PRELIMINARY WORK OF A NEW BIOLOGICAL STATION (LOUGH INE, CO. CORK, I.F.S.)

By LOUIS P. W. RENOUF.

(*With Plates XXIII–XXVI and* 3 *Maps.*)

Historical.

Mr Richard Southern, of the Fisheries Branch of the Department for Agriculture and Technical Instruction for Ireland, whilst on a cruise for the Department, spent five days collecting specimens and making observations in Barloge Creek and Lough Ine or Hyne, into which it opens, during November, 1916.

So interesting did this area appear to be, from the data collected during this short time, that the Royal Irish Academy formed the intention of investigating it in detail, as soon as times were normal again. Post-war conditions, however, altered the outlook of even this long and firmly established body, and the matter had to be shelved.

This was briefly the introduction to the district which Dr R. Lloyd Praeger gave the author during 1922 on the first occasion they met, some little time after the latter had taken up duties at University College, Cork; and with it was coupled a strong suggestion to the effect that, as it was within easy access of Cork, the author should begin its investigation.

A visit to the district was made during the following February, 1923, and though for the three days of its duration rain was incessant, the inducements met in other directions were such as to make the author resolve to follow Dr Praeger's suggestion, and arrangements were made to spend part of the following Easter Vacation at Baltimore, where the nearest accommodation was available.

During this first fortnight a very general idea of the Baltimore-Lough Ine region was obtained, and more or less permanent quarters were found at Baltimore. These were used as headquarters during the Summer Vacation and a "Survey" was started. This very soon showed that Lough Ine would be an ideal situation for a laboratory to be used as headquarters, from which to carry out the contemplated survey of the Carbery Region. In the complete absence of funds and in view of the apparent impossibility of obtaining accommodation of any kind at Lough Ine, prospects, however, were not very bright.

But the very next year a small bequest left by Miss E. Crawford Hayes, for the promotion of biology, became available, and the Governing Body of University College, Cork, agreed with the suggestion that some of this should be spent on the proposed work. During March, 1925, a large room was rented and used as a laboratory at Baltimore, and a really serious start was made.

Gradually the shyness of the farmer holding Barloge, the key to Lough Ine, was overcome, and short stays were made at the farm. These culminated in the obtaining of permanent living accommodation at Barloge, and the installation of a very large packing case in a sheltered situation alongside the Narrows, between Barloge Creek and Lough Ine itself, for use as a laboratory, during 1926. This was the condition of things for some three years, during which Baltimore was used as headquarters, Lough Ine as a field station.

1928 saw the erection of an army-hut type of building which was fitted out as a laboratory and aquarium alongside the Narrows, and an intensive study of Lough Ine and its immediate surroundings was started. Reports of what we were doing and of the richness of the area from the biological aspect prompted enquiries from other universities, as a result of which a second larger laboratory, with simple feeding and lavatory accommodation was erected and equipped (Plate XXV, Phot. 11). This has been used by visiting classes and individual workers each Easter and Summer Vacation since, classes preferring the former. In consequence our ambitions have increased, and we hope eventually to see the Cork University Biological Station firmly established as a fully recognized station, and to extend our operations over a much wider area than that originally contemplated. A second consequence of this unexpected development is that the amount of research work accomplished so far, by the station itself, is not so great as it would have been had the necessary time not been given to organising the arrangements for visiting workers, and on this hangs the need for publishing this general account of what has been done, that it may serve as a guide to what we hope will be done in the near future.

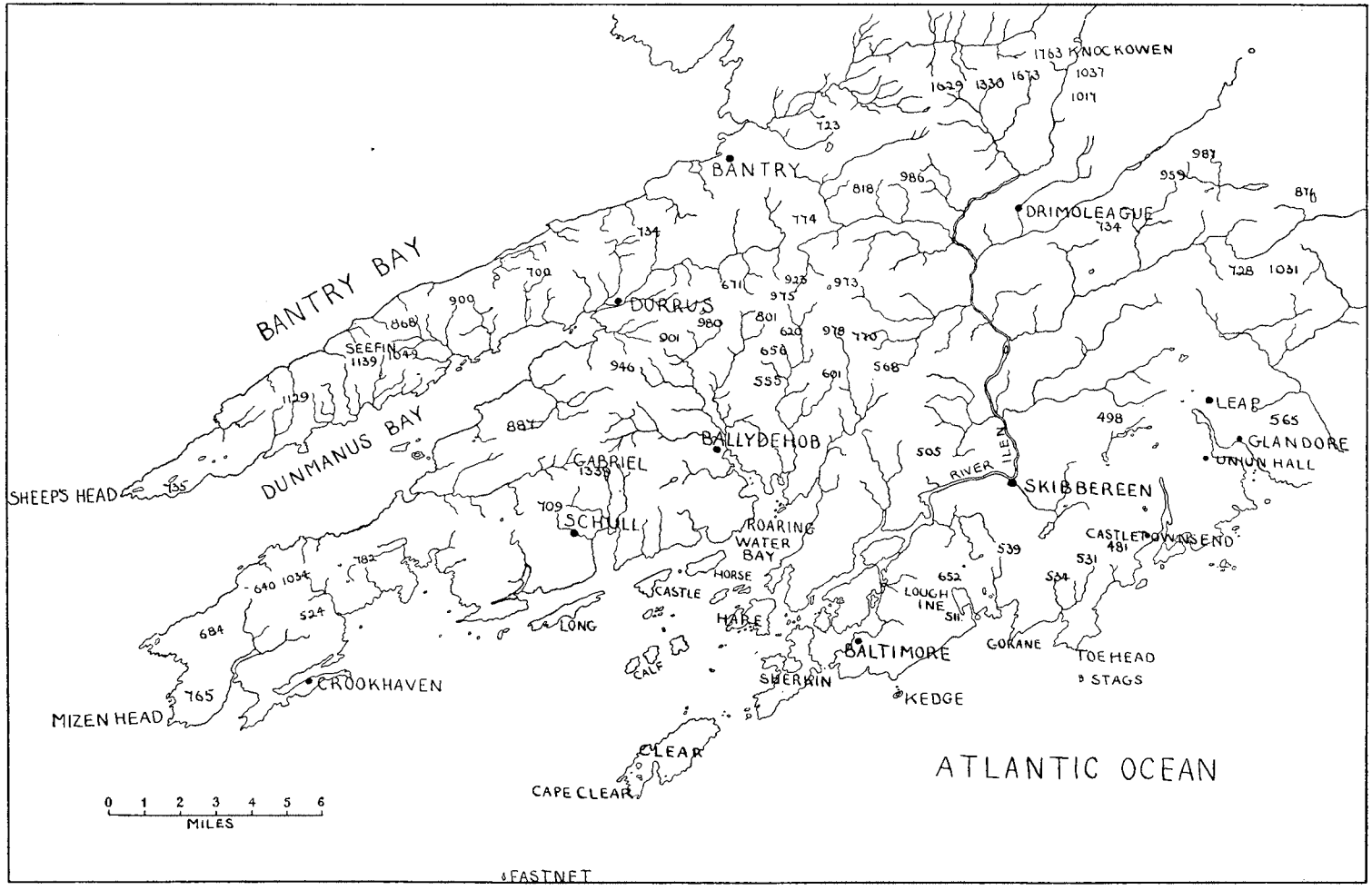
DISTRICT INVOLVED (SEE MAP I, p. 412).

The wider area referred to above is roughly 20 miles wide by 32 miles long, and lies between Bantry and Dunmanway to the north, Bantry and Mizen Head to the west, Mizen Head, the Fastnet Rock and Glandore to the south, Glandore and Dunmanway to the east; in other words it embraces the greater part of the old barony of Carbery.

Of the 600 and odd square miles enclosed by these lines the sea and tidal estuaries account for some 250, land and fresh water for some 380.

The land area includes a great deal of hilly country, especially to the west and north, with ranges of hills stretching roughly from Glandore to Dunmanway—highest point 986 feet; Dunmanway to Bantry, with Owen (Nowen)[1] Hill 1763 and 1673 feet, Derreenacrinnig 1330 feet, Mullaghmesha 1629 feet; Bantry to Sheep's Head, with Seefin 1139 feet, to Mizen Head, with Milane Hill 1160 feet, Mount Gabriel 1339 feet, and Knocknamaddree 1034 feet. Most of the river valleys between these are small and represented mainly by narrow strips and small areas between the ranges and the sea. The valleys of the

[1] Cnoc Owen—the Hill of Streams. The Ilen, the Bandon River and the Meallagh (Bantry) River all arise here.



Map I. Southern extremity of Ireland, showing the positions of Baltimore and Lough Ine.

River Ilen and its tributaries, with Skibbereen as their centre, form exceptions to this rule however, and radiate out to Union Hall, Leap, Drimoleague, Baltimore, and Ballydehob, Schull, and Crookhaven, the islands north of Broad Head and Cape Clear being the remnants of a delta, which lay in the mouth of an originally bigger river, of which the Rathruane and the Banacknockane at Ballydehob, and the Leamawadda and others were tributaries.

GEOLOGY.

The greater part of the Carbery region consists of Old Red Sandstone, through which run bands of Carboniferous Slate, the general direction of the formations being south-west, and the bands alternating with each other in their general arrangement.

The Baltimore-Lough Ine district is nearly all Lower Old Red Sandstone; a belt of Carboniferous Slate, about 2 miles wide, lies to the north, and passes from Roaring Water Bay, through Skibbereen and Leap. Other belts border Dunmanus and Bantry Bays, the former becoming wider as it is traced inland, its southern limit lying about a mile to the south of Drimoleague and converging towards the more southern belt mentioned above.

PRESENT SPHERE OF OPERATIONS.

Up to the present work has been confined to the more or less immediate neighbourhood of Baltimore and Lough Ine, special attention having been paid to Lough Ine itself. Although a great deal of work has been done, none of it can claim to be in any way complete, except in so far as it has amply confirmed the original expectations that the area would prove to be of exceptional interest.

This interest is presented not only by the variety of habitats within a very small radius and the richness of the fauna and flora they support, but also especially by the varied problems which many individual species and associations offer. In addition to the more purely academic problems suggested by many of the habitats and associations, both plant and animal, a problem of first class importance is afforded by the changes which have taken place in the larger marine fauna. These have resulted in the failure of a considerable hake fishery, which was carried on from many centres along the coast; a lucrative pilchard industry, whose headquarters were at Baltimore and Bantry; and oyster fishing, from beds in Lough Ine, between the islands in Baltimore Harbour, and elsewhere. Hake and pilchards seem to have deserted the coast; oysters have been suffocated by silt or have perished through other agencies. So far as Lough Ine is concerned *Asterias glacialis* L. and *Nassa incrassata* (Ström.) may have been the culprits, though probably the low temperature of the water has been another factor.

GENERAL FEATURES OF THE REGION (SEE MAP II).

The whole district around Baltimore and Lough Ine consists of unevenly undulating country, much of which is rugged in the extreme (Plates XXIII–XXVI, Phots. 3, 4, 7–10, 11, 14). Pockets of very fertile soil occur, but most of the fields are small, the majority under two acres, and even in these large outcrops of rock are frequent. The ground rises rapidly from the sea, the rise along most of the coast east of Baltimore Harbour being very steep, often practically sheer, while the coast throughout the region is very rocky. Beaches are numerous, owing to the indented nature of the coast, but for the most part they are composed of boulders and pebbles, and are very small in extent. Sandy beaches are of rare occurrence, the chief ones being Tranaplousa and Tragowenmore on the west of Sherkin, and Tragumna or Tragemona (see Plate XXV, Phot. 13) to the north of Gokane Point and east of Lough Ine. Caves, the majority of them small, occur in many places, and subterranean passages, through which the sea ebbs and flows, pierce Kedge Island and the headland of which it once must have formed part.

By far the greater part of the area consists of moorland (see Plates XXIII, XXIV, Phots. 3, 4, 7), interspersed with marshes, marsh ponds (Plate XXIII, Phots. 5, 6), peat bogs, bog ponds where the peat has been cut, and small lakes. Many interesting transitions from one to the other occur. Of the lakes Lough Ballyally, some 9 acres in extent, is the largest, Lough Nacartan, about 2 acres, is probably a large bog pond, while the lough at Tragemona, 2 acres, promises to prove of special interest because it is liable to wave effects at spring tides during south-west gales.

The River Ilen is tidal to just above Skibbereen, but the main channel is narrow and its navigation difficult. Boats up to 50 tons still, however, ply as far as Skibbereen, which is a very important distributing centre. In the estuary proper the river is divided into two very unequal arms by the islands of Inishbeg, about 100 acres, and Ringaroga, about 900 acres, the eastern one of which is reduced at low water to a small stream meandering through a mud flat and between countless rocky islets. The southern shore of Ringaroga and the smaller Spanish Island, separated from its south-western extremity by a very narrow channel, form the northern boundary of Baltimore Harbour, whose western limit is determined by the eastern shore of Sherkin Island. The channels leading into the harbour from the Atlantic on the south, between the mainland and the south-east of Sherkin, and between the north-east of Sherkin and Spanish Isle, are very narrow, whilst the former contains a sunken rock—the Loo—marked by a buoy. The channel is marked at night by a lighthouse on Sherkin and a white beacon on the mainland on to which it flashes.

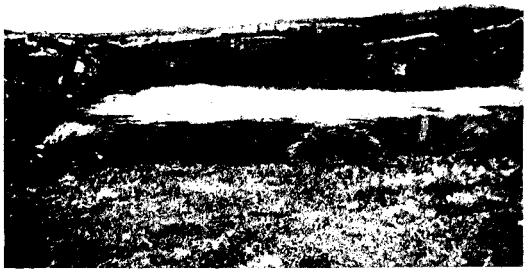
Sherkin Island is very irregular in shape by reason of the large bay known as Kinish Harbour, which nearly divides it into three. South-west of it lies Cape Clear Island, the southern point of which is usually described as being the

Phot. 1. Baltimore. Cove Bay at high water. Tranadroum and Sherkin in the background. Sheehan's Island is the rising ground behind the two cottages.

