IS *PORCELLIO LAEVIS* (LATREILLE) DECLINING IN BRITAIN AND IRELAND?

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ABSTRACT

The cosmopolitan woodlouse, *Porcellio laevis* (Latreille) is large and distinctive, and was formerly recorded widely in Britain and Ireland, mainly in urban and strongly synanthropic situations. In recent decades the species has been recorded in a decreasing number of localities. In this paper possible explanations for this apparent decline are explored, including the progressive loss of suitable synanthropic sites associated with domestic cattle and horses. Alternative synanthropic sites in old, traditionally-managed, walled gardens may also be important for this species.

INTRODUCTION

Porcellio laevis (Latreille, 1804) is a large and distinctive woodlouse, up to 20mm long with a smooth dorsal surface and, in the male, long uropods.

Vandel (1962) and Schmalfuss (1998) place *P. laevis* as a characteristic representative of a distinctive North African group of *Porcellio* species. It is now a cosmopolitan species, spread widely throughout the world, including North and South America, Western Asia, Japan, Australia and some Pacific islands, resulting in a complex synonymy (Schmalfuss, 2003). In the region of its probable natural origin, North Africa, it has been recorded at altitudes up to 2000 metres, and in southern France (Alpes-Maritime) at over 1000 metres (Vandel, 1962). It occurs in many parts of the rest of Europe but is normally regarded as a cosmopolitan species (cf. Taiti & Ferrara, 1989). It has been recorded in parts of northern Europe, to southern Sweden and Denmark, but always in close association with human habitations and farms. Even in hotter climates, such as India, it seems to occur as an anthropophile (Nair, 1984). As a widespread, cosmopolitan species, it has attracted some interest in relation to genetic variation for plasticity in physiological and life-history traits (Lardies & Bozinovic, 2008).

P. laevis is clearly a synanthropic species in Britain and Ireland (Harding & Sutton, 1985; Gregory, 2009). However, our contact with this species appears to have declined for several decades. This apparent decline in records of *P. laevis* in Britain and Ireland may be merely a result of changed priorities among recorders, but, in this paper I suggest other possible reasons for decline. The known distribution of *P. laevis* in Britain and Ireland is summarised in Fig.1.

RECORDS

The first record of *P. laevis* from Britain is from the late 13th century. Although identifiable evidence of woodlice is rarely found in archaeological deposits, 'sub-fossil' remains of *P. laevis* were recorded from a medieval infill pit at Stonar, East Kent (Girling, 1979). The processes by which such remains were preserved in an archaeological context are described by Girling, involving the permeation of calcium carbonate into the exoskeleton in hard water, waterlogged conditions.

