Irving, RA, Schofield, AJ and Webster, CJ. Island Studies (1997). Bideford: Lundy Field Society

Lundy's Non-marine Invertebrates

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Introduction

The invertebrates include insects and a great many other groups such as Arachnida (spiders, harvesters, mites and their allies), Mollusca (slugs and snails), Myriapoda (centipedes and millipedes), Crustacea (woodlice) and Annelida (earthworms and leeches). The term 'non-marine' reminds us that there are also many marine invertebrates (see also Hiscock, this volume). There are a number of reasons why a knowledge of the invertebrates of Lundy is important:-

1. Studies on the invertebrates may help in understanding the local history of individual species.
2. Many flying insects arrive regularly on the island and studies of these may advance our knowledge of insect movements.
3. In the case of some species which are scarce and/or localised elsewhere but have strong populations on the island, conservation is of particular importance.
4. Conservation requires knowledge of the biology of the species and knowledge of the island's invertebrates may assist specialists in such studies.
5. Most of the island is a Site of Special Scientific Interest (SSSI) and management policies need to reflect the requirements of species which are generally local or scarce or are important on the island.
6. There is a small number of people who will willingly travel to the island to see good populations of scarce insects (in the same way that larger numbers come for the birds); hence the invertebrates may help, in a small way, in the financial viability of the island.

Residents and visitors

At the end of the last Ice Age sea-levels were much lower than they are today, due to the amount of water locked up in ice and snow, and Lundy was most probably connected to the mainland. As the ice melted and the sea rose (very gradually, in a series of fluctuations), some invertebrates which were gradually moving north, following the retreating ice, had an opportunity to reach the island. Other species, moving north at later dates, would have failed to cross to the island before its insulation. For example, the centipede *Lithobius borealis*, widespread under heather on the island, is likely to have been a fairly early arrival. This is probably true, also, of its relative *L. forficatus* but we cannot be certain because this common species is often found associated with man and could possibly have been carried to the island with materials or supplies at a later date.

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It seems likely that insulation occurred around 8,000 years ago, although the critical time would have varied for different species (the environment around the island would have changed over the years as the sea advanced). One species which is common on the island is the field grasshopper *Chorthippus brunneus* which can fly well. However, its flightless relative the meadow grasshopper *C. parallelus*, which is also abundant on the mainland, does not occur and this suggests that these grasshoppers arrived too late to use the land bridge. With some flightless species, there were still possibilities for natural arrival on the island after insulation. For example, many spiders disperse by casting a silken thread into the air and using this as a 'hang-glider'. Evidence from such islands as Krakatoa and Surtsey suggests that such spiders are often amongst the first colonists. Other species may have arrived, on occasion, on natural flotsam although this is not likely to have been a major factor in colonisation. Much more likely is the carriage of species by man, as hitch-hikers in supplies or associated with introduced plants (perhaps as larvae, in galls or leaf-mines, or associated with soil around the roots). It is a reasonable assumption that numerous species have been carried to the island in this fashion.

On warm days between April and October, the air over southern England carries vast numbers of flying insects. Some are strong fliers, deliberately dispersing in a particular direction. Others are weak fliers, virtually drifting on the wind. Huge numbers of these insects arrive on Lundy each year but most pass unnoticed, either because of their small size, or because they fly at night. Some may find the island suitable for habitation (and may reinforce an existing population) while, to others, it may be totally unsuitable, perhaps because a specific host or larval habitat is absent. Single records of conspicuous species are likely to fall into the latter category, such as the damselfly *Calopteryx virgo* in 1985.

Even with relatively conspicuous species such as the butterflies, problems arise which are difficult to solve. The green hairstreak *Callophrys rubi* was only recorded for the first time in 1983 but has been seen since and undoubtedly is resident on the island. Has it always been an inconspicuous resident or is it a recent colonist? The brown argus *Aricia* agestis was recorded before the Second World War then one appeared in 1989. This butterfly breeds on rock-rose but is also known to be able to use storksbills. Has there been a tiny population on the island, unnoticed for over 50 years, or is this merely a rare vagrant?

The woodlouse-like 'pill millipede' *Glomeris marginata* was found in the Quarries in 1983. It usually occurs on calcareous soils and is a surprising denizen of a granite island but, presumably, has a viable population. When and how did it arrive on the island and why can it survive here but not in similar conditions elsewhere?

Some species which are widespread in south-west England are not as common as they used to be

on the mainland (through habitat degradation or other changes). Lundy, however, holds particularly good populations of a few of these. The thrift clearwing *Bembecia muscaeformis* is a small moth which is restricted to the habitat of its food plant and is localised on the mainland. Lundy, however, has an exceptionally strong population of this species. Similarly, there are thriving populations of the grayling butterfly *Hipparchia semele*, the green tiger beetle *Cicindela campestris*, the ground beetle *Carabus granulatus*, the rose chafer *Cetonia aurata*, the sulphur beetle *Cteniopus sulphureus* and the very large fly *Tachina grossa*. The latter is a parasitoid (the accepted term, nowadays, for such a 'parasitic' species) of large moths, particularly the oak eggar *Lasiocampa quercus* and the fox moth *Macrothylacia rubi*, both of which are common on the island, and is a local species only found consistently in Devon and Cornwall. The solitary wasp *Ancistrocerus oviventris* is common on the island and is parasitised by a large, black ichneumon *Acroricnus stylator* which is also common on Lundy but is very scarce elsewhere.

