

Colwall Orchards Invertebrate Survey

A Report for the Colwall Orchard Group



Tillus elongatus © F. Köhler

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SUMMARY

A group of three orchards at Colwall, Herefordshire, were found to support an exceptional assemblage of wood decay (saproxylic) invertebrates – they are amongst the richest traditional orchards that have been studied in Britain:

- 73 saproxylic species were found, comprising 34 beetles, 38 two-winged flies, and one snake fly;
- These include two species of British Red Data Book status, one Near Threatened and fifteen Nationally Scarce;
- The three most exciting finds – all from the main cherry orchard (Broadwood)
 - are:
 - The false click beetle *Eucnemis capucina*
 - The throscid beetle *Aulonothroscus brevicollis*
 - The fungus gnat *Acnemia amoena*
- The false click beetle and the fungus gnat have not previously been reported from Herefordshire, while the throscid is well known from Moccas Park, but not known elsewhere in the county; none of these three species has previously been associated with cherry trees or traditional orchards;
- Overall this group of orchards are believed to be of national importance for the rare insect species and near regional importance for relict old growth indicator species;
- Much of this fauna is associated with wood-decay fungi and the decaying heartwood of the old but living fruit trees.

Two further species of interest were also found: the rare lauxaniid flies *Homoneura interstincta* and *H. thalhammeri*. These are poorly known species with very few records nationally. They may either be breeding in accumulations of decaying cherry leaves or possibly willow leaves by the small stream.

The presence of such a rich assemblage almost certainly reflects the local history of old open-grown trees in and around the medieval Malvern Chase. These species have been able to colonise the local orchards as the fruit trees aged and became suitable, and the concentration of traditional orchards has proved viable for many rare species and even relict old growth species.

Site condition appears to be very good, with a large concentration of old fruit trees many of which are showing the signs of heartwood decay and hollowing. Overall the orchards can be considered to be in ‘favourable’ conservation condition (using JNCC’s guidelines).

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1 INTRODUCTION

The author was invited to carry out a saproxylic (wood-decay) invertebrate survey and assessment of selected orchards in Colwall Civil Parish, Herefordshire, by Colwall Orchard Group in 2009.

Three adjoining orchards were selected by the group for investigation:

- Maybole Orchard
- Broadwood Orchard (The Parks)
- Snatford Orchard

These are centred on the OS 1km grid square SO7642.

2 METHODOLOGY

Field survey was primarily through a walkover survey and exploration of features of potential interest for invertebrates. Beating, sweeping, hand search and direct observation were used to target key indicator species. Three visits were made: 10th June, 5th August and 19th October.

The walkover survey was supplemented by the operation of two flight interception traps to enable sampling to continue between the three visits. Both were placed in Broadwood Orchard.

The main taxonomic focus of the work was Coleoptera and Diptera – the two predominant groups within saproxylic invertebrates - although a wide range of other groups were also covered. Specimens were identified to species level either in the field or – for more difficult species – samples taken for examination under a microscope. The Diptera taken in the flight trap were identified by Peter Chandler, a leading authority of the group.



Fig 1 Flight trap positioned in old cherry tree in Broadwood Orchard

3 RESULTS

3.1 Site features

The three orchards vary considerably in composition and character, and therefore provide a useful baseline for investigation of the invertebrate fauna of the Colwall orchards in general. The trees in Maybole and Broadwood orchards have been tagged and so individual trees are readily identifiable.

Maybole Orchard is the smallest of the three orchards and has a relatively low density of veteran orchard trees. The commonest tree is apple but there are also a number of pear, and a small group of damson. Mistletoe is a feature of some of the apple trees. Broadwood Orchard is the largest of the three orchards. It is well-stocked with veteran cherry trees across the larger southern half but more open in the north, where there are veteran pear trees concentrated in the lower part. This orchard also contains a few large open-grown parkland trees of oak, common lime, etc. These trees are mature and would not be expected to be contributing much in the way of saproxylic invertebrates.

