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NOTES ON THE PHYTO-PLANKTON OF THE BAY OF FUNDY AND PASSAMAQUODDY BAY.

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In previous publications relating to the Diatoms of New Brunswick and Prince Edward Island, fairly complete lists of these, as found at a series of localities along the Atlantic coast, have been given, but no attempt has been made to distinguish between littoral or neritic and deeper water or planktonic forms, or to show the relations of either of these to differences of season and environment. Yet it is obvious that, as with other plants, such varying relationships do exist, and as their varying abundance must directly affect the food supply of the different animals, such as young fishes, oysters, etc., which feed upon them, as complete a knowledge as possible upon these points is highly desirable.

The present notes are intended mainly to apply to the Phyto-Plankton of the bay of Fundy and Passamaquoddy bay, though occasional references are made to points on the north shore of New Brunswick and to Prince Edward Island. Moreover, as the line between planktonic and non-planktonic forms is ill-defined, species ordinarily regarded as neritic are not unfrequently met with far from shore, and may even constitute a considerable part of any planktonic gathering. In the following pages, lists of such gatherings from numerous localities are given for the various months of the year, excepting December, for which latter month no data are yet available.

I. SEASONAL AND DISTRIBUTIONAL VARIATIONS IN THE PHYTO-PLANKTON.

(*a*) *January.*

The following records were made during this month:—

Biological Station, January 1.

Chætoceras decipiens, Cleve. Abundant.
Biddulphia aurita, Breb.
Coscinodiscus eccentricus, Ehr.
A fine Radiolarian (*Actinophrys?*).

Chance Harbour, January 12.

Diatoms few, mainly—
Coscinodiscus eccentricus, Ehr.
Actinoptychus undulatus, Kutz.
Chætoceras decipiens (few).
Biddulphia Mobilensis, Bailey.

Bald Head, January 15.

Biddulphia Mobilensis, Bail.=*B. Baileyi,* Sm.
Coscinodiscus eccentricus, Ehr.
Chætoceras decipiens, Cleve. = *Ch. sociale,* Land.
Skeletonema costatum, Grev.
Fragillaria.

Wilson's Beach, January 16.

Biddulphia Mobilensis, Bail.
Coscinodiscus eccentricus, Ehr. Common.
Rhizosolenia setigera, Br.

Friar's Bay, Campobello, January 26.

Diatoms few.
Chætoceras decipiens, Cleve.

Head Harbour, Campobello, January 27.

Biddulphia Mobilensis, Bail.
Coscinodiscus eccentricus, Ehr.
" *concinnus,* W. Sm.
Chætoceras decipiens, Cleve.
" *boreale,* Bail. Rare.
Rhizosolenia setigera, Br.

St. John Harbour, January 27.

Diatoms few.
Biddulphia Mobilensis, Bail.
Actinoptychus undulatus, Kutz.
Coscinodiscus eccentricus, Ehr.
Paralia sulcata.
Rhizosolenia setigera, Br.

Seely's Cove, January 31.

Biddulphia Mobilensis, Bail.
Coscinodiscus asteromphalus, Ehr.
" *concinnus,* W.S.
Chætoceras decipiens. Rare.
Rhizosolenia setigera, Br.

Friar's Bay, Campobello, January 30.

Cocconeis scutellum, Ehr. In clusters on algæ. Abundant.

Letite.

Thalassiosira sociale. One specimen only.

Lepreau, January 29. Water temperature, 33° F.

Biddulphia Mobilensis, Bail.
Pleurosigma formosum, W.S.

(*b*) February.

The Plankton during this month is much richer, both in number and variety, than that of the preceding month. The following observations have been made:—

St. Andrews Harbour, February 19.

Chætoceras decipiens, Cleve.
" *sociale.*
Coscinodiscus eccentricus, Ehr.
" *radiatus,* Grun.
" *asteromphalus,* Ehr.
" *concinnus,* W.S.
Biddulphia aurita, Breb.
" *pulchella,* Gr.

Melosira subflexilis, Kutz.
Pleurosigma decorum, Sm.
" *formosum,* W.S.
" *strigosum* (?) W.S.
Rhizosolenia setigera, Br.
Paralia sulcata.
Skeletonema costatum, Grev.
Thalassiosira Nordenskioldii, Cleve.

Biological Station, St. Andrews, February 27.
Biddulphia aurita, Breb.
Actinoptychus undulatus, Ehr.
Chætoceras sociale, Land.
" *decipiens,* Cl.
Coscinodiscus eccentricus, Ehr.
Grammatophora marina, Kutz.
Pleurosigma fasciola, Sm.
" *decorum.*
Thalassiosira Nordenskioldii, Cleve.
Thalassiothrix.
Rhizosolenia setigera, Br.

