

cribriform by the presence of the "pores" (how far this sarcode may belong to the epithelial cells individually, and thus being agglomerated possess a general motory power like that of an Amœba or Myxogaster (*Æthaliûm*), I am not prepared to say),—and the innermost layer of a soft fibro-reticulated structure, in which the fibre is composed of fibrillæ in the form of elongated, linear, (?) muscular cells. The pores are best seen over the interstices of the fibro-reticulated layer, as the light then passes directly through them, when the reticulated fibro-framework of *their* structure again appears to be composed of the "transparent sarcode" in which the epithelial cells are imbedded, rendered more or less opaque here and there by the presence of an epithelial cell or two, with other granular matter.

[To be continued.]

XXIX.—*Contributions to the Study of the Littoral Fauna of the Anglo-Norman Islands (Jersey, Guernsey, Herm, and Sark).* By Dr. R. KœHLER.

[Plate XI.]

[Continued from p. 243.]

JERSEY (*continued*).

CRUSTACEA.

The class Crustacea is represented at Jersey by numerous individuals belonging to various species. It was to the Crustacea, which interested me from various points of view, that I paid attention more particularly during my visits to the Anglo-Norman islands. I shall speak here only of the Decapoda, Isopoda, and Amphipoda. The number of species that I can record amounts to 141; and it is to be remarked that this is nearly the number indicated by Delage in the list given by him of the Crustacea of Roscoff, namely 119.

*Decapoda.*

*Stenorhynchus phalangium*, Edw., and *tenuirostris*, Bell, occur very commonly among the rocks. A third and more

interesting species, the existence of which was indicated to me by Mr. Sinel, is *Stenorhynchus ægyptius*, Edw., which, so far as I know, has not hitherto been seen out of the Mediterranean. This *Stenorhynchus* is only found about a small rock situated near the entrance of the port of St. Helier on the side of the Albert jetty, a rock which is uncovered only at spring-tides; moreover, it is not very abundant. Another type which is also very rare, namely *Achæus Cranchii*, Leach, is found frequently at the Havre des Pas, at the Crabière.

The three species of *Inachus* described by Bell occur at Jersey. *Inachus dorsettensis*, Leach, and *I. dorynchus*, Leach, are met with at various points of the southern coast of the island, but never in great abundance. *Inachus leptochirus*, Leach, has been several times captured by Mr. Sinel with the dredge in St. Aubin's Bay. Bell also regards it as a very rare species. *Pisa Gibbsii* and *tetraodon*, Leach, are common everywhere. The genus *Hyas*, allied to the preceding, is represented by two species, *H. coarctatus* and *araneus*, Leach, which are met with but rarely in the products of dredgings; they are found at a depth of 5-10 fathoms off Gorey. This is also the case with *Eurynome aspera*, Leach, which never quits a certain depth.

The species of *Xantho*, which are generally common enough on our coasts, are not very frequent at Jersey. *Xantho florida*, Leach, is not so scarce as *X. rivulosa*, Edw.

I will do no more than mention the following species, which are distributed everywhere in profusion:—*Pilumnus hirtellus*, Leach, *Cancer pagurus*, Bell, *Portunus puber*, Leach, *pusillus*, Leach, *arcuatus*, Leach, *Carcinus mænas*, Leach, and *Pinnotheres pisum*, Leach. *Portunus corrugatus*, Leach, and *depurator*, Leach, are sometimes associated with them at La Mothe and La Rocque. *P. marmoreus*, Leach, has sometimes been found by Mr. Sinel; I have never met with it. *Portunus holsatus*, Fab., and *Portumnus variegatus*, Leach, are obtained only with the dredge. The latter is very rare, and I have never captured it.

I may cite further *Pirimela denticulata*, Leach, of which I have collected some specimens at low water at Fort Elizabeth, and with the dredge in St. Aubin's Bay; *Ebalia Bryerii* and *Pennantii*, Leach, which are obtained by the dredge in the same bay; and *Dromia vulgaris*, Edw., which does not live on the coast, but which the fishermen often bring up in the baskets (pots) employed in fishing for lobsters, and in which specimens of *Inachus* and *Stenorhynchus* and of *Portunus corrugatus* may also be collected. To conclude the enumeration of the Brachyura I may note *Porcellana platycheles*,

Lam., and *longirostris*, Edw., as very common; *Corystes cassivelaunus*, Penn., which lives buried in somewhat muddy sand and is found abundantly at Elizabeth Castle, where it digs galleries side by side with the Solens; and, lastly, *Thia polita*, Leach, which also lives in the sand and is tolerably common at La Rocque.

Of the Macrura I will first of all indicate *Gebia deltura*, Leach, *Callianassa subterranea*, Leach, and *Axius stirhynchus*, Leach, so as to continue the enumeration of the species which dig galleries in the sand. I have found all three of them at La Rocque in muddy sand, in which they bury themselves to a depth of several decimetres. The *Gebia* is not so common as the others. The *Axius* also sometimes occurs under stones at the Grève d'Azette.

I shall cite *Pagurus Bernhardus*, Forb., only as a matter of form. *Pagurus cuanensis* and *Hyndmanni*, Thomps., and *Eupagurus Prideauxii*, Leach, are frequently found in St. Aubin's Bay, but always with the dredge.

