

Bicester Golf Course: a preliminary invertebrate assessment during 2018 and 2019

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CONTENTS

Summary	2
Introduction	3
Methods	3
Site visits	3
Site compartments	3
Location and collection of specimens.	4
Taxonomic coverage	4
Survey results	4
General	4
Noteworthy species	5
Nationally rare (RDB) species	5
Nationally scarce (notable) species	6
Very local species	8
Discussion	12
Conclusion	13
References	13

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SUMMARY

- A preliminary invertebrate survey of part of Bicester Golf Course, was carried out in 2018 and 2019.
- The primary purpose of the survey was to assess the invertebrate biodiversity of parts of the site.
- The survey area, approximately 8 hectares, comprised rough grassland, scrub, hedgerows, marginal woodland, ponds (some dried out) and pond edges.
- The site was visited on 4 occasions — 7 and 18 September 2018, 21 May and 17 June 2019
- 266 invertebrate species were recorded — a relatively good list, but commensurate with recording effort and available habitats.
- Three nationally rare (red data book) species were found:
 - Dichetophora finlandica*, a snail-killing fly with poorly understood habitat requirements
 - Dorycera graminum*, a picture-wing fly associated with rough meadowland
 - Oxyna parietum*, a picture-wing fly that breeds on mugwort.
- 13 nationally scarce (notable) species included:
 - Aphanus rolandri*, a ground-bug associated with fumitory
 - Ceraleptus lividus*, a ground-dwelling shieldbug of warm dry places
 - Donacia cinerea*, a reed beetle that feeds on reed-mace
 - Donacia thalassina*, a reed beetle that feeds on club rushes
 - Hoplitis claviventris*, a southern solitary bee of woodland edges
 - Hippodamia variegata*, the ‘Adonis’ ladybird, a warmth-loving species
 - Lasioglossum pauxillum*, a solitary bee of dry sandy and chalky soils
 - Merzomyia westermanni*, a picture-winged fly that feeds on ragwort
 - Phytoecia cylindrica*, a longhorn beetle that breeds in plant stems
 - Rhinocyllus conicus*, a weevil that feeds on thistles
- 23 ‘very local’ species were also recorded.
- These are mainly insects associated with rough flowery grassland, hedgerows or roadside verges, woodland edges or pond-edges.

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INTRODUCTION

This report is an updated version of the report submitted in September 2018. Bicester Golf Course is situated to the west of the town, hard up against the M40 motorway. It mostly comprises mown grass tees, fairways and greens, but there are also areas of rough, woodland, and some small ponds. This invertebrate survey, of part of the course was commissioned by WSP as part of a wider environmental impact study.

The golf course covers about 40 hectares, but a small part of this, roughly 8 hectares, had been identified during a previous survey as worthy of invertebrate study. The area is approximately centred on grid reference SP548218, and is entirely within Vice-County 23, 'Oxfordshire'.

METHODS

Site visits

The site was visited on 4 occasions: 7 and 18 September 2018, 21 May and 17 June 2019. The weather was warm and dry on all occasions.

Site compartments

Previous surveys of the site had already identified areas of potential invertebrate interest. Three of these were selected for this current survey.

Compartment 1. Narrow, linear, raised bund of bulldozed earth and rubble separating carpark and golf course, planted with various trees and with some ruderal growth.

Compartment 2. Large rectangular area of bulldozed rubble with some thin ruderal growth and marginal scrub.

Compartment 6. Large triangular area of fairways, rough grassland, scrub, marginal trees, ponds (some dried out) and damp pond edges. A large north/south ridge separates the golf course from the M40 motorway here.

These compartments are indicated in Figure 1 below.



Figure 1 Invertebrate Survey Compartments

Location and collection of specimens

A walk-over survey was carried out. Invertebrates were located and collected by general methods using sweep net, beating tray and a stout trowel. Flowers, leaf surfaces, rocks, bare ground, logs and tree trunks were examined by visual searching. Others were found by finger-tip grubbing in loose soil and plant roots, logs, stumps and animal dung. In addition, pit-fall traps were set out on the first visit on 7 September 2018 and examined on the subsequent visit of 18 September 2018. Water-filled pan traps were also used on both 2018 visits. Voucher specimens of all but the most common and characteristic species were collected for examination under the microscope.

