

THE COCCINELLIDAE (LADYBIRDS) OF BUCKINGHAMSHIRE

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The species of Coccinellidae in Buckinghamshire are reviewed, the distributions of the commoner species are illustrated, and a key is given for their identification. 34 species are recorded, of which 7 are listed for the first time and 8 have not been taken since 1950. The incidence of the species is discussed with reference to conservation.

Introduction

Typical coccinellids are easy enough to recognise but several species are small and dull coloured and therefore easily overlooked. However the popularity and distinctiveness of the larger species mean that the group is relatively well recorded and easy to distinguish in the field. Thus the known distribution of Coccinellidae in this country will be a useful yardstick for comparison with other invertebrate groups. The maps included here should be regarded as preliminary. Anyone with additional distribution information is invited to submit their records (with specimens of the rare species) to the County Museum.

As all the published keys to British Coccinellidae are out of print or not easily available, a new one is given here, based mostly on simple characters. It is hoped that this will be adequate for almost all specimens. The County Museum has a good collection for comparative purposes. Besides the scattered specialist literature there is a useful introduction to this group by Chinery (1975), who includes a practical definition of the family, with colour illustrations of some common species.

This paper is a by-product of my interest in the distribution of other groups of beetles in Buckinghamshire. As such it has one obvious limitation: Collecting methods which particularly favour Coccinellidae were not generally used. However enough data have been collated, including information from museum collections, literature and other collectors to give a reasonable picture of the relative frequency of the species for a review of the family in Buckinghamshire to be worthwhile.

The majority of the distribution records are from my own collecting from 1976 to 1984; mostly done by searching grass tufts in winter. Other unpublished records have come from the collections of E. C. Ansorge, H. J. Quilter and T. Williams in the Buckinghamshire County Museum, Aylesbury (BCM), and E. G. Elliman in the National Museum of Wales, Cardiff (NMW). Several local collectors have also supplied records (see Acknowledgements). Sadly, the original list, in the Victoria County series (Fowler 1902, henceforth the VCH), is just a list and Fowler's collection in Nottingham is completely without data labels.

The area covered in this review is Watsonian vice-county 24 (i.e. including Slough) plus the small areas since incorporated into modern Buckinghamshire. The recording units are 5×5 km squares based on the National Grid. This size compensates for the rather weak coverage overall but allows some distinctions between regions. Maps are not provided for species with fewer than 5 records for the county.

Nomenclature follows Pope (1977), with the later amendments by Pope and Marshall (1979).

Biology

Coccinellids are important throughout the world both as predators of pests and as herbivorous pests themselves, although we have only one species of the latter group in Britain, and that is a harmless one. Because of this importance there is a vast amount of literature on various aspects of their biology which I do not intend to review here. Hodek (1973) is a good introduction to the subject.

Three aspects of coccinellid biology are of particular relevance to distribution and abundance:

1. Most of the predatory species feed primarily on aphids, scale-insects or mites, as both adults and larvae. Lists of prey for several common species are given by Moreton (1969), Mills (1981) and Gordon (1985). Coccinellidae with narrow prey ranges are frequently restricted to certain plant species, especially trees, and these beetles have been under-recorded.
2. Most species overwinter as adults. Different species prefer different hibernation sites (Eastop and Pope 1966; Benham and Muggleton 1978) and those species favouring above-ground positions have been under-recorded.
3. Two species (*Coccinella septempunctata* L. and *C. undecimpunctata* L.) make huge irruptions every few years, notably in 1976. This phenomenon has been observed since at least 1782 (Kirby and Spence 1873). Obviously in 'good' years these species should occur throughout the country, rendering their distribution maps meaningless.

Collecting Coccinellidae

Adults of most species may be collected throughout the year. In winter large numbers (up to several hundred per grass-tussock) hibernate in grass or under bark (especially of *Acer* and *Salix*). Three species are well known for hibernating in houses: *Adalia bipunctata* L., *C. septempunctata* and *C. undecimpunctata* (Benham and Muggleton 1978). At other times most species may be collected by sweeping low vegetation or beating higher foliage. A few species are most common in spring, and some are restricted to marshes or conifers.

Key to Buckinghamshire Coccinellidae

This key is intended for relatively quick and easy identification of most specimens. Identification of occasional melanistic or spot-polymorphic individuals may not be possible. The species of *Scymnus* are considered too difficult to separate here (see Pope 1973).

(Note: A key is essentially a list of choices between different characters worked through in sequence,

effectively eliminating the possibilities for the identity of a specimen one by one until an answer is arrived at.

In this key the choices are in pairs or couplets, although the two halves of the couplet may not be found together. Each half has a number, and its corresponding other half is indicated by a number in brackets, e.g. the two halves of the first couplet are 1(16) and 16(1).

The way to work the key is to see which half of the couplet best describes the specimen being determined. If it is clearly pubescent on the dorsal surface as in 1(16), proceed to the next couplet down i.e. 2(7). If it is glabrous and so fits 16(1) better, go on from that point i.e. to 17(26). Should the specimen fit the characters described in 17(26) go on to 18(19). If it seems better described by 26(17) go on from there to 27(32), and so on until a description is reached which fits the specimen and which has a name attached. This, if the Key has been worked correctly, is the identification of the specimen. *Ed*)

The characters used may need some explanation.
Dorsal surface: Either hairy (pubescent) or hairless (glabrous).

Body shape: Mostly almost hemispherical with head hidden from above e.g. *Tythaspis sedecimpunctata* (L.), or more elongate with more obvious head (e.g. *Anisosticta novemdecimpunctata* (L.)). *Coccidula* species are quite flat and elongate, unlike other coccinellids.

Spots: Shape, distribution and colour may be virtually constant or very variable, depending on the species. The typical patterns illustrated here are decisive. A spot is present in some species at the base of the middle (suture) of the elytra (scutellar spot).

Pronotum: The technical term for the dorsal surface of the 'thorax'.

Prosternum: The thoracic segment found between the front legs, and between those and the head. May be longitudinally keeled (carinate).

Tarsi: The small segments at the apex of the legs. There may be three or four.

1(16) *Dorsal surface clearly pubescent.*

2(7) Very small, 1–2.5mm; without distinct dorsal spots, or with a red spot on each black

