Trophic variety and abundance of hoverflies (Diptera, Syrphidae) in an English suburban garden

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28924 hoverflies of 85 species were caught in a Malaise trap in an English suburban garden during the eight-year period 1972-79, and three additional species were hand-netted. Hoverfly larvae fall into five trophic categories all of which were represented by adults in the trap sample. 82.71% of the hoverflies trapped have larvae that feed on aphids, 12.04% feed on decaying organic material, 5.14% eat living plants, 0.09% scavenge in Hymenoptera nests, and 0.02% are associated with tree sap or rotting wood. The relative frequency of the different trophic groups varied annually and seasonally although the aphid-feeders were nearly always the most abundant. 22 species are believed to breed in the garden, and a further 29 in the surrounding area; 15 species are regarded as casual and 22 as chance visitors. It is suggested that the high plant diversity and spatial heterogeneity of gardens result in them supporting more species than would be found in a natural area.

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The garden habitat

Gardens, under the general heading of domestic habitats, have been dismissed as being 'in the direction of biological deserts' (Elton 1966) on the assumption that the many introduced plants growing there have few animals associated with them. Intensive studies of a suburban garden in Leicester, England, have shown that this is not so and that insect diversity is high (Owen 1976, 1978a,b, Owen and Owen 1974, 1975). As industrial, and accompanying residential, development encroaches on the English countryside, gardens become increasingly important as refuges for wildlife, particularly insects. Most gardens are small, some are very large, but collectively they occupy an area of more than 400000 ha, more than the area set aside as national parks and nature reserves. Housing patterns and social customs in England are such that the garden habitat is in no way threatened, and indeed its total area is increasing all the time.

Gardens are characterized by contrived plant diversity and spatial heterogeneity. Casual introduction of native plants, i.e. weeds, together with planned planting programmes result in continual addition of new plants, but this is countered by weeding and management decisions as to what to grow. Gardens are therefore maintained in a state of permanent succession, and not only is the resulting plant diversity high, but the composition of the flora changes from year to year. The average gardener demands much from a small patch of land: a display of colourful flowers, a supply of vegetables and other produce, space to sit or for children to play, somewhere to stroll, a pleasing view from the house, a screen from neighbours or traffic, and often a display site for his or her skills and tidiness. This produces, in even the smallest garden, a patchwork of shaded and open places, so close-packed that the garden becomes a system of ecotones, each micro-habitat grading into another on all sides. Consequently, even a small garden can accommodate a wide variety of insects, simply because the garden habitat encompasses a multitude of ecological niches.

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The study garden

The study garden, which covers an area of 658 m², is typical of English suburbia. It was created in 1927 and, although subject to many minor changes in lay-out of paths, lawns and flowerbeds and in the sorts of annual and biennial flowers and vegetables grown, it has probably remained essentially unchanged for at least 40 years. There are paved paths, neat lawns (one of which was left uncut for a season to allow grasses to flower, and has since been converted to a flowerbed), herbaceous borders with an array of colourful and fragrant flowers, vegetable patches, a compost heap, a rock-garden, fruit bushes and a tangle of brambles, an old apple tree, many shrubs of a variety of species, some tall, exotic conifers screening the garden from a busy road, and until recently a small pond. It is thus a complex mosaic of open spaces and shade, as are other gardens in the vicinity. There are also two small parks with mature trees and recreational lawns within a radius of 450 m, a small stream flanked by tall trees within 125 m, and farms and open fields 800 m away, although the garden is only 3.8 km from the centre of the large industrial city of Leicester in central England.

Since 1971, an effort has been made to make the garden as attractive and hospitable as possible to insects and other wildlife. This includes growing plants whose flowers are known to be attractive to insects (Tab. 1), limiting pruning and other clearing activities to what is absolutely necessary, maintaining continuous soil cover, whether by weeds or cultivated plants, and rigorously excluding herbicides, insecticides and other poisonous chemicals. Small-scale plant diversity is further enhanced by mixed planting of vegetables and ornamental flowers, an ancient gardening practice which is believed to reduce outbreaks of pests.