Taxonomic coverage

The survey concentrated on the following major groups: Coleoptera (beetles), Diptera (flies), Hemiptera (bugs, froghoppers etc), Hymenoptera (bees, wasps and ants) and Lepidoptera (butterflies and moths). Some examples of other groups were noted if seen.

These are hugely numerous and diverse orders of insects, and identification is not always possible, especially in many of the microscopically small species. Consequently, there is much subjective selection of which families or genera are worth taking as sample specimens for later study. This is often influenced by a knowledge of the groups for which useable identification keys are available, and for which the individual entomologist has a particular penchant. Nevertheless, a wide coverage of insect orders allows some assessment of just how important any given site may be for its invertebrate biodiversity.

SURVEY RESULTS

General

A total of 266 invertebrate species was found during the survey. They currently represent:

	Species
Coleoptera (beetles)	112
Dermaptera (earwigs)	1
Diptera (flies)	43
Hemiptera (bugs)	45
Hymenoptera (bees, wasps etc)	26
Lepidoptera (butterflies & moths)	14
Neuroptera (lacewings)	1
Odontata (dragonflies)	9
Orthoptera (grasshoppers etc)	5
Trichoptera (caddis flies)	1
Aranaea (spiders)	3
Isoptera (woodlice)	4
Mollusca (slugs and snails)	2

Total 266

Two hundred and sixty-six species is a fairly good list and it compares favourably with similar survey sites elsewhere. It is commensurate with the survey effort and the range of sites and habitat types visited.

Noteworthy species

The following species are picked out as being especially noteworthy. Most are uncommon nationally. Criteria for allocation of accepted 'nationally rare' (red data book) and 'nationally scarce' (notable) statuses are varied and complex (originally published in Shirt, 1987; Hyman & Parsons, 1992 etc). Statuses continue to be assessed and reassessed over time, and a JNCC database is available giving a summary overview. Statuses change over time. Every time a rare insect is found there are more records and on a scoring system based on grid squares in which an insect is found, it becomes less rare. These statuses are useful to gauge relative rarity, but despite the apparent objectivity of counting numerical records, there is still a subjective element to what is sometimes a very vague notion of exactly how rare an organism may be. The statuses that are relevant to this report are listed in brief below.

- **Endangered** (RDB-1). The rarest taxa. Taxa in danger of extinction in Great Britain; species with very few recorded localities or living in especially vulnerable habitats.
- **Vulnerable** (RDB-2). Very rare species. Taxa likely to move into the RDB1 category; species declining in their range.
- **Rare** (RDB-3). Rare species. Taxa with small populations and which are at risk; species estimated to occur in 15 or fewer of the 10-km squares in the national Ordnance Survey grid since 1970.
- **Insufficiently known** (RDB-K). Species thought to be very rare in Britain, recorded from less than 15 of the 10-km squares of the national Ordnance Survey grid since 1970, and which warrant RDB classification of some sort, but for which there is a recognized lack of accurate information.

- **Nationally scarce** (notable A). Very local species, thought to occur in 16 to 30 of the 10-km squares of the national Ordnance Survey grid since 1970.
- **Nationally scarce** (notable B). Very local species, thought to occur in 31 to 100 of the 10-km squares of the national Ordnance Survey grid since 1970.
- **Nationally scarce** status is sometimes not subdivided into categories A and B, (notable, occurring in 16 to 100 10-km squares).
- **Very local** status is a much more subjective, but nevertheless useful, measure of scarcity and is based on personal experience, published and unpublished records. It is applied to species that are very limited in distribution or confined to very limited specialist habitats.

The following is a list of some of the more interesting and noteworthy species taken in the area.