The two flight traps were hung in two of the veteran cherry trees – the trees selected both have cavities providing access to extensive heartwood decay and the traps were placed immediately above those cavities. One trap was close to the centre of the orchard (tag number 3239), the other just within its south-eastern boundary (tag number 3161).

Snatford Orchard is the most varied of the three and only somewhat smaller than Broadwood. It is a mixed orchard, with areas of veteran apple, pear and cherry, and locally a few plum and/or damson. Mistletoe is present on some of the apple trees.

Tree girth was only noted for a few selected trees. The veteran cherry of Broadwood appear mostly to be around 1m girth at breast height - one was measured at 1.09m. The largest cherry measured was 1.8m, in Snatford Orchard.

The floor of the orchards is long-established grassland, either semi-improved or reverting from past agricultural improvement. Creeping thistle and nettle are frequent and locally abundant. The grassland was being grazed with sheep.

3.2 Invertebrates recorded

The invertebrate fauna of traditional orchards is most usefully described in terms of the key invertebrate assemblage types represented:

- canopy invertebrates,
- epiphyte invertebrates,
- wood-decay invertebrates;
- field layer invertebrates.

The nature conservation quality of these assemblages reflects land management practices and so can be used to inform management recommendations.

This assemblage structure is based on the approach being taken by Natural England's Invertebrate and habitats and Species Information System (ISIS) – see Drake et al (2007).

The target assemblage for the 2009 survey was the saproxylic or wood-decay invertebrates but representatives of the other assemblage types were also observed incidentally and merit some comment.

3.2.1 Wood-decay invertebrates

The wood decay fauna of traditional orchards is thought to be the most important individual feature from a nature conservation perspective. The Colwall orchards were found to be amongst the richest known for this fauna in Britain, supporting a wide variety of nationally scarce species (thought to be confined in Britain to fewer than 100 of the 10km squares of the OS national grid) as well as at least two species of British Red Data Book status and one of Near Threatened status.

The two RDB species (1992 assessment using UK criteria) are:

- *Eucnemis capucina**, a false click beetle (Eucnemidae) which develops in old hollowing trees, where moist decayed heart wood occurs beneath an outer skin of exposed and seasoned wood on the trunk; the species is best known from the New Forest and Windsor Forest but has also been reported from at least two sites in Worcestershire (Bredon Hill & Pipershill Common); this record is the first from Herefordshire, the first from a traditional orchard, and the first from a cherry tree;
- *Aulonothroscus brevicollis**, a small beetle (Throscidae) which develops in decaying wood in old open-grown tree trunks, usually oak; known from a dozen or so sites across southern England (including Moccas Park and Bredon Hill); this is the first report from both a cherry tree and a traditional orchard.



Fig 2 *Eucnemis capucina* © F. Köhler

One RDB Near Threatened (using current IUCN criteria)

- *Acnemia amoena**, a fungus gnat (Mycetophilidae) with unknown biology but others in the genus are associated either with decaying wood or wood-decay fungi; known sites are scattered across southern Britain, including New Forest, Burnham Beeches, Dinefwr Deer Park, and Powis Castle Deer Park, but this is the first report from Herefordshire;

Fifteen Nationally Scarce wood-decay invertebrates have also been found:

