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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY,

INCLUDING

ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'ANNALS' COMBINED WITH LOUDON AND CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

CONDUCTED BY

P. J. SELBY, Esq., F.L.S., GEORGE JOHNSTON, M.D.,
CHARLES C. BABINGTON, Esq., M.A., F.R.S., F.L.S., F.G.S.,
J. H. BALFOUR, M.D., Prof. Bot. Edinburgh,

AND

RICHARD TAYLOR, F.L.S., F.G.S.

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1855.

"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; à verè eruditis et sapientibus semper exculta; malè doctis et barbaris semper inimica fuit."—LINNÆUS.

"Quelque soit le principe de la vie animale, il ne faut qu'ouvrir les yeux pour voir qu'elle est le chef-d'œuvre de la Toute-puissance, et le but auquel se rapportent toutes ses opérations."—BRUCKNER, *Théorie du Système Animal*, Leyden, 1767.

. . . . . The sylvan powers
Obey our summons; from their deepest dells
The Dryads come, and throw their garlands wild
And odorous branches at our feet; the Nymphs
That press with nimble step the mountain thyme
And purple heath-flower come not empty-handed,
But scatter round ten thousand forms minute
Of velvet moss or lichen, torn from rock
Or rifted oak or cavern deep: the Naiads too
Quit their loved native stream, from whose smooth face
They crop the lily, and each sedge and rush
That drinks the rippling tide: the frozen poles,
Where peril waits the bold adventurer's tread,
The burning sands of Borneo and Cayenne,
All, all to us unlock their secret stores
And pay their cheerful tribute.

J. TAYLOR, *Norwich*, 1818.

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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[SECOND SERIES.]

" ..... per litora spargite muscum,
Naiades, et circùm vitreos considite fontes :
Pollice virgineo teneros hìc carpite flores :
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas ;
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchylia succo."
N. Parthenii Giannettasii Ecl. 1.

No. 85. JANUARY 1855.

I.—*Notes of an Excursion to the South of France and the Auvergne in search of* Diatomaceæ.

By the Rev. William Smith, F.L.S., Professor of Natural History, Queen's College, Cork.

[With a Plate.]

A statement of the results of an excursion made in the course of last spring to the shores of the Gulf of Lyons and the volcanic district of the Auvergne, may have some interest, at a time when much attention is being given to the minute organisms that more especially formed the object of my researches.

I have always thought that the geographical distribution of species in the Diatomaceæ is far more general and uniform than that in the higher orders of vegetable forms, and this opinion has received ample confirmation from the examination of the products of the various localities explored during the above journey.

While the Phanerogamous flora of the South of France is so widely different from that of the British Isles, that the most superficial observer cannot fail to be struck with its novelty, the Diatomaceous growth of its streams and lakes, and of that portion of the Mediterranean Sea that washes its coasts, is almost identical with that of our more northern localities.

The following outline of my tour will show the extent of my explorations, and I subjoin lists of the species that rewarded my search.

I reached Avignon on the 13th May 1854, and devoted several days to an examination of the interesting localities in its immediate neighbourhood, making gatherings of Diatomaceæ from a well in the Amphitheatre at Orange, from the river Sorgues at Vaucluse, and from the banks of the Rhone near the spot where it is joined by the waters of the Durance. Proceeding to Marseilles, I spent three days on the neighbouring shores of the Mediterranean, and collected from various spots north and south of the city, many specimens of the larger Algæ rich in parasitic Diatoms. A fountain in the court of the Hotel des Colonies, and a spring near Château Vert also supplied abundant materials for future examination.

Returning from Marseilles, I made collections near St. Chamas, on the borders of the Etang de Berre, a large salt-water lagoon connected with the Mediterranean, and on the same day explored the Canal de Crapone, in the vicinity of Arles.

On the 24th May, I reached Montpellier, and found a few specimens in the Château d'Eau, and the ponds of the Botanic Garden, but was more amply rewarded during excursions which I made from Montpellier to Frontignan, Cette and Agde, which again brought me to marine and brackish-water habitats, under the influence of the Mediterranean. The Canal du Midi and the river Hérault also supplied a few valuable gatherings.