Nationally rare (red data book) species

Dichetophora finlandica Verbeke, a small pale pinkish-brown snail-killing fly (family Skiomyzidae). Status: nationally rare (red data book category 3, Falk, 1991b). Very little is known about this fly, but like others in the family its larvae are probably obligate snail predators/parasitoids. Its distribution in Britain is scattered, with no clear geographical or habitat relationship. Others in the genus are species of rough dry grassland; this is at odds with the majority of the family which are more likely to inhabit damp meadows or pond edges. This suggests that any host specificity is likely to be on those snail occurring in more dry habitats, rather than those of marshy places. One specimen was found by sweeping rough grassland in compartment 6 on 7.ix.2018.

Dorycera graminum (Fabricius), a small mottled fly (family Ulidiidae). Status: nationally rare (red data book category 3, Shirt, 1987; Falk, 1991b). *Dorycera* is usually associated with herb-rich unimproved meadows, often in association with umbellifers and broad-leaved trees. The life history is unknown, but the larvae probably develop in decaying vegetable matter, possibly in the dead or dying roots of hogweed, *Heracleum sphondylium* or a near relative. It was once regarded as a fairly frequent insect, but appears to have declined dramatically in recent years. Threats are thought to come from loss of unimproved flowery meadows through drainage or lack of grazing leading to scrub invasion. Although there are old records from Hampshire and Worcestershire, most of the recent records are from the Thames Estuary where it regularly occurs on brownfield sites (Ismay, 2000; Jones, 2003; Jones, 2007). On a personal note, however, this was the fourth time in 2019 that I have recorded this fly in four widely spread localities in the Home Counties. Several specimens were found sweeping in compartments 2 and 6 on 21.v.2019 and 17.vi.2019.

Oxya parietina (Linnaeus), a small grey picture-winged fly (family Tephritidae). Status: nationally rare (red data book category 3). Although not originally given any conservation status by Falk (1991b), this fly was suggested as being nationally scarce by Clemons (1997); this status has since been revised to nationally rare by JNCC/ National Biodiversity Network. A very local central southern and south-eastern England species where it is associated with disturbed places, rough ground, road verges and brownfield sites. It is associated with

mugwort, *Artemisia vulgaris*. Several specimens were swept from the foodplant in compartment 2 on 21.v.2019.

Nationally scarce (notable) species

Aphanus rolandri (Linnaeus), a small black and orange ground bug (family Lygaeidae). Status: nationally scarce (notable, Kirby, 1992). Little is known about its life history or habitat preferences, but this very scarce bug appears to favour disturbed ground in southern England, with most records being from southern coastal counties from Norfolk to Cornwall. It is likely associated with fumitory. It has been spreading through central England during the last 5 years, Several specimens were found by finger-tip searching in sparse vegetation in compartment 2 on 17.vi.2019.

Ceraleptus lividus Stein, a medium-sized brown leaf bug (family Coreidae). Status: nationally scarce (Bantock, 2016). A species of warm and dry places, usually on sandy soils, mainly in southern England particularly Surrey, Sussex, Hampshire and Kent (Hawkins, 2003). One specimen was found by sweeping in compartment 6 on 21.v.2019.

Donacia cinerea Herbst, a medium-sized metallic grey reed beetle (family Chrysomelidae). Status: nationally scarce (notable B, Hyman & Parsons, 1992, Hubble, 2014). Although widespread across most the British Isles, this is a very scarce insect. It feeds on reeds, *Phragmites australis* and reed-mace, *Typha* species, but despite the wide occurrence of suitable foodplants, it is rarely seen. Precise habitat requirements that keep it scarce are unknown. Very many specimens were seen all over *Typha* reed-mace in compartment 6 on 21.v.2019 and 17.vi.2019.

Donacia thalassina Germar, a medium-sized metallic reed beetle (family Chrysomelidae). Status: nationally scarce (notable B, Hyman & Parsons, 1992, Hubble, 2014). Although widespread across most the British Isles, this is a very scarce insect (Cox, 2007). It is thought to feed on various club-rushes and sedges. Several specimens were seen on *Typha* reed-mace in compartment 6 on 21.v.2019 and 17.vi.2019.