*Palinuri* and *Homari* abound, but their fishery is not very active. The genus *Galathea* includes *G. squamifera*, Leach, a very common species, and *G. strigosa*, Fab., of which I have collected several fine specimens at La Rocque. By dredging in St. Aubin's Bay I have obtained a third species, which, in a former memoir, I referred with doubt to *G. nexa*, Embl., pointing out the differences which distinguished it clearly from that species. This *Galathea* is *G. Andrewsii*, Norm.; moreover, Mr. Sinel has informed me that he had obtained by dredging a specimen of *G. nexa* agreeing with the type described by Embleton.

The group of the Caridina (*Salicoques*) is well represented by *Palamon squilla*, Fab., and *serratus*, Fab., and by *Cranigon vulgaris*, Fab., *fasciatus*, Risso, *bispinosus*, Westw., *trispinosus*, Hailst., and *sculptus*, Bell, which live in the pools of water or in the midst of the *Zostera*; the last three species are rare. *Nika edulis*, Risso, is not very frequent; *Pandalus annulicornis*, Leach, never quits the deep water and may be collected by the dredge; *Athanas nitescens*, Leach, is common under stones. *Hippolyte varians*, Leach, and *viridis*, Edw., abound in the meadows of *Zostera*; *Hippolyte Cranchii*, Leach, is less abundant; I have collected some specimens with the dredge.

Lastly, I will note *Lismata seticaudata*, Risso, of which one specimen was collected by Mr. Sinel in one of those baskets which the fishermen employ in the lobster-fishery. This species is regarded as peculiar to the Mediterranean.

The group of the Schizopoda is represented by numerous

examples of *Mysis chamæleon*, Thomps., a species which is exceedingly abundant among plants. *M. vulgaris*, Thomps., accompanies it here sometimes; but this is especially pelagic, as is also the case with *M. Griffithsæ*, Bell. *Themisto brevispinosus*, Goods., is sometimes associated with *Mysis chamæleon*, but is not common. Mr. Sinel has also collected, with the preceding species, some rare examples of *Cynthia Flemingii*, Goods., and of *Thysanopoda Couchii*, Bell, species which for my own part I never met with.

The Stomatopoda are only represented by *Squilla Desmarestii*, Risso, which the fishermen sometimes bring in from the open sea.

Lastly, among the Cumaceæ I may cite *Gastrosaccus sanctus*, Ben., *Sphinoë serrata*, Norm., and *S. trispinosa*, Goods., which live among the *Zosterae*, but are rare, and finally a small pelagic Cumacean, *Cuma Edwardsii*, Bell.

### Isopoda.

The Tanaidina are not very abundant at Jersey. *Tanais vittatus*, Lillj., *Leptocheilia Edwardsii*, Kröy., and *Paratanais forcipatus*, Lillj., live among the *Halichondria panicea* and *Cynthiae* which clothe the surface of the rocks; *Anceus maxillaris*, Mont., and *Praniza cærulea*, Mont., are also found there. *Paranthura costata*, Spence Bate, and *Apeudes talpa*, Leach, are sometimes met with in similar situations.

The true Isopoda are more generally distributed. Belonging to the group of the *Idoteæ* we have *I. tricuspidata*, Desm., very common among sea-weeds, sometimes pelagic; *I. linearis*, Linn., generally distributed, usually associated with the preceding, but at certain points much more frequent, as, for example, at Elizabeth Castle; *I. acuminata*, Leach, of which I found a specimen at St. Aubin; *I. appendiculata*, Risso, not very abundant, which I have found at La Mothe; and, lastly, *I. emarginata*, Fab., which is always pelagic and lives in the midst of floating sea-weeds.

Among the Oniscidæ the best-known type is *Ligia oceanica*, Fab., which lives upon the rocks of the shore. The individuals are generally of very small size. *Janira maculosa*, Leach, is common under stones. Living among sponges and beneath the tufts of *Cynthia rustica* I have also met with *Janiræ* of smaller dimensions and of which the inferior antennæ are comparatively much shorter than in the typical *J. maculosa*. Delage also indicates a *Janira* with short antennæ at Roscoff. I do not think that we ought to ascribe any importance to this character, for among these small

*Janiræ* I find specimens whose antennæ scarcely attain half the total length of the body, while others have them nearly as long as the body. *Limnoria lignorum*, Rathke, which is found in floating pieces of wood, in which it hollows out galleries, is also placed among the Oniscidæ; I have collected at Jersey several specimens associated with an Amphipod, which is also xylophagous, namely *Chelura terebrans*, and with specimens of *Tanais vittatus*, accidentally present in the wood.

The family Sphæromidæ is represented at Jersey by *Sphæroma serratum*, Fab., which lives under stones, and *S. Prideauxianum*, Leach, which is frequently found among Algæ and Sponges; by *Cymodoce pilosa*, Leach, associated with the *Sphæromata*, but not common; by *Dynamene viridis*, Leach, and *D. Montaguï*, Leach, and *Næsa bidentata*, Leach, moderately distributed throughout, very frequent in the empty shells of *Balanî*. The species of these last two genera appear to adapt themselves with facility to different habitats; they occur sometimes in constantly wet gravels, sometimes upon rocks which are left bare every tide; lastly, I have collected several specimens by pelagic fishing.