Manawagonish, St. John County, N.B., February 5.
Coscinodiscus eccentricus, Ehr.
Ditylum Brightwellii, Grun.
Rhizosolenia setigera, Br.
Skeletonema costatum, Grev.
Thalassiosira nitschioides.

St. John, Reversing Falls, February 14. Temperature, 32° F.
Actinoptychus undulatus, Ehr.
Biddulphia Mobilensis, Bail.
Coscinodiscus asteromphalus, Ehr.
" *eccentricus,* Ehr.
" *radiatus,* Ehr.
Melosira subflexilis, Kutz.
Pleurosigma formosum.
" *fasciola,* W.S.

(*c*) *March.*

St. Andrews, N.B., West Light, March 17.
Chætoceras decipiens, Cleve.
" *sociale.*
Coscinodiscus concinnus, W.S., with chromatophores.
Biddulphia aurita, Breb.
Pleurosigma.
Thalassiosira Nordenskioldii, Cleve.

Joe's Point.
Biddulphia aurita, Breb.
" *pulchella.*
Chætoceras decipiens, Cleve.

Coscinodiscus asteromphalus, Ehr.
" *concinnus,* W.S.
" *radiatus,* Grun.
Melosira subflexilis, Kutz.
Rhizosolenia setigera, Br.

Doucett's (Dochet) Island, March 27.
Chætoceras decipiens, Cl.
" *sociale.*
Coscinodiscus eccentricus, Ehr.
Biddulphia pulchella.
" *aurita,* Breb.
Pleurosigma.
Thalassiosira Nordenskioldii, Cl.

St. Croix River, at mouth, March 28.
Diatoms abundant.
Biddulphia aurita, Breb. Common.
" *pulchella,* Gray. Common.
Chætoceras decipiens, Cl.
Coscinodiscus concinnus, W.S. Common.
" *asteromphalus,* Ehr. Common.
" *radiatus,* Grun. Rare.
Fragillaria capucina, Desm.
Melosira varians, Ag.
Rhizosolenia setigera, Br.
Thalassiosira Nordenskioldii, Cl.

Doucett's (Dochet) Island, March 27.
Chætoceras decipiens, Cl.
" *sociale.*
Coscinodiscus eccentricus, Ehr.
Biddulphia pulchella, Gray.
" *aurita,* Breb.
Pleurosigma.
Thalassiosira Nordenskioldii, Cleve.

St. Andrews Harbour, March 4.
Biddulphia aurita, Breb.
Chætoceras decipiens, Cl.
" *sociale,* Land.
Coscinodiscus asteromphalus, Ehr.
Melosira Jerghensii, Ag.
Pleurosigma.

Letite, March 28.
Biddulphia aurita, Breb. Common.
" *pulchella,* Gray. Abundant.
Coscinodiscus asteromphalus, Ehr. Common.
" *concinnus,* W.S. Common.
Chætoceras decipiens, Cl. Common.
" *boreale,* Bail. Rare.

(*d*) *April.*

St. Andrews, April 19.

Biddulphia aurita, Breb.
" *pulchella,* Gray.
Coscinodiscus eccentricus, Ehr.
" *concinnus,* W.S.
Chætoceras decipiens, Cl.
" *sociale,* Land.
Fragillaria capucina.
Thalassiosira Nordenskioldii, Cl.

St. Andrews, April 9.

Actinoptychus undulatus, Ehr.
Chætoceras decipiens, Cl. Few.
Biddulphia aurita, Breb.
Coscinodiscus eccentricus, Ehr.
Ditylum Brightwellii, Grun.
Nitschia sigmoidea, W.S.
" *closterium.*
Melosira Jerghensii, Ag.
Pleurosigma fasciola, W.S.
" *intermedium,* and others.

St. Andrews Harbour, April 17.

Biddulphia aurita, Breb. Abundant.
Chætoceras decipiens, Cleve.
Coscinodiscus asteromphalus, Ehr., with Chromatophores.
Thalassiosira Nordenskioldii. Two varieties. Very abundant.

Similar forms are met with at Navy island, Little Douchet islands, Mill Cove, Eastport, Campobello, and other points.

(*e*) *May.*

Robbinston, Me., in the waters opposite the Biological Station, St. Andrews, N.B., May 23 and 25.