Phot. 2. Baltimore. Cove Bay at low water.

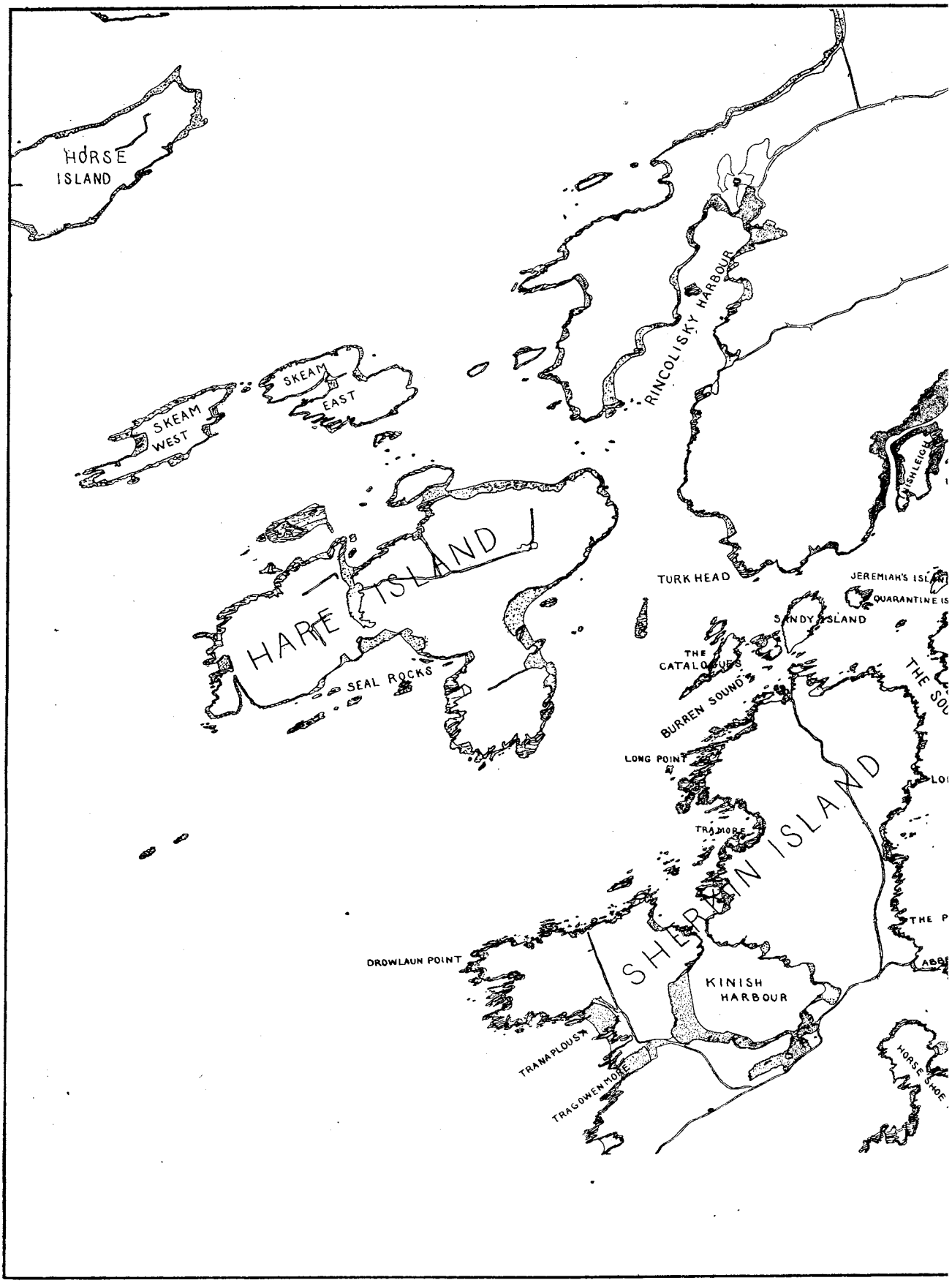
Phot. 3. Baltimore. Typical country.

Phot. 4. Baltimore. On the way to the Beacon. Sherkin in the background.

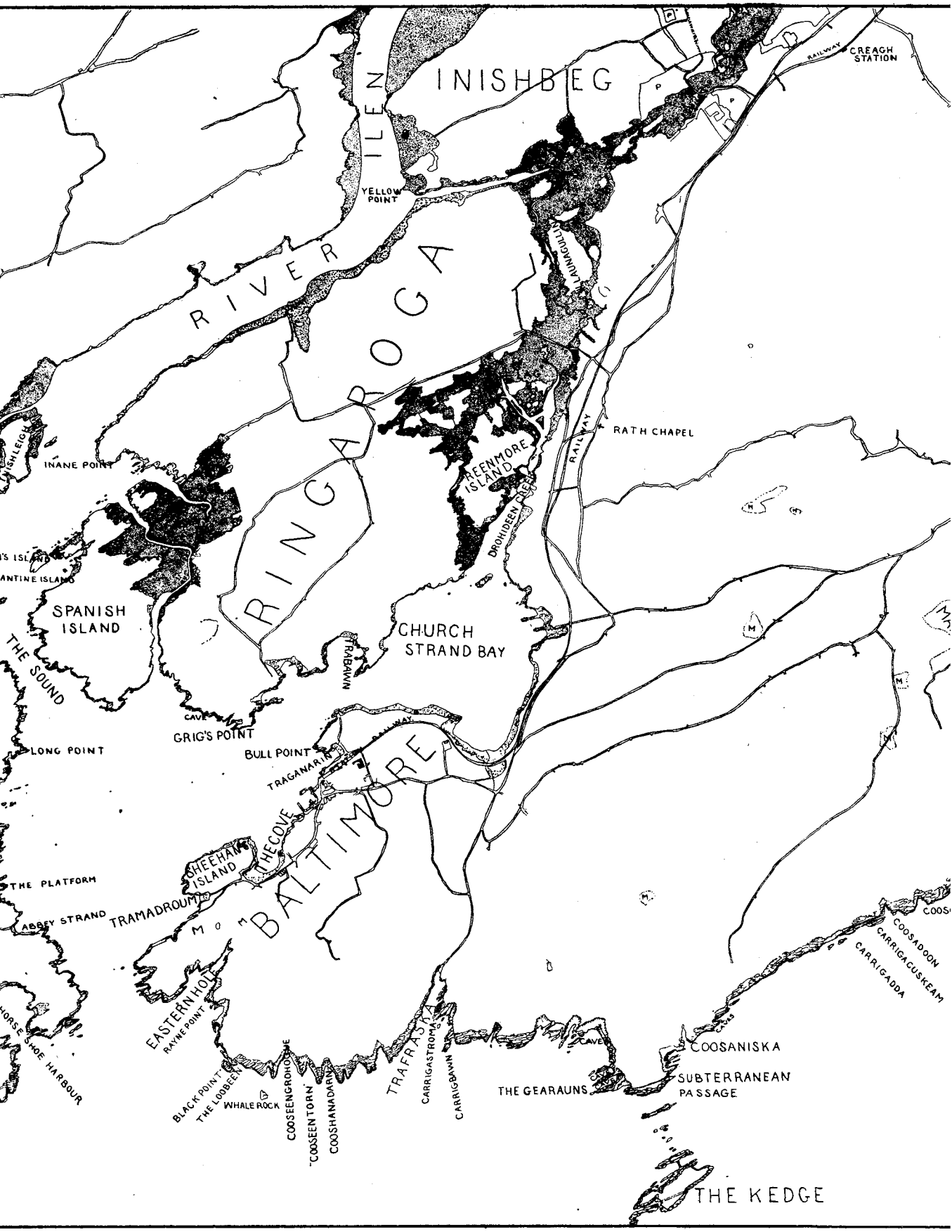


Phot. 5. Baltimore. A marsh pond, normal condition.

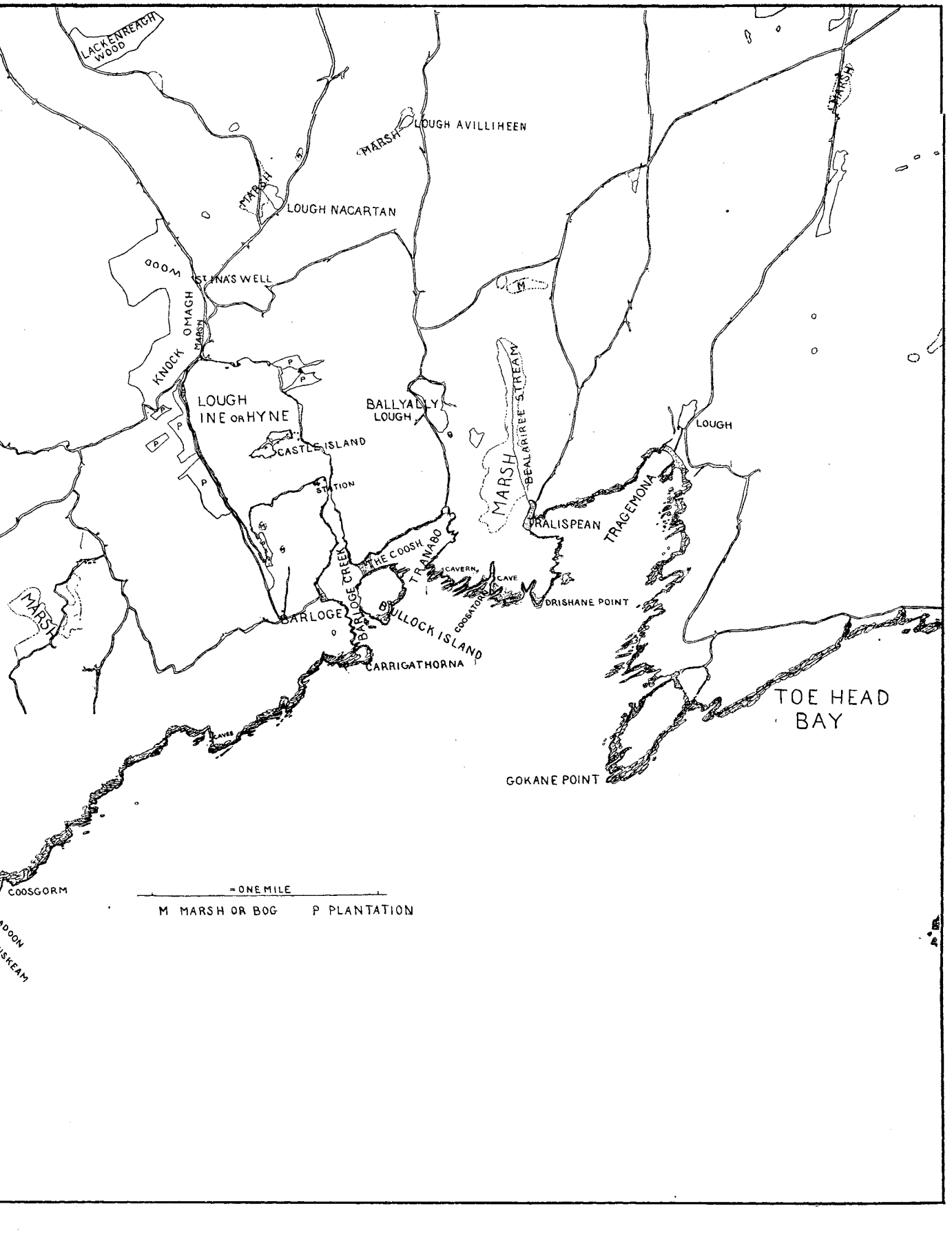
Phot. 6. Baltimore. Same pond as phot. 5, after an exceptionally dry spell.


HORSE ISLAND
SKEAM WEST
SKEAM EAST
RINCOLISKY HARBOUR
HARE ISLAND
SEAL ROCKS
TURK HEAD
SANDY ISLAND
THE CATALOGUES
BURREN SOUND
LONG POINT
TRAMORE
SHERKIN ISLAND
DROWLAUN POINT
KINISH HARBOUR
TRANAPLOUS
TRAGOWEN MORE

Face p. 414



Map II. The country round Lough Ine, Baltimore and the islands to the west.


LACKENREAGH WOOD
MARSH
LOUGH AVILLIHEEN
MARSH
LOUGH NACARTAN
MARSH
ST. INA'S WELL
KNOCK OMAGH
MARSH
LOUGH INE OR HYNE
CASTLE ISLAND
BALLYALLY LOUGH
STATION
MARSH
BEALAIRIEE STREAM
LOUGH
TRALISPEAN
TRAGEMONA
THE COOSH
TRANABO
CAVERN
CAVE
DRISHANE POINT
BARLOGE CREEK
BARLOGE
BULLOCK ISLAND
COOGATORY
CARRIGATHORNA
MARSH
TOE HEAD BAY
GOKANE POINT
CAVES
COOSGORM
= ONE MILE
M MARSH OR BOG
P PLANTATION

most southerly point of Ireland. Actually, however, this honour belongs to the Fastnet Rock[1], which lies some 3 miles south-west of the usurper. Between Sherkin and Cape Clear and the peninsula running south-west and ending in the Mizen Head are numerous other islands and islets. The largest of these are Hare or Heir (about 380 acres), the three Calf Islands (together about 200 acres), and to the north-west of these Long Island (300 acres), Castle Island (120 acres) and Horse Island (155 acres), which are said to have formed one long island until the middle of the ninth century. North-west of these is Roaring Water Bay, whose name is elegantly descriptive of the conditions which prevail there during a south-westerly gale.

BALTIMORE DISTRICT.

