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FRESH-WATER ALGAE,

WITH A SUPPLEMENT OF MARINE DIATOMS.

By WILLIAM WEST, F.L.S.

PLATES I.–II.

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I MADE two special visits to the district dealt with by this Survey at Whitsuntide, 1910, and Whitsuntide, 1911, and collected a great deal of material. The hundreds of gatherings were made from as varied habitats as possible, and have since been worked out microscopically. Collecting was carried on over the whole of the district, from Achill Island round by Curraun and Westport to Louisburgh and Mweelrea; inland as far as Castlebar; and on Clare Island itself. I have also utilized much other material that I had collected from the district on several previous visits; and I have to thank the following gentlemen for the opportunity of examining material collected by them:—Messrs. Lancelot Bayly, A. D. Cotton, J. W. H. Johnson, R. Ll. Praeger, L. B. Smyth, and G. H. Wailes. Mr. Wailes collected the material from Inishturk, Inishbofin, and Caher Island; these collections were all from additional localities of much interest, and consequently have greatly enriched this paper. The list of halophilous Diatoms has been very considerably enhanced by means of the excellent material collected by Messrs. Smyth and Cotton; my own collections of marine material were limited and were not made for the purpose of this Survey, as I was then unaware that I was to be asked to examine and enumerate the marine Diatoms as well as the fresh-water ones.

Previous work in the district of this Survey has not been very considerable. Archer's records are the earliest, but those from Mayo are few when compared with his numerous observations from such counties as Dublin and Wicklow. With regard to Diatoms, O'Meara did excellent work at the greater part of Ireland; but I am not aware of any detailed work by anyone at the district under consideration. In a Paper[1] I published twenty years ago,

[1] W. West: A Contribution to the Fresh-water Algae of W. Ireland. Journ. Linn. Soc., Bot., xxix, 1892.

a number of records of Algae in general from near Westport were enumerated. In 1906 I published a Paper[1] in conjunction with my son, Prof. G. S. West, in which some records were given for the plankton occurring in Lough Keel and Lough Acorrymore, Achill Island. A fair number of other records of Desmids have been published in "British Desmidiaceae"[2] for near Westport, Castlebar, and Achill Island. From Clare Island itself and the Louisburgh district I do not know of any previous records.

The district is very rich in Algae; 887 species, 254 varieties, and 46 forms have been collected,[3] and the investigation has resulted in extending the known distribution of a large number of species, in adding 157 species to the number of those already known for Ireland, in adding 19 species to those already known for the British Isles, as well as adding to science 6 new species, 27 varieties, and 7 forms. The new species are as follows:—

Hormospora ellipsoidea	Synechococcus minutus
Ankistrodesmus Selenastrum	Microcystis minutissima
Reinschiella curvata	Lyngbya cliarense

As an example of a remarkable extension of range, one genus with its single species was known previously only from one locality in Colorado. As was anticipated for this class of plants, the species occurring on the island are very much the same as those occurring in similar localities on the adjacent mainland, the conditions being similar. The Algae are, as usual, much scarcer on the Carboniferous limestone of the mainland than on other rocks, from the natural comparative scarcity of wet places there, as well as from the calciphobic character of many species.

A few associations, out of many lists that were made, are enumerated; these may be of some interest in these days of ecology-worship. It will be noticed that the lists of species enumerated vary very considerably though obtained from similar pools with similar surrounding influences.

In all the bogs of this district, the gigantic thiobacterium *Hillhousia mirabilis* was abundant. Another smaller species of this genus was also frequent and is being investigated by the authors of the larger species; the smaller species has been found in England also.

Although the list which follows is a fairly long one, with many localities,

[1] W. and G. S. West: A comparative study of the Plankton of some Irish Lakes. Trans. Royal Irish Academy, vol. xxxiii, Sect. B, Part II, 1906.

[2] W. and G. S. West: British Desmidiaceae, vols. i, ii, iii, and iv. Ray Society, 1904, 1905, 1908, 1911.

[3] Made up as follows:—Fresh-water Algae, 769 species, 230 varieties, 40 forms; Marine Diatoms, 118 species, 24 varieties, 6 forms.

the microscopical examination of the material having occupied considerably more than a thousand hours, the district cannot be said to be exhausted by any means.

When measurements are given, they apply only to the specimens actually measured; hundreds of specimens of many species were observed, but comparatively few were measured.

At first I made lists from the different divisions of Clare Island; but as I found they were increasing in similarity as work proceeded, I thought it best to merge them into one.

Many other Algae were collected, which, on account of their barren condition, or by reason of the few specimens seen, could not be determined with certainty, such as species of Oedogonium, Zygnema, Spirogyra, Mougeotia, &c.

It is possible that a few brackish-water forms, and even a few marine ones, may occur in the list of fresh-water Diatoms, this being due to the fact that some of the fresh-water lakes and pools are close to the sea and often frequented by gulls, and sprinkled with storm-spray from the sea during gales; I have noticed this commingling from the Outer Hebrides and similar places. As far as I know, I have not repeated a name in the list of marine Diatoms which had already occurred in the list of those from fresh water.

To show how marine and fresh-water species get mixed in such places as tidal rivers, I give a list of ten species out of many others from the mouth of the Bunowen River, Louisburgh, at about the limit of high tide; the first five are fresh-water forms, the others marine ones :—*Ceratoneis Arcus, Melosira varians, Surirella ovalis, Gomphonema constrictum, Synedra Acus, Hantzschia virgata, Rhabdonema adriaticum, Amphora salina, Navicula palpebralis,* and *N. digitoradiata.*

As other reports of the series (see Report 10, Phanerogamia) have dealt or will deal with questions of soil, &c., it is only necessary for me to say that the prevalent soil where most of the collections were made is peaty, that the rainfall is heavy—about 60 inches—and that the climate is mild even in winter.

I must here express my great indebtedness to Mr. J. Adams, M.A., for the trouble he has taken in kindly adding up the number of species, &c., and analyzing the new records for tabulation.

Species now for the first time recorded for Ireland are distinguished by an asterisk; those new to the British Isles by two asterisks; while species, varieties, and forms new to science are printed in capital letters.

CONTRACTIONS USED FOR LOCALITIES.

Ac = Lough Acorrymore, Achill Island.
AS = Near Achill Sound.
B = Church Lake, Inishbofin.
C = Clare Island.
CP = Croaghpatrick.
Cr = Near Castlebar.
CI = Caher Island.
Cn = Croaghaun, Achill Island.
D = Near Dugort, Achill Island.
DL = Doo Lough.
I = Inishbofin.
IT = Lake on Inishturk.
K = Keel Lough, Achill Island.
L = Near Louisburgh.
LG = Lough Gall, Achill Island.
M = Near Mulranny.
Mw = Mweelaun.
RL = Roonah Lough.
S = Slievemore, Achill Island.
SL = Sraheens Lough, Achill Island.
VL = Valley Lough, Achill Island.
W = Near Westport.

LIST OF SPECIES.

Class RHODOPHYCEAE.

Order NEMALIONACEAE.

Fam. **Helminthocladieae.**

Batrachospermum vagum Ag.—C, AS, I, D, Cn.

Fam. **Lemaneaceae.**

Sacheria mamillosa Sirod.—C.

Class CHARACEAE.

The following localities are taken mostly from papers on the botany of the district between Mulranny and Castlebar by Rev. E. G. Marshall,[1] and of Clare Island, Achill, and Inishturk, by R. Ll. Praeger[2]; the balance are from MS. notes by the latter. All Mr. Praeger's specimens were verified by H. and J. Groves. I did not collect Characeae during my two visits.

Chara fragilis Desv.—Newport; Castlebar; Clare I.; Achill I.; Inishturk.
var. **barbata** Gant.—Clare I.
var. **delicatula** Braun.—Clare I.
C. aspera Willd.—Newport; Castlebar; Achill.
var. **subinermis** Kuetz.—Achill.

[1] Journ. Bot., xxxviii, 184. 1900.
[2] Irish Nat., xii, 277, 1903; xiii, 265, 1904; xvi, 113, 1907.

C. polyacantha Braun.—Castlebar.
C. vulgaris L.—Mulranny; Achill.
Nitella translucens Ag.—Newport; Clare I.
N. opaca Ag.—Newport; Castlebar; Achill; Clare I.

Class CHLOROPHYCEAE.

Order OEDOGONIALES.

Fam. **Oedogoniaceae.**

***Bulbochaete Brebissonii** Kütz.—I.
gigantea Pringsh.—W.
insignis Pringsh.—LG.
mirabilis Wittr.—C.
Oedogonium Braunii Kütz.—C.
crispum (Hass.) Wittr.—C, vegetative cells 10–13μ broad, 4 to 6 times longer, oogonia (average) 40μ wide, 36μ high.
cryptoporum Wittr.—C, veg. cells 44 × 7–7·5μ, oogonia 27μ broad 21μ long.
var. **vulgare** Wittr.—C.
***giganteum** Kütz.—L.
Itzigsohnii De Bary, var. **minus** West.—D, lat. cell 5·8–7μ, lat. oogonia 25 – 26μ.
macrandrum Wittr.—VL.
platygynum Wittr.—C.
****pusillum** Kirchn.—C, vegetative cells 3·3 × 12μ (average), oogonia 12μ broad, 14μ long.
****propinquum** Wittr.—VL.
punctato-striatum De Bary.—LG.
Rothii (Le Cl.) Pringsh.—VL, D.
undulatum (Bréb.).—A, Br, C, I.
***urbicum** Wittr.—B.
Several other sterile species from many localities.

Order CHAETOPHORALES.

Fam. **Herposteiraceae.**

Herposteiron confervicola Näg.—C, K.

Fam. **Ulotrichaceae.**

***Ulothrix aequalis** Kütz.—L; W, up to 18–20μ broad, 26–30μ long; C, B.
var. **catenaeformis** (Kütz.) Rabenh.—IT.

Ulothrix moniliformis Kütz.—I.

subtilis Kütz.—S, cell 8μ lat., 5μ long.; C.

var. **variabilis** (Kütz.) Kirchn.—L, C, Ac, I, Cl, B, W, CP.

var. **tenerrima** (Kütz.) Kirchn.—W, Mw.

tenuis Kütz.—C; D, 15–17μ broad, 4μ long, from several places.

zonata (Web. et Mohr) Kütz.—C, L, VL, Cl, Ac.

Hormospora ELLIPSOIDEA sp. nov.—H. lobulis subangustis, solitariis, et subflexuosis; cellulis approximatis sed demum subdistantibus, diametro circiter 1½-plo longioribus, polis rotundatis, 10·5–11·6μ long, 7·5–8·3μ lat., tubul. 15·5–16·5μ lat. D.

***Binuclearia tatrana** Wittr.—C, in many places, usually from 7–9μ broad; S; CP, up to 11μ broad; Cn.

Fam. **Chaetophoraceae.**

Chaetophora pisiformis (Roth) Ag.—C.

elegans (Roth) Ag.—C.

Myxonema amoenum (Kütz.) Hazen.—D.

protensum (Dillw.) Hazen.—SL.

nanum (Dillw.)—C.

fastigiatum (Kütz.) Hazen.—C, SL, LG, Ac.

tenue (Ag.) Hazen.—S, CP.

Fam. **Microthamniaceae.**

Microthamnion Kuetzingianum Näg.—C; D, 3–3·5μ broad, 14–17μ long.

Fam. **Trentepohliaceae.**

Trentepohlia Iolithus Wallr.—Cliffs of Croaghmore.

aurea (L.) Mart.—W, C, D, Cliffs of Croaghmore.

lichenicola (Ag.).—L, up to 10–12μ broad, zoosporangia 16–20μ.

Order ULVALES.

Fam. **Ulvaceae.**

Enteromorpha intestinalis (L.) Link.—C, frequent in quite fresh water.

Order SCHIZOGONIALES.

Fam. **Prasiolaceae.**

Prasiola parietina (Vauch.) Wille.—L, W, C.

Order MICROSPORALES.

Fam. **Microsporaceae.**

Microspora abbreviata (Rabenh.) Lagerh.—C, cells 11–12μ broad, 1½ times longer than broad, average size; Cn, breadth 10–11μ.

Microspora amoena (Kütz.) Lagerh.—L; C, 20-25μ broad; M, I.
var. **crassior** Hansg.—W, lat. 23-25μ; D.
var. **irregularius** W. & G. S. West.—Ac, K; C, in several places, 21-24μ broad.
floccosa (Vauch.) Thur.—W, C, D, Cr, Ac.
***fugacissima** (Roth) Rabenh.—W, D, L, C.
pachyderma (Wille) Lagerh.—C, in several places, average 13·3μ broad.
****stagnorum** (Kütz.)Lagerh.—W, 8·5-10μ lat.

Order CLADOPHORALES.

Fam. **Cladophoraceae.**

Cladophora crispata (Roth) Kütz.—L, W, C, DL.
flavescens Ag.—W, L, C, Cr.
glomerata (L.) Kütz.—Cliffs of Croaghmore, width 53-82μ, of branches towards the tips 24μ.
***Chaetomorpha sutoria** (Berk.) Rabenh.—C.
Rhizoclonium hieroglyphicum Kütz.—C; W, 13-15·5μ in diameter, 56 64μ long.

Order SIPHONEAE.

Fam. **Vaucheriaceae.**

Vaucheria spp.—Several, in different localities, but sterile. One from Clare Island averaged 61μ in thickness, another from Westport was from 100-110μ in diameter.

Order CONJUGATAE.

Fam. **Zygnemaceae.**

Sub-fam. Mesocarpeae.

Mougeotia viridis (Kütz.)—C, 8μ broad, 10 to 13 times as long, zygospore 30μ across the angles, 26μ across the middle.
gracillima (Hass.) Wittr.—C, lat. cell. 5·5-6μ, up to 136μ long: examples from other pools, 5-5·5 × 55-83μ; D, 6μ broad, spores 20μ across middle, 24μ across the angles.
elegantula Wittr.—D, 40-48μ long, 3·5-4μ broad.
parvula (Hass.) Wittr.—D, 8μ broad, zygospores 19μ, spherical.
spp., several others from many different localities, sterile.

Sub-fam. Zygnemeae.

***Zygnema anomalum** (Hass.) Cooke.—C, I, Cl, Cr.
cruciatum Ag.—Cr.
ericetorum (Kütz.) Hansg.—L, C, D.

Zygnema pectinatum Ag.—C, vegetative cells 35μ broad, 92μ long.

leiospermum De Bary.—C, breadth 18–19μ, 2–3 times longer, zygosp. 25 × 30 (-33)μ; S. W. of Dugort, 16–20μ broad, 32–48 (rarely 52)μ long, zygospores mostly spherical (sometimes ellipsoid), 24–27μ, mixed among sterile Spirogyra. (Plate I, fig. 3; Plate II, fig. 23.)

***Vaucherii** Ag.—AS.

var. **subtile** Rabenh.—D, cell. 13–15μ lat., 3–4-plo longioribus, The zygospores were as broad as the cells and sometimes a little broader, distending them laterally, usually 1½ times as long as broad.

***parvulum** (Kütz.) Cooke.—C.

Spirogyra condensata (Vauch.) Kütz.—C, lat. fil. 35–40μ, lat. zygosp. 31–37μ; W, lat. fil. 31·5–33·5μ, 48–64μ long, zygosp. 31–32 × 42–46μ; S, a form with sub-spherical zygospores, lat. fil. 34–41·5μ, zygosp. 36–39μ lat.

***flavescens** (Hass.) Rabenh.—C, VL.

***insignis** (Hass.) Kütz.—C, lat. cell. 24–32μ, 3–6-plo longioribus, zygosp. 31–32μ × 86–90μ.

longata (Vauch.) Kütz.—L; W, lat. cell. 23–27, circa 3-plo longioribus, zygosp. 28–32μ, lat. usque 56μ long.

porticalis (Vauch.) Cleve.—C, lat. cell. 36–43μ; W, lat. cell. 42–52·5μ, 2–3-plo longioribus, zygosp. 35–42 × 52–59μ.

***quadrata** (Hass.) Petit.—C, lat. fil. 19–22μ, saepe 12–16-plo longioribus, zygosp. 33–35 × 60–85μ; L, lat. cell. usque 31μ; CP, D.

***Weberi** Kütz.—VL.

tenuissima Hass.—D; C, sterile cells 8·5–11μ broad, 10 to 13 times as long.

nitida (Dillw.) Link.—D, cells average 108μ long × 72μ broad.

varians (Hass.) Kütz.—D, cells usually 1½ to 2 times longer than broad, 28–32μ wide, inflated on conjugating side, zygospores broadly elliptic to roundish, 28–31μ broad.

Fam. **Desmidiaceae.**

***Gonatozygon Brebissonii** De Bary.—W; L, forma 83 × 8·5–μ.

var. **laeve** W. & G. S. West.—C, 128–9 × 8·5–9μ, faintly punctate under high power.

var. **minutum** W. & G. S. West.—M, 65 × 5·8μ; Cr, 95 × 5·6μ.

Kinahani (Arch.) Rabenh.—S, 343 × 14μ; D, 250–256 × 152μ; near Slievemore, a small form, 152 × 10μ.

monotaenium De Bary.—W, Ac; C, small forms, 132 × 8·5μ.

Spirotaenia minuta Thur.—SW of D, 24 × 6·5μ.

obscura Ralfs.—D, 55 × 16·4μ.

bispiralis West.—W.

condensata Bréb.—C, 165 × 25μ; D, 212 × 20μ, a long narrow form, smaller forms down to 122 × 19μ with six turns of the spiral.

Mesotaenium chlamydosporum De Bary.—W; D, 29·7 × 11μ: in another place 23 × 11μ, 24 × 11·5μ, 25 × 12μ.

f. **minor**, W. & G. S. West.—W; D, 20 × 9μ.

De Greyi Turn.—L, 67–103 × 23–24μ; D; C, a short form intermediate between type and var. *breve*, 70 × 21μ.

var. **tenuis** W. & G. S. West.—D, an elongated form, 105 × 15μ.

endlicherianum Näg.—S, 25 × 7·5μ; C, 29·7 × 9·2μ, another gathering 25·3 × 7·7μ; D, 25 × 8·3μ; Cr, 33 × 10μ.

var. **grande** Nordst.—M, 53–54 × 13·3μ.

macrococcum (Kütz.) Roy. & Biss.—L, 37 × 15μ; C, 37·15 × 5·4μ; VL; CP, 35–35·5 × 14–14·5μ.

var. **micrococcum** (Kütz.) W. & G. S. West.—S, 19 × 8·3μ; C.

Cylindrocystis Brebissonii Menegh.—C, AS, S; SL, 58 × 18μ; CP, L, B, W, M; D, up to 61 × 18·5μ.

var. **minor** W. & G. S. West.—M; D, 25 × 11·6μ, short forms, in another locality 41 × 12·5μ, some thick forms 29 × 14μ.

crassa De Bary.—IT, SL, L, C, CP; D, 47 × 23·4μ, in one place thick specimens 47·5–48·3 × 25 (–28)μ, also narrower forms 36·5 × 19·2μ.

diplospora Lund.—C, 68 × 29μ, also from another place small forms 50 × 21μ; SL, CI; CP, average size of some 65 × 28·7μ, others 64 × 24μ; D, 59 × 24μ, also 66 × 26μ.