Biddulphia pulchella, Gray.
Chætoceras decipiens, Cl.
Coscinodiscus concinnus, Sm.
Fragillaria capucina, Desm.
Pleurosigma decorum. Rare.
" (indt.).
Rhizosolenia setigera, Br.
Thalassiosira Nordenskioldii, Cl. Common.

(*f*) *June.*

West Quoddy, June 17.

Actinoptychus undulatus, Kutz.
Coscinodiscus. Rare.
Cocconeis scutellum, Ehr.
Gomphonema marinum.
Grammatophora serpentina, Ehr.
" *marina,* Kutz. Common in chains.
Navicula.
Pleurosigma fasciola, W.S.
Rhabdonema arcuatum, Kutz.

Biological Station, June 28.

Actinoptychus undulatus, Kutz.
Biddulphia aurita, Breb.
Coscinodiscus eccentricus, Ehr.
Melosira Jerghensii, Ag.
Navicula distans.
" *viridis,* Kutz.
Pleurosigma Balticum, W.S.
" *fasciola,* W.S.
Tabellaria.
Stephanopyxis.
Nitschia closterium, W.S.
" *vermicularis,* Grun.
Rhabdonema arcuatum, Kutz.

(*g*) *July.*

St. Andrews, N.B., near Indian Point, July 7.

Biddulphia aurita, Breb.
Chætoceras.
Coscinodiscus.
Navicula.
Pleurosigma strigosum (?).
Nitschia sigma, Sm.
Rhabdonema arcuatum, Kutz.
Synedra.

Some *Protozoans* were found and determined in this July collection, viz.:—

Tintinnopsis. Common.
Amphorella subulata.
Rotalia.
Discorbina.
Spirillina (?).
Distephanus speculum.

Eastport, Me., July 29.

Skeletonema costatum, Grev.
Actinoptychus undulatus, Ehr.
Amphiprora alata, Kutz.
Thalassiosira Nordenskioldii, Cleve.
Chætoceras decipiens, Cl.
" *sociale,* Land.
Coscinodisus asteromphalus, Ehr.
" *concinnus,* S.M.
" *eccentricus,* Ehr.

(*h*) *August.*

Friar's Bay, Campobello, August 1.

Fragillaria capucina, Desm.
Chætoceras decipiens, Cl.
" *crinitum,* Schutt.
Nitschia seriata, Cl.
Rhoicosphrenia curvata, Grun.
Rhizosolenia setigera, Br.
Skeletonema costatum, Grev. Rare.

Eastport, August.

Coscinodiscus asteromphalus, Ehr.
" *concinnus,* W.S.
Isthmia nervosa. Rare.
Grammatophora serpentina, Ehr.

West Quoddy.

Actinoptychus undulatus, Ehr.
Fragillaria.
Cyclotella.
Grammatophora marina, Kutz.
" *serpentina,* Ehr.

Chamcook Harbour.

Coscinodiscus asteromphalus, Ehr. Common.
" *concinnus,* W.S. Common.

White Horse.

Coscinodiscus eccentricus, Ehr. Common.
" *asteromphalus,* Ehr. Common.

St. Martins, August, 1910.

Amphora.
Amphiprora alata, Kutz.
Amphipleura sigmoidea, W.S.
Actinoptychus undulatus, Kutz.
Coscinodiscus eccentricus, Ehr.
Grammatophora marina, Kutz.
Melosira nummuloides, Ag.
" *Jerghensii,* Ag.
Navicula Smithi, Breb.
" *didyma,* Kutz.
" *rhyncocephala,* Kutz.
" *distans.*
Nitschia sigma, W.S.
" *sigmoidea,* W.S.
" *dubia.*
" *vermicularis,* Hautz.
Pleurosigma obscurum, W.S.
Plagiotropis vitrea, Grun.
Rhabdonema arcuatum, K.
Stauroneis salina, W.S.
Surirella striata.
" *ovalis,* Breb.
" *constricta.*
" *Molleriana* (?) Grun.
Synedra gracilis.
" *radians,* W.S.
Triceratium alternans, Bail.
Tryblionella.

L'Etang Harbour, August 10.

Coscinodiscus asteromphalus, Ehr. Very abundant.
Biddulphia Mobilensis, Bailey.
Chætoceras.

Cocconeis scutellum, Ehr. Rare.
" *placentula*, Ehr.
Grammatophora serpentina, Ehr.
Paralia (*Melosira*) *sulcata*.
Nitschia sigma, W.S.
Rhizosolenia setigera, Br.
Pleurosigma fasciola, Sm.
" *formosum*, W.S.
Skeletonema costatum, Grev.
Thalassiosira Nordenskioldii, Cleve.

Deadman's Harbour, August 10.