From Montpellier my route lay through Nismes, where one gathering, from the celebrated Fountain of the Nymphs, proved rich in the number and variety of its forms.

From Nismes I passed to Alais, and thence across the Cevennes to the romantic city of Le Puy, collecting a few specimens at Genolhac and Langogne, at an elevation of about 4000 feet. The vicinity of Le Puy proved unproductive; not so the neighbourhood of Clermont-Ferrand, where I entered upon the volcanic region of Central France.

Collections made from the "Fontaine Pétrifiante," or calcareous spring of St. Alyre, and from basaltic caverns near the beautiful village of Royat, lying at the base of the Puy de Dôme, contained many interesting species.

Three weeks spent at the romantic watering-place of Mont Dore les Bains, at an elevation of 3424 feet above the level of the sea, enabled me to add to my herbarium most of the forms which characterize the mountain springs and marshes of this lofty region of extinct volcanos. The snows of the Pic de Sancy, at an elevation of 6100 feet, snow marshes on the Pic du Capuchin, and the shores of Lake Guery, a sheet of water which

occupies the hollow of an ancient crater, proved fertile in a variety of forms. The eddies of the Dor, the mountain torrent which drains the district, and the perpendicular surface of the rock over which the stream is hurried that forms the Grande Cascade, were also productive.

From the Auvergne I proceeded to Orleans, and from the source of the Loiret, three miles from that city, collected excellent specimens of two rare and interesting forms, namely *Orthosira arenaria*, W. Sm., and *Gomphonema cristatum*, Ralfs.

The 4th of July closed my herborizations, and on that day I plundered one of the fountains of the Champs Elysées in Paris of materials, which added a few names to my roll of French Diatomaceæ.

The gatherings made during the above journey amounted to forty-nine, and the included species may be conveniently divided into five classes.

1st. Those which were found in the Gulf of Lyons.

2nd. Brackish-water forms in localities under the influence of the Mediterranean.

3rd. Species which were collected in springs and rivers at a low elevation.

4th. Forms which only occurred at high elevations in the volcanic districts of the Puy de Dôme and Mont Dore.

5th. Species or varieties which have not hitherto been figured or described.

In the following lists I have underlined those species which have not hitherto been found in Britain, and I employ throughout the nomenclature adopted in the "Synopsis," whether in the portion already published or in that prepared for the press.

List 1. *Mediterranean forms.*

Epithemia Musculus, *Kütz.*
Cocconeis Scutellum, *Ehr.*
—— diaphana, *W. Sm.*
Eupodiscus fulvus, *W. Sm.*
Tryblionella Soleæformis, *W. Sm.*
Surirella fastuosa, *Ehr.*
—— striatula, *Turp.*
Amphiprora alata, *Kütz.*
Navicula didyma, *Kütz.*
—— Westii, *W. Sm.*
—— Pandura, *Bréb.*
Stauroneis pulchella, *W. Sm.*
Pleurosigma elongatum, *W. Sm.*
—— angulatum, *W. Sm.*
Synedra affinis, *Kütz.*
—— fulgens, *W. Sm.*
Podosphenia Ehrenbergii, *Kütz.*
Podosphenia Lyngbyei, *Kütz.*
—— elegans, *W. Sm.*
Rhipidophora elongata, *Kütz.*
Licmophora splendens, *Grev.*
Fragilaria striatula, *Lyng.*
Striatella unipunctata, *Ag.*
Hyalosira delicatula, Kütz.
Rhabdonema arcuatum, *Kütz.*
—— Adriaticum, *Kütz.*
Grammatophora marina, *Kütz.*
—— serpentina, *Kütz.*
Biddulphia pulchella, *Gray.*
Achnanthes longipes, *Ag.*
—— subsessilis, *Kütz.*
Podosira hormoides, *Kütz.*
Berkeleyia fragilis, *Grev.*