Netrium Digitus (Ehrenb.) Itzig. & Rothe.—C, up to 360 × 98μ; D, M; IT, up to 90μ lat.; LG, I, SL, B, W, CP.

interruptum (Bréb.) Lutkem.—W, C.

var. **sectum** W. & G. S. West.—W.

Naegelii (Bréb.) W. & G. S. West.—L.

oblongum (De Bary) Lutk.—C.

var. **ANGUSTATUM** var. nov.—Var. cellulis distincte angustioribus quam in forma typica, 123 × 23μ. C, in sphagnum pool.

var. **BREVIUS**, var. nov.—Var. cellulis diametro 3½-plo longioribus. C, 86 × 25μ, also 86 × 25μ in another locality.

var. **cylindricum** W. & G. S. West.—D, 89–108 × 22·5 23μ, a large form; near L. Keel, Achill, 63–70 × 18·3μ; C, 79 × 18μ.

Penium cruciferum (De Bary) Wittr.—M, 15 × 8·4μ: in a different gathering in the same district up to 27 × 12·5μ; W, 17 × 9·8μ.

Penium curtum Bréb., f. **intermedia** Wille.—C, 39·5-40·5 × 15·4-16·5μ.

cucurbitinum Biss.—M, L; D, 60 × 26·6μ.

f. **minor** W. & G. S. West.—C, SL, M, D.

Cylindrus (Ehrenb.) Bréb.—C, 44 × 11-11·5μ, common among *Utricularia minor*; D; W, 35 × 11μ, the forms seemed to have smaller granules than usual, the newly formed cell-walls were colourless, another gathering measured 29-42 × 10·6-12μ.

didymocarpum Lund.—C, 38-39 × 13-13·5μ, also 35 × 14·3μ.

exiguum West.—Cr, 17 × 6μ.

f. **major** W. & G. S. West.—S, 44-44·5 × 10·5-10·8μ.

inconspicuum West.—C.

Jenneri Ralfs.—D.

margaritaceum Ralfs.—C.

mooreanum Arch.—W.

minutum (Ralfs) Cleve.—W; S, 133 × 13·3μ; D, 132 × 14μ, 152 × 13·2μ, 119 × 14μ.

var. **tumidum** Wille.—D, 100 × 16μ.

Navicula Bréb.—M, W; C, 48 × 14μ, a rather long form occurred in one place, 74 × 15μ; L, 46 × 12·5μ; D, 49 × 12·6μ.

phymatospermum Nordst.—D, 33 × 15μ; M, 30 × 14·2μ; CP; C, 35·5 × 17·5μ.

polymorphum Perty.—S, 55 × 24·2μ; D, 50 × 24μ, 60 × 25μ.

spinospermum Josh.—C, 31 × 14μ, 28·4 × 12·5μ; S, 34 × 15μ, also 26·7 × 13·4μ; D, 27-32 × 13-14μ.

spirostriolatum Bark.—W, LG; D, in several places, a short form 117 × 23·3μ, others averaging 140 × 25μ.

truncatum Bréb.—W; S W of D, 39 × 12·5μ.

Roya Pseudoclosterium (Roy.) W. & G. S. West.—D, 86-118 × 2·5-3μ.

Closterium abruptum West.—C, M; L, 155 × 15·8μ; Cr, 158 × 15μ, a little more curved than type. Some forms from Clare Island were a little longer than the type with narrower apices, average size 184 × 15μ.

acerosum (Schrank) Ehrenb.—L, 320-323 × 33-34μ, 21° of arc; S.W. of D, 507 × 44μ, 24° of arc, also 490 × 43·8μ, 27° of arc.

aciculare T. West, var. **subpronum** W. & G. S. West.—W, 498 × 6μ.

acutum Bréb.—W; C, from several places.

var. **linea** (Perty) W. & G. S. West.—W; D, average size 134 × 3·7μ.

angustatum Kütz.—W, 386 × 20μ.

var. **ASPERUM**, var. nov.—Var. costis omnibus granulatis, granulis subdistantibus, apicibus cellularum laevissime subrecurvatis. W, 457 × 22μ. (Pl. I, fig. 5.)

Closterium Archerianum Cleve.—L, I, W; C, a form 285 × 21μ, not more than 110° of arc.

attenuatum Ehrenb.—W, 597 × 40μ; M.

calosporum Wittr.—C, CI; L, 148 × 11·6μ, 114° of arc.

Cornu Ehrenb.—C, LG, W; L, 148 × 6·3μ.

var. **ARCUM** var. nov.—Var. cellulis curvatioribus usque 85° arci, subparallelibus solum circa medium, 138 × 8·5. LG.

costatum Corda.—C, average size 355 × 52μ, 80° of arc: in one place the examples were rather narrow, 340 × 40μ; IT, CI, W.

Cynthia De Not.—W, 156 × 16μ average, 124° of arc; M.

Dianae Ehrenb.—C; M, 250 × 26·5μ, 128° of arc; IT, L, LG, AS; CI, 285 × 29·1μ; D, VL, Cr; I, some minor forms also from this locality, 163 × 14·5μ.

var. **arcuatum** (Bréb.) Rabenh.—C, between apices 128 × 16·5μ, others 162–166 × 18, 133° of arc, a form approaching type, but shorter: another gathering, 201–224 × 19–21μ; CI, 168 × 21·6μ, 134° of arc; W, 137 × 18·3μ; L, 120 × 16·6μ, 150° of arc.

didymotocum Corda.—C; M, 422·5 × 47·5μ, 425 × 48μ, 428 × 46μ, 345 × 42·5μ, 375 × 45μ, breadth near apices 16–20μ, breadth at 20μ from apex 25–28μ, 30–37° of arc; W.

***eboracense** Turn., var. **ACHILLENSE** nov. var.—Var. cellulis semper majoribus quam in forma typica, margine ventrali leviter sed distincte tumido ad partem mediam. D; S, 262 × 61μ (the last measurement was the most constant, 270 × 69μ, 257 × 61μ, 255 × 57·5μ, 290 × 63μ, 287 × 64μ). (Pl. 1, fig. 13, Pl. 2. fig. 16 (poles).)

Ehrenbergii Menegh.—D, 353 × 56μ; C, 348 × 73μ; from a pool on Croaghmore a large number of examples were measured: they varied as follows:—353–743μ long by 56–106μ wide; S, IT, I, AS, W; L, short forms, 254 × 66μ.

gracile Bréb.—L, W; C, average size 172 × 6·6μ.

var. **tenue** (Lemm.) W. & G. S. West.—W; M, 74 × 3·3; S. W. of D, 82 × 4μ.

incurvum Bréb.—CI, 52 × 10μ, 185° of arc; L, 49 × 9·7μ, 61 × 9·6μ, 50 × 10μ.

intermedium Ralfs.—C, 260 × 22·5μ, 224 × 22μ, 294 × 21·5μ, 33–36° of arc: from another place, 250–260 × 17·5 – 20μ, 33° of arc; M, L, W; D, 224 × 16μ; Cn, some peculiar small forms, 188–228 × 19–19·5μ.

var. **hibernicum** West.—W.

Closterium Jenneri Ralfs.—C, M, VL, CI, W; Cr, 84×11–12μ.

var. **HIBERNICUM**, var. nov. — Var. cellulis longioribus angustioribusque quam in forma typica, et minus curvatis. Long. inter apices 116μ, lat. 11μ, lat. prope apices, 4–5μ, 120° of arc. W.

juncidum Ralfs.—W, 110×9μ, 206×10μ, and 165×8μ from different gatherings; D, 268×8μ.

var. **elongatum** Roy & Biss.—A little shorter than R. & B.'s variety, 342×12μ.

var. **brevior** Roy.—194×14μ.

Kuetzingii Bréb.—L, abundant in several places, 347×17μ; SL, abundant in the plankton, average size 417×17μ.

Leibleinii Kütz.—C, W; L, 157×23μ, 135° of arc; D. In one pool in Clare Island among *Utricularia minor* and *Batrachospermum vagum*, a small very arcuate form occurred without ventral inflation, 101×17·5μ, 170° of arc.

var. **OCCIDENTALE** var. nov.—Var. cum parte mediana marginis interioris subrecta, id est, cellula sine inflatione centrali, 146–158×20·6–21·7μ. L; DL, 153–158×25μ, 175° of arc; W, 172×22μ, 140° of arc, a form with middle of inner margin distinctly, though very slightly, concave; W, 137×18·3μ, 138° of arc; D.

***Libellula** Focke.—W.

var. **interruptum** W. & G. S. West.—M.

lineatum Ehrenb.—C, a small form, 356×18·7μ, 40° of arc: from another place, large forms, 573×30μ, 34° of arc; M, 45–47° of arc; W, a small form 334×16μ, 40° of arc.

Forma brevior, striis delicatissimis. A shorter form with pale yellowish-brown cell-wall. I; M, 435×32μ, 45–47° of arc.

Lunula (Müll.) Nitzsch.—C, B, L, I, W; D, 657×116·6μ; SL, 557×85μ. (Pl. 2, fig. 15 (form of poles)).

moniliferum (Bory) Ehrenb.—W; L, 269×43μ, 84° of arc; C, large much curved forms, 378–390×63–66μ, 140° of arc.

parvulum Näg.—C, in one locality small forms 90×12μ, 132° of arc: in another place, 132×11μ, 120° of arc; M, IT; L, 125×13·6μ; W, D; I, various forms, some 141–145×12·5μ, 122° of arc, near apices 4–5μ; K.

var. **angustum** W. & G. S. West.—C, 91–101×7–8μ, 125° of arc; I, 120° of arc; C.

praelongum Bréb., f. **brevior** West.—C, 360×16μ: from another locality 220×13μ: none of the examples had as long a recurved apex as is usually figured.

Closterium pronum Bréb.—W; C, 348–380 × 10·5–11μ.

f. **BREVIUS** f. nova.—Cellulis semper distincte brevioribus, 222–250 × 8·4–9μ. C.

pritchardianum Arch.—D, 462 × 30μ, 358 × 30·5μ, 343 × 30μ; C, large forms, 495 × 51μ.

Pseudodianae Roy.—M; C, 203 × 14μ; CI, 193 × 12·5μ; W, 164 × 12μ, 98° of arc: also a smaller form 155 × 11μ, 84° of arc. A small form was seen from Clare Island, 130 × 9·6μ.

Ralfsii Bréb.—L, 382–384 × 38–39μ; C, 251 × 42μ, a short form.

var. **hybridum** Rabenh.—W, 316–384μ, average breadth 32μ; Cr, 390 × 28μ.

rostratum Ehrenb.—L, AS, M, D; C, 330 × 25μ, 343 × 26·5μ.

var. **brevirostratum** West.—M, L; C, 248 × 20μ average.

setaceum Ehrenb.—I, CI; B, 11–12μ broad; Cr, 320 × 8·5μ.

striolatum Ehrenb.—W, 253 × 40μ, 38° of arc; L, very variable, short forms 228 × 38μ.

subulatum (Kütz.) Bréb.—C, 215 × 10μ.

***tumidum** Johnson.—C, 106 × 17·6μ, a form with the ventral margin almost straight in the middle part.

Toxon West.—C; W, 206 × 10μ.

var. **VALIDUM** var. nov.—Var. cellulis duplo crassioribus quam in forma typica, 250–260 × 17·5–20μ. C. (Pl. 1, fig. 6.)

turgidum Ehrenb.—C, W.

Ulna Focke.—D, 410 × 15μ, breadth near apices 11μ; C, various lengths, 225, 275, 285, 300, 310, 432·5, by 15–16·5μ in breadth; CP, 295 × 22μ.

Venus Kütz.—C, B; W, 55 × 6·6μ, 165° of arc; M, 80 × 9·8μ, 138° of arc.

Docidium baculum Bréb.—C, W.

Pleurotaenium coronatum (Bréb.) Rabenh.—IT; C, up to 464μ long and 38μ wide.

var. **fluctuatum** West.—SL, 575 × 54μ, apex 50μ.

Ehrenbergii (Bréb.) De Bary.—M, average size 448 × 24μ at middle; VL, IT, L, W, CI; C, 319 × 27·5μ (just above the base of semicell); Cr, 393 × 40μ, specimens up to 455μ long.

var. **granulatum** Ralfs.—Cr, 240 × 17μ.

Trabecula (Ehrenb.) Näg.—W.

f. **clavata** (Kütz.) W. & G. S. West.—W; C, 353 × 33·5μ.

var. **rectissimum** W. & G. S. West.—C, in Creggan Lough, a form with practically parallel sides, 418 × 20μ.

Pleurotaenium truncatum (Bréb.) Näg.—L; Cr, 412×42μ; W; C, 425×56μ.
var. **Farquharsonii** (Roy and Biss.) W. & G. S. West.—L, 252×37·5μ.

Tetmemorus Brebissonii (Menegh.) Ralfs.—S, 145×32μ; M, I, C; D, 151×33μ; CP; W, 100×26μ. (Plate I, fig. 8.)
var. **minor** De Bary.—C; D, 70×20μ, 62×16μ, 67×18μ.

granulatus (Bréb.) Ralfs.—C; D, 160 × 30μ; IT, SL, L, CI, W, B, CP.

laevis (Kütz.) Ralfs.—AS, CP; D, 72×18μ; C, 82×21μ, 75×20·7μ; CI, W, VL; S, 80×19μ. This was with zygospore S. of Dugort. ends retuse, sides almost straight (slightly convex), greatest length and breadth 71×47μ. (Pl. 1, fig. 10.)

minutus De Bary.—W, LG; L, average size 57 × 17·5μ; D, 58×19μ, also 62–65×18·3μ from another gathering.

Euastrum ampullaceum Ralfs.—C.

affine Ralfs.—W.

ansatum Ralfs.—C, M, IT, L, W, VL, Cr; D, 76×39μ, 78×35μ.

bidentatum Näg.—IT, L; D, 52·5–58×35–36μ, frequent; W, frequent; B, VL, S; C, common in many places, 50×36μ, also 55×37·5μ; CP; M, 46 × 34μ; Cr.

binale (Turp.) Ehrenb.—C, 18–20×14–16μ, also 14·3×11μ; W, Cr, C, P, D.
f. **secta** Turn.—D, a small form, 16×11μ.
f. **Gutwinski** Schmidle.—C, 23·4×17μ (average size); W, CP, Cn; D, 26·6–29 × 20–21μ.
var. **subelobatum** West.—C.
var. **retusum** West.—C.
f. **hians** West.—IT, B, I, LG, M.
f. **minor** West.—C, 10–12μ long, 9–11μ wide; D, 11–11·5μ broad, 11–12μ long.

crassicolle Lund.—C.

crassum (Bréb.) Kütz.—M, LG, W; D, 165 × 78–81μ.

crispulum (Nordst.) W. & G. S. West.—C.

cuneatum Jenner.—D, 138 × 65μ, isthmus 18μ, a large form.

denticulatum (Kirchn.) Gay.—C, 24 × 18·6μ; M, IT, L, W, S, Cn.

Didelta (Turp.) Ralfs.—C, W; CP, 154 × 86μ.

dubium Näg.—C, up to 36 × 21·6μ; L.

elegans (Bréb.) Kütz.—C, 27·5 × 18μ; IT, SL, LG, I, B, W, D, VL; Cr, 30 × 19μ; M, 29 × 17·5μ.

erosum Lund.—C.

gemmatum Bréb.—W.

Euastrum insulare Wittr.—W, 17·5 × 11·5μ; M, LG; SW of D, 29 × 19μ, in one place a short wide form occurred 16 × 14μ.

var. **PARVUM**, var. nov.—Var. cellulis similibus ad formam typicam sed parvioribus et relative brevioribus, lobulis lateralibus minus retusis, 12·5 × 10μ. D; Cr, 14–17 × 12–13μ.

montanum W. & G. S. West.—C; LG, in this locality the examples had more pyramidal semicells than in the type, causing the apices to be relatively narrower; D, 27·5 × 20·5μ, width of apex 12·5μ.

oblongum (Grev.) Ralfs.—C, IT, W; M, 174 × 89μ; Cr, 166 × 83μ; D. (Plate I, fig. 1.)

var. **cephalophorum** West.—Cr, 158 × 93μ.

pectinatum Bréb.—C, W, M, VL, IT, LG, D.

var. **inevolutum** W. & G. S. West.—C.

pulchellum Bréb.—C, 38 × 33–36μ; M, 37 × 28μ.

var. **retusum** W. & G. S. West.—C.

rostratum Ralfs.—C; L, 52 × 30μ; W.

sublobatum Bréb.—IT.

Turnerii West.—SL; Cr, 36–37·5 × 28·3μ.

***validum** W. & G. S. West.—M, 26·6 × 23.

ventricosum Lund.—M, W.

verrucosum Ehrenb.—W, D.

var. **reductum** Nordst.—K, LG.

Micrasterias apiculata (Ehrenb.) Menegh., var. **fimbriata** (Ralfs) Nordst.—C; W.

Crux-melitensis Ralfs.—W; Cr, 106 × 93μ, width of polar lobe 24·5μ.

denticulata Bréb.—C, 224 × 194μ, 222 × 192μ, 220 × 196μ; W; CP, the following are measurements of some of the specimens in μ:—232 × 224, 238 × 212, 220 × 189, 224 × 224 (an example as broad as long), 220 × 200, 216 × 182, 240 × 196, 228 × 208, 208 × 186. (Pl. 1, fig. 14, various forms of polar lobes; Plate II, figs. 17, 18).

var. **angulosa** (Hantzsch) W. & G. S. West.—C, 275 × 215μ.

Jenneri Ralfs.—W; D, 171 × 123μ.

var. **simplex** West.—D, 170 × 117μ.

oscitans Ralfs, var. **mucronata** (Dixon) Wille.—W; D, 171 × 123μ, rare.

pinnatifida (Kütz.) Ralfs.—W.

papillifera Bréb.—SL, W.

rotata (Grev.) Ralfs.—W.

Sol (Ehrenb.) Kütz. (*M. radiosa* Ralfs).—W.

thomasiana Arch.—AS; D, 226-230 × 175-160μ.

truncata (Corda) Bréb.—C, 106 × 103μ, 114 × 106μ; M, I, W; CP, 132 × 110μ and 145 × 121μ; D.