Chætoceras. Common.
Ditylum Brightwellii, Grun. Common.
Asterionella. Very rare.
Rhizosolenia setigera, Br.
Skeletonema costata. Common.
Thalassiosira Nordenskioldii, Cl.

Tynemouth Creek, St. John County, N.B., August.

Chætoceras.
Biddulphia Mobilensis (= *B. Baileyi*), in great numbers, making up the larger part of the plankton.
Coscinodiscus asteromphalus, Ehr.
" *radiatus*, Ehr.
Doryphora amphiceros, Kutz. (= *Raphoneis*).
Pleurosigma Balticum, Sm.
Actinoptychus undulatus.
Rhizosolenia setigera.
Navicula didyma.

Narrows of St. John River, New Brunswick, August 10.

Actinoptychus undulatus, Ehr.
Asterionella.
Amphiprora ornata, Bail.
Bacillaria paradoxa, Gmel.
Coscinodiscus minor, Ehr.
Doryphora Boeckii, W.S.
Gomphonema.
Campylodiscus cribrosus, W.S.
Cocconeis scutellum, Ehr.
Melosira nummuloides.
" *subflexilis*.
Navicula elliptica, K.
" *viridis*, Kg.
" *ovalis*, W.S.
Pleurosigma.
Synedra salina, W.S.
Surirella striatula, Turp.
Tabellaria fenestrata, Kutz.
Tryblionella.
Rhoicosphenia curvata, Grun.
Homœcladia sigmoidea, W.S.
Zygoceros (*Biddulphia*) *Mobilensis*, Bail.
Isthmia enervis, Ehr.

St. John Harbour and Docks, August.

Actinoptychus undulatus.
Amphiprora alata.
Acnanthes longipes.
" *subsessilis.*
Bacillaria paradoxa.
Biddulphia aurita. Common.
Cocconeis scutellum.
" *pediculus.*
Coscinodiscus radiatus.
" *minor.*
" *eccentricus.*
Cocconema cistula.
Cyclotella striata.
Gomphonema geminatum.
Melosira nummuloides.
" *Jerghensii.*
" *varians.*
Navicula didyma.
" *maculata.*
" *ovalis.*
" *distans.*
Nitschia closterium.
" *sigmoidea.*
" *vermicularis,* Hantz.
Orthosira marina.
Pleurosigma fasciola.
Rhabdonema arcuatum.
" *minutum.*
Surirella gemma.
Tryblionella gracilis.
Triceratium alternans.
Raphoneis (Doryphora) Boeckii.
" *amphiceros.*

(*i*) *September.*

" PRINCE " COLLECTION.

September 8. Station 17, Yarmouth Harbour; 7 fathoms.
Diatoms almost wanting in the plankton.

September 18. Station 5, Bay of Fundy, between Head Harbour and the Wolves; 51 fathoms.
Skeletonema. Abundant.
Nitschia seriata. Rare.
Coscinodiscus, with bright green chromatophores.

September 19. Station 20, Bay of Fundy, off St. John Harbour.
Diatoms few. Copepods abundant.

September 20. Station 21, Kennebecasis Bay, at east end of Long Island.
Copepods only.

September 21. Station 22, St. John River, near mouth of Kennebecasis River.
Melosira subflexilis.
Thalassionema.

September 21. Station 23, Bay of Fundy, between St. John and Digby, N.S.
Melosira subflexilis, in numerous chains and the only Diatom present excepting *Biddulphia Mobilensis,* rare. Copepods abundant.

September 22. Station 26, Annapolis Basin, above Annapolis.
A few *Coscinodisci* occurred.

September 23. Station 24, Bay of Fundy, between St. John and Digby.
No diatoms. Copepods only.

September 23. Station 25, Bay of Fundy, off Digby Gut.
No diatoms.

September 25. Station 26, Basin in river inside Annapolis Royal.
Rhizosolenia setigera abundant in fine groups. Copepods abundant.

September 26. Station 27, Annapolis River, near Goat Island.
Rhizosolenia setigera abundant, but no other diatoms present.

September 27. Station 28, lower end of Annapolis Basin.
Coscinodiscus.
Rhizosolenia setigera, with spear-like terminal spine.

(*j*) *October.*

October 3. Station 4, Passamaquoddy Bay.
Great quantities of *Synedra*-like cylinders dotted on margins. Supposed to be a variety of *Thalassionema.* Other forms wanting.

October 9. Station 6, St Croix River between the Biological Station and Robbinston, Me.
Same as Station 4.