- *Aderus oculatus**, a small beetle (Aderidae) which develops in red-rotten heartwood on old open-grown broad-leaved trees;
- *Agrilus sinuatus*, Hawthorn Jewel Beetle (Buprestidae), which develops in the cambial layer of dying and freshly dead woody Rosaceae especially hawthorn but also pear;
- *Anisoxya fuscula**, a false darkling beetle (Melandryidae) which develops in aerial dead twigs on open-grown broad-leaved trees;
- *Ctesias serra*, Cobweb Beetle (Dermestidae), which develops in web-cavities within thick dead bark on old open-grown tree trunks;
- *Eledona agricola**, a darkling beetle (Tenebrionidae), which develops in the brackets of chicken-of-the-woods fungus *Laetiporus sulphureus* on old open-grown tree trunks;
- *Grzegorzekia collaris*, a fungus gnat (Mycetophilidae) with larvae forming webs across the underside of damp decaying wood; thinly scattered throughout Britain but previously known from Herefordshire;
- *Hadrobregmus denticollis*, a woodworm beetle (Anobiidae) which specialises on woody Rosaceae, especially hawthorns but also apple;
- *Lasius brunneus*, Brown Tree Ant (Formicidae), which excavates its nests in the decaying heartwood of open-grown trees;
- *Megatoma undata*, a hide beetle (Dermestidae), a scavenger in spider webs in decaying wood in old trees, feeding on remnants of insects, spider exuviae, etc; also known from bee-hives and bee burrows, where its larvae feed on cast skins, pupae etc;
- *Mycomya insignis*, a fungus gnat (Mycetophilidae) with larvae presumed to be web-spinners on the underside of decaying wood, where the wood-decay fungus has been identified it was *Schizophora paradoxa*; thinly scattered throughout Britain but previously known from Herefordshire;
- *Orchesia micans*, a false darkling beetle (Melandryidae) which develops in the brackets of the weeping polypore *Inonotus hispidus* on old open-grown broad-leaved trees, especially ash and apple;
- *Prionychus ater**, a darkling beetle (Tenebrionidae) which develops in the wood mould of old hollow open-grown broad-leaved trees;
- *Scolytus mali*, the Large fruit Tree Bark Beetle (Scolytidae), which develops beneath freshly dead bark on woody Rosaceae, especially old orchard trees;
- *Subilla confinis*, a snake fly (Raphididae) which develops beneath bark on freshly dead branches and trunks of open-grown broad-leaved trees, especially old fruit trees in traditional orchards;
- *Tillus elongatus**, a checkered beetle (Cleridae) which develops in decayed heartwood in the trunks of open-grown broad-leaved trees.

Species marked with an asterisk are particularly associated with sites which have had long continuity of concentrations of large old open-grown trees, and are better known from old forests, wood pastures and historic parklands. Two further species of the old growth assemblage are also present: *Thanasimus formicarius* and *Dorcatoma chrysomelina*.

A key feature of this assemblage of wood-decay invertebrates is the association with heartwood decay and trunks and large boughs. Only three of the species concerned are not of this category: the false darkling *Anisoxya fuscula* which is characteristic of aerial dead branches and twigs, while the Large Fruit Tree Bark Beetle and the snakefly *Subilla confinis* develop beneath bark on recently dead branches. The bark beetle will also use trunk bark, and this is probably also the case with the snakefly.

The presence of the widespread stiletto fly *Thereva nobilitata* is also a feature of note as the larvae are predatory in the wood mould inside the hollowing trees, favouring large populations of the darkling beetle *Prionychus ater* as prey. It is most readily found as larvae with larvae of these beetles.

A total of 34 species of saproxylic beetle were noted in these three orchards and others undoubtedly occur as well – a more detailed study would be needed to gain a fuller species list. Two of the species are relatively recent arrivals in Britain – the weevil *Euophryum confine* (an import from New Zealand) and *Axinotarsus marginalis* (a colonist from the near continent) – and other new arrivals may be expected.

Seven saproxylic Diptera were detected by direct searching but many more were detected using the flight traps, bringing the total to 38 species. One species of fungus gnat appears to be a recent arrival in Britain, *Mycetophila sigmoides*, having first been detected in 1998 – it is already widespread across lowland England.

The main heartwood-decay fungus active in the old cherry, pear and damson trees is chicken-of-the-woods *Laetiporus sulphureus*, while the apple trees are being hollowed by the weeping polypore *Inonotus hispidus*. These are also characteristic fungi of ancient wood pasture trees, especially oak and ash, respectively, which explains to some extent the broad similarity between this orchard fauna and famous wood pasture sites such as Moccas Park and Bredon Hill. One further bracket fungus was noted fruiting inside two hollow apple trees in Snatford Orchard: *Aurantiporus fissilis*. This is an uncommon and localised species most frequently known from large dead standing trunks of beech in old woodland on calcareous soils, but also known from old apple trees in orchards (Legon & Henrici, 2005). The presence of this unusual wood-decay fungus is perhaps significant given the high quality of these orchards for wood-decay invertebrates.