Cosmarium abbreviatum Racib.—VL.

var. **planctonicum** W. & G. S. West—Plankton of LG.

f. **minor** W. & G. S. West.—W.

amoenum Bréb.—W; From several places in C, from 50×27 up to $59 \times 31\mu$; D, $43{\cdot}5 \times 26\mu$, $48 \times 31\mu$, $46{\cdot}6 \times 30\mu$, $52{\cdot}6 \times 28\mu$.

anceps Lund. var. **crispulum** Nordst.—L, $18{\cdot}3 \times 11{\cdot}6\mu$.

var. **TATRICOIDES** var. nov.—Var. cellulis relative latioribus, cum isthmo ancipitis sed forma tatrici, cytiodermate glabra. C, $33 \times 21\mu$.

angulosum Bréb. var. **concinnum** (Rabenh.) W. & G. S. West.—W., CP, D, L; C, $12 \times 10{\cdot}3\mu$, in several places. In one of the collections from Clare I. a large form was seen $21 \times 18{\cdot}2\mu$.

***binum** Nordst.—W.

bioculatum Bréb.—W.

f. **depressa** Schaarschm.—S.W. of D, a small form 10μ long, 11μ wide.

bipapillatum W. & G. S. West—W.

bipunctatum Borg.—W.

Blyttii Wille.—SL, W; C, $16 \times 14\mu$.

Boeckii Wille.—L, D, VL, M, SL; C, $38 \times 34\mu$.

Botrytis (Bory) Menegh.—C, L, CI; W, $55 \times 50\mu$; DL, SL, LG, VL, Cr; CP, rather large and wide examples, $80 \times 68\mu$.

var. **mediolaeve** West.—C, $65\text{-}67 \times 51\text{-}53\mu$, also in another locality $59 \times 49\mu$; W.

Brebissonii Menegh.—C, $106 \times 76\mu$; M; W, $100 \times 68\mu$.

Broomei Thw.—W.

caelatum Ralfs.—C, $48 \times 44\mu$; W.

var. **spectabile** (De Not.) Nordst.—D, $46 \times 40{\cdot}5\mu$.

circulare Reinsch.—W.

f. **minor** W. & G. S. West.—W.

conspersum Ralfs.—W.

var. **latum** (Bréb.) W. & G. S. West.—Cr, $80 \times 71\mu$.

contractum Kirchn.—M, a form between the type and var. *ellipsoideum* (Elfv.) W. & G. S. West.

corriense Bissett.—Cr, $39 \times 29\mu$.

crenatum Ralfs.—L; D, $21{\cdot}5 \times 19\mu$.

Cucumis Corda.—W; M, rather broad forms, $65 \times 43\mu$; I, B, L; C, from one locality on dripping rocks among Vaucheria a broad form occurred $62 \times 45\mu$: from L. Creggan $65 \times 37{\cdot}5\mu$, isthmus $20{\cdot}8\mu$; D, a small form $52{\cdot}6 \times 28{\cdot}3\mu$.

Cosmarium Cucurbita Bréb.—A, S; D, 43 × 21μ; M, IT, C, LG; SL, 46 × 21·7μ; CP, Cn; L, 46 × 22μ.

Debaryi Arch.—W.

depressum (Näg.) Lund. (*C. Scenedesmus* Delp.).—C, IT, VL, SL, W.

var. **reniforme** W. & G. S. West.—W.

var. **MINOR** var. nov.—Var. cellulis minoribus, long. 25μ, lat. 26μ, also 24·1 × 25μ. Cr; C, a wider form 23·3μ long, 31μ wide.

***decedens** (Reinsch.) Racib.—SL.

difficile Lutk.—VL; M, 31 × 19·5μ; W.

var. **sublaeve** Lutk.—C, 35 × 20·8μ; W, L; M, 32 × 20μ.

elegantissimum Lund. var. **minor** West.—D.

exiguum Arch.—C, 26–26·5 × 12μ; W, 27–28 × 15–16μ.

var. **subrectangulum** W. & G. S. West.—Cr, 11·7 × 9μ, a small form.

formosulum Hoffm.—L, plankton of Lough Roonah near L; CI, D, VL; C, 47 × 40–43μ, also from another place 43–44 × 37–40μ; some examples were near the variety *Nathorstii*; W, up to 52·5 × 48μ; K.

furcatospermum W. & G. S. West.—C, 21 × 19μ, forma cum sinu angustiori.

galeritum Nordst.—M, W; C, 52·5 × 40μ.

globosum Buln.—W.

granatum Bréb.—L, W, VL; C, 29 × 18–20μ; Cr, 33 × 21–22μ.

var. **subgranatum** Nordst.—L, W.

humile (Gay) Nordst.—W, 14 × 12μ; D, Cn, VL, Cr.

var. **substriatum** (Nordst.) Schmidle.—C, 17·5 × 15μ; L, K, SL, I, LG, C, I, W, D.

var. **glabrum** Gutw.—W.

var. **striatum** (Boldt.) Schmidle.—W.

holmiense Lund., var. **integrum** Lund.—D.

Hammeri Reinsch.—M, W, C.

var. **homalodermum** (Nordst.) W. & G. S. West.—W.

isthmium West.—W.

impressulum Elf.—C, VL, L; W, 28 × 20μ, also 24 × 17·5μ; DL, D; CP, 21·6 × 15·8; Cr, 21 × 15μ.

latum Bréb.—Cr, 63·5 × 75μ.

laeve Rabenh.—C, M, L, VL, D.

var. **octangulare** (Wille) W. & G. S. West.—L, CI, Cr, W; C, 22·5 × 16·6–17μ; K.

var. **septentrionale** Wille.—C, L, D.

var. **cymatium** W. & G. S. West.—C.

margaritiferum (Turp.) Menegh.—C, 43·5 × 38μ; M, SL, W, CP.

Cosmarium Meneghinii Bréb.—C, 15·5–16 × 13–13·4μ; CI, W; D, 16 × 12·6μ; VL; DL, 16·6 × 13·3μ.

var. **nanum** Wille.—C, 16·6 × 13·5μ, a small form.

moniliforme (Turp.) Ralfs.—C, SL, W.

f. **panduriformis** Heimerl.—D, W.

monomazum Lund. var. **polymazum** Nordst.—Cr.

nitidulum De Not.—S.W. of D, a small form, 27 × 21·6μ.

notabile Bréb.—L.

f. **minor** Wille.—W.

nymannianum Grun.—C, among *Sphagnum cuspidatum*, 46·6 × 37·5μ, also among Hypnum, 44–47·3 × 35–38·5μ.

obliquum Nordst.—W; D, 15 × 11·6μ.

ochthodes Nordst.—C, 70 × 55μ, also in another place 84 × 62–64μ, also 91 × 63μ, 68·5 × 52·5μ, 72·5 × 56μ; D.

ornatum Ralfs.—C, L, W.

pachydermum Lund.—C, 81 × 66μ; B.

perforatum Lund.—W.

perpusillum West.—CI.

Phaseolus Bréb.—W.

var. **elevatum** Nord.—Cn, at above 2100 feet, average size 27 × 26μ.

plicatum Reinsch.—D, 48·5 × 26·6μ.

var. **hibernicum** West.—SL.

portianum Arch.—W, CP.

var. **nephroideum** Wittr.—W.

praemorsum Bréb.—W.

pseudoconnatum Nordst.—W.

pseudoexiguum Racib.—C, 25–26 × 12–13μ, also 23 × 10·5μ from another place among *Utricularia minor*; D, 24 × 11μ, 25·5 × 11μ, 25 × 12μ.

pseudopyramidatum Lund.—M, W.

pseudonitidulum Nordst.—SL, C.

var. **validum** W. & G. S. West.—D, a small form, 51 × 42μ; C, 52·5 × 40μ.

punctulatum Bréb.—L, M, IT, I, CI, W, VL.

var. **subpunctulatum** (Nordst.) W. & G. S. West.—DL, L, M; C, form *a* W. & G. S. West frequent, 28–31 × 26–30μ; W, D; Cr, 28·3 × 26μ.

pygmaeum Arch.—C, IT, L, SL, DL, D, W.

pyramidatum Bréb.—M, SL, I; C, a small form, 57 × 42μ; W, LG; D, small forms 68·5 × 45μ average; Cr.

Cosmarium quadratum Ralfs.—W, D; Cr, 57·5 × 33·5μ, also 60 × 31μ.

quadrifarium Lund.—W, 51–55 × 48–50μ.

quadrum Lund.—Cr, 72 × 70μ, 66 × 66μ, 63 × 68 (broad)μ, 78 × 60μ.

***Quassilus** Lund.—W.

quinarium Lund.—Cr, 37·5 × 31μ.

Ralfsii Bréb.—W, SL.

var. **ROTUNDATUM** var. nov.—Var. lateribus semicellularum rotundatis, angulis basalibus interdum levissime productis, sinu subclauso, 110 × 100μ, isthmus 24μ. W. (Pl. II, fig. 19.)

var. **montanum** Racib.—D, 126 × 98·5μ, a form with the sinus open to its apex. D. (Pl. II, fig. 20.)

rectangulare Grun.—C, common among *Utricularia minor*, 31-36·5 × 26–30μ; IT, LG, I, CP, D.

radiosum Wolle.—W.

Regnellii Wille.—C, 4·6μ long, 13·4μ wide: from another place 17 × 14·5μ, 18 × 14·7μ, 15·5 × 13μ; L, CI, B, DL, D.

Regnesi Reinsch.—I, W; C, 8 × 8μ; D, 8·2 × 8·2μ.

var. **tritum** West.—W.

reniforme (Ralfs) Arch.—C, 48 × 44μ, isthmus 13·5μ; L, LG, W; Cr, 50 × 48μ; M; K, 52·5 × 47·5μ.

***sexangulare** Lund. f. **minima** Nordst.—C, CI, IT.

speciosum Lund.—C.

var. **biforme** Nordst.—D.

sphagnicolum W. & G. S. West.—C, 9μ long, 11μ wide; DL, Cr; D, 10μ long, 12·5μ wide.

sphalerostichum Nordst.—C, M, W, D, B, W, SL.

subcostatum Nordst.—C, 25 × 23μ, the smaller forms approaching f. *minor*.

f. **minor** W. & G. S. West.—K, 24 × 22·4μ.

subcrenatum Hantsch.—C, from several places, the small forms 26 × 22μ, the largest examples measured 33·5 × 30μ; D, 25·5 × 22μ.

var. **divaricatum** Wille.—W.

***subcucumis** Schmidle.—CI; B, 70 × 45μ.

subspeciosum Nordst.—W.

subundulatum Wille.—W.

subtumidum Nordst.—C, L, LG, W, D.

var. **MINOR** var. nov.—Var. cellulis minoribus quam in forma typica, 26 × 20μ. C.

subprotumidum Nordst.—C.

var. **Gregorii** (Roy and Bissett) W. & G. S. West.—Plankton of RL; L, CI, W, SL; plankton of LG, 31 × 29μ.

Cosmarium succisum West.—CI, W.

synthlibomenum West.—SL.

tatricum Racib.—Cn, very rare, 49 × 27μ, width of apex 19μ.

tetraophthalmum (Kütz.) Menegh.—C, 90 × 68μ; D, W, SL; W, up to 106·6 × 72μ; M; W, a form of this occurred near Westport with the upper two-thirds of the semicell almost semicircular; Cr, a short broad form, 80 × 58·5μ.

Thwaitesii Ralfs.—Cr, 61 26·5μ.

tinctum Ralfs.—C, M, IT, W.

truncatellum (Perty) Rabenh.—W.

tumidum Lund.—C, 32·5 × 28μ; W.

Turpinii Bréb.—Plankton of L. Roonah near L; W, small pool connected with a spring, 72·5 × 56μ.

var. **eximium** W. & G. S. West.—W.

***umbilicatum** Lütk.—L, 20 × 16·6μ.

undulatum Corda.—IT; W, 57 × 38μ.

var. **minutum** Wittr.—C, 21 × 19μ; W.

viride (Corda) Joshua.—C, 52·5 × 27·5, very rare, among *Utricularia minor*.

venustum (Bréb.) Arch.—C, W, Cn.

Xanthidium antilopaeum (Bréb.) Kütz.—C, AS; W, 71μ long, 51μ broad without spines, 88μ with spines; Cr.

var. **depauperatum** W. & G. S. West.—Plankton of SL.

armatum (Bréb.) Rabenh.—C, M; SL, a form from this locality with three-lobed processes approached var. *fissum* Nordst.

concinnum Arch., var. **boldtiana** West.—W.

cristatum Bréb.—C, W.

fasciculatum Ehrenb.—C, W.

Smithii Arch.—C, 26–29 × 23·5–26μ, common among *Utricularia minor*; D.

variabile (Nordst.) W. & G. S. West.—C, very frequent; I, SL, W, CP; D, 24 long × 23μ broad without spines, spines 2–3μ.

robinsonianum Arch.—C, 27 × 26μ without spines; D, 23·5 × 21·7μ without spines.

Arthrodesmus convergens Ehrenb.—C, IT, SL; W, 45μ long, 48·4μ broad without spines, 65μ broad with spines; Cr; M, 50μ long, 68μ broad with spines, 56μ without spines.

bifidus Bréb. var. **truncatus** West.—D.

controversus W. & G. S. West.—W, D; C, length 11·6μ, breadth with spines 12·3μ.

Arthrodesmus Incus (Bréb.) Hass.—C, IT, M, W, VL.

var. **indentatus** W. & G. S. West.—C, W.

var. **Ralfsii** (West) W. & G. S. West.—D, LG; C, some forms with markedly divergent spines.

f. **latiuscula** W. & G. S. West.—D, length 16·5μ, breadth with spines 27μ, isthmus 8μ.

f. **minor** W. & G. S. West.—C, L, W, M. The average length of examples in the boggy pools of Clare Island was 14μ; D, some very small examples, 11 × 11μ without spines, breadth with spines 16μ, isthmus 4·5μ.

octocornis Ehrenb.—C, LG, W, Cn.

f. **impar** Jacobsen.—C.

Staurastrum anatinum Cooke & Wille.—SL, W.

aciculiferum (West) Anders.—C, 25-29μ long, 28-33μ broad with processes; D.

aculeatum (Ehrenb.) Menegh.—C, W.

alternans Bréb.—W, M, VL; Cr, 21·5μ long, 25μ wide.

apiculatum Bréb.—L, C; Cr, 19 × 20μ.

Arctiscon Lund.—W.

arcuatum Nordst.—W.

asperum Bréb.—C.

Avicula Bréb.—C, the cell walls were delicately and regularly punctate, 36–37μ long, 26·5–27μ wide without processes, 37μ wide with processes; W.

var. **subarcuatum** (Wolle) West.—C, L, LG, VL, W, D.

bienianum Rabenh.—W.

var. **ellipticum** Wille.—W.

brevispinum Bréb.—W; SL, 46·6 × 40·8, a rather long form.

Brebissonii Arch.—L, VL.

***cosmarioides** Nordst.—C, D. New to Ireland, very rare in Great Britain.

controversum Bréb.—C.

crenulatum (Näg.) Delp.—C.

cuspidatum Bréb.—L, VL, W; C, 26–31μ long × 25–29 μ wide; D.

var. **maximum** West.—Plankton of LG, and of S L; K.

curvatum West.—C.

cyrtocerum Bréb.—IT, W.

dejectum Bréb.—C, K, L, SL, W, D, LG.

denticulatum (Näg.) Arch.—Plankton of LG.

Dickiei Ralfs.—W.

f. **punctata** West.—W.

Staurastrum dilatatum Ehrenb.—C, average size 20·8μ long, 21·5μ broad; D, W, DL, LG; Cr, 23μ long, 24μ broad.

*__disputatum__ W. & G. S. West.—W.

*__erasum__ Bréb.—Plankton of LG, SL, and of RL.

__furcatum__ Bréb.—W.

var. __reductum__ W. & G. S. West.—C.

__furcigerum__ Bréb.—L, W.

__gracile__ Ralfs.—C, L, Ac, K, W, CP, Cr.

var. __nanum__ Wille.—W.

var. __cyathiforme__ W. & G. S. West.—Plankton of LG, breadth with processes 69μ, length 40μ; C; SL, up to 88μ wide.

__hexacerum__ (Ehrenb.) Wittr.—C, L, DL, D, Cr, W.

__hirsutum__ (Ehrenb.) Bréb.—SL, M, L; D, 31·6 × 25–26μ; C, average size 44 × 44μ; CP, 46μ long.

__inconspicuum__ Nordst.—C.

__inflexum__ Bréb.—C, small forms 25·5μ long; IT, L, VL, Cr; LG, 29–30μ broad with processes, 21μ long, a small form.

__jaculiferum__ West.—K, D.

f. __biradiata__ West.—Plankton of LG and of SL.

__laeve__ Ralfs var. __Clevei__ Wittr.—D.

__longispinum__ Bailey.—SL, length 98μ, breadth with spines 117μ.

__Manfeldtii__ Delp.—Ac.

__margaritaceum__ (Ehrenb.) Menegh.—C, 26–27 × 19–20μ, mostly tetraradiate; LG, both tri- and tetra-radiate; W, SL, M, CP; D, 31 × 21·5–25μ.

__Meriani__ Reinsch.—C, 34 × 25μ, a short form with dilated apices.

__monticulosum__ Bréb.—C.

__muticum__ Bréb.—C, W, D; Cr. 41·5 × 33·5μ.

f. __minor__ Rabenh.—C, 15μ long, 15·8μ broad; among *Utricularia minor*: in another locality among submerged Hypnum, the average size was 16μ long and 15·5μ broad; D, very small forms in several places, not more than 14·3 × 12·5μ, in another gathering 18 × 16μ.

__muricatum__ Bréb.—IT, C; W, 50 × 37μ without spines.

__O'Mearii__ Arch.—D, C.

__orbiculare__ (Ehrenb.) Ralfs, var. __hibernicum__ (West) W. & G. S. West —W.

var. __Ralfsii__ W. & G. S. West.—IT, L; W, up to 42 × 33μ; C, 33 × 29μ, another gathering average size 29·5 long, 26·5 broad; D, 30·8 × 27·5μ, and 31 × 27μ; Cr, 38 × 31μ.

var. __depressum__ Roy & Bissett.—IT, SL, W; D, 28 × 26·6μ.

var. __extensum__ Nordst.—D, 36·6 × 28μ; Cr, 37·5 × 29μ.

Staurastrum oxyacanthum Arch.—C.

paradoxum Meyen.—C, K, Ac, D, Cr, Cn.

var. **longipes** Nordst.—DL, 20μ long, 44μ wide (with processes), isthmus 6·7μ; VL, D.

pelagicum W. & G. S. West.—Plankton of LG, and of VL.

pilosum (Näg.) Arch.—AS, C, L, W; D, 34 × 33μ.

pileolatum Bréb.—S.W. of D, rare, 41–43 × 20–21μ, also 39 × 23μ, other specimens from another gathering, 40μ long × 23·3μ broad across apex, 18·3μ across base, 12·5μ at isthmus.

polymorphum Bréb.—C, L, W; D, 23·4μ broad, 5-rayed.

var. **PUSILLUM** var. nov.—Var. multe parvior, processubus gracilioribus et subinflexis, forma corporis ut in forma typica. C, 18–18·5μ long.

polytrichum Perty.—C, M; S.W. of D, not more than 47μ wide, spines 6–7μ long.

punctulatum Bréb.—C; L, average dimensions 33–34μ long × 32μ wide; IT, LG; W, 39 × 35μ; M, D, C, P.

var. **coronatum** (Schmidle) W. & G. S. West.—D.

var. **pygmaeum** (Bréb.) W. & G. S. West.—C, 38 × 35μ; L, 36 × 29μ, breadth of isthmus 13·3μ, 31·6 × 30·8μ; W; D, 31·5 × 28μ; M, 39 × 32·5μ.

pungens Bréb.—C, rare, south side in small pond.