October 16. Station 10, Eastern Entrance to St. Andrews Harbour.
Ditylum. Abundant, with chromatophores.
Chætoceras decipiens.
Coscinodiscus eccentricus. Rare.
Rhizosolenia setigera.

October 2. Station 6, St. Croix River.
Coscinodiscus asteromphalus.
" *radiatus.*
Ditylum. Rare.
Thalassionema (?).

October 19. Station 19, St. John Harbour.
Biddulphia Mobilensis, in chains.
Coscinodiscus. Rare.
Rhizosolenia setigera.

October 3. Station 9, Off Grand Manan.

Coscinodiscus eccentricus.
Chætoceras decipiens. Rare.
Ditylum. Common.
Rhizosolenia setigera. Common.
Thalassionema (?). Very abundant.
Copepods few.

October 9. Station 10, St. Andrews Harbour.

Principally *Thalassionema.* Abundant.
Chætoceras decipiens.
Ditylum. With fringed extremities. Rare.
Rhizosolenia setigera.
Copepods few.

October 27. Station 25, Bay of Fundy, off Digby Gut.

Chætoceras decipiens.
Thalassionema. Abundant.
Copepods, etc. Abundant.

II. NOTES ON THE MORE CHARACTERISTIC GENERA.

Acnanthes.—Though the species of this genus are usually attached by a stipe, and therefore not strictly planktonic, they are still not unfrequently found as isolated frustules or small chains in planktonic gatherings. The most common species is *A. subsessilis,* found along with *A. longipes* in St. John harbour in August, and near Grand Manan, also in Passamaquoddy bay and the St. Croix river. The genus is more common on the north shore of New Brunswick.

Actinoptychus.—Like most genera of circular form, this genus is free-floating, and though nowhere very abundant, is widely distributed. The only species is *A. undulatus.* It was found in Chance harbour, in January; at the Biological Station, February 19, in the reversing Falls, St. John, February 14, near St. Andrews, April 9, West Quoddy, June 17, Biological Station, June 28, West Quoddy, August 1, St. Martin's bay, August, Narrows of St. John river, August 10, but was not observed in any of the samples of the "Prince" collection in September and October. No marked differences except as regards these latter months as to relative numbers have been observed, either as regards distribution or season.

Amphiprora.—The members of this beautiful genus occur but sparingly in the plankton; but owing to their delicacy and transparency, the result of imperfect silicification, are apt to be overlooked.. *Amphiprora alata,* the most common form, was found at Eastport, July 29, St. John harbour and St. Martins in August; but was rare at both. The very beautiful but rare *Amp. ornata* was obtained, but one specimen only, in the Narrows of the St. John river, August 10.

Asterionella.—This is a typically planktonic genus, common in the plankton of Europe, as well as America, but is very rare in that of New Brunswick. A species, doubtfully referred to *As. Berkeleyi,* has been found in considerable numbers at some stations in the Bay of Fundy.

Biddulphia.—This is a very characteristic plankton genus, the attachment of the frustule to form chains of considerable length adapting its members readily to flotation.

Of its species the most common is *B. aurita,* found on almost all gatherings, and at almost every season. It occurs in January at the Biological Station; at St. Andrews, again in February; in March and April at various stations on the St. Croix river and Passamaquoddy bay, as also in June and July. It is common in the waters of St. John harbour in August, and probably occurs, though not yet recorded, in the later months. No examples were noted in the "Prince" series. The much larger species *B. Mobilensis* (=B. Baileyi) was found at Chance harbour, Bald Head, Campo Bello, St. John harbour, Seely's Cove, and Lepreau, at different dates in January (the water temperature being 33° F.), and on February 14 at the Reversing Falls, St. John. It was not observed during the summer months about Passamaquoddy bay, but at Tynemouth creek, in St. John county, in August, it was so abundant as to make up the bulk of the plankton, and on September 27, it was found but rarely in the Bay of Fundy between St. John and Digby Gut. It would appear to be more common in deep water, and is one of the species quoted as being characteristic of the European plankton. *B. pulchella* was found in St. Andrews harbour, February 19, and again March 17, and April 19, but it is very rare.