Dorytomus tremulae (Fabricius), a small mottled weevil (family Curculionidae). Status: nationally scarce (notable B, Hyman & Parsons, 1992). A scarce weevil associated with grey and white poplars. It seems very widespread in Britain, but localities are very widely scattered (Cox, 2007). One specimen was beaten from a poplar tree in compartment 6 on 17.vi.2019.

Hippodamia (formerly *Adonia*) *variegata* Goeze, the Adonis ladybird (family Coccinellidae). Status: nationally scarce (notable B, Hyman & Parsons, 1992), but status needs revision. Until about 25 years ago, this species was always regarded as having a coastal distribution, occurring in warm sheltered locations such as chalk downs, dunes, undercliffs and other disturbed areas (Majerus *et al.*, 1997). However, it is now known to be fairly widespread in England, especially in the London area and Thames Estuary, where it is associated with sparsely vegetated post-industrial brownfield sites, and it has also spread across central England (Roy *et al.*, 2011). Several specimens were found by general sweeping of the sparse vegetation in compartment 2, on 7.ix.2018, 18.ix.2018 and 17.vi.2019.

Hoplitis claviventris (Thomson), a small dark bee (family Megachilidae). Status: nationally scarce (notable B, Falk, 1991a). This is mainly a southern species

where it occurs in a variety of habitats including woodland edges, heathland, chalk grassland and coastal cliffs. It nests in the dead stems of bramble rose and such like (Edwards, 1998). It may have increased in recent years (Baldock, 2008). One specimen was found visiting flowers in compartment 1 on 17.vi.2019.

Lasioglossum pauxillum (Schenck), a small dark solitary bee (family Apidae). Status: nationally scarce (notable A, Falk, 1991a). A rather local solitary bee found mostly in southern England. It is usually found in dry sandy or chalky places, including heathland, downs, cliffs, sandpits and quarries (Edwards & Broad, 2005). Although once regarded as exceptionally rare, this bee appears to have increased and spread in the last decade. One specimen was found by in a water-filled pan trap laid out in compartment 2 on 18.ix.2018, another was swept in compartment 1 on 21.v.2019.

Merzomyia (formerly *Ictericia*) *westermanni* (Meigen), a medium-sized brown and orange picture-winged fly (family Tephritidae). Status: nationally scarce (notable, Falk, 1991b). This very local fly is known from an area south-east of a line from The Wash, to Gloucester to Weymouth. It breeds in the heads of ragwort, *Senecio* species, but despite the widespread abundance of its foodplant, it remains a scarce fly (Clemons, 1997, 2004, 2015). One specimen was found by sweeping ragwort in compartment 2 on 18.ix.2018.

Microplontus (formerly *Cuethorhynchus*) *campestris* (Gyllenhal), a small mottled weevil (family Curculionidae). Status: nationally scarce (notable B, Hyman & Parsons, 1992). Widespread, but scarce, on roadside verges, rough grassy places where it feeds on ox-eye daisy, *Leucanthemum vulgare*. Several specimens found by sweeping in compartments 2 and 6 on 21.v.2019 and 17.vi.2019.

Phytoecia cylindrica (Linnaeus), a medium-sized grey longhorn beetle (family Cerambycidae). Status: nationally scarce (notable B, Hyman & Parsons, 1992). This uncommon beetle develops in the stems of umbellifer plants. It is widely recorded from scattered localities in central and southern England (Twinn & Harding, 1999), mostly south of the Severn/Wash line. A single specimen was found by sweeping in compartment 6 on 21.v.2019.

Polydrusus formosus Mayer, a small metallic green weevil (family Curculionidae). Status: nationally scarce (notable A, Hyman & Parsons, 1992). This very local weevil occurs on various broad-leaved trees, including hazel, oak, beech, apple and sallow in southern England. Until recently it was only recorded from Sussex, Hampshire and Kent, but has apparently started to spread, and is widely recorded in the southern England, London and Thames Gateway area. Its status may need revision. One was beaten from bushes in compartment 1 on 21.v.2019.