Reinschii Roy.—D, 21·6 × 22μ; C, 21 × 23μ; W, SL.

scabrum Bréb.—AS, M, CI; C, 33–35μ broad, 36–37μ long, isthmus 13·5μ broad.

Sebaldi Reinsch.—L, SL, Cr.

sexcostatum Bréb.—C, 42μ long, 40μ wide with processes; SL.

spongiosum Bréb.—S.W. of D, rare.

striolatum (Näg.) Arch.—D, L, W, C.

teliferum Ralfs.—C; W, 36 × 31·5μ; LG.

tetracerum Ralfs.—C, M, VL, DL, W; Cr; LG, 21μ broad with processes; D, Cn.

f. **trigona** W. & G. S. West.—D, W.

tumidum Bréb.—W, M.

vestitum Ralfs.—W.

Spondylosium pulchellum Arch.—C, in many places; LG, CP; D, frequent, average size 17 × 13·6μ.

Sphaerozosma aubertianum West.—Ac.

excavatum Ralfs.—W.

secedens De Bary.—D, 9·6μ long, 11μ wide.

Desmidium Swartzii Ag.—C, 41–43μ broad, 20·5–21μ long; W; Cr, 38·3μ broad, 14·5 long.

cylindricum Grev.—C, M; D, average of many specimens 12μ long, 49μ wide.

Gymnozyga moniliformis Ehrenb.—C, W; SL, 24 × 20·8μ, another gathering 36–40 × 20–23·3μ; D, 25–31 × 16·5–20–21μ.

Hyalotheca dissiliens (Sm.) Bréb.—C, AS, I, VL, W, B, Cr; D, diameter of zyospores 26μ; C, cells 16·3μ long, 29μ broad, 65μ with hyaline sheath; CP; M, 26–28μ broad.

f. **punctata** Jacobsen.—C; CP, 24–25·2 broad.

undulata Nordst.—L. Creggan, C.

Order PROTOCOCCOIDEAE.

Fam. **Chaetopeltideae.**

Chaetosphaeridium globosum (Nordst.) Klebahn.—C, cells 13·3–15μ broad; I, cells 9–10μ broad; W.

var. **depressum** W. & G. S. West.—C, 10–12μ broad.

Fam. **Volvocaceae.**

Sub-fam. Volvoceae.

Volvox aureus Ehrenb.—C, frequent, average diameter of cells 350μ.

Eudorina elegans Ehrenb.—C, SL, I, CI; D, a number of examples were measured from here, the colonies reached up to 220μ, and as the cells began dividing to form new colonies they varied from 26 to 32μ in diameter as incipient colonies.

Gonium pectorale Müller.—C, W.

Pandorina morum (Müller) Bory.—C, SL, LG, I, CI, W, D; Cr, cells 8–10μ broad, coenobia 30–45μ broad; M, cells 10–12μ broad.

Sub-fam. Chlamydomonadeae.

***Carteria multifilis** (Fresen.) Dill.—L, up to 16μ broad.

Chlamydomonas Pulvisculus (Müll.) Ehrenb.—C, W.

***Kleinii** Schmidle.—D.

Sphaerella lacustris (Girod.) Wittr.—C, L, W.

Fam. **Endosphaeraceae.**

***Phyllobium sphagnicola** G. S. West.—D, on *Sphagnum cuspidatum.*

***Chlorochytrium Knyanum** Szymanski.—C.

Fam. **Characieae.**

Characium debaryanum (Reinsch.) De Toni.—Ac, K.

***Pringsheimii** A. Br.—L; C, epiphytic on Oedogonium.

subulatum A. Br.—VL.

Fam. **Pleurococcaceae.**

Pleurococcus angulosus Menegh.—W.

vulgaris Menegh.—C, L; W, and on mainland everywhere.

Trochiscia reticularis (Reinsch.) Hansg.—C.

Fam. **Hydrodyctyaceae.**

Sub-fam. Pediastreae.

Pediastrum boryanum (Turp.) Menegh.—C, L, K, RL, I, LG, CI, VL, W, DL, L, SL.

var. **PRODUCTUM** var. nov.—Var. processibus cellularum externarum perlongis, multe longioribus quam latitudo cellulae et non capitatis. C.

duplex Meyen.—VL, W; D, average breadth of colonies of 16 cells 56μ, of 8 cells 43μ.

tetras (Ehrenb.) Ralfs.—C, L, LG, CI, W, DL, D, Cr. Colonies of four were mostly seen. In one gathering from Clare Island, all seen were in fours, the colonies were very small and measured usually 9–10μ across, rarely 11μ; the notch was sublinear, and the two outer sides of each cell were always retuse.

***glanduliferum** Benn.—Plankton of RL, LG, VL, L.

***gracile** A. Br.—VL, C.

Fam. **Protococcaceae.**

Sub-fam. Coelastreae.

Sorastrum spinulosum Näg.—C; plankton of LG.

Coelastrum sphaericum Näg.—C, very frequent: I, L, CI; W, diameters of colonies 34–36μ, of cells 8·5–9μ; VL.

cambricum Arch.—C.

microporum Näg.—C.

Sub-fam. Crucigenieae.

Crucigenia quadrata Morren.—C, VL.

Tetrapedia (Kirchn.) W. & G. S. West.—VL, C.

rectangularis (Näg.) Gay.—C, in several places, 4–4·5 × 5·5–6·5μ.

***Tetrastrum staurogeniaeforme** (Schröd.) Chodat.—VL, DL.

Sub-fam. Selenastreae.

Scenedesmus antennatus Bréb.—W.

acutiformis Schröder.—C, W, DL, D, VL; Cr, some of the forms from here were rather broad, 14 × 5·5μ.

bijugatus (Turp.) Kütz.—C, I, LG, W; Cr, cells 10–11 × 4·5–5μ.

denticulatus Lagerh.—S.W. of D

Scenedesmus obliquus (Turp.) Kütz.—CI, VL, W, Cn; C, in one place small forms with cells 7·2 × 2·5μ.

var. **dimorphus** (Turp.) Rabenh.—K, VL, DL, D; Cr, length of cells 24–26μ, width of colony of 4 cells with processes 26–30μ, width of colony of 4 cells at middle 21μ; W; C, length of cells 20·8–21·5μ, width of colony of 4 cells with processes 23·3μ, width of colony of 4 cells at middle 15·5μ.

quadricauda (Turp.) Bréb.—C, RL, I, LG, L, CI, VL, DL, WD, Cr.

var. **horridus** Kirchn.—Mw, C.

Dimorphococcus lunatus A. Br.—M, C.

Selenastrum gracile Reinsch.—D, Cr, W.

Ankistrodesmus falcatus (Corda) Ralfs.—C, L, DL, SL, CI, W, B, Cr, K.

var. **tumidus** G. S. West.—C, in several places up to 6μ broad; Cr, up to 7·5μ broad.

var. **acicularis** (A. Br.) G. S. West.—C, I, Sl, CL.

var. **mirabilis** (W. & G. S. West) G. S. West.—W, 91 × 3μ, slightly curved, chloroplast interrupted; C, 133 × 3·5μ, almost straight.

Pfitzeri (Schröd.) G. S. West.—C, Mw, CI.

***Braunii** (Näg.) W. & G. S. West.—Cr.

convolutus Corda var. **minutum** (Näg.).—Cr, C.

SELENASTRUM sp. nov.—Cellulae semilunatae, apicibus acutis, inter apices 18–18·3μ, lat. ad medium 7·5μ. Inter algis variis (Cosmariis, &c.). Cr.

Closteriopsis longissima Lemm.—I, CI, LG, D.

Reinschiella CURVATA sp. nov.—R. cellulis solitariis, libere natantibus, late lunatis, margine interiori concavo, apicibus acutis, spina brevi extrorsum curvata praeditis, long. sine spin., 38μ, lat. 20μ, long. spin. 5–6μ. C. (Pl. I, fig. 2.)

Kirchneriella obesa (West) Schmidle.—K; plankton of RL, VL, L, Cr.

Sub-fam. Oocystideae.

***Oocystis crassa** Wittr.—B, Cr, SL, D.

gigas Arch.—I.

lacustris Chod.—Plankton of LG.

solitaria Wittr.—C, 19 × 10μ, also in other places 34 × 20μ, 33 × 21·5; D, up to 33·5 × 21·5μ; M, I, B, M; CP, 35 × 20μ (average): this often occurred in fair abundance of constantly small dimensions often 8–9μ broad and 14–16μ long; some examples from neighbouring pools were larger, extra broad, 30–31 × 22·5μ; Cr, 23–28 × 145–17μ.

Oocystis elliptica West.—C, I.

Nephrocytium Naegelii Grun.—C; plankton of LG.

lunatum West.—C, L, Cr, W.

agardhianum Näg.—L, I.

***obesum** West.—C, M, CI; Cr, size of cells in colonies of 25–27 × 15–16μ, colonies 60 × 48μ.

Eremosphaera viridis De Bary.—C, up to 151μ broad; M, average 139μ broad; IT, W, D.

***Palmellococcus miniatus** (Kütz.) Chodat.—C, mostly 3μ broad.

***Chlorella vulgaris** Beyer.—C, L, D, W.

Sub-fam. Tetraedrieae.

Tetraedron caudatum (Corda) Hansg.—L, VL, DL, W, C.

***limneticum** Borge.—VL, DL; plankton of LG.

regulare Kütz.—C, W.

enorme (Ralfs) Hansg.—C, W; Cr, 35μ wide.

Cerasterias longispina (Perty) W. & G. S. West.—D.

var. **HEXACTINUM** var. nov.—Var. processibus radiantibus sex ex centro commune. D.

Sub-fam. Phythelieae.

Chodatella breviseta W. & G. S. West.—C, D.

***Lagerheimia genevensis** Chodat.—D, from several localities; C, AS.

subglobosa Lemm.—D.

Sub-fam. Dictyosphaerieae.

Dictyosphaerium pulchellum Wood.—L, K; plankton of RL, abundant; plankton of LG; W.

ehrenbergianum Näg.—L, LG, W.

***Tetracoccus botryoides** West.—I; C, 4·5–5·5 in diameter, in another place not more than 4μ.

Botryococcus Braunii Kütz.—C, L, SL, C, I, Cr. In some of the many places in which it was seen, as in Clare Island, the peculiar state described as *Ineffigiata neglecta* was the only state observed.

***protuberans** W. & G. S. West.—C; Cr, cells 7–8·5μ broad mostly.

Fam. **Palmellaceae.**

Sub-fam. Palmelleae.

Palmodactylon varium Näg.—C, width of cells 6·3–7·5μ.

Palmella mucosa Kütz.—M; W, 8·8–11μ in diameter.

***miniata** (Leibl.) Chod.—Mw.

***Schizochlamys delicatula** West.—C, most abundant in many places.

gelatinosa A. Br.—C, 10-11·7μ broad, among *Batrachospermum vagum*; D, 10-11μ broad.

Sphaerocystis Schroeteri Chod.—K, SL; plankton of LG; VL; D, cells 8μ broad.

Sub-fam. Tetrasporeae.

Tetraspora gelatinosa (Vauch.) Desv.—C, in several places, cells 8-15μ broad; CP.

Apiocystis brauniana Näg.—C, W; L, on *Cladophora crispata.*

Sub-fam. Gloeocystideae.

Gloeocystis gigas (Kütz.) Lagerh.—C, 17-20μ, in another place 11-15μ, another gathering averaged 22μ; L, M, SL, VL; W, 11·6-15μ mostly; D, 16-17μ; Cr, 10-11μ.

vesiculosa Näg.—C, from 7·5 up to 11μ broad; M, SL, L, LG, CI, W, B, D.

rupestris Lyngb.—C.

***Asterococcus superbus** (Cienk.) Scherffel (=*Gl. infusionum* (Schrenk) W. & G. S. West).—C, IT, I, L, CI, M, D, SL.

***Dactylothece Braunii** Lagerh.—LG.

***Palmodictyon viride** Kütz.—C.

***Coccomyxa subellipsoidea** Acton.—C, forming jelly-like incrustations on mosses.

Class HETEROKONTAE.

Order CONFERVALES.

Fam. **Tribonemaceae.**

Ophiocytium cochleare (Eich.) A. Br.—C, L, W, D.

bicuspidatum (Borge) Lemm. f. **longispina** Lemm.—C, in several places, 26-29 × 5·5-6·5μ without spines.

majus Näg.—C, IT, VL, CI, W.

parvulum (Perty) A. Br.—Cr, C.

Arbuscula (A. Br.) Rabenh.—CI, W.

***Bumilleria pumila** W. & G. S. West.—C.

***Tribonema affine** (Kütz.) G. S. West.—C, I.

bombycinum (Ag.) Derb. & Sol.—C, 12-13·3 broad; B, SL, L CI, W, CP.

f. **minor** (Wille) G. S. West.—W, C.

Chlorobotrys regularis (West) Bohlin.—C, very common with *Utricularia minor*; M, Cn, C, D, CP, IT, I, CI, W, B, LG, DL, SL, Cr. This was so variable in size and abundant in one place in Clare Island, growing with *Batrachospermum vagum*, that I measured a number of examples; they varied from 11·6 to 25·5μ in diameter; it was on account of the very large size of some of them that they were measured.

Class BACILLARIEAE (= Diatomaceae).

(I have here adopted Van Heurck's arrangement of the Diatoms for convenience.)

Div. I. RAPHIDIEAE.

Tribe **Cymbelleae.**

Amphora ovalis Kütz.—C, 52 × 33·5μ; IT, L, D; W, 50 × 30μ, valve-view.
var. **affinis** Kütz.—D, 26·6–36 × 14·1–18μ.
var. **Pediculus** (Kütz.) V. H. (*A. minutissima* W. Sm.).—B, L.
f. **minor** V. H.—W, 31 × 17·6μ, 29 × 15·5μ.

Cocconema affine (Kütz.) W. & G. S. West.—M, D, L; CP, average length 22μ.
caespitosum (Kütz.) G. S. West.—W, M, L, K.
var. **lata** V. H.—C.
var. **Auerswaldii** (Rabenh.) V. H.—C, W, CP.
Cistula Ehrenb.—C, IT, W, M.
cuspidatum (Kütz.) G. S. West.—C, L, D; W, 74 × 24μ; SL.
var. **naviculiformis** (Auersw.) W. West.—L; D, in several places; W, average size 33 × 7·3μ.
cymbiforme Ehrenb.—W, M; C, 56 × 10·3μ; Croaghmore cliffs; K.
var. **parva** (W. Sm.) W. West.—L, W, CP.
***delicatulum** (Kütz.) W. & G. S. West.—C, SL; D, 30 × 5μ, valve-view; LG, Cr; W, 36·5 × 4·8μ.
Ehrenbergii (Kütz.) G. S. West.—C, large forms up to 125 × 30μ, 136 × 32·5μ, valve-view; L, I, W.
gastroides (Kütz.) W. & G. S. West.—D; C, 115μ long, also 98 × 22μ, valve-view; M, from 104 up to 180μ long; W, 131 × 26·6μ, in another place 124 × 25μ; Croaghmore cliffs.
var. **minor** (V. H.) W. West.—C.
gracile (Rabenh.) G. S. West.—W, CP, Ac.
f. **minor** (V. H.) W. West.—M, L, SL, W, B.
helveticum (Kütz.) W. & G. S. West.—C, 61 × 9μ.

***Cocconema laevis** (Näg.) W. West.—C, B; W, 24 × 5·6μ.

lanceolatum Ehrenb.—C, 79 × 13·3μ; W.

***leptoceras** (Kütz.) W. West var. **elongata** (V. H.) W. West.—C.

***microcephala** (Grun.) W. West.—C, D.

***obtusum** (Greg.) W. & G. S. West.—M, C.

tumidum Bréb.—C.

turgidum (Greg.) W. West.—W.

ventricosum (Ag.) W. & G. S. West.—IT; C, up to 33 × 8·3μ, valve-view; SL; near LG; CP, 28·3 × 7·5, valve-view; D, 20 × 7·5μ; Croaghmore cliffs.

Tribe **Naviculeae.**

Mastogloia Smithii Thw.—C, 48·5 × 12μ, in several places; W.

var. **amphicephala** Grün.—C, SL; near LG.

Stauroneis anceps Ehrenb.—C, 40 × 8·6μ; L; W, 49 × 13·3μ, a broad form; D, Croaghmore cliffs.

var. **LATA**, var. nov.—Var. cellulis diametro 3-plo longioribus, 60 × 20μ. A marked variety, as the type is 4½ times as long as broad. C.

var. **linearis** (Kütz.) V.H.—L; W, 46 × 12μ.

var. **amphicephala** (Kütz.) V.H.—W, 45 × 9μ; C, 51 × 10μ.

Phoenicenteron (Nitzsch.) Ehrenb.—C, up to 152 × 28·4μ; L; W, 121 × 28μ, in one locality all small forms 86–95 × 20μ; M, 180–183μ × 31–33μ.

f. **PRODUCTA**, f. nova.—F. cellulis minoribus et apicibus distincte productis, 81 × 18·2μ average size, some only 73 × 15μ. C.

gracilis Ehrenb.—W.

acuta W. Sm.—M, I, C; D, small forms 80–90μ × 13–14μ; W, average size 110 × 17·5μ.

Legumen Ehrenb.—W.

Navicula acuminata W. Sm.—W.

***affinis** Ehrenb.—IT.

alpina (W. Sm.) Ralfs.—CP, SL.

ambigua Ehrenb.—W, 59 × 13μ.

amphirhyncus Ehrenb.—W.

amphisbaena Bory.—C, W; D, 55–62 × 21–23·4μ.

***anglica** Ralfs.—D, C, W.

***appendiculata** Kütz.—L; W, 41 × 6·6μ; M.

****atomoides** Grun.—B.

***Navicula atomus** Näg.—D.

Bacillum Ehrenb.—L.