- elytron; shape elongate-hemispherical (Fig. 1); antennae very short, cf. length of eye.
- 3(4) Prosternum produced anteriorly, without carinae; body entirely black, labrum, tibiae and tarsi yellowish; size 1–1.3 mm; on *Prunus* and other fruit trees (local). *Stethorus punctillum*
- 4(3) Prosternum not anteriorly truncate; without same colour combination; various habitats.
- 5(6) Prosternal carinae present; tarsi 4 segmented; elytra mostly black or red (Fig. 1.).
Scymnus spp.
- 6(5) Prosternal carinae absent; tarsi 3 segmented; elytra mostly reddish. *Nephus redtenbacheri*
- 7(2) Small, 2–4 mm; with or without distinct dorsal spots; hemispherical or elongate in shape; antennae longer than length of eye.
- 8(9) Black with 2 dull red blotches on each elytron; oval; size 2.5–3 mm; on deciduous trees (rare). *Platynaspis luteorubra*
- 9(8) Without this colour pattern, usually testaceous (dull red), with or without black marks; on herbs and grasses.
- 10(13) Elongate and quite un-coccinellid in shape (Figs. 2–3); dominant colour dull red or reddish yellow.
- 11(12) Reddish-yellow with 2 black marks on each elytron and one shared basally (Fig. 2); size 3–4 mm; marshy ponds (very local).
Coccidula scutellata
- 12(11) Entirely dull red; size 2.5–3.5 mm; damp grassland (common). *C. rufa*
- 13(10) At most elongate-hemispherical; ground colour brownish-yellow.
- 14(15) Size larger, 3–4 mm; variably patterned with c.20 blurred dark spots on elytra, with dark central spot on pronotum (Fig. 4); pubescence short; low herbs on dry soils (local).
Subcoccinella vigintiquattuorpunktata
- 15(14) Size smaller, 2–3 mm; with or without blurred dark horseshoe mark across elytra (Fig. 5); pubescence long; grassland (common).
Rhizophorus litura
- 16(1) *Dorsal surface glabrous.*
- 17(26) Isolated scutellar spot present, plus variable number of other black spots on red or yellow elytra.
- 18(19) Elytra with c.19 spots on yellow background (Fig. 6); shape long-oval; size 3–4.5 mm; on tall marsh grasses. *Anisosticta novemdecimpunctata*
- 19(18) Elytra with less than 12 spots on a red background; shape round-oval.
- 20(21) Scutellar spot elongate, other elytral spots usually merged into an elongate irregular streak; size 4–5 mm; on *Calluna* (very local).
Coccinella hieroglyphica
- 21(20) Scutellar spot round or transverse, other spots discreet; not associated with *Calluna*.
- 22(25) Pronotum black with white front angles; scutellar spot larger than the other spots (common spp).
- 23(24) Size larger, 6–8 mm; 7 elytral spots (Fig. 7). *C. septempunctata*
- 24(23) Size smaller, 4–5 mm; 11 elytral spots (Fig. 8). *C. undecimpunctata*
- 25(22) Pronotum mostly black but at least anterior and lateral margins white; scutellar spot smaller than largest elytral spots (Fig. 9); size 3.5–5 mm; (rare). *Adonia variegata*
- 26(17) Without well defined single scutellar spot.
- 27(32) Anterior of head extending laterally in front of eyes (Fig. 10); black with 2 or 4 red spots.
- 28(29) 4 elytral spots, anterior pair comma-shaped (Fig. 11); size 3–5 mm.
Exochomus quadripustulatus
- 29(28) 2 elytral spots.
- 30(31) Width of elytral spots 1.5 × length (Fig. 12); size larger, 3.5–5 mm (locally common).
Chilocorus renipustulatus
- 31(30) Elytral spots like narrow bars; size smaller, 2.5–3 mm (rare). *C. bipustulatus*
- 32(27) Without lateral extension of head in front of eyes.
- 33(38) Colour pattern of white spots on reddish-yellow background.
- 34(37) Ground colour redder, with 14 or 18 well defined elytral spots; size smaller, 4–6 mm.
- 35(36) Usually 14 elytral spots, 2 spots well separated at base of elytral suture (Fig. 13); size 4.5–6 mm; on deciduous trees (common).
Calvia quattuordecimguttata
- 36(35) Usually 18 elytral spots, 4 spots, sometimes fused at base of suture; size 4–5 mm; on conifers (rare). *Myrrha octodecimguttata*
- 37(34) Ground colour yellow with c.16 poorly defined spots; size larger, 6–7.5 mm; on deciduous trees (rare). *Halysia sedecimpunctata*
- 38(33) Elytral colour pattern of dark spots on paler background or entirely straw coloured.
- 39(40) Black elytral spots rectangular, often some

joined together (Fig. 14); elytral suture usually black; background colour yellow; size 3–4 mm (common).

Calvia quatuordecimpunctata
40(39) Spots not rectangular.

41(44) Large number of black elytral spots on clear yellow background; size small, 2.5–4 mm; on low vegetation (common).

42(43) 22 clearly defined spots, suture yellow (Fig. 15); size 3–4 mm.

Propylea vigintiduopunctata

43(42) At most 16 spots, lateral ones usually fused, suture black (Fig. 16); size 2.5–3 mm.

Tythaspis sedecimpunctata

44(41) Background not clear yellow, elytral spots different; size 3.5–10 mm.

45(50) Size very large, 6–10 mm; on conifers.

46(47) Entirely reddish yellow with at most large M-mark on pronotum and vague oblong elytral markings; legs yellow; size 7–8 mm.

Neomyia oblongoguttata

47(46) Pronotum without M-mark; legs brown or black; elytra usually spotted.

48(49) Pronotum black with white anterior and lateral margins, and 2 white basal spots; elytra varying from c.12 well defined black spots with cream borders on red background, to entirely red (Fig. 17); elytral margins black; legs black; size 8–10 mm.

Anatis ocellata

49(48) Pronotum creamy-yellow with brown spots; elytra varying from c.16 irregular brown spots on reddish-yellow background, to reddish-yellow with 4 vague spots (Fig. 18); elytral margins pale; legs brown; size 6–8 mm.

Harmonia quadripunctata

50(45) Size smaller, 3.5–5 mm.

51(52) Entirely reddish-brown with dark brown M-mark on pronotum; legs yellow; size 4–5 mm; on conifers.

Aphidecta obliterated

52(51) Without pronotal M-mark; not on conifers; size 3.5–5 mm.

53(54) Typically with 2 large black elytra spots on red background, thorax mostly black and 12 cream spots on brown background; legs black.

Adalia bipunctata

54(53) Typically with 10 small black elytral spots on reddish-yellow background, thorax cream with black spots (Fig. 20); other forms include overlap with *A. bipunctata*; legs usually with tibiae and tarsi pale brown.

Adalia decempunctata

Species list

Species marked * are new records for the County.

Subcoccinella vigintiquatuor punctata (L.)

6 squares (Map 1): Chesham (SP90), E. G. Elliman (NMW); West of Maidenhead (SU88) (Sharp 1906); Prestwood (SP90), 1919, H. J. Quilter (BCM); Chalfont St Peter (SU99), i.1959 and vi.1970, E. C. Ansoorge (BCM); Burnham Beeches, SU9486, edge of cornfield/wood, ix.1981, C. Reid. Littleworth Common, SU98, xi.1983, C. Reid; Amerden Ponds, SU9080, gravel pit, ix.1984, C. Reid; Hedsor, SU9086, streamside, ix.1984, C. Reid.

Merely listed in the VCH (i.e. regarded as common) and was taken 'by sweeping on the chalk downs near Tring' (Elliman 1892). It is locally common in Britain as far as south Scotland. Although still frequent in open situations on the gravels and sands of southern Buckinghamshire, the species appears to have disappeared from the Chilterns and has never been recorded from north of the Chiltern escarpment, where the soils are predominantly clays.

Subcoccinella vigintiquatuor punctata is phytophagous (low herbs and grasses) and although a pest of some crops in Europe is regarded as harmless in Britain (Richards, Pope and Eastop 1976). The contraction in range may be due to 'cleaner' agricultural practices.

Coccidula rufa (Herbst)

59 squares (Map 2).

Common throughout the British Isles. One of the six commonest species in Buckinghamshire, widespread and abundant throughout the county. The vast majority of my specimens were taken on waterside vegetation or in damp grassland and this species seems to be absent from chalk grassland and woodland. The prey of this species appear to be unknown.

**Coccidula scutellata* (Herbst)

4 squares: Gerrards Cross, SU998883, under *Juncus/Glyceria* by pond, 10.ix.1979, C. Reid; Haversham, SP827426, *Phragmites/Veronica beccabunga* by old fishpond, 3.viii.1980, C. Reid; Stoke Park, SU970823, *Glyceria maxima* marsh, ix.1981, C. Reid; Weston Turville Reservoir LNR, SP8609, grass tufts by reedbed, iii.1984, C. Reid.

Not previously recorded, and very local in England generally (J. Muggleton, pers. comm.). Apparently confined to ponds with tall emergent vegetation, but absent from many suitable sites. It seems possible that this species has undergone a slight range expansion in recent years, spreading as far north as Durham (Reid and Eyre 1984), which may account for the recent Buckinghamshire records.

Rhyzobius litura (F)

62 squares (Map 3).

