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ART. XXVIII.—*A list of Animals dredged near Caribou Island, Southern Labrador, during July and August, 1860*; by A. S. PACKARD, JR.

The following results were collected during a stay of fifty days, with a party of six others, left by the Williams College (Mass.) Expedition to Greenland, in the summer of 1860.

Caribou Island is situated in the extreme N. E. corner of the Gulf of St. Lawrence, at the entrance of the straits of Belle Isle in lat.  $51^{\circ}.25$ , long.  $57^{\circ}.39$ . It is composed of sienitic rocks, and is the largest of many small islets which line the coast of Labrador between the Mecatinas and Bradore. Like many others, this island is situated directly opposite the mouth of a long narrow bay, or reach, two or three miles in extent, which receives a shallow impetuous stream. Salmon Bay, thus protected from the heavy swell of the Gulf, by the high cliffs of Caribou island, affords, with its deep muddy bottom, good anchorage, and a comparatively quiet harbor for the fishing vessels which yearly frequent it. It is connected on the west by a narrow ship channel with another exposed bay which receives Esquimaux River. On the east side, between the island and the mainland, is a narrow passage closed to navigation by a sand bar, where the fishermen draw their nets for capelin, lance fish, and young cod for bait. As the water deepens towards the gulf, the sand grows coarser, till farther out, where the strong current, sweeping down the Straits, carries off the fine

sediment, the bottom is most curiously paved with polished and clean "cobble stones." This barren bottom is scattered over with patches of *Desmarestia*, *Ptilota*, and *Agarum*, which give shelter to *Hyas*, *Chiton*, *Cynthia*, and a few *Echini*. Three or four miles further out into the Straits, a long narrow ledge forms the "Bank," whose crown rises to within eighteen fathoms of the surface, and it is here that the *Astrophyton* abounds most. On this bank the *Ptilota elegans* and the *Nullipora polymorpha* were the only plants observed. Indeed I was struck with the poverty of this locality in sea weeds, compared with the mouth of the St. Lawrence river, as catalogued in a previous number of this journal.

The rocky shores exposed to surf from the Gulf did not seem to harbor any animal life, but a narrow, interrupted belt of sand and mud flats in Salmon Bay, with patches of *Zostera marina*, about six inches in length, exhibited a feeble assemblage of littoral animals compared with that of Maine, even. In the higher levels of the zone, whose whole extent was only six feet vertically, were *Littorina rudis*, *Rissoa minuta*, *Balanus balanoides* and *Jaera copiosa*; and below, *Mya arenaria*, *Macoma fusca*, *Mytilus edulis*, *Littorina littoralis*, *Tectura testudinalis*, and *Nereis*. In the pools on the flats, myriads of *Mysis* and *Crangon* occurred with *Platessa* and *Cottus*; under the rocks and seaweed, *Gammarus mutatus*, *Cancer borealis*, and occasionally *Homarus Americanus*; and on the fuci *Laomedea*, with *Dynamena pumila*.

The entire absence of any specimens of *Purpura lapillus* was inexplicable, though I searched for that shell. So also I did not find any species of *Idotea*, though it is found at Anticosti, and I took it from seaweed floating a few miles off Cape Ray, Newfoundland. There were also no Planarians or Nemerteans observed between tide marks.

Another belt, extending a fathom or two below low water mark, was characterized by the three species of *Asterias*, *Solaster papposus*, *Echinus*, *Echinarachnius*, *Pecten tenuicostatus*, *Mesodesma Jaresii*, *Margarita helicina*, *Buccinum undatum*, *Pycnogonids*, *Cuma*, *Hyas aranea*, *Desmarestia* with *Spirorbis*, *Eupagurus*, two species, and *Agarum* with eggs of *Nudibranchs*; but no forests of *Laminaria* such as those in Maine, occurred around Caribou Island.

The muddy and sandy bottom of Salmon Bay in 15 to 20 fathoms was characterized by *Ophoiglypha nodosa*, *Pentacta calcigera*, *Nucula tenuis* and *expansa*, *Leda buccata*, *Thyasira Gouldii*, *Car-*

*dium islandicum* and *pinnulatum*, *Serripes Groenlandicus*, *Macoma proxima*, *Turritella reticulata* and *erosa*, *Aporrhais occidentalis*, and the different species of *Bela*, with *Pectinaria Eschrichtii* and *Onuphis Eschrichtii*. These all occurred in the greatest abundance.

So also out on the Bank in fifty fathoms did the following, which are mentioned here at the risk of repetition, since they are of special interest in connection with the patches of Drift fossils found up and down the St. Lawrence, and in New England.

<i>Yeatia crassicornis</i> ?	<i>Astarte</i> , two species.
<i>Sertularia</i> , &c.	<i>Modiolaria decussata</i> .
<i>Astrophyton eucnemis</i> .	<i>M. corrugata</i> .
<i>Ophiacantha spinulosa</i> .	<i>Glycimeris siliqua</i> .
<i>Eschara</i> , <i>Cellepora</i> , and the species of <i>Lepralia</i> .	<i>Mya uddevallensis</i> .
<i>Hippothoa</i> , <i>Stomatopora</i> &c.,	<i>Diadora noachina</i> .
<i>Anomia</i> , two species.	<i>Margarita cinerea</i> .
<i>Hypothyris psittacea</i> .	<i>Admete viridula</i> .
<i>Pecten islandicus</i> .	<i>Trichotropis borealis</i> .
<i>Cardita borealis</i> .	<i>Fusus tornatus</i> .
	<i>Trophon scalariforme</i> .

with *Spirorbis cancellata* and *S. vitrea*, *Vermilia serrula*, *Hippolyte spini*, *Chionoecetes opilio*. Dredging was carried on for about six weeks; from the middle of July to the last of August, during a season that proved to be the most boisterous and foggy that the inhabitants had experienced for twenty years.

Dr. William Stimpson has kindly identified the annelides and crustacea, so far as their state of preservation would allow, and given me aid in the determination of several other forms. I am under obligations to Theodore Lyman, Esq., Museum of Comparative Zoology, Cambridge, for naming the Ophiurians, and to Dr. Dawson, for identifying several species of *Lepralia*. I subjoin the names of some Foraminifera sent him in sand, &c., which he has furnished me.

*Polystomella umbilicatula*, *Truncatulina lobata*.  
*Miliolina seminulum* (some very large and complex).  
*Biloculina ringens*, *Entosolenia globosa* (var. *costata*).  
*Polymorphina lactea*, *Nonionina umbilicatula*, *Textularia variabilis*, *Nodosaria*? *Spiroloculina*?

## POLYPI.

*Tealia crassicornis*? Gosse. On stones 15-50 feet.

## ACALEPHE.

*Halecium muricatum* Johnst. Frequent on the Bank. Its occurrence on our coast has not before been noticed.

*Laomedea gelatinosa* Johnst.? Frequent on fuci in the lower levels of the littoral zone. By no means so common as in Maine.

*Dynamena pumila* Lam. Occurs with the preceding.

*Sertularia rosacea* Johnst. Very abundant in 50 feet on the Bank.

*Sertularia tricuspidata* Alder. Exactly agrees with Alder's figure and description in the Annals Nat. Hist. Abundant on the Bank upon *S. rosacea*.

*Campanularia verticillata* Lam. Several specimens dredged on the Bank.

*Lafoea ramosa* Lam. Abundant, occurring upright and branching out from a common stout stalk, or creeping upon *S. rosacea* in 50 feet on the Bank.

*Clava multicornis* Pallas. On shells.

*Hydractinia polyclina* Ag. On an ascidian in 15 feet Salmon Bay.

*Aurelia flavidula* Per. and LeS. The young and mature were very abundant. The young were both yellowish and purplish.

*Cyanea arctica* Per. and LeS. This is the common species in the Gulf and about the Banks, and is rarely seen in retired bays where *A. flavidula* abounds. The fishermen experience much discomfort from handling fish lines entangled in the very long tentacula of this species.

*Idyia roseola* Ag. This is doubtless the species so common on this coast.

#### ECHINODERMATA.

*Astrophyton eucnemis* Müll. and Trosch.

One was hauled up by a fisherman 20 miles from land in about 80 feet. They are common and very large in 18 feet on the crown of the Bank.

*Ophiacantha spinulosa* Müll. and Trosch. Several from the Bank.

*Ophiopholis aculeata* Lütken. Most abundant among nullipores in 15 feet. A few were taken in dead pectens in 2 feet. Also from the Bank in 50 feet.

*Ophioglypha nodosa* Lyman. This species was especially abundant on a sandy bottom in Salmon Bay in 10 feet, and ranges from low water mark to 50 feet.

*Solaster papposa* Forbes. Occasionally taken with the dip-net a few feet below low water mark.