2. *Brackish-water species.*

Epithemia constricta, *Bréb.*
Tryblionella gracilis, *W. Sm.*
—— punctata, *W. Sm.*
—— marginata, *W. Sm.*
Navicula tumens, *W. Sm.*
Navicula Amphisbœna β, *W. Sm.*
Pinnularia peregrina, *Ehr.*
Nitzschia dubia, *W. Sm.*
Mastogloia Danseii, *Thw.*
—— lanceolata, *Thw.*

3. *Species collected at* low elevations, *many of which also occurred in the higher districts of the next class.*

Epithemia turgida, *W. Sm.*
—— alpestris, *W. Sm.*
Cymbella Helvetica, *Kütz.*
—— affinis, *Kütz.*
—— maculata, *Kütz.*
—— ventricosa, *Kütz.*
Amphora ovalis, *Kütz.*
Cocconeis Pediculus, *Ehr.*
—— Placentula, *Ehr.*
Cyclotella operculata, *Kütz.*
Campylodiscus costatus, *W. Sm.*
Surirella angusta, *Kütz.*
—— ovata, *Kütz.*
—— ovalis, *Bréb.*
—— turgida, *W. Sm.*
Cymatopleura Solea, *W. Sm.*
—— Hibernica, *W. Sm.*
—— elliptica, *W. Sm.*
Nitzschia minutissima, *W. Sm.*
—— sigmoidea, *W. Sm.*
—— linearis, *W. Sm.*
—— Amphioxys, *W. Sm.*
Navicula ambigua, *Ehr.*
—— ovalis, *W. Sm.*
—— dicephala, *Kütz.*
—— tumida, *W. Sm.*
—— Amphirhynchus, *Ehr.*
Pinnularia radiosa, *W. Sm.*
—— acuta, *W. Sm.*
—— viridis, *W. Sm.*
—— Stauroneiformis, *W. Sm.*
—— Stauroneiformis β, *W. Sm.*
Stauroneis Phœnicenteron, *Ehr.*
—— gracilis, *Ehr.*
—— anceps, *Ehr.*
Stauroneis? rectangularis, *Greg.*
Pleurosigma attenuatum, *W. Sm.*
Synedra radians, *W. Sm.*
—— Ulna, *Ehr.*
—— pulchella, *Kütz.*
—— (*Nitzschia*) *Palea*, Kütz.
Cocconema lanceolatum, *Ehr.*
—— Cistula, *Ehr.*
—— cymbiforme, *Ehr.*
Gomphonema capitatum, *Ehr.*
—— constrictum, *Ehr.*
—— acuminatum, *Ehr.*
—— dichotomum, *Kütz.*
—— olivaceum, *Ehr.*
—— curvatum, *Kütz.*
—— cristatum, *Ralfs.*
Meridion circulare, *Ag.*
—— circulare, var. β, *W. Sm.*
—— constrictum, *Ralfs.*
—— constrictum, var. β, *W. Sm.*
Fragilaria capucina, *Desm.*
Odontidium mesodon, *Kütz.*
—— Tabellaria, *W. Sm.*
Diatoma vulgare, *Kütz.*
Denticula tenuis, *Kütz.*
—— inflata, *W. Sm.*
—— sinuata, *W. Sm.*
Achnanthidium lanceolatum, *Bréb.*
Achnanthes exilis, *Kütz.*
Melosira varians, *Ag.*
Orthosira arenaria, *W. Sm.*
Mastogloia Smithii, *Thw.*
Encyonema prostratum, *Ralfs.*
—— cæspitosum, *Kütz.*

4. *Species collected at* high elevations *in the* Auvergne.