Fig 3 Rare bracket fungus *Aurantiporus fissilis* fruiting inside hollow apple tree in Snatford Orchard

3.2.2 Epiphyte invertebrates

Traditional orchards tend to be relatively species-rich in epiphyte invertebrates as concentrations of mature or older open-grown trees are the richest habitat type for them in Britain. The old orchard trees at Colwall are also rich in epiphyte species, notably barkflies (Psocoptera) with 11 species, but no nationally rare species were found. Of the 11 the most significant are the picture-winged *Loensia fasciata* and *L. variegata*, as well as *Reuterella helvimacula* as these have localised distributions across Britain. The first two are especially characteristic of traditional orchards. Notably few of the typical associated predatory bugs were found, just *Loricula elegantula*, but the absence of *Temnostethus* spp for example from the list must be due to under-recording rather than true absence.

3.2.3 Canopy invertebrates

The canopy fauna present in traditional orchards tends to be dominated by specialists in woody Rosaceae, although more widespread species are also often well-represented.

Amongst the canopy fauna, traditional orchards are best known for mistletoe insects, and the uncommon mistletoe plant bug *Pinalitus viscicola* was found on the mistletoe on the old apple trees. This bug sucks sap from mistletoe buds, flowers and unripe fruits.

3.2.4 Field layer invertebrates

The pasture within the orchard currently provides limited habitat quality for grassland invertebrates, reflecting a recent history of unsympathetic management. The more mobile grassland species may be expected to return if it continues to be managed without any in-puts of agro-chemicals.

Two fly species from this general assemblage type and with conservation status in Britain were taken in the flight traps. One has provisionally been assessed as having RDB Near Threatened status:

- *Homoneura interstincta* (Lauxaniidae), a rare species best known in Britain from the New Forest;

The other has provisional Nationally Scarce status:

- *Homoneura thalhammeri* (Lauxaniidae), known widely across lowland Britain;

The conservation statuses were proposed because there are relatively few records of these species – ‘Data Deficient’ would appear more appropriate and is likely to be the official assessment once the status review is published.

The ecology of lauxaniid flies is poorly known - the species are usually associated with shady vegetation in damp places, with the larvae developing in decaying vegetation. *Homoneura* - as far as is known - feed on decaying leaves as larvae. Some species are particularly associated with poplars and willows, so wetland habitats are favoured. This might suggest that these species are associated with the stream margins in the centre of the cherry orchard rather than with the trees but accumulations of decaying cherry leaves may well provide suitable habitat.

4 ASSESSMENT OF THE SAPROXYLIC INVERTEBRATE FAUNA

Two systems have been devised for the relative assessment of site quality for nature conservation using saproxylic beetles: the Index of Ecological Continuity (revised in Alexander, 2004) and the Saproxylic Quality Index (Fowles, Alexander & Key, 1999).

4.1 Index of Ecological Continuity

The Index of Ecological Continuity has been used to identify Britain’s most important sites for the saproxylic invertebrates of ancient trees and wood-pasture type habitats. The Index calculation is based on the presence or absence of a select list of beetle species (revised by Alexander, 2004). The species are graded according to their degree of association with Britain’s remaining areas of old growth – mainly the old wood pastures and historic parklands - and these grades are used as the basis for a scoring system. The total of these scores provides the Index.

The species in the qualifying list include many which are difficult to find on demand and so the Index may be built up over a number of years. Records from earlier

recording therefore contribute to the Index. A control on old records is however imposed, with only post-1950 records being used in the calculation. As the IEC builds up with time, the Index should be regarded as a minimum figure only.

Experience has suggested that sites of national importance have an IEC in the range of 25-80 while IEC values of 15-24 are of regional importance (Alexander, 2004). Sites in excess of 80 are considered to be of European significance.