*Gribella oculata* Forbes. Among nullipores in 15 feet.

*Asterias vulgaris* Stm. (*Asteracanthion rubens*, M. and T.) Common just below low water mark. The largest specimens from 8-10 inches across.

*Asteracanthion polaris* M. and T. Occurring with and as common as the preceding, if not more so. Often taken, especially the young in 10-15 feet.

*A. n. sp?* Large specimens measuring 20 inches across frequently occurred in pools at low water mark. The color in life was a light greenish hue, mottled with reddish brown.

*Foxopneustes drobachiensis* Ag. (*E. granulatus* Say.) Specimens measuring four inches across were often taken at low water mark. It extends to 50 feet, at which depth it was dredged on the Bank frequently, where the specimens were uniformly small: but after a careful study I cannot see any permanent specific differences. I cannot see that it differs at all from individuals collected during the past summer at Eastport.

A specimen in my possession from Greenland seems to be very distinct from our Labrador and Maine species. The periphery is distinctly pentagonal. The whole shell is more elevated; while the sides of the shell are not so full and rounded as in our species, the ambulacral plates are not slightly depressed, nor that area so distinctly marked as in ours. The tubercles are fewer and proportionately larger; thus in the Greenland species there are 20 tubercles in a row along the narrowest interambulacral zone, in ours 28. In the broader interambulacral zone there are 15 papillæ in the Greenland species; in ours, 18. Moreover there are fewer flutings in the spines taken from either end of the shell than in our species.

*Echinarachnius parma* Gray. (*E. atlanticus* Gray). Abundant and large on sandy bottoms in 2-15 feet.

*Psolus Fabricii* Lütken. Two were taken in 15 feet on pebbles in Esquimaux Bay.

*Pentacta calcigera* Stm. (*Cucumaria Koreni* Lütken). One was taken in 15 feet sand, in Salmon Bay.

*Pentacta frondosa* Jaeger. One specimen was thrown upon the beach.

*Chirodota laeve* Grube. Very fine specimens, eight inches long, were abundant in 10 feet sand in Salmon Bay.

*Eupyrgus scaber* Lütken. Several were taken in 10 feet sand in Salmon Bay. It has not occurred so low down the coast before.



## POLYZOA.

*Tubulipora patina* Johnst. Common.

*T. hispida* Johnst. Frequent on sertularians in 50 feet.

*T. flabellaris* Johnst?

*Diastopora verrucaria* M. Edw. (*Millepora verrucaria* O. Fabr.) Frequent in 50 feet. I have species from Greenland from which it does not differ, also from the Bay of Fundy.

*Stonapora expansa* n. sp. Creeping, flat, expanding; the branches widening at the origin of new ones, rugose. Cells in the young long, slender, erect, slightly recurved; arising singly, or in groups of two or three at irregular intervals along the branch. Old specimens broader, cells horizontal, apertures hardly raised above the surface, emarginated.

A small slender white species, the erect tubes in the young longer than the width of the branch. It differs from the European *A. major* in being broader and more expanded.\*

*Idmonea pruinosa* Stm. Frequent from the Bank.

*Hippothoa rugosa* Stm. Abundant. All the polyzoa here enumerated are, unless otherwise stated, from the Bank, in 50 feet hard stony bottom, occurring on stones, shells, &c.

*H. borealis* D'Orb. (*H. divaricata* Lamx.?) Abundant.

*H. expansa* Dawson. Frequent. I have also dredged it at Mt. Desert, Me., in 15 feet.

*Lepralia annulata* O. Fabr. A group of three cells, with two spines on each side of the distal margin, occurred.

*L. crassispina* Stm. which I take to be the representative of the European *L. Peachii*, and which assumes its forms, was one of the most abundant species.

*L. trispinosa* Johnst., or an allied species was very abundant. It is also abundant in Maine, as far south as Portland.

*L. pertusa* Thomps. I cannot distinguish my specimens by any permanent characters from the British species occurring on a stone with *Crania anomala*. It is oval or broad oval, somewhat flattened or convex, punctured somewhat coarsely, with ridges separating the cells, which are arranged in no special order. Aperture round,

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\* *S. compressa* n. sp. I have another narrow compressed, very convex species from Greenland. It is adherent, creeping, much rounded above. Cells in a single alternating row, being short and thick, and opening a little outwards; at the end of the branch much thickened and enlarged, giving rise to three or four cells. It varies in the size and relative distances of the cells. William Coll. Exp.

truncate behind, or with a broad shallow sinus. The ovi-capsules globose, subrugose, sub-punctate, much as in the British specimens. Found growing in purple patches. Length  $\frac{1}{30}$  of an inch, half as broad as long.

What I take to be a second and larger form of this species has the cells large, oblong, oval, convex, being closely connected with the ones before and behind in radiating lines. The surface has coarse emarginatad punctures. In old specimens the punctures are so large that the surface is often but a network enclosing them. Apertures round, slightly raised, with a deep narrow sinus, at the entrance of which are two denticles, one on each side, which often become obsolete. In some cells the surface is perfectly smooth, and only the marginal punctures present.

Specimens from Greenland do not differ. It is much larger than the preceding form, which is  $\frac{1}{40}$  of an inch long, and arranged in more regular rows, and preserves better its oblong, oval, convex form. The ovi-capsules are emarginato-punctate, and proportionally smaller and smoother than in the preceding form.

I have also specimens on *Pecten islandicus* from the Newfoundland bank.

*L. producta* n. sp. (Fig. 1.) Cells oval, convex, coarsely punctate; in the young the punctures are emarginate, the base of the cell is produced and wedged in between adjacent ones. Aperture broad, round, with a moderately large and deep sinus in the young; in older cells, small, round, truncate behind, horse-shoe shaped; margin full, broad, unarmed, and when the cells are crowded, the margin in front expands upon the base of the cell in front. Cells arranged in lines, soon becoming very irregular, and partially radiating; forming white, but more generally purple patches. Length  $\frac{1}{30}$  of an inch. Old specimens are flattened, granulated with marginal punctures; very rarely the aperture has a small sinus. It is the largest species observed. Frequent.

As in the preceding species, there are two forms which might easily be mistaken for as many species. The young cells are rounded, ovate, depressed and with emarginate punctures, while the apertures are sinuate. With the other form the species becomes the largest of the genus yet observed on this coast, being one thirtieth of an inch long. The cells are much thickened, convex, in outline often pyriform, owing to the elongation of the base of the cell; and the aperture is small and truncate behind.

In both forms the surface is more than usually rugose.

*L. Belli* Dawson. Frequent.

*L. labiata* Stm. One group of this singular species occurred.

*L. lineata* Hassell. Rare.

*L. globifera* n. sp. Cells large, flat, white, the surface somewhat raised around the small round aperture, which has a slight sinus. Behind the sinus is a minute perforated conical avicularium. Ovi-cell large, globose, with a few emarginated coarse punctures. Cells in radiating lines, with ridges running between them. The ovi-capsules are more crowded in the centre of the patch, not being present in the inner cells. Frequent, forming frosty white patches. It often encrusts Celleporæ, where the ovi-cells are much crowded, and the ridges between the radiating rows of cells obsolete. I have dredged it in the Bay of Fundy.

Stimpson's *L. candida*, very common in the Bay of Fundy, did not occur in my collection.

*Membranipora pilosa* Johnst. Especially abundant encircling fronds of Desmarestia just below low-water mark.

*M. lineata* Busk.

*M. Lacroixii* Busk? I cannot distinguish these two species from Greenland specimens.

*M. solida* n. sp. (Fig. 2.) Cells large, flat, solid, oval angulated, often presenting a six sided figure as is common in the genus. Margin raised, simple, very broad and without spines. Aperture occupying one half of the upper surface, transversely broad, oval, with a broad deep sinus; the posterior half of the upper valve is thin, convex subrugose, with a small, triangularly perforate, conical avicularium, situated at the posterior end of the upper surface. Cells arranged in lines, or in quincunces, or more often irregularly. The cells are not so crowded as in the other species. To the naked eye it looks like bleached patches of old worn Lepraliæ.

*Beania admiranda* n. sp. Cells very large, erect, oval smooth, base produced, sessile. Growing in tufts, the cells arranged in contiguous series, the new cells arising on each side of the aperture of the parent cell. Aperture raised, circular, surmounted by two long stout truncate spines, which are succeeded on the opposite side by two rows of long obtuse spines nearly meeting across the hollow formed by the two ridges on the back of the cell. Compared with *B. mirabilis* of the British coast, this is a much stouter species, growing in low spreading, but not creeping tufts. There are from 6 to 8 pairs of large obtuse spines which meet across the cell; being fewer in number, and longer and stouter



than in *B. mirabilis*. More important differences exist in the diameter of the cell being greatest at the distal or anterior third of the cell, where in the British species it is thickest posteriorly; and in our species the aperture opens near the end of the cell. It occurred rarely on Pecten in 50 feet.