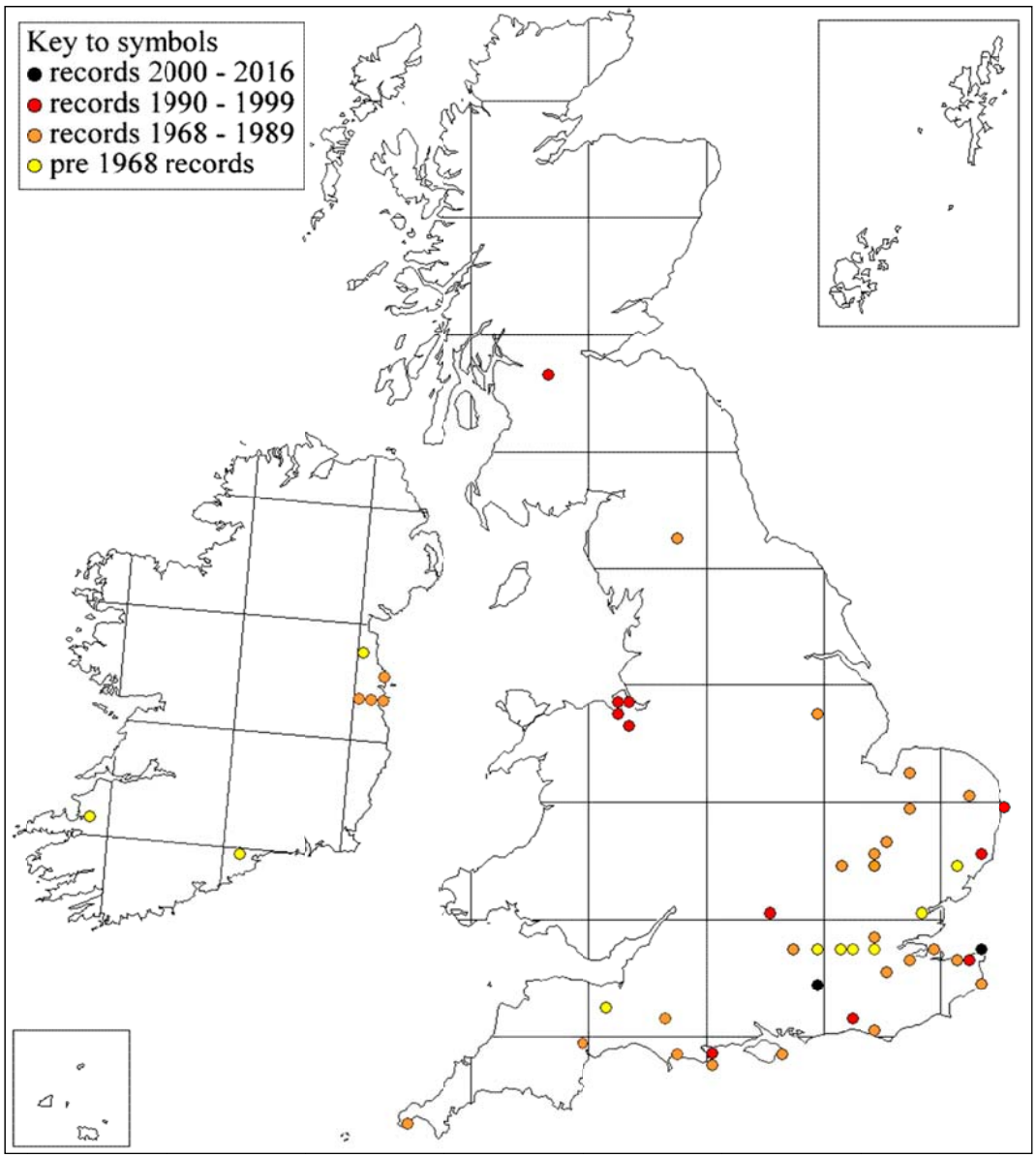

FIGURE 1: Map indicating distribution of *Porcellio laevis* (Latreille) in Britain and Ireland (plotted at 10km resolution)

Given its large size, distinctive appearance and synanthropic associations, it is perhaps not surprising that *P. laevis* was one of the first species of woodlice to be recognised in Britain and Ireland. Robert Templeton (1836) listed five species of woodlice from Ireland from the papers of his late father, John Templeton (1766-1825). Leach (1814)[3] listed six species of woodlice from "Britain", noting that *P. laevis* was rare, referring to a single specimen taken by him in Devon. Bate and Westwood (1868) stated that it occurred commonly in stable-litter in England and Ireland but, from their description, it is possible that some of their *P. laevis* records may refer to *Cylisticus convexus* (De Geer, 1778). Examination of museum collections (Harding, 1977a,b) suggested that confusion with *C. convexus* was also experienced by W.E. Collinge and R.A. Phillips or D.R. Pack-Beresford.

[3] There is uncertainty about the precise date of Leach's list in The Edinburgh Encyclopaedia, which was published in parts. It could be as late as 1830.

Notwithstanding these confused identifications, subsequent authors (up to and including Edney, 1954) recorded *P. laevis* as common or at least widespread, usually associated with stables and farms, and "among vegetable rubbish near human dwellings" (Webb & Sillem, 1906). But these observations were probably based on records from south-east England and around cities in Ireland. Later authors (Sutton, 1972; Doogue & Harding, 1982; Harding & Sutton, 1985; Hopkin, 1991; Oliver & Meechan, 1993; Gregory, 2009) remarked on the fact that, although obviously a synanthropic species, often associated with farms and dung- and compost-heaps, *P. laevis* has appeared to be less frequently recorded. Indeed, until 2016 the most recent field records were from the Wirral in 1995, Glasgow, southern Scotland in 1996 and Margate, Kent in 2007 (Steve Gregory, pers. comm.).