Brebissonii Kütz.—C, IT, I, B, L; W, 52·5 × 11μ, valve-view; M, LG, SL; D, 45 × 10·5, valve-view; Cn, Croaghmore cliffs.

var. **subproducta** V.A.—S.W. of D, 34 × 11μ.

bicapitata Lagerstedt.—C, L, SL; S.W. of D, 56 × 12μ, valve-view; W, 61 × 12μ, valve-view.

cryptocephala Kütz.—L, W, Cr; C, up to 43 × 10·5μ; D.

var. **exilis** V.H.—C.

cuspidata Kütz.—M, C, W.

crucicula (W. Sm.) V.H. var. **protracta** Grun.—D, 20 × 6μ.

dicephala W. Sm.—C, M, W, L; D, 29·5 × 95μ.

elliptica Kütz.—C, 31 × 14·3μ, valve-view; IT, L, I, AS, B; D, 24-25 × 14·2-15μ; W.

var. **ovalis** Hilse.—CP; W, 26·6 × 11μ, a rather narrow form; D, 21·6 × 11·6μ.

var. **oblongella** Näg.—C, I, B, M, L; W, large forms averaging 29 × 11μ.

var. **minima** V. H.—L; W, up to 18 × 9μ.

exilis (Kütz.) Grun.—C, 23·3 × 6μ; M, IT, SL, L, B, CI, W, D, CP.

Gastrum (Ehrenb.) Donk. var. **placentula** (Ehrenb.) V. H.—C, D, L; in all three localities it occurred in fresh water, but near the sea; in the last locality it was among Spirogyra.

gibba (Ehrenb.) Kütz.—C, 67 × 11μ up to 86 × 14μ; M; W, 50·5 × 8μ.

gibberula W. Sm.—W.

***gracillima** Greg. — C, a variety with very faintly subundulate margins.

***gregaria** Donk.—C, a large form up to 46 × 12μ.

gracilis Kütz.—D; C, 51 × 10 valve-view; Croaghmore cliffs.

***hilseana** Janisch.—CP, C.

Iridis Ehrenb.—C, IT.

var. **Amphirhyncus** (Ehrenb.) De Toni.—C, D, L.

var. **producta** (W. Sm.) V. H.—D, W, C, SL.

lanceolata Kütz.—C, L; D, 51 × 10μ.

var. **phyllepta** (Kütz.) V. H.—C; W, small forms 23 × 6μ.

limosa Kütz.—M, L, D; C, 53 × 9μ, a narrow form; W, 66 × 17·5μ, 54 × 14·3μ, 56 × 13·3μ.

var. **gibberula** (Kütz.) V. H.—IT, L.

Legumen Ehrenb.—SL, Cr; C, 76 × 15·3μ; W, 75·5 × 14·6.

var. **decrescens** Grun.—D, 70 × 13·4μ, a narrow form.

Navicula major Kütz.—W, M, IT, D, CI, L, SL; C, 171 × 26μ (girdle-view). In one gathering S. of Dugort, a small form occurred averaging 135 × 24μ, girdle-view.

mesolepta Ehrenb.—C; M, 56 × 11μ; IT, L, W; D, 58·5 × 12·5μ.

var. **Termes** (Ehrenb.) V. H.—C, 47 × 9μ valve-view; Cr; D, 27 × 6μ, valve-view, up to 47 × 11·6μ; L.

var. **PROTENSA** var. nov.—Var. cellulis multe angustioribus quam in forma typica, lateribus regulariter triundulatis, average size 63 × 8·8μ. W.

****minima** Grun.—B.

nobilis (Ehrenb.) Kütz.—W, 330 × 53μ; C, L, CI, D; M, 278 × 49μ (valve-view), others 225 × 60μ (girdle-view).

var. **Dactylus** (Ehrenb.) (V. H.)—C, 200 × 34μ, valve-view; M, one form was relatively narrow, 260μ long, 35μ wide, another 184 × 22·7μ.

oblonga Kütz.—L.

peregrina Kütz.—C, L, SL, W, D, VL.

var. **PRODUCTA** var. nov.—Var. polis distincte productis, cellulis latioribus quam in forma typica. Formae majores 118–119 × 37·5μ, formae minores 71 × 29μ. C. (Pl. II, fig. 22.)

Pupula Kütz.—D, 30 × 9μ, among *Hippuris vulgaris*.

pusilla W. Sm.—D, in fresh water 200 yards from the sea; C, a narrow form in fresh water 39·5 × 15·4μ; W, 29 × 13·3μ.

var. **PUSILLISSIMA** var .nov.—Var. cellulis multe parvioribus, 24 × 12·6μ. D.

radiosa Kütz.—C, 55 × 10μ; K; L, a narrow form, average size 70 × 9·5–10μ; IT, I, VL, CI, M; W, 60 × 11·6μ; D, LG.

var. **acuta** W. Sm.—C, 92 × 12·5μ, 83 × 9·3μ, valve-view; L, D, W, Cr.

Rabenhorstii Ralfs.—W.

rhyncocephala Kütz.—C, M, L; D, 51 × 10·8μ; SL; W, a narrow form 48 × 10μ, as well as typical forms.

var. **amphiceros** V. H.—D, 44 × 13·3.

f. **robusta** Rabenh.—W.

****seminulum** Grun.—C.

serians (Bréb.) Kütz.—C, SL, L, CI, W, SL.

var. **brachysira** (Bréb.) V. H.—M.

var. **thermalis** Grun.—B.

sphaerophora Kütz.—C, 60 × 20μ.

***sublinearis** Grun.—M, I.

Navicula stauroptera Grun.—L; Cr, 92 × 15μ, valve-view.

Tabellaria Ehrenb.—W, 113 × 15μ, another gathering 112 × 15·5μ, 103 × 13·3μ; C, 114 × 16μ; M, 120 × 19μ, also small narrow forms, 83 × 10μ; S, 108 × 12μ; L.

var. **acrosphenia** Rabenh.—W.

***vulpina** Kütz.—W, 84-90 × 12·5-14·3μ; M, 88 × 14·3μ.

viridula Kütz.—C, L, SL, Cr; W, 72·6 × 16·5-17μ; M, 70 × 16·5μ.

f. **minor** V. H.—W, 44 × 10μ; C, 50 × 10μ, valve-view.

var. **slesvicensis** (Grun.) V. H.—D, 41 × 11μ, 51 × 13μ; W, 54 × 12·5μ.

var. **avenacea** (Bréb.) V. H.—L, 46 × 8·5μ, valve-view.

viridis Kütz.—C, M, IT, I, L, CI, B; W, 91 × 15·3, girdle-view; SL, CP; D, 102 × 22μ, valve-view; Cn; Croaghmore cliffs.

var. **commutata** Grun.—C.

var. **ANGUSTATUM** var. nov.—Var. cellula angusta, diametro 7-plo longiori, apicibus non attenuatis. D, 87 × 12·5μ.

Vanheurckia rhomboides (Ehrenb.) Bréb.—W; M, up to 94 × 20μ; L, D; C, 84 × 16μ.

var. **saxonica** (Rabenh.) W. & G. S. West.—C, 51-63 × 13·3-15·4μ; L, As, M, CP, SL, IT, DL, S, I, W, B, CI, D, Cn.

viridula Kütz.—C, L, SL, Cr, W; CP, 108 × 21μ, also from another place 73 × 13μ.

vulgaris (Theo.) V. H.—C.

Amphipleura pellucida Kütz.—L, W, SL.

***Gyrosigma acuminatum** (Kütz.) O.K.—L, 126 × 14μ, smaller forms 101 × 13·5μ; W, 122 × 13·5μ.

attenuatum (Kütz.) Rabenh.—L; W, 227-235 × 27·5-29μ; VL.

var. **scalprum** (Grun.) O.K.—C; W, 127 × 21·3μ.

Spencerii (Quekett) O.K.—W, C.

var. **nodifera** (Grun.) O.K.—Croaghmore cliffs.

****curvulum** (Ehrenb.) Rabenh. f. **longior** (V.H.)—C, 155 × 14·5μ.

Tribe **Gomphonemeae.**

Gomphonema acuminatum Ehrenb.—C, W, IT, L, I, CI, D; Cn, 64-69 × 11·5-14μ, valve-view.

constrictum Ehrenb.—L, 37 5 × 11·5μ, valve-view; W, D, VL; CP, 34-42μ long, 15-18μ broad, breadth of stalk 4μ.

var. **capitatum** (Ehrenb.) V.H.—L, D, CP.

Gomphonema gracile Ehrenb.—C.

var. **dichotomum** (Kütz.) V.H.—B, W, D; Cr, 44 × 6·5μ, valve-view; Croaghmore cliffs, K.

intricatum Kütz.—C, I, B, W, LG.

var. **Vibrio** (Ehrenb.) V.H.—B, D, LG.

var. **pumila** Grun.—B.

***montanum** Schumann var. **subclavatum** Grun.—C.

var. **commutatum** Grun.—C, 41μ long, 9μ greatest breadth in valve-view; W, 44 × 8·4μ, also in another place 44 × 9·5μ.

olivaceum (Lyngb.) Kütz.—C, L, I, VL, D, CP.

parvulum Kütz.—C, LG, M.

Rhoicosphaenia curvata (Kütz.) Grun.—L, on *Cladophora crispata*; C, on *C. flavescens* and *Rhizoclonium hieroglyphicum*.

Tribe **Achnantheae.**

Achnanthidium flexellum Bréb.—W; C, 31·5 × 15·8μ, valve-view, 35–38 × 14·6–16μ.

Achnanthes exilis Kütz.—C; W, 24μ long, average size; S, IT, L, I, B, D, LG; CP, 16–20μ long; Cr; K, 20μ long.

linearis (W. Sm.) Grun.—C, L.

biasolettiana Grun.—C, IT, B, L, W, Cr.

***minutissima** Kütz.—C, 22–24 × 4·5μ, valve-view.

microcephala (Kütz.) Grun.—C, CP.

Tribe **Cocconeideae.**

Cocconeis Pediculus Ehrenb.—C, IT, D, W, L, on *Cladophora crispata*.

Placentula Ehrenb.—C, 18–36 × 12·5–23μ; L, I, D, W.

var. **lineata** V. H.—C.

DIVISION II. PSEUDRAPHIDIEAE.

Tribe **Epithemieae.**

Epithemia Argus (Ehrenb.) Kütz.—C, 41–44 × 10μ valve-view, girdle-view 18μ; L, B.

var. **amphicephala** Grun.—C, 41·6 × 9·1μ average; W.

turgida (Ehrenb.) Kütz.—C, average size 70·5–92·5μ long, 16·5–17μ broad, valve-view; IT, L, W.

var. **Westermanni** Kütz.—L, W.

gibberula (Ehrenb.) Kütz. var. **producta** Grun.—Cr; D, 26–34μ long; M, length 37·5μ; C, length 36–37μ, in another place 30μ long; B, I, CI,

Epithemia zebra (Ehrenb.) Kütz.—C, 49 × 10μ, valve-view; I, D, L, Croaghmore cliffs.

var. **proboscidea** Grun.—C, 55 × 8·5μ valve-view; D, Croaghmore cliffs.

Hyndmanni W. Sm.—C, 166 × 30μ; Croaghmore cliffs (a small form)· A very rare diatom.

Sorex Kütz.—IT; LW, 40μ long, 12μ across, girdle-view.

Rhopalodia gibba (Kütz.) Otto Müll.—C, 128–143μ long × 12·8–13μ, girdle-view; L, I, B, D; W, 118–140μ long; VL.

var. **ventricosa** (Kütz.) Otto Müll.—C.

Eunotia Arcus Ehrenb.—M, W.

var. **bidens** V. H.—W, M; C, 31·6 × 4μ, valve-view; L; D, 32 × 5·2μ, valve-view.

var. **minor** V. H.—C, CI, M, B, SL, CP; D, 26–27 × 4μ; Croaghmore cliffs.

var. **uncinata** V. H.—B, M.

var. **hybrida** Grun.—I.

var. **tenella** Grun.—C.

monodon Ehrenb.—CP.

diodon Ehrenb.—SL, C, PC.

***triodon** Ehrenb.—M.

flexuosa Kütz. var. **bicapitata** Grun.—W.

***exigua** (Bréb.) Rabenh.—C, D, CP, L.

var. **nymanniana** Grun.—W.

Faba (Ehrenb.) Grun.—D; W, 19·3 × 5·6μ.

gracilis (Ehrenb.) Rabenh.—C, M, L, I, SL; D, short forms 53 × 3·4μ also in another gathering 136 × 3μ; W.

****impressa** (Ehrenb.) var. **angusta** Grun.—D, 20–25 × 3–3·3μ.

lunaris (Ehrenb.) Grun.—C, L; W, many were measured from 23 to 98μ long from the same gathering, usually 3·2–4μ wide; Ac, M, VL, AS, I, CI, D, B, SL, CP, Cn.

var. **bilunaris** (Ehrenb.) Grun.—L, D; W, 28·5 × 5·5μ.

var. **excisa** Grun.—Variable in length, 14–31 × 5–6μ.

var. **subarcuata** (Näg.) Grun.—D, L.

var. **EMARGINATOVALIDA** nov. var.—Var. cellulis emarginatis ad latus ventrale, crassioribus brevioribusque quam in formas ceteras. D, among *Hippuris vulgaris*. This variety has twice the breadth of Van Heurck's figure of *E. lunaris* var. *excisa* Grun. (=*Synedra falcata* Bréb.). His figure measures 30 × 4·6μ; the Irish specimens are 24 × 7·2μ. (Plate II, fig. 21.)

Eunotia major (W. Sm.) Rabenh.—C, L; W, 122μ long; D, 152μ long.
var. **bidens** V. H.—SL.
****minor** (Kütz.) Rabenh.—W, 31 × 6μ, valve-view.
pectinalis (Dillw.) Rabenh.—C, K, Ac, M, W; S.W. of D, 95 × 31μ, girdle-view.
var. **undulata** Ralfs.—D, 60-65 × 5-5·3μ.
var. **Soleirolii** Kütz.—W.
var. **ventricosa** Grun.—CP.
var. **stricta** Rabenh.—D, 40μ long.
f. **elongata** V. H.—B, W.
f. **curta** V. H.—D; W, 25 × 7μ valve-view.
praerupta Ehrenb.—L; W, 35 × 7μ; C, 55 × 9·5μ.
var. **bidens** (Ehrenb.) Grun.—C; D, 43μ long.
var. **inflata** Grun.—L.
var. **curta** V. H.—L; W, 34 × 6·3μ.
robusta Ralfs var. **tetraodon** V. H.—M.
Ceratoneis Arcus (Ehrenb.) Kütz.—C, L; CP, 40–45 × 5–6μ, a constantly short form; W, 36·6 × 4μ.

Tribe **Synedreae.**

Synedra Acus (Kütz.) Grun.—C, W; L, 132 × 6·6μ, valve-view; I, B, D, Croaghmore cliffs, K.
var. **delicatissima** W. Sm.—W; C, 88μ long; CP, 112 × 4μ, valve-view.
amphicephala Kütz.—LG, L; W, 35 × 3·2μ.
famelica Kütz.—C, L, I, B, D, LG, CP.
pulchella Kütz.—C, W; L, 53·5 × 6μ, valve-view; CP, 114–132μ long, 7·2μ broad at middle, 4·9μ at apices.
var. **Smithii** Ralfs.—VL; D, 121 × 5μ, valve-view.
f. **major** V. H.—C, 133–136 × 7–7·6μ.
radians (Kütz.) Grun.—VL, C, CI, M, W, B; L, 61 × 1·6μ, valve-view.
Ulna (Nitzsch.) Ehrenb.—L, C, K, I, VL, CI, D; W, average length 220μ, up to 260μ; CP, Croaghmore cliffs.
var. **amphirhynchus** (Ehrenb.) V.H.—C; W, 164 × 5μ, valve-view.
var. **splendens** (Kütz.) Grun.—W.
var. **lanceolata** (Kütz.) V.H.—W.
var. **danica** (Kütz.) V.H.—C, 244 × 5μ, valve-view; W, a broad form 188 × 7·5–8μ, valve-view; L.
Vaucheriae Kütz.—C, M.

Asterionella formosa Hass.—C, K, VL, W.
gracillima Heib.—Plankton of Roonah Lough near L.

Tribe **Fragilarieae.**

Fragilaria capucina Desm.—SL, L; D, 35–55 × 11·9–14·7μ, girdle-view; CP, 32–55μ long; M, 33–61μ long; Ac, W.
mutabilis (W. Sm.) Grun.—C, SL, W, L, IT, LG, VL, CI, B, D, CP.
virescens Ralfs.—C, L, I, W.
construens (Ehrenb.) Grun.—C.
***Harrisonii** (W. Sm.) Grun.—D.

Tribe **Meridioneae.**

Meridion circulare (Grev.) Ag.—C; CP, 26 × 11μ apex of valve-face; W, 30–38μ long; D.

Tribe **Diatomeae.**

Diatoma vulgare Bory.—L, CI, D.
anceps (Ehrenb.) Grun.—W.
elongatum Ag.—C, 46–51 × 5·5μ, girdle-face; L, CI, W, LG, VL, CP; D, 60 × 5·6μ, girdle-face; Croaghmore cliffs.
hiemale (Lyngb.) Heib.—S.
var. **mesodon** (Kütz.) V.H.—S; CP, some only 13μ long; D.
var. **tenue** (Ag.) V.H.—C, L.
Denticula tenuis Kütz.—C, SL, LG, D.
var. **inflata** (W. Sm.) V.H.—C.
var. **frigida** Kütz.—C, in several places.

Tribe **Tabellarieae.**

Tabellaria flocculosa (Roth) Kütz.—C, L; W, 22 × 6μ (valve-view); Ac, K, M, IT, SL, I, B, D, Cr, CP.
fenestrata (Lyngb.) Kütz.—C, 57–5 × 4·5, valve-view, average size; L, W, Ac, D, W, LG.

Tribe **Surirelleae.**

Cymatopleura Solea (Bréb.) W. Sm.—W, D.
Surirella apiculata W. Sm.—W.
biseriata Bréb.—C; W, up to 197 × 57·5μ; M; SL, 144 × 50μ.
elegans Ehrenb.—C, 201 × 65μ.
linearis W. Sm.—W.

Surirella ovalis Bréb. var. **ovata** (Kütz.) V. H.—C, B; L, mouth of Bunowen River in brackish water, forms near var. *crumena* (Bréb.), 33–34 × 21–22μ.

var. **angusta** (Kütz.) V. H.—C.

var. **minuta** (Bréb.) V. H.—C, 22·5 × 13μ.

var. **pinnata** (W. Sm.) V. H.—C, L, VL, M, IT, D, SL.

var. **panduriformis** (W. Sm.) W. West.—SL.

var. **SUBMAMILLATA** var. nov.—Var. cellulis late ellipticis apicibus productis in mamillis brevibus. W, 38·5 × 16·5μ, also 30 × 13μ and 29 × 12·5μ.

spiralis Kütz.—B, L, W.

robusta Ehrenb. (*S. nobilis* W. Sm.).—W, 246μ long; SL; M, 310 × 72μ.

var. **splendida** (Ehrenb.) V.H.—W; C, 205 × 76μ.

Tribe **Nitzschieae.**

Hantzschia amphioxys (Ehrenb.) Grun.—C.

Nitzschia curvula (Ehrenb.) W. Sm.—W.