Very common and widely distributed in most of the British Isles. One of the six commonest species, widespread and abundant in all grassland habitats, whether on clay or chalk, disturbed or natural. Aphid prey hosts include *Centaurea*, *Cirsium*, *Dactylis* (Mills 1981), and low vegetation especially grasses (Eastop and Pope 1966), and prey include the aphids *Dactyonotus cirsii* (L.), *D. jacobaeae* (L.) and *Macrosiphum avenae* (F.) (Gordon 1985). I have found *R. litura* feeding on aphids on *Senecio jacobaeae* at Langley Park. It will also feed on rusts and fungi (Ricci 1986a).

Stethorus punctillum (Weise) (= *Scymnus minimus* Rossi)

2 squares, only 1 post-1950: Chesham (SP90), E. G. Elliman (NMW); Weston Turville, SP8510, on bushes by lane, v.1977, C. Reid, in garden, vii.1977, C. Reid. Recorded from Tring (frequent in gardens (Gibbs 1902)).

The species is very small and restricted in habitat and therefore overlooked, but it appears to have greatly decreased in abundance throughout England. It is an important predator of tetranychid mites on fruit trees (Moreton 1969) and oaks (Eastop and Pope 1966) and has undoubtedly suffered from the extensive use of acaricides in orchards. Weston Turville still has a few old plum orchards although these are being cleared for housing.

Scymnus auritus Thunberg (= *S. capitatus* (F))

3 squares: Chalfont St Peter (SU99), 27.v.1958, E. C. Anson (BCM); Robertswood LNR, SP8805, beech litter, bole of tree, 12.iii.1978 C. Reid; Shabbington Wood, SP61, malaise traps, 1.iv.-30.ix.1980, O. Watts. Also recorded in the VCH, and from Tring (Gibbs 1902).

Restricted to, and locally common on oak trees, where it feeds on the mite *Phylloxera* (Pope 1973), throughout England.

Scymnus femoralis (Gyll.) (= *S. pygmaeus* Fourc.)

1 square, pre-1950: Cowcroft Wood, Chesham (SP90), E. G. Elliman (NMW). Also recorded in the VCH, and from Albury (Gibbs 1902).

A local southern species preferring dry grassland (Pope 1973) and therefore probably confined to the chalk in this county. Its continued presence needs confirmation and I have failed to find *S. femoralis* at Cowcroft Wood.

Scymnus frontalis (F.)

1 square, pre-1950: Prestwood (SP80), 4.viii.1925, H. J. Quilter (BCM). Also recorded in the VCH, and from Tring (Gibbs 1902).

A local southern species associated with aphids on grassland plants (thistles and sowthistles) (Pope 1973), and possibly confined to the chalk in this county.

Scymnus haemorrhoidalis Herbst

15 squares (Map 4).

The most widely recorded of the small Coccinellidae in Buckinghamshire. All records are for grassy riverbanks except one in damp woodland and one on sandy heathland. Prey unknown.

**Scymnus limbatus* Stephens

1 square: Weston Turville Reservoir LNR, SP8609, *Salix*/reed litter by water, iii.1980, C. Reid.

This is the typical habitat of this local and rare species, confined to southern England. Prey unknown.

**Scymnus nigrinus* Kuglann

1 square, pre-1950: Prestwood (SP80), 4.i.1935, H. J. Quilter (BCM).

Widespread but local in Britain and always found on or near pines on which it predated woolly aphids (Pope 1973). Undoubtedly overlooked.

Scymnus suturalis Thunberg (= *S. discoideus* Illiger)

2 squares: Shire Oak, SP9128, swept pine flowers,

24.v.1980, C. Reid; Oak Wood, SP9128 and SP9129, swept pine flowers, v.1984; Shabbington (SP61) (Aubrook 1936); Shabbington Wood (SP61), in malaise traps, 22.i.v.-8.vii.1980, O. Watts. Also recorded in the VCH and from Tring (Gibbs 1902).

Restricted to pines and common in Britain (Pope 1973). Probably found throughout the county.

**Nephus redtenbacheri* (Mulsant)

3 squares: Robertswood LNR, SP8805, in *Pseudoscleropodium*, open ground near pines, 12.iii.1978, C. Reid; Calvert LNR, SP6825, low vegetation, dry grassland, 24.ix.1978, C. Reid; Thorndon, SP7436, damp pasture by river, i.1982, C. Reid. Also recorded from Tring (Gibbs 1902).

Very local but found throughout Britain on rather open, dry soil habitats (Pope 1973). It appears to be genuinely rare and local in Buckinghamshire. Prey unknown.

Platynaspis luteorubra (Goeze)

2 squares, 1 pre-1950: Burnham Beeches (SU98) (VCH); Chalfont St Peter (SU99), 27.v.1958, E. C. Anson (BCM).

A rare southern English species associated with old deciduous trees. Prey unknown.

Chilocorus bipustulatus (L.)

No localities are known but the species is listed in the Bucks VCH and was presumably frequent at that time. Recorded next to Whitecross Green (SP51) in Oxfordshire (Campbell 1985). Found on trees on sandy heaths. The species must be at least very local in Buckinghamshire although not looked for. Prey presumably scale insects.

Chilocorus renipustulatus Scriba (= *C. similis* Rossi)

12 squares (Map 5).

Widespread and common in diverse habitats and undoubtedly under-recorded. All of my specimens were taken on *Fraxinus*, but *Salix* and *Fagus* are also known hosts for its scale insect prey (Mills 1981).

Exochomus quadripustulatus (L.)

12 squares (Map 6).

The distribution and habits of this species are similar to *C. renipustulatus* and the two species are frequently found together. The scale insect hosts of *Exochomus* are found on *Salix* and *Fraxinus* (Mills 1981), but I have only taken it on *Fraxinus*, and in grass tufts in March.

Adonia variegata Goeze (= *Hippodamia*)

There are no locality records for this species although it was listed without comment in the VCH, and was recorded from Aldbury (Gibbs 1902). A dry grassland species which seems to have become much rarer in England, it is possibly still present in the Chilterns. Prey unknown.

Anisosticta novemdecimpunctata (L.)

13 squares (Map 7).

Possibly formerly much more local (recorded only from Burnham Beeches in the VCH), but is now widespread on tall emergent vegetation throughout the county. Often found with *Hygroma dimidiata* (Ol.) (Staphylinidae) and *Psammoechus bipunctatus* (L.) (Silvanidae) and like them is very active on stems of *Phragmites* and *Glyceria maxima*, within which it overwinters. Supposedly an aphid predator.

Aphidecta oblitterata (L.) (= *Adalia*)

5 squares, 1 pre-1950: Eton (SU97) (White-Thompson 1930); Chalfont St Peter (SU99), x. 1956 and viii. 1968, E. C. Ansorge (BCM); Sheeppothill Wood, SP 7164, under sycamore bark, fir wood, ii. 1980, C. Reid; Shabbington Wood (SP61), 8.iv.–30.ix. 1980, O. Watts; Shire Oak, SP9128, on pines, v. 1984, C. Reid. Recorded in the VCH and from Tring (Gibbs 1902).

Aphidophagous, the host trees being *Picea* and *Pinus* (Mills 1981). Overwinters under bark (Parry 1986). Undoubtedly under-recorded.

Tythaspis sedecimpunctata (L.) (= *Micraspis*)

62 squares (Map 8).

One of the commonest Coccinellidae in Buckinghamshire and a common species in southern and central England. Like *Rhyzobius litura* this species is found in any sort of grassland and may occur in huge aggregations in grass tussocks, especially *Deschampsia*, in winter.

This ladybird is mycophagous, associated with *Aridius* spp. (Lathridiidae) and *Stilbus testaceus* (Payk.) (Phalacridae) in Buckinghamshire. It also feeds on pollens and insects (Ricci 1986b). It seems to have become commoner this century.