In the five-year period 1975-79, 310 species of flowering plants belonging to 71 families were recorded, 142 native species and 168 aliens. All plants that have been introduced to the British Isles by man, whether intentionally or accidentally as weeds of cultivation, together with hybrids of garden origin are regarded as aliens. Some plants on the garden list are so widespread and familiar that their status as aliens is open to dispute: Acer pseudoplatanus was brought to England by the Romans; Buddleia davidii, widely introduced to gardens in the early 1900s had become naturalized by the 1940s; and Matricaria matricariaeoides and Conyza canadensis, although probably introduced accidentally, are common weeds. On the other hand, Daphne mezereum and Potentilla fruticosa, both widely cultivated, are rare native species, and such common garden crops as cabbages, cauliflowers and broccoli are derived from the native Brassica oleracea. The exact composition of the garden flora changes from year to year as species appear and disappear, by accident or intent, but plant diversity and dense cover are maintained. Nevertheless, the garden is in no sense wild or overgrown, and its general appearance is similar to that of neighbouring gardens.

The sample of hoverflies

Since 1972, a Malaise trap has been operated continuously on the same site from 1 April to 31 October, and the large catch includes many hoverflies, among them several species which have never been observed alive in the garden. Hoverflies are good indicators of the diversity of a habitat because different species and life stages exploit their surroundings in many different ways, yet the family is distinct and easily recognized.

The type of Malaise trap used is described in Townes (1972). It is an open-sided tent-like structure of fine netting, with a central baffle parallel with the open sides. The netting 'roof' of the trap is highest at one end where a collecting jar filled with 70% alcohol is attached. Insects flying in through the open sides and striking the central baffle tend to fly upwards, and ultimately fall into the collecting jar at the apex. The trap is particularly suitable for sampling flying insects, such as hoverflies, because it is in operation continuously, day and night, in all weather conditions, and uses no attractant, capturing only those insects that have independently entered its air space. The trap samples an area of about 2.6 m² to a height of 1.1 m, and therefore removes from the garden only those flying insects that
enter 2.9 m³ of air space. This is unlikely to affect the size or composition of the garden fauna; even if insects enter the garden to fill the space created by removing some, both removal and replacement are effectively random.

During the eight-year period 1972-79, the Malaise trap caught 28924 hoverflies of 85 species, slightly more than a third of the British species (Kloet and Hincks 1975). Three additional species have been hand-netted in the garden. A total of 127 species has been recorded in the county of Leicestershire (Owen 1979), so one small garden has yielded two thirds of the species known to occur in the vicinity, including 18 known only from the garden.

Trophic composition of the Malaise trap sample

Adult hoverflies are predominantly nectar- and pollen-feeders and although there are some differences between species, the requirements of all are broadly similar. The larvae, however, vary considerably in their food and feeding places, and hence in their positions in garden food webs. Five categories (derived from Colyer and Hammond 1968) can be recognised: consumers of living roots, bulbs, stems or fungi; predators of aphids and other Homoptera; dwellers in (and presumably feeders on) rotting wood or sap from tree wounds; dwellers in (and hence feeders on) soft, or liquid decaying organic material; and scavengers in the nests of ants, bees or wasps. Members of most groups are probably opportunist feeders: aphid-feeders occasionally attack other insects and each other; larvae associated with tree sap may eat small insects attracted to the sap; and scavengers in Hymenoptera nests occasionally eat live larvae and pupae. Hoverflies as a family are unusual in exploiting the environment in such diverse ways. All five groups are represented by adults caught in the Malaise trap and the numbers of individuals and species, and the trophic levels of the groups are shown in Tab. 2. The larvae of a number of garden species are undescribed, but they are assumed to have habits similar to those of closely related species.

Three genera trapped in the garden, Merodon, Eumerus, and Cheilosia, fall into group 1. Merodon equestris and the two species of Eumerus feed by burrowing in living bulbs, and almost certainly breed in the garden. Of the five species of Cheilosia, C. bergenstammi feeds on ragwort (Smith 1979), and the others are believed to feed on living plants. Group 1 is represented by 1488 individuals, less than 6% of the total catch.