***communis** (Rabenh.) Grun.—B.

****Clausii** Hantzsch.—C, in a freshwater pool close to sea.

***dissipata** Kütz. var. **acuta** V.H.—C, LG.

apiculata (Greg.) Grun.—C, 30–32 × 4–5·5μ, in brackish water.

linearis (Ag.) W. Sm.—C, I, DL; W, 74 × 9μ, girdle-face.

var. **tenuis** Grun.—D.

sigmoidea (Ehr.) W. Sm.—D, 335 × 20·5μ, girdle-view.

***obtusa** W. Sm.—CI; C, a form approaching var. *scalpelliformis* Grun., 92·5 × 6·6μ; L.

var. **scalpelliformis** Grun.—D.

var. **brevissima** Grun.—I, L.

****subtilis** Grun.—D, 53μ long; W, 74μ long; SL, 60 × 4·5, valve-view.

var. **paleacea** Grun.—C, 33μ long, 35 × 4·5 μ from another place; D, 46 × 2·8μ.

parvula W. Sm.—W.

Palea (Kütz.) W. Sm.—C, 57·5 × 5·5μ average; VL, L; D, 40 × 4·3μ, valve-view; W.

var. **debilis** V. H.—C, L, W.

var. **tenuirostris** Grun.—C, 55 × 48μ.

var. **fonticola** Grun.—C, 18μ long; W, up to 28μ long, 4μ broad.

Nitzschia Sigma W. Sm.—L, in several places, also in brackish water, mouth of Bunowen River with *Navicula digitoradiata*; B, W. (C, N, E, also, in sea-water).

var. **rigida** (Kütz.) Grun.—C, I M, Croaghmore cliffs.

Tryblionella Hantzsch. var. **littoralis** (Grun.) V.H.—C.

var. **Victoriae** Grun.—AS.

thermalis (Kütz.) Grun.—L, D; C, 82·5 × 11·6μ.

***vermicularis** (Kütz.) Grun.—C, L; M 196 × 6μ; IT, I, CI; W, 96 × 4·8μ; B; W, 166μ long, girdle-face 10μ broad.

***vitrea** Norman.—W, 81 × 16·6μ (girdle-view).

sinuata (W. Sm.) Grun.—L, C.

Division III. CRYPTORAPHIDIEAE.

Tribe **Melosireae.**

Melosira varians Ag.—C, mostly 12–12·5μ broad in one locality, in another 30–31μ broad; VL, D; W, 15–30μ broad; CP; Cr, 21μ broad average size.

granulata (Ehrenb.) Ralfs.—D, among *Hippuris vulgaris*; C.

Cyclotella operculata Kütz.—C, L, B.

meneghiniana Kütz.—C, 13–13·5μ broad; L, 15μ broad.

kuetzingiana (Thw.) Chauvin.—W, 16μ broad.

comta (Ehrenb.) Kütz.—W.

var. **radiosa** Grun.—W, 43–45μ broad.

Class MYXOPHYCEAE (CYANOPHYCEAE)

Sub-Class I. GLAUCOCYSTIDEAE.

Glaucocystis nostochinearum Itzig.—L.

Sub-Class II. ARCHIPLASTIDEAE.

Order I. COCCOGONEAE.

Fam. **Chroococcaceae.**

Chroococcus limneticus Lemm.—K, D, VL; DL, 8–10μ broad.

***membraninus** (Menegh.) Näg.—C, usually quadrigeminate and distinctly angular. Agrees with Kützing's original figure.

***macrococcus** (Kütz.) Rabenh.—M, cells 37–40μ broad; C, IT; Cr, cells 29–32μ broad; I; CI, cells 30–32μ broad; W; D, cells 28–30μ broad; S.W. of D, cells 34–42μ broad, thickness of integuments outside cells 12μ.

Chroococcus minutus (Kütz.) Näg.—D, diameter of cells 5–6μ.

var. **minimus** (V. Keissler) Lemm.—C, L, Mw, M; VL, 2·2–2·5μ broad; D, 2–2·2μ broad.

minor (Kütz.) Näg.—C, in several localities, 3·0–4·5μ broad; M, 3·3–4μ broad.

pallidus Näg.—C, L.

turgidus (Kütz.) Näg.—C, CP; LG, a large form, intensely aeruginose, with cells up to 22·5μ in diameter, sheaths up to 59 × 72μ; W; Cr, average size 18μ broad; S.W. of D, 20–22 broad, with integument 34μ.

Synechococcus aeruginosus Näg.—C, 17·5 × 11μ; IT, W; D, a peculiar subrotund form 24 × 21μ.

f. **ANGUSTIOR** f. nov.—F. cellulis relative angustioribus, circiter 25 × 10μ. C.

***crassus** Arch.—M; C, 31–32 × 20μ; W, 42 × 26·6μ (incipient division showing); B, 35 × 17μ.

f. **crassior** Lagerh.—SL, in a small tarn, 38·4–41·6μ long, 29–38·3 broad, colour almost blue with hardly any trace of green.

MINUTUS sp. nov.—S. cellulis singulis, ellipticis, utroque polo rotundatis, circiter 3·3μ latis, 1½-plo longioribus, contentu pallide aerugineo et granuloso. *Hab.*—in paludibus divitibus cum desmidiis, diatomis, et algis aliis. M.

***Dactylococcopsis acicularis** Lemm.—B, not more than 1·6μ broad.

***fascicularis** Lemm.—CI; C, a variety or form much less contorted.

rhaphidioides Hansg.—L, a small form 6 × 1μ; C, 14–15 × 2·5–3μ.

Gloeocapsa Magma (Bréb.) Kütz.—CP.

***muralis** Kütz.—Cr, cells ellipsoid, 4 × 6μ, masses brown.

***punctata** Näg.—C, cells 0·8–1·6μ.

***rupestris** Kütz.—L, 6–10μ broad without integuments.

montana Kütz.—C, 3·5–5μ broad without integuments.

Gloeothece confluens Näg.—C, 6–8 × 3–3·3μ; AS, average size 5 × 2·5μ; D, mostly 3–5 × 1·8–2μ.

linearis Näg.—C, SL.

forma **ANGUSTA** f. nova.—F. cellulis 1–1·4 lat. rectis subcurvatisque. LG.

rupestris (Lyngb.) Born.—D.

***Aphanocapsa elachista** W. & G. S. West.—C, 1·4–1·5μ lat.; LR, 1·4–1·6μ; DL, 1–5–2μ, spherical.

Grevillei (Hass.) Rabenh.—C; CR, 3·3–5μ.

***testacea** Näg.—B, 7·5–8μ: C, 8–8·5.

***Aphanocapsa rivularis** (Carim.) Rabenh.—M.

virescens (Hass.) Rabenh.—SL, 6·6—8μ broad.

***Aphanothece conferta** P. Richt.—C, colonies 35–70μ, 2–2·5 × 3–4μ.

microscopica Näg.—SL; LG, 3·5–4 × 6–7μ; VL, B; C, 3·3–4μ × 7·5–8μ, also in brackish water, 3–3 × 7–9μ.

saxicola Näg.—DL, 2–5 × 1–2μ; W, L; S, 2 × 1μ.

***stagnina** (Spreng.) A. Br.—C, 3·3–3·5 × 5–6·7μ; associated and interlaced with the floating gelatinous mass was *Lyngbya Rivulariarum* in plenty.

***Microcystis elabens** (Bréb.) Kütz.—C.

***firma** (Bréb. & Lenor.) Schmidle.—LG, colonies distinct, 20–30μ broad, cells circiter 1μ broad; DL, 1–1·5μ broad.

***Flos-aquae** (Wittr.) Kirchn.—CI, W.

incerta Lemm.—K; S. W. of D, 2μ broad, sometimes slightly ovoid.

***ichthyoblabe** Kütz.—W, K.

marginata Menegh.—C.

MINUTISSIMA sp. nov.—M. cellulis oblongis et confertis, aerugineis, post divisionem subrotundatis, 0·8–1μ latitudine (interdum 1·2μ), 1·1–1·5μ longitudine (interdum 2μ); familiis irregularibus in margine, circiter 40–140μ (interdum majoribus), tegumento hyalino. *Hab.*—in locis paludosis libere natans. C, SL, VL.

stagnalis Lemm.—C, Mw; SL; S. W. of D, 1·5–1·8μ broad.

***Clathrocystis elongata** W. & G. S. West.—DL.

Gomphosphaeria aponina Kütz.—C, L, K.

lacustris Chod.—Plankton of LG, 32–40μ broad usually, also among Bulbochaete attached to *Lobelia Dortmanna*.

Coelosphaerium kuetzingianum Näg.—C, M; plankton of RL and LG; SL; L, in a small lake; W, Cr.

Merismopedium aerugineum Bréb.—D.

elegans A. Br.—C, W; SL, 6–6·6 × 7–8·3μ.

glaucum (Ehrenb.) Näg.—L, SL, C, M, IT, CP, I, SL, CI, W, VL, DL, Cr; D, cells 4–5μ broad.

punctatum Meyen.—Cr, W.

tenuissimum Lemm.—W; C, 1·6–2μ, in another gathering 0·7–0·8μ; Cr, 0·9–1μ, in another gathering 1·2μ.

Eucapsis alpina Clements & Schrautz.—Small tarn on Slievemore. This plant has been recorded only once before, from a pond on a mountain in Colorado, and as no British publication contains it, I give a description:—"Colonies 30–80 mic. in diameter, usually containing 32–128 cells, cubical, free-floating; tegument colourless; cells 6–7 mic. in

diameter, spherical, more rarely elliptic, in cubical families; cell-contents blue-green." I perhaps ought also to add that I had described this plant in my manuscript as a new species of Merismopedium, necessitating an alteration in the definition of the genus; this was some time before I came across a description of Eucapsis, so I think it may be of interest to publish just what I had written before I knew of Eucapsis:—"*Merismopedium cubicum* sp. nov. Familiis e cellulis 64 compositis, 4 longitudine, 4 latitudine, et 4 in altitudine, in strato mucoso distincto et hyalino, cellulis confertis et angulato-globosis, contentis aeruginosis, 5–6·6μ lat. The specimens seen consisted of four families, held together by their gelatinous investment and arranged in a square. The genus Merismopedium will require amending to include this species which had certainly divided in three directions of space as in the bacterial genus Sarcina."

***Holopedium irregulare** (Lagerh.) Hansg.—C, 2–2½μ.

Tetrapedia reinschiana Arch.—Cr, D, DL, L, VL, C.

Fam. **Chamaesiphonaceae.**

***Chamaesiphon incrustans** Grun.—L, on *Cladophora crispata*; AS, C; VL; D, on Copepods.

***curvatus** Nordst.—DL, 3–4μ broad, 18–24μ long.

Order HORMOGONEAE.

Sub-Order PSILONEMATEAE.

Fam. **Oscillatoriaceae.**

Sub-fam. Oscillatorieae.

Oscillatoria Agardhii Gom.—C, in many places, 3·6–4μ broad. 2μ long, also 4·5–5μ broad, cells ½ to ⅔ as long as broad, all distinctly capitate; M, 6μ broad, 3-4μ long; S, 4·2μ broad, ⅔ as long as broad.

amphibia Ag.—C, W; M, 2·5μ broad, 3μ long; CP, 2·5-3μ broad, 4μ long; S; Ac, 2·6-3·1μ broad, 3·6–4μ long.

***angustissima** W. & G. S. West.—C, 0·6–0·66μ broad, in another place 0·7μ broad, 1·1μ long.

formosa Bory.—CP, 5–5·5 broad, average length 3–4μ.

limosa Ag.—M, 11μ broad; C, 16–17μ broad, cells six times shorter than broad; L, 14–15μ broad, cells 5 times shorter than broad; I, 12μ broad, cells 3 times shorter than broad; CI, cells 4 times shorter than broad; M; W, 13·3–14·3μ broad, 2·5–3μ long; Cr; SL, a well-marked form, 9·5–11μ broad, 6–8μ long, apical cell subcapitate; W, 12μ broad, 3·5μ long.

Oscillatoria nigra Vauch.—L; D, 8μ broad.

nigro-viridis Thw.—W.

princeps Vauch.—C, 26·6–28·3μ broad, cells 6 times shorter than broad; W; 23–25μ broad; Cr, 27·5–30μ broad; D, a smaller form, 20μ broad.

splendida Grev.—W.

subtilissima Kütz.—C.

tenuis Ag.—C, 9·5μ broad, 4·5μ long; L; Mw, a form with cells as long as broad; VL; M, 8·4μ broad, 3μ long.

Sub-fam. Spirulineae.

Spirulina subsalsa Oersted.—W; C, thickness of coil 4μ, of trichome 1·3μ, in fresh water in both cases.

major Kütz.—S.W. of D, breadth of spiral 4μ, breadth of filaments 1·6μ, distance between turns 3–4μ.

Sub-fam. Lyngbyeae.

Phormidium inundatum Kütz.—VL.

P. subfuscum Kütz.—W.

tenue (Menegh.) Gom.—Ac, 1·3μ broad, 2μ long; C, mostly 1·5μ broad, but sometimes up to 2·5μ; Mw, LG, L, CI.

Lyngbya aestuarii (Mart.) Lieben.—C, filaments 26μ broad, cells 6–7μ long; VL, filaments 12·5–13·5 broad, cells 1·7μ long.

aerugineo-coerulea (Kütz.) Gom.—L, filaments 3·6–4μ broad, cells 2–2·5μ long; VL, filaments 5·5–5·8μ broad, cells 2·5–3·3μ long; M.

***Diqueti** Gom.—M, filaments 2·5–3μ broad, cells 2·2–3 long.

limnetica Lemm.—D.

martensiana Menegh.—C, filaments 11μ broad, trichomes 6·5μ broad; CP, filaments 7·5–8·2 broad, cells 2·5–3μ long, rosy-violet.

CLIARENSIS sp. nov.—L. filis singulis libere natantibus, rectis vel subrectis, 11·5–12·0μ lat., rigidis, vaginis hyalinis et crassis, 1·7μ crassitudine, trichomatibus coeruleo-aerugineis, contentu granulis sparsis, 6–6·7μ lat. articulis valde inequalibus, diametro semper longioribus, 9–24μ long. (Plate I, fig. 7.) C.

***putealis** Mont.—D, a form not more than 8μ broad with sheath, trichomes 7μ, cells mostly subquadrate.

***Rivulariarum** Gom.—SL, 0·9μ broad; L, C, VL; C, 0·8μ broad; LG, DL, Cr.

subtilis West.—M, 1·5–1·6μ broad, 2·2–2·5μ long; W; I, 1·6μ broad, 2–2·1μ long; RL, 1·6μ broad; L.

Sub-fam. Schizotricheae.

***Inactis tinctoria** (Ag.) Thur.—LG; M, trichomes 1–1·5μ broad.

Dasygloea amorpha Berk.—SL, AS.

Fam. **Nostocaceae.**

Sub.-fam. Heterocystidae.

***Nostoc. minutum** Desm.—W, C; L, trichomes 3–3·3μ broad; LG, I, CI, B. This was often noticed within the empty tests of Rhizopoda.

coeruleum Lyngb.—CP.

***Anabaena confervoides** Reinsch.—C, a small form, 1·4–1·8μ broad, heterocysts 2·5μ broad, 4μ long, subangular; D, trichomes 2μ broad.

Flos-aquae (Lyngb.) Bréb.—L, RL, CI; Cr, trichomes 4–6μ broad, heterocysts 8·5 broad.

var. **MINOR**, var. nov.—Var. ut in forma typica sed latitudine cellularum 2·5–3μ, heterocystis 3·5–4·5μ. C.

Hassallii Wittr.—W.

oscillarioides Reinsch.—VL, 3–3·2μ broad, heterocysts 3·4–3·6μ broad, 4·2–5·4μ long.

variabilis Kütz.—C, 2·5–3μ broad; L, M, B.

***inaequalis** (Kütz.) Born. & Flah.—N. W. of D, trichomes 5μ broad, spores 12·5–15μ long, 6–6·7μ broad, heterocysts sub-spherical, 6μ broad.

Fam. **Scytonemaceae.**

***Plectonema nostocorum** Born.—L; AS, with *Dasygloea amorpha, Stigonema turfaceum* and other algae.

***Scytonema amplum** W. & G. S. West—forma **HIBERNICA**, f. nov.—F. filis 13–15μ lat., trichomatibus 3·2–3·5μ lat., aerugineis, vaginis achrois. IT.

Tolypothrix distorta (Hofm.-B.) Kütz.—C, VL, CI; M, sheaths 15μ, trichomes 9μ.

lanata (Desv.) Wartm.—M.

tenuis Kütz.—C.

Fam. **Stigonemaceae.**

Hapalosiphon hibernicus W. & G. S. West.—C; W, 7–9μ broad; M; LG, associated with *Bulbochaete insignis*; S.W. of D, 8–9μ broad in several places.

Stigonema mammillosum (Lyngb.) Ag.—M.

minutum (Ag.) Hass.—C, M, RL, D.

turfaceum (Berk.) Cooke.—I, AS, D.

Sub-order TRICHOPHOREAE.

Fam. **Rivulariaceae.**

Calothrix fusca (Kütz.) Born. et Flah.—L; SL, sheaths up to 13·5μ broad, trichomes 6–8·4μ broad.

parietina (Näg.) Thur.—M.

Rivularia beccariana (De Not.) Born. et Flah.—C, abundant on stones in tumbling rill on Croaghmore, many measured up to 3·5 millimetres, 1 mm. is the usual measurement. This was exceptionally fine in one place where *Trichocolea tomentella* occurred.

haematites (DC.) Ag.—W.

nitida Ag.—On rocks near Roonah Point near L.

echinulata (Sm.) Born. et Flah.—C; plankton of LG.

[Such plants as *Rivularia atra*, which always grow subject to salt-water influence, I have purposely left to the marine algologist.]

Class FLAGELLATA.

Dinobryon cylindricum Imhof. var. **divergens** Lemm.—C.

elongatum Imhof., var. **undulatum** Lemm.—CP, D.

protuberans Lemm.—C, I, CI.

sociale Ehrenb.—D, VL, M.

Sertularia Ehrenb.—C.

var. **thyrsoideum** (Chod.) Lemm.—C, CP, S. W. of D.

Euglena viridis Ehrenb.—C, L, W, CP.

***Synura uvella** Ehrenb.—S. W. of D.

Class PERIDINIEAE.

Glenodinium pulvisculus (Ehrenb.) Stein.—C, M, I, CI, SL, Cr, D.

Ceratium hirundinella O. F. Müller.—K, Ac, LG, VL.

cornutum (Ehrenb.) Clap. et Lachm.—Cr; SL, associated with abundance of *Anuraea cochlearis* and *Notholca longispina*.

Tripos (Ehrenb.).—DL. These agreed with published figures of this plant, the examples were scarce, and may have been brought to the fresh-water lake (which is close to the sea) by the numerous gulls.

Peridinium tabulatum (Ehrenb.) Clap. et Lachm.—SL.

Willei Huitfeldt-Kaas.—C, As, D, SL.

ASSOCIATIONS OF ALGAE.