Epithemia rupestris, *W. Sm.*
Eunotia Arcus, *W. Sm.*
—— gracilis, *W. Sm.*
—— tetraodon, *Ehr.*
—— tridentula, *Ehr.*
—— quaternaria, *Ehr.*
—— *quinaria*, Ehr.
Cymbella cuspidata, *Kütz.*
Cocconeis Thwaitesii, *W. Sm.*
Surirella biseriata, *Bréb.*
—— splendida, *Kütz.*
—— linearis, *W. Sm.*
Navicula rhomboides, *Ehr.*
—— rhynchocephala, *Kütz.*

Navicula crassinervia, *Bréb.*
—— serians, *Kütz.*
—— firma, *Kütz.*
—— gibberula, *Kütz.*
Stauroneis dilatata, *W. Sm.*
Pinnularia nobilis, *Ehr.*
—— major, *W. Sm.*
—— acuminata, *W. Sm.*
—— gibba, *Ehr.*
—— divergens, *W. Sm.*
—— late-striata, *Greg.*
—— hemiptera, *Bréb.*
—— nodosa, *W. Sm.*
—— tenuis, *Greg.*
Synedra lunaris, *Ehr.*
—— biceps, *W. Sm.*
Himantidium Arcus, *Ehr.*
—— gracile, *Ehr.*
—— pectinale, *Kütz.*
Fragilaria virescens, *Ralfs.*
Odontidium hyemale, *Kütz.*
Tabellaria flocculosa, *W. Sm.*
—— fenestrata, *Kütz.*
Melosira distans, *Kütz.*
—— nivalis, *W. Sm.*
Orthosira orichalcea, *W. Sm.*
Colletonema vulgare, *W. Sm.*

5. *Species or varieties* not hitherto figured *or described.*

Navicula firma, var. *β*, *W. Sm.*
Gomphonema capitatum, var. *β*, *W. Sm.*
—— capitatum, var. *γ*, *W. Sm.*
—— Brébissonii, *Kütz.*
—— elongatum, *W. Sm.*
Diatoma vulgare, var. *β*, *W. Sm.*
—— grande, *W. Sm.*
Fragilaria undata, *W. Sm.*
Odontidium anomalum, *W. Sm.*
Achnanthidium lineare, *W. Sm.*
—— coarctatum, *Breb.*
Amphitetras antediluviana, var. *β*, *W. Sm.*
Orthosira spinosa, *W. Sm.*

I subjoin a description of the species and varieties included in the last list.

Navicula firma, var. *β*, W. Sm. Synopsis of Brit. Diatomaceæ, p. 48.

Fresh water. Pic du Capucin, Mt. Dore; elevation 4565 feet.

This is probably the normal *Nav. firma*, Kütz. Bacill. xxi. 10, and I am disposed to refer *Nav. amphigomphus*, Kütz. Bacill. xxviii. 40, to the same species.

Plate I. fig. 1. Valves of *Nav. firma β.*

Gomphonema capitatum, W. Sm. Syn. Brit. Diat. p. 80. pl. 28. 237.

Var. β. Upper portion of frustule almost linear, elongated, equal to, or slightly exceeding the lower. Length of frustule ·0013″ to ·0023″. v.v.

Var. γ. Much attenuated towards both the extremities. Length ·0012″ to ·0016″. v.v.

Var. γ. G. Fusticulus, W. Sm. MSS. Greg. in Mic. Journ. vol. iii. p. 39.

Fresh water. Var. *β.* Puy du Cliergue; elevation 5576 feet. Ilford near Lewes, Nov. 1853, *W. Sm.* River Spey, July 1854,

Dr. Gregory. Braemar, Aug. 1854, *Dr. Balfour.* Var. γ. Spring at Château Vert near Marseilles. Braemar, Aug. 1854, *Dr. Balfour.*

PLATE I. fig. 2 β. *Gomphonema capitatum*, var. β. Fig. 2 γ. *G. capitatum*, var. γ.

Gomphonema Brébissonii, Kütz. Valve constricted above the centre, upper extremity cuneate, obtuse, lower gradually attenuated and acute. Striæ 24 in ·001″. Length ·0013″ to ·0018″. v.v.

Kütz. in Sp. Alg. p. 66. ad specim. authen. quæ dedit am. De Brébisson.

Fresh water. Puy du Cliergue.

But slightly differing from *G. acuminatum*, var. γ, W. Sm. Syn. Brit. Diat. pl. 28. 238. *a*‴; and probably only another variety of the same species.

