

TWO NEW FLEAS FROM LUNDY AND THEIR POSSIBLE HOSTS.

by

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INTRODUCTION

During the period 3 to 6 November 1984 a group of scientists (medical, veterinary and biological) from the Universities of Rennes I, Brest and Exeter visited Lundy with the primary objective of collecting material for a study of the epidemiology of arboviruses and leptospires. In the course of this work ectoparasites were collected from small wild mammals. Four species of flea were identified, two of which had not previously been recorded from the island.

MATERIAL, METHODS AND RESULTS

Small mammals were collected by trapping and shooting. A total of four common (brown) rats *Rattus norvegicus* was trapped, and a further two were shot near the incinerator. One pigmy shrew *Sorex minutus* was also trapped. Attempts to collect the only other small mammal species known to occur on the island, namely the rabbit *Oryctolagus cuniculus* and the ship (black) rat *Rattus rattus*, were unsuccessful. The ship rat has been found to be scarcer on Lundy than the common rat, and the rabbit was also scarce at the time of this work as a result of the recent introduction of myxomatosis to the island. Details of these trappings are given in Couatarmanach and Linn (1988).

Thirty-one fleas were collected from two of the trapped rats, and were identified as follows:

Nosopsyllus fasciatus (Bosc d'Antic, 1801); 5 males and 7 females

Ctenophthalmus nobilis vulgaris Smit, 1955; 6 males and 10 females

Doratomylla dasyncnema dasyncnema (Rothschild, 1897); one male

Typhlocyba poppei poppei Wagner, 1903; one female

A single flea from the shrew was unfortunately lost during manipulation.

The complete list of fleas already known from Lundy, compiled from the reports of Cotton (1960), George (1974) and C. Guiguen (unpublished) is as follows:

Pulicidae

Spilopsyllus cuniculi (Dale, 1878): a monoxenous flea of the rabbit

Ctenophthalmidae

Ctenophthalmus nobilis vulgaris Smit, 1955: on both common and ship rats

Ceratophyllidae

Nosopsyllus fasciatus (Bosc d'Antic, 1801): on both common and ship rats

Dasyopsyllus gallinulae gallinulae (Dale, 1878): a flea of birds, found on Lundy in the nests of chaffinches *Fringilla coelebs*, wrens *Troglodytes troglodytes* and blackbirds

Turdus merula

Ceratophyllus vagabundus insularis Rothschild, 1906: in nests of shags *Phalacrocorax aristotelis* and kittiwakes *Rissa tridactyla* (Guiguen unpublished)

Ceratophyllus gallinae (Schränk, 1803): in nests of chaffinches and blackbirds

Ceratophyllus garei Rothschild, 1902: in the nest of a pied wagtail *Motacilla alba*.

Further details of the fleas mentioned may be found in Hopkins & Rothschild (1962).

DISCUSSION

Two species of flea may now be added to the Lundy fauna. One of these, *Doratomylla dasyncnema dasyncnema*, is common throughout Great Britain and Ireland on shrews, especially the common shrew *Sorex araneus*, according to Smit (1957) and George (1974). Beaucournu (1976) considers the principal hosts of this flea to be shrews of the genera *Sorex* and *Neomys*, with shrews of the genus *Crocidura* as secondary hosts. It is worth noting, however, that 11.5% of his collections of this species came from accidental hosts, so that it is not unreasonable to suppose that the Lundy rat on which we found the flea, became infested from the pigmy shrews *Sorex minutus* which we know to be on the island, and which we know to carry fleas.

The other new flea, *Typhloceras poppei poppei*, presents a more intriguing problem. A study of the distribution of this ectoparasite in the British Isles (Fig. 1) shows that on mainland Britain it is found only in the extreme south, with few records north of a line from the Severn to the Wash. Within this area the distribution is strongly coastal. There is also, however, a quite dense scattering of records on offshore islands from west Wales up the west coasts of northern England and Scotland to Shetland in the extreme north, and also around the Irish coast. This is a geographical distribution of the sub-Atlantic, or even Atlanto-Iberian, type.

