plates reaching the constriction. Length '0060" to '0085". (Fig. 15.)

Hab. Harvey Bay, Queensland; Dr. Roberts.

Here is a large *Amphiprora*, which I cannot refer to any described species, and yet it may be found eventually to be merely an extreme aberrant form. Unfortunately, although I have seen many examples, I have been unable to fix upon any side view as indubitably identified with it. If I knew any described species to which I could trace it, even as a remote variety, I would gladly do so; but the very circumstance of this perplexity renders a figure desirable, and I give it a provisional name, which may be cancelled whenever its relations shall have been conclusively established. Specimens occur much larger than the one figured, and, consequently, greatly exceeding in size *A. maxima* of Gregory, with which I was at first induced to compare it. But that diatom is very much more broadly truncate, the widest part being near the ends and the constriction very deep, whereas, in the present species, the widest part is halfway between the end and the constriction, and the latter comparatively quite shallow. The character of the marginal curve in the two species appears to me to be essentially distinct. It would require a careful examination, however, of a long series of examples of the different species in order to ascertain finally how much dependence may be placed on the character to be derived from the curve of the lobes. My own impression is that a peculiarity exists in the curve of most of the species,

especially when taken in connection with the constriction, which may be recognised throughout all the variations of each species. This, however, is only an impression produced on my own mind after, it must be confessed, a too limited suite of observations. I find that Dr. Wallich obtained an *Amphiprora* at St. Helena, which he also compared with *A. maxima*; but he remarks in his notes, written at the time (accompanied by a very careful sketch), that the curve of the lobes is different. They appear, indeed, to differ both from those of *A. maxima* and the subject of the present notice.