Adalia bipunctata (L.)

28 squares (Map 9).

Common and widely distributed in southern Britain. Supposedly a lowland species in southern England (Benham and Muggleton 1976), but it certainly occurs on the Chiltern tops. Mostly recorded from woods, hedgerows and gardens in Buckinghamshire. In winter it hibernates under bark and in buildings (Benham and Muggleton 1978). Prey host-plants include a wide variety of trees, bushes and tall herbs (Mills 1981). In studies of coccinellids at Kew, Eastop and Pope (1966) found *A. bipunctata* in equal proportions on trees and herbs in summer, and in winter it hibernated above ground.

The extreme colour polymorphism of *A. bipunctata* has been the subject of several recent studies in Britain. The greater incidence of melanism around cities is now thought to be linked to increased cloud cover (thermal melanism) rather than crypsis on sooty substrates (Muggleton, Lonsdale and Benham 1975; Brakefield 1987).

Adalia bipunctata is very closely related to *A. decempunctata* but the supposed hybrid, *biabilis* Mariner is now known to be a form of *decempunctata* (Ireland, Kearns and Majerus 1986). These authors illustrate some laboratory reared hybrids.

Adalia decempunctata (L.)

18 squares (Map 10).

Rather more local than *A. bipunctata* in southern England and mostly found on deciduous trees, especially *Salix*, in summer. Recorded aphid prey hosts are all deciduous trees (Mills 1981). In contrast to *A. bipunctata* it hibernates on the ground (Eastop and Pope 1966).

Coccinella hieroglyphica L.

Listed in VCH but without locality. Associated specifically with *Calluna* therefore very local in southern England. I have been unable to find this species in the small remnants of heathland in Buckinghamshire and it may well be extinct.

Coccinella septempunctata L.

52 squares (Map 11).

The common British ladybird, widely distributed throughout the county and one of the six most recorded species. Subject to huge fluctuations in annual populations aided by occasional large-scale irruptions from the Continent. Found in any habitat, although the aphid host-plants are predominantly tall herbs (Mills 1981). As this species is such a great wanderer a distribution map is somewhat meaningless but it does show the available coverage for a large brightly coloured species which should occur everywhere.

Coccinella undecimpunctata L.

19 squares (Map 12).

As with *C. septempunctata*, a migrant with large fluctuations in population, but much less common. Recorded aphid host plants are all grasses, from *Triticum* to *Phragmites* (Mills 1981). In Buckinghamshire it occurs in all grassland habitats.

Halyzia sedecimpunctata (L.)

Listed without locality in the Bucks VCH and recorded from Tring (Gibbs 1902). A nationally rare species which appears to have contracted in range; recent records are from south England, Northumberland and northern Scotland (Reid 1986; Muggleton, pers. comm.). Appears to be associated with *Betula* but the aphid prey are unknown. This large species may be extinct in the county.

**Harmonia quadripunctata* (Pont.)

3 squares: Shire Oak, SP9128, swept pine flowers, 24v. 1980, C. Reid; Shabbington Wood (SP61), in malaise traps, 1980, O. Watts; Slough, SU9979, 1983, J. Hammond.

A recent immigrant to Britain, first recorded in 1937 in West Suffolk, but known from most of southern England by 1974 (Hammond 1974). Occurs only on conifers, especially *Pinus*.

**Anatis ocellata* (L.)

2 squares: Shire Oak, SP9128, swept pine flowers, v. 1980, C. Reid, v. 1984, C. Reid; Shabbington Wood (SP61), in malaise traps, 6.iv.–9.ix. 1980, O. Watts.

Common on pine throughout Britain. Recorded aphid hosts are *Pinus* and *Betula* (Mills 1981).

**Myrrha octodecimguttata* (L.)

2 squares (1 doubtful, pre-1950): Marlow Common (Radford 1932); Shabbington Wood (SP61), in malaise traps, 27.v.–3.vi. 1980, O. Watts.

Widespread in Britain but usually rare, on conifers. Aphid host is *Pinus* (Mills 1981). The Marlow record is from a list with errors and may be a misdetermination.

Calvia quattuordecimpunctata (L.) (= *Halyzia conglobata*)

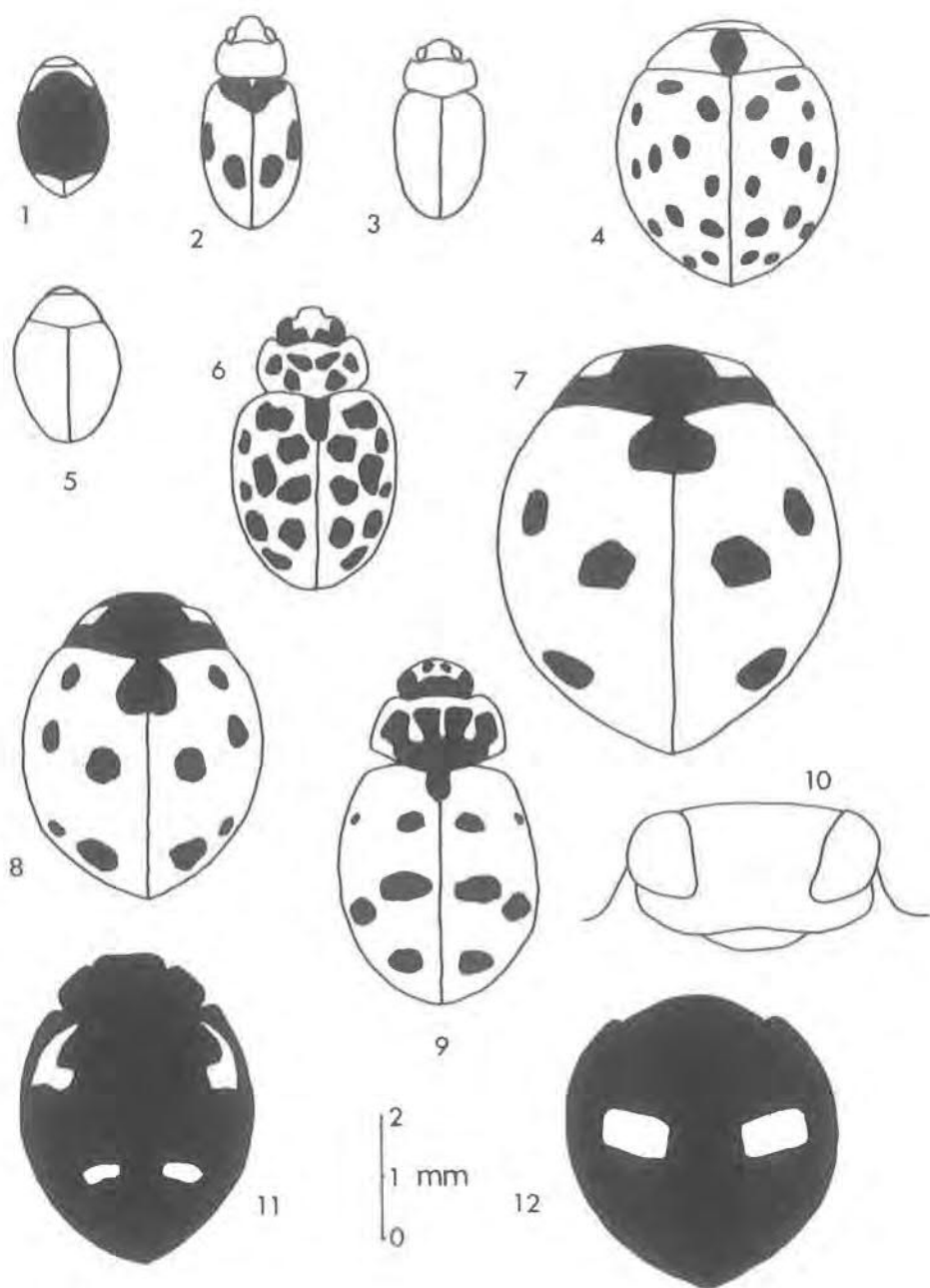
54 squares (Map 13).