PLATE I. fig. 3. *Gomphonema Brébissonii.*

Gomphonema elongatum, W. Sm. Valves inflated at centre, afterwards constricted towards both extremities, the upper of which is capitate, or somewhat cuneate, the lower slightly inflated below the constriction, afterwards attenuated and obtuse. Striæ 24 in ·001″. Length ·0018″ to ·0045″. v.v.

Gomphonema Brébissonii, Greg. in Mic. Journ. vol. ii. p. 99. pl. 4. 18.

Fresh water. Puy du Cliergue, *W. Sm.* Mull Deposit, *Dr. Gregory.* Wisbeach, April 1854, *Mr. G. Smith.*

This may probably be a variety of *G. Brébissonii*, Kütz., with which it occurs intermixed in the French gathering; both are in my opinion closely allied to *G. acuminatum.*

PLATE I. fig. 4. *Gomphonema elongatum.*

Diatoma vulgare, Bory.

Var. β. Valve linear, extremities gradually and slightly attenuated. Length of frustule ·0018″ to ·0030″. v.v.

Diatoma tenue, Ag., ad specim. in herb. Grev.

Fresh water. Fountain in court of the Hotel des Colonies, Marseilles; Canal du Midi, and Canal de Crapone; Plumpton, Sussex, April 1852, *W. Sm.* Pentland Hills, April 1821, *Dr. Greville.*

The valve in the normal form of *D. vulgare* is elliptical and suddenly attenuated towards the extremities.

PLATE I. fig. 5. *Diatoma vulgare*, var. β.

Diatoma grande, W. Sm. Valve linear, constricted near the capitate and rounded extremities. Costæ 24 in ·001″.

Length of frustule ·0017″ to ·0038″. Breadth of valve ·00025″ to ·0003″. v.v.

Fresh water. River Sorgues near Vaucluse; River Lune, Lancashire, April 1848, *Mr. G. Smith.* River Shannon near Athlone, and Lough Corrib river, July 1853, *W. Sm.* Lough Neagh, *Dr. Dickie.* Lough Leven, May 1854, *Dr. Gregory.*

A very fine and distinct species allied to *D. Ehrenbergii*, Kütz. Bacill. xvii. 17, but distinguished by the linear outline of its valve, its closer striæ, and greater relative size.

PLATE I. fig. 6. *Diatoma grande.*

Fragilaria undata, W. Sm. Filaments imperfectly tenacious; frustules frequently cohering by their angles; valve oval or linear, acuminate. Striæ 42 in ·001″. Length of frustule ·0006″ to 0008″.

Var. β. Valve linear, acuminate. Length of frustule ·0008″ to ·0012″. v.v.

Var. γ. Valve constricted in the centre. Length of frustule ·0008″ to ·0021″. v.v.

Var. γ. *Odontidium Tabellaria*, "sporangia," Greg. Mic. Journ. vol. ii. pl. 4. 22.

Fresh water. River Mortes, Lac Guery, Mont Dore; elevation 4066 feet. Var. γ. Mull Deposit, &c.

The specimens which I collected in the locality above mentioned enabled me to assign the present species to the genus *Fragilaria.* Its mode of growth and delicately striated valves ally it closely with *F. virescens.*

PLATE I. fig. 7. *Fragilaria undata.*

Odontidium anomalum, W. Sm. Filament tenacious; valves linear, constricted towards the obtuse extremities. Costæ 4 to 12. Length of frustule ·0005″ to ·0012″. v.v.

Var. β. Frustules with internal cells.

Fresh water. Genolhac in the Cevennes; elevation about 4000 ft. Braemar, Perthshire, Aug. 1854, *Dr. Balfour.*

The presence of internal cells within the ordinary frustule, a mode of growth occasional in others of the Diatomaceæ, is frequent in this species, and frustules of the more usual description are rarely to be detected in the above gatherings; they may however be found at times, side by side with others, containing internal cells, showing that the latter formation is a modification of the usual method, and not a normal condition of the filament.

PLATE I. fig. 8. *Odontidium anomalum.*

Achnanthidium lineare, W. Sm. Valve linear, obtuse; striæ obscure. Length ·0003″ to ·0007″. v.v.