Finally, to conclude this enumeration of the Isopoda Errantia, it remains for me to indicate *Cirolana Cranchii*, Leach, and *Conilera cylindræa*, Mont., species which do not live on the coast, but which the fishermen occasionally bring in from the open attached to their apparatus. The specimens of *Conilera* are not perfectly in agreement with the description of Spence Bate and Westwood, and appear to me to be identical with those noted by Delage at Roscoff, which differ from the type specimens "by the antennæ, by the natatorial appendages of the sixth abdominal segment, and by red punctuations, the absence of which is specified by the English authors." I possess *Conilera* from Naples the characters of which agree absolutely with the description of the English authors, and from which the Jersey specimens differ by the following characters:—Length of the appendages of the last abdominal segment, length of the hairs borne by the fourth joint of the inferior antennæ, and lastly the presence upon the carapace of numerous small red spots.

Among the parasitic Isopods I can only cite *Bopyrus squillarum*, Lat., and *Anilocra mediterranea*, Leach.

#### *Amphipoda.*

The group Orchestiidæ has furnished me with *Talitrus locusta*, Lat., common on all the sandy beaches, *Orchestia*



*mediterranea*, Costa, which lives under stones, and *O. littorea*, Lat., pretty frequent among the Algæ. An allied type, *Nicca Lubbockiana*, Spence Bate, is met with pretty frequently under Algæ.

The numerous family of the Gammaridæ includes, in the first place, some *Montaguæ*, two species of which exist at Jersey, *M. monoculoides* and *marina*, Sp. Bate, the latter rather rare. They live in general under the tufts of *Cynthia rustica* and sponges which clothe the rocks. In the same stations *Anonyx Edwardsii*, Krøy., is found much more frequently. The specimens of this species present considerable differences in the length of the superior antennæ, which are sometimes shorter than, sometimes as long as the inferior antennæ; the flagellum presents analogous variations. *Ampelisca Gaimardii*, Krøy., is pretty often met with in pelagic fishing.

To the group Atylidæ belong:—*Dexamine spinosa*, Leach, a species common under the stones among vegetation (I may remark that in small individuals the characteristic tooth presented by the first joint of the superior antennæ generally does not exist), *Atylus Swammerdamii*, Sp. Bate, and *bispinosus*, Sp. Bate, *Pherusa bicuspis*, Edw., *P. fucicola*, Leach, and *Iphimedia obesa*, Rathke, species which are pretty common among vegetation, except *A. bispinosus* and *P. bicuspis*, which are scarcer.

The group Leucothoina is well represented by *Leucothoë articulosa*, Leach, which is associated among plants with the preceding species. *Aora gracilis*, Sp. Bate, also exists at Jersey; but I have found only a single specimen among tufts of *Cynthia*.

The Gammarinæ are very generally distributed. I will first of all note a *Gammarella*, of which I have found some specimens in the meadows of *Zostera*, and which differs from *G. brevicaudata*, to which it is nearly allied, by the length of its antennæ. I have already described this species under the name of *G. longicornis*. Then come *Melita palmata*, Leach, and *Mera grossimana*, Leach, two species pretty common among vegetation. *Erythræus erythrophthalmus*, Sp. Bate, *Gammarus marinus*, Leach, and *G. locusta*, Fab., are very frequent in the same stations. *Amathilla Sabini*, Leach, is scarcer. I will further indicate *Microdeutopus gryllotalpa*, Costa.

The group Podocerinæ is represented by numerous specimens of *Amphithoë littorina*, Sp. Bate, and a few of *A. gammaroides*, Sp. Bate, associated with the *Gammari*, *Atyli*, &c., and by *Podoceri*, two species of which, *P. capillatus*, Rathke, and *falcatus*, Sp. Bate, occur commonly under the *Cynthiae*. *Siphonocætes typicus*, Krøy., is met with sometimes among the

Algæ in the neighbourhood of Elizabeth Castle. I will mention further *Cheura terebrans*, which is associated with *Limnoria*.

The Læmodipoda are represented by *Protella phasma*, Sp. Bate, and *Caprella linearis*, Edw., two species very common among plants.

I must, lastly, cite, to complete the enumeration of the higher Crustacea, *Nebalia Geoffroyii*, Edw., common under stones which lie upon mud rich in organic detritus.

#### INSECTA.

The number of marine insects at present known is very restricted. We hardly know more than *Æpus marinus* and *Robinii*, *Microlymma brevipenne*, and *Ochthebius Lejolisii*, which live on our coasts and really merit the name of marine insects. To these Coleoptera we must add the Hemipteron, *Æpophilus Bonnairei*, Sign., which was discovered only in 1879 at the island of Ré. It is an extremely rare species, and does not seem to have been met with again since that time; nevertheless there is a specimen in the British Museum bearing "Cornwall" as an indication of origin. I have been fortunate enough to find *Æpophilus* at Jersey, and I collected several examples of it, which have enabled me to study this interesting animal with care, and to rectify the incorrect interpretation which Signoret had given of the external genital organs. Moreover I have found the larva of this interesting Hemipteron, not in Jersey but in the caves of Gouliot, in the Isle of Sark.

In November 1885, Mr. Sinel also found in Jersey this same larva of *Æpophilus*, of which he has sent me some specimens.