Most garden hoverflies, and the majority of the common species, have aphid-feeding larvae. As far as is known, the larvae of all Syrphinae and Pipizini feed on aphids or other herbivorous insects. Fifty-three species and over 80% of all individuals taken fall into group 2. Gardens provide ample opportunities for aphid-feeding species, and seven species of Syrphinae have been reared from larvae collected in the garden: Syrphus ribesii, Episyrphus balteatus, Sphaerophoria scripta, Melanostoma mellinum, M. scalaris, Platycleirus albinanus and P. scutatus. Most of the abundant garden species range widely over many habitats and the adults of a few are migratory.

Group 3 includes 5 species and only 7 individuals, but neither rotting wood nor sap runs on trees are common garden micro-habitats, and the species collected are unlikely to breed in the garden. Exactly what their larvae feed on is a matter for conjecture; indeed placing them in a separate group may be unjustified. They probably feed on rotting plant material, but larvae that imbibe

| Feeding site | Trophic level | Representatives: species in each group in brackets | Species | Individuals | Percentage of total |
|--------------|--------------|--------------------------------------------------|--------|-------------|---------------------|
| Stems, roots, bulbs | primary consumers | Cheilosia (5), Eumerus (2) Merodon (1) | 8 | 1488 | 5.14 |
| Plants infested with aphids | secondary consumers | Syrphinae (46) Pipizini (7) | 53 | 23922 | 82.71 |
| Tree sap, roiling wood | mainly primary consumers | Ferdinandeia (2), Xylota (1) Criorrhina (2) | 5 | 7 | 0.02 |
| Decaying organic material | primary to third-order decomposers | Rhingia (1), Chrysogasterine (3) Syrta (1), Tropidia (1) Eristalini (11) | 17 | 3482 | 12.04 |
| Wasp and bumblebee nests | usually secondary to third-order decomposers | Volucella (2) | 2 | 25 | 0.09 |

Notes: Separation into trophic levels is based on the system suggested by Wiegert and Owen (1971). Additional species collected in garden: 2 secondary consumers (1 Syrphinae, 1 Pipizini) and 1 decomposer (Eristalini).
tree sap might better be placed in group I, and any that are predators of insects attracted to the sites where they occur should perhaps be placed in group 2 with the aphid-feeders.

The species in group 4 are taxonomically diverse, but all have larvae that live in decaying organic material, often of animal origin. All are decomposers, but since the nature of their food varies, they operate at several trophic levels. Larvae of *Erisalis* and *Helophilus* are usually found in water feeding on minute particles of organic material, but *Erisalis tenax* also occurs in dung, in sewage and in wet carrion. The larvae of *Syritta pipiens* occur in garden compost, but they have also been recorded from dung of cows, horses and humans (Skidmore 1978). Most of the species in this group undoubtedly breed in the study garden or its immediate vicinity, either in compost, on dung or carrion, or in ponds and tree holes, and the proximity of farmland accounts for the regular capture of *Rhingia campesiris* whose larvae feed on and in cow dung. Group 4, represented by 17 species and 3482 individuals, 12% of the total catch, ranks second in importance to the aphid-feeders in group 2.

*Volucella bombylans* and *V. pellucens* are the only representatives of group 5. Their larvae scavenge in bee and wasp nests, not only eating dead Hymenoptera and detritus, but also stimulating the host larvae to produce excrement on which they feed. Occasionally however, especially towards the end of the season, they eat live larvae, pupae or weakened adults. Group 5 constitutes less than one per cent of the total sample.

Most of the species of hoverflies on the British list can be assigned to groups 1 to 5, if larval habits are inferred from descriptions and from known habits of other species in the same genera. Group 2, species with aphid-feeding larvae, are over-represented in the garden, and groups 1 and 3 are under-represented; groups 4 and 5 form about the same proportion of the British and garden lists.

