

THE GRANITE SHORES OF LUNDY

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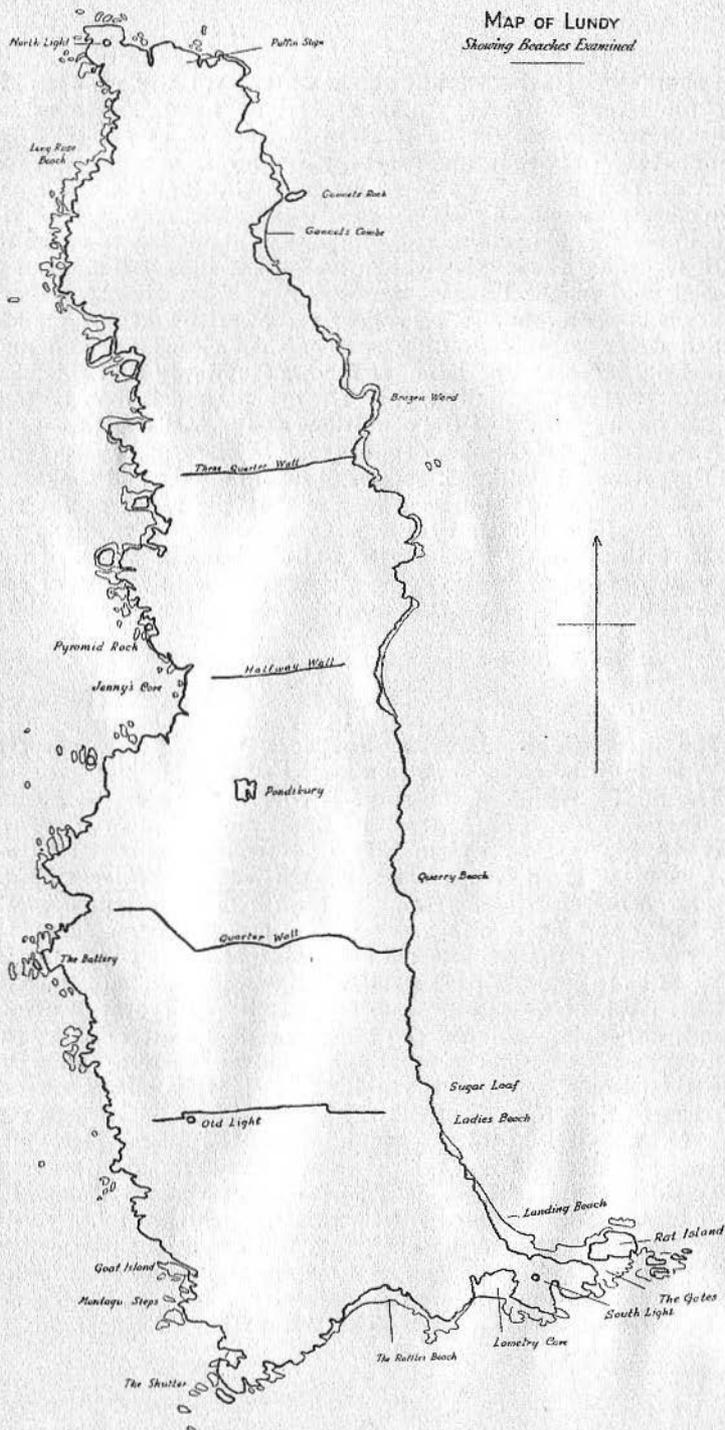
Work on the ecological conditions on the shores of Lundy is by no means yet finished. It has however, been decided, in response to repeated requests, to publish brief preliminary accounts, partly so that the interested visitor may know what to expect, partly as an incentive to others to partake in the work. A glance at the map is sufficient to indicate the extreme differences in physical conditions to be expected around the coasts of the island. The west coast, exposed to the full force of the prevailing south-westerly and westerly weather, is subject to continuous wave pounding and erosion. The east coast, on the lee side, enjoys by contrast normally quiet waters, and only during rare easterly weather does it suffer heavy wave action. The short northern and southern coasts exhibit transitional conditions between these two extremes. In addition, the south-east corner presents a marked contrast with all other parts of the shore in that the rock here is slate, softer and stratified, and consequently it weathers into entirely different patterns from those of the granite which elsewhere constitutes the rock of the shore.

The main object of the survey undertaken of these shores has been to determine the differences in fauna and flora displayed under these various conditions. It has therefore been necessary to attempt examination of as many loci as possible around the island's perimeter. So far we have visited the following places, the positions of which are marked on the map, Fig. 1 : The Gates, the north shore of Rat Island, the Landing Beach, Ladies Beach, Quarry Beach, Brazen Ward, Gannet's Combe and the north side of Gannets Rock, below Puffin Slope, Long Ruse, Jenny's Cove, Goat Island, the Rattles and Lametry Cove. Description of the slate shores of the Gates, Rat Island, Lametry Cove and the Rattles is reserved until a later report, and here we are concerned only with the conditions on the granite of the bulk of the island.