Rhinocyllus conicus (Froh.), a small mottled brown weevil (family Curculionidae). Status: nationally scarce (notable A, Hyman & Parsons, 1992). Historically, this very scarce beetle was only known from a few scattered localities in south and south-west England, usually on disturbed ground. It was usually regarded as a coastal species, but appears to have been spreading in recent years, occurring at inland sites. Its status may need revision. Several specimens were swept from thistles, compartment 2 on 21.v.2019.

Very local species

Agapanthia villosoviridescens (Degeer), a large grey mottled longhorn beetle (family Cerambycidae). Status: very local. This large and handsome insect has larvae

which develop in the stems of large herbaceous plants, most usually thistles and hogweed. It has always had a distribution ranging across central England (north of the Thames), through East Anglia, as far north as Hull (Twinn & Harding 1999). There is some evidence that it has been spreading and increasing in numbers in the last 20 years and its range now includes almost the whole of England from Newcastle to Manchester to Portland Bill, but it remains an elusive and localized insect. Although provisionally suggested as being worthy of nationally scarce (notable B) status by Hyman (1985), this was not confirmed by Hyman and Parsons (1992). Several specimens were seen sitting on foliage and flowers in compartments 2 and 6 on 17.vi.2019.

Bembidion assimile Gyllenhal, a small black ground beetle (family Carabidae). Status: very local. This beetle is found in marshes and swamps in the southern half of Britain (Luff, 1998), and its main stronghold appears to be the Thames Estuary and east coast from Felixtowe to Ramsgate. Several specimens were found running on pondside mud in compartment 6 on 17.vi.2019.

Bruchus atomarius (Linnaeus), a small seed beetle (family Chrysomelidae). Status: very local. This species was originally accorded nationally scarce (notable B) status by Hyman & Parsons (1992), but this was not confirmed by Hubble (2014). Although widespread in Wales and southern England, this is a very local insect. It is associated with rough flower-rich grassland, where it breeds in the seed pods of various vetches, *Vicia* and *Lathyrus* species (Cox, 2007). Several specimens were found by sweeping in compartment 2 on 21.v.2019.

Chorisops nagatomii Rozk., a small yellow and metallic green soldier fly (family Stratiomyidae). Status: very local. Although formerly accorded nationally scarce (notable) status by Falk (1991b) this was not confirmed by Drake (2017). Although widespread in southern England, this species is decidedly scarce and usually associated with broadleaved woodland, parkland, rivers and fens. Its life history is unknown, but it is likely to feed in moist leaf litter or soil (Drake, 1991). One specimen was found flying in the wooded edges of compartment 6 on 7.ix.2018.

Chrysolina oricalcia (Mull.), a medium-sized blue-bronze leaf beetle (family: Chrysomelidae). Status: very local. Although listed as nationally scarce (notable B) by Hyman & Parsons (1992) this was not confirmed by Hubble (2014). A widespread, but rather local species associated with cow parsley, *Anthriscus sylvaticus* and other Umbelliferae in woodlands and hedgerows. Although with scattered localities into Wales and Scotland, it is mainly a species of central and southern England (Cox, 2007). Very many specimens found crawling over its foodplant in compartment 6 on 17.vi.2019.

Corizus hyoscyami (Linnaeus), a large black and red ground bug (family Rhopalidae). Status: very local. This rather local bug occurs on dry sandy soils, like dunes, cliffs and undercliffs, mainly in southern and western Britain. Until recently it was not known from any inland sites other than the Norfolk Breck, but over the last 10 years has occurred widely across central and southern England. It now occurs as far north as York and is quite widespread in the London area (Jones, 2008). It is thought to feed on a variety of wild vetches. Several specimens were found by general sweeping in all compartments on 7.ix.2018 and 18.ix.2018.