*Æpophilus Bonnairei* (Pl. XI. figs. 6, 7) is 3 millim. in length, its breadth is 1·5 millim.; its colour is a rusty yellowish brown. The body, especially the abdomen, is covered with very fine and silky little hairs. According to Signoret the external genital organs are situated above the abdomen in the female and beneath it in the male. Now I easily convinced myself that this naturalist had mistaken the male for the female and *vice versâ*; in fact, I was able easily to recognize the presence of eggs in the individuals which he regards as males. Moreover, the mere inspection of the genital armatures enables one to recognize the sexes, for they correspond well with the classical description of the copulatory organs in the Hemiptera. I had not at my disposal a sufficient number of specimens to enable me to study the organs of copulation in detail, but the figures which I give of these organs in the

male and female are, I think, sufficient to give an idea of them (figs. 4 and 7).

*Æpophilus Bonnairci* occurs under strongly adherent stones situated at some depth among the gravels; it seems to remain there motionless, only to run with great rapidity as soon as the block which covers it is raised. I have found it in St. Clement's Bay, behind La Mothe, at points which are left bare every tide; it is associated with *Næsa bidentata*, *Gammarus marinus*, *Phascolosoma elongatum*, *Terebella conchilega*, *Cirratulus Lamarckii*, *Nereis cultrifera*, &c.

*Æpus Robinii*, Lab., also lives at the same station; during my first sojourn in Jersey I did not observe this beetle, but I found some specimens of it in 1885.

As to the larva of *Æpophilus*, it is a little smaller and more flattened than the perfect insect (fig. 2). It differs from the latter, in the first place, by the absence of genital organs and of elytra, and further by some peculiarities in the form of the rostrum and of the feet (figs. 5, 8, and 9).

In 1884 the existence of *Ochthebius Lejolsi*, Leach, at the Corbières, was indicated; it lives, with its larva, in the pools which are formed at low water near the bank. I looked for this insect in 1885, and likewise met with it.

There is nothing astonishing in seeing insects such as *Æpus* and *Æpophilus* living in regions of the coast which are uncovered at every tide. We know, in fact, that insects, even aerial insects, are able to resist a submersion lasting for several hours, or even one or two days, as appears from the interesting experiments of Plateau. Under these conditions the animal falls into a state of apparent death, but becomes re-animated when brought again into the open air, providing the duration of the submersion has not exceeded a certain limit.

But a thing that greatly surprised me was to find specimens of *Æpophilus* in the caves of Gouliot, in Sark, in the cave of the Tubularians, that is to say in a place which is only uncovered at the highest spring-tides. Now, if in the ordinary tides of the syzygies the sea retires sufficiently to lay bare the upper part of the caves, during the whole interval which separates two successive spring-tides the cave is absolutely full of water. We must therefore assume either that *Æpophilus* is able to live for several days together without being obliged to renew the provision of air which it retains in its tracheal system, or that it quits the caves to take shelter in a spot which is more frequently uncovered, and only reenters them at the time of the spring-tides; this latter hypothesis is hardly sustainable.



Among the other groups of Arthropods I may cite *Pycnogonum littorale*, Ström, and *Ammothea longipes*, Hodge, which are pretty common on the coast of Jersey among Algæ.

I will also indicate a small mite, which is associated with *Æpus* and *Æpophilus*, and is perhaps a *Halacarus*.

## GUERNSEY.

The island of Guernsey, situated to the north-west of Jersey, has the form of a right-angled triangle, of which the two sides of the right angle, corresponding to the eastern and southern coasts, are about 7 miles long, while the hypotenuse, which runs in a direction from south-west to north-east, is rather more than 9 miles in length. The east coast, the two extremities of which are St. Martin's Point in the south and Fort Doyle in the north, is slightly excavated, and nearly in its middle is situated the capital of the island, St. Pierre-du-Port.

The geological constitution of the island of Guernsey is very different from that of Jersey. The syenite, which in Jersey formed exposures of great extent, and which made its appearance at almost all points of the coast (except at the north-east and in St. Aubin's Bay), does not appear in Guernsey except in the northern region of the island, and is replaced in the south and south-east by gneisses associated with quartziferous porphyries, and by porphyrites, pegmatite, and some phyllades. Syenite appears especially in the north-eastern and western portions of the coast, and gives place in the north to considerable exposures of granite and diorite; important quarries are worked near St. Sampson and in the neighbourhood of L'Ancrese Bay.

It is to be remarked that in the regions where the coast is lowest, that is to say throughout nearly the whole western coast and the north-eastern half of the east coast as far as St. Pierre, we meet with diorite and syenite; but as soon as the coast begins to rise, that is to say on quitting St. Pierre, we see the gneisses and porphyries make their appearance and continue throughout the southern half of the east coast and the whole extent of the south coast of the island.

The part of the coast situated between St. Pierre and Fort Doyle is low, and the sea in retiring lays bare shores of considerable extent, interspersed with rocks. It is in this portion of the coast that is situated the port of St. Sampson, a small village of fishermen, connected with St. Pierre by a steam tramway; then, further to the north, the port of Bordeaux.