A highlight of the BMIG Annual Meeting at Juniper Hall, Surrey in 2016 was the discovery of an apparently thriving population of *P. laevis* in the middle of Guildford, Surrey (Flanagan, 2016).

PORCELLIO LAEVIS, LIVESTOCK NUMBERS AND HUSBANDRY PRACTICES

The early recognition of *P. laevis* in Britain and Ireland almost certainly relates to the particular synanthropic associations of the species in northern latitudes. The available evidence suggests that where any form of habitat information has been documented in publications or in modern records, stables, farms, dung heaps and gardens predominated. Early records appeared to be mainly from cities and towns, although this may be a partial artefact of the way records were summarised. However, the thermal effect of cities may have been a contributory factor in the occurrence of *P. laevis*.

In the second half of the 19th century and throughout 20th century there were considerable changes in the numbers and distribution of cattle and horses. Dairy cows were commonly kept within large cities until efficient rail transport enabled fresh milk to be brought in from the surrounding countryside. Taylor (1971) estimated that in the mid-19th century there were 24,000 cattle in London, but this number had possibly halved by 1865 when the viral disease rinderpest (cattle plague) spread throughout Britain. Similarly, horses were abundant in cities for all forms of transport until World War I, and their use in agriculture continued into World War II. Estimates vary regarding the number of horses in Victorian Britain – over 3 million has been suggested, but Brassley (2000) concluded that by 1909 there were 1.1 million, by 1946 this had halved to 545,000, and by 1960 the total number of horses had reduced to 54,000. During the 20th century the number of tractors increased from 500 (in 1909) to an estimated 500,000.

Thus, by the 21st century, contact with urban cattle had been lost and numbers of horses had reduced to under 2% of that in Victorian times, and these too are almost exclusively rural. If formerly *P. laevis* was mainly associated with stables and cow yards, particularly in urban settings, it would appear to have undergone a major decline in habitat availability. But that may not be the only factor in limiting habitat availability and opportunities for passive dispersal in rural settings. Agricultural methods and equine practices have become increasingly sophisticated since World War II. The introduction of powerful helminthicides and other biocides has increased the 'sterility' of dung, and storage of slurry and dung is now carefully managed and subject to regulation.

DISCUSSION

Despite the apparently isolated record in 2016, we seem to have progressively lost contact with *Porcellio laevis* in Britain and Ireland. This is surprising for what was one of the first six species of woodlice to be recorded here (Leach, 1814). For over 100 years it was recorded as common, and being a large and distinctive, surface living species it is not easily overlooked. Are isopodologists just not looking for it or has the species declined?

The habitat of *P. laevis* is poorly defined, but it appears to be strongly synanthropic, associated mainly with stables, cattle yards and dung heaps and occasionally with compost heaps and old, enclosed gardens. With the exception of the last two, its habitats have declined as numbers of horses have shrunk and cattle husbandry has modernised. In contrast, the other classic compost heap species, *Porcellionides pruinosus*, seems able to disperse and maintain populations (Gregory, 2009) and is comparatively well recorded.

Even if a good dung heap from an organic herd of dairy or beef cattle can be found, the prospects of a passing isopodologist gaining access to it will probably be limited by modern farm biosecurity. Security and biosecurity can also greatly restrict access to stables with any more than a few riding ponies.

The recent discovery of *Porcellio laevis* in the long-established walled garden of the former Allen House Mansion at Guildford (Flanagan, 2016) highlights a potentially important habitat for the species. Although the conditions and historical context described for the Guildford locality may in themselves be uncommon, it would certainly be worth surveying other large, old, well-established and continuously managed gardens and, in particular, walled gardens. A similar record from Oxford in the 1990s was from a compost heap in an entirely enclosed, walled domestic garden in the city centre (Gregory & Campbell, 1995).

Porcellio laevis would appear to be much less common than a century ago. This may be due to a decline in habitat availability and suitability caused, for example, by modern agricultural and equine management practices. This is a species for which negative records would be both practicable and useful – where a search was made and the species was not found.

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REFERENCES

Bate, C.S. & Westwood, J.O. (1868) *A history of the British sessile-eyed Crustacea, Vol. 2.* London: John van Voorst.

Brassley, P. (2000). Output and technical changes in twentieth century British agriculture. *Agricultural History Review*, **48**: 60-84.

Doogue, D. & Harding, P.T. (1982) *Distribution atlas of woodlice in Ireland.* Dublin: An Foras Forbartha.