*Cellularia Peachii* Johnst.? With the preceding. Rare.

*Menipea ternata* Busk? Rare.

*M. fruticosa* n. sp. (Fig. 3.) This fine species grows an inch in height, with large wide branches, dividing dichotomously. The cells are large and long, being attenuated downwards. Above they are truncated, with four spines, two upon each side, and invariably with an outer projecting spine, when the others are absent. The upper valve is long, oval and sunken; aperture transversely linear, closed by a square incomplete lid. Cells contiguous, arranged in two alternating rows, with two or three median ones before the origin of the branches. The avicularia have long beaks, and are arranged sparsely at the base of the median cells. Long vibracula arise near the front of a few lower valves. The ovi-capsules are globose and smooth. It is more nearly allied to *M. cirrata* of Europe than any other species, though very distinct. It is a common species, and occurs in Greenland, from whence I have a specimen.

*Scrupocellaria Americana*, n. sp. This species is closely allied to *S. scruposa*, with specimens of which, collected by Dr. Stimpson on the English coast, I have compared it. With much the same habit, our species is twice as large and much more solid. There are the same relative proportions in the form and size of the cells, but in our species the avicularia are smaller in proportion to the cell, and there is but a single spine surmounting this appendage, the lip of the orifice being unarmed, while in *S. scruposa* two spines are very constantly present on the inner side of the cell. The lids or upper valves, which in my specimens are raised from the coenocidium by the relaxation of the muscles, are convex, and somewhat rugose, owing to several slight transverse lines. The ovi-cells are smooth and globose. It is not unfrequent on the Bank.

*Caberea Hookeri* Busk? One species presents some differences from the British specimens in my possession collected by Dr. Stimpson; and also from Mr. Busk's figures. It is abundant in Labrador, and on the coast of Maine as far as Casco Bay.

*Halophila borealis* n. sp. (Fig. 4.) This species agrees

well in its generic character with *H. Johnstonice* Gray from New Zealand, though differing specifically among other respects in being multiseriate. The coenocidium forms soft and flexible horn colored tufts an inch in height. The cells in mature specimens are arranged in several contiguous series and are very long, subclavate, truncate, widening a little above, with sometimes a slight spine on the outer angle. The aperture is transversely linear and closed by a slightly sinuate lid. The ovi-capsules are globular and nearly smooth. The upper valves are so thin that in dried specimens it readily contracts and the lid and linear aperture are effaced, and the cell then appears as if it possessed a large, broad, oval aperture, covered by a thin lid.

A single branch consisted in one example of eight rows of cells. A single isolated cell closely resembles a cell of *Flustra truncata*, showing the near relationship of this genus to the Flustradæ. But one tuft of this interesting species occurred in 50 feet associated with *Beania admiranda*, on a fragment of Pecten.

*Flustra truncata* Linn. Frequent.

*F. membranacea* Linn. Abundant.

*F. Murrayana* Busk. 10-50 feet. Abundant. A common species in Maine.

*Cellepora pumicosa* Ellis. Frequent on sertularians.

*Celleporaria surcularis* n. sp. Grows two or three inches high, branching dichotomously, the ends of the branches somewhat truncated. Cylindrical, base two or three lines in thickness, surface rough. Cells crowded, of unequal size, erect, conical. Aperture small, with a slight sinus. In the young conical communities, the cells stand out more from the axis; apertures large, round, with a slight, often obsolete, sinus. Surface of the cells coarse, irregular and deeply punctured, often arranged in irregular series running down the sides from the aperture. The terminal cell large and conical. In old species the sinus is sometimes enlarged with two denticles at its entrance. In section the cells are irregularly oval, scattered thickly over the axis and periphery.

Abundant on stems and cells in company with *Escharæ*.

Dr. Stimpson has placed in my hand specimens belonging to this species, collected by Dr. Hayes in Northern Greenland, and by McAndrew in Manseroe Sound, Finmark. European authors have confounded this arctic species with *C. cervicornis* of the Mediterranean sea, from whence it was originally described by Pallas.

*Eschara lobata* Lamx. This species Lamoureux describes as

growing in radiating patches, always adhering to the surface of objects, and collected near the Bank of Newfoundland. Cells oblong, oval, convex; each end is connected with the cell in front and behind, with a few larger emarginate punctures. Aperture round with a shallow broad sinus. Just behind the aperture a small perforated conical eminence, which in old specimens bears a large avicularium, with long sharp pointed beaks gaping widely; or when absent the cone is large, covering the upper surface of the cell, and furrowed with descending ridges. In communities with ovi-capsules, the surface of the cell itself cannot be seen; the capsules are globular, sublunate in form, with emarginated-punctures; the aperture large, often truncate behind. Cells arranged in linear series with intervening ridges.

Occurs spreading over dead *Cardium* and *Serripes* in 10-20 feet Salmon Bay, or in 50 feet on the Banks. I have taken it in the Bay of Fundy from low water mark at Eastport to 20 feet.

It is very different from a thin, flat, membranaceous, inverted cup-shaped species that inhabits Massachusetts Bay.

*E. elegantula* D'Orby. The coenocidium of this fine species grows several inches high in erect branching masses, the branches expanding flat and spreading at the ends. Cells broad, oval flattened, somewhat produced at the base; surface smooth, sub granulated. Aperture round, with a broad shallow sinus. Young cells often margined with a row of large punctures. In old communities the ovi-cells are narrow-oblong, very convex, semi-cylindrical, the cylinder-like avicularia projecting over the aperture, and perforated with a large operculated aperture. Towards the end of the branches, the cells are somewhat cylindrical bearing narrow globular ovi-capsules, which are emarginate-punctured. This is near Busk's *E. saccata* which came either from Norway or Finmark. It differs however from his figure; and his rather unsatisfactory description does not aid me in determining the species.

Common on the Bank in company with *Cellepora*. I have specimens also from the Newfoundland Banks. Dr. Stimpson has also specimens collected in Northern Greenland by Dr. Hayes in his last expedition.

*Myriozoom subgracile* D'Orby. (Fig. 5.) (*Millepora truncata* Linn. Fabr. F. G.) Frequent with the other species.

Fabricius' description applies well to this species. It grows two or three inches high, branching dichotomously; branches cylindrical, smooth, while at irregular distances slightly contracting,—

*passim annulis angustioribus*—Cells immersed; apertures round with a very narrow deep sidnus, those at the end of the truncate branches have the *figuram calcei equini* of Fabricius' description. The surface between the cells is deeply and irregularly punctured. A transverse section of a branch shows about twelve oval cells separated by thin walls, arranged around the solid axis of the stem.

This species approaches somewhat Busk's *Eschara teres*, Ann. Nat. Hist., 1856, but it seems to have a more regular form; the oval cells shown in a transverse section are not so much produced towards the central axis of the stem; while it differs wholly from the *teres* in the punctures dotting thickly the whole surface between the cells, instead of there being a single row surrounding the aperture as usual in the genus. *Millepora truncata* is a Mediterranean species, and as represented by Lamoureux, is a much larger and very different form from the two species above mentioned. On the Bank in 50 feet; with the preceding species.

#### TUNICATA.

*Leptoclinum*. A species of compound ascidian was abundant in somewhat pellucid masses surrounding branches of nullipores in 15 feet.

*Ascidia callosa* Stm. Dr. Stimpson has identified this and the species of *Pelonaia*. It is profusely abundant in the Bank in 50 feet growing to a very large size, and affords shelter to various worms, Sipunculi and Modiolaria, besides serving as a base of attachment to Sertularia, &c.

*Cynthia pyriformis* Ratke. Several were taken up alive on beaches after storms. Fishermen haul them ashore in their nets.

*C. sp.* A specimen occurred on *Ascidia callosa*. It is whitish, smooth, low conical, base expanding.

*Pelonaia arenifera* Stm. Several occurred in 15 feet sand.

*Boltenia oviformis* Sav. A young specimen, that I refer to this species was taken on the Bank. It is much more hirsute than the two Maine species:

#### BRACHIOPODA.

*Hypothyris psittacea* King. Frequent on hard and sandy bottoms in from 10–50 feet.

#### LAMELLIBRANCHIATA.

*Anomia ephippium* Linn. Abundant, though small. On nullipores.

*A. aculeata* Gm. In from 10–50 feet.



*Pecten tenuicostatus* Migh. (*P. magellanicus* Lam.) Is most abundant on a sandy bottom at a fathom's depth. The young were only dredged in 15 feet. The inhabitants call them "pussels" and often eat them. We can bear testimony to the delicacy and rich flavor of this shell fish.