Access to almost any of Lundy's shores is arduous at best, and in some cases only to be had at the expense of a climb down the cliffs. With moderate care, however, this can be accomplished fairly easily and without danger, except in wet weather, when the grass, in particular, may become very slippery. As a result of our experiences in the wet August of 1950, we would warn visitors only to attempt with extreme circumspection the descents to Ladies Beach and Lametry if the surface is wet. It should also be borne in mind that the slate cliffs are far less dependable than the granite, so that it is advisable to test hand and foot holds carefully before putting any weight on them.

The granite beaches of the east side include Ladies Beach, Quarry Beach, Brazen Ward and those of the Gannets Rock area. Of these, by far the most easily worked is the first. On all the others

MAP OF LUNDY
Showing Beaches Examined



the shore slopes rather rapidly at low water level, while the boulders are too large and heavy to be turned by hand. Moreover it is difficult to examine the substratum because rocks are piled in a jumbled layer above it, and it is only in a few clear areas that more than an occasional chink gives access to the bottom. As a consequence, although the fauna beneath the rocks may well be rich, it is impossible to examine it thoroughly, and one has to be content with recording the species which live on the tops and sides of the blocks, and in the occasional pools. At Ladies Beach, however, the whole shore shelves very gently seawards and the boulders which cover it are uniformly smaller than elsewhere, and many can easily be turned by hand. It follows inevitably that this beach has received more attention than the others, and it may be taken as our main example of the conditions of the east coast.

A well defined succession of zones may be discerned characterized by the presence of different species of furoid weeds, and the display of this succession is enhanced by the very big range of the tides in the Bristol Channel. During 1948 a number of readings were taken with a dumpy level on the Landing Beach. A few of these may be quoted as exemplifying the approximate ranges of some of the more prominent species, the height in each case being relative to Datum :

<i>Pelvetia canaliculata</i>	from 15.3 to 7.98 feet
<i>Fucus spiralis</i>	from 9.08 to 6.68 feet
<i>Ascophyllum nodosum</i>	from 8.72 to 5.11 feet, on the cliff face from 10.0 to -2.19 feet on boulders

The little wrinkle, *Littorina neritoides*, extends upwards from H.W.M. into the spray zone to a height of 19.7 feet.

The middle region of the shore is covered with *Fucus serratus*, the range of which overlaps at its upper limit that of *F. spiralis* and *Ascophyllum*, and from here it extends downwards to low-water level where it gives place to the oarweeds, *Laminaria digitata*, *L. saccharina*, *L. cloustoni* and *Saccorhiza bulbosa*. Mingling with the *Fucus* and *Laminaria*, often indeed growing upon them, is a rich growth of the red weed *Rhodomenia palmata*, which may be so thick as to confer a deep red colour upon the whole of the shore at this level. Many other algae, red, green and brown, are to be found, either epiphytic on the larger weeds, or attached as tufts and encrustments on the cliffs and boulders. There are, however, few tidal pools, because the uniformly shelving shores offer no barriers to the drainage of the tidal waters. The pool weeds must therefore be sought at the margins of the bays. Here short promontories jut out and their rock is usually eroded into narrow, steep-sided clefts with small, deep pools in their bottoms. Protruding seawards as these little capes do they are more subject to erosion than are the beaches, and the conditions come nearer to those of the west side. The larger weeds can rarely retain a hold and the substratum appears therefore rather bare, until it is seen to be covered with an extensive incrustation of calcareous red

weeds, *Lithothamnion* spp. and tufts of *Corallina officinalis* on the edges of cracks and in a fringe at water level round the rim of the pool. Here and there, however, and in particular on the shells of limpets, little gardens of brilliant colour occur, where fine weeds, like *Polysiphonia*, *Dasya*, *Antithamnion* and *Antithamnionella*, among reds, and *Cladophora*, *Chaetomorpha* and, more rarely, *Bryopsis*, among greens, have established themselves.

The fauna may be divided into sessile forms like sponges, barnacles, Bryozoa, Coelenterates and Tunicates, tubicolous and crevice haunting species such as flatworms and nemertines, many polychaete worms, amphipods and isopods, many decapods and the echinoderms, and finally the freely creeping and swimming forms like prawns, gastropod molluscs, some polychaetes and the fishes. On shores like Quarry Beach, Brazen Ward and Gannets Combe most of the known fauna belongs to the first group, but this is largely due to the extreme difficulty which attends study of the others, for reasons which have already been indicated. What follows relates more to Ladies Beach than to the others here.