Cryptocephalus moraei (Linnaeus), a small black and yellow leaf beetle (family Chrysomelidae). Status: very local. A rather local, but quite widespread beetle associated with *Hypericum* species on chalk downland (Cox, 2007). Although

provisionally listed as nationally scarce (notable B), by Hyman (1985), this was not confirmed by Hyman & Parsons (1992) or Hubble (2014). Several specimens were found by sweeping in compartment on 2, 17.vi.2019.

Epitrix pubescens (Koch), a minute black flea-beetle (family Chrysomelidae). Status: very local. This local beetle feeds on woody nightshade, *Solanum dulcamara*, mainly in southern and eastern England (Cox, 2007). Although provisionally listed with nationally scarce (notable A) status by Hyman (1985), this was not confirmed by Hyman & Parsons (1992) or Hubble (2014). Many specimens were swept from the foodplant, growing in a dried out pond in compartment 6 on 7.ix.2018 and 18.ix.2018.

Epyris niger Westwood, a minute black beetle parasitoid wasp (family Bethylinidae). Status: very local. This scarce insect is recorded from a handful of southern vice-counties, mostly along the Thames Estuary and Basin, although it belongs to a little-studied group of insects and is probably under-recorded. Its life history is not known, but it is thought to be a parasitoid of beetles. A single specimen was found by sweeping in compartment 6 on 17.vi.2019.

Gonocerus acuteangulatus (Goeze), the box-bug, a medium-sized brown shieldbug (family Coreidae). Status: very local. Previously considered to be 'endangered' (red data book category 1, Shirt, 1987; Kirby, 1992), but now spreading and widespread. This was once regarded as one of the rarest bugs in Britain, and since its discovery in the late 19th century it was long known only from a few box trees on the precipitous slopes of Box Hill, Surrey. However, during the 1990s it was found at first one, and then other Surrey localities and has continued to spread. It is now known throughout most of that county (Hawkins, 2003), then in Kent and Sussex and is now quite widespread south of the Severn/Wash line. The reason for its increase appears to be a change in its foodplant preference from the very restricted box tree to hawthorn, apple, and honeysuckle. One specimen was swept from hawthorn bushes in compartment 2 on 18.ix.2018.

Gymnomerus laevipes (Sch.), a medium-sized mason wasp (family Eumenidae). Status: very local. This scarce wasp specializes in attacking weevil larvae to supply its nest of a few cells in a hollow bramble or other plant stem. Although not given nationally scarce status by Falk (1991a), the recent paucity of records indicates that it is declining and is now more or less limited to the sandy heaths of Surrey (Baldock, 2010) and Hampshire and in the Thames Estuary coasts of Essex and North Kent (Edwards & Telfer, 2001). Several specimens were found visiting flowers in compartment 6 on 17.vi.2019.

Linnaemya picta (Meigen), a small mottled grey parasitoid fly, family Tachinidae. Status: very local. This local fly is thought to be an internal parasitoid of noctuid moth caterpillars, but no firm rearing records are reported. It was first noted as a British species from Kent about 5 years ago it has spread into Bedfordshire, Oxfordshire and Berkshire. A specimen found by sweeping in compartment 6 on 7.ix.2018, was wrongly identified as *L. tessellans* in the previous report. Another specimen was swept from dense vegetation, compartment 6 on 17.vi.2019.

Lipoptena cervi Linnaeus, the deer ked, a small pale blood-sucking fly (family Hippoboscidae). Status: very local. This strange flattened fly, covered all over with backwards-facing bristles, is adapted to living in the fur of various deer species, the blood of which it drinks. It is winged, but once arrived at a host animal it sheds its wings and burrows into the pelage. This is a very local insect,

but because of its blood-sucking life history it is often considered vermin. It is actively eradicated on farmed or domesticated deer, as is a similar species on sheep. Most records are from Scotland or deer-infested woodlands of southern, western and central England. One specimen was caught as it was flying in compartment 6 on 18.ix.2018.

Longitarsus dorsalis (Fabricius), a very small black and yellow flea beetle (family Chrysomelidae). Status: very local. Originally given nationally scarce (notable B) status by Hyman & Parsons (1992) this was revised by Hubble (2014). Although widespread across much of south-east England, this is still a scarce species (Cox, 2007). It occurs on ragworts, usually on dry sandy or chalky soils or on coastal cliffs and landslips. Numerous specimens were found by sweeping the sparse vegetation in compartment 1 on 7.ix.2018.