Between St. Pierre and St. Sampson the coast forms a very extensive but not deep bay, called Belgrave Bay. This bay, occupied partly by *Zostera* and partly by rocks clothed with sea-weeds, presents a tolerably varied fauna. The *Zostera* give shelter to some sponges (*Leucosolenia botrylloides* and *Isodictya fucorum*), small Crustacea (*Mysis*, *Themisto*, *Gastro-saccus*), Planariæ, compound Ascidia, and a few Nudibranchs (*Doris tuberculata*, *Eolis papillosa*). Under the rocks live some interesting species of sponges (*Halichondria incrustans*, *Oplispongia papillata*, *Isodictya cinerea*, *Hymeniacion mammeata*) and Polychæta. In Belgrave Bay I have also found at the limit of the lowest tides fine specimens of a *Lep-toclinum*, the very thick corms of which are of a brilliant red colour, and which I refer to *L. Lacazii*, Giard.

Towards Bordeaux and over the whole portion which extends between that little port and the Homptol rock (below Fort Doyle) the coast is exceedingly interesting to explore, and it presents a fauna of great variety although in a rather restricted space. Certain regions are occupied by *Zostera* which shelter their usual fauna; other points present small sandy beaches traversed by rivulets, in which are found *Sagartia bellis* and *parasitica* and *Bunodes gemmacea*. Lastly, under the rocks and under stones incrustated with calcareous Algæ there live a number of not very common species. Sea-Urchins, *Comatulæ*, Ophiurans, and *Asterias glacialis* are abundant there. I have found several specimens of *Molgula socialis*, *Cynthia sulcatula*, *Ascidiella scabra*, *Clavelina lepadiformis*, *Chatopterus Quatrefagesii*, *Edwardsia callimorpha*, *Caryophyllia Smithii*, &c., and several calcareous sponges—*Grantia ensata*, *Sycon tessellatum*, *Leucosolenia lacunosa*, &c. This region of the coast, which extends to the north of Bordeaux, is certainly the one the exploration of which was most profitable to me.

The west coast of the island is likewise but little inclined; it is broken by several irregular bays, presenting at low water beaches of considerable extent sprinkled with rocks, which are not so high in the northern region, where they are composed of diorite, as in the south, where the diorite gives place to syenite. Among these bays the most important are L'Ancrese Bay, which looks towards the north, then the Grand Havre, and the bays of Pecqueriès, Cobo, Vazon, and Perelle, turned towards the north-west; it is beyond Cobo Bay that the syenite appears. Finally, Rocquaine Bay, the longest, which looks to the west, terminates this series of small gulfs; it extends from La Rée tower, opposite to which is the island of Lihou, to which one can go dryshod at low water, to

Pleinmont Point, which forms the south-western extremity of the island of Guernsey. I have explored this coast through nearly its whole extent except the little bays of Perelle and Pecqueriès.

L'Anresse Bay is very poor, only presenting naked rocks, upon which is found *Actinia equina*, var. *fragacea*. It possesses no interest.

The Grand Havre is an interesting station as regards its fauna. The Algæ which cover the stones harbour many of the lower Crustacea (*Idotea tricuspudata* and *I. appendiculata*, *Atylus Swammerdamii*, *Podocerus fulcatus*, *Anonyx Edwardsii*), together with *Galathea squamifera*, *Athanas nitescens*, *Stenorhynchus phalangium*, *Xantho florida*, &c. Among the Polychæta I found especially *Phyllodoce lamellosa*, *Eulalia clavigera*, *Glycera capitata*, *Eteone longa*, *Siphonostomum uncinatum*, &c. *Ascidia producta* and *Cynthia sulcatula* are common. The rocks are clothed with tufts of *Cynthia rustica*, under which the worms and Crustacea live. The sponges are tolerably varied—*Tethya lynceurium*, *Dictyocylindrus ramosus*, *Halichondria incrustans*, &c.

Cobo and Vazon Bays appear to me to be rather poor. The sand which occupies the bottom of them only contains a few not very interesting Annelides, and the rocks are covered with very common sponges (at least so far as I have determined them). At Cobo I found a specimen of *Chalina cervicornis*; but it had been thrown up by the sea. At Vazon Bay *Pholas dactylus* is pretty common. In this bay are found the remains of a submerged forest, from which the inhabitants formerly obtained a considerable quantity of combustible material; in the country they give the name of *corban* to these submerged remains.

The neighbourhood of the island of Lihou and Rocquaine Bay, on the other hand, present a tolerably rich fauna. The physiognomy of this region, both as regards the configuration of the coast and the aspect of the rocks at low water and as regards the fauna, is absolutely identical with that of the southern region of Jersey, for example at the Grève d'Azette. The sea forms numerous pools, of which the bottoms are carpeted with *Zostera*, and the rocks are covered with Algæ, among which swarm Crustacea, small Polychæta, and Compound Ascidia. Some species which are scarce or wanting in Jersey are met with at this station; the *Comatulæ*, for example, are very common there, as also *Glycera capitata*. I have also found some examples of *Cucumaria pentactes* and one of *C. frondosa*.

Starting from Pleinmont the coast rises rather suddenly and

soon presents perpendicular rocks, forming vertical cliffs overhanging the abyss and attaining a great height. Throughout its whole length to the Pointe St. Martin the south coast of Guernsey presents a series of picturesque bays and indentations separated by bold promontories. The perpendicular rocks forming these, being constantly beaten by the waves, are hollowed into numerous caves; gradually worn away at their base, they fall down in different parts and leave the deep indentations which irregularly cut into the coast. Thus on quitting Pleinmont Point and travelling eastwards we successively come upon the bays of the Creux-Mahié, Bon-Repos, La Moye, Petit-Bot, Icart, and Moulin-Huet, all places celebrated as very remarkable sites.