A species of boring sponge, which grows two inches or more in height, its roots boring worm-like galleries in the shell, hastens the decomposition of dead shells very greatly.

*P. islandicus* Müll. Common in 10-50 feet on a sandy or rocky hard bottom. Valves are occasionally thrown up on beaches.

*Limatula sulculus* Leach. Several dredged in 15-50 feet sand and gravel.

*Nucula tenuis* Turton.

*N. expansa* Reeve. Occurred abundantly with the preceding. Dr. Stimpson has identified our specimens as being this before doubtful species.

*Yoldia sapotilla* Stm. A few occurred in 10-15 feet.

*Leda buccata* Stp. Abundant. Does not differ from Greenland specimens.

*Crenella glandula* Turton. Abundant.

*Modiolaria corrugata* Stm. In 50 feet.

*M. laevigata* Gray. With the preceding.

*M. discrepans* Müll. A valve two inches long was taken from the stomach of cod caught on the Bank.

*Mytilus modiolus* Linn. Not common.

*M. edulis* Linn. Abundant.

*Alasmodonta arcuata* Baines? I was told that a fresh water mussel was common in Salmon River. This must be the same shell that Professor Chadbourne informs me is very abundant in the streams of Newfoundland.

No Cyclades or any other fresh water mollusca were found in the countless pools of the mainland; though a more thorough search than I could make must reveal some forms.

*Cryptodon Gouldii* Phil. Very large and abundant; a few in 50 feet.

*Cardita borealis* Conr. Bank 50 feet.

*Astarte semisulcata* Leach. *A. elliptica* Brown. Bank 50 feet Abundant.

*A. Banksii* Leach. Frequent with the two preceding shells

*Cardium islandicum* Chemn. Very abundant and large in Salmon Bay.



*C. pinnulatum* Conr. Very common, and as large as usual ; with the preceding species.

*Serripes grenlandicus* Beck. This is a very abundant species, and is a very constant companion of *Cardium islandicum*, occurring in a mixed sand and mud bottom in 10--20 feet, where it grows to an enormous size.

It varies considerably when old, some specimens being triangular and flattened, with the beaks placed far anteriorly, while other shells are ventricose, oval, with the beaks very central. The young all agree in being short and high, very thick and in having the large swollen beaks placed nearly in the middle of the shells. Some specimens from Greenland differ very much from the Labrador shells in being very triangular, not much longer than high, and having the beaks small and flattened, and placed far anteriorly. Were there not others approaching very closely to some Labrador forms, these characters would easily separate the *grenlandicus* into two representative species.

*Tapes fluctuosa* Sby. One valve from the Bank.

*Mactra solidissima* Chemu. One valve was given me, which was taken three miles inland from the mouth of Esquimaux River on a sand beach.

*M. polynema* Stm. (*M. ovalis* Gould.) Rarely thrown up on beaches.

*Mesodesma Jauresii* Joannis. It is thrown up very abundantly on beaches, of a very large size.

*Macoma fuscæ* Stm. Common between tide marks.

*M. sabulosa* Stm. (*T. proxima*.) Very large and abundant in 15 feet Salmon Bay.

*Solenensis* Linn. Rarely taken. Young dredged in 15 feet.

*Thracia Conradi* Couth. One small specimen was dredged.

*T. myopsis* Beck. A fine large specimen was dredged in 10 feet mud.

*Pandora trilineata* Say. A few specimens occurred in 15 feet sand.

*Pandorina arenosa* Möll. One valve was taken with the preceding among nullipores in strong sand, 15 feet.

*Cyrtodaria siliqua* Daudin. In from 15--50 feet Mostly on hard stony bottoms.

*Mya truncata* Linn. The short obliquely truncated variety *uddevallensis* if it should not be considered a distinct species, occurred on the Bank.

*M. arenaria* Linn. Abundant.

*Saxicava rugosa* Linn. Common in 10--50 feet Limestone pebbles are often fished up from the Gulf, which are bored into in every direction by these shells, which are then become short and much thickened.

## GASTEROPODA.

*Clione limacina* Phipps. (*Clio borealis* Brug.) Seen frequently floating near the surface in calm weather.

*Proctoporia* ? sp. A species with an expanded foot was taken in 50 feet on the Bank. It was not discovered until immersed in alcohol, and is undistinguishable, though it differs from anything in New England, approaching rather Fabricius' figure of *P. fusca*. No other species of Nudibranchs, were found, though the ova frequently occurred in round masses on sea weeds in the *Laminarian* zone.

*Cylichna alba* Lovèn. Several large specimens with a thin brown epidermis, and differing in no respect from one from Greenland, occurred in 10--15 feet mud and sand.

*Philine lineolata* Stm. Frequent, with the preceding.

*Chiton marmoreus* Fabr. From low water to 50 feet.

*C. albus* Linn. Several in 50 feet.

*Tectura testudinalis* Müll. Largest and most abundant at low-water mark. The young were dredged in 15 feet.

*Diadora noachina* Gray. Several in 10--50 feet.

*Scissurella crispata* Flem. Dr. Dawson has detected this species in sands examined for Foraminifera, as also the following species.

*Adeorbis costulata* Stm.

*Margarita cinerea* Gould. Grows largest on sandy bottom in 50 feet.

*M. undulata* Sby. and Brod. Common in 15--20 feet sand.

*M. helicina* Möll. Common, 2--15 feet.

*Rissoa minuta* Stm. One dead specimen occurred above high water mark.

*Rissoa castanea* Möll. *R. exarata* Stm. 15 feet sand.

*Lacuna vineta* Turt. The plain and banded varieties were common.

*Littorina vestita* Gould. *T. vestitus* Say *L. rudis* Gould.

*L. palliata*, Gould. *L. littoralis*, F. and H. Both these species occurred abundantly and with variations, as in Maine.

*Scalaria grænlandica* Perry. A fragment only occurred.

*Turritella erosa* Couth. Abundant.

*T. reticulata* Migh. Very abundant, occurring with the preceding in 10–50 feet, but most abundant in 15 feet mud. Salmon Bay.

*T. acicula* Stm. One individual in 50 feet hard bottom.

*Menestho albula* Möll. The young were frequent in 2–15 feet sand.

*Lamellaria perspicua* Lovén. 15 feet sand and mud.

*Natica heros* Say. Two young dead shells were found at high water mark.

*N. clausa* Sby. Frequent in 15 feet.

*Bela violacea* Stm. (*Pleurotoma violacea* Migh. and Adams.) 18 feet. Both this and the *bicarinata* Couth., which Dr. Stimpson considers but a variation of the *violacea*, were frequent in 20 feet sand.

*B. decussata* Stm.

*B. scalaris*, (*Defrancia scalaris* Möll., Ind. Moll. Grön. *Fusus turricula* Gould.)

The European *B. turricula*, as observed by Mörch, is very different from the American representative. On a comparison of our shell with several specimens of the *turricula*, we find that the shoulder on each whorl that gives the shell its turreted appearance, is situated more in the middle in *B. scalaris*. The *turricula* has twelve longitudinal ridges on each whorl, being fewer and proportionately larger than in our species which has seventeen.

Our species seems also to be a larger shell. It agrees well with Möller's *D. scalaris* to which he refers *turricula* Gould

*B. Woodiana* Möll. *Fusus harpularius* Gould.

One specimen was dredged with the preceding have also two specimens of it from Greenland. It is a shorter and thicker shell than *B. scalaris*, in which the first whorl is as long as the remaining ones together. In this species the first whorl is longer than the rest. The canal is shorter and the aperture rounder. The longitudinal ridges are the same in number, but are less prominent, while the revolving lines are much coarser, giving the surface a reticulated appearance.

*B. pyramidalis* Stm.

These species of *Bela* occurred in sand and mud 15 feet Salmon Bay. *B. decussata* was the most abundant species.

*Buccinum labradorensis* Reeve. Icon. Conch., pl. 1, fig. 5. Most abundant just below low water mark. Fine specimens  $3\frac{1}{2}$  inches long were frequent; their egg capsules in large bunches were often deposited at low water mark. This species represents the European *B. undatum*.

*B. scalariforme* Müll. One specimen on the bank.

*B. cretaceum* Reeve, Icon. Conch., Monogr. Bucc., pl. 14, fig. 112. Shell fusiform, slender, nearly three times as long as broad. Aperture oval, ending in a rather long, broad, oblique canal. Inner lip regularly curved; the columella projecting into the aperture at the base of the canal; from this projection a slight ridge runs back to the other end of the aperture, following the curve of the inner lip. Whorls 9, convex, especially on the upper two thirds. Spire much prolonged, acute, 21 longitudinal ridges, smooth and rounded. On the first whorl the ridges disappear on the lower two thirds, where the minute revolving lines are more minute than elsewhere. Aperture within, light chocolate, darker in the young, in which the revolving lines are more distinct. Length  $\frac{2}{3}$  in., breadth  $\frac{1}{10}$  in.