Coast. The coast from the inner harbour round to the Kedge Rocks is very much indented with small bays and gulfs. Two of these are especially worthy of mention, because they contrast very strikingly with each other. They are the Cove and Tranadroum (Plate XXIII, Phots. 1, 2), both within Baltimore Harbour and separated from each other only by a low-lying strip of land some 26 yards wide by 235 yards long. According to local tradition the high ground, composed mostly of rock, which forms their north-western boundaries and which is known as Sheehan's Island, was actually an island until the Spaniards who established a pilchard industry here joined it to the mainland. (The holes into which poles were put during the process of extracting oil from the fish are still quite plain—see Plate XXIV, Phot. 9.) The floor of the Cove is of mud, intermingled with sand and covered with boulders and stones along the south-east and south-west, whilst a small stream enters at the southern corner. Its fauna, therefore, includes burrowing Molluscs and Polychaetes, such as *Mya arenaria* L., *Tapes virgineus* L., *Cardium edule* L., and *Arenicola marina* L., which are dug for bait, the daisy anemone, *Cereus pedunculatus* (Pennant), and the sea-squirt, *Phallusia mentula* (O.F.M.), growing in large numbers on small flat stones embedded in the mud, and tube-making Polychaetes, such as *Sabella pavonina* Sav., *Branchiomma vesiculosum* (Mont.), and *Myxicola infundibulum* (Ren.), which burrow between these stones.

The main part of Tramadroum is of rock and pockets of coarse sand, but its upper region is covered with stones. Ridges along its south-western and boulders along its north-western sides provide shelter for a very different fauna from that found even on the rocky parts of the Cove. The most interesting members are the Gephyreans *Phycosoma granulatum* (Leuckart) and *Thalassema neptuni* Gaertner, and the Hemipteran bug *Aëpophilus bonnairei* Sig., all of which live in crevices in the schist. *Aëpus robinii* Laboulb., a beetle, which lives in crevices in boulders which are exposed only at low water of spring tides, although it is, like *Aëpophilus*, an air-breathing form, is found in the Cove as well.

[1] The Irish name for the Fastnet, Carrigeena (more correctly Carrigaonair), means "the lone rock."

The flora of Tranadroum is much richer than that of the Cove by reason both of its conformation and of the fact that it is more exposed to wave action. A complete study of these two bays is in progress.

From Baltimore seawards the ground rises and the whole of the coast is very rugged, in many places sheer. These characters are well seen at Beacon Point, at the entrance to the harbour, where there are sharp ridges, deep gullies and caves, which support an abundance of life. At low water of spring tides the edible sea-urchin, *Echinus esculentus* L. is exposed in large numbers, together with forests of *Laminarias* and carpets of *Florideae*. Cliff plants include *Crithmum maritimum* L. and varieties of *Anthyllis*.

Inland. The greater part of the land consists of undulating gorse-heather moor with outcrops of rock in abundance, small fertile patches, most of which are used to good advantage, and marshy patches, often with pools (Plate XXIII, Phots. 5, 6). These marshy regions are of very great interest because they not only bear different dominant plants, *Hypericum elodes* L. here, *Iris pseudacorus* L. there, *Osmunda-Juncus* elsewhere, and so on, but also show transitions from one type of association to another, different stages in reclamation and in reversion. The ponds contain large numbers of aquatic animals, *Nepa cinerea* L. the water scorpion, and *Argyroneta aquatica* Latr. the water spider being especially noticeable. Frogs are scarce, but the common newt, *Molge vulgaris* L. is abundant. On several occasions this last has been found in "dug-outs" beneath boulders on the shore which were within the reach of spring tides.

The more noticeable plants include *Pinguicula vulgaris* L., *Spiranthes spiralis* Koch and *Rosa spinosissima* L.

The Islands. Sherkin. Sherkin is not only the largest of the islands, some 1250 acres in area, but also probably the most interesting on account of Kinnish Harbour, which all but cuts it into two and which at low water exposes large mud-flats, its caves, and particularly the sand at Tragowenmore and Tranaplousa on its southern coast. *Glaux maritima* L. sea milkwort, and *Suaeda maritima* Dum. sea blite, grow well here above high-water mark, whilst *Eryngium maritimum* L. sea holly and *Viola curtisii* Forst. occur among the grass on the blown sand above the bays. *Helix pisana* L. the sandhill snail occurs here in large numbers. The common shore molluscs, especially *Littorina rudis* (Maton), *L. littorea* (L.) and *Purpura lapillus* (L.), exhibit great ranges in shell variation, as regards both colour and texture, on the rocks of Tranaplousa, where they occur in great numbers. Another striking feature of the fauna is the occurrence, at times, of the lamp Polypes, *Lucernaria campanulata* Lamour. and *Haliclystus auricula* Fabr. on *Chondrus* and *Ulva*, their normal habitat being *Zostera*. The outstanding record from the other islands is that of a single specimen of Ray's bream, *Brama raii* (Cuv.), which came ashore on Hare Island during the summer of 1927, and which was passed on by its captor Stewart Musgrave, Esq., of Cork.

Roadsides. Roadsides present a great diversity of habitat. Hedges of

Fuchsia, *Crataegus*, *Fagus* or *Ligustrum*, dykes of stone or turf, ditches, streams, and marshes and bogs with ponds. An interesting contrast is afforded by the roads along the eastern and western sides of Lough Ine. The former is entirely devoid of trees, the latter bears trees on both sides, some of them meeting each other high overhead, while water trickles down the walls of rock, which form its western boundary in many places, to form a small stream. The vegetation here includes at least sixteen species of fern, including *Osmunda regalis* L., liverworts, lichens and mosses in profusion. Of the lichens *Peltigera canina* Ach. in association with other species of the same genus, is one of the most obvious. On account of the mildness of this situation several forms make very early appearances during most years. As examples may be cited a particular *Quercus sessilis* Ehrh., which is usually in leaf by about March 20th, and the occurrence of frog spawn during the first days of February.

The eastern road is beginning to show a transition in its vegetation, on account of flooding at high spring tides, through breaks in the sea wall. This latter is carpeted with lichens and mosses, but one of the chief interests of this side centres around two small ponds, which are separated from each other by only a few yards of rock. One of them, fed only by rain and land-drainage, supports a meadow of *Glyceria fluitans*, in which frog spawn develops. The other derives its water supply mainly from the Lough, whose water seeps through under the road at high tide. Its vegetation consists of *Enteromorpha*, *Fucus spiralis* and small green algae. The sides of the pond support a typically littoral flora, including *Statice*, *Salicornia*, *Suaeda*, *Cochlearia*, *Plantago coronopus* and *maritima*, and *Triglochin maritimum*. Along its northern and eastern sides grow various species of *Juncus* and *Carex*.

LOUGH INE OR HYNE (see Map III). (Plates XXIV–XXVI, Phots. 7, 8, 10, 11, 14.)

Lough Ine or Hyne lies on the old Skibbereen-Baltimore Road, about half-way between these two places, and some 4 miles from them. There are two traditions about the name of this piece of water. Of these the one associates it with the little holy well of St Ina, a few hundred yards up the Scour Road, on the way to Creagh. The other refers to the popular belief that the Lough is bottomless, and derives the name from "doimhin" (pronounced rather like "ghine"), which means "deep."

Though the Lough proper is but three-fifths of a mile long by three-eighths of a mile wide, its different parts present widely differing physical, and therefore correspondingly different biological, features. Roughly rectangular in shape Lough Ine is land-locked, except at its south-east corner, where a narrow channel some 26 yards across its widest part, puts it into communication with the Atlantic Ocean, two-thirds of a mile farther south, via a wider channel, Barloge Creek, which broadens considerably opposite Tranabo Cove, with which it is joined at high water (Plate XXIV, Phot. 10).

The physical feature which most affects the Lough is a rocky sill (Plate XXIV, Phot. 8), about 6 feet high, situated at the narrowest part of the channel—usually referred to as the Narrows or the Rapids—on account of which the ebb and flow in the Lough do not synchronise with these changes in the sea without. Through the narrowness of the channel there is a lag at the beginning of the ebb tide, but far more important than this is the fact that on account of the Sill, the Lough continues to ebb for a long period, 3½ hours during neap tides, after the beginning of the flood tide outside. During spring tides this period is much reduced owing to the fact that these tides reach the level of the top of the Sill, and there meet the ebb tide from the Lough much sooner than do the neap tide floods. Hence it follows that the lowest ebbs from the Lough occur at the times when the outside ebbs are at their minimum, and that there is very little ebb from the Lough when they are at their maximum. A second very important effect of the Sill and the Narrows combined is that the flood water entering the Lough and the ebb water descending into Barloge Creek is first of all confined and then suddenly released, with the result that it is very turbulent and consequently very highly aerated.

The surrounding land is all high and steep, the peninsula which forms the southern boundary of the Lough and the western boundary of the Rapids and Barloge Creek being less so than the rest. In spite of this no considerable body of fresh water enters the Lough, the largest being the two streams already mentioned as entering at the north-eastern corner, and near the north-west quay, and another small one which flows into the western corner of the Goleen[1]. Apart from these there are only slight trickles down the face of the rocks in various places. At times of heavy rain, however, the amount of fresh water which drains into the Lough must be very considerable. In fact Southern reports that he found a considerable layer of fresh water, without any taste of salt, overlying the salt water, a phenomenon which we have experienced in a lesser intensity.

Habitats. The number of strikingly different habitats afforded is very surprising, especially when we reflect that the whole Lough covers only about a quarter of a square mile. This variety is due to four chief factors: the rocks, which form the boundary of the greater part of the Lough are broken into in many places, with the formation of small bays, and stone and boulder beaches; an island, Castle Island, shaped something like a figure of eight, lies off the southern and eastern shores; the south-western corner opens into a pocket, extending southwards for some 400 yards as the Goleen, which besides being very shallow contains a few small islets; and the bottom, in addition to shelving very differently along different parts of the shore, undulates considerably, and exhibits considerable differences in its composition. Over a wide belt, which extends from the north-west quay to the north quay, the bottom is of hard sand and slaty stones, with a good many boulders in

[1] From "goilin," a pool or a little back harbour.

Phot. 8. Lough Ine. The Rapids and Southern's Bay.

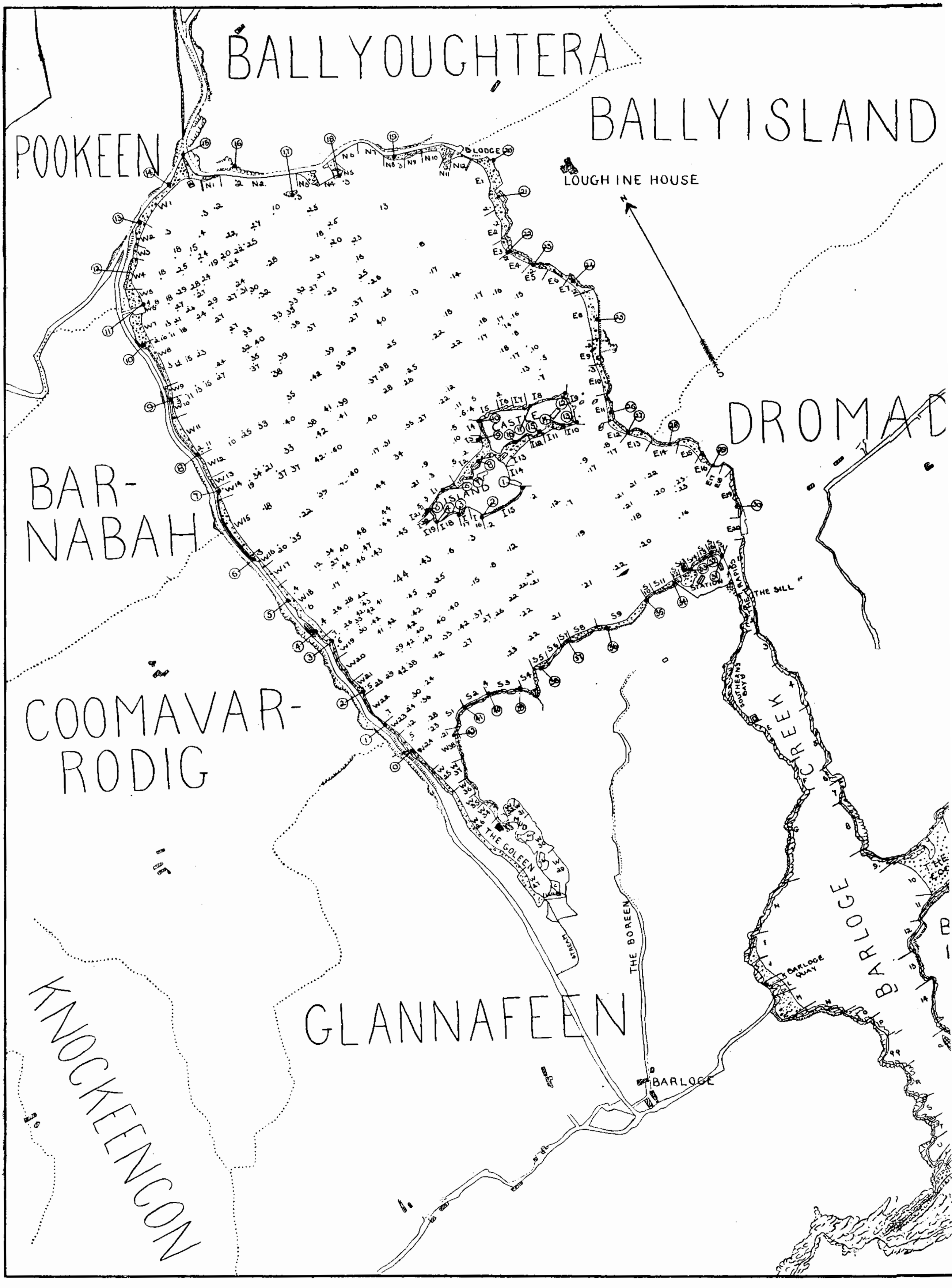
Phot. 10. Lough Ine. The Coosh at low water. Tranabo Bay behind, Bullock Island to the right.