I have visited nearly all these bays at low water, and most of them had only to offer me naked rocks and an extremely poor fauna. The Moulin-Huet Bay alone forms an exception. The head of this little gulf presents rocks of pegmatite cut into sharp points and covered with Algæ, sponges, and Actiniæ, the whole somewhat reminding one of the fauna of the caves of Gouliot, in Sark, although much less rich than in the latter station. *Cynthia rustica*, *Halichondria panicea*, and *Hymeniacion manmeata* are highly developed, and are associated with *Cynthia sulcatula*, *Molyula socialis*, *Leucosolenia lacunosa*, *Grantia compressa* and *G. ensata*, and *Sycon ciliatum* and *S. tessellatum*. *Actinia equina* is represented by numerous varieties; some examples of *Sagartia sphyrodeta*, Gosse, are also met with.

On passing the Pointe St. Martin the coast, which runs thence northward, is seen to become somewhat lower, although still remaining considerably elevated, except at the level of Fermain Bay. It falls rather suddenly at a short distance from the jetty which bounds the port of St. Pierre on the south. The fauna of Fermain Bay is rather poor; I met with hardly anything there except a few specimens of *Caryophyllia Smithii*, Stokes.

#### SPONGES.

The Sponge-fauna is particularly rich on the coast of Guernsey. Besides *Sycon ciliatum*, which is common everywhere, I found at Moulin-Huet, at Bordeaux, and at Belgrave Bay specimens of *S. tessellatum*, Bow., a sponge which, according to Bowerbank, occurs only at the caves of Gouliot. *Grantia compressa* and *G. ensata* are also common at Bordeaux, where they are associated with *Leucosolenia lacunosa*. *Leucosolenia botrylloides* is common in all the meadows of

*Zostera*. I found at Guernsey all the sponges which I have indicated at Jersey, besides some forms, such as *Oplitospongia papillata*, Bow. (Belgrave Bay), *Chalina cervicornis*, Bow. (Cobo Bay), and *Isodictya densa*, *I. infundibuliformis*, and *Polymastia mammillaris*, Bow., which I met with in the produce of dredgings brought in by a fisherman.

#### CŒLEENTERATA.

The Actiniæ are more numerous and more interesting at Guernsey than at Jersey. *Actinia equina* and *A. mesembryanthemum*, which are pretty common in the bays of the western coast, are less abundant in the north, and give place to less common types, such as *Aiptasia Couchii*, Gosse, which is found in abundance on days of spring-tide from St. Pierre to Fort Doyle. This species, so common in Guernsey, seems not to be very widely distributed; it is scarcely known except upon a few points of the coast of England (Falmouth). *Tealia crassicornis*, which is very abundant to the north of Bordeaux, attains a remarkable size, and is associated with *Sagartia bellis*, *S. troglodytes*, *S. parasitica*, and lastly *S. sphyrodeta*; the last-named, like the *Aiptasia*, is only observed in stations which are uncovered only at spring-tides. A variety of *Actinia equina*, *A. fragacea*, is extremely common in the bay of L'Anresse and Moulin-Huet. From Bordeaux I have also procured fine specimens of *Edwardsia callimorpha*. Lastly, *Caryophyllia Smithii* seems to be pretty common at Bordeaux and in Fermain Bay.

The *Lucernariæ* which I found at Herm I have never met with in Guernsey.

#### ECHINODERMATA.

These are much more abundant in Guernsey than in Jersey. The Common Sea-Urchin (*Strongylocentrotus lividus*), which is rare at Jersey, where it is never captured but with the dredge, is very abundant at Bordeaux, where it occurs in company with *Ophiothrix fragilis*, *Ophiocoma neglecta*, *Asteriscus verruculatus*, *Asterias glacialis*, and *Antedon rosaceus*. At the same station I have met with some specimens of *Cribrella oculata* and *Asterias rubens*. *Cucumaria pentactes*, Gum., also appears to be abundant to the north of Bordeaux; with it I have found two specimens of *Cucumaria frondosa*, Müll. The *Synapta* are very common and are found all round the island. On the west coast the Echinoderm fauna is less



varied. The *Comatule* are pretty generally distributed in Rocquaine Bay, where they are accompanied by *Asterias glacialis*, *Ophiothrix fragilis*, and *Asteriscus*. *Cucumaria pentactes* and *C. frondosa* also exist in Rocquaine Bay; but I have only found the Sea-Urchins in the north of the island.

One day I met with a small *Echinocardium cordatum*, Penn., in the neighbourhood of the Port, close to the Chateau Cornet; it is the only specimen of the species that I have found at the English islands. Lastly, in the produce of a dredging I observed fragments of *Luidia fragilissima*, Forbes. This interesting species seems to be tolerably abundant in the neighbourhood of Guernsey. A person who collects Actiniæ for the English aquaria showed me an entire specimen, which was found one day to the north of Bordeaux at low water. The fact deserves to be recorded, as the *Luidia* appears to be a rather rare form.