The other feature of interest about this flea is that Smit (1957), Peus (1972) and most other authors who have considered the matter agree that it is a monoxenous parasite of the woodmouse *Apodemus sylvaticus*. A glance at the distribution map of *A. sylvaticus* in the British Isles (Fig. 2) shows clearly that the rodent is very widespread, occurring on at least 54 British offshore islands and three of the Channel Islands as well as the mainland. The flea *T. poppei* has been recorded from 15 islands off the coast of Great Britain, and three of the Channel Islands, but this new Lundy record is exceptional in that it is the first record of the flea from an offshore British island from which the woodmouse is absent (distribution data provided by the Biological Records Centre, Institute of Terrestrial Ecology).

Bearing in mind these observed characteristics of *Typhloceras poppei*, it is interesting to speculate on the possible routes by which the flea might have reached Lundy, as follows:

1. The flea might have been carried to the island accidentally without its host. A flea is, however, unlikely to survive longer than about two months away from a host, so that the probability that an unattached flea could be the founder of a population leading a normal parasitic existence would seem to be small.
2. There might exist at present on the island an undiscovered population of woodmice whose members are carrying the flea, and from which the rat became infested. This again seems very unlikely, as all the habitats on Lundy which might be suitable for woodmice have been trapped for rodents on many occasions, and no woodmouse has ever turned up. House mice *Mus musculus* were once common on the island, but were reported to have been exterminated in 1929 (Gade, 1974). Persistent rumours of their recent recurrence are probably well founded, since commensal mice are notoriously difficult to eradicate completely. An 'old mouse nest' found 'quite recently' in 1950 (Anon., 1950) was believed to have been made by descendants of escaped pet mice, and during the first half of November 1987 mouse droppings (faeces) were found in the kitchen of the Lundy shop and tavern (Neil Willcox, personal communication). In neither case was any animal seen or caught. However, even if feral mice still survive, their existence would be of little relevance in the present context.
3. Woodmice carrying the flea might have occurred on Lundy in the past, and have persisted long enough to overlap in time with the later arriving rats — long enough for the flea to become established on the rats before the mice became locally extinct. There is no obvious reason why woodmice should not have reached Lundy naturally before the land bridge from Hartland Point, in north Devon, finally broke. The time of this event is uncertain, but is unlikely to have been more than about 9000 years ago, the period when the English Channel finally cut Britain off from continental Europe. Yalden (1982) places the woodmouse in mainland Britain well before that time. Both common and ship rats survive well on Lundy, but must be relatively recent arrivals, since their residence in western Europe is measured in a few hundreds of years at most. Thus, the woodmouse and the flea would have had to survive together for many thousands of years on Lundy, becoming extinct on the island quite recently, in order to have been able to transfer the flea directly to the rat. This is by no means impossible, but on such a small, bleak island, with good woodmouse habitat always limited in extent, the survival for such a long time of a tiny population of woodmice seems unlikely.

The possibility that the mouse might have passed the flea on to an intermediate host (the pigmy shrew, perhaps) from which it later reached the rat, seems even less likely on the time scale which we are considering, since the ability of monoxenous fleas to complete their life cycle on secondary hosts is relatively

poor. Thus, while the flea population may be expected to survive indefinitely as long as the primary host is available, local extinction becomes much more likely, at least in the long term, when it has access only to secondary hosts.

4. It is not necessary to assume, however, that this hypothetical woodmouse population survived on Lundy for thousands of years. It is entirely possible that the mouse, plus flea, arrived on the island relatively recently. Yalden (1982) points out that several authors have suggested that the small rodent faunas of many small offshore islands around the British coastline have been enriched, mainly accidentally, by human agency. The high probability that this could have happened on Lundy is emphasised by the report by Gade (1974) that on two occasions 'long-tailed field mice' arrived on the island in consignments of wheat and oat straw imported for thatching ricks. Mr Gade was an excellent naturalist, well able to tell the difference between 'field mice' (*Apodemus* spp.) and house mice. He also reports a 'field-mouse' found electrocuted in the compressor motor of a refrigerator, with the comment that the mouse may have been imported in thatching reed (Gade, 1978), which was probably a separate incident from the two observations recorded in his earlier publication. These were the incidents which came to light, and it seems likely that there were many more which were not observed. A quite transient, short-lived woodmouse population established relatively recently by this means, overlapping in time with the rats, would have sufficed to bring the flea on to the island, and transfer it to the rat. For the moment, until more information becomes available, this would be our preferred hypothesis.