Fresh water. Fountain of Vaucluse; Lasswade near Edinburgh, June 1854, *Dr. Greville.*

Plate I. fig. 9. *Achnanthidium lineare.*

Achnanthidium coarctatum, Bréb. Valve linear-elliptical, constricted at the centre, attenuate, and constricted towards the rounded extremities. Striæ moniliform, 24 in ·001″. Length of frustule ·0013″ to ·0018″. v.v.

Bréb. in Kütz. Sp. Alg. p. 54. ad specim. authen. quæ dedit am. De Brébisson.

Fresh water. Cave near Royat; Grassmere, Westmoreland, Aug. 1853, *W. Sm.*

Plate I. fig. 10. *Achnanthidium coarctatum.*

Amphitetras antediluviana, Ehr.

Var. β. Frustules cruciform, angles produced; valves with a deep sinus between each angle.

Marine. Salt Pans near Agde, *W. Sm.* Stomach of Crab, *Professor Williamson,* 1852. Near Ipswich, Aug. 1852, *Mr. Hodgson.* Poole Bay, Nov. 1849, *W. Sm.* Near Cumbrae, Feb. 1854, *Mr. R. Hennedy.*

I had at first distributed the present variety as a distinct species, and proposed to name it *A. excavata,* but the structure of the valve is exactly that of the ordinary form; and although the produced angles and consequently concave valve, as well as the deeply hollowed sides, give a very peculiar physiognomy to the frustules, I am constrained to regard it as a variety of Ehrenberg's well-known species.

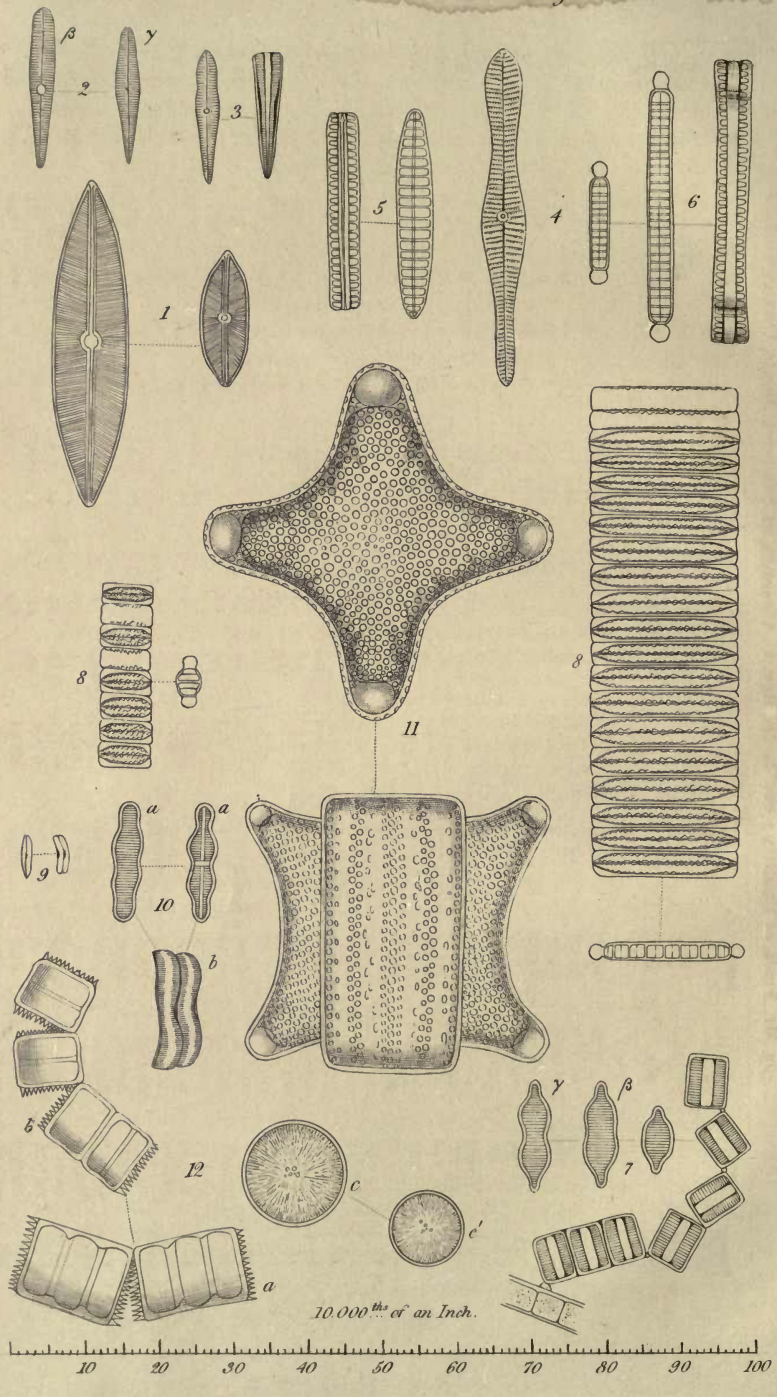
Plate I. fig. 11. *Amphitetras antediluviana,* var. β.

