

Dung-dwelling beetles at a farm in southwest Worcestershire

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Inspired by Sarah Beynon's fascinating talk on dung beetles at the Worcestershire Recorders annual meeting in March 2017, I decided that it was high time I looked for beetles in the masses of dung deposited at the farm where I live in the far southwest of Worcestershire. The farm in question, Carpenter's Farm, Berrow, (centre SO777339, VC37) is a 90-acre pastoral farm hosting cattle (about 30 Traditional Hereford), sheep (about 150 ewes, plus lambs), and one horse. Herbivore dung is rich in organic matter that supports a wide variety of invertebrates, notably true flies and beetles.

Methods

Direct probing of dung deposited in pastures was chosen as a simple and effective method. The direct sampling of dung deposits was

found to be the most productive method in a study in Leicestershire, although in that study a flotation method was used in which samples of dung (about 500 g) were placed in buckets of water and beetles collected from the surface (Clark & Cook, 2015). Direct probing with spatulas, albeit messy, allows the thorough examination of many dung deposits; disposable gloves were worn. It was found that beetles were fairly easy to spot, especially if they moved, though fast moving ones sometimes escaped. Between late March and mid-October 2017, dung deposits of varying ages were examined. In the case of cattle dung this included crusted to semi-dried deposits.

In addition to this direct sampling, dung-dwelling beetles that had been caught in light traps or found incidentally at the farm during the past few years were re-examined and are included here.

Results and comments

Probing dung yielded 23 species of beetle. An additional seven were found in light traps and five in other circumstances, making a total of 35 species (Table).

Species	Cattle dung	Sheep dung	Horse dung	Light trap	Other	Date
Carabidae						
<i>Clivina fossor</i> Linn., 1758			x			02/04/2017
Hydrophilidae						
<i>Cercyon haemorrhoidalis</i> Fabr., 1775		x				02/04/2017; 07/04/2017
<i>Cercyon impressus</i> Sturm, 1807	x					01/06/2017; 14/06/2017
<i>Cercyon laminatus</i> Sharp, 1873				x		15/09/2016
<i>Cercyon lateralis</i> Marsham, 1802				x		15/09/2016
<i>Cercyon melanocephalus</i> Linn., 1758	x	x	x			March-June 2017
<i>Cercyon pygmaeus</i> Illiger, 1801		x	x			08/04/2017; 01/09/2017
<i>Cercyon quisquilius</i> Linn., 1760				x		15/09/2016
<i>Cercyon unipunctatus</i> Linn., 1758				x		22/04/2014; 15/09/2016
<i>Sphaeridium bipustulatum</i> Fabr., 1781	x					25/07/2017
<i>Sphaeridium lunatum</i> Fabr., 1792	x					01/06/2017; 25/07/2017
<i>Sphaeridium marginatum</i> Fabr., 1787	x					01/06/2017
<i>Sphaeridium scarabaeoides</i> Linn., 1758	x					12/10/2017
Histeridae						
<i>Atholus duodecimstriatus</i> Schrank, 1781			x			02/04/2017
<i>Hister unicolor</i> Linn., 1758	x					25/07/2017
Staphylinidae						
<i>Anotylus sculpturatus</i> Gravenhorst, 1806		x				18/04/2017
<i>Anotylus tetracarinatus</i> Block, 1799			x			14/06/2017
<i>Cilea silphoides</i> Linn., 1767	x					01/09/2017
<i>Gyrophypnus fracticornis</i> Müller, 1776			x			02/04/2017
<i>Ontholestes tessellatus</i> Geoffroy, 1795					In compost	05/07/2012
<i>Oxytelus laqueatus</i> Marsham, 1802			x			07/04/2017
<i>Philonthus longicornis</i> Stephens, 1832					In compost	18/10/2015
<i>Philonthus splendens</i> Fabr., 1793					Pond edge	24/04/2014
<i>Philonthus varians</i> Paykull, 1789					Pond edge	29/08/2014
<i>Platystethus arenarius</i> Fourcroy, 1785	x					01/09/2017
Scarabaeidae						
<i>Aphodius fimetarius</i> Linn., 1758	x					12/03/2017; 09/04/2017
<i>Aphodius granarius</i> Linn., 1767		x	x			02/04/2017; 07/04/2017
<i>Aphodius haemorrhoidalis</i> Linn., 1758	x					25/07/2017
<i>Aphodius luridus</i> Fabr., 1775	x	x				02/04/2017; 09/04/2017
<i>Aphodius prodromus</i> Brahm, 1790	x	x	x			March-October 2017
<i>Aphodius rufipes</i> Linn., 1758				x		May-Sept 2017
<i>Aphodius rufus</i> Moll, 1782				x		19/07/2017
<i>Aphodius sphacelatus</i> Panzer, 1798	x	x	x			March-July 2017
<i>Aphodius sticticus</i> Panzer, 1798				x		14/09/2016
<i>Onthophagus similis</i> Scriba, 1790					In garden	07/06/2016