Either way, it seems entirely possible that a population of woodmice might once have existed on Lundy, complete with fleas, including *Typhloceras poppei*, and been the source of the flea found by us on the common rat. It has been pointed out earlier that woodmice occur on all of the 15 islands off the British coast, and the three Channel Islands, on which *Typhloceras poppei* has previously been recorded. It is also worth noting that the flea records were not always from woodmice or their nests, but that out of 16 records, 10 were from *A. sylvaticus*, and two from nests of this rodent. These data suggest a clear connection between the flea and the woodmouse, and tend to confirm previous observations that the flea only occasionally, and perhaps temporarily, wanders from its preferred host. It is to be hoped that future workers on Lundy, particularly those involved in archaeological explorations, will keep a lookout for subfossil remains of small rodents, particularly woodmice.

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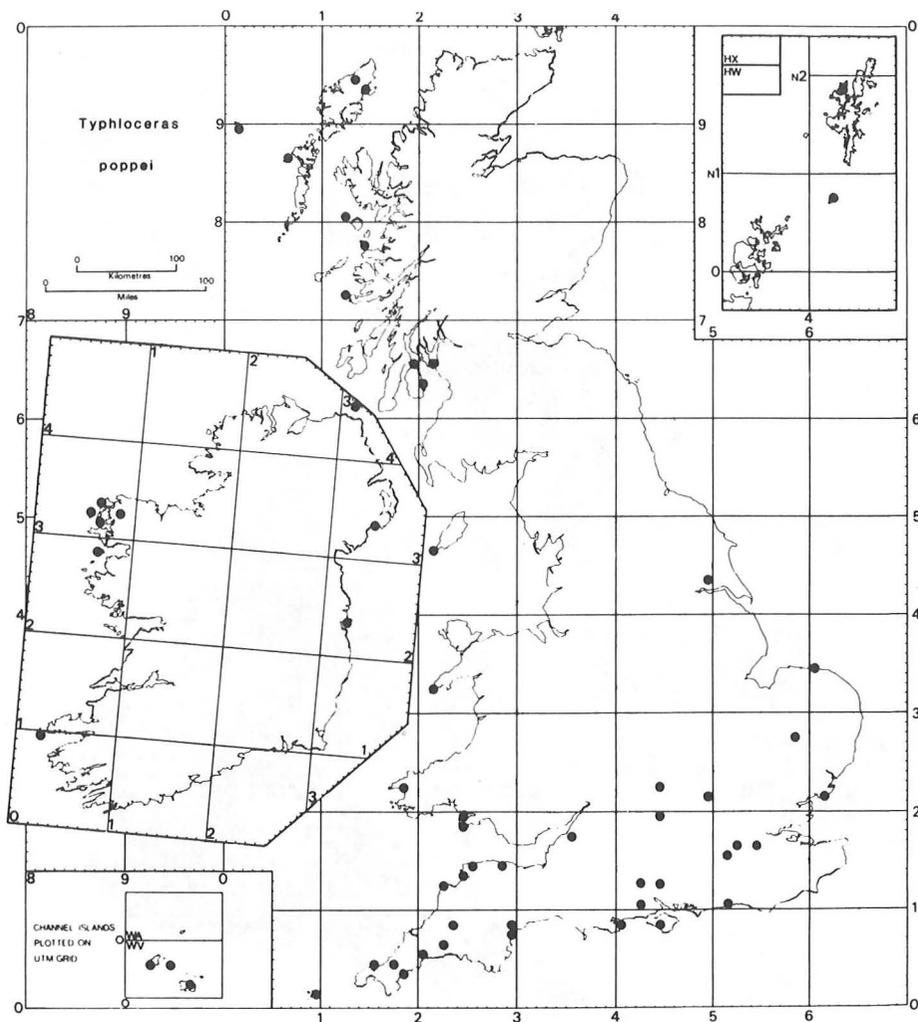


Fig. 1: Distribution of the flea *Typhloceras poppei* in Great Britain and Ireland. A solid circle has been placed on each 10km grid square in which the parasite has been recorded. Data from Biological Records Centre, Institute of Terrestrial Ecology.