Common and widely distributed throughout England and one of the six commonest species in Buckinghamshire. It occurs in all habitats in the county including chalk grassland, fens and woodland. The recorded aphid-prey host plants include grasses, tall herbs and trees (Mills 1981) and Eastop and Pope (1966) found *C. quattuordecimpunctata* on trees and herbs in the ratio 1:4.

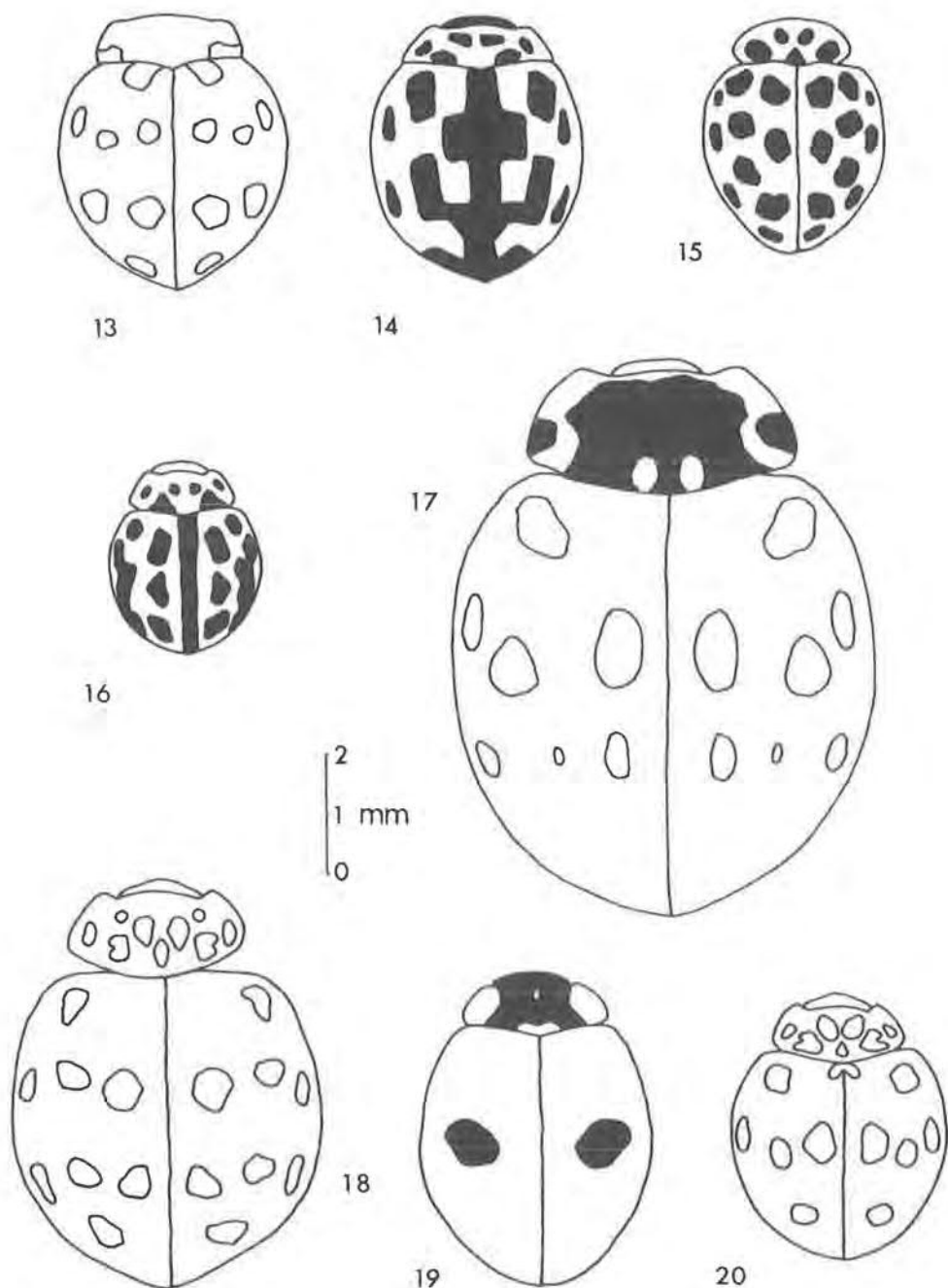
Calvia quattuordecimguttata (L.) (= *Halyzia*)

12 squares (Map 14).

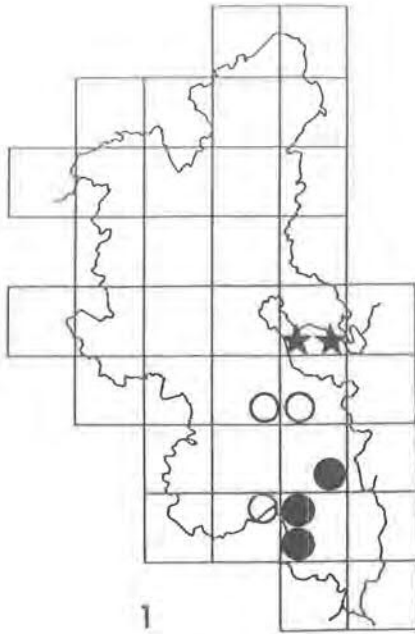
Fairly common and widely distributed throughout England.



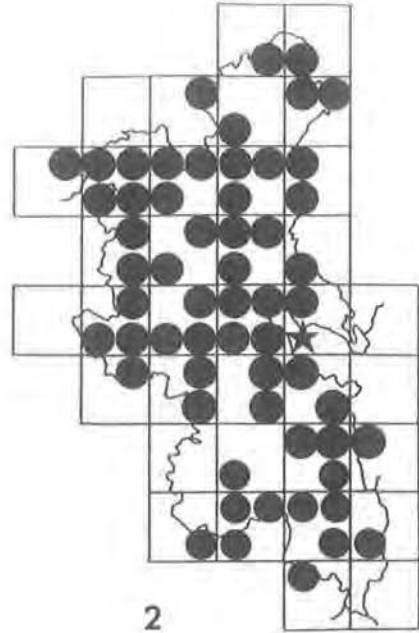
Figs. 1-12. 1, *Scymnus haemorrhoidalis*; 2, *Coccidula scutellata*; 3, *C. rufa*; 4, *Subcoccinella vigintiquatuor-punctata*; 5, *Rhyzobius litura*; 6, *Anisosticta novemdecimguttata*; 7, *Coccinella septempunctata*; 8, *C. undecimpunctata*; 9, *Adonia variegata*; 10, 11, *Exochomus quadripustulatus*; 12, *Chilocorus renipustulatus*.



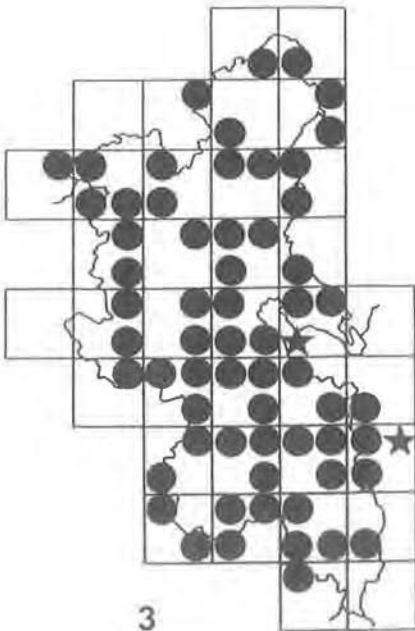
Figs. 13–20. 13, *Calvia quattuordecimguttata*; 14, *C. quattuordecimpunctata*; 15, *Psyllobora vigintiduo-punctata*; 16, *Tytthaspis sedecimpunctata*; 17, *Anatis ocellata*; 18, *Harmonia quadripunctata*; 19, *Adalia bipunctata*; 20, *A. decempunctata*.