Many insects live in association with particular plants. Lundy has an exceptionally rich flora for a granite island, and some plant/insect associations are of paramount importance. Balm-leaved figwort *Scrophularia scorodonia* is a relatively rare plant in Britain and is home to a tiny moth *Nothris congressariella* which has now been looked for (and immediately found) in the plant on Lundy. It is known, otherwise, only from the Scillies. Lundy cabbage *Coincya wrightii* occurs nowhere else in the world and has its quota of 'hangers-on'. The ecology of this plant's invertebrates has been the subject of a special study for the past three years, not least because one tiny species of leaf beetle, *Psylliodes luridipennis*, only occurs on this cabbage and, therefore, Lundy has the entire world population of this beetle.

Other scarce species probably have established populations on the island but are either difficult to identify, have limited flight periods, or are inconspicuous because of their habits or habitat. One such is the large rove beetle *Staphylinus dimidiaticornis* which appears to be established on the island but has only been recorded on one day (when several were present). A female of the very rare ichneumon *Dicaelotus fitchi* was found in 1983, there being only five known specimens of this species at that time; then, in 1986, a male of the same species was found. It seems reasonable to assume that there is a resident population of this little parasite on the island but it is so rare that nothing whatsoever is known about its biology. Similarly, Lundy provided the first British record of the tiny ichneumon *Polyblastus nanus*. All *Polyblastus* species are parasitoids of sawflies and it is safe to include *P. nanus* in this but there is undoubtably a viable population of this species on the island which cannot be included, at present, in any conservation regime since nothing is known about it.

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Research: past, present and future

In the past twenty years or so, the study of invertebrates has been advanced considerably by the use of more sophisticated equipment, such as light traps which have been used on Lundy in recent years. Actinic ultra-violet, mercury-vapour and mercury-vapour / tungsten-halogen ('blended') lights have all been used, although the catches from the first-named tend to be lower. Not only are moths attracted to these traps. Many caddis-flies, night-flying parasitic hymenoptera and beetles are regularly caught, with smaller numbers of other orders. Unfortunately, the use of such traps does require a generator and, on Lundy, this considerably increases the effort required to record in areas beyond the south-east corner. Two previously unrecorded pyralid moths, *Catoptria pinella* and *C. margaritella*, both uncommon wetland species, were located in St John's Valley in 1995 by the use of a blended light. This demonstrates the potential for finding new and important species and also indicates the importance of the small wetland of St John's Valley.

To the best of my knowledge, very little work has been undertaken with pit traps and none at all with Malaise traps. The former are pots sunk into the ground to monitor terrestrial invertebrates and the latter are large, tent-like structures used to monitor flying insects. One problem with the use of Malaise traps is that very large samples of insects can be captured in a short time. This means that the user must have the time and expertise (or contacts) to be able to sort out and identify the catch. Massive samples are only of value once the contents are identified and excessive use of such traps could damage the populations which are being studied. Nevertheless, work on the mainland indicates that a small number of species are unlikely to be located without the use of such equipment.

Another technique which is beginning to be used on the island is that of rearing insects. Collecting eggs, larvae, pupae or apparently parasitised adults will add considerably to our knowledge in due course. Rearing is not particularly difficult in most cases but does require a degree of self-discipline in feeding and caring for one's charges. Often, even the simplest rearing, that of hatching out a pupa, will provide interesting results. Pupal cases of a small braconid parasitoid of the cream-spot tiger *Arctia villica* collected on the island produced not only the parasitoid *Apanteles villanus* but also two 'hyperparasites' which are parasitoids of the *Apanteles*, the ichneumons *Lysibia nana* and *Gelis instabilis*. A small pupa collected in St Helen's Copse in 1995 produced a hoverfly, *Meliscaeva auricollis* which had been recorded on only one previous occasion.

One candidate for study could be the night-flying ichneumon *Enicospilus ramidulus* which is a regular visitor to light traps on the island. Little is known about this large, orange-brown 'ophion' with a black end to its abdomen. Old records from elsewhere

suggest that it is a parasitoid of various medium-sized moths but it is so frequent on Lundy that either its host must be abundant or it must have a range of hosts. Rearing identified moth larvae might provide the answer.

