An update on *Sitaris muralis* (Forster) (Meloidae) in the New Forest and significant new populations in Wiltshire

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An update on *Sitaris muralis* (Forster) is now appropriate, as a lot has happened since the species was rediscovered in Britain in Brockenhurst, South Hampshire in 2010 (Brock, 2010), which also provided a brief summary of British records. *Sitaris muralis* is one of Britain's rarest beetles, assessed as Red List, Vulnerable (Alexander *et al.*, 2014). The chances of finding this species are not helped by the likelihood of it being virtually restricted to sites at a height too high for easy scrutiny. They are hidden in brick or cob walls, possibly on private land. Additionally, the adult beetles have a short lifespan and may be inactive, seldom moving far from the nest of the host bee, *Anthophora plumipes* (Pallas) (Hymenoptera: Apidae) in Britain. The adults are occasionally observed on walls during the short breeding season.

The range of this Palaearctic species has expanded in Europe, with many finds in new localities since 1990 (Lückmann, 2016). A range expansion may be happening in Britain, as there was a record in Wareham, Dorset in 2015 (Mellings & Piper, 2015) and numerous records in the Salisbury area of Wiltshire in August 2017, with several sites identified by SR. The information provided will hopefully enable recorders to narrow down search areas in an effort to find more populations in other areas.

In Brockenhurst, PDB and Helen Brock have been monitoring the small population on and around one old brick wall (house constructed in 1886) since 2010, having searched for, but so far failed to find, the beetles elsewhere in Brockenhurst/New Forest. The survey site is unusual in that it is an unlikely site for the host bee *Anthophora plumipes*, confirmed by few female bees ever seen entering crevices in the wall. The lowest nests are well above head height, whereas many known sites in Europe are low down.

The following table shows Brockenhurst records of *S. muralis* adults (0 found in 2016)

YEAR	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2017**
Total number	3	5	5	5	4	3	22
Number found alive	2	1	1	2	0	1	7
Live as % of total	67	20	20	40	0	33	32

[The Coleopterist 26(3): 137-142, December 2017]

Methodology: regular checks were made on the brick wall from 24 July to 7 September, with more than one visit made on sunny, warm days when the beetles become active. The surrounds were also checked, including pavements, and dead and live specimens counted.
Earliest records: 31 July in 2011 and 2017, both early years for insects in general in the New Forest. **Latest record**: 29 August 2014.
Notes: Before a population explosion in 2017, when 18 of 22 specimens recorded were found from 3 to 7 August inclusive, some deaths appeared to be caused by specimens being trodden on by passers-by, but others may have fallen dead from bee nests high up. In 2017, at least 5 specimens were dead, caught in spiders' webs.
Behaviour: If alarmed, some beetles curl up in defence, as figured in Brock (2010). At the Brockenhurst site, at least, it appears that much activity takes place 5 metres or more above ground level. Males are usually fairly inactive, sitting on a brick wall. However, in August 2017 two males were observed rapidly climbing high up, confirming these clumsy-looking beetles can climb vertical brick walls at speed. Only four females have ever been observed, those found on 8 August 2011 and 21 August 2013 were barely alive, with thin bodies, implying that they had already laid eggs, probably in bee nests or nearby crevices (they died shortly afterwards). One on 22 August 2013 was dead, but the 4th female on 4 August 2017 was alive, high up on the wall in the afternoon, where it remained almost motionless overnight (this was the best day of the season, with a specimen count of eight, but all seven males were dead). On 5 August 2017 the female was seen mating at 12.30 pm, in exactly the same position as the previous day (Fig. 1). Another male soon appeared from a nearby crevice and came close to the mating pair, before resting nearby. The pair were brought down three hours later and placed in a container. After separation from the male, the female remained motionless, despite its plump abdomen. As it failed to lay eggs in the container on a brick provided, the decision was taken on 6 August to see if the female showed an interest in a known *Anthophora plumipes* nest in PDB's garden. The nest entrance is a round hole in a wooden fence post attached to a brick garage. Having explored the entrance, the female beetle entered and turned around before almost immediately starting to lay a number of eggs (Figs 2 and 3). The female died next day. The triungulins might have hatched in September 2017, but were not observed. They apparently remain attached to the eggshells until spring, but unless the Brockenhurst eggs (now shells) were eaten by a predator, the triungulins moved out of from sight. The life-cycle takes about two years, occasionally a year (Lückmann & Niehuis, 2009). Before 2017, efforts to find eggs in the wild have been unsuccessful, possibly because they are laid within nest entrances or crevices.