Taking the species in taxonomic order, we start with the ground beetle *Clivina fossor* of the family Carabidae. Ground beetles do not usually inhabit dung, but *Clivina fossor*, which is a carnivorous soil dweller found particularly in pastures, is occasionally found in horse dung, as in this case. It is a digger (Latin *fossor*) and this is indicated by the strongly developed front legs with large femora and spiny tibiae and tarsi (01).



01. *Clivina fossor*. Note strong spiny forelegs adapted for digging. M. Skirrow

Species belonging to Hydrophilidae were well represented. Eight species of *Cercyon* were found and four *Sphaeridium* (see below). Of the *Cercyon* species, four were found by direct probing and four in light traps (02). *C. melanocephalus* is a common lowland species mainly restricted to dung, whereas the others also inhabit decaying organic matter of various sorts, such as rotting vegetation, compost heaps, carrion, and even birds' nests. The status of the other seven *Cercyon* beetles is difficult to assess, as national distribution maps almost certainly under-represent their presence owing to the specialist nature of their collection and identification. They are nearly all small. *C. pygmaeus* is the smallest of the group with a body length of only about 1.6 mm (02). A somewhat restricted

distribution is suggested for *C. impressus* and *C. laminatus* as neither was found in the Leicestershire study mentioned above (Clark & Cook, 2015). *C. laminatus* is an introduced oriental species first found in England in 1959 in west Kent, since when it has slowly spread northwest. It flies at dusk and has typically been found in light traps, as in the present case. It seems to be a synanthropic species following the activities of man and his livestock. A diagnostic feature is that the mesosternal process on the underside of the thorax is strongly keeled (03). The present specimen is the first to be recorded on the Worcestershire Biological Record Centre (WBRC) database