Associated with *Oedogonium Braunii* as the dominant feature in one pool in Clare Island were:—*Pediastrum tetras* in great abundance, *Coelastrum sphaericum* frequent, *Lyngbya Rivulariarum* mostly clinging to and around the Oedogonium, *Anabaena inaequalis* mostly agglutinated to the Oedogonium by its sheath, and various forms of *Scenedesmus quadricauda* with *Tetrapedia reinschiana*. Mixed up with the rest, but in much smaller quantity, were:—*Scenedesmus obliquus, S. acutiformis* v. *brasiliensis, Pediastrum boryanum* v. *productum, Tetraedron caudatum, Ankistrodesmus falcatus, Merismopaedia tenuissima, Dactylococcopsis fascicularis* v. *subrecta, Staurastrum punctulatum* var. *pygmaeum, Cosmarium laeve* var. *octangularis, C. humile, C. Meneghinii, C. punctulatum* var. *subpunctulatum.*

In a pool near the light-house on Clare Island the following were in a mixed association with *Sphagnum cuspidatum* and *S. subsecundum*:—*Eremosphaera viridis, Ulothrix variabilis, Chlorobotrys regularis, Ophiocytium cochleare, Botryococcus Braunii, Asterococcus superbus, Scenedesmus bijugatus, Dimorphococcus lunatus, Schizochlamys delicatula, Microthamnion kuetzingianum, Glenodinium cinctum, Chroococcus minor, Nostoc microscopicum, Navicula viridis, N. Tabellaria, Vanheurckia rhomboides* v. *saxonica, Netrium Digitus, Closterium Lunula, C. Cynthia, C. calosporum, C. turgidum, Euastrum bidentatum, E. elegans, E. Didelta, E. binale, Micrasterias apiculata*, v. *fimbriata, M. angulosa, M. rotata, Cosmarium angulosum* v. *concinnum, C. Cucumis, C. Brebissonii, C. difficile* v. *laeve, Xanthidium antilopaeum, Tetmemorus granulatus, T. Brebissonii, Staurastrum margaritaceum, S. aciculiferum, S. polymorphum, S. hirsutum, Desmidium cylindricum, Hyalotheca dissiliens*, &c.

An association in a small pool on the top of Croaghmore, Clare Island, at about 1,500 feet elevation, contained as the main feature *Chroococcus turgidus*; in much smaller quantity were *C. macrococcus* and *C. pallidus*; *Tribonema bombycina* was also in quantity; the rest consisted of *Vanheurckia rhomboides* v. *saxonica, V. vulgaris, Navicula viridis, Gloeocystis vesiculosa, G. rupestris, Aphanocapsa testacea, Mesotaenium macrococcum* v. *micrococcum, Euastrum binale* v. *Gutwinskii, Cosmarium Cucurbita, C. sphagnicolum, Staurastrum margaritaceum, S. Avicula* v. *subarcuatum*, &c.

Another association from a pond of fairly aerated water near the hotel, Clare Island, was chiefly *Rhizoclonium hieroglyphicum* and *Cladophora flavescens*, amongst which were *Ulothrix variabilis, Myxonema nanum, Lyngbya Rivulariarum, Characium Prinjsheimii* epiphytic on a sterile Oedogonium,

Scenedesmus horridus, Cosmarium laeve, Merismopaedia glauca, Synedra pulchella, Diatoma elongatum, Fragilaria mutabilis, Rhoicosphaenia curvata, Navicula elliptica, N. cryptocephala, N. amphisbaena, &c.

In an association in a pool on Croaghmore, among a small quantity of a barren Œdogonium and a Bulbochaete the dominant species was *Closterium moniliferum*, and *Netrium Digitus* was sub-dominant; the rest are enumerated in point of order as to their prevalence:—*Tabellaria flocculosa, Spondylosium pulchellum, Cosmarium angulosum* v. *concinnum, Oocystis solitaria, Cylindrocystis Brebissonii, Chlorobotrys regularis, Navicula Brebissonii, Hillhousia* sp., *Achnanthes exilis, Mastogloia Smithii, Euastrum pectinatum, E. denticulatum, Micrasterias denticulata*, &c.

Associated in very varying proportions with *Cladophora flavescens* as the dominant alga (considering bulk only) in one pool (quite a different locality from the last one for the same alga) on Clare Island were:—*Mougeotia* sp. (sterile), *Cosmarium subtumidum* v. *minor, C. subcrenatum, C. laeve* v. *cymatium, C. Botrytis* v. *mediolaeve, Cocconema gastroides, C. Cistula, Cocconema leptoceras* v. *elongata, Achnanthes exilis, Gomphonema olivaceum, G. parvulum Cocconeis Placentula* and its variety *lineata* (by far the most abundant diatom epiphytic on the Cladophora), *Denticula tenuis* v. *frigida, Epithemia turgida, Eunotia major, Navicula limosa, N. cryptocephala, N. seminulum, N. lanceolata* v. *phyllepta*, &c.

The following were associated with *Utricularia minor* in Lough Avullin in Clare Island; the first four enumerated were dominant collectively; if any of the four showed prevalence, it was the first one:—*Cosmarium rectangulare* (*gotlandicum*), *Chlorobotrys regularis, Xanthidium Smithii, Staurastrum aciculiferum, S. margaritaceum, S. punctulatum, S. muticum* f. *minor, Spondylosium pulchellum, Euastrum binale, Tetmemorus Brebissonii, Penium Cylindrus, Hyalotheca dissiliens, Schizochlamys delicatula, Oocystis solitaria, Crucigenia rectangulare, Botryococcus Braunii, Chroococcus macrococcus, Gloeocapsa montana* (probably washed in from turfy bank), *Vanheurckia rhomboides* and its var. *saxonica, Binuclearia tatrana, Mougeotia* sp. (sterile), *Oedogonium* (2 sterile spp.).

An association (Clare Island) among a gathering of *Mougeotia gracillima* with zygospores and another sterile species of *Mougeotia*, consisted of the following, enumerated as nearly as possible in the order of their prevalence:—*Tetmemorus granulatus, Hyalotheca dissiliens, Pleurotaenium Trabecula* v. *clavatum, Closterium striolatum, Tabellaria flocculosa, Euastrum bidentatum, Staurastrum punctulatum, S. orbiculare* v. *Ralfsii, S. Meriani, S. sexcostatum, Euastrum pectinatum, Myxonema nanum, Cosmarium tinctum, Surirella pinnata*, &c.

Another Sphagnum-pool, chiefly *S. plumosum*, Clare Island, yielded a very mixed association, no species showing dominance:—*Tetmemorus granulatus, T. Brebissonii, T. laevis, Netrium Digitus, Staurastrum sexcostatum, Euastrum dubium, E. denticulatum, E. ansatum, E. Didelta, E. bidentatum, E. binale* f. *minor, Micrasterias truncata* (the last two rather more abundant), *M. denticulata, Cosmarium Regnellii* (rather frequent), *C. pygmaeum, Closterium intermedium, C. Lunula, Eremosphaera viridis, Anabaena Flos-aquae* v. *minor, Synedra Acus, S. pulchella, Vanheurckia rhomboides* and its var. *saxonica, Navicula Tabellaria, N. mesolepta* and its var. *Termes, N. viridis, N. major, Tabellaria flocculosa, Eunotia lunaris, Dinobryon Sertularia*, &c.

A tuft of *Microspora abbreviata* was examined from Clare Island for its associates; the three first enumerated were the most abundant; all are placed in the order of their relative abundance in the gathering:—*Cosmarium rectangulare, Chlorobotrys regularis, Staurastrum aciculiferum, Netrium Digitus, Oocystis solitaria, Vanheurckia rhomboides* v. *saxonica, Ulothrix variabilis, Œdogoninm* (sterile), *Euastrum binale, Micrasterias truncata, Euastrum bidentatum, Tetmemorus laevis, Gymnozyga moniliformis, Staurastrum margaritaceum*, &c.

Associated with a submerged species of Hypnum on Clare Island were:—*Eremosphaera viridis, Chlorobotrys regularis, Euastrum bidentatum*, and *Vanheurckia rhomboides* var. *saxonica*, the four together showing dominance; scattered among these occurred, but in much less proportion, *Tolypothrix tenuis, Ulothrix variabilis, Binuclearia tatrana, Microspora pachyderma, Gloeocystis gigas, Oocystis solitaria, Micrasterias truncata, Euastrum binale* with varieties, *Netrium Digitus, Tetmemorus granulatus, T. laevis, Cosmarium rectangulare, C. tinctum, C. Cucurbita, Spondylosium pulchellum, Staurastrum cuspidatum, S. punctulatum, S. muticum* v. *minor, Penium didymocarpon, Mesotaenium endlicherianum, Arthrodesmus Incus* v. *minor, Navicula viridis, N. mesolepta, Tabellaria flocculosa, Merismopedium glaucum, Chroococcus macrococcus, C. turgidus, Oscillatoria Agardhii, Dinobryon protuberans*, &c.

An association consisting of minute algae mostly, from a ditch near the chapel, Clare Island, was thus constituted:—*Desmidium Swartzii* and *Micrasterias denticulata* as the main features, the former species more abundant; then the following, all in small proportion, the first three being a little more abundant than the rest:—*Pleurotaenium truncatum, Closterium costatum, C. rostratum, C. pronum, C. Archeriarum, Euastrum oblongum, Penium Navicula, Spirotaenia condensata, Cosmarium subcostatum, C. ochthodes, C. Meneghinii, C. formosulum, C. Botrytis, Mougeotia viridis, Stauroneis Phoenicenteron, S. anceps, Navicula gibba, N. cryptocephala, Surirella robusta*,

S. biseriata, and a very small quantity of a barren Oedogonium (*Hydra vulgaris* was also present).

A large patch of *Cladophora glomerata* from the cliffs of Croaghmore had an association of diatoms upon and among it; the epiphytic *Cocconeis Pediculus* was the truly dominant one, and almost hid some parts of the Cladophora from view. The other species occurred in varying proportions, and I have written down the chief of them in the approximate order of their frequency:—*Cocconema gastroides, C. cymbiforme, C. Navicula, C. Brebissonii, Epithemia Sorex, E. zebra* and its variety *proboscidea, E. Hyndmanni* (small forms), *Eunotia Arcus* v. *minor, Synedra Acus, Gomphonema gracile* v. *dichotomum, Achnanthes exilis, Cocconema ventricosum, Diatoma elongatum, Navicula gracilis, N. viridis* (small forms), *Nitzschia Sigma* v. *rigida, Synedra Ulna, Gyrosigma Spencerii* v. *nodifera, Stauroneis anceps*, &c.

Near Dugort, Achill Island, associated in a pool along with *Batrachospermum vagum* were *Euastrum bidentatum* and *Spondylosium pulchellum* in fair quantity; next in point of numbers came *Desmidium cylindricum* and *Ophiocytium cochleare*, then in less quantity *Oocystis solitaria, Chlorobotrys regularis, Mougeotia* (sterile), *Oedogonium* (sterile), *Vanheurckia rhomboides* v. *crassinervia*; after these, and quite scattered, were *Penium Digitus, P. Navicula, Tetmemorus granulatus, Closterium Lunula, C. juncidum, C. acutum* var *Linea, Staurastrum margaritaceum, S. tetracerum, S. paradoxum, Cosmarium pygmaeum, C. subtumidum, C. pyramidatum, Euastrum ansatum, E. binale, Micrasterias truncata, Hyalotheca dissiliens* (with zygospores), *Eremosphaera viridis, Merismopedium glaucum, Tetrapedia reinschiana, Chroococcus minutus, Tabellaria flocculosa, Nitzschia Palea, N. subtilis, Navicula Brebissonii, N. viridis, N. nobilis, Vanheurckia rhomboides*, &c.

An association near the summit of Croaghaun, Achill Island, 2,192 feet elevation, consisted of the following in a very mixed manner, no species approaching either dominance or subdominance:—*Mougeotia* (sterile), *Oedogonium* (sterile), *Batrachospermum vagum, Binuclearia tatrana, Microspora abbreviata, Oocystis solitaria, Scenedesmus obliquus, Chlorobotrys regularis, Arthrodesmus octocornis, Staurastrum paradoxum, S. tetracerum, Closterium intermedium, Cosmarium tatricum, C. Cucurbita, C. Phaseolus* v. *elevatum, Euastrum binale, E. denticulatum, Navicula viridis, N. Brebissonii, Vanheurckia rhomboides* v. *saxonica, Eunotia lunaris*, &c.

Associated in a scattered manner with *Bulbochaete insignis* in Lough Gall, Achill Island, were:—*Hapalosiphon hibernicus, Lyngbya Rivulariarum*, 2 sterile species of *Spirogyra*, 1 of *Zygnema*, 2 delicate species of *Oedogonium*, (one was not more than 3·3μ in diameter, and might be either *inconspicuum* or *excisum*; the thickest specimens of the other were 5μ broad, the size of

pusillum), *Caelosphaerium kuetzingianum, Aphanotheca microscopica, Dactylotheca Braunii, Staurastrum paradoxum, S. denticulatum, Euastrum binale* v. *hians, Scenedesmus quadricauda, Pediastrum glanduliferum,* &c.

A large tuft of a sterile Vaucheria from near Westport was examined to ascertain what was the association of other algae *amongst* it. It turned out to be mostly a Diatom association; I enumerate some—the chief of the species present, in the order of their prevalence:—*Tabellaria flocculosa, Fragilaria capucina, Synedra Ulna, Amphora ovalis, Navicula viridis, N. nobilis, N. viridula, Eunotia praerupta, E. pectinalis, Cocconema gastroides, Surirella ovalis, S. biseriata, Gomphonema montanum* v. *commutatum, Nitzschia Palea, Meridion circulare, Stauroneis anceps, Navicula limosa,* N. *bicapitata, N. appendiculata, N. pusilla, &c.* A few chlorophyllaceous algae were also present in small quantity:—*Ulothrix aequalis, Ankistrodesmus falcatus, Selenastrum gracile, Staurastrum orbiculare, S. punctulatum, Cosmarium Botrytis* and *Closterium Cynthia.*

MARINE DIATOMS.

The following contractions for localities have been used:—

AS = Achill Sound.
BB = Bellacragher Bay.
C = Shores of Clare Island (no definitely indicated place thereon).
CB = Clew Bay.
CNE = Clare Island, N.E. shore, includes a number of different gatherings.
K = Kinnacorra, Clare Island.
M = Mulranny.

Class BACILLARIACEAE (DIATOMACEAE).

Div. I. RAPHIDIEAE.

Tribe **Cymbelleae.**

Amphora angularis Greg.—CB.
***marina** V. H. (*non* W. Sm.)—AS.
salina W. Sm.—CB, C; CNE, 28-41μ long; L, mouth of Bunowen River, 38μ long.
***Proteus** Greg.—AS.
***veneta** Kütz.—CB, CNE.

Tribe **Naviculeae.**

Gyrosigma angulatum (Quek.) O.K.—CB, 150 × 31·6μ.
affine (Grun.) O.K.—AS, a narrow form 173 × 28·5μ.

Gyrosigma balticum (W. Sm.) O.K.—CB, 260 × 28μ; CNE.

var. **ATLANTICUM** var. nov.—G. cellulis minoribus brevioribusque constante sed formae ejusdem ut in forma typica. CB.

distortum (W. Sm.) O.K.—CB, 92 × 16·6μ.

formosum (W. Sm.) O.K.—CB, 425 × 31μ.

Hippocampus (Hass.)—CB.

***rigidum** (W. Sm.) O.K.—CB.

strigilis (W. Sm.) O.K.—CB, 540 × 40μ.

Orthotropis lepidoptera (Greg.) Cleve.—CNE, 108μ long.

maxima Greg.—AS, 103 × 16·6μ, valve-view.

Plagiotropis elegans (W. Sm.) Grun.—C, up to 270μ long.

Schizonema Grevillei Ag.—C.

Navicula abrupta Greg.—M, 50 × 22μ.

***advena** Ad. Schm.—AS.

var. **parca** Ad. Schm.—AS; CNE, 37 × 12μ.

aspera Ehrenb.—CB, 66 × 14μ, a small form, also 105 × 14·5μ; CNE, 100 × 19μ, 104-16μ, 104 × 21μ, also short forms 56 × 14μ, 96 × 22μ, 140 23·5μ; AS, 63 × 21μ girdle-face; K.

Bombus Ehrenb.—AS, 63 × 27·5μ, isthmus 17·5μ; CNE, 50 × 20μ, isthmus 12·5μ; also 50–52 × 18μ, 55 × 24μ.

***balnearis** Grun. var. **MAJOR**, var. nov.—Var. cellulis duplo longioribus et latioribus quam forma typica, 70 × 22μ. CNE.

cancellata Donk.—CB, 68 × 16·5μ; CNE, 70 × 20·8μ.

cincta (Ehrenb.) Kütz.—C, 37–39 × 7·5–8μ (in a somewhat brackish place).

Crabro Ehrenb.—C, 96 × 31·6μ, isthmus 22·5μ.

digitoradiata Greg.—C, 50 × 10μ; L, mouth of Bunowen River, 69 × 12·5μ.

var. **Cyprinus** (W. Sm.) V.H.—AS, 72 × 19μ; CNE, 65 × 14·2μ.

didyma Ehrenb.—AS, 50 × 29μ; C, 29 × 12·5μ, common, a small form; CNE, 34–39 × 15–16μ, 12·5–13μ at isthmus.

***forcipata** Grev.—CB, 35 × 15μ; AS, 37 × 18μ; CNE, 31 × 12μ.

formosa Greg.—CNE, 148μ long.

fusca Greg. var. **hyperborea** (Grun.) V.H.—AS, 70 × 32·5μ.

var. **delicatula** Ad. Schm.—C, 47 × 23·5μ, a small form; CNE, 47 × 21μ.

granulata Bréb.—CB, 58 × 30μ, slightly retuse at sides, others 88 × 47μ, neither retuse nor almost flat at sides.

humerosa Bréb.—AS, 50 × 25μ.

interrupta Kütz.—CB, 53-65μ long, rather small forms; CNE, 57 × 19μ, 12·5μ at isthmus, a narrower form 60 × 17μ, 12·2 at isthmus.

Liber W. Sm.—CNE, large forms up to 170 × 23μ, also 92 × 18μ.

Navicula Lyra Ehrenb.—CB, 124μ long; AS, 115μ long; C.

f. **MINOR**, forma nova.—F. cellulis typicis in forma, sed multe minoribus, 64 × 28·2μ. Cn.

musca Greg.—C, 46 × 16·5μ; AS, 46 × 19μ, isthmus 15·2μ.

var. **PARVA**, var. nov.—Var. cellulis multe parvioribus. CB, 33 × 14·2μ; AS, 35 × 13·8μ, isthmus 9·1μ.

mutica Kütz.—C, very variable; M.

palpebralis Bréb.—AS; L, at mouth of Bunowen river, 56 × 20μ, valve-view.