The slender and fusiform shape, and greater length of the spire than is found in other northern species, will distinguish it. The young and old were dredged alive in 10 feet mud and sand, Salmon Bay. Dr. Stimpson informs me that he has seen specimens from the Newfoundland Banks. It seems to be identical with Reeve's species, of which he gives no locality.

*Fusus tornatus* Gould. A large specimen, tenanted by a hermit crab, was dredged in 50 feet.

*Trichotropis borealis* B. and S. Frequent in 10-50 feet.

*Admete viridula* Stm. Thick heavy specimens, an inch in length, were dredged in 40-50 feet.

*Trophon scalariforme* Stm. Large specimens from the Bank.

*Bulimus harpa* Say. One dead shell was found in moss. The only Helicid found.

#### CEPHALOPODA.

*Ommastrephes*. A squid, the fishermen informed me, sometimes comes ashore in swarms, or is fished up from deep water.

#### ANNELIDA.

*Sipunculus* n. sp. It is very different from *S. Bernhardus*, being larger, proportionately thicker, while the anterior third is suddenly rounded and cylindrical. Found between Ascidiæ on a hard bottom in 50 feet.

*Cerebratulus* n. sp. Occurred with two other species of nemerteans, in 10 feet mud.

*Spirorbis spirillum* Lam.

*S. nautiloides* Lam.

*S. vitrea* Stm.

*S. porrecta* Stm.



*S. cancellata* Fabr.

*S. glomerata* Müll., Fabr. F. G. Large, round, smooth, aperture round, sinistrose, raised slightly from the whorl beneath. The adult shell is not flattened out beneath upon the surface of objects, but nearly free.

Diameter of the tube  $\frac{1}{10}$  in., of the whole shell  $2\frac{1}{2}$  tenths. The largest species observed occurring on the edges of Cardum in 10 feet mud, but more abundantly in company with the preceding species in 50 feet hard bottom. Other specimens are a little smaller, but with a slight ridge on the upper surface, occurred with it. I have a specimen of this form also, from Greenland, together with the slightly curved and flattened convex young shells.

*S. quadrangularis* Stm. With the preceding species.

*Vermilia serrula* Stm. Abundant with the preceding.

*Pectinaria Eschrichtii* Rathke. Very abundant and large, especially in 10 feet mud on fish offal thrown overboard from fishing vessels. One was taken at low water mark.

*Terebella* n. sp. 50 feet Bank.

*Siphonostomum plumosum* Müll., 10 feet mud.

*Cirrhatus* n. sp.

*Nephtys coeca* Fabr.

*Heteroneis arctica* Oersted. One specimen was found swimming on the surface.

*Eteone* sp.

*Nereis pelagica* Linn.

*Nereis* n. sp. Allied to *denticulata*, and like that found in mud between tide marks.

*Lepidonote cirrata* Oersted. 10-50 feet.

*L. punctata* Oersted.

#### CRUSTACEA.

*Cytherina Mulleriü?* In 15 feet gravel.

*Cytherina* sp.

*Daphnia?* A very large species, two tenths of an inch in length is abundant in fresh water pools. It is not the *D. retispina* of Greenland.

*Phoxichilidium* sp. At a little below low water mark.

*Nymphon grossipes* Kroyer. In 50 feet Bank.

*Coronula diadema*. On the grampus.

*Balanus balanoides* Linn.

*B. porcatus* Da Costa.

*Cuma* sp. A little below low-water mark.



*Jaera copiosa* Stm. Common near high-water mark.

*Aega* sp. On the belly of cod.

*Unciola irrorata* Say.

*Anonyx* sp. In 15 feet gravel.

*Anonyx* sp.

*Ampeliscus pelagica* Stm.

*A. Eschrichtii* Kr.

*Gammarus purpuratus* Stm. In 10 feet mud and sand.

*G. mutatus* Liljeborge. (*G. pulex*). Occurs as in Maine.

*Mysis spinulosus*. In swarms in tidal pools. The sea trout feed on it.

*Hippolyte spini*. (H. Sowerbyi Leach). Frequent in 10--50 feet

*Crangon vulgaris* Fabr. Very large and abundant.

*Argis lar* Owen. This fine species occurs rarely in 10 feet mud.

*Homarus Americanus* M. Edw. Common.

*Eupagurus pubescens* Stm.

*E. Kroyeri* Stm. Both species from below low-water mark to 50 feet.

*Hyas coarctata* Leach.

*Hyas aranea* Leach. Both species common.

*Chionocetes opilio* Fabr. A number were taken from stomachs of cod from the Bank.

*Cancer borealis* Stm. Common under sea weed.

To make the list of species of this region as complete as possible, I add the following radiata from Newfoundland, on the authority of Lütken.\*

*Astrophyton eucnemis* M. and T.; *Ophiura Stuwitzii* Lütk.; *Ophioglypha nodosa* Lyman—(*Ophiura nodosa* Lütken.); *Solaster papposus*, *S. endeca*; *Asteracanthion polaris* M. and T., *A. Groenlandicus* Stp.; *Echinus Dröbachiensis*, small specimens and *Psolus Fabricii*.

Also the following mollusca from the Grand Bank, mentioned by Dr. Gould:

*Solecuartus fragilis*, *Machaera nitida*, *Panopaea Norvegica*, *Glycimeris siliqua*, *Mya truncata*, *Mactra ponderosa*, *polynema* Stm., *Mesodesma deauratum*, *Astarte lactea*, *Venus (Tapes) fluctuosa*, *Aphrodite Groenlandica*, *Mytilus discrepans*, *Pectend. islandicus*, *Natica clausa*, *N. flava*, *Scalaria Grönlandica* *Fagus ventricosus*, *F. tornatus*, *F. scalariformis*, *Aporrhais occidentalis*, *Buccinum Donovanii*, *B. ciliatum*. Also a few species

\* Uebersicht über Grönland's Echinodermata.

from Labrador, mentioned by Dr. Mighels. Bos. Jour. Nat. Hist., Vols. 1 and 4: *Cardium pinnulatum*, *Nucula rostrata*, (*N. bucata*?) *Mytilus pectinula*. *M. Minganensis*, *Margarita acuminata*, Sby., *M. varicosa*, *Fasciolaria ligata*, *Fusus islandicus*.

Woodward also mentions *Astarte crebricostata*, *Cyprina islandica*, *Machæra costata*, *Buccinum undulatum* Müll., *B. Labradorense* Reeve, *B. cyaneum*, *Lacuna*——, and *Ommastrephes todarus* d'Orb., as coming from Newfoundland. Sowerby, in the "Thesaurus," figures *Terebratella Labradorensis*. Troschel in Wiegmann's Archiv., 1846, describes *Anaperus cigaro*, and *Orcula Barthii* collected at Okkak in northern Labrador.

Professor Chadbourne informs me that *Pecten tenuicostatus* and *Alasmodonta arcuata* are very abundant and characteristic shells in Newfoundland.

Reeve (Icon. Conch. Monog. Fusus, pl. 21, fig. 89) figures and describes *Fusus pullus*, which was collected at Newfoundland by Mr. Jukes.

Lamoureux, in his "Exposition Methodique des Polypiers," has figured and described several species of Polyzoa collected by Captain Laporte upon or near the Bank of Newfoundland: *Loricaria Americana*, of which *Gemellaria dumosa* Stm., seems to be a synonym; *Eucrætea appendiculata*, and *Eschæra lobata*, besides one *Acaleph*, *Lafœa ramosa*.

*Gemellaria Americana* d'Orb., *Eschæra retiformis* Ray, (= *E. foliacea* Lamk), *Eschæra lobata* Lamarck, *Eschæra elegantula* d'Orb., *Celleporaria incrassata* d'Orb. (*Cellepora incrassata* Lamarck), *Celleporina ramosissima* d'Orb., *Biflustra aculeata* d'Orb., *Ornithopora avicularia* d'Orb., Hudson's Bay. *O. dilatata* d'Orb., *Semieschæra lamellosa* d'Orb., *Hippothoa borealis* d'Orb., *Hippothoa robertina* d'Orb., *Cellepora* sp. (none described), *Reptocelleporaria tuberosa* d'Orb., *Repteschærellina borealis* d'Orb., *Multeschærellina aculeata* d'Orb. var., *Membranipora partita* d'Orb., *Reptoflustra Americana* d'Orb., *Cridia appendiculata* d'Orb. (= *Eucrætea appendiculata* Lamx.), *Myrionozoum subgracile* d'Orb., *Fasciculipora Americana* d'Orb., *Idmonea angustata* d'Orb., *Reptotubigera confuens* d'Orb., *Entalopora Gallica* d'Orb., *Diastopora latomarginata* d'Orb., *Tubulipora verrucaria* Edwards, *Proboscina serpens* d'Orb., *Proboscina latifolia* d'Orb., *Berenicea prominens* Lamx.