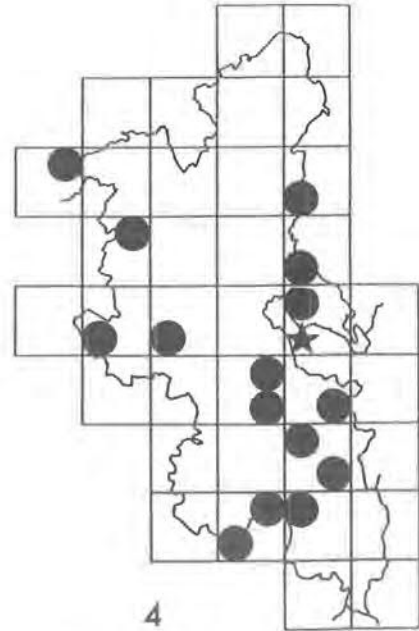
1



2

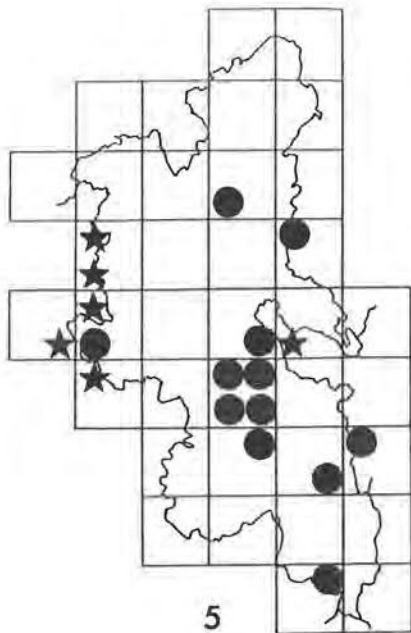


3

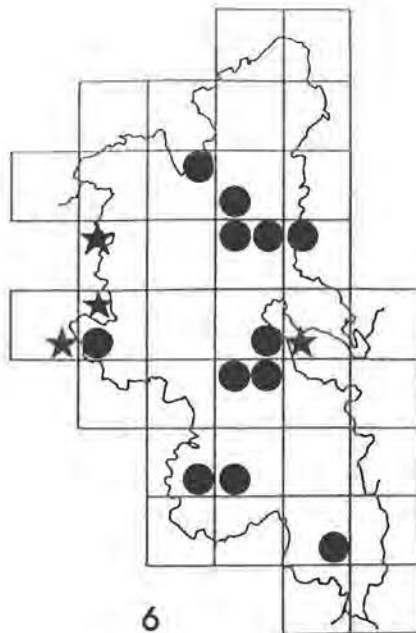


4

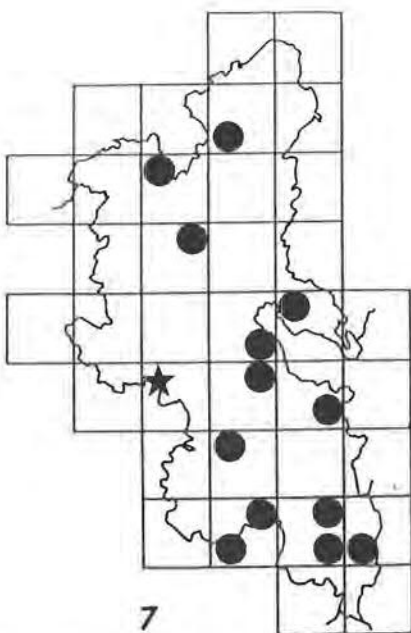
Maps 1–4 (symbols: ★ = extra-limital; ○ = pre-1950; ● = post-1950). 1, *Subcoccinella vigintiquatuor-punctata*; 2, *Coccidula rufa*; 3, *Rhyzobius litura*; 4, *Scymnus haemorrhoidalis*.



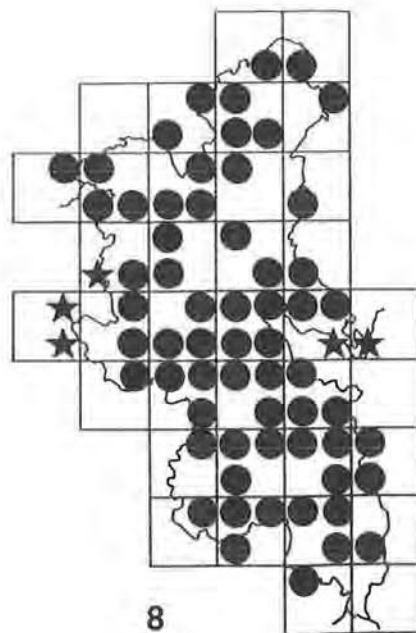
5



6

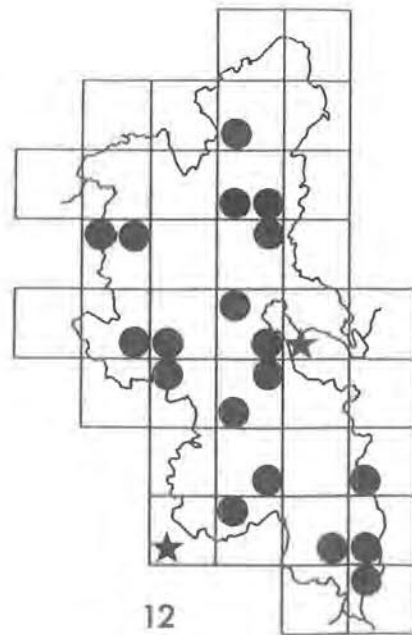
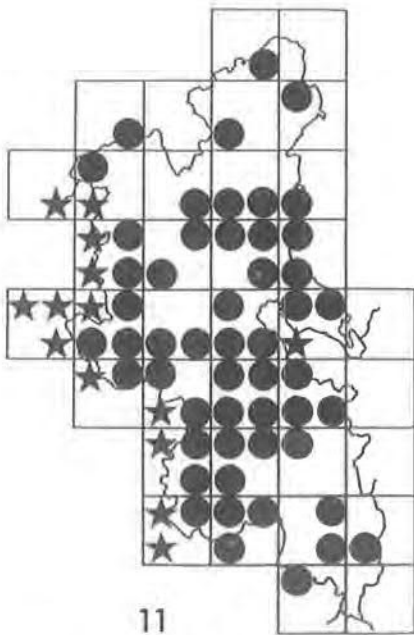
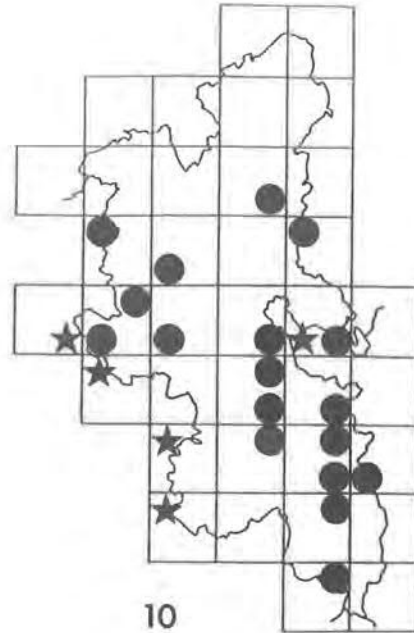
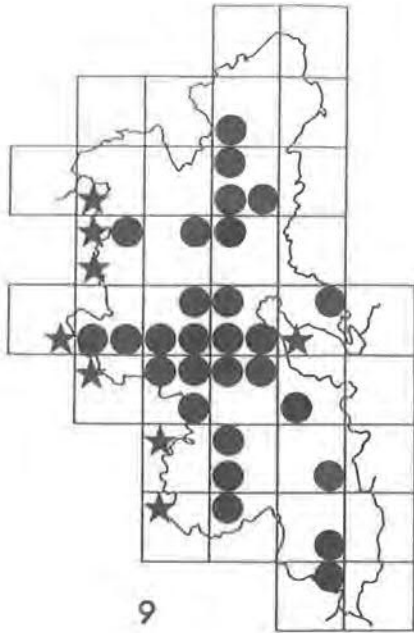