The calculated Index of Ecological Continuity for the Colwall orchards from the 2009 survey is a minimum of 14, suggesting a site of near regional importance (in a West Midlands context). Few other orchards have been surveyed to the same extent and so comparative data is thin. Broadway Farm Orchards, Westbury-on-Severn (Gloucestershire) is widely regarded as an exceptionally rich site and has an IEC of a minimum of 16 (Alexander, 2003). In contrast, Rough Hill Orchard, Birlingham (Worcestershire) has a minimum IEC of 8 (Alexander, 2006).

4.2 Saproxylic Quality Index

The Saproxylic Quality Index (Fowles et al, 1999) is a more recent development designed to take the whole saproxylic beetle fauna into account and to include some control of recording effort. The species are scored according to the level of their national status and on a geometric scale – from 1 point for common species through to 32 points for the rarest. The total of these scores is termed the Species Quality Score and the Species Quality Index is calculated by dividing this score by the number of qualifying saproxylic species recorded and then multiplying the result by one hundred.

The SQI calculation has certain provisos:

- a threshold of 40 qualifying species must have been recorded from the site;
- the list should be complete, ie include all qualifying species recorded during surveys;
- the same attention should have been applied to recording common species as rare ones.

Fowles et al (1999) suggest that an SQI of 500 is probably an appropriate threshold for assessing national importance. The Colwall SQI achieves 574 (no of species = 31; saproxylic quality score = 178). The total of qualifying species achieved at Colwall is however below the threshold for application of the SQI and so – strictly – this index is not valid at Colwall. However, even if 9 additional common species were also found to be present the SQI would be 445.

Colwall Orchards therefore fall within the range of 445 to 574 and so are near national importance using the SQI. For comparison, Broadway Farm Orchards achieved an SQI of 512, based on 33 qualifying species – again below the number of qualifying species needed for application of this Index. Rough Hill Orchard achieved an SQI of 390, based on 41 qualifying species.

4.3 Overview

It seems reasonable to conclude that Colwall Orchards are of similar quality for nature conservation to the important Broadway Farm Orchards, ie of near national significance for its rare beetle species and of near regional importance for old growth beetle species.. None of the other sites studied by Lush et al (2009) for English Nature in 2004 achieved comparable results.

The presence of such a rich assemblage almost certainly reflects the local history of old open-grown trees in and around the medieval Malvern Chase. These species have been able to colonise the local orchards as the trees became suitable and the concentration of traditional orchards has proved viable for many rare species and even relict old growth species.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview of conservation interest & site condition

As explained in the preceding section, and on the basis of present knowledge, Colwall orchards appear to be of near national significance for its rare beetle species and of near regional importance for old growth beetle species..

Site condition appears to be very good, with a large concentration of old fruit trees many of which are showing the signs of heartwood decay and hollowing. Overall the orchards can be considered to be in ‘favourable’ conservation condition (using JNCC’s guidelines).

5.2 Management recommendations

The key conservation requirements appear already to be in place:

- Retain all older generation fruit trees, and
 - maintain them in good condition, including thinning of excessive growth of mistletoe, as necessary – too much mistletoe can sap the tree’s strength and also lead to branch collapse;
 - leave all dead and decaying wood in situ, wherever feasible, or displace only short distances, where unavoidable – do not cut into smaller sections as this reduces its value to wood-decay invertebrates, and leave mostly in sunny situations as shade is **not** favourable for all wood-pasture invertebrates;
 - leave fruiting fungi in situ, as these potentially support invertebrates of conservation importance, and are part of the natural wildlife of traditional orchards;
 - pruning to promote enhanced light levels within the crown, to encourage greater flowering and fruiting, is acceptable but needs to be carried out with attention to good nature conservation practice, ie **not** dead-wooding;

- continue to gap-up any spaces left by failed fruit trees, to promote a more varied age structure, for long-term succession of wildlife from tree to tree;
- avoid the use of any pesticides, fungicides, herbicides, fertilisers or any other agricultural, horticultural, or fruticultural products, as these tend to have unforeseen consequences on non-target interests – including veterinary products on the grazing livestock;
- continue to use the orchard for extensive grazing, as this maintains the field layer in a condition suitable for the widest range of grassland invertebrates;
- management to organic standards (Soil Association) is almost certainly the best option for maintaining an ecologically sound management regime and promoting nature conservation; alternatively aim for a sustainable extensive approach.