On this shore the winkles, *Littorina* spp., are not prominent, although the normal succession may be traced, *L. neritoides* in the splash zone being overlapped and then succeeded by *L. saxatilis*, and this in turn followed by *L. littorea*. *L. littoralis* is associated with fucoid weeds over their entire range. But for reasons not yet understood, only *L. neritoides* is at all numerous. The top-shells are more abundant; *Gibbula umbilicalis* extending from near H.W.M., well down the shore, where it meets and overlaps extensively with *G. cineraria*. *Osolinus lineatus* is not uncommon in the upper parts, while an occasional *Calliostoma zizyphinum* may be found near L.W.M. This large, brilliantly marked top-shell is, however, much more common on the sides of the slate ridges at the Gates and Rat Island. Of other gastropods, the limpets, *Patella vulgata* and *P. athletica* are common at almost all levels, while the rainbow limpet, *Patina pellucida*, is very common in the *Laminaria* zone, the young ones on the fronds of both *Laminaria* and *Chondrus*, the older animals within the holdfasts, or burrowed deeply into the stipes of the oarweeds. The dog-whelk, *Nucella lapillus*, and *Ocenebra erinacea* are comparatively scarce, largely on account of the relative infrequency of their main diet of barnacles and mussels. Under stones, in the *Laminaria* holdfasts and among tufted weeds such as *Corallina*, occur many small species of snail, such as *Rissoa* spp., *Cingula semicostata*, *Barleeia unifasciata*, *Nassarius incrassatus* and the cowry, *Trivia europaea*. Few large bivalves occur, the fauna being restricted to small species like *Lasaea rubra*, *Musculus marmoratus* and young *Hiatella arctica* and *Modiolus* spp., which live for the most part among the tangled and tufted smaller weeds.

Of encrusting animals the most prominent are the sponges, Bryozoa, and Tunicata. Small species are to be found among the

weeds, including sponges such as *Sycon coronatum* and *Grantia compressa*, and the Bryozoa, *Flustra foliacea*, *Membranipora membranacea*, *Crista* spp., *Alcyonidium gelatinosum*, and more rarely *Pedicellina cernua*. The bread-crumble sponge, *Halichondria panicea*, sprawls among the bases of the weeds, *Hymeniacion sanguineum* makes brilliant, brick-coloured, splashes beneath overhanging rocks, while, on turning stones, their undersides are coated with a patchwork of *Leuconia nivea*, *Microciona atranguinea*, *Oscarella lobularis* and *Halisarca dujardini*, among sponges, mingled with the carpet-like pink bryozoan, *Umbonula verrucosa* and tunicates such as the star-like *Botryllus schlosseri*, *Botrylloides leachi*, *Didemnum gelatinosum*, the solitary *Dendrodoa grossularia* and tufted species such as *Amaroucium punctum* and *Morchellium argus*. Here and there may be small groups of the assymetrical barnacle, *Verruca stroemia*. On this living substrate creep a variety of scale-worms, amphipods and isopods, the porcelain crab, *Porcellana platycheles*, the cushion star, *Asterina gibbosa*, brittle stars like *Amphipholis squamata* and *Ophiothrix fragilis*. More rarely the urchin *Psammechinus miliaris* or the sea-cucumber, *Cucumaria saxicola* occur.

Innumerable crustacea occur among the crevices. In addition to those already found beneath stones, are crabs such as young *Cancer pagurus*, and *Carcinus moenas*, *Portunus puber*, *Xantho incisus* and *Pilumnus hirtellus*, either lying doggo among the stones or scuttling away into cover. The prawns *Leander serratus*, *Hippolyte varians* and *Athanas nitescens* are there, often in numbers, and an occasional young lobster, *Homarus vulgaris*, may be turned out of a deep hole. Squat-lobsters, *Galathea squamifera* and small hermit crabs, *Eupagurus bernhardus* and *E. prideauxii*, are not uncommon. Here too may be seen the bizarre sucker fish, *Lepadogaster gouani* and *L. bimaculatus*, the pipe-fish, *Nerophis lumbriciformis*, and gobies, blennies and rocklings. Such a wealth of life cannot all be seen between one tide and the next. Indeed, even after three years of visiting these Lundy shores, it cannot be claimed that more than a proportion of the shore population is known; and the lists which are appended to this brief article do not pretend to be more than a start on the task of cataloguing the fauna and flora.