Mr. Verrill has identified specimens of a polyp in the collections of the Essex Institute, (Salem, Mass.) brought from the Grand

Bank of Newfoundland, as *Alcyonium rubiformis* Dana, (Ehr. sp.)

I have permission to introduce in this connection :

A LIST OF THE INVERTEBRATA COLLECTED AT ANTICOSTI AND MINGAN ISLANDS, by MESSRS. A. E. Verrill, A. Hyatt, and N. S. Shaler, in 1861, who have allowed me to make this use of the names given below. The specimens are deposited in the Museum of Comp. Zoology at Cambridge, Mass. The list of radiates and the accompanying notes were furnished me by Mr. Verrill.

#### POLYPI.

*Metridium marginatum* E. and H., (*Actinia marginata* Les.)? Several young actiniæ were dredged in 8 feet, at Ellis Bay, Anticosti, adhering to rocks, which appeared to belong to this species. No other polyps were obtained at these islands. At Gaspé, C. E., Prof. Dawson obtained this species, and has described and figured it very accurately,\* (*Actinia dianthus*?). With it he also found *Actinia carneola* Stimp. In Chedabucto Bay on the southern side of Breton Island, N. S., we dredged an abundance of *Alcyonium carneum* Ag., in 10 feet rocky bottom, associated with a variety of hydroids. This is the most northern locality yet known for the species, its range being southward to Cape Cod.

#### ACALEPHÆ.

*Pleurobrachia rhododactyla* Ag. Very abundant about East Point, Anticosti, in July.

*Idyia roseola* Ag. East Point, Anticosti. Very abundant the first of July.

*Bolina alata* Ag. Near Fox Bay, Anticosti. Very abundant June 29.

*Cyanea arctica* Per. and LeS. Anticosti. Common. Young about 1 inch in diameter were taken at Fox Bay, June 28.

*Aurelia flavidula* Per. and LeS. Eastern end of Anticosti. Common. Young ones  $\frac{1}{2}$  inch in diameter were taken at Salmon River Bay, July 2.

*Halicystus auricula* Clark. (*Lucernaria auricula* Rathke, non Fabricius.) Near S. W. Point, Anticosti. Very abundant on *Chorla filum*, Aug. 14, at low water. Another species of *Lucernaria* was taken, but the specimen was lost.

*Cosmetica* sp. A beautiful species of this genus, about 3 inches in diameter, with large tentacles about two inches long and half an inch apart, was found in great abundance, June 25, at Entry Island, in

\* Canadian Naturalist and Geologist, vol. 3, p. 401.

the caverns excavated in the high cliffs of red sandstone by the sea.

*Hydractinia polyclina* Ag. Anticosti and Mingan. Common.

*Sertularia polyzonias* Johnst. Niapisca Is. Mingan. In 15 feet rocky bottom.

*S. argentea* Johnst. " " "

*S. rosacea* Johnst. " " "

*Eudendrium* sp. " " "

*Clytia olivacea* Lamx. " " "

*Thuiaria thuja* Johnst. " " "

*Plumularia falcata* Lamx. Anticosti.

#### ECHINODERMATA.

*Pentacta frondosa* Jæg. Anticosti, near Ellis Bay. Not common. A fine young specimen was found among rocks at low water.

*Chirodota laevis* Grube. Anticosti, near Ellis Bay. Several specimens were found under rocks at low water.

*Echinus drobachiensis* Müll. Anticosti and Mingan Is. Very common in 20-30 feet, rocky bottom.

*Echinarachnius parma* Gray. (*E. atlanticus* Gray). A few small specimens were dredged at Mingan.

*Asteracanthion polaris* M. and T. S. W. Point and Heath Point, Anticosti. Common among rocks just below low-water mark. Also dredged in 15 feet rocky bottom at Mingan Is.

*Asteracanthion* sp. A form with longer rays and sharp spines was obtained at Gaspé, C. E.

*A. Greenlandicus* Stp. A single specimen was dredged in 15 feet rocky bottom off Ellis Bay, Anticosti.

*Cribella oculata* Forbes. Heath Point. Common.

*Ophiopholis aculeata* Lütken. Anticosti and Mingan Is. Very common in 10-15 feet rocky bottom. Cod-fish were often caught having their stomachs filled with this species.

*Ophioglypha robusta* Lyman. A single specimen dredged in 20 feet, rocky bottom, off Table Head, Anticosti.

*Astrophyton Agassizii* Stimp. A specimen of this species, obtained near Gaspé, C. E., was presented by Rev. I. A. Tallman.

#### POLYZOA.

*Tubulipora patina* Johnst. Anticosti.

*Diastopora verrucaria* Fabr. sp.

*Membranipora Lacroixii*? Sav. All these species occur at Mingan in 15 feet.

*Lepralia annulata* Fabr.

*L. trispinosa* Johnst.

*L. hyalina* Johnst.

*L. Belli* Dawson.

*L. pertusa* Johnst.

*L. paucispina* Stimp.

*Eschara lobata* Lamk.

*Myriozoum subgracile* d'Orb.

D'Orbigny in the *Paleontologie Française*, Terrain crétacés 1850-52, has described a large number of Polyzoa from the Bank of Newfoundland, a list of which is here given :

#### BRACHIOPODA.

*Hypothyris psittacca* King. One specimen occurred at Anticosti in 20 feet, rocky bottom.

#### LAMELIBRANCHIATA.

*Mytilus edulis* Linn. Anticosti.

*Saxicava arctica* Desh. Anticosti.

*Mya arenaria* Linn. Anticosti.

*M. truncata* Linn. Anticosti.

These four species, together with *B. Labradorensis* and *P. lapillus* and *Cancer irrorata*, were all that occurred during a walk along the shores of the island for 12 miles. Owing to the freshness of the water, there was a remarkable paucity of littoral animals noticed.

*Pecten islandicus* Müll. Mingan, 20 feet.

*Crenella glandula* Turton. Anticosti, 20 feet.

*Cardita borealis* Conr. Mingan, 20 feet rocky.

*Cardicum islandicum* Chemn. Mingan, 20 feet rocky, abundant.

*Serripes Grœnlandicus* Beck. With the last; large and abundant.

#### GASTEROPODA.

*Doris* sp. Not described.

*Chiton marmoreus* Fabr. Mingan.

*Margarita undulata* Sowb. Mingan.

*M. cinerea* Gould.

*M. helicina* Müll. Anticosti, abundant.

*M. varicosa* Mightes. Mingan Is. 20 feet rocks, common.

*Turritella erosa* Couth.

*Aporrhais occidentalis* Beck.

*Lacuna vineta* Turton. Anticosti.

*Littorina vestita* Gould.

*L. palliata* Gould.

*Purpura lapillus* Lam. Anticosti. Not very common.



*Buccinum Labradorensis* Reeve. (*B. undatum* Gould), Anticosti. Not very common.

*Fusus tornatus* Gould. Mingan Is. 20 feet rocky. One large dead shell.

*Bela Woodiana* Möll. Mingan, 20 feet rocky.

*Physa heterostropha* Say. Occurred on the south side of Anticosti in great abundance.

*Limnaea*. A species was common in ponds at Anticosti.

*Vitriina pellucida* Drap.? Common at Anticosti and Mingan.

*Succinea obliqua* Say. Common at Anticosti and Mingan. Fright Island, and Niapisca Island.

*S. avara* Say. Frequent at Mingan under drift stuff, boards, and rocks near the shore, where all the terrestrial species mentioned from Labrador occur. But those mentioned from Anticosti were found all over the island, in the interior as well as on the shore.

*Pupa budia* Adams. Abundant at Fright Is., Mingan.

*Bulinus lubricoides* Stm. Common at Niapisca Is., Mingan.

*Helix chersina* Say. Frequent at Fright Is.

*H. nemoralis* Linn. Both the plain and striped varieties were found on plants at Anticosti.

*H. arborea* Say. Common at Niapisca Is.

*H. minuta* Say. Common at Anticosti.

*H. striatella* Anthony. Abundant at Fright Island and Niapisca Island.

*Limax campestris* Binney. Frequent at Anticosti.