Magdalis armigera (Geoffroy), a small black weevil (family Curculionidae). Status: very local. This widespread, but scarce species breeds in the twigs and branches of elm trees. It is currently increasing again, after becoming extremely scarce following the disappearance of elm trees from the landscape after the ravages of Dutch elm disease in the 1970s. Several were beaten from small elm trees in compartment 6 on 21.v.2019.

Magdalis ruficornis Linnaeus, a small black weevil (family Curculionidae). Status: very local. Feeds on hawthorn and wild plum (and domestic varieties), with larvae that develop in the dead twigs. It is recorded from scattered localities throughout England and Wales, but is decidedly scarce. Several were beaten from hawthorn bushes in compartment 2 on 21.v.2019.

Mecinus labilis (Herbst), a minute grey weevil (family Curculionidae). Status: very local. A widespread but rather local species that feeds on ribwort plantain, *Plantago lanceolata*, in rough grassy places, verges, downlands and hillsides. One specimen found by sweeping in compartment 6 on 21.v.2019.

Microlestes maurus Sturm, a minute black ground beetle (family Carabidae). Status: very local. Sometimes abundant when found, this tiny beetle is nevertheless rather confined to dry soils, often coastal. It is more or less confined to an area south of the Severn/Humber line and it is commonest in south-east England (Luff, 1998). One specimen was found by finger-tip searching under rubble, in compartment 2, and another was found in a pitfall trap in compartment 6 on 18.ix.2018.

Microlestes minutulus Goeze, a small black ground beetle (family Carabidae). Status: very local. This recent arrival to Britain was first found on the Suffolk coast in 1976, but was not recognized until 1995. It was later found in a few scattered coastal sites in Suffolk, Essex and Kent, usually in coastal litter (Luff, 1998). Since then it has continued to spread inland and is now known from numerous localities in southern and Eastern England. It seems to be associated with warm, well-drained soils with sparse vegetation. A single specimen was found under rocks and stones in compartment 2 on 17.vi.2019.

Ochina ptinoides Marsham, a minute grey woodworm beetle (family Anobiidae). Status: very local. Although widespread in England and Wales, this beetle is rather uncommon and scarce. It breeds in the dead and dying stems of ivy, *Hedera helix*, and usually only occurs in old woodlands where large ivy stems are available. Several specimens were beaten from overhanging tree branches in compartment 6 on 17.vi.2019.

Ophonus ardosiacus Luts., a medium-sized blue-black ground beetle (family Carabidae). Status: very local. Although given nationally scarce (notable B) status by Hyman & Parsons (1992), this was later revised by Telfer (2016). This is mainly an uncommon species of southern England, south of the Severn/Wash line, and most localities are coastal or estuarine, with a large series of localities on the north Kent and South Essex coast of the Thames Estuary (Luff, 1998). Several specimens were found under rocks and stones, and by finger-tip searching in the root-thatch layer in compartments 2 and 6 on 21.v.2019.

Stictopleurus punctatonervosus (Goeze), a medium-sized brown leaf bug (family Rhopalidae). Status: extinct (Shirt, 1987, Kirby, 1992), but now recolonized and spreading across Britain (Bantock, 2016). At the time of the national review of British Hemiptera, this species was regarded as being extinct. It had been recorded from only two localities in Britain, the last in 1870. It appears to have successfully recolonized Britain since it was recorded in Essex in 1997. It has now become a species typical of the dry, well-drained and sparsely vegetated brownfield sites in and around urban London and the Thames Estuary (Jones, 2008), and is spreading widely across England. Several specimens were swept from wormwood, *Artemisia vulgaris*, in all compartments on 7.ix.2018 and 18.ix.2018.