Smithii Bréb.—C, a small form 54 × 25μ; AS, also small forms; CNE.

var. **MINOR**, var. nov.—Var. cellulis semper minoribus, 46 × 26μ. C.

trevelyana Donk.—K, 131 × 36μ girdle-view.

var. **MINOR**, var. nov.—Var. cellulis brevioribus et relative latioribus in visa cinctuare. AS, 60μ long, 20μ at widest part of girdle-face; a relatively shorter form.

****vacillans** Ad. Schm.—CNE, 25 × 10μ, constriction slight.

***Berkeleya Dillwynii** (Ag.) V.H.—CNE, 38 × 6μ.

Scoliopleura latestriata (Bréb.) Grun.—AS, 100 × 20μ.

Tribe **Gomphonemeae.**

Rhoicosphenia curvata (Kütz.) Grun. var. **marina** (W. Sm.) V. H.—C, L.

Tribe **Achnantheae.**

Achnanthes subsessilis Ehrenb.—C, CB; M, 36 × 12μ, valve-view.

brevipes Ag.—C; M, 56 × 12·5μ, a small form; L, 58 × 15·8μ; CNE, 56–63μ long.

***delicatula** Kütz.—C; M, 18–22 × 10μ, valve-view.

longipes Ag.—C, CB.

parvula Kütz.—AS, 13·3 × 8·3μ, some specimens occurred up to 21μ long; C.

Tribe **Cocconeideae.**

****Cocconeis danica** Flug.—CB.

***dirupta** Greg.—CB, 31 × 24·2μ; CNE, 29 × 23μ, 25 × 21μ, 18 × 13μ, 28 × 21μ; K.

molesta Kütz.—C, 17μ long; CNE, 18–20μ long, also up to 28 × 20μ, a large form.

pinnata Greg.—C, CB.

Scutellum Ehrenb.—C, AS; BB, extremely abundant; CNE, K.

f. **parva** V. H.—AS; CNE, from 10 to 6μ up to 25 × 18μ; M, K.

Div. II. PSEUDORAPHIDIEAE.

Tribe **Synedreae.**

Synedra affinis Kütz.—C, CB, CNE.
var. **parva** Kütz.—CNE, 31–55μ long, frequent.
var. **fasciculata** Kütz.—M, 57 × 5μ valve-view.
investiens W. Sm.—CB, C; up to 50 × 6μ valve-view, girdle-view 5μ; CNE, 30μ long, 3·8μ broad, girdle-view, frequent.
barbatula Kütz.—AS, 33 × 8μ.
Gallionii Ehrenb.—C, 176 × 10μ valve-view; AS, up to 216μ long; CNE, 116 × 9·1μ, 156 × 10μ; K, up to 225μ long.
nitzschioides Grun.—C.
****Asterionella japonica** Cleve.—CB.

Tribe **Fragilarieae.**

****Cymatosira lorenziana** Grun.—CB; CNE, 34μ long.
***belgica** Grun.—CB, 32μ long.
***Campylosira cymbelliformis** (A. Schm.) Grun.—CNE, 29–37μ long.

Tribe **Raphoneideae.**

***Raphoneis Surirella** Grun.—C; CB, 36–37 × 17μ.

Tribe **Licmophoreae.**

Licmophora flabellata (Carm.) Ag.—C; AS, very abundant, sizes measured were 97–180 long, 18μ broad girdle-view, 7μ valve-view.

Tribe **Tabellarieae.**

****Grammatophora angulosa** Ehrenb.—C, AS, K.
marina (Lyngb.) Kütz.—C, AS; CNE, 44μ long; K.
serpentina (Ralfs) Ehrenb.—C, 44–66μ long; CB, AS; CNE, 72·5–90μ long, also 47–64μ long × 9·5–10μ broad.
var. **pusilla** (Grev.) V.H.—AS.
Rhabdonema adriaticum Kütz.—C, 71–93μ long, valve-view 18·5–19μ; AS, 85μ long; CNE, 63–68μ long.
arcuatum (Ag.) Kütz.—C, 40μ long; AS; CNE, 33–54μ long.
minutum Kütz.—C, 15–27μ broad (only 10μ sometimes); CNE, up to 33μ broad; M; AS, 26μ broad; K.
****Striatella unipunctata** Ag.—CB, AS.
***delicatula** (Kütz.) Grun.—CNE, 10–13μ long.

Tribe **Surirelleae.**

Surirella fastuosa Ehrenb.—CNE, 81 × 50μ, 85 × 56μ; K.
var. **lata** (W. Sm.) V. H.—CB, 82·5 × 34μ; C, 76 × 38μ; CNE, 73 × 36μ, 68 × 41μ, 77 × 40μ.

Tribe **Nitzschieae.**

Hantzschia virgata (Roper) Grun.—L, at mouth of Bunowen River, 110 × 13μ, valve-view.
Nitzschia angularis W. Sm. var. **affinis** Grun.—C, 71 × 9μ.
apiculata (Greg.) Grun.—CB; CNE, 33·3 × 6·6μ.
bilobata W. Sm. var. **minor** Grun.—CNE, as small as 30 × 13μ, girdle-face.
***commutata** Grun.—CB, 86 × 12·5μ; CNE, 48μ long.
fasciculata Grun.—L, 76μ long.
***communis** Rabenh., var. **abbreviata** Grun.—C.
constricta (Greg.) Grun.—CNE, 45 × 14μ, width of constriction 11·8μ, other gatherings 41·7 × 14·2μ, width of constriction 12·5μ, 48 × 15·2μ, at constriction 13μ.
****lorenziana** Grun.—CB.
var. **incurva** Grun.—CB.
plana W. Sm.—CNE, 135 × 17μ.
punctata (W. Sm.) Grun.—AS, 24 × 14μ; CNE, 30 × 15·5μ; not at all subrostrate, obtuse. Also from brackish water near D.
spectabilis (Ehrenb.) Ralfs.—CB, up to 420μ long.
Tryblionella Hantzsch. var. **levidensis** (W. Sm.) V. H.—CB.
var. **littoralis** Grun.—CNE, 55μ long, 25μ broad.
***vitraea** Norm. var. **recta** (Hantzsch) V. H.—CB.

Division III. CRYPTORAPHIDIEAE.

Tribe **Chaetocereae.**

Sub-tribe Rhizosolenieae.

Guinardia flaccida (Castr.) Perag.—CB.
Rhizosolenia alata Brightw. var. **gracillima** (Cl.) V. H.—M.
***imbricata** Brightw. var. **Shrubsolii** (Cl.) V. H.—CB.
setigera Bright.—M.
styliformis Bright.—M.

Sub-tribe **Euchaetocereae.**

Chaetoceros decipiens Cl.—CB.
didymus (Ehrenb.) Cl.—CB.
***paradoxum** Cl.—CB.
***teres** Cleve.—CB.
***Wighamii** Brightw.—M; CB, 16–20μ broad.

Tribe **Melosireae.**

Skeletonema costatum (Grev.) Cl —CB, 10μ broad.
Melosira Borreri Grev.—AS; CB 41μ broad.
f. **MINOR** f. nov.—Lat. 11·6μ. CB.
nummuloides (Bory) Ag.—C, 33μ broad.
var. **hyperborea** Grun.—C, 12–15μ broad.
sulcata (Ehrenb.) Kütz.—AS, 24μ broad; CB, 23μ broad, also smaller forms
f. **minor** Richmond.—CNE.
***Druridgea geminata** Donk.—C.
***Hyalodiscus subtilis** Bail.—CB, 17–18μ broad; C, 21μ broad; AS, 23μ broad.
stelliger Bail.—CNE, 42–66μ broad, another gathering 36μ broad.
Cyclotella striata (Kütz.) Grun.—C; CB, 41μ broad; AS; CNE, sometimes not more than 20–22μ broad.

Tribe **Biddulphieae.**

Biddulphia antediluviana (Ehrenb.) V. H.—C, breadth of valve-view 42μ; CB; CNE, breadth of valve-view 43–52μ.
***laevis** Ehrenb. f. **minor** V. H.—C, CB, AS.
aurita (Lyngb.) Bréb.—CB, 24–25μ long; AS, 25–26μ long; CNE; C, 33μ long.
pulchella Gray.—CB, 87–90μ long, breadth at middle 58μ.
Smithii (Ralfs) V. H.—C, 42μ broad; CNE.
***Triceratium elegans** Grev. f. **pusilla** V. H.—CB, 14·5μ lat.

Tribe **Eupodisceae.**

Auliscus sculptus (W. Sm.) Ralfs.—CB, 52·5 × 48μ, valve-view.

Tribe **Heliopelteae.**

Actinoptychus undulatus Ehrenb.—CB, 46–70 broad; AS; CNE, 50–94μ broad.
***splendens** (Shadb.) Ralfs.—AS.

Tribe **Coscinodisceae.**

Coscinodiscus perforatus Ehrenb.—C, 74–80μ broad.
excentricus Ehrenb.—CNE.
Actinocyclus subtilis (Greg.) Ralfs.—CNE, 46–73μ broad.

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DESCRIPTION OF PLATES.

PLATE I.

Fig.

1. *Euastrum oblongum* Ralfs, after division, one semicell not completely developed. × 250. Mulranny.
2. *Reinschiella curvata* sp. nov. × 250. Clare Island.
3. *Zygnema leiospermum* De Bary. × 300. Dugort. To show that the individual cells become physiologically sexual when conjugating.
4. *Oedogonium* sp. × 300. Collected in April; every other cell was often firmly encrusted—sometimes many cells successively—with what looked like an oxide of iron; and in some cases there seemed to be the remains of two successive coatings.—Clare Island.
5. *Closterium angustatum* Kütz., var. *asperum* var. nov. × 232. Westport.
6. *Closterium Toxon* West, var. *validum* var. nov. × 300. Clare Island.
7. *Lyngbya cliarensis* sp. nov. × 300. Clare Island.
8. *Tetmemorus Brebissonii* (Menegh.) Ralfs, abnormal. × 300. Clare Island.
9. *Tetmemorus*, abnormal. × 250. Dugort.
10. Zygospore of *Tetmemorus laevis* (Kütz.) Ralfs. × 300. Dugort.
11. *Euastrum*, abnormal division. × 300. Clare Island.
12. do. do., × 300. Dugort.
13. *Closterium eboracense* Turn., var. *achillense* var. nov. × 100. Sraheens Lough.
14. *Micrasterias denticulata* Bréb. × 250. To show variability of the polar lobes. Clare Island.

Plate II.

Fig.

15. *Closterium Lunula* (Müll.) Nitzsch. To show apices. × 228. Dugort.

16. *Closterium eboracense* Turn. var. *achillense* var. nov. To show apices. × 420. Sraheens Lough.

17 &18. *Micrasterias denticulata* Bréb., after division, the new semicells not completely developed; one with abnormality of the polar lobe. × 250. Clare Island.

19. *Cosmarium Ralfsii* Bréb., var. *rotundatum* var. nov. × 250. Westport.

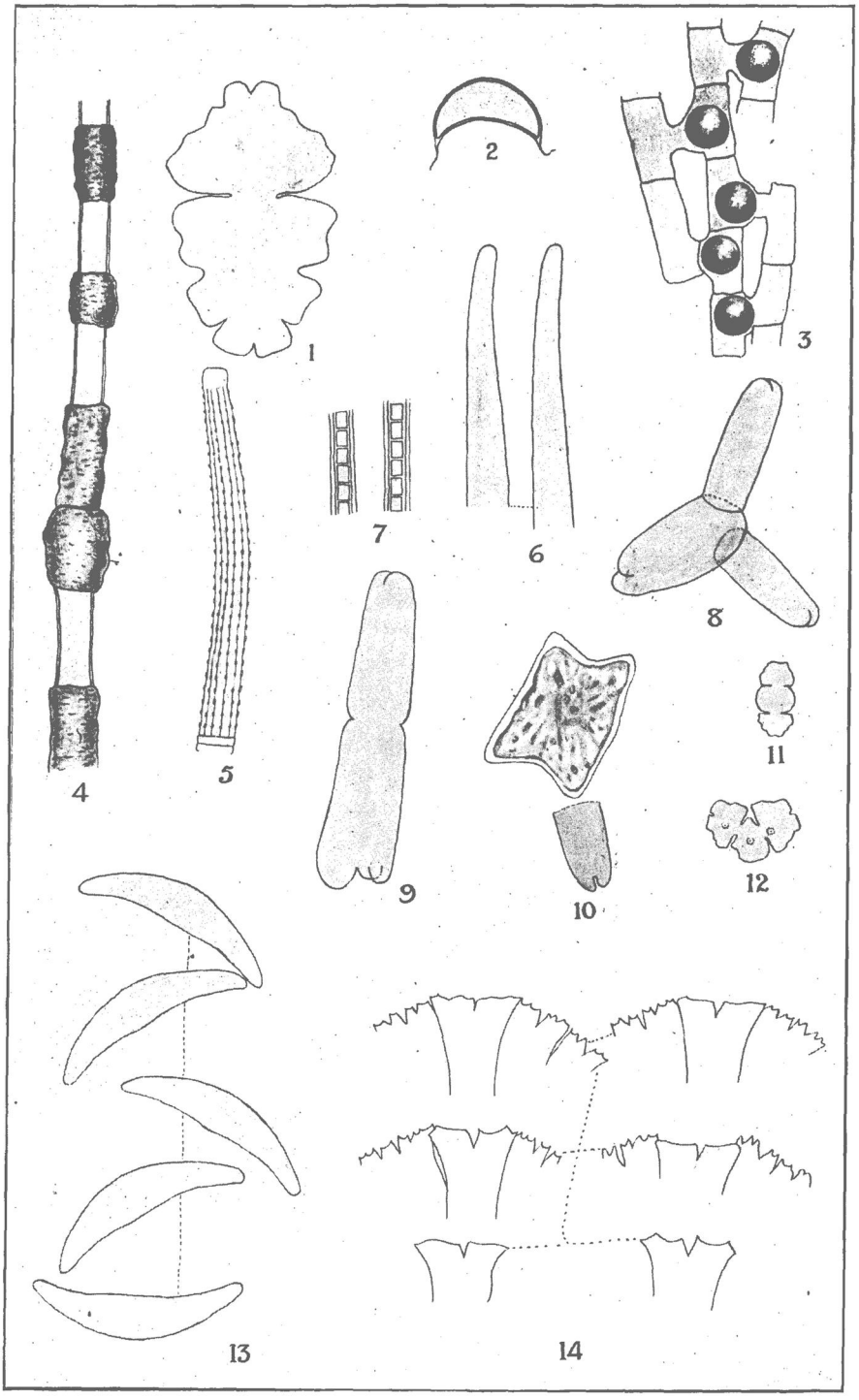
20. do. do. var. *montanum* Racib. × 300. Dugort.

21. *Eunotia lunaris* (Ehrenb.) Grun. var. *emarginatovelida* var. nov. × 500. Dugort.

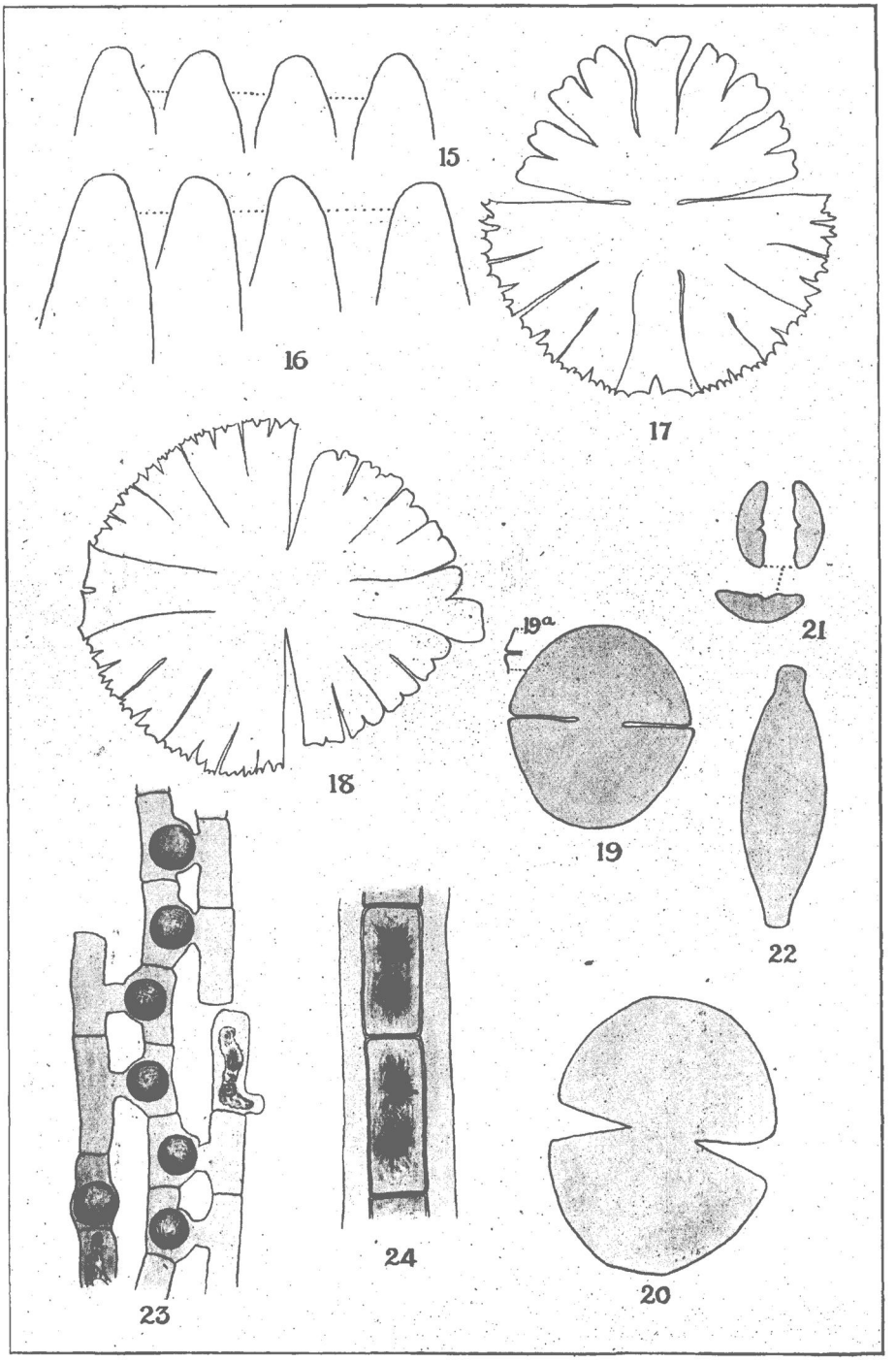
22. *Navicula peregrina* Kütz., var. *producta* var. nov. × 300. Clare Island.

23. To illustrate the same as Fig 3. × 300. Dugort.

24. *Zygnema* sp. with a distinct mucous investment, as in *Hyalotheca dissiliens.* × 300. Clare Island.



CLARE ISLAND SURVEY.—WEST: FRESH-WATER ALGAE.



CLARE ISLAND SURVEY.—WEST: FRESH-WATER ALGAE.