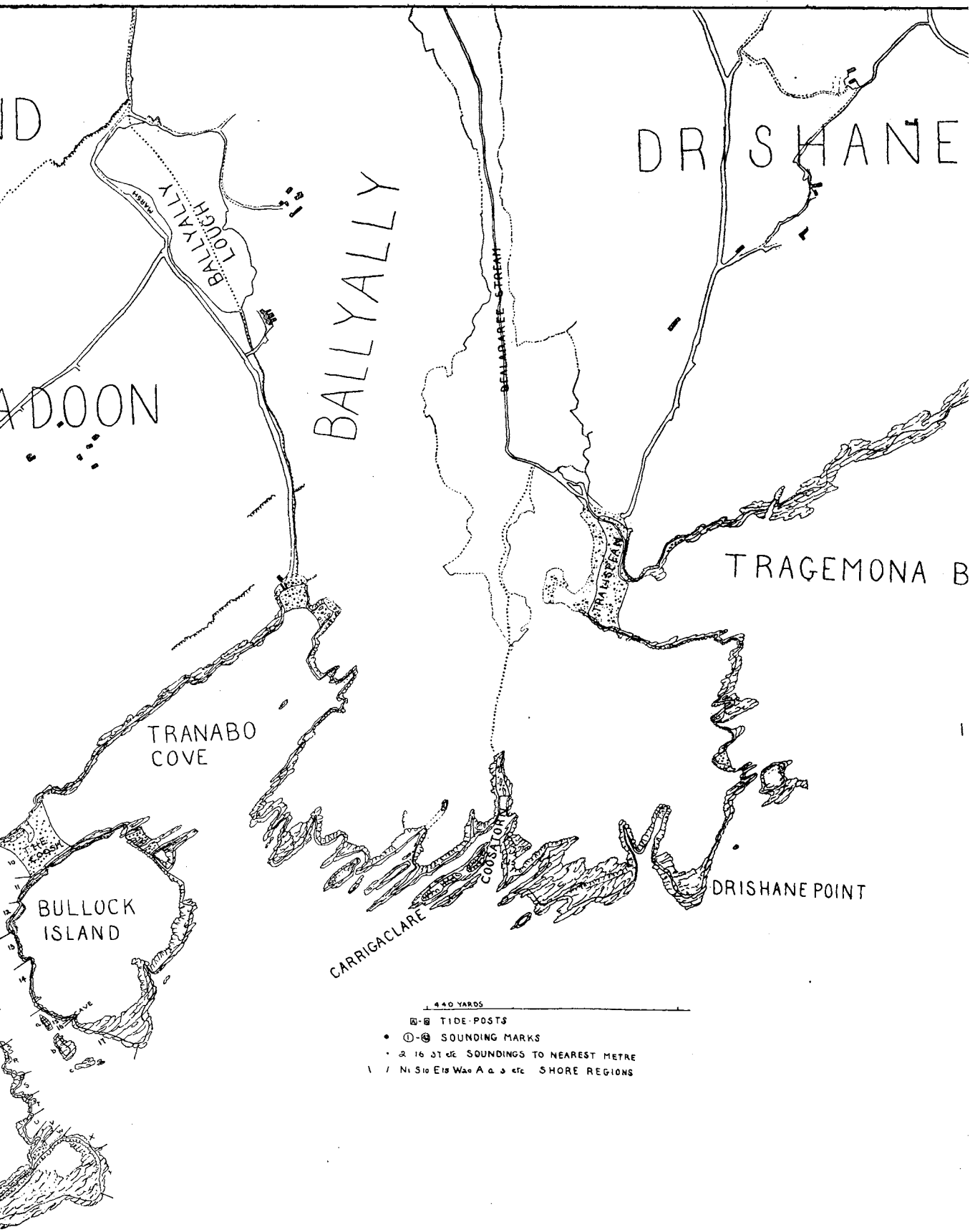
Phot. 7. Lough Ine and Barloge from the South.

Phot. 9. Sheehan's Island between Cove Bay and Tranadroum. Rocks showing holes for Pilchard Presses.

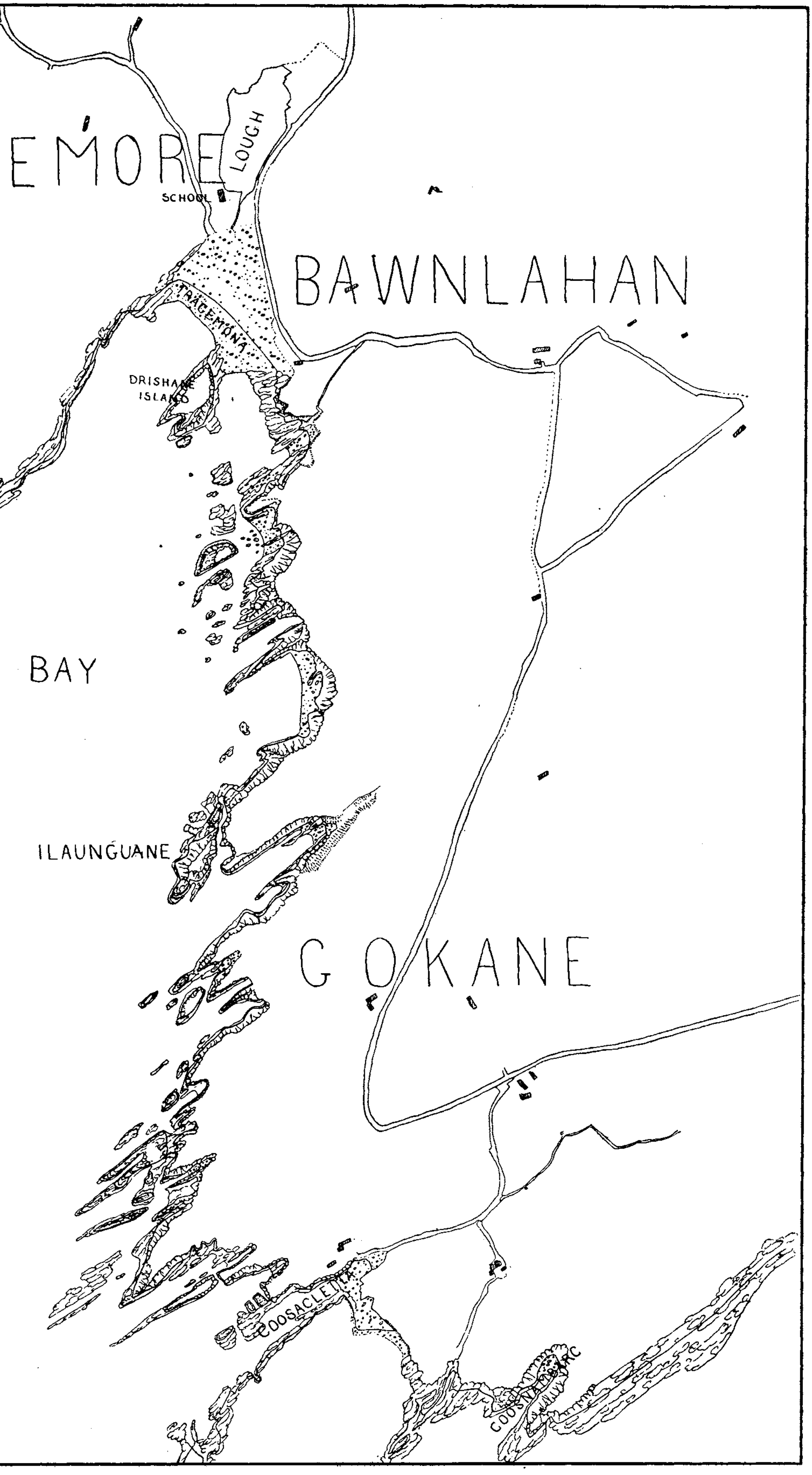
RENOUF—PRELIMINARY WORK OF A NEW BIOLOGICAL STATION (LOUGH INE, CO. CORK, I.F.S.)

Face p. 418


BALLYOUGHTERA
BALLYISLAND
POOKEEN
LOUGH INE HOUSE
LODGE
N
DROMAD
CASTLE ISLAND
BAR-NABAH
STATION
THE SILL
THE RAPIDS
COOMAVAR-RODIG
SOUTHEAN'S BAY
CREEK
THE GOLEEN
BARLOGE
BARLOGE QUAY
THE BOREEN
GLANNAFEEN
BARLOGE
KNOCKEENCON



Map III. Lough Ine (with soundings) and coast line to the east


EMORE
LOUGH
SCHOOL
BAWNLAHAN
TRAGEMONA
DRISHANE ISLAND
BAY
ILAUNGUANE
GOKANE

places, and slopes more or less gradually. Off some of the bays and beaches too the slope is a gradual one. Off most of the rocky regions, on the other hand, the slope is very steep and in some cases the drop is sheer. This last is true also of some of the beaches, whose fringes are formed by slabs and boulders, particularly where these have been cemented together by calcareous organisms. Where the depth exceeds 10 fathoms the bottom is usually made up of very fine mud. In places where the shelving to this depth is gradual the bottom is harder, generally of a coarse sand, and is covered with rough stones and shells. This is true especially of parts along the eastern and western shores. In many places the sand is covered with a carpet of a very fine species of *Callithamnion*, which makes washing out the sand very difficult, as it continually blocks the sieves.

Grab samples have been taken in various places to supplement the general information obtained by means of the dredge and the trawl, but the bottom is so irregular that a great deal more work of this kind and several thousand soundings will have to be taken before it will be possible to make even a rough map of it.

Soundings (some 1200 have been taken) show that although the north-eastern part of the Lough is covered by 10 fathoms and less of water, and the Goleen proper by half a fathom on the average, most of the rest has a much greater depth, the average being about 20 fathoms. The deep region lies roughly between lines drawn from marks 11 to 42 and from 16 to 40 through 5 Castle Island. The maximum depth, $32\frac{1}{2}$ fathoms (59·2 metres), occurs just north of the entrance to the Goleen, and lends some slight support to the legend which derives the name of the Lough from doimhin, for this is a surprising depth to occur in such an area.

Other Physical and Chemical conditions. As already pointed out, one of the most interesting points about the Lough is the fact that owing to the height of the Sill in the Rapids above the bottom seawards of the Narrows, the lowest ebbs from the Lough occur at the times of the smallest neap tides. In order to determine the maximum ranges of the tides, both in and below the Lough, graduated posts have been planted at the northern corner, in the Goleen, in a little bay (referred to as Scyllium Bay, shore region S.13 on Map III) on the south shore near the Rapids, and at the south-western point of Southern's Bay. Readings taken from these show that, while the maximum difference between low and high water in Southern's Bay is some 12 feet, in the Lough it is rather less than 4 feet. (During winter gales, when the Lough is very tempestuous, wave action reaches considerably further than these figures suggest.) The positions of the tide posts are indicated on the map thus [A] [B] [C] [D].

Though only a little hydrographical work has yet been possible the results obtained are sufficient to show that only the surface water to a depth of something under 10 fathoms is directly affected by the tides, but that the whole of the water in the Lough, which is more or less regularly stratified, is subject to

seasonal changes. This is shown by the following figures, which give the average temperature, specific gravity (surface), and *p*H for September, 1928, and April, 1929:

	Temperature (° C.)	Specific gravity	*p*H at room temperature
September, 1928			
Surface	15·5	1027·5	8·4–8·5
20 metres	14·8		8·3–8·4
30	12·0		8·0–8·1
40	10·2		8·0–8·1
April, 1929			
Surface	11·0	1025·5	8·4
20	9·6		8·3
30	9·5		8·3
40	8·0		8·0–8·1

The figures for specific gravity show the effect of the winter rains. A sample taken during February, 1930, at the time of a south-west gale gave a reading of 1024. To the taste it was saltless, but no doubt this was because of the amount of fine spray which was being blown about and which must have affected one's lips and critical sense of taste.

The amount of work done on salinity and alkalinity is insufficient to lead to any conclusions, but the results obtained do suggest that in some parts of the Lough the fresh-water streams retain their individuality for some considerable distance from the shore. This may be of importance in connection with the distribution of Diatoms.

For the purpose of having standard cross-bearings during sounding, water-sampling, dredging, etc., the rocks have been blazed in suitable places with patches of white paint. These are indicated on the map by means of circles, each of which contains a fixed number.

Biology. From the biological standpoint the outstanding features are the relative absence of the larger algae, the abundance, especially in certain localities, of encrusting Corallinaceae, and the extraordinary plentifulness of animals, in particular of sedentary and sessile forms, coupled with the occurrence in very shallow water of more or less typically deep-water species.

Botany. Though the zoning of the lichens and algae is masked in a great many places, on account of the irregularities of the shore, and of the narrowness of some of the zones, it can be made out quite well on the whole. *Fucus serratus* L., however, occurs in only a few places.

Where fresh water enters *Fucus ceranoides* L. occurs, in amounts roughly proportional to that of the fresh water, if largish stones are present to afford it a suitable substratum. In their absence the presence of fresh water is indicated, as is usual, by the growth on *Enteromorpha.*

Laminarias are absent from most parts of the shores, but occur to some extent on the rocks at both ends of the island; between the eastern end of the island and the mainland, on rocks which are exposed at low water; on the rocks north of the Rapids, and in the mouth of the Rapids *Laminaria saccharina* L.

is the common species, with *Laminaria digitata* L. and *Saccorhiza bulbosa* De la Pyl. in addition in the Rapids, where *L. cloustoni* Edm. also occurs.

Enteromorpha and *Ulva* occur more or less abundantly and spasmodically, the former where fresh water influence is at work, the latter mainly below the *Fucus* zone, whilst *Himanthalia lorea* Lyngb. is common in what should be the Laminarian zone, in those places where Corallines are not excessive in amount.