Thecophora atra (Fab.), a small black parasitoid fly (family Conopidae). Status: very local. This scarce fly is a parasitoid of solitary bees and is usually associated with chalk downland or dry soils in southern England and Wales. A specimen was found by general sweeping rough grassland in compartment 6 on 7.ix.2018.

DISCUSSION

Mown lawns, whether in domestic gardens, playing fields, or golf course fairways, are notoriously low in biodiversity. It is in the surrounding rough edges that wildlife lurks, and it was in these rough edges that this current invertebrate survey concentrated.

Most species found were common ones - those that could occur on almost any piece of open land in England. The habitats available - rough grassland, scrub, young woodland, small ponds - are all part of a relatively recently landscaped environment, and although some unusual and scarce species occurred, it does not seem that the site has had much time to mature and acquire complex communities of more varied and unusual insects. Where these habitats abutted the open golf course, they were rather severely managed with close mown grass hard up against hedges, grass cuttings dumped around trees and pond-side vegetation strimmed back severely. All of the species found on the site probably also occur in hedges and field edges and the M40 motorway verges nearby. Nevertheless a few interesting species were found and they can give a flavour of the invertebrate value of the site.

The open rough grassland, with its flowery mix and better diversity of plant architecture was home to a variety of more unusual insect species. Species like the picture-winged flies *Merzomyia westermanni* and *Oxya parietum*, the plant bugs *Stictopleurus punctatonervosus* and *Corizus hyoscyami*, weevil *Microplontus campestris*, leaf beetle *Cryptocephalus moraei*, and the flea beetles *Longitarsus dorsalis* and *Epitrix pubescens* all feed on plants typical of disturbed places or in rough grassland. Likewise, the

longhorns *Agapanthia villosoviridescens* and *Phytoecia cylindrica* are typical of rough flowery places where they breed in the stems of thistles or umbellifers.

Several species seem to prefer warm, well-drained chalk or sand habitats - the ground bug *Aphanus rolandi*, mason wasp *Gymnomerus laeivipes*, the ladybird *Hippodamia variegata*, the solitary bee *Lasioglossum pauxillum*, the ground beetles *Microlestes maurus* and *M. minutulus* and the bee parasitoid fly *Thecophora atra*. The large raised embankment of the M40 boundary, the narrow compartment 1 bund along the car park edge and the recently cleared compartment 2 provide this habitat in abundance.

The woodland areas are very recently grown up secondary woodland and scrub, but still produced the scarce leaf beetle *Chrysolina oricalcia* and twig-weevils *Magdalis armigera* and *M. ruficornis*.

The pond habitats, which looked rather uninteresting in autumn 2018 produced two of the scarcest beetles of the survey - the reed beetles *Donacia cinerea* and *D. thalassina*.

The snail-killing fly *Dichetophora finlandica* was an unusual find. Unfortunately, very little is known about this obscure and poorly understood insect. Only a single specimen was found, along with its congener, the local, but much more widespread *D. obliterata*. Another very unusual find was the deer ked, *Lipoptena cervi*. Again, just a single specimen was found, and its association with the habitat of the golf course is very loose since it is a highly mobile blood-sucking parasite of highly mobile deer hosts.

Perhaps the most surprising find was of several specimens of the picture-winged fly *Dorycera graminum*. This Biodiversity Action Plan species has been the subject of some considerable research to discover its life history and the reasons for its very limited occurrence in Britain. At the time of a species review (Ismay, 2000) it was known from only a handful of sites in the Thames Estuary meadows and had been declining. It appears to have had something of a renaissance in recent years and is now known to be quite widespread across central and southern England. It, however, remains scarce, with most known localities scattered across South Essex, North Kent and the London area.

CONCLUSION

The invertebrate habitats on Bicester Golf Course are relatively limited - rough flowery grassland, scrub, marginal trees, small ponds. These are all fairly recent habitat, and have had only a limited time to develop complex flora and fauna. Where these adjoin the fairways they are unsympathetically managed for wildlife. A limited number of unusual invertebrates found during September visits indicates that these semi-natural habitats have some value for invertebrate biodiversity, with several scarce or interesting species found.

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