At Entry Island, one of the Magdalen group, in the centre of the island under boulders, occurred and in the usual abundance, *Helix nemoralis*, *arborea*, *lineata*, *striatella*, *electrina*, and *Bulinus lubricoides*.

At Chedabucto Bay *Pandorina arenosa*, young shells, alive, *Margarita acuminata* and *Nassa trivittata* were dredged by the same party.

#### ANNELIDA.

*Omatoplea Stimpsoni* Girard. Anticosti, 15 feet rocky bottom.

*Nereis* sp., allied to *denticulata*. Anticosti.

*Lepidonote cirrata* Oersted. Anticosti.

*L. punctata* Oersted. Anticosti and Mingan.

#### CRUSTACEA.

*Hippolyte aculeata* Fabr.

*H. polaris* Sabine.

*H. Fabricii* Kroyer.

*H. Gaimardii* M. Edw.

*Argislar* Owen. This and the four preceding occurred at the eastern end of Anticosti in 20 feet rocky bottom.

*Homarus Americanus* M. Edw. Common.

*Eupagurus pubescens* Stimp. Anticosti, 20 feet common.

*Cancer borealis* Stimp. Common.

*Hyas aranea* Leach. Common.

*Gammarus mutatus* Leily. Low water, abundant.

*Idotea* new sp. Low water and 10 feet, common.

*Cyprilla*. Two species, 20 feet, common.

*Calliope lævinscula*. Magdalen Isles. Abundant at the surface of the water in the caverns under eroded cliffs.

*Themisto* sp. Anticosti, common.

*Pandalus annulicornis* Leach. Anticosti, 15 feet.

*Argislar* Owen. Mingan, 15 feet Niapisca I.

*Homarus Americanus* M. Edw. (Lobster.)

*Hyas aranea* Linn. At Ellis Bay, Anticosti, in 8 feet rocks.

*Cancer irrorata* Say. Anticosti.

These articulata were identified by Dr. Stimpson.

*Crangon boreas* has been brought from Labrador by H. R. Storer, M.D.

Though the above lists of species are imperfect, yet they seem to afford very satisfactory evidences that there are three distinct assemblages of marine invertebrates intermingled on the coast of southern Labrador. We can easily separate from the list, as foreign to this coast, three species of moluscs; viz. *Pandora trilineata*, *Natica heros*, and *Rissoa minuta*. These shells were rare, and of small size, though on the coast of New England they are large and abundant.

By the aid of "The Invertebrata of Massachusetts," by Dr. Gould, and a list of invertebrates found by Mr. Robert Bell, Professor of Natural Sciences, in Queen's College, Kingston, about the mouth of the St. Lawrence and the coast of New Brunswick, published in the Canadian Naturalist and Geologist; together with a list of the shells of Halifax by Mr. Willis, and Stimpson's Invertebrates of Grand Manan, we are enabled to trace the fauna peculiar to the coast from Cape Cod to Nova Scotia, as it reappears again in the Eastern shores of the Gulf of St. Lawrence, about Prince Edward's Island, at Gaspé, and extends up the river St. Lawrence towards Quebec.

Some of the following shells do not occur at Grand Manan, but seem to be as abundant on the shores of Canada as in Maine:

<i>Leda limatula.</i>	<i>Crepidula plana.</i>
<i>Mytilus plicatulus,</i>	“ <i>fornicata.</i>
<i>Venus mercenaria.</i>	<i>Rissoa minuta.</i>
<i>Lyonsia hyalina.</i>	<i>Natica heros.</i>
<i>Ostroæa virginiana.</i>	“ <i>triseriata.</i>
	<i>Nassa trivittata.</i>

Mr. Bell observes that *Natica heros* is “large and abundant.” *Mytilus plicatulus* and *Venus mercenaria* were “from the Gulf.” The last mentioned species occurs abundantly in Casco Bay—*Eupagurus Bernhardus*, which does not occur in Labrador, was frequent. *Aporrhais occidentalis* occurred very rarely at Gaspé, as it does on the coast of Maine.

The occurrence of the large long oyster so common at Prince Edward’s Island, and which is found in such immense heaps at Newcastle, Me., upon the banks of the Sheepscot River, in whose waters it still lives, though in diminished numbers, indicates similar oceanic conditions existing on those two shores, which are separated by the colder waters of the Bay of Fundy.

The occurrence of *Astrophyton Agassizii* at Gaspé, which is replaced in Labrador by *A. eucnemis*, is interesting as showing that the echinoderm faunæ of those localities are also distinct. The island of Anticosti, judging by its land shells and vegetation and the presence of *Idyia roseola*, *Bolina alata*, and *Pleurobrachia rhododactyla*, belongs to New Brunswick.

This fauna was stated by Dr. Gould to extend from Cape Cod to the Newfoundland Banks from the study of the mollusca alone. It was afterwards, by Forbes, termed the “Boreal” province, and he considered Cape Breton its most northern limit.

In 1852, Dana\* established under the name of the “Nova Scotian Province,” a crustacean fauna, embracing an extent of nine hundred miles, reaching from “Cape Cod to the Eastern Cape of Newfoundland;” and in 1857, Lütken † likewise proposed for the same region an echinoderm fauna, which he calls the “Acadiske Provinds,” merely changing Dana’s name for the more ancient title of that Province.

They all agree in bringing down the Arctic or polar fauna to intermingle with the Acadian fauna at the northern limits of the latter. But with a better knowledge of the polar fauna, which is presented in the lists of Greenland invertebrates by Reinhart, Mörch, Lütken, and others, ‡ we are led to the conclusion that there is an in-

\* Crustacea of the U. S. Exploring Expedition.

† Uebersicht über Grönland’s Echinodermata.

‡ Naturhistoriske Bidrag til en Beskrivelse af Grønland. Kjøbenhavn 1857.

intermediate fauna inhabiting the seas of Labrador and Newfoundland.

A large portion of the polar species have not yet been discovered south of Greenland; and the following species are characteristic of Labrador and the Banks of Newfoundland:

<i>Cyrtodaria siliqua.</i>	<i>Machæra nitida.</i>
<i>Asterias n. sp.?</i>	<i>Margarita acuminata.</i>
<i>Anaperus cigaro.</i>	“ <i>varicosa.</i>
<i>Orcula Barthii.</i>	<i>Natica flava.</i>
<i>Terebratella Labradorensis.</i>	<i>Aporrhais occidentalis.</i>
<i>Pecten tenuicostatus.</i>	<i>Fusciolaria ligata.</i>
<i>Alasmodonta arcuata.</i>	<i>Buccinum cretaceum.</i>
<i>Mesodesma Jauresii.</i>	<i>Fusus ventricosus.</i>
<i>Ommastrephes todarus.</i>	

The littoral species of south-eastern Labrador agree well with those of Maine. The two species of *Littorina* present the same variations, and the *Macoma fusca* occurs in the same abundance. These three mollusks are replaced in Greenland by representative species; as regards the latter, Dr. Stimpson has separated this species from *Tellina Grænlondica* Beck; and my own specimens from Greenland are plainly distinct. The genus *Mesodesma*, which does not occur in Greenland, is represented by two species in Labrador and the Grand Banks. The fresh water *Alasmodonta arcuata*, which is so abundant throughout Newfoundland, and in Nova Scotia, New Brunswick, and the eastern half of Maine, which is included in what was formerly called “Acadia,” also characterizes this fauna. In the deep water species there is a greater similarity to the polar fauna, but many species of *Buccinum* and *Fusus* described from the frozen seas, which have not been found to the southward, show plainly a different fauna adapted to those climatic conditions. Most of the species enumerated in the preceding list extend around Cape Breton to Halifax and the Banks lying off Nova Scotia, and predominate at the mouth of the Bay of Fundy; but along the coast of Maine they become reduced in size and numbers before reaching the mouth of the Penobscot. The fauna also reappears on St. George’s Banks, and very probably on Jeffries Bank, and the occurrence of *Eupagurus pubescens*\* and *Cardita borealis*, a very abundant Labrador and Greenland shell, off the coast of New Jersey, indicates that the cold arctic current impinges upon that coast. How far northward of Newfoundland this fauna extends is not now known. The charts show the existence of an im-

\* Forbes’ Natural History of the European seas, p. 53.



menseshoal to the northward of that island, which with the opposite coast of Labrador is no doubt occupied by this fauna. Returning down the coast we find it following very closely the line of floating ice as laid down in the charts. It includes the Mingan Islands, partially embracing Anticosti, and then sweeps around towards Cape Breton, there meeting the warmer waters of the Gulf Stream.

Thus, south of Labrador, it is apparently a *shoal* fauna, and we would propose for it the name of the *Syrtensian Fauna*, indicative of the physical features that limit its bounds.