7

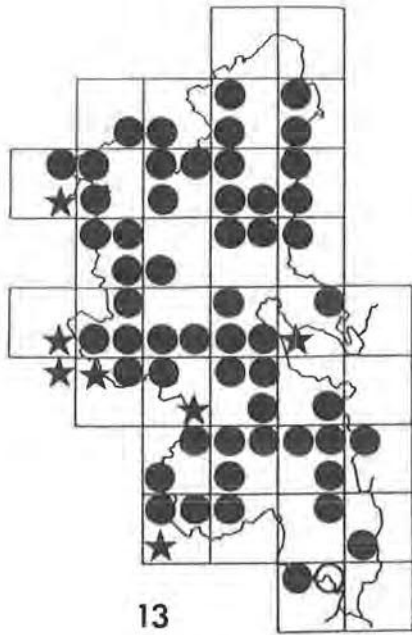


8

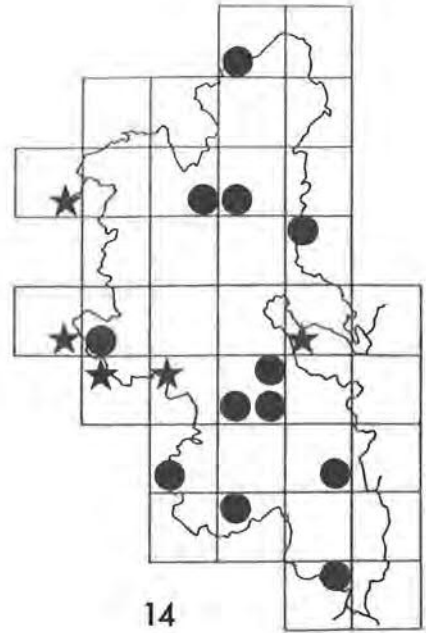
Maps 5–8. 5, *Chilocorus renipustulatus*; 6, *Exochomus quadripustulatus*; 7, *Anisosticta novemdecimguttata*; 8, *Tythaspis sedecimpunctata*.



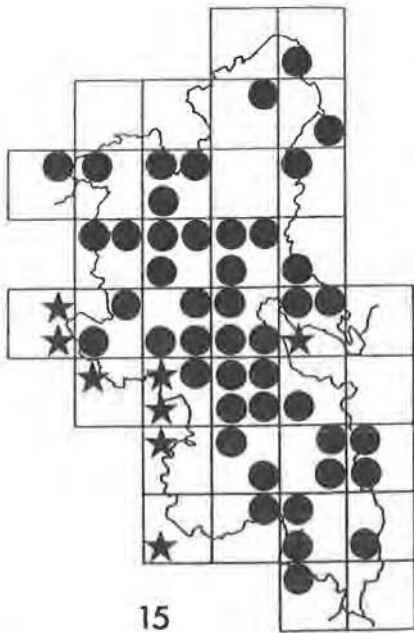
Maps 9–12. 9, *Adalia bipunctata*; 10, *A. decempunctata*; 11, *Coccinella septempunctata*; 12, *C. undecimpunctata*.



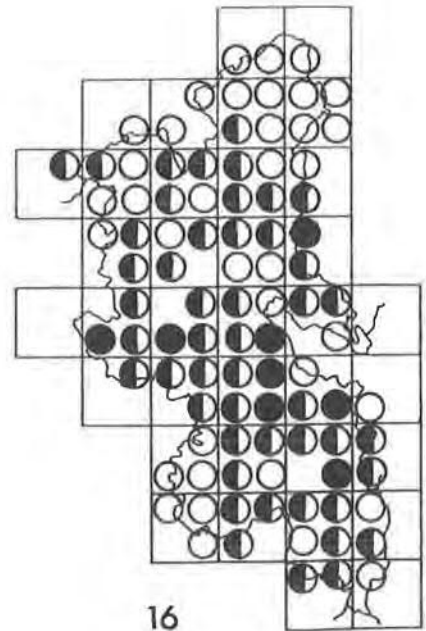
13



14



15



16

Maps 13–16. 13, *Calvia quattuordecimpunctata*; 14, *C. quattuordecimguttata*; 15, *Psyllobora vigintiduopunctata*; 16, density of records of Coccinellidae: ○ = 1–4 species; ◐ = 5–9 species; ● = 10+ species.

The recorded aphid-prey host plants are all deciduous trees (Mills 1981). In Buckinghamshire most records are for woodland habitats rather than hedges.

Myzia oblongoguttata (L.) (= *Mysia*)

Listed in Bucks VCH but otherwise unrecorded. Common on pines throughout Britain and undoubtedly overlooked in the county.

Psyllobora vigintiduopunctata (L.) (= *Halyzia*)

45 squares (Map 15).

Common and widely distributed in southern England, and one of the 6 commonest species in this county. My records are for low vegetation in all habitats, particularly hedgerows and pasture. It seems particularly common in nettle beds. This species was taken predominantly on low herbs by Eastop and Pope (1966).

Discussion

Generally the fauna is typical of the southeast Midlands and contains no surprising elements. Further species which might be expected include *Clitostethus arcuatus* Rossi (see Campbell 1985), *Scymnus schmidti* Fürsch (see Pope 1973) and *Hyperaspis pseudopustulata* Muls. (see Campbell 1985), all of which are small and relatively rare, and *Coccinella distincta* Fald. which inhabits wood-ant nests.

Overall the north, northwest and southeast portions of the county remain poorly studied and these areas include important woodland, wetland, and chalk habitats (Map 16). Most of the records included in this paper are from my own collecting which has been strongly biased towards ground searching, especially in damp habitats in winter. Thus there are very few records of pine-frequenting coccinellids, which are probably common and widely distributed throughout the county. They have no doubt increased in abundance as conifers have replaced hardwoods. Other tree frequenting species such as *Scymnus auritus*, *Chilocorus* spp., *Adalia* spp., and *Calvia quattuordecimguttata* are also under-represented in the material available.

In contrast the frequencies of species inhabiting low vegetation are likely to be reasonably accurate. Thus *R. litura* and *C. rufa* are two of the commonest species in Buckinghamshire but are very poorly represented in Oxfordshire where the survey is clearly biased towards tall vegetation species (Campbell 1985). The other most frequent species in Buckinghamshire are *T. sedecimpunctata*, *C. septempunctata*, *C. quattuordecim-*

punctata and *P. vigintiduopunctata*. The most comparable county survey to hand is a list of the most abundant (by distribution, as used here) Coleoptera of Essex, which includes seven species of coccinellid (Hammond 1974). The Essex list excludes *T. sedecimpunctata* and has in addition *C. undecimpunctata* and *A. decempunctata*, but otherwise has the same species. There are also two studies of back-garden coccinellids using malaise traps during the 1970s. In Leicester, Owen (1982-3) trapped 4260 specimens of 8 species in 10 years. He found a continuous residential population of *A. bipunctata*, large influxes of *C. septempunctata* and *C. undecimpunctata* in summer in certain years, and invasion by *C. quattuordecimpunctata* in late summer every year. *Psyllobora vigintiduopunctata* and *A. decempunctata* were frequent and *C. quattuordecimguttata* and *C. renipustulatus* very scarce. In Oxford over three years, Losito (1984) collected *C. septempunctata*, *A. bipunctata*, *C. quattuordecimpunctata* and *C. undecimpunctata* most commonly, with large fluctuations of the two *Coccinella* species. There seems to be a general consensus from these studies that *A. bipunctata* and *C. quattuordecimpunctata* are consistently abundant whereas the *Coccinella* spp. have irregular populations, in the Midlands. The six common Buckinghamshire species are all exclusively or commonly grassland or low herbage species inhabitants and are therefore particularly adapted to the modern landscape, the culture-steppe (Hammond 1974).