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APPENDIX: SPECIES LIST

Beetles (Coleoptera)	Family	Saproxylic
<i>Aderus oculatus</i>	Aderidae	+
<i>Anobium punctatum</i>	Anobiidae	+
<i>Dorcatoma chrysomelina</i>	Anobiidae	+
<i>Hadrobregmus denticollis</i>	Anobiidae	+
<i>Ptilinus pectinicornis</i>	Anobiidae	+
<i>Agrilus sinuatus</i>	Buprestidae	+
<i>Cantharis cryptica</i>	Cantharidae	
<i>Rhagonycha fulva</i>	Cantharidae	
<i>Abax parallelepipedus</i>	Carabidae	
<i>Dromius spilotus</i>	Carabidae	
<i>Pterostichus madidus</i>	Carabidae	
<i>Pogonocherus hispidulus</i>	Cerambycidae	+
<i>Oulema lichenum</i>	Chrysomelidae	
<i>Cis boleti</i>	Ciidae	+
<i>Thanasimus formicarius</i>	Cleridae	+
<i>Tillus elongatus</i>	Cleridae	+
<i>Adalia 10-punctata</i>	Coccinellidae	
<i>Adalia bipunctata</i>	Coccinellidae	
<i>Coccinella 7-punctata</i>	Coccinellidae	
<i>Exochomus quadripustulatus</i>	Coccinellidae	
<i>Hippodamia axyridis</i>	Coccinellidae	
<i>Cionus scrophulariae</i>	Curculionidae	
<i>Euophryum confine</i>	Curculionidae	+
<i>Ctesias serra</i>	Dermestidae	+
<i>Megatoma undata</i>	Dermestidae	+
<i>Denticollis linearis</i>	Elateridae	+
<i>Melanotus castanipes</i>	Elateridae	+
<i>Stenagostus villosus</i>	Elateridae	+
<i>Dacne bipustulata</i>	Erotylidae	+
<i>Eucnemis capucina</i>	Eucnemidae	+
<i>Anisotoma humeralis</i>	Leiodidae	+
<i>Sinodendron cylindricum</i>	Lucanidae	+
<i>Anisoxya fuscula</i>	Melandryidae	+
<i>Orchesia micans</i>	Melandryidae	+
<i>Axinotarsus marginalis</i>	Melyridae	+
<i>Dasytes sp (larva)</i>	Melyridae	
<i>Mycetophagus quadripustulatus</i>	Mycetophagidae	+
<i>Rhinosimus planirostris</i>	Salpingidae	+
<i>Scaphidium quadrimaculatum</i>	Scaphidiidae	+
<i>Scolytus mali</i>	Scolytinae	+
<i>Scolytus rugulosus</i>	Scolytinae	+
<i>Anaspis fasciata</i>	Scriptiidae	+
<i>Anaspis regimbarti</i>	Scriptiidae	+
<i>Sphindus dubius</i>	Sphindidae	+
<i>Eledona agricola</i>	Tenebrionidae	+
<i>Prionychus ater</i>	Tenebrionidae	+
<i>Aulonothroscus brevicollis</i>	Throscidae	+
Earwigs (Dermaptera)		
<i>Forficula auricularia</i>	Dermaptera	