Corallinaceae are exceedingly abundant, as compared with the other kinds of algae present, and are largely responsible for the character of several regions of the shore. Along several stretches on the west, the east and the south, they (together with Porifera and other sessile animal forms) cement together the boulders and rock fragments, the effect produced in some places being that of a fringing shelf of conglomerate, varying in width from 2 to 10 feet or more. This effect is best seen about the middle of the southern and in two regions of the western shores. The greatest quantity, however, occurs along the middle region of the northern shore of Castle Island, where a *Melobesia* dominates a zone of from 10 to 30 yards or more, encrusting stones and shells with a thick tuberculous coating, whilst a thin and somewhat leaf-like form (*Lithophyllum lichenoides* Ellis) constitutes a conspicuous feature of Scyllium Bay, where it is exceedingly and painfully abundant, both on the boulders and on other algae growing on them. Its presence interferes very considerably with shore collecting, owing to its razor-like cutting powers.

A further feature of the algal distribution is the presence of what may be described as small fields of *Cystoseira ericoides* C.Ag., at the south-eastern corner and on the north-east of the island, and in smaller patches on the eastern shore, just in front of the Narrows. It will be observed that all these situations get the full benefit of the in-rushing tide.

A remarkable contrast with the abundance of Corallinaceae and paucity of Laminariaceae in the Lough is provided in the upper part of Barloge Creek, referred to as Southern's Bay, where the latter are abundant, the former very poorly represented. A further contrast is presented by large meadows of sea-grass, *Zostera marina* L., which carpet the whole floor of the upper half of the Creek, with the exception of the main channels, which are very narrow. *Zostera marina* does occur in small quantities in some parts of the Lough, but these cannot be described as meadows; on the other hand, meadows occupy the greater part of the floor of the southern half of the Goleen. These, however, are composed of *Z. nana* Roth.

Zoology. The most conspicuous animal form is *Paracentrotus lividus* (Lam.), the spiny purple urchin, which occurs abundantly in most places where the substratum is really hard, with the exception of those which are subject to the full force of the incoming rush through the Narrows, and where the rocks are sheer. So plentiful is it in some places that twenty adults may be found in a square foot, which contains numerous small specimens too. In some places, especially along the southern shore, the olive green variety occurs mingled with

the deep purple form. It is noticeable also that specimens from different regions exhibit very great differences in the length and robustness of their spines. In two places, one on the eastern shore, the other on the northern shore of the island, *Paracentrotus* lives in excavations in the rock, as described by Nicholls in the Clare Island Report (**57**, p. 8). It also moves up and down the shore with the flood and ebb tides, and is very prone to cover itself partially with empty bivalve valves, those of *Anomia* being its especial favourites, but possibly only because they are particularly abundant.

Were the individual *Anomia ephippium* L. equally conspicuous with the individual *Paracentrotus* this species would be *the* outstanding inhabitant of the Lough, for not only is it exceedingly plentiful in the living state, literally encrusting stones and boulders in many places, but its valves cover large areas of the bottom.

Pecten varius L. is the other outstanding Mollusc, and is especially abundant on boulders along the north-west, most of the north shore, in various places along the west and south, along half the north shore of the island, and in the northern part of the Goleen. Off the island it is often covered with the tuberculous *Melobesia* mentioned in the previous section, in others by sponges, which grow to a considerable size and in which a hole, about the size of a five-shilling piece in diameter, is kept open by the scallop. In some cases the growth of *Melobesia* is so heavy that a similar state of affairs is brought about here too.

Littorea littorea (L.) and *Mytilus edulis* L. are present in even greater numbers, for, besides being very abundant in certain places, they are generally distributed wherever the substratum is suitable. Clumps of mussels occur in many places, such as the rocks in the Goleen, the rocky islet at the northern corner, and especially at the Sill in the Rapids. Some of these may be described as small reefs, and are clothed with *Tubularia*, *Plumularia*, other Hydrozoa, and Polyzoa, besides harbouring many errant forms, notably Ophiuroids and Polychaetes.

Of the remaining Gastropoda *Gibbula cineraria* (L.) and *G. umbilicata* (Mont.) are common and very generally distributed, though on account of its beauty and of the fact that it is much less usually met with, *Trivia europaea* (Mont.), the European cowrie, is more conspicuous than they are. This species occurs especially in the region of the Rapids, including Southern's Bay.

Of Opisthobranchs *Aplysia punctata* Cuv., the sea-hare, and *Oscanius membranaceus* (Mont.), occur occasionally, and *Pleurobranchus plumila* (Mont.) is moderately common. Nudibranchs are well represented, *Jorunna johnstoni* (A. and H.) being the most plentiful and showing very interesting colour variations, which render it very inconspicuous against the sponges on which it feeds. One particularly arresting case of this was met with during 1928, when a pairing couple was found, one individual of which was dark scarlet, the other dirty yellow, their colours matching exactly two adjacent sponges on which they were standing, and into which they had eaten. *Limapontia capitata*

(Müll.) and *Elysia viridis* (Mont.) occur in numbers, but so far *Alderia* has not been observed, though Lough Ine is but 4 miles from the original locality for this genus—in the River Ilen.

Nudibranchs and Tectibranchs constitute such a feature of the fauna of the shores of the Lough and of Southern's Bay that a list of species identified to date is of considerable interest:

NUDIBRANCHS
- Archidoris tuberculata (Cuv.)
- A. testudinaria (Risso.)
- Jorunna johnstoni (A. and H.)
- Rostangia coccinea (Forbes)
- Doris flammea (A. and H.)
- Aegires punctilucens (d'Orb.)
- Triopa claviger (O.F.M.)
- Goniodoris castanea (A. and H.)
- G. nodosus Mont.
- Lamellidoris bilamellata (L.)
- Acanthodoris pilosa (O.F.M.)
- Ancula cristata Alder
- Doto pinnatifida (Mont.)
- Polycera quadrilineata (O.F.M.)
- P. ocellata
- Antiopella cristata (delle Chiaje)
- Galvinia farrani (A. and H.)
- G. picta A. and H.
- G. tricolor (Forbes)
- Facelina drummondi
- F. punctata (A. and H.)
- F. coronata (Forbes)
- Tergipes despectus (Johnst.)
- Aeolidia papillosa (L.)
- Eolis angulata
- Pleurophyllidia loveni Bergh.
- Elysia viridis Mont.
- Limopontia capitata Müll.

TECTIBRANCHS
- Acera bullata Müll.
- Aplysia punctata Cuv.
- Oscanius membranaceus (Mont.)
- Pleurobranchus plumula (Mont.)

As related in the introduction, Lough Ine was once frequented for the sake of its oysters. Now, however, *Ostraea* is scarce in the living state, though its former abundance is vouched for by the quantities of valves which persist, while there is still a very small bed below the main part of Southern's Bay[1].

"Worms" belonging to very different groups are well represented, but by far the most plentiful species is the Serpulid *Pomatoceros triqueter* Morch., which in many places covers a considerable proportion of the surface of stones and rocks. This is especially the case in a little bay on the eastern shore of the Goleen, where the slabs are all but covered by the chalky tubes of this species, which here form a retreat for *Phoronis hippocrepea* L. This remarkable form occurs also in the thick encrusting Corallines found at the north-west point of Castle Island, and probably elsewhere. Polynoids, too, are abundant, but the most conspicuous worms, by reason of both their numbers and their large size, are the Terebellid *Polymnia nebulosa* (Mont.), which fortifies its sinuous slimy covering with small stones and fragments of shell, and the bright orange coloured Nemertinean *Cerebratulus marginatus* Renier, whose delicate membranous tube has the appearance of semi-translucent mica.

After *Paracentrotus* the most striking of the Echinodermata is *Asterias glacialis* L., small specimens, up to 5 or 6 inches in diameter being common on the under-surface of rocks and boulders along the shore, while large ones, up to 16 inches in diameter, are common in deep water. The difference in colour between the shore and off-shore specimens is very marked, a steely blue-grey prevailing in the former, various shades of yellowish brown in the latter.

[1] The upper part of Barloge Creek, where it broadens out on the west we designate Southern's Bay in acknowledgment of Mr T. C. Southern's work of 1915. See Plate XXIV, Phot. 8.

Asterias rubens L., the common cross-fish, is by no means common, and rarely reaches 4 inches in diameter. This predominance of *A. glacialis* and *Paracentrotus* furnishes us with a very salutary warning against the far too prevalent habit of referring to a species as "the common, or the usual so-and-so," for on most parts of the coasts of the British area *A. rubens* and *Echinus esculentus* are the common or usual species.

Ophiuroids (brittle stars) are represented chiefly by *Ophiothris fragilis* (O.F.M.) and *Ophiocoma nigra* (O.F.M.), the common and black brittle stars, both of which show wide ranges of colour variation, though several other species occur. *Echinus esculentus* L. is usually plentiful along the part of the eastern shore which faces the Rapids, and on the steep rocks opposite to this on the western shore. Southern records it as being abundant on the eastern shore of the Rapids, but we did not find it there at all until 1928, and then only in very small numbers. From the way in which it appears at, and disappears from, other places in the Lough this species appears to do a good deal of moving about. It occurs in large numbers on the steep rocks at the mouth of Barloge Creek, north of Carrigathorna. *Echinus miliaris* L. may be mentioned here, though it is anything but common, because it occurs in a few places where *Paracentrotus* is scarce, or from which it is absent. This species resembles *E. esculentus* in being abundant just outside the Lough, its favourite haunt being on the eastern side of the spit which separates Barloge Creek from Tranabo Cove at low water, and which is known as the Coosh.

Of Crustacea the most abundant of the larger forms are the porcelain crabs, *Porcellana platycheles* (Penn.) and *P. longicornis* (L.), both of which, the former especially, are very numerous on the under-surfaces of stones and in crevices containing stones, with smaller numbers of *Xantho incisus* (Leach) and *Pilumnus hirtellus* (L.). Young specimens of *Cancer pagurus* L. are common too, but *Carcinas maenas* (Penn.) is astonishingly uncommon, except in the Goleen, where a considerable proportion of their number is infested with the parasitic barnacle, *Sacculina carcini* (Thomp.). *Verruca stroemii* (O.F.M.) is by far the commonest barnacle, and occurs in large numbers on the under-surface of stones, especially those in crevices. The common acorn barnacle, *Balanus balanoides* (L.), is much less frequent, the largest specimens growing on the wall which forms the western boundary of the Rapids, a considerable percentage of them being parasitised by the Isopod, *Cryptothir balani*. Caprellids and other small Crustacea live in surprising numbers among the Hydroids of the mussel beds and of large stones in the Rapids.

Polyzoa, Tunicata, both simple and compound, and Porifera, are extremely abundant wherever there is a suitable substratum. The second of these are remarkable for their brilliancy of colour, especially in the Rapids and the regions most affected by the incoming tide. So great are the differences in both colour and conformation that it is difficult to subscribe to the view that there is but one species of *Botryllus*.

The Porifera are among the most interesting of the sessile inhabitants of both the Lough and Barloge Creek, being exceedingly numerous and exhibiting tremendous variation of both form and colour, *Hymeniacidon caruncula* Bwk., *Suberites carnosa* (Johnst.) and *Tethya lyncurium* (L.) affording three common examples. Brilliant blue patches of *Terpios fugax* Duch. and Mich., whose colour is due to a symbiotic Beggiotacean alga, are frequent, but more remarkable than any of these is the abundance of *Hymedesmia stevensi* Burton, a species but recently described by Burton from scanty material found at Plymouth[1]. A second new species, *Halichondria bowerbankia*, described in the same paper, also occurs in the Lough. The influence of light as a factor in the production of colour is well shown by masses of *Pachymatisma johnstoni* Bwk., which grow in a long narrow cave on the western side of Bullock Island. Near the mouth of the cave the outer parts, which are subjected to bright light are so dark that an ordinary observer would call them black. A little further in it becomes obvious that the "black" is really a very dark purple, and as we go farther and farther from the source of light the colour pales gradually until the sponge is almost white.

Abundant but "local" species of Coelenterata constitute striking features of the regions which they inhabit. Chief among these are *Cereus pedunculatus* (Pennant)[2], which is so abundant right across the middle region of the Goleen, along the northern shore of the island from the middle round to the rocks at the eastern end, and in Southern's Bay, that it forms regular fields, in addition to filling crevices in the ridges just south of the quay in Barloge Creek; *Anemonia sulcata* (Penn.), found with *Cereus* in the second habitat mentioned above, and on *Zostera* in the Goleen, to the east of the Coosh, and abundantly in Southern's Bay; *Corynactis viridis* Allman, many varieties of which literally cover the undersurface of slabs, large and small in some regions, notably in and near to the Rapids: slabs which rest on one edge are often entirely covered except for the small area which touches their support; *Obelia geniculata* L. which clothes the fronds of *Laminaria digitata* Edm. and *L. saccharina* Lam. in most of the places where these occur; in many cases it is of quite a distinct red colour: *Sertularia operculata* L. which occurs in large quantities on slabs in the Rapids, where, as already mentioned, it is tenanted by hordes of *Caprellids* (and other Syncarida). The other common Coelenterate which is very abundant at times is *Aurelia aurita* Lam. the common jellyfish. Of this there appear to be two "broods"—one from April to June, the other from July or August to late autumn. There is some evidence that the former is the outcome of strobilisation within the Lough, and that the latter is brought in on the flood tides, but this needs further investigation.

Three other species of Coelenterata, all fairly abundant, are worthy of

[1] **Burton**, "Additions to the Sponge Fauna at Plymouth." *J. Mar. Biol. Ass.* N.S. XVI, 2. March, 1930.