**Annual variation in the trophic composition of the Malaise trap sample**

The trophic composition of the Malaise trap catch varied to some extent from year to year, as shown in Tab. 3. Although hoverflies with aphid-feeding larvae (group 2) constituted the majority of the sample in every year, their relative frequency was considerably lower in 1973, 1976 and 1978. In 1973 this was associated with an increase in relative frequency of species with larvae that feed on decaying organic material (group 4); the autumn of 1973 was warm and sunny, and species such as *Erisalis arbustorum*, which continue flying late in the season, were particularly abundant. In 1976, species with herbivorous larvae (group 1) formed a greater proportion of the total catch than in other years, and *Merodon equestris* and *Eumerus strigatus* were relatively common. In 1978, a good year for hoverflies in general, the relative frequency of group 4 was again high, and *Syritta pipiens* was particularly abundant.

Large number of hoverflies with aphid-feeding larvae, particularly *Metasyrphus corollae* and *Episyrphus balteatus*, a well-known migrant, moved into the garden during the first two weeks of August in 1975 and 1977, and during the last two weeks of July in 1976; *M.

![Fig. 1. Frequency of Metasyrphus corollae, Episyrphus balteatus, other hoverflies with predatory larvae, and those with other larval feeding habits in annual Malaise trap samples.](image-url)
corollae formed about 40% of the total catch in 1975 and in 1976, and E. balteatus over 44% in 1977 (Fig. 1). This is not reflected in the relative frequency of group 2 hoverflies in these years (see Tab. 3), largely because the numbers of resident species of Melanostoma and Platycerius in the catch were far lower than usual; Melanostoma mellinum, for instance, which breeds in the garden and is usually common, was represented by only two individuals in 1977, and M. scalare, which also breeds, was absent altogether. In 1978, when the numbers of M. corollae and E. balteatus fell, those of M. mellinum, Platycerius albimanus and P. scutatus reached unprecedented levels. Thus the trophic composition of the garden hoverfly fauna was apparently unaffected by immigration of M. corollae and E. balteatus to the garden in 1975, 1976 and 1977.

Seasonal variation in the trophic composition of the Malaise trap sample

Seasonal changes in the relative abundance of species with different larval habits is expressed in Fig. 2 as the percentage of each month's catch composed of aphid-feeders (group 2). They were first to appear and increase in numbers in spring, and their frequency relative to those with other larval habits was highest in April and May. It fell in June when the catch increased in variety, but had usually risen again by August. By October, species whose larvae feed on decaying organic material, e.g. Eristalis and Helophilus, were common and the relative frequency of aphid-feeders was lower.

The greatest departure from this pattern was in 1973 when Eristalis arbustorum and other species with larvae that feed on decaying organic material became particularly abundant in August such that, by September, the relative frequency of aphid-feeders had fallen to 38.8%. In 1975, the relative frequency of aphid-feeders fell to 51% in June when Merodon equestris, Syrta pipiens and Eumerus spp. were common, and rose to only 68.5% in July with the appearance of a great variety of other species, especially Eristalis and Helophilus. In June 1976, abundance of the same species accounted for the low relative frequency of aphid-feeders, 42.5%, but this rose dramatically to 85.6% in July when Eristalis and Helophilus became relatively scarce. 1976 was the drought year when seasonality differed from the usual pattern. In the other years, the number of individuals and of species in the hoverfly sample reached a peak in August, but in 1976 both peaked in July and immigration of M. corollae and E. balteatus to the garden took place earlier than in other years when this occurred; few hoverflies were caught in September and October, and the usual seven-month season was compressed into the period April-August. Hoverflies with aphid-feeding larvae were relatively scarce in July 1977 and 1978, 50.9 and 55.1%, respectively; in July 1977 the total catch was small and aphid-feeders unusually scarce, but in 1978, E. arbustorum and S. pipiens were relatively common.

The usual situation in any month was for hoverflies with aphid-feeding larvae to outnumber those with other larval habits in the Malaise trap sample, although in the late summer those whose larvae feed on decaying organic material became relatively more common. Aphid-feeders were not only more abundant than the
1972–1979

![Graph](image)

Fig. 3. Monthly frequency of hoverflies with predatory larvae and those with other larval habits, captured in a Malaise trap during the eight-year period 1972–79.

other but also showed a more pronounced seasonal peak in numbers (Fig. 3).