Chaetoceras.—This is the most typical, as it is also the most common and widespread of all the genera which distinguish the Phyto-plankton. Of the several species represented, by far the most common, both as to numbers, time, and place, is *C. decipiens* usually easily recognized by the narrow slit-like form of the inter-cellular spaces. It was abundant on January 1, at the Biological Station, and throughout the month at other points about Passamaquoddy bay, accompanied, though much less abundantly, by the *C. sociale.* Both of these species, but with the same difference in relative numbers, were found through February in St. Andrews harbour, and again in March, extending up the St. Croix river to and above Doucett's island. Both species were similarly found all through April and May but became less common in June, and still less, in the latter months, though both were found at Eastport July 29, and Campobelle August 1. No specimens were found in the August plankton of St. Martin's or St. John, though found during this month in collections from L'Etang and Deadman's harbour. In the "Prince" series the only records of this genus are *Chaetoceras decipiens* at the eastern entrance of St. Andrew's harbour October 16, and the same species at Grand Manan, but rarely, on October 3 and 27.

Coscinodiscus.—This genus is almost invariably present in the marine plankton, and sometimes to the exclusion of almost everything else. The most common species is *C. asteromphalus,* Ehr., easily distinguished by the conspicuous central rosette of cells; and *C. concinnus,* remarkable for its large size, fine radial sculpture, and short marginal striæ. Both species were found at Campo Bello and Seely's Cove in January; but not commonly. Both again were obtained in St. Andrews harbour, February 19 and March 18, and were abundant at La Tete, March 28. They were common in April in St. Andrews, as also in succeeding months at many different stations both in Passamaquoddy bay and the bay of Fundy. In almost all instances they were accompanied by the much smaller species *C. eccentricus* and less frequently by *C. radiatus.*

Ditylum.—This genus, though frequently, and sometimes abundantly represented in the plankton of the bay of Fundy and Passamaquoddy bay, is one as to whose relationships much doubt still exists. First named and described by the late Professor J. W. Bailey of West Point, N.Y., it was subsequently referred, by West and others, to *Triceratium,* while this latter genus was itself later referred to *Biddulphia.* Except, however, in the outline of the valves, varying, as in *Triceratium* from triangular to quadrangular and pentagonal, it bears, as remarked by Mann in his report on the Diatoms of the Albatross Expedition, not the remotest resemblance to the genus last named.

As found in New Brunswick waters the genus *Ditylum* (*dis,* two, and *tyle,* a swelling) is usually in the form of a lengthened quadrate cylinder, due to the great length of its zone or girdle, the terminal valves being somewhat puckered or constricted, with slight but conspicuous bristles at the angles bordering a circle or fringe of very delicate and short bristles, from the centre of which springs a single long and stout spine. The sculpture of the valve is radio-punctate, the rays being delicate and grouped around the base of the central spine. The arcolation, so marked in *Triceratium,* is entirely wanting. Though usually triangular, specimens have been observed in which triangular, quadrate, and pentagonal valves have been found, enclosed in the same connecting membrane, which is very imperfectly silicified. In the writer's opinion the forms are much more nearly related to *Rhizosolenia* and *Corethron,* than to either *Triceratium* or *Biddulphia.* They are often found in groups, of which the individuals may be attached either laterally or by the ends, on the sagittal plane. As to distributional and seasonal variations, the representatives of the genus *Ditylum* have been found in the bay of Fundy, near St. John, in February, and at St. Andrews in April, but only rarely. They were abundant in Deadman's harbour, August 10, and especially abundant in St. Andrews harbour, and off Grand Manan, in October. They were also observed during this latter month at the mouth of the St. Croix river, but rarely.

Fragillaria.—This genus, though usually to be found in plankton collections elsewhere, is not common in the region under review. This species represented appears to be mainly *Fr. capucina* and *Fr. pacifica* (?).

Grammataphora.—The species *Gr. marina* and *Gr. serpentina* are both found in the bay of Fundy and Passamaquoddy bay, but not very generally. They were both found rather abundantly and forming long chains in the waters about West Quoddy Head on the 28th of June; at Eastport, August 1 and St. Martins, also at L'Etang harbour, August 10. None were observed in the "Prince" collections, made in September and October.

Hyalodiscus.—This genus, as represented by the species *H. subtilis,* is occasionally met with in the plankton, but not in sufficient numbers to be made the basis of comparative statements. It is found but rarely in Passamaquoddy bay.

Isthmia.—Only a few specimens of this genius, including both *I. nervosa* and *I. enervis,* have been observed in the summer plankton about Campo Bello; but not in Passamaquoddy bay.

Melosira.—No genus is more widely or more abundantly met with than this, its rabit of forming long chains, some times including thirty or more frustules, making it quite conspicuous. The most common species is *M. nummuloides,* though *M. varians* and *M. Borerii* and *M. Jerghensii* are by no means rare. They have been found at various stations in the bay of Fundy and also about Passamaquoddy bay. *M. subflexilis* was found at St. John and St. Andrews, in February and March, the others almost everywhere during the summer months. In the "Prince" collection *M. subflexilis* was obtained between St. John and Digby on the 21st of September, and quite abundantly.