[2] Probably other species are included here, too.

special mention. These are the so-called cup-coral, *Caryophyllia smithii* Stokes, which careful searching has shown to be anything but scarce in places which afford a roof-like habitat just below the limit of low water at spring tides in the Creek and of neap tides in the Lough; *Sarcodictyon catenata* Forbes, which is less common but by no means rare; and a new species of Alcyonarian, closely related to but differing in several important features from *Parerythropodium norvegicum* Kor. and Dan., for which the name *P. hibernicum* has been suggested. There is just the possibility that this may be the adult stage of *Hartea elegans*, described by Wright in 1864[1], from a single specimen found attached to a shell in deep water off the west coast of Ireland. Unfortunately Wright's description and figure are not detailed enough to enable a proper comparison to be made between this form and the earliest single-polype stage of the new species.

All the species to which reference has been made above are to be obtained by shore-collecting, the majority of them either exposed or in water of but a few inches in depth during the periods of low tide, and it is of especial interest that a number of them, such as *Echinus esculentus*, *Ophiothrix fragilis*, *Ophiocoma nigra*, *Asterias glacialis*, and *Caryophyllia smithii* are usually obtainable only by means of a dredge. To this list must be added the Brachiopod *Crania anomala* Müll., the Crinoid *Antedon bifida* (Penn.), the Lamellibranch *Lima hians* (Gm.), and the Polychaete *Chaetopterus variepedatus* Ren., while but one littoral form, other than *Alcyonium*, closely related to *P. hibernicum* is known.

To this general description may be added an account of a specific region, as an example of what the shore of the Lough is like. For this purpose the part of the southern shore, S. 12 to S. 17 on Map III is taken.

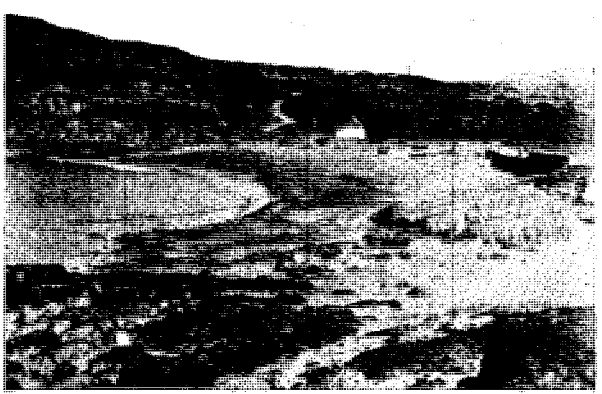
S. 12 is a small ridge of rocks: S. 13, Scyllium Bay, has been formed through the breaking down of the rocks, and consists at low water of a horseshoe-shaped strand, backed by a flat sward, at the foot of which are large blocks of rock. The floor is of coarse muddy sand and stones, and at spring tides, a wide area of small boulders clothed with algae, conspicuous among which are *Cystoseira ericoides* Ag. and *Lithophyllum lichenoides* Ellis. S. 14 is another ridge, some 10 feet high and practically sheer along its eastern half. This wall of rock continues round to the Narrows, but is broken up into jutting ridges, which form little bays at S. 16 and S. 17. At S. 15 and S. 16 are zones of boulders and small slabs on a gently sloping bottom, separated from each other by a large rock. S. 16 bears a small field of *Cystoseira*. S. 17 is very rugged and slopes down from a narrow boulder zone into deep water very rapidly. It is subjected to the full influence of tides flooding into and ebbing from the Lough.

The narrow land region between S. 13 and S. 17 consists of a high ridge of rocks, marked by Gorse and Heather. The laboratories are situated on the sward above Scyllium Bay and behind the ridge near S. 17 (Plates XXIV, XXV, Phots. 8, 11).

[1] Wright, P., on a new genus of Alcyonidae (*Hartea elegans*). *Proc. Dub. Micro. Club*, 1864.

Phot. 11. Lough Ine. The laboratories at Scyllium Bay and the Rapids.

Phot. 12. Tralispean Marsh. The Bealariree Stream enters from the left. Tragemona Bay in the right distance.



Phot. 13. Tragemona Strand at low water. The lake is just to the right of the school house.

RENOUF—PRELIMINARY WORK OF A NEW BIOLOGICAL STATION (LOUGH INE, CO. CORK, I.F.S.)

The shore area from which the following species have been identified is approximately 235 yards in length and averages 4 yards in width.

LOUGH INE. S. 12—S. 17.

PORIFERA

Clathrina coriacea (Mont.)
C. contorta (Bwk.)
Leucosolenia botryoides (Ellis and Sol.)
Sycon ciliatum (Fabr.)
S. raphanus Schmidt
Leucandra nivea (Grant)
Halisarca dujardini Johnston
Pachymatisma johnstoni (Bwk.)
Tethya lyncurium (L.)
Cliona celata Grant
Terpios fugax Duch. and Mich.
Reniera cinerea (Grant)
Halichondria panicea (Pallas)
H. Bowerbankia Burton
Hymedesmia stevensi Burton
Myxilla incrustans (Johnst.)
M. contrarenii (Martens)
Esperiopsis fucorum (Johnst.)
Hymeniacidon sanguineum (Grant)
Aplysilla rosea Schultze
Plakina monolopha

COELENTERATA

GYMNOBLASTEA

Clava muticornis Forshal.
C. squamata (Müller)
Tubularia bellis Allman

CALYPTOBLASTEA

Obelia geniculata (L.)
Campanularia flexuosa (Hincks)
C. neglecta (Alder.)
Sertularia pumila L.
S. operculata L.

DISCOMEDUSAE

Aurelia aurita (L.)

ANTHOZOA

ALCYONARIA

Alcyonium digitatum L.
Parerythropodium hibernicum sp. nov.
Sarcodictyon catenata Forbes

ZOANTHARIA

Actinia equina Linn. var. fragacea
Metridium senile (L.)
Anemonia sulcata (Penn.)
Bunodactis verrucosa (Penn.)
Anthopleura ballii (Cocks)
Corynactis viridis Allman

MADREPORARIA

Caryophyllia smithii Stokes

CTENOPHORA

Pleurobrachia pileus Fabricius

ECHINODERMATA

HOLOTHUROIDEA

Cucumaria saxicola Brady and Robertson

CRINOIDEA

Antedon bifida (Penn.)

ASTEROIDEA

Asterina gibbosa (Penn.)
Asterias rubens L.
A. glacialis L.

OPHIUROIDEA

Amphiura elegans (Leach)
Ophiocoma nigra (Abild.)
Ophiothrix fragilis (Abild.)

ECHINOIDEA

Echinus miliaris Gmel.
E. esculentus L.
Paracentrotus lividus (Lmk.)

TURBELLARIA

Leptoplana tremellaris (Müller)
L. fallax (Quatrf.)
Prostheceraeus vittatus (Mont.)

NEMERTINEA

Lineus longissimus Gunn
Cerebratulus marginatus Renier

ANNELIDA

ARCHIANNELIDA

Dinophilus taeniatus Harmer

POLYCHAETA

Euphrosyne foliosa Aud. and Edw.
Lepidonotus squamatus (L.)
L. clava (Montagu)
Lagisca floccosa (Sav.)
Harmothoe imbricata (L.)
Halosydna gelatinosa (M. Sars.)
Sthlenelais boa (Johnst.)
Eulalia viridis (Müller)
Nereis pelagica L.
Staurocephalus rubrovittatus Grube
Lysidice ninetta Aud. and Edw.
Cirratulus cirratus (O.F.M.)
Polymnia nebulosa (Mont.)
Stylariodes plumosa (O.F.M.)
Flabelligera affinis Sars.
Pomatoceros triqueter L.
Spirorbis spirorbis (L.)

GEPHYREA

Phascolosoma johnstoni (Forbes)

POLYZOA

Pedicellina cernua Pallas
Crisia eburnea L.
C. cornuta L.
Diastopora patina Lmk.
Lichenopora hispida Fleming
Eucratea chelata L.
Bugula calathus Norman
B. flabellata
Scrupocellaria reptans L.

Membranipora membranacea L.
Electra pilosa L.
Electra pilosa var. dentata Ellis and Solander
Smithia landsborovii Johnston
Alcyonidium mytili Dalyell
Flustrella hispida Fabricius
Bowerbankia imbricata Adams var. densa Farre

BRACHIOPODA

Crania anomola Müller

ARTHROPODA

CRUSTACEA

ENTOMOSTRACA

Ascidicola rosea Threll.
Verruca stroemia Müller
Balanus balanoides L.
B. porcatus da Costa

ARTHROSTRACA

Tanais cavolini M.Ed.
Ligia oceanica (L.)
Naesa bidentata (Adams)
Jaera marina (Fabr.)
Janira maculosa Leach
Gammarus marinus Leach
Amphithoe rubricata (Mont.)
Microdeutopus anomalus (Rathke)
Jassa dentex (Czerniavski)
Parajassa pelagica (Leach)
Caprella acanthifera Leach

DECAPODA

Cancer pagurus L.
Pilumnus hirtellus (L.)
Xantho incisus (Leach)
Carcinus maenas (Pennant)
Inachus dorsettensis (Pennant)
Portunus puber (L.)
P. arcuatus Leach
Porcellana longicornis (L.)
P. platycheles (Pennant)
Galathea squamifera Leach
Hippolyte varians Leach
Spirontocaris cranchi (Leach)
Leander serratus (Pennant)
L. squilla (L.)

INSECTA

Anura maritima Laboulb.
Machilis maritima Leach

MYRIAPODA

Scolioplanes maritima (Leach)

PYCNOGONIDA

Pycnogonum littorale Stroem
Nymphon rubrum Hodge

MOLLUSCA

AMPHINEURA

Acanthochites fascicularis (L.)
Craspedochilus cinereus (L.)

PELECYPODA

Anomia ephippium L.
Anomia ephippium var. striatum
Mytilus edulis L.
Volsella modiolus (L.)
V. phaseolina (Phil.)
Modiolaria marmorata (Forbes)
M. discors (L.)
Pecten varius (L.)
Kellia suborbicularis (Mont.)
Tapes decussatus (L.)
Venus verrucosa L.
Cardium exiguum Gmel.
C. edule (L.)
Saxicava rugosa L.
Ostraea edulis (L.)

GASTROPODA

Patella vulgata (L.)
Helcion pellucidum (L.)
Acmaea virginea (Müll.)
Emarginula fissura (L.)
Fissurella graeca (L.)
Gibbula umbilicata (Mont.)
Calliostoma zizyphinus (L.)
Phasianella pullus (L.)
Littorina obtusata (L.)
L. rudis (Maton)
L. littorea (L.)
Rissoa parva (da Costa)
Rissoa parva var. interrupta
R. proxima Alder
R. violacea Desmarest
Cingula semistriata (Mont.)
Trivia europaea (Mont.)
Bittium reticulatum (da Costa)
Ocinebra erinacea (L.)
Purpura lapillus (L.)
Nassa incrassata (Stroem)

TECTIBRANCHIATA

Pleurobranchus plumula (Mont.)
Oscanius membranaceus (Mont.)

NUDIBRANCHIATA

Archidoris tuberculata (Cuv.)
A. testudinaria (Risso)
Jorunna johnstoni (A. and E.)
Rostangia coccinea (Forbes)
Aegires punctilucens (d'Orb)
Triopa clavigera (O.F.M.)
Lamellidoris bilamellata (L.)
Goniodoris castanea (A. and H.)
Ancula cristata Alder
Doto pinnatifida (Mont.)
Galvania farrani A. and H.
G. picta (A. and H.)
G. tricolor (Forbes)
Facelina punctata A. and H.
Cuthona peachi (A. and H.)
Tergipes despectus (Johnst.)
Aeolidia papillosa (L.)
Pleurophyllidia loveni Bergh.
Limopontia capitata Müller
Elysia viridis Mont.

TUNICATA

Phallusia mentula (Müll.) = Ascidia rubicunda Hanc.
P. virginea (Müll.)
Ascidiella aspersa (Müll.)
Ciona sociabilis (Gunn) = C. intestinalis (L.)

Ascidia producta Nanc.
Styela rustica L.
Cynthia squamulosa A. and H.
Clavelina lepadiformis (Müll.)
Aplidium zostericola (Giard)
Amouricium proliferum M.E.
Dendrodoa grossularia (Bened.)
Parascidia flemingii A. and H.
Didemnum durum M.E.
Leptoclinum gelatinosum (M.E.)
L. fulgens (M.E.)
L. griseum A. and H.
L. maculosum A. and H.
Botryllus schlosseri (Pallas)
Botrylloides rubrum M.E.

PISCES

Scyllium canicula (L.) and "purses"
Conger vulgaris Cuv.
Anguilla vulgaris Turton
Gobius rithensparri Euphras.
G. minutus (L.)
Cottus bubalis Euphras.
Liparis montagui (Donovan)
Lepadogaster gouani (Lacep.)
Blennius pholis (L.)

PHANEROGAMIA

Ranunculus ficaria L.
R. repens L.
Cochlearia danica L.
C. officinalis L.
Viola (canina)
Polygala vulgaris L.
Cerastium viscosum L.
Spergularia marina L.
Ilex aquifolium L.
Ulex europaeus L.
Anthyllis vulneraria L.
Lotus corniculatus L. var. crassifolius Pers.
Lathyrus pratensis L.
Rubus fruticosus L.
Prunus spinosa L.
Sedum anglicum Huds.
Hedera helix L.
Lonicera periclymenum L.
Scabiosa succisa L.
Hieracium pilosella L.
Bellis perennis L.
Matricaria inodora L. var. maritima L.
Hypochaeris radicata L.
Taraxacum officinale
Achillea millefolium L.
Vaccinium myrtillus L.
Erica cinerea L.
Calluna vulgaris L.
Statice maritima Mill.
Primula vulgaris Huds.
Glaux maritima L.
Plantago lanceolata L.
P. coronopus L.
P. maritima L.
Digitalis purpurea L.
Euphrasia officinalis L.
Thymus serpyllum L.
Teucrium scorodonia L.
Atriplex rosea L.
Suaeda maritima Dum. procumbens Syme
Euphorbia hiberna L.
Juncus maritimus Lam.
Luzula sylvatica Gaud.