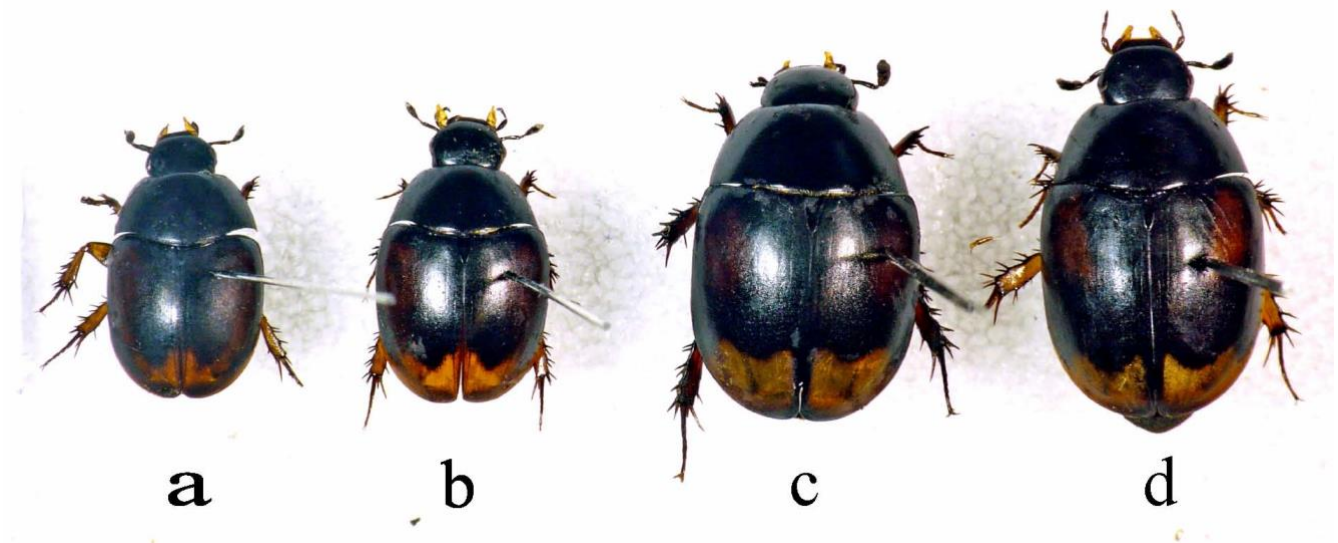


02. Examples of *Cercyon* spp. found in dung: (a) *C. pygmaeus*; (b) *C. melanocephalus*; (c) *C. haemorrhoidalis*; (d) *C. impressus*; (e) *C. unipunctatus*. M. Skirrow



03. *Ceryon laminatus* ventral view showing sharply keeled mesosternal process (arrowed), a diagnostic feature. M. Skirrow

All four British species of *Sphaeridium* were found, all in cattle dung (04). This 'full house' might seem surprising, but *Sphaeridium* species are often found together (Foster *et al.*, 2014). Identification can be tricky and dissection of male genitalia may be necessary, as in the case of the *S. marginatum* specimen, which was fortunately a male. *S. marginatum* was also found here at the farm in 2014 on a compost heap; it too was a male, and it was dissected and its identity confirmed by Garth Foster. *S. marginatum* was recently found on carrion at Shakenhurst in northwest Worcestershire by Kevin McGee (McGee, 2016). This species is easily confused with *S. bipustulatum* which, previous to the present example, has been recorded only five times in Worcestershire during the past 20 years.



04. All four *Sphaeridium* spp. found in cattle dung: (a) *S. marginatum* male; (b) *S. bipustulatum* female; (c) *S. luridum* female; (d) *S. scarabaeoides* female. M. Skirrow

Of the two species belonging to the family Histeridae, *Atholus duodecimstriatus* (so named because of its distinctive pattern of elytral striations) was found in horse dung (05). It seems to be an uncommon species as there are only two existing Worcestershire records and it was not found in the Leicestershire study (Clark & Cook 2015). *Hister unicolor* is found in horse and cattle dung, in this instance the latter (05). It too was absent from the Leicestershire study, but found on carrion at Shakenhurst by Kevin McGee (McGee, 2016).



05. Histeridae: (a) *Atholus duodecimstriatus*; (b) *Hister unicolor* (wings only partly folded away). M. Skirrow.

Among the 10 species of Staphylinidae (rove beetles) found, *Oxytelus laqueatus* and *Platystethus arenarius* are primarily herbivore dung dwellers, but the others are found in rotting organic matter as well as dung. *Philonthus longicornis* and *Ontholestes tessellatus* were found in warm active compost heaps. *Cilea*

silphoides, which belongs to the subfamily Tachypoides, was found in cattle dung and is a locally distributed species with only three previous records on the Worcestershire database. Four examples of the smaller and easily overlooked species found in dung in this study are shown (06).