Navicula.—Specimens of this genus, which includes a very large number of species, are found in nearly all collections, but the majority of the latter are littoral rather than pelagic or planktonic. Of those occurring in the plankton one of the most common and widely distributed is *N. didymo,* which has been found during the summer months at many points along the coast between Grand Manan and St. Martins. *N. distans* and *N. Smithii* (including *Nelliptica*) are also of common occurrence; but none have yet been recorded from winter collections. They are common in Passamaquoddy bay, in July and August.

Nitschia.—Though represented generally, and by a large number of species, few of these are found in the plankton. The most common are *N. sigmoidea* and *N. closterium,* found near St. Andrews, April 19. *N. Sigma* was observed at the same station July 7th, and *N. seriata* in August. Besides the above *N. dubia* and *N. vermicularis* were found at St. Martins in August; *N. closterium, N. sigmoidea* and *N. vermicularis* in St. John harbour during the same month. *N. seriata* was obtained from the "Prince" collection, at Station 3 (between Head harbour and the Wolves) September 18; but not from other points. None were observed in October gatherings.

Pleurosigma.—Though a littoral and brackish water genus, some of its species are also pelagic and planktonic. *P. decorum* and *P. formosum* were found in St. Andrews harbour February 19; *P. fasciola* and *P. decorum* at the Biological Station February 27; the same at the Reversing Falls, St. John, February 14; at Doucette's island in March; *P. intermedium* and others in St. Andrews harbour, April 17; *P. fasciola* at West Quoddy June 17; *P. Balticum* and *P. fasciola* at the Biological Station June 28; and *P. obscurum* at St. Martins in August. *P. fasciola* and *P. formosum* were found in L'Etang harbour August 10, and *P. Balticum* at Tynemouth creek August. No representatives of the genus were found in the "Prince" collections of September or October.

Rhabdonema.—Isolated frustules, and more rarely short chains of *R. arcuatum* are occasionally met with in the plankton, but are not common.

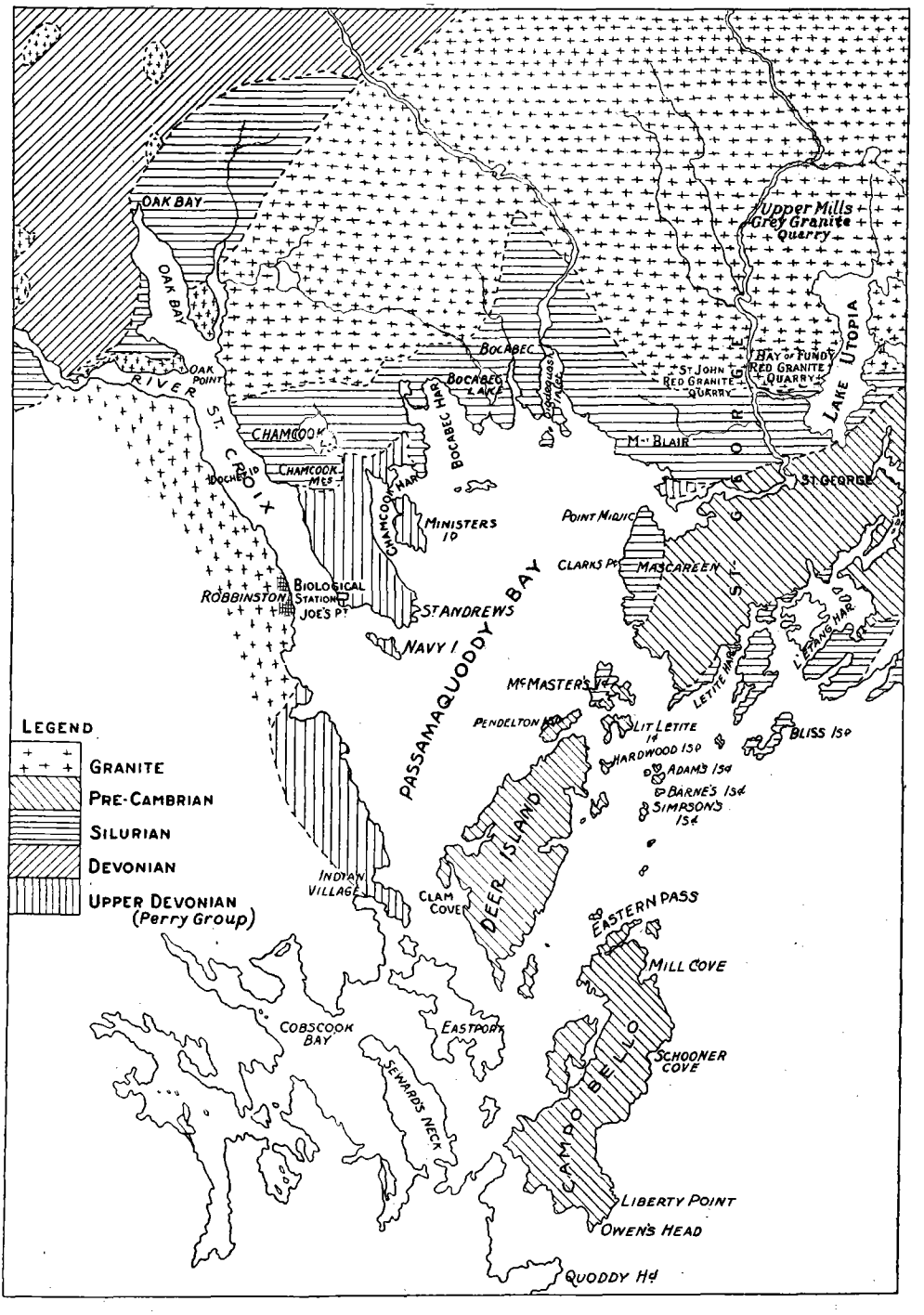
Rhizosolenia.—This is one of the typically planktonic genera, and as represented by *R. setigera,* is often very abundant. It was obtained as early as January 16 at Wilson's beach, Campbello, and at Seeley's cove January 31; in St. Andrews harbour February 19, and the Biological Station February 27; at Joe's Point, St. Andrews, and the St. Croix river March 28; and at Robbinstown May 23; but appears to be absent in June and July. It was found at Campbello August 1, and L'Etang harbour August 10, also at Tynemouth creek the same month. In the "Prince" series it was September 27 at the lower end of Annapolis Basin (with spear-like enlargements of the terminal spines, not yet observed in the bay of Fundy), and on the Annapolis river, near Goat island. In the same series it occurs as found in St. Andrews harbour October 10, St. John harbour October 19 and Grand Manan (abundantly).