Two-winged flies (Diptera)		saproxylic
<i>Sylvicola cinctus</i>	Anisopodidae	+
<i>Emmesomyia grisea</i>	Anthomyiidae	
<i>Hylemya nigrimana</i>	Anthomyiidae	
<i>Hylemya vagans</i>	Anthomyiidae	
<i>Hylemyza partita</i>	Anthomyiidae	
<i>Lasiomma strigilatum</i>	Anthomyiidae	
<i>Paradelia intersecta</i>	Anthomyiidae	
<i>Pegomya testacea</i>	Anthomyiidae	
<i>Pegomya winthemii</i>	Anthomyiidae	
<i>Machimus atricapillus</i>	Asilidae	
<i>Dilophus febrilis</i>	Bibionidae	
<i>Calliphora vicina</i>	Calliphoridae	
<i>Melanomya nana</i>	Calliphoridae	
<i>Melinda gentilis</i>	Calliphoridae	
<i>Forcipomyia pulchrithorax</i>	Ceratopogonidae	+
<i>Chrysotimus molliculus</i>	Dolichopodidae	
<i>Chrysotus gramineus</i>	Dolichopodidae	
<i>Dolichopus trivialis</i>	Dolichopodidae	
<i>Gymnopternus cupreus</i>	Dolichopodidae	
<i>Medetera ambigua</i>	Dolichopodidae	+
<i>Medetera jacula</i>	Dolichopodidae	+
<i>Medetera pallipes</i>	Dolichopodidae	+
<i>Scellus notatus</i>	Dolichopodidae	
<i>Sciapus longulus</i>	Dolichopodidae	
<i>Sciapus platypterus</i>	Dolichopodidae	+
<i>Drosophila subobscura</i>	Drosophilidae	+
<i>Neuroctena anilis</i>	Dryomyzidae	
<i>Empis albinervis</i>	Empididae	
<i>Empis lutea</i>	Empididae	
<i>Rhamphomyia tarsata</i>	Empididae	
<i>Piezura pardalina</i>	Fanniidae	+
<i>Heteromyza commixta</i>	Heleomyzidae	
<i>Tephrochlamys flavipes</i>	Heleomyzidae	+
<i>Tephrochlamys rufiventris</i>	Heleomyzidae	
<i>Drapetis ephippiata</i>	Hybotidae	
<i>Oedalea holmgreni</i>	Hybotidae	+
<i>Oedalea tibialis</i>	Hybotidae	+
<i>Tachypeza nubila</i>	Hybotidae	+
<i>Homoneura interstincta</i>	Lauxaniidae	
<i>Homoneura thalhammeri</i>	Lauxaniidae	
<i>Meiosimyza decempunctata</i>	Lauxaniidae	
<i>Minettia inusta</i>	Lauxaniidae	
<i>Pseudolyciella stylata</i>	Lauxaniidae	+
<i>Tricholauxania praeusta</i>	Lauxaniidae	
<i>Limonia nubeculosa</i>	Limoniidae	
<i>Ormosia depilata</i>	Limoniidae	
<i>Lonchoptera lutea</i>	Lonchopteridae	
<i>Coenosia mollicula</i>	Muscidae	
<i>Helina abdominalis</i>	Muscidae	+
<i>Helina depuncta</i>	Muscidae	
<i>Helina impuncta</i>	Muscidae	
<i>Muscina levida</i>	Muscidae	+
<i>Neomyia cornicina</i>	Muscidae	