This fauna seems to have its equivalent upon the European side of the Atlantic in Finmark, where Löven\* records the discovery of several new species of Mollusks and other invertebrates. The climatic conditions are very similar, and the insect fauna and the flora correspond very exactly with the insects and plants of Labrador.† Indeed, there is apparently a belt of faunæ intermediate between the boreal province on both sides of the Atlantic on the one hand, and the circumpolar province, which touches upon the southern point of Greenland, includes Iceland, and spreads out so as to include Finmark and the neighboring islands. Dr. Gould, in noticing the distribution of our mollusks, mentions the fact that "about 20 species may be regarded as intermediate, being found most frequently by fishermen about the Banks, Newfoundland, and the islands intervening between Greenland and England. (Invertebrates of Massachusetts, p. 316).

Thus with our present knowledge we can approximate very nearly to the southern limits of this *shoal* fauna, and trace the isolated patches situated upon the cold and unprotected elevations, which rise in the warmer seas of New England; but our imperfect information respecting the range northward of its most characteristic species, does not allow us to speak with much certainty how far up the eastern coast of Labrador these species extend, or whether those few species, which reach Greenland and occur there rarely, may not be considered as foreigners to the soil. For example: of *Apporhais occidentalis*, which is so profusely abundant in the Straits of Belle Isle, Mörch reports but a fragment from Greenland. This is analogous to the occurrence of

\* Identified by Dr. William Stimpson..

† In a communication to the Boston Society of Natural History, "Proceedings," 1863, Mr. S. H. Scudder has intimated that there is an insect fauna peculiar to Eastern Labrador, and in conversation with the writer, has also spoken of the close analogy, which the insects of Labrador bear to those of Lapland.



*Cardita borealis* on the New Jersey coast, where it is certainly an alien.

In the absence of requisite data concerning the distribution of marine life in the arctic and subarctic seas, we shall be very materially aided by tracing the course of the yearly isothermal lines; and more especially for our purpose that area of the Atlantic ocean comprised between the line of  $40^{\circ}$  and  $32^{\circ}$ . The line of  $40^{\circ}$ , according to Professor Henry\*, begins in America at the Northern portion of Nova Scotia. This agrees well with Gould's and Forbes' designation of Cape Breton, as being the dividing point between the Acadian and Arctic provinces. The line of " $32^{\circ}$  indicates the boundary of the region within which the average temperature is below the freezing point. It will be seen at a glance, that, instead of being circular in its outlines, it has the form of an irregular elongated ellipse, the greater diameter of which is across the pole, from the southern extremity of Hudson's Bay, to the south of Lake Baikal, in Siberia." Upon the map accompanying the report, the line is made to pass through the lower third of the eastern coast of Labrador, dividing Cape Farewell from the remaining portion of Greenland, and touching Europe at Finmark in the vicinity of Nordland, one of the most southern of the Lofoden Islands. Thus to the north it shuts out a vast circumpolar region, including the northern portion of Hudson's Bay, with all of Baffin's Bay; and upon the European side it includes Spitzbergen and Nova Zembla. We are therefore confirmed in our opinion formed before meeting with these meteorological facts, that this elliptical area embraces a belt of faunæ of a subarctic character; and in the supposition that the fauna of Labrador and the Newfoundland banks has an European equivalent fauna in Finmark, occupying an extent of perhaps some 400 miles along the coast from Nordland to a point somewhere beyond Cape North.

Brunswick, Maine, Aug. 1863.

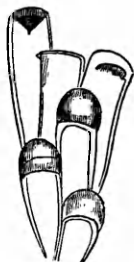
#### EXPLANATION OF THE FIGURES.

- Pl. s. I. II. Fig. 1. *Lepralia producta* Pack.  
 " 2. *Membranipora solida* Pack.  
 " 3. *Menipea fruticosa* Pack.  
 " 4. *Halophila borealis* Pack.  
 " 5. *Myrizoum subgracile* D'Orby.  
 " 6. *Buccinum cretaceum* Reeve.

\* Meteorology in its connection with Agriculture. Patent Office Report on Agriculture, 1856.



3.



4



4 a



2.



2a.

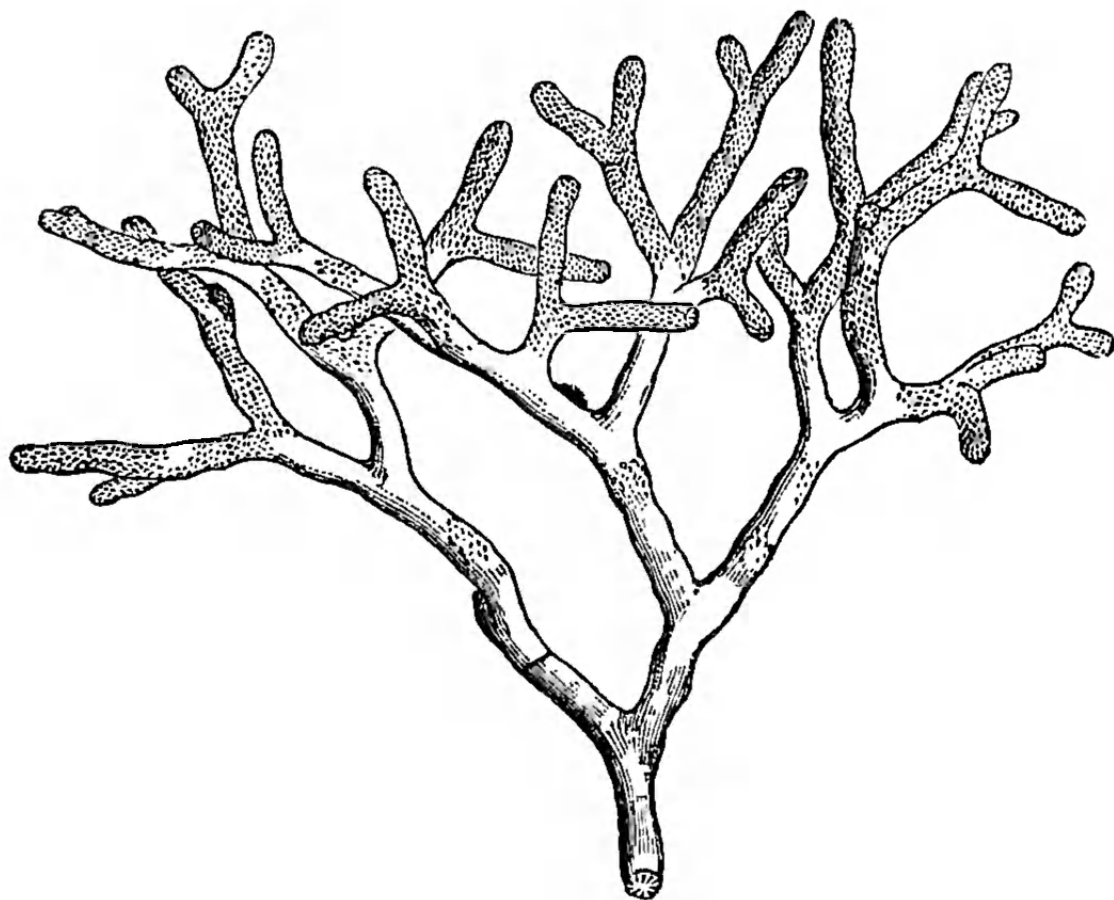
2 *M. solida*.

4 *H. borealis*.

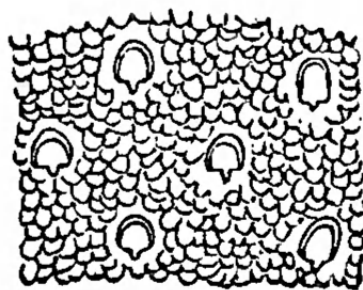
3 *M. fruticosa*.



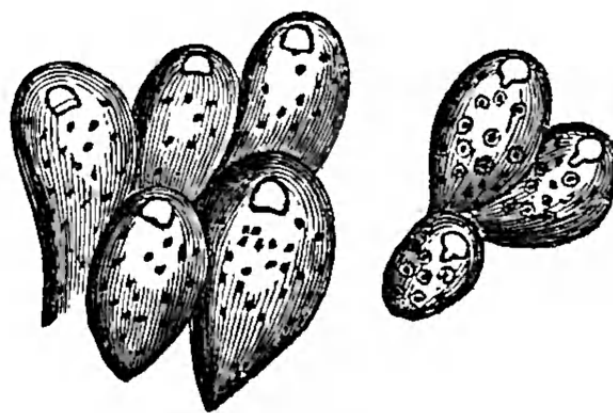
6.



5.



5a.



1.

1 *L. producta*.

6 *B. cretaceum*.

5 *M. subgracile*.