PTERIDOPHYTA

Pteris aquilina L.

BRYOPHYTA

MUSCI

Some

HEPATICAE

Frullania germana Taylor

THALLOPHYTA

LICHENES

Lichina pygmaea Ag.
Ramalina scopulorum Ach.
(R. calicaris Hffm.)
Usnea hirta Hoffm.
Parmelia perlata Ach.
Xanthoria parietina Ach.
Physcia aquilina Ach.
P. stellaris Ach.
Lecanora murorum Ach.
L. atra Ach.
L. tartarea Ach.
Cladonia pyxidata Fr.
C. furcata Ach.
(C. cervicornis)
Lecidea contigua Fr.
L. elaeochroma Ach.
Verrucaria maura Wahlenb.
V. mucosa Wahlenb.

ALGAE

CYANOPHYCEAE

Rivularia atra Roth.
Microcoleus anguiformis Harv.
Calothrix semiplena Ag.

CHLOROPHYCEAE

Ulva latissima L.
Enteromorpha intestinalis Link
E. compressa Grev.
Cladophora rupestris Kg.
C. hutschinsiae Harv.
C. flexuosa Griff.

PHAEOPHYCEAE

Asperococcus bullosus Lamour.
A. echinatus Grev.
Ectocarpus granulosus
Pylaiella litoralis Kjellm.
Elachista fucicola Fries
Ralfsia sp.
Mesogloia griffithsiana Grev.
M. vermicularis Ag.
Leathesia tuberiformis S.F.G.
Chorda filum Stackh.
Laminaria saccharina Lamour.
Laminaria saccharina var. phyllitis Le Jol.
Fucus spiralis L.
F. vesiculosus L.
F. serratus L.
Ascophyllum nodosum Le Jol.
Pelvetia canaliculata Decne. et Thur.
Himanthalia lorea Lyngb.
Cystoseira ericoides Ag.

RHODOPHYCEAE

Gelidium corneum Lamour. var. K. abnorme Grev.
Chondrus crispus Lyngb.
Gigartina mamillosa Ag.
Rhodymenia bifida Grev.
R. laciniata Grev.
R. laciniata very narrow
Chylocladia kaliformis Hook.
Delessaria hypoglossum Ag.
Laurencia pinnatifida Lamour.
Laurencia pinnatifida var. littoralis
Laurencia pinnatifida var. angusta
Polysiphonia elongata Grev.
P. fastigiata Grev.
Callithamnion roseum Lyngb.
C. virgulatum Harv.
C. affine Harv.
C. pedicellatum Ag.
C. brachiatum Bonnem
Ceramium diaphanum Roth.
C. rubrum Ag.
C. echionotum Ag.
Dumontia filiformis Grev.
Dilsea edulis Stackh.
Hildenbrandtia Sp.
Melobesia pustulata Lamour.
Lithophyllum lichenoides Ellis
Corallina officinalis L.

Dredging, etc. Dredging in the Lough itself is rather disappointing, mainly because the amount of hard ground is so small and the area of mud so large. The most abundant forms dredged are "worms," including Polychaetes, Nemertineans and Nematodes; Molluscs, the chief of which are *Acera bullata* Müll. and *Philine aperta* (L.), the former with spawn, and *Turritella communis* Lmk.; Crustacea, chiefly the swimming crabs, *Portunus arcuatus* Leach, and *P. corrugatus* (Penn.), rarely hermit crabs, the largest *Eupagurus bernhardus* (Lin.) occurring in shells of *Gibbula magus* (L.), a few *E. prideaxii* (Leach) with poor specimens of *Adamsia palliata* (Bod.), the cloaklet anemone, and *E. cuanensis* (Thomp.), on one of which was the parasitic Isopod *Athelges* sp. *Calocaris macandreae* Bell, a single specimen, and numerous Amphipods; and the Echinoderms *Amphiura chiajii* Forbes, and *Asterias glacialis* L. large specimens.

In the southern half of Barloge Creek a greater variety of the larger forms are taken by the dredge, including large numbers of spider crabs of different kinds, an occasional *Eledone cirrhosa* Lmk. and various fish (see list later).

Experiments have proved that a good deal of the bottom is suitable ground on which to use Mortensen's method of bottom tow-netting, and surface tow-netting is carried on as regularly as possible from a boom which is slung out over the Rapids at half-flood and half-ebb tides. None of the samples taken have yet been properly examined.

At times currents from the Atlantic result in additions to the more normal inhabitants of the Creek and the Lough. In this way *Velella spirans* Lam., *Pelagia perla* (Slabber) and *Aequorea forskalea* Peron and Les., have been brought in in small shoals, as also small numbers of *Lepas pectinata* Spengler, one specimen (dead) of *Chelone imbricata* and a cocoa-nut both with colonies of *Lepas anatifera* L. of the same size growing on them; and a packet of love letters, which appears to have been cast overboard from an American vessel.

Barloge. The small peninsula which constitutes the holding of Barloge, consists of rocky heather-gorse moorland, rising to over a 100 feet on the east, but with some good fields on the west and north. The largest fertile area slopes down towards the Goleen, from which its northernmost portion is flooded at high spring tides. As a result of this it bears a characteristic flora of *Spergularia, Cochlearia* (which bears a few mauve flowers), *Triglochin, Plantago,*

Phot. 14. Lough Ine from the north: the Goleen to the right.

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Salicornia, and *Atriplex*. At the end of September, 1930, a large part of this region had the appearance of having been sprinkled with coarse salt. Examination determined this to be due to countless larvae of a Coccid, belonging to the genus *Orthezia*. These were still abundant in December, and some of them kept in the laboratory at University College, Cork, are still alive, so it is hoped that they will complete their development[1].

The little islets in the Goleen are all submerged during high spring tides, and are being gradually washed away. Their flora is composed chiefly of grasses and rushes, among which the species mentioned just above are scattered. Small puddles left by the tide bear the miniature varieties of Fuci on their edges. In these puddles and on the flood land with the *Orthezia Salda pallipes* F. abounds.

The uncultivated land includes two small areas of marsh, one of which is permanently under water.

Bellis perennis L. with variegated leaves occurs in places. In the experience of the author such variegated plants do not bear flowers. (They occur also in part of the grounds of University College, Cork. Out of Ireland they have been met with in the island of Cumbrae, in the Firth of Clyde.) Many parts of the peninsula provide ideal conditions for the very beautiful Irish spurge, *Euphorbia hiberna* L., which takes full advantage of them. This plant occurs all through the district under consideration, but is seen at its best in this particular locality. The general flora is very varied, partly on account of the physical differences between parts of the holding, partly because it has been inhabited for many centuries, as is testified by the presence of ancient erections, Druidical, early Irish, and early Christian, and some possibly from even earlier times. These relics of the past include alignments, standing stones, a liss or ancient fort, a church, and incised grave stones. *Anthoceros* sp. occurs in quantity a short distance away from the homestead of Barloge.

Castle Island (Plate XXVI, Phot. 14). At high water of spring tides this is divided into two, through the flooding of the low strand of gravel and small rocks which separates the loftier eastern from the lower western half. The physical features of the two halves are so different that there is very little in common between the biological associations which characterise them. These last are being worked out in full. The Coralline region off the north shore has been mentioned in the general part.

Barloge Creek. Including the Narrows the Creek is about two-thirds of a mile long. The Narrows are a little over 100 yards in length, but are only 30 feet wide at low water; small though they are their importance from the biological aspect cannot be exaggerated, on account of the effects they produce in both the Lough and the Creek. The channels in the Creek are very narrow owing to the presence of banks of *Zostera*, whilst forests of *Chorda filum* Stackh. make navigation even more difficult during the summer. Southern's Bay, which constitutes the widest part of the Creek, is a favourite collecting ground

[1] Since this was written adults, abundant during June, show this to be *Orthezia urticae* (Lin.).

with visiting classes. The narrow southern end supports great quantities of Algae, which show zoning very distinctly, and large numbers of *Echinus esculentus* L. Two of the most interesting records from this region are of *Holothuria forskali* Delle Chiaje, an Echinoderm usually obtained by dredging, and the Chelifer *Obisium maritimum* Leach, whose habits are comparable with those of *Aepus*.

At high water, when Bullock Island is separated from the mainland, Barloge Creek communicates with Tranabo Cove, but at low water Bullock is reached from the mainland across a strand, the Coosh, a short account of which follows later. The cave, in which the effects of light on *Pachymatisma* are so clearly demonstrated, penetrates the western side of Bullock Island, a few yards north of the open sea.

Short hauls with the dredge have been made as opportunity allowed, and the animals taken, in addition to Zostera and Algae, are summarised in the following list, which bears a striking contrast with that for Tragemona, which follows later.

DREDGING BARLOGE CREEK.

PORIFERA
Hymeniacidon sanguineum (Grant)

COELENTERATA
Anthopleura ballii (Cocks)

ECHINODERMATA

ASTEROIDEA
Asterias rubens L.

OPHIUROIDEA
Ophiura albida Forbes
Ophiothrix fragilis (Abild.)

ECHINOIDEA
Echinus esculentus L.

NEMERTINEA
Lineus longissimus (Gunn)

ANNELIDA
Harmothoe imbricata (L.)
Nereis pelagica L.
N. diversicolor O.F.M.
Pomatoceros triqueter (L.)
Filigrana inplexa Berkeley
etc. and others not identified

CRUSTACEA

ENTOMOSTRACA
Peltogaster sp.

ARTHROSTRACA
Idotea baltica (Pallas)
I. linearis (Penn.)

DECAPODA
Carcinus maenas (Penn.)
Pilumnus hirtellus (L.)
Maia squinado (Herbst.)
Achaeus cranchii Leach
Inachus dorynchus Leach
Stenorhynchus rostratus L.
Ebalia sp. carapace
Portunus puber (L.)
P. depurator (L.)
P. arcuatus Leach
Porcellana longicornis (L.
P. platycheles (Penn.)
Eupagurus bernhardus (L.)
E. prideauxii (Leach)
E. cuanensis (W. Thompson)
Anapagurus laevis (W. Thompson)
Hippolyte varians Leach
Crangon vulgaris L.

PYCNOGONIDA
Nymphon rubrum Hodge

MOLLUSCA

PELECYPODA
Pecten maximus L.
Dosinia lupulina valves
Cardium nodosum Turton
Gari ferroensis (Chemnitz) fresh shell

GASTROPODA
Gibbula cineraria (L.)
G. miliare (Brocchi)
Phasianella pullus (L.)
Bittium reticulatum (da Costa)
Trivia europaea (Mont.)
Natica alderi Forbes
Nassa incrassata (Stroem)

TECTIBRANCHIATA
Aplysia punctata Cuv.
Philine aperta (L.)

CEPHALOPODA
Eledone cirrhosa (Lmk.)
Sepia officinalis L. spawn

PISCES
Raia batis L.
Nerophis lumbriciformis (Yarrell)
Syngnathus acus L.
Zeugopterus punctatus (Bloch)
Gobius ruthensparri Euphras.
Cottus scorpio (L.)
Callionymus lyra L.
Centronotus gunnellus L.

The Coosh. This consists of a bank of gravel and large stones fringed with boulders (Plate XXIV, Phot. 10), and built between crests of rock from the mainland and from Bullock. It is exposed only at low water. Its name and the rocky crests together point to its origin, the probable derivation of Coosh being from cuavas (pronounced cuash), which means stepping stones, all of which, except the crests, have become buried under the cargo of stones dropped by the waves, when they come round from each side of Bullock and meet.

At low water of spring tides an expanse of sand with small meadows of *Zostera* is exposed below the boulder zone along the eastern side of the Coosh, together with small areas of weed-covered boulders at the foot of the ridges of rock, which form the northern and southern boundaries. Examination of this region is not yet complete, but the fauna and flora are in such striking contrast to those of any region of Lough Ine itself that lists are appended for comparison with those given from the southern shore of the latter.

THE COOSH, EASTERN SIDE.

PORIFERA
Clathrina coriacea (Mont.)
Leucosolenia botryoides (E. and S.)
Leucandra nivea (Grant)
Sycon ciliatum (Fabr.)
S. raphanus Schmidt
Terpios fugax Duch. and Mich.
Halichondria panicea (Pallas)

COELENTERATA
HYDROMEDUSAE
GYMNOBLASTEA
Coryne pusilla Gaertner
CALYPTOBLASTEA
Campanularia neglecta (Alder.)
Sertularia pumila L.
SIPHONOPHORA
Velella spirans (Fôrskal)
DISCOMEDUSAE
Aurelia aurita (L.)
Pelagia perla (Slabber)
Cyanea capillata Peron.
Aequorea forskalea Peron. et Lea
Haliclystus auricula (Fabr.)
Lucernaria campanulata Lamour.
ANTHOZOA
ZOANTHARIA
Actinia equina L. and var. Fragacea
Anemonia sulcata (Pennant)
Sagartia troglodytes Johnst.

ECHINODERMATA
ASTEROIDEA
Asterias rubens L.
Asterina gibbosa (Pennant)
OPHIUROIDEA
Amphiura elegans (Leach)
Ophiothrix fragilis (Abild.)
NEMERTINEA
Lineus longissimus (Gunn)

ANNELIDA
POLYCHAETA
Euphrosyne foliosa Aud. and Edw.
Lepidonotus squamatus (L.)
L. clava (Montagu)
Lagisca floccosa (Savigny)
Harmothoë imbricata (L.)
Sthlenelais boa (Johnst.)
Nereis pelagica L.
N. diversicolor O.F.M.
Glycera alba Rathk.
Eulalia viridis (Müller)
Eulalia viridis var. aurea (Müller)
Cirratulus cirratus (O.F.M.)
Dodecaceria concharum Oersted
Amphitrite gracilis (Grube)
Pomatoceros triqueter (L.)
Spirorbis borealis L.
GEPHYREA
Physcosoma granulatum (Leuckart)
Thalassema neptuni Gaertner

POLYZOA

Lichenopora hispida Fleming
Scrupocellaria reptans L.
Membranipora pilosa L.
Lepralia pallasiana Moll.
etc.