<i>Neomyia viridescens</i>	Muscidae
<i>Phaonia angelicae</i>	Muscidae
<i>Phaonia pallida</i>	Muscidae
<i>Phaonia palpata</i>	Muscidae
<i>Phaonia subventa</i>	Muscidae
<i>Phaonia tuguriorum</i>	Muscidae
<i>Acnemia amoena</i>	Mycetophilidae
<i>Acnemia nitidicollis</i>	Mycetophilidae
<i>Apolephthisa subincana</i>	Mycetophilidae
<i>Coelosia flava</i>	Mycetophilidae
<i>Grzegorzekia collaris</i>	Mycetophilidae
<i>Leia cylindrica</i>	Mycetophilidae
<i>Monoclona rufilatera</i>	Mycetophilidae
<i>Mycetophila adumbrata</i>	Mycetophilidae
<i>Mycetophila sigmoides</i>	Mycetophilidae
<i>Mycetophila tridentata</i>	Mycetophilidae
<i>Mycomya cinerascens</i>	Mycetophilidae
<i>Mycomya flavicollis</i>	Mycetophilidae
<i>Mycomya insignis</i>	Mycetophilidae
<i>Mycomya sigma</i>	Mycetophilidae
<i>Phronia nigricornis</i>	Mycetophilidae
<i>Phronia notata</i>	Mycetophilidae
<i>Platurocypta testata</i>	Mycetophilidae
<i>Sciophila fenestella</i>	Mycetophilidae
<i>Sciophila hirta</i>	Mycetophilidae
<i>Chyliza leptogaster</i>	Psilidae
<i>Chrysopilus asiliformis</i>	Rhagionidae
<i>Rhagio scolopaceus</i>	Rhagionidae
<i>Paykullia maculata</i>	Rhinophoridae
<i>Anapausis dalmatina</i>	Scatopsidae
<i>Apiloscatopse picea</i>	Scatopsidae
<i>Ectaetia clavipes</i>	Scatopsidae
<i>Bradysia brevispina</i>	Sciaridae
<i>Bradysia placida</i>	Sciaridae
<i>Bradysia trivittata</i>	Sciaridae
<i>Leptosciarella subpilosa</i>	Sciaridae
<i>Lycoriella ingenua</i>	Sciaridae
<i>Schwenckfeldina carbonaria</i>	Sciaridae
<i>Trichosia splendens</i>	Sciaridae
<i>Leptocera fontinalis</i>	Sphaeroceridae
<i>Beris vallata</i>	Stratiomyidae
<i>Eupeodes corollae</i>	Syrphidae
<i>Pipizella voduata</i>	Syrphidae
<i>Xylota sylvarum</i>	Syrphidae
<i>Haematopota pluvialis</i>	Tabanidae
<i>Thereva nobilitata</i>	Therevidae
<i>Nephrotoma quadrifaria</i>	Tipulidae
<i>Seioptera vibrans</i>	Ulidiidae
True Bugs (Hemiptera)	
<i>Anthocoris confusus</i>	Anthocoridae
<i>Anthocoris nemorum</i>	Anthocoridae
<i>Loricula pselaphiformis</i>	Dipsocoridae
<i>Deraeocoris flavilinea</i>	Miridae
<i>Deraeocoris ruber</i>	Miridae

Heterotoma merioptera	Miridae
Phytocoris reuteri	Miridae
Pinalitus viscidicola	Miridae
Plagionotus arbustorum	Miridae
Himacerus apterus	Nabidae
Pentatoma rufipes	Pentatomidae
Ants, Bees & Wasps (Hymenoptera)	
Bombus lucorum	Apidae
Chrysis sp	Chrysidae
Lasius brunneus	Formicidae
Lasius flavus	Formicidae
Lasius niger	Formicidae
Lasius platythorax	Formicidae
Leptothorax acervorum	Formicidae
Myrmica scabrinodis	Formicidae
Ectemnius sp	Sphecidae
Dolichovespula saxonica	Vespidae
Vespa crabro	Vespidae
Vespa vulgaris	Vespidae
Bush-crickets (Orthoptera)	
Leptophyes punctatissima	
Meconema thalassinum	
Barkflies (Psocoptera)	
Ectopsocus briggsi	
Elipsocus hyalinus	
Graphopsocus cruciatus	
Loensia fasciata	
Loensia variegata	
Philotarsus parviceps	
Philotarsus picicornis	
Reuterella helvomacula	
Stenopsocus immaculatus	
Stenopsocus stigmaticus	
Valenzuela flavidus	
Snake flies (Raphidioptera)	
Subilla confinis	+
Gall mites	
Eriophyes similis	
Spiders	
Nuctenea umbratica	
Centipedes	
Lithobius variegatus	
Millipedes	
Cylindroiulus punctatus	
Proteroiulus fuscus	
Harvestmen (Opiliones)	
Dicranopalpus caudatus	
Leiobunum sp	
Mitopus morio	
Paroligolophus agrestis	
Phalangium opilio	
Woodlice (Oniscidea)	
Oniscus asellus	

Porcellio scaber

Snails & Slugs (Mollusca)

Arion subfuscus

Lehmannia marginata

Limax flavus

Oxychilus alliarius

Vitrina pellucida