The descent to the shore north of Gannets Rock is accomplished by an easy climb down the face of the cliff just north of the rock. So far only a comparatively small area of shore has been examined, between the base of the rock and the cliff-face for some twenty or thirty yards northwards. It is a difficult shore to work, covered with huge boulders and these coated with extremely slippery weeds. Its interest lies largely in the transition it affords between the sheltered beaches to the south and the exposed conditions which become steadily more rigorous as one passes north, under Puffin Slope and round the North End to the west side. Here, however,



THE FORESHORE RATTLES BEACH

Photo: L. A. Harvey



JENNY'S COVE *Fucus Vesiculosus Evesiculosus*

Photo: L. A. Harvey

considerable shelter is still available, and a rich growth of weeds maintains itself. But the *Fucus vesiculosus* is of smaller habit, the fronds shorter and the bladders, from which it gets its name, many fewer in numbers. Deep water comes close to the cliff, and it is only on a big tide that one can explore very far. Then, however, many of the deeper clefts can be examined, and at Easter, one may expect to find the big sea-urchin, *Echinus esculentus*, which only comes inshore from deeper waters during the spring. Here too, on the vertical faces of the clefts, the rare orange coloured coral, *Balanophyllia regia*, is quite frequent, together with an occasional individual of its close relative *Caryophyllia smithi*. Among the most pleasant features of working on this shore are the fulmars on Gannets Rock, the small kittiwake colony on the side of the gully above, and the invariable presence of half a dozen or more grey seals, which float only a few yards off shore and watch everything that goes on with their inquisitive spaniel-like eyes.

Turning now to the west side; only two profitable areas are known to us. These are, at Jenny's Cove where an almost stair-like approach is possible down the pyramid of rock on the north side of the cove, and at Goat Island after a long, steep grassy descent and a clamber over the jumbled debris of a cliff fall for the last fifty yards. The Goat Island region, the beach of which extends southwards as far as Montagu Steps, provides rather more shelter than is found at Jenny's Cove, for a number of granite pinnacles, of which Goat Island itself is the largest example, offer breakwaters. The shelving beach is covered by a clutter of medium sized boulders to an unknown depth. By using these as stepping stones it is possible to get among the *Laminaria* at low water, on the rare occasions of easterly weather when the swell is damped down. But out here there is nothing movable and the rock between the weeds is polished to a point at which little can obtain a foothold. The weeds are either closely growing, encrusting and tufted forms, like the corallines, *Cladophora*, *Chondrus*, *Gigartina* and *Rhodymenia palmetta*, or tough, strap-like species, such as the *Laminarias*, *Alaria*, *Himanthalia* and *Halidrys*, and these latter are frequently battered, distorted and stunted. This is still truer of Jenny's Cove, where the shore meets, unprotected, the full force of the Atlantic, and in stormy weather the swells may break forty or fifty feet up the rocks. Here the shore appears almost bare between the low water mark fringe, of *Laminaria*, *Chondrus* and little else, and a band near high water mark of *Pelvetia* and lichens. Between these two levels the zoning weeds so characteristic of the east side are represented only by a sparse covering of tiny plants of *Fucus vesiculosus*. These are of the very striking variety, *vesiculosus*, and are almost unrecognizable as the same species which grow into long, bladdered fronds in shelter. Here the fronds are narrow, rarely more than six inches long, if that, and they bear no vesicles at all. Because of the shortness of the fronds the stiff stipe rises

in a very characteristic curve from the holdfast, and the plants call to mind a group of tiny, dark brown weeping willow trees scattered sparsely over the rocks. See Ill. p. 38. There is no beach proper the rock descending by a series of steps and platforms, the last here, going straight down into relatively deep water. Here and there, however, the platforms are worn into shallow pools, the bottoms of which are coated right up to the waterline, with a continuous carpet of *Lithothamnion* and fringes of *Corallina officinalis*. Just as in the rock basins of the east coast, however, small clumps and gardens of minute red and green weeds occur, particularly on the shells of the limpets.

As may be expected, the fauna is sparse. The little plumed hydroid, *Plumularia* is not uncommon in the pools, occurring here and only rarely elsewhere on the island. Barnacles such as *Chthamalus stellatus* and *Balanus balanoides* encrust the rock faces; limpets and dog-whelks and a few *Littorina saxatilis* browse over them, while *L. neritoides* occupies every chink and cranny in the splash zone, which here extends from high water mark to at least sixty feet above datum. A few of the mussel-like bivalve, *Modiolus*, cling tightly in small depressions, as also do the beadlet anemones, *Actinia equina*. Encrusting sponges and bryozoa cover the edges of crevices, and for the rest the fauna is confined to small worms, molluscs, amphipods and isopods and the like, which find their shelter and food in the corallines and the holdfasts of *Laminaria*.

At Goat Island the moderate amount of shelter ameliorates conditions somewhat, and here, the fauna is enriched by virtue of the far greater living space provided by the more luxuriantly growing weeds and the numerous chinks and lee surfaces presented among the boulders on the shore. The conditions resemble almost a miniature of those of the east side, and probably approach those transitional between the two coasts. But, until we have examined the regions between Gannets Rock and the North End in more detail it is not profitable to comment on this.