ARTHROPODA

CRUSTACEA

ENTOMOSTRACA

Balanus balanoides L.
Verruca stroemi Müller

ARTHROSTRACA

Ligia oceanica (L.)
Idotea baltica (Pallas)
Gammarus marinus Leach
Amphithoë rubricata (Mont.)

DECAPODA

Cancer pagurus L.
Pilumnus hirtellus (L.)
Xantho incisus (Leach)
X. hydrophilus (Herbst.)
Carcinus maenas (Pennant)
Hyas araneus (L.)
Inachus dorynchus
Portunus puber (L.)
Porcellana longicornis (L.)
Porcellana platycheles (Pennant)
Galathea squamifera Leach
Eupagurus bernhardus (L.)
Leander serratus (Pennant)

INSECTA

Anura maritima Laboulb.
Machilis maritima Leach
Aëpus robinii Laboulb.
Aëpophilus bonnairei Sig.

PYCNOGONIDA

Pycnogonum littorale Stroem
Nymphon rubrum Hodge

MOLLUSCA

AMPHINEURA

Acanthochites fascicularis L.

PELECYPODA

Anomia ephippium L.
Modiolaria discors (L.)
Pecten varius L.
Saxicava rugosa L.
Kellia suborbicularis (Mont.)
K. minuta

GASTROPODA

Patella vulgata (L.)
Helcion pellucidum (L.)
Acmaea virginea (Müller)
Emarginula fissura (L.)
Gibbula umbilicata (Mont.)
G. cineraria (L.)
Calliostoma zizyphinus (L.)
Phasianella pullus (L.)
Littorina obtusata (L.)
L. rudis (Maton)
L. littorea (L.)
Rissoa proxima Alder.
Trivia europaea (Mont.)
Purpura lapillus (L.)
Ocinebra erinacea (L.)
Nassa incrassata (Stroem)

TECTIBRANCHIATA

Aplysia punctata Cuv.
Pleurobranchus plumula (Mont.)

NUDIBRANCHIATA

Jorunna johnstoni (A. and H.)
etc.

TUNICATA

Ascidia producta Hanc.
Clavellina lepadiformis (Müller)
Botryllus schlosseri (Pallas)

PISCES

Motella tricirrata Bloch.
Centronotus gunnellus (L.)

ALGAE

CYANOPHYCEAE

Lyngbya? flacca Harv. on Gelidium

CHLOROPHYCEAE

Conferva sp.
Ulva latissima L.
U. lactuca L.
Enteromorpha intestinalis Link
E. linkiana Grev.
Cladophora rupestris Kg.
C. flexuosa Griff.
C. albida Kütz
C. lanosa Kütz
Codium tomentosum Stackh.

PHAEOPHYCEAE

Punctaris latifolia Grev.
Asperococcus echinatus Grev.
Ectocarpus siliculosus Lyngb.
Pylaiela litoralis Kjellm.
Cladostephus spongiosus Ag.
Rytiphlaea fruticulosa Harv.
Leathesia tuberiformis S.F.G.
Laminaria saccharina Lamour.
Fucus spiralis L.
F. vesiculosus L.
F. serratus L.
Ascophyllum nodosum Le Jol.
Pelvetia canaliculata Decne. et Thur.
Himanthalia lorea Lyngb.
Cystoseira ericoides Ag.

RHODOPHYCEAE

Gelidium corneum Lamour.
Gelidium corneum var. flexuosum
Chondrus crispus Lyngb. normal
Chondrus crispus Lyngb. very broad
Chondrus crispus Lyngb. narrow
C. norvegicus Lamour.
Rhodymenia palmata Grev. var. soboliferus
R. jubata Grev.
R. laciniata Grev.
Chylocladia kaliformis Hook.
C. articulata Grev.
C. ovalis Hook.

Plocamium coccineum Lyngb.
Nitophyllum punctatum Grev.
N. hilliae Grev.
Delessaria alata Lamour.
Delessaria alata var. angustissima
Laurencia pinnatifida Lamour.
Laurencia pinnatifida var. osmunda
L. dasyphylla Grev.
L. tenuissima Grev.
L. caespitosa Lamour.
Polysiphonia elongata Grev.
P. fastigiata Grev.
Dasya coccinea Ag.
Callithamnion virgulatum Harv.
Ptilota sericea Gmel. (sp.)
Furcellaria fastigiata Lamour.
Polyides rotundus Grev.
Melobesia pustulata Lamour.
Corallina officinalis Lamour.
Janira rubens Lamour.

Tranabo Cove and Tragemona. Both of these bays provide excellent dredging grounds, which are composed of firm sand or fine gravel. On account of its larger size and the sandier nature of the main area of its bottom Tragemona yields a larger number of both species and individuals. With the exception of the strands the boundaries of both consists of much indented rock.

Through the strand of Tragemona (Plate XXV, Phot. 13) runs the effluent from the fresh-water Lough alluded to in an earlier part of this paper, and fringed by a marsh, which widens out to the north, and from which the area probably derives its name—Traigh na Mona, the Strand of the Marsh or Bog.

On the west Tragemona leads into a smaller cove, Tralispean (Plate XXV, Phot. 12), whose strand is now slaty gravel, but which was once probably of sand, for the name means "the Smooth Strand," and above high water mark there is a small sandbank, held together by grasses, *Lotus corniculatus* var. *crassifolius* Pers. and small plants of *Anthyllis vulneraria* among which are scattered plants of *Eryngium maritimum* L. Into the strand flows a small stream, the Bealariree, whose upper region often floods the narrow flat valley through which it flows, and from this a large area westwards and northwards of the strand, while to the north-west it connects with a large expanse covered with common reed, *Phragmites vulgaris* Druce, which used to be cultivated for thatching and other purposes. Eastwards this joins a marshy area, on part of which a fen carr, with *Myrica gale* L. sweet gale, *Salix repens* L. dwarf willow, *Alnus rotundifolia* Mill, etc. is developing. The whole of this region is extremely interesting on account of the transitions it shows from coarse heather-gorse moor, and maritime associations, to moor water, reed marsh, bog, fen, and fen carr, back to moorland.

The following list of animals obtained by dredging in Tragemona includes many characteristic arenicolous species (marked "a"), in addition to numerous offshore forms, and provides an interesting contrast with the main fauna of Barloge Channel. Many species of algae, especially of small Florideae, which have been torn from their substratum by the waves, are taken in the dredge, but have not been identified.

Dredging Tragemona Bay.

COELENTERATA

Hydromedusae

GYMNOBLASTEA

Hydractinia echinata Fleming

CALYPTOBLASTEA

Obelia geniculata (L.)
Antennularia antennina (L.)
Plumularia setacea (Ellis)
Sertularia polyzonias (L.)

Anthozoa

ZOANTHARIA

Metridium senile (Linn.)

ECHINODERMATA

Asteroidea

Luidia sarsi (D. and K.) a
Astropecten irregularis (Penn.) a
Asterias glacialis L.
A. rubens L.

Ophiuroidea

Amphiura elegans (Leach)
Ophiura ciliaris (L.) a
O. albida Forbes
Ophiothrix fragilis (Abild.)

Echinoidea

Echinus esculentus L.
Echinus miliaris Gmel.
Echinocardium cordatum (Penn.) a

Holothuroidea

Cucumaria saxicola Brady and Robertson*

Nemertinea

Lineus longissimus (Gunn)

ANNELIDA

Nephthys caeca (Müller) a
Pomatoceros triqueter (L.)
etc.

POLYZOA

Scrupocellaria reptans L.
Membranipora membranacea L.
etc.

Crustacea

ENTOMOSTRACA

Chondracanthus lophii Johnst.
Balanus porcatus da Costa

ARTHROSTRACA

Idotea baltica (Pallas)
I. linearis (Penn.)
I. emarginata (Fabricius)
Amphipoda numerous

Decapoda

Cancer pagurus L.
Pilumnus hirtellus (L.)
Carcinus maenas (Penn.)
Maia squinado (Herbst.)
Hyas araneus (L.) a
Pisa tetraodon (Penn.)
Inachus dorsettensis (Penn.)
Stenorhynchus rostratus L.
Portunus puber (L.)
P. depurator (L.)
P. marmoreus Leach
P. corrugatus (Penn.)
P. arcuatus Leach
Corystes cassivelaunus Penn. a
Porcellana longicornis (L.)
Galathea squamifera Leach
Eupagurus bernhardus L.
E. prideauxii (Leach)
Hippolyte varians Leach
Leander serratus (Penn.)
Crangon vulgaris L. a

Pycnogonida

Nymphon rubrum Hodge

MOLLUSCA

Pelecypoda

Nucula nitida G.B.S.
Lucinopsis undata (Penn.)
Dosinia lupulina
Venus verrucosa L.
Cardium tuberculatum
Lutraria elliptica Lmk. a
Ensis ensis (L.) a
Kellia minuta
K. suborbicularis (Mont.)

Gastropoda

Helcion pellucidum (L.)
Gibbula umbilicata (Mont.)
G. cineraria (L.)
Calliostoma zizyphinus (L.)
Phasianella pullus L.
Rissoa spp.
Trivia europaea (Mont.)
Buccinum undatum (L.) shell

TECTIBRANCHIATA

Aplysia punctata Cuv.
Philine aperta (L.)
Acera bullata Müller

NUDIBRANCHIATA

Doris flammea A. and H.

Cephalopoda

Sepia officinalis L. spawn

PISCES

Scyllium canicula (L.)
Raia batis L. a
R. clavata (L.) a
R. maculata Mont. a
Nerophis lumbriciformis (Yarrell)
Pleuronectes platessa (L.) a
P. limanda (L.) a
P. microcephalus Donov. a
Rhombus laevis Rondel. a
Arnoglossus megastoma Day a
Solea vulgaris Quesn. a
S. lutea (Risso.) a
Gobius ruthensparri Euphras.
Cottus scorpius (L.)
Callionymus lyra L.
Zeus faber L.
Centronotus gunnellus (L.)

FAUNA, GENERAL.

No really systematic collecting of the general terrestrial fauna has been attempted yet, but a good many data have been accumulated. These show that the mammals of the district include *Erinaceus europaeus* L. the common hedgehog (usually called porcupine locally), *Sorex minutus* Lin. the lesser or pigmy shrew, *Canis vulpes* L. the fox, *Mustela vulgaris* Erxl. the weasel, *Meles taxus* L. the badger, *Lutra vulgaris* Erxl. the otter, *Oryctolagus cuniculus* (L.) the rabbit, and of course, *Mus musculus* L. and *M. decumanus* Pall. the house mouse and brown rat. Probably the pine marten *Mustela martes* L. occurs too, but we have met with only verbal evidence that such is the case. (*Phoca vitulina* L. the common seal, is abundant throughout the year, and small shoals of porpoise, *Phocaena communis* Lesson, appear at times.) Of the seventy species of birds noticed the most prominent on account of their numbers, are the common curlew (*Numenius arquata* (L.)), the wren (*Troglodytes parvulus* K. L. Koch) and the stonechat (*Pratincola rubicola* (L.)); while the scarcest include the hoopoe (*Upopa epops* L.), the kingfisher (*Alcedo ispida* L.) and the chough (*Pyrrhocorax graculus* (L.)).

Lacerta vivipara Jacquin, the common lizard, which is abundant, especially around Lough Ine, is the only reptile found (with the exception of the turtle previously mentioned, as having been washed ashore). *Molge vulgaris* L. the common newt, locally believed to be a lizard, is very abundant, more particularly about Baltimore, and often hibernates beneath large stones on the shore of the estuary of the Ilen and sometimes even on the seashore, which must be washed by spring tides. *Rana temporaria* L. is met with only occasionally, though its spawn is sometimes abundant.

Insecta and Arachnida are plentiful, some of them unpleasantly so, in particular *Haematopota pluvialis* L. the clegg, known in many parts as the "horse doctor," and *Ixodes ricinus* L. the sheep and cattle tick. *Argyroneta aquatica* Latr. the water spider and *Epeira diadematа* (Clk.) the large cross-spider are the most noticeable of the Araneida, on account of the numbers in which they occur. On account of their brilliant coloration *Cicindela campestris* L. the tiger beetle and *Cetonia aurata* L. the rose chafer are two of the most obvious members of the Coleoptera. Of the Lepidoptera, the Rhopalocera are well represented, five species of Vanessa, including *V. polychloros* L. the large tortoiseshell, *V. cardui* L. the painted lady, *Euchloe cardamines* L. the orange tip, and *Argynnis aglaia* L. the dark green fritillary, being especially prominent. *Smerinthus ocellatus* the eyed hawk-moth, *Lasiocampa quercus* L. the oak eggar, and *Saturnia pavonina* L. the emperor, are some of the outstanding Heterocera. Though members of the Odonata, Hymenoptera, and other orders abound but few of them have been identified yet, and the same is true of the Myriapoda, Isopoda, Crustacea and Mollusca.

Reference has been made already to the occurrence of *Orthezia* sp. and *Salda pallipes* F. in the Goleen.

Species identified to date number 580 plants and 820 animals. These numbers will probably be at least trebled if the work continues as it has started, for, as pointed out at the beginning of this report, our results are incomplete in every direction, while some groups have not been dealt with at all. It is hoped, however, that sufficient has been said to attract serious workers to the area under consideration.

One other inducement may be proffered. This is the accessibility of the famous regions of south-west Ireland, well known for the interest of their natural history and for their beauty, such as Killarney and the Macgillicuddy Reeks.

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