Skeletonema.—This is another of the distinctly planktonic genera, its adaptation to a floating life being effected by the association of the frustules in long chains, sometimes embracing forty or fifty individuals. It is, however, characterized by much diversity as regards size, distribution and seasonal variations. It was found at Bald Head January 15, St. Andrews harbour February 19 and Manawagonish, St. John county Febraury 5; but no occurrences have been recorded at any station for March, April, May, or June. It was found at Eastport July 29, Campbello August 1 (rare). L'Etang harbour and Deadman's harbour August 10. From the "Prince" collections, in September and October, it appears to be wholly absent.

Thalassiosira.—Another characteristic plankton genus, easily recognized by the interposition between the widely separated frustules of long filamentous threads (Slime threads of the Germans). Of its two species *Th. Nordenskioldii* is the more common, but exhibits great seasonal differences. It was found in January and February at the Biological Station, again very abundantly about Joe's point, St. Andrews, on May 27, as also at La Tete, Campbello and Eastport; and at the latter station again on July 29; Biological Station March 17, St. Croix river and La Tete March 28; Doucette's island March 27; Joe's point April 30, St. Andrews harbour April 18, very abundantly;

Robbinstown May 23; Biological Station May 21, very abundantly. It was found at Eastport in July, and in L'Etang harbour August 10; but was wanting in collections later than August both in Passamaquoddy bay and the Bay of Fundy. It would seem to attain its maximum in April and May.

Thalassionema.—Forms believed to be referable to this genius have been found in several gatherings made by the "Prince" in Passamaquoddy bay. Some of these, collected in October, being composed of little else. The frustules bear considerable resemblance to those of *Synedra,* and again to some varieties of *Rhizosolenia,* but differ greatly from both. The most remarkable feature, the specimens referred to is their enormous length, running from 300 to 800 mu, with a zonal breadth from 3½ to 8 mu. The sculpture along the edge is a very minute row of points, perhaps running about 20 in 10 mu. The cells show variations in diameter, and are often curved or flexuose, but do not taper at the ends or bear bristles, as in *Rhizosolenia.*. Perugallo following Van Heurck places the genus *Thalassionema* between *Synedra* and *Thalassiothrix.* Dr. McKay is disposed to regard the form here described as new. It may be a variety of *Thalassiothrix nitschioides.*



Geolo ical Map of Passamaquoddy Bay and Surroundings, by L W. Bailey.