Edney, E.B. (1954) *British woodlice, with keys to the species*. Linnean Society of London Synopses of the British fauna, No. **9**.

Flanagan, J. (2016) A new record of the woodlouse *Porcellio laevis* from Allen House Grounds in Guildford, Surrey. *British Myriapod and Isopod Group Newsletter*, No. **33** (unpublished).

Girling, M.A. (1979) Calcium carbonate-replaced arthropods from archaeological deposits. *Journal of Archaeological Science*, **6**, 309-320.

Gregory S. (2009) *Woodlice and Waterlice (Isopoda: Oniscidea & Asellota) in Britain and Ireland*. Shrewbury: Biological Records Centre/Field Studies Council.

Gregory, S.J. & Campbell, J.M. (1995) An atlas of Oxfordshire Isopoda: Oniscidea. *Oxfordshire Museums Service Occasional Paper* No. **17**. 19pp. Oxfordshire County Council.

Harding, P.T. (1977a) A re-examination of the work of W.E. Collinge on Woodlice (Crustacea, Isopoda, Oniscoidea) from the British Isles. *Journal of the Society for the Bibliography of Natural History*, **8**, 286-315.

Harding, P.T. (1977b) *A catalogue of the woodlice (Crustacea, Isopoda, Oniscoidea) from Ireland and Britain in the collection of the National Museum of Ireland, Dublin.* Unpublished report to the National Museum of Ireland and the Royal Irish Academy.

Harding, P.T. & Sutton, S.L. (1985) *Woodlice in Britain and Ireland: distribution and habitat*. Huntingdon: Institute of Terrestrial Ecology.

Hopkin, S.P. (1991) *A key to the woodlice of Britain and Ireland*. AIDGAP, Field Studies Council Publication No. 2014. Shrewsbury: Field Studies Council. (Reprinted from *Field Studies*, **7**, 599-650.)

Lardies, M.A. & Bozinovic, F. (2008) Genetic variation for plasticity in physiological and life-history traits among populations of an invasive species, the terrestrial isopod *Porcellio laevis*. *Evolutionary Ecology Research*, **10**, 747-762.

Leach, W.E. (1814) Crustaceology. In: Brewster, D. (editor) *The Edinburgh Encyclopaedia*, **7**, 383-437.

Nair, G.A. (1984) Breeding and population biology of the terrestrial isopod *Porcellio laevis* (Latreille), in the Delhi region. In: Sutton, S.L. & Holdich, D.M. (editors) *The Biology of Terrestrial Isopoda*. Zoological Society of London Symposia, No 53. Oxford: Clarendon Press.

Oliver P.G. & Meechan, C.J. (1993) *Woodlice*. Synopses of the British Fauna (New Series) No. 49. Shrewsbury: Field Studies Council.

Schmalfuss, H. (1998) The terrestrial isopod fauna of the central Near East: composition and biogeography. *Israel Journal of Zoology*, **44**, 263-271.

Schmalfuss, H. (2003): World catalog of terrestrial isopods (Isopoda: Oniscidea). Stuttgarter Beitrage zur Naturkunde, Serie A, Nr. 654: 341 pp.
Updated as http://www.oniscidea-catalog.naturkundemuseum-bw.de/Cat_terr_isop.pdf)

Sutton, S.L. (1972) *Invertebrate Types: Woodlice*. London: Ginn.

Taiti, S. & Ferrara, F. (1989) Biogeography and ecology of terrestrial isopods from Tuscany. In: Ferrara, F. (editor) *Proceedings of the second symposium on the Biology of terrestrial isopods. Monitore zoologico italiano,* N.S. Monographia, **4**, 75-101.

Taylor, D. (1971). London's milk supply 1850-1900: a reinterpretation. *Agricultural History*, **45**: 33-38.

Templeton, R. (1836) Catalogue of Irish Crustacea, Myriapoda and Arachnida, selected from the papers of the late John Templeton, Esq. *Loudon's Magazine of Natural History*, **9**, 9-14.

Vandel, A. (1962) *Isopodes terrestres (Deuxieme partie)*. (*Faune de France* No.66). Paris: Lechevalier.

Webb, W.M. & Sillem, C. (1906) *The British Woodlice*. London: Duckworth.