#### VERMES.

A list of the Vermes of Guernsey was published in 1866 by Ray Lankester in the Ann. & Mag. Nat. Hist. (vol. xvii. p. 388). I have found the greater part of the species indicated by that naturalist, at least of the Polychæta, but I have captured a certain number of forms which he does not record. Of the Turbellarians I have only met with a few species, which, moreover, also live at Jersey. I will indicate:—*Leptoplana tremellaris*, common everywhere; *Prosthecereus vittatus*, which lives in the *Zostera*-meadows (Belgrave Bay, Lihou; the Guernsey specimens are larger than those of Jersey); *Proceros argus*, Quatref. (Grand Havre); *Polycelis lavigatus* (Rocquaine Bay); and *Eurylepta cornuta* (Bordeaux, Grand Havre). *Lineus longissimus* is very common at Bordeaux; it is also met with at Cobo, at Lihou, and near the Port, under stones. *Nemertes gracilis* and *Tetrastemma candidum* also are not rare. The three Jersey species of *Valencia* are found in the mud covered with *Zostera*, where they are associated with *Marphysæ* and Clymenians.

The Polychæta are very abundant. The Amphinomians are represented by *Polynoë squamata*, *P. cirrata*, and *Sthenelais Edwardsii*, common at Bordeaux, Grand Havre, and Rocquaine Bay. Lankester also cites *Harmothoë sarniensis*, which I have not met with; as to *H. Malmgreni*, Lanck., which, as is known, lives as a commensal in the tubes of the *Chaetopteri*, I have found it also in Guernsey in the tubes of *Chaetopteri* from the port of St. Pierre.

Among the Eunicians I may cite:—*Eunice Harassi*, abun-

dant everywhere; *Marphysa sanguinea*, from the muddy sands of Bordeaux and Rocquaine Bay; *Staurocephalus rubrovittatus*, Gr., found at Bordeaux under pebbles incrustated with calcareous Algæ; *Lumbriconereis contorta* and *L. humilis* and *Lysidice ninetta*, species which are also common in Jersey. Among the Nephthydians:—*Nephthys Hombergi* and *N. longisetosa*, the latter also living on the coast, and of which I found a specimen at Grand Havre. Among the Chloræmians:—*Siphonostomum uncinatum*, which is tolerably common, and *Chloræma Dujardini*, Quatref., which occurs at Bordeaux in company with the Sea-Urchins. *Aonia foliacea* is sometimes met with in Rocquaine Bay.

I cite, only as a matter of form:—*Cirratulus Lamarckii*, *Nereis cultrifera* and *N. Dumerilii*, *Aricia Cuvieri*, and *Arenicola piscatorum* and *A. ecaudata*.

The Phyllococians are represented by *Phyllodoce laminosa*, which is rather less common than *Eulalia clavigera*, and *Eteone longa*. I have found these three species at nearly all the points that I have explored. *Glycera capitata* is exceedingly common; *G. lapidum* is sometimes associated with it.

Among the Syllidians I will cite:—*Syllis amica* and *S. divaricata*, and *Grubea fusifera*, besides a number of small species identical with those of Jersey and which have not been determined.

Two species of *Chatopterus* live in Guernsey, namely *Chatopterus Valencinii*, Quatref., and *C. Quatrefagesii*, Jourd. The former is very common in the port of St. Pierre itself, in the portion included between the old port and the jetty which bounds the new port on the north. This species, which possesses a U-shaped tube, is identical with that of Herm. Ray Lankester, who does not indicate *Chatopterus* at Guernsey, calls the animal from Herm *C. pergamentaceus*, Cuv. It is not easy to determine whether *C. pergamentaceus* and *C. Valencinii* are two identical forms; but the specimens from the port of St. Pierre and those of Herm present all the characters of *C. Valencinii* indicated by Quatrefages. The anterior region presents sometimes eleven, sometimes twelve segments. In the tube of this *Chatopterus*, in half the specimens, *Harmothoë Mabnigreni* lives as a commensal; one never finds more than a single specimen at a time.

The second Guernsey species of *Chatopterus* which I have found at Bordeaux is identical with that indicated at Jersey, *C. Quatrefagesii*, the differential characters of which have been clearly established by Jourdain. Its tube is never bent into a U, but it is simply attached to the lower surface of a stone; it resembles a large Terebellan tube. Its structure is

the same as that of the tube of *C. Valencinii*, but it is much thinner. The animal is smaller than in the latter species, and the anterior region of its body presents only nine segments.

*Clymene lumbricoides* accompanies the *Marphysæ* in the muddy sands. At Bordeaux I found *Petaloproctus terricola* enclosed in a tube with very thick walls, formed of agglutinated fine sand, and fixed to the lower surface of stones.

The fauna of the Terebellians and Serpulians differs little from that of Jersey. *Terebella conchilega* and *T. nebulosa* are common at Bordeaux, at the Grand Havre, and on the western coast of the island, where *T. prudens* is also met with. North of Bordeaux I have also found a specimen, unfortunately in very bad condition, of a *Terebella*, which I refer to *T. Montagui*, Quatref. (*T. cirrata*, Mont.), indicated by Lankester at Guernsey. *Protula protensa* is also common in Rocquaine Bay. *Sabella arenilega* and *S. verticillata* are common; *S. pavonina* is rather rare, and I have met with only two specimens of it at the Grand Havre. With *Spirorbis communis* and *Vermilia conigera* and *tricuspis* I may cite further *Serpula fascicularis*, which is abundant at Bordeaux.

As at Jersey, the Gephyrians are represented by *Phascolosoma elongatum* and *P. margaritaceum*.