Hoverflies and the garden habitat

The size and diversity of the hoverfly sample from the Malaise trap leads to speculation as to what so many individuals and species were doing in the garden. Adults eat not only nectar but also pollen and, in at least some species, a pollen meal is necessary for the maturation of eggs and therefore precedes egg-laying (Pollard 1971). All the common, medium to large species are regularly seen at flowers such as Potentilla fruticosa, Geranium cinereum, Buddleia davidii, and composites, including Chrysanthemum frutescens and various species of Aster. Amongst the smaller hoverflies, some, such as Platycheirus spp., Melanostoma spp. and Syratta pipiens, are abundant on flowers, although others, such as Pipiza spp., are known only from the Malaise trap. Adults of all species find an abundance of food in gardens which become especially important late in the summer when there are few wild flowers to compete with the herbaceous border display. Many nectar-feeding insects are indiscriminately to the source of fluids rich in sugars, salts and other nutrients. Hoverflies are no exception and lap honeydew, the juices of rotting fruit and exudations from carrion: Syrphus ribesii and S. vitripennis have been caught in traps baited with fish offal; and traps baited with rotting fruit have caught S. ribesii, S. vitripennis, Metasyrphus corollae, M. luniger, Scaeva electitica, Episyphus balteatus, Platycerus scutatus, Ferdinandaea cuprea, Volucella pellucens, and Helophilus hybridus.

While adult hoverflies exploit flowers, honeydew and fallen fruit in a garden, their larvae eat a variety of different foods. Gardens can obviously accommodate species with aphid-feeding larvae, and to a lesser extent those whose larval habit decaying organic material, bulbs and Hymenoptera nests; but those whose larval feed on tree sap or rotting wood are less likely to find egg-laying sites. The spatial complexity of gardens is important, for adult females show habitat preferences when egg-laying; for instance, Syrphus ribesii females are more often seen lapping honeydew and laying eggs on aphid-infested plants of Epilobium angustifolium in the sun than in the shade.

Some garden hoverflies are resident; the rest are visitors, sometimes casual, but more often seeking food or egg-laying sites. Of the 88 species, 30 (such as Baccha, Ferdinandaea, Criorhina and Xylola) are usually associated with woodland or woodland edge, eight (such as Rhingia and Merodon) with more open places, and 50 are found in both types of habitat (compiled from Pollard 1971, Steele and Welch 1973, and Stubbs and Chandler 1978). Since gardens include both open and shaded places, they might be expected to be more hospitable to species with no marked habitat preferences. Species characteristic of open ground may be attracted to lawns and paths; furthermore much of the land surrounding suburban gardens is open and sunny. It is less easy to explain the presence of so many woodland species. There are many sheltered and shady corners in the garden and nearby, but it is unlikely that woodland species breed or spend any length of time in the garden. Twenty-six of the woodland species are rare visitors, presumably attracted by flowers as a source of food; the other four have aphid-feeding larvae and might therefore be inspecting potential breeding sites.

On the basis of captures and breeding records together with the statements about habitat given above, the hoverflies can be divided into four categories: 22 species are regular, common and are either known to breed or assumed to do so; a further 29 species are regularly present and are assumed to breed within the surrounding gardens and suburban areas; 15 species have been recorded in more than one year, but only infrequently, and are probably casual visitors, not resident in the area adjacent to the garden; 22 species have been recorded in one year only, 16 of them represented by a single individual in the Malaise trap sample, and rank as chance visitors (Tab. 4). Species in the last two
Tab. 4. Status of hoverflies recorded in a suburban garden, 1972–79, and number of individuals caught in Malaise trap. (Nomenclature after Kloet and Hincks 1975.)