Little is known about how the beetles spread and it might be the case at Brockenhurst that the triungulins simply crawl onto newly emerged *A. plumipes* exiting the nest in spring. As male bees hatch first, the triungulins need to transfer to females to access cells and this would most likely happen during mating. However, catching and releasing both sexes of *A. plumipes* in Brockenhurst for the presence of triungulins, has not yet produced results.

Fig.1 *Sitaris muralis* mating pair

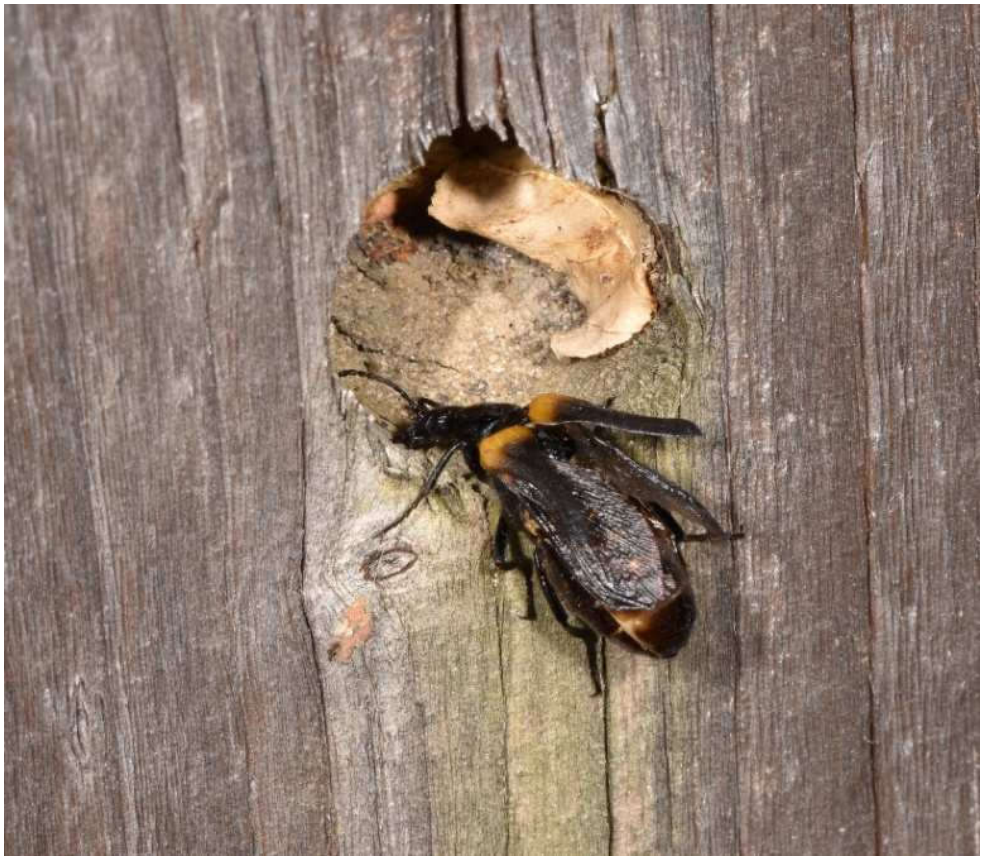

Fig2a

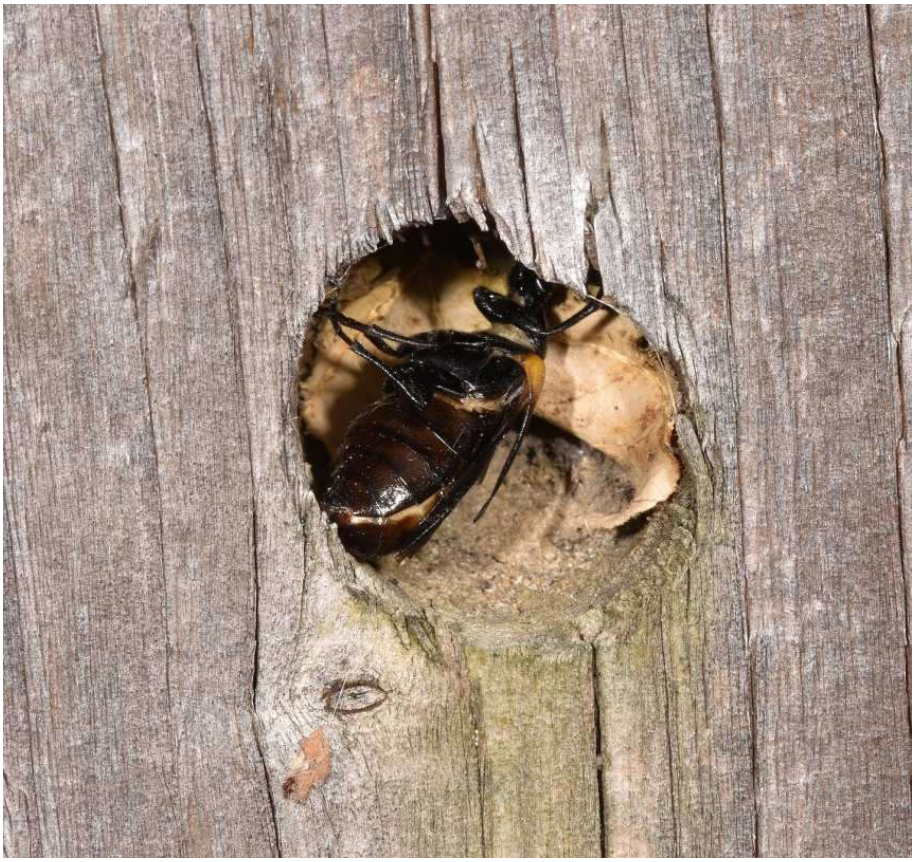

Fig. 2b

Fig. 2c

Fig. 2 Female *Sitaris muralis* a) exploring entrance to *Anthophora plumipes* nest, b) turning around, c) egg laying

Fig. 3 *Sitaris muralis* eggs

Moving onto Wiltshire, SR (with assistance from Maria La Femina), checked established aggregations of *A. plumipes* nests in cob walls in the city of Salisbury and surrounding villages (SU1235, SU1237, SU1529, SU1430, SU0931 and SU0337) and was astonished to find *S. muralis* present on most of them on 15 to 20 August inclusive. Numbers of live beetles varied at each site (but usually with several active) and a number of dead specimens were observed on the ground, or caught in spiders' webs. Large populations of *S. muralis* are rare (Lückmann, 2016), but the cob wall with the most spectacular find of at least 40 beetles (Fig. 4), fits this category and was observed being repaired the next day (repairs could wipe out bee and beetle populations). The populations of *S. muralis* at five other sites totalled 1 to 20+ adults, some active and one male observed in flight. Mainly cob walls are used, but one site is on bare exposed hard packed soil on the ground.

Anthophora plumipes is a widespread bee in many parts of southern Britain and potentially, *S. muralis* could easily be present but overlooked in previously recorded counties, (Devon, Kent, Surrey, Oxfordshire, W. Gloucestershire and Warwickshire), or elsewhere. Have they really died out from these counties? Recorders should keep an eye out for where the bees nest, then look for the beetles around these nests in the first half of August. Now there are additional survey sites, further studies are expected to shed more light on the complex life history of *S. muralis* and help

explain why many specimens are found dead, even early in the season. Possibly, they simply do not live for long and perhaps few females are seen because most die within nest cells.

Fig. 4 *Sitaris muralis* activity on cob wall in Ditchampton (Maria La Femina)

Acknowledgement

Thanks to Maria La Femina for providing photographs of the adult beetles from sites in the Wylye Valley, Wiltshire.

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