#### ASCIDIA.

The fauna of the simple Ascidia seems to be rather less developed at Guernsey than at Jersey. At Guernsey I have not found *Cynthia granulata*, *Asciadiella aspersa*, *Molgula roscovita*, and *Ctenicella Lanceplainsi* of Jersey. The other Ascidia are those of Jersey. *Molgula socialis*, Ald., is pretty common at Bordeaux; I have also found it at Moulin-Huet, but always of small size in the latter locality.

The Compound Ascidia, which are not common at Bordeaux and in the north of the island, are more abundant at Lihou and in Rocquaine Bay, where the genera *Amaroucium*, *Fragarium*, *Morchellium*, *Leptoclinum*, *Botryllus*, and *Botrylloides* are represented by varied species. I will also record *Leptoclinum Lacazii*, which I have indicated above in Belgrave Bay.

#### CRUSTACEA.

A certain number of species captured at Jersey I have not met with at Guernsey, such as:—*Stenorhynchus ægyptius*, *Portunus pusillus*, *Thia polita*, *Galathea strigosa*, *Inachus dorsettensis*, *Crangon sculptus*, *C. bispinosus*, *C. trispinosus*, *Mysis*

*Griffithsia*, and all the types which I captured with the dredge at Jersey. Certain forms of Decapods, such as *Pirimela denticulata*, *Xantho florida*, and *X. rivulosa*, are common at Guernsey. But in general the fauna of the higher Crustacea is not very rich, especially in the north of the island. *Scyllarus arctus*, Rœm., is frequently brought in by the fishermen, who dredge it off the island.

As regards the Isopoda and Amphipoda, they are absolutely identical with those of Jersey. Certain species, such as *Paranthura Costana*, *Apseudes talpa*, *Tanais vittatus*, and *Leptochelia Edwardsii*, are commoner at the Grand Havre and in Belgrave and Rocquaine Bays than at Jersey.

#### MOLLUSCA.

A considerable number of species recorded by M. Duprey at Jersey have not been met with by me at Guernsey. But the results obtained by a few weeks of researches must not be compared with those obtained by M. Duprey by a long investigation. In the list of animals which concludes this memoir I have indicated some species which he did not find at Jersey and which I have met with in Guernsey in the north of the island.

As in Jersey, the Nudibranchs are represented by *Doris flammea*, Ald., *D. tuberculata*, A. & H., *D. Johnstoni*, A. & H., *Eolis Cuvieri*, Lam., *Triopa claviger*, Müll., and *Pleurobranchus membranaceus*, Mont., species which are all common enough in the *Zostera*-meadows.

---

In the north of the island of Guernsey there are two pools of brackish water, one situated near the church of Vale, in a private property, the other to the west of the Grand Havre, near the road which skirts the west side of that bay and leads towards the Pointe Rousse. Near St. Sampson, in the neighbourhood of the old castle of Vale, there is also a small stream of brackish water, in which we find only *Palæmon varians*, Leach. But the fauna of the two pools is more interesting.

The pool at Vale is in free communication with the sea, which is able to enter it at all tides. The species which ordinarily live in fresh water are not numerous; they are larvæ of *Chironomus* and some *Pisidia*. The marine types are represented by *Mysis chamæleon*, *Idotea tricuspидata*, *Melita palmata*, *Corophium longicorne*, Lat., *Gammarus locusta* and *G. marinus*, *Spharoma serratum*, and *Rissoa*

*labiosa*. *Palæmon varians* and *Philhydrus maritimus*, Solier, are very abundant. Near the bank freshwater plants, *Scirpi* and rushes, are very vigorous, and accommodate themselves very well to an existence in the brackish water.

The pool situated to the west of the Grand Havre is less extensive than the preceding; the sea-water penetrates into it by infiltration. I have found numerous larvæ of Diptera belonging to at least four different species, as well as the larvæ of a Hemipteron belonging to the genus *Corixa*, associated with *Philhydrus*. *Melita palmata* and *Jera Nordmanni* are very abundant, as well as *Gammari*. In the mud which occurs near the margins I have found several specimens of *Nereis falsa*, Quatref.

[To be continued.]

---

XXX.—Notes from the St. Andrews Marine Laboratory (under the Fishery Board for Scotland).—No. VI. On the very young Cod and other Food-Fishes. By Prof. M'INTOSH, M.D., LL.D., F.R.S., &c.\*

It is about twenty years (viz. 20th May, 1866) since Prof. G. O. Sars found the larval cod 6–7 millim.† in length on the surface of a sea teeming with ova off Loffoden; yet up to this time there is no account of a connected series between the larval fish as it issues from the ovum and the larger forms mentioned by Sars and other authors. It is true Sars gives various links in the chain:—Thus, on the 12th June, 1866, he again observed the young cod at the surface, the largest reaching 24 millim. in length, and he considers they had attained this size in the interval (three weeks). Their embryonic fin-fold has now become divided into first and second dorsals, and a small barbel is present. On the 5th July he procured others an inch and a half in length under Medusæ. His observations were continued in the following year, for on the 3rd August he met with young cod two inches and upwards, and on the 23rd of the same month nearly three inches in length. In the beginning of October again they were upwards of four

\* Communicated by the Author, having been read at the Birmingham Meeting of the British Association (Biological Section), Sept. 1886.

† This is larger than recently-hatched cod in this country.