For those who might wish to conduct further research on the invertebrates of Lundy, there are many possibilities. The distribution of most species on the island is imperfectly known. The numbers of many species vary from year to year, either as a result of variable breeding conditions on the island or of variable rates of immigration. Census work on many species, particularly some of the more conspicuous ones such as the butterflies, bumble-bees and social wasps, might help eventually in the correlation of climatic conditions and populations. Ecological work could take two main directions. Firstly, studies on the communities of certain habitats, whether of individual plant species such as turkey oak or creeping willow, or of wider communities such as short turf or wet heath, would be invaluable. Secondly, as has already been mentioned, the rearing of early stages can be very productive. Even the simple counting of butterflies, dragonflies and damselflies, rose-chafers and other species in a given area will always be of historical interest and may be of use in long-term population studies.

Around 1,600 species of invertebrates have been recorded on the island so far and, undoubtedly, very many more will be found. With some groups, there are papers published in the Field Society's Annual Reports which collate existing records up to a certain date and which form a strong basis for future studies. Examples are the beetles (Coleoptera) in Welch's paper in 1969 and in Brendell's synopsis in 1975; the flies (Diptera) in Lane's synopsis in 1977; the bugs (Hemiptera) in Alexander's synopsis in 1991; and the spiders (Araneae) in Howes' paper in 1968 (which includes harvesters and pseudoscorpions) and in Alexander's synopsis in 1989, with an addendum covering the Hemiptera and the Araneae in the 1992 Report (Alexander 1992). The freshwater biology has been covered in a series of papers by George and others; these include George (1978), George & Stone (1979), George & Stone (1980) and George & Sheridan (1986).

Unfortunately, information on some groups is scattered throughout the literature both within the Society's Annual Reports and also, on occasion, in equally obscure, specialist books and journals. For example, the earliest records of moths and butterflies (Lepidoptera) from Lundy known to me are in a note in *The Entomologist* in 1894 (referring to a small collection made by Chase), and in the 1907 paper by Longstaff in *The Entomologist's Monthly Magazine* and in his book about the Morthoe area. The next major lists of Lepidoptera are those of Dymond (1972 & 1973) and a note by Sherwood on the butterflies in 1974 (Sherwood 1974). Since 1985, the Lepidoptera have been listed separately in the Society's Annual Report each year. Early records of ants and species associated with ants are to be found in Donisthorpe's

two books, both published in 1927. The excellent book on the Fauna and Flora of the Ilfracombe District, edited by Palmer (1946), contains many Lundy records (although most of these are also covered by other references). The maps produced by the Biological Records Centre (BRC), often used in publications such as *The Moths and Butterflies of Great Britain and Ireland* (edited by Heath 1976) and editions of *The Provisional Atlas of the Insects of the British Isles* (published by the BRC), sometimes indicate Lundy records which do not appear elsewhere and which were presumably passed direct to the BRC.

Amongst the references to invertebrates should be mentioned those on the ectoparasites and one on the endoparasites. I would emphasise that these are the papers of which I am personally aware and that others may also exist. The main articles are by Gordon Thompson which, apart from his papers in the 1952, 1953, 1954 and 1956 Annual Reports, consist of several papers in *The Entomologist's Monthly Magazine* during 1955 to 1957. They refer to ticks, fleas, lice and flat-flies. Arthur's papers published in *Parasitology* (Arthur 1955 & 1957) relate to a species of tick then believed to be new to science, *Ixodes thompsoni* Arthur (= *I. festai* Rondelli), which was found on Lundy; and Thompson and Arthur published a joint paper in 1955 on ticks from birds which included many Lundy records (Thompson & Arthur 1955). Mead-Briggs' 1967 paper also relates to *I. festai*, from Lundy. A valuable study which is unlikely to be repeated or expanded soon is the work of Barbara Cole in the 12th Annual Report (Cole 1959) on the endoparasites found on the island.

Conclusion

The study of invertebrates on Lundy is progressing gradually from a series of lists of species found (which, in themselves, are of great importance) to a multi-disciplinary study involving the flora, the geology, the climate and land management. Straight identifications of species are still of great importance but ecological studies have now taken their rightful place alongside these. One point worthy of mention here is that any information which is not published and therefore not accessible to future workers, is lost. I would plead for publication, within the *Annual Report of the Lundy Field Society*, of either the results of any work or, at least, a resumé, with relevant references.

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The following list of references to the invertebrates of Lundy includes major items and some which are relatively obscure. It does not include references to all articles on invertebrates in the Reports. Since 1983, there have been many notes and lists published in this journal which should be accessible to anyone who is interested. Students of Lundy should also be aware of the Index to Lundy Field Society Reports 1947-1990, by Chris Webster, published by the Society in 1991. I believe it is worth mentioning here that any branch of the Public Library Service can provide any reference held by the British Library (providing an absolutely accurate reference is given) on payment of a small fee.

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Plate 19 *Cteniopus sulphureus*

NON-MARINE INVERTEBRATES — TONY PARSONS

Plate 20 Damselfly *Calopteryx virgo*

NON-MARINE INVERTEBRATES —TONY PARSONS

Plate 21 Green hairstreak *Callophrys rubi*

NON-MARINE INVERTEBRATES — TONY PARSONS

Plate 22 Ichneumon *Eniscospilus ramidulus*

NON-MARINE INVERTEBRATES —TONY PARSONS