The distribution and frequency of the small or rare species agrees reasonably well with the available comparative literature. For example *S. haemorrhoidalis* is clearly the commonest scymnine in the southeast Midlands (Pope 1973), just as it is in Buckinghamshire. However the number of recent records of *C. bipustulatus*, a species I have never seen in Britain, from Oxfordshire (Campbell 1985) is puzzling. Other rare species show similar distribution patterns in the two counties, e.g. *S. vigintiquatuordecimpunctata* has declined in both and has its headquarters in the south, and *A. variegata* is represented by only pre-1938 records in both counties.

Conservation of Buckinghamshire Coccinellidae

(i) Firstly it should be pointed out that there have

probably been some extinctions. *Adonia variegata* and *H. sedecimguttata*, though relatively large species, have not been recorded since 1910, and have become rarer nationally. They are probably now extinct in Buckinghamshire, but if rediscovered would certainly merit conservation.

(ii) The conservation of species. Most species are widespread and catholic in their habitat choice, or are under-recorded in the county because they occur on conifers or because they are very small. Species to be conserved should be native, restricted by habitat, and of limited distribution. The following species appear to qualify: *C. scutellata*, *S. limbatus*, *S. frontalis*, *S. femoralis*, *P. luteorubra*, *C. hieroglyphica* and *C. bipustulatus*. These are all relatively scarce species nationally. There are no post-1960 records in Buckinghamshire of the last five species. *Coccinella hieroglyphica* is of particular concern because of its association with *Calluna*, an increasingly scarce commodity in the county.

(iii) Conservation of sites. Sites where any of the above seven species have occurred should be regarded as important at present until more information is available on their distribution. The few sites I studied that were particularly species rich were merely more frequently visited (e.g. Weston Turville Reservoir LNR), or subject to intensive faunal surveys (e.g. Robertswood and Calvert LNRs).

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BIBLIOGRAPHY

- Benham, B. R. and Muggleton, J. 1976. 'Coccinellidae distribution maps scheme, progress report, April 1975', *Entomologist's Gaz.* **27**, 269-73.
- Benham, B. R. and Muggleton, J. 1978. 'Observations on the overwintering of Coccinellidae in the British Isles', *Entomologist's mon. Mag.* **114**, 191-97.
- Brakefield, P. M. 1987. 'Industrial melanisms: Do we have the answers?', *Trends in Ecology and Evolution* **2**(5), 117-22.
- Campbell, J. M. 1985. *Occasional paper no. 8. An atlas of Oxfordshire ladybirds* (Woodstock, Oxfordshire County Council).
- Chinery, M. 1975. *Insects of Britain and northern Europe* (London, Collins).
- Eastop, V. F. and Pope, R. D. 1966. 'Notes on ecology and phenology of some British Coccinellidae', *Entomologist* **99**, 287-9.
- Elliman, E. G. 1892. 'Tring district', *Entomologist's Rec. J. Var.* **3**, 296-9.
- Fowler, W. W. 1902. 'Coleoptera', in *A history of the County of Buckingham* (Victoria County History). **1**, 71-98.
- Gibbs, A. E. 1902. 'Coleoptera', in *A history of the county of Hertfordshire* (Victoria County History). **3**, 83-110.
- Gordon, R. D. 1985. 'The Coccinellidae (Coleoptera) of America north of Mexico', *J.N.Y. Ent. Soc.* **93**, 1-912.
- Hammond, P. M. 1974. 'Changes in the British coleopterous fauna', in D. L. Hawksworth (ed.) *The changing flora and fauna of Britain* (London, Academic Press) 323-69.
- Hodek, I. 1973. *Biology of Coccinellidae* (The Hague).
- Ireland, H., Kearns, P. and Majerus, M. 1986. 'Interspecific hybridisation in the coccinellids: Some observations on an old controversy', *Entomologist's Rec. J. Var.* **98**, 181-5.
- Kirby, J. and Spence, W. S. 1873. *An introduction to entomology* (7th edn.).
- Losito, L. J. 1984. 'The occurrence of Coccinellidae in suburban habitats', *Entomologist's Rec. J. Var.* **96**, 14-16.
- Mills, N. J. 1981. 'Essential and alternative foods for some British Coccinellidae (Coleoptera)', *Entomologist's Gaz.* **32**, 192-202.
- Moreton, B. D. 1969. 'Beneficial insects and mites', *Bull. Minist. Agric. Fish. Fd.* **20**, 1-118.
- Muggleton, J., Lonsdale, M. and Benham, B. R. 1975. 'Melanism in *Adalia bipunctata* L. (Col., Coccinellidae) and its relationship to atmospheric pollution', *Journal appl. Ecol.* **12**, 451-64.
- Owen, D. F. 1982-3. 'Fluctuations in abundance of

- Coccinellidae', *Entomologist's Rec. J. Var.* **94**, 225-8 and **95**, 29-31.
- Parry, W. H. 1986. 'The overwintering strategy of *Aphidecta oblitterata* in Scottish coniferous forests', in I. Hodek, *Ecology of Aphidophaga* (Dordrecht, Junk) 179-84.
- Pope, R. D. 1973. 'The species of *Scymnus* (s. str.), *Scymnus* (Pullus) and *Nephus* (Col., Coccinellidae) occurring in the British Isles', *Entomologist's mon. Mag.* **109**, 3-39.
- Pope, R. D. 1977. 'A checklist of British insects. Coleoptera and Strepsiptera', *Handbk. Ident. Br. Insects* **11(3)**, i-xiv, 1-105.
- Pope, R. D. and Marshall, J. E. 1979. 'The British and Fennoscandian checklists of Coleoptera — a commentary with corrections', *Entomologist's mon. Mag.* **115**, 117-21.
- Radford, P. 1932. 'A list of Coleoptera taken in and around Eton during the summer of 1931', *Eton College NHS Annual Report, 1931-2*, 41-3.
- Reid, C. A. M. 1986. 'Some rare or local Coleoptera from lowland wetland in North Northumberland', *Naturalist* **111**, 121-3.
- Reid C. A. and Eyre, M. D. 1984. 'Coccinellidae in north-east England', *Recording News (Hancock Museum)* **3**, 17-18.
- Ricci, C. 1986a. 'Seasonal food preference and behaviour of *Rhyzobius litura*', in I. Hodek, *Ecology of Aphidophaga* (Dordrecht, Junk) 119-24.
- Ricci, C. 1986b. 'Food strategy of *Tythaspis sedecimpunctata* in different habitats', in I. Hodek, *Ecology of Aphidophaga* (Dordrecht, Junk) 311-16.
- Richards, A. M., Pope, R. D. and Eastop, V. F. 1976. 'Observations on the biology of *Subcoccinella vigintiquatuoripunctata* (L.) in southern England', *Ecol. Ent.* **1**, 201-7.
- Sharp, W. E. 1906. 'Some Buckinghamshire Coleoptera', *Entomologist's mon. Mag.* **42**, 38-9.
- White-Thompson, C. R. 1931. 'A list of the Coleoptera taken in and around Eton during the summer of 1930', *Eton College NHS. Annual Report, 1930-1*, 97-101.