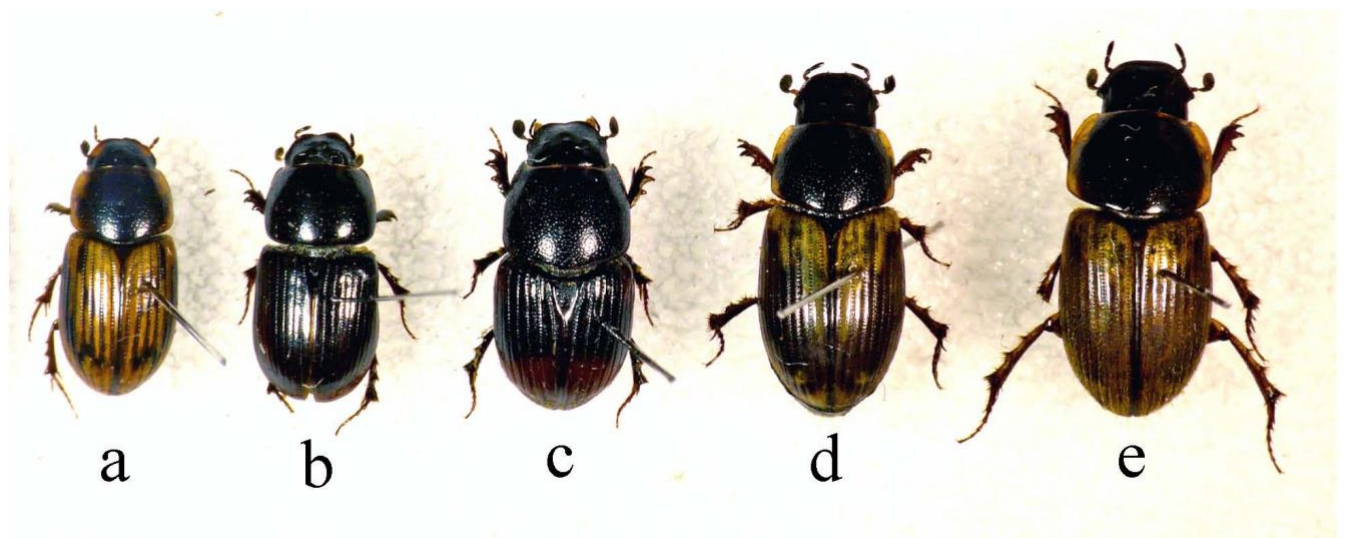


06. Some small staphylinids extracted from dung: (a) *Cilea silphoides*; (b) *Platystethus arenarius*; (c) *Oxytelus laqueatus*; (d) *Gyrohypnus fracticornis*. M. Skirrow