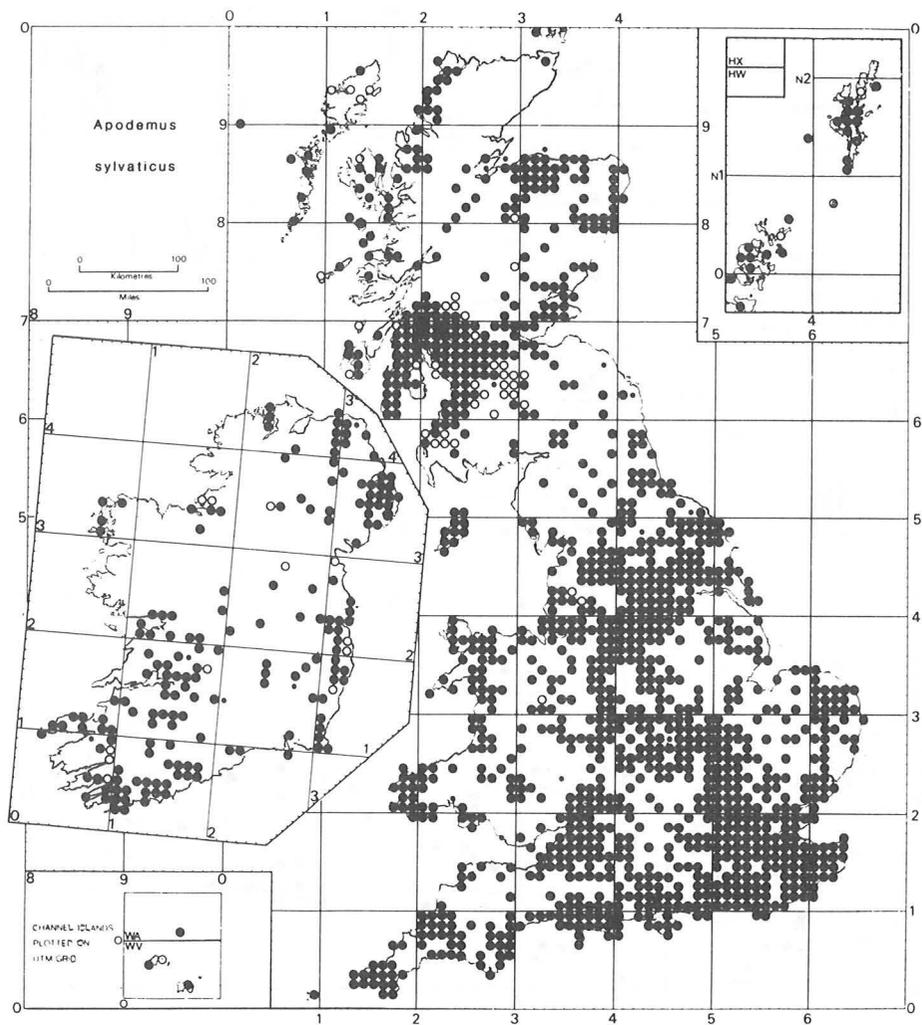


Fig. 2: Distribution of the woodmouse *Apodemus sylvaticus* in Great Britain and Ireland. Each 10km grid square in which the rodent has been recorded has been marked. Large solid circles — records from 1960 to 1985; open circles — records from 1900 to 1959; small solid circles — records before 1900. Data from Biological Records Centre, Institute of Terrestrial Ecology.