Orthosira spinosa, W. Sm. Filament fragile, often only partially cohering; valves cylindrical, spinose at the line of junction, striated; striæ moniliform, radiate, 30 in ·001″. Breadth of filament ·0005″ to ·0017″. v.v.

Fresh water. Cave near Royat. Cave under Grand Cascade, Mont Dore; elevation 4236 feet. Braemar, Aug. 1854, *Dr. Balfour.*

Plate I. fig. 12. *Orthosira spinosa*: *a,* filament drawn from a balsam mounting; and *b,* ditto from a dried specimen.

It will be seen by the above lists, that only three of the species collected during my late journey are to be regarded as



C. Coppock ad nat. del.

J.D.C. Sowerby sc.

foreign to our own waters, and it is not improbable that of these, *Eunotia quinaria*, Ehr., and *Nitzschia Palea*, Kütz., will be found to be natives of Britain. There only remains *Hyalosira delicatula*, Kütz., and as Professor Kützing gives the Atlantic as a locality for this species, it may also prove to be indigenous.

This result demonstrates the general distribution of these organisms; and the discovery by Professor Balfour of several of the rarer forms of the Auvergne, among the lofty ridges of the Grampians, is also an interesting circumstance, showing that elevation, and consequently temperature, influence the character of the minute Diatomaceous vegetation, as well as that of the larger and more conspicuous flora of such regions.

Lewes, Nov. 29th, 1854.

EXPLANATION OF PLATE I.

Fig. 1. Side views of two valves of *Navicula firma*, var. β.
Fig. 2. *Gomphonema capitatum*, var. β. and γ.
Fig. 3. *Gomphonema Brébissonii.*
Fig. 4. *Gomphonema elongatum.*
Fig. 5. *Diatoma vulgare*, var. β.
Fig. 6. *Diatoma grande.*
Fig. 7. Filament and valves of *Fragilaria undata.*
Fig. 8. Filament and valves of *Odontidium anomalum.*
Fig. 9. *Achnanthidium lineare.*
Fig. 10. *Achnanthidium coarctatum.*
Fig. 11. Front and side view of *Amphitetras antediluviana*, var. β.
Fig. 12. *Orthosira spinosa*: *a*. Front view from a balsam mounting; *b*. Front view from a dry specimen; *c* and *c'*. Side views of frustules.

II.—*Amended Characters of the singular Lymneadous Genus* Camptoceras, *and description of a new* Ancylus, *inhabitants of North-western India.* By W. H. Benson, Esq.

In 1842, M'Clelland's 'Calcutta Journal of Natural History' contained the description of a new Lymneadous genus, which appears not to have attracted in Europe the attention which it deserves, principally in consequence of the scarcity of the publication in the pages of which it is to be found; although some pains were taken to make it more generally known by forwarding to Mr. Hugh Cuming, and to the British Museum, from India, copies of the paper and specimens of the shell. The form appears of sufficient importance to warrant the publication of revised and more extended characters of the genus, together with a few observations on its habits, and the locality in which it occurs, points shortly adverted to in the former notice.