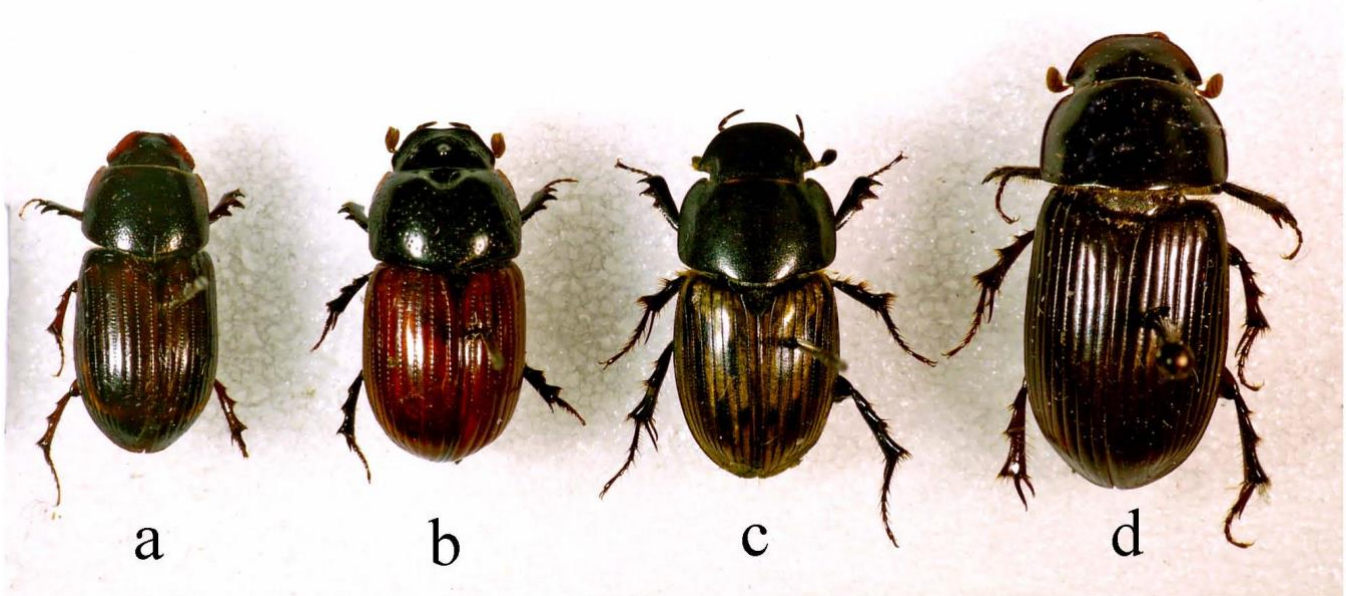
Lastly, we turn to the true dung beetles in the family Scarabaeidae, which are familiar, if for no other reason, from their portrayal in ancient Egyptian drawings. All but one of the ten species found in this study belonged to the genus *Aphodius* (07, 08), which contains 42 British species. *A. prodromus* was by far the most common species with *A. sphacelatus* also plentiful. They were particularly abundant in March and April. At that time the removal of the crust from a fairly fresh cattle dung deposit would attract, within less than a minute, 30 or more *Aphodius* flying around the dung and plunging into it with apparent enthusiasm. This abundance was not observed later in the year. Another common species was *A. rufipes*, but strangely none was found in dung; all were in light traps. Anyone regularly setting such traps will be familiar with these medium-sized oval black beetles crawling and scurrying around the bottom of their traps, often in their hundreds. It is said that they fly great distances at night in search of new food sources. The other *Aphodius* species were found in smaller numbers or only as single examples. Neither

A. granarius nor *A. luridus* were found in the Leicestershire survey, again suggesting more limited distributions (Clark & Cook, 2015). There are less than ten Worcestershire records of these two species over the past 20 years, and the same is true for *A. haemorrhoidalis*, *A. rufus*, and *A. sticticus*. The latter species was found on carrion by Kevin McGee in his Shakenhurst study (McGee, 2016). Lastly, the remaining scarab beetle, *Orthophagus similis*, was captured when it settled on a garden table (09). This species is locally distributed in southern and central England and in coastal areas.

It is disappointing that no member of the dor beetle family, Geotrupidae, was found. This dung-feeding group, together with members of Scarabaeidae, perform the vital service of breaking down dung and burying it in the topsoil, thereby aerating and enriching the soil. Searches will continue.



07. Smaller *Aphodius* spp. (a) *A. sticticus*; (b) *A. granarius*; (c) *A. haemorrhoidalis*; (d) *A. prodromus* female; (e) *A. prodromus* male. M. Skirrow



08. Larger *Aphodius* spp. (a) *rufus*; (b) *A. fimetarius*; (c) *A. luridus*; (d) *A. rufipes*. M. Skirrow



09. Scarab beetle *Onthophagus similis*. M. Skirrow

Use of anthelmintic drugs in livestock

Anthelmintics, such as Ivermectin, given to livestock to control worm infestations may persist in dung and are toxic to dung beetles, so excessive use can hinder the breakdown of dung and be detrimental to the health of the soil. Anthelmintics are used at the farm with discretion. Cattle are dosed annually with preparations containing Ivermectin during the winter when they are kept in barns, but not before they are put out to grass in mid-April. Ewes are similarly dosed at least 24 hours before being put out to grass between February and April and then again in August if there are signs of infestation. Lambs are dosed in June and then checked

every six weeks and dosed only if symptomatic. The horse does not normally get any worming treatment. The profusion of *Aphodius* beetles in March and April suggests that any toxic effect of anthelmintics was minimal at that time. There are insufficient data to judge whether the relative paucity of beetles in later months was linked to the dosing of ewes and lambs.

Acknowledgements

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References

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Images

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