| Known or assumed to breed in garden | Assumed to breed in surrounding area | Casual visitors | Recorded in one year only |
|------------------------------------|-------------------------------------|----------------|---------------------------|
| Syrphus ribesii (Linnaeus) .......... 896 | Metasyrphus laitfuscatus (Macquart) 67 | Epistrophe nitidicollis (Meigen) 9 | Syrphus torvus Osten-Sacken 1 |
| S. vitripennis Meigen ............... 191 | Scaeva pyrastra (Linnaeus) .......... 16 | Metasyrphus latilunulatus (Collin) 9 | Epistrophe grossulariae (Meigen) 1 |
| Epistrophe elingans (Harris) .......... 153 | Dasyssyrphus albostritatus (Fallén) .... 77 | Dasyssyrphus lunulatus (Meigen) 1 | Scaeva selenitica (Meigen) 2 |
| Metasyrphus corollae (Fabricius) .... 4972 | Leucozona lucorum (Linnaeus) ........ 21 | Melangyna lasiophthalma (Fallén) 2 | Dasyssyrphus tricolor (Collin) 1 |
| M. luniger (Meigen) ................. 604 | Melangyna cineta (Fallén) ........... 12 | Meliscaeva cinctella (Zetterstedt) 3 | D. venustus (Meigen) 1 |
| Episyrophus balteatus (Degeer) ....... 3360 | Meliscaeva auricollis (Meigen) ....... 91 | Melangyna umbellatatarum (Fabricius) 3 |
| Sphaerophoria menthastris (Linnaeus) ... 65 | Sphaerophoria rueppelli (Wiedemann) ... 17 | Parasyrphus punctulatus (Verrall) 1 |
| S. scripta (Linnaeus) .............. 698 | C. verrallii Collin (Linnaeus) ....... 13 | Xanthogramma pedissequum (Harris) 4 |
| Baccha elongata (Fabricius) .......... 89 | Baccha obscurinennis Meigen .......... 30 | Platycheteiros scambus (Staeger) 3 |
| Melanostoma mellinum (Linnaeus) ..... 1754 | Platycheirus immarginatus (Zetterstedt) 11 | Pyrophaena rosarum (Fabricius) 2 |
| M. scalar (Fabricius) .............. 498 | Lejosgaster metallina (Fabricius) .... 7 | Pipiza fenestrata (Meigen) 1 |
| Platycheirus albimanus (Fabricius) ... 3825 | Paragus trihilaris (Fallén) .......... 90 | C. nasutula Becker 1 |
| P. angustatus (Zetterstedt) .......... 225 | Pipiza noctiluca (Linnaeus) ........... 53 | C. proxima (Zetterstedt) 3 |
| P. clypeatus (Meigen) .............. 1493 | Necrophoromocymba (Linnaeus) ......... 105 | Ferdinandea cuprea (Scopoli) 1 |
| P. manicatus (Meigen) .............. 249 | Neocnemosom oxypterus (Meigen) ....... 91 | P. raficormis (Fabricius) 1 |
| P. pellitae (Meigen) ............... 248 | Cheilosia bergeri (Fabricius) ....... 60 | Orthoneura splendens (Meigen) 1 |
| P. scutatus (Meigen) ............... 3556 | Volucella bombylans (Linnaeus) ...... 10 | Tropidia scita (Harris) 1 |
| P. ambiguus (Fallén) .............. 356 | V. pellucens (Linnaeus) ............... 15 | Criothone berberina (Fabricius) 1 |
| Eumenis strigatus (Fallén) .......... 729 | Helophilus hybridus (Linnaeus) ....... 13 | C. floccosa (Meigen) 1 |
| E. tuberculatus (Fallén) ............ 429 | Loew (Linnaeus) ............... 247 | Helophilus parallelus (Harris) 1 |
| Rondani (Linnaeus) .......... 429 | Eristalis arbustorum (Linnaeus) ....... 960 | Eristalis abius (Collin) 2 |
| Syrta api (Linnaeus) .............. 1725 | E. intricarius (Linnaeus) .............. 22 | 15 species |
| Merodon equestris (Fabricius) ...... 296 | E. nemorum (Linnaeus) .............. 14 | |
| 22 species | E. pertinax (Scopoli) ............... 98 | |
| Notes: Total number of species = 88. Total Malaise trap catch = 28924 individuals of 85 species. Species hand-netted but not taken in the Malaise trap are indicated by –; Myathropa florea is recorded regularly. Dasyssyrphus lunulatus has been recorded in more than one year, although only one individual has entered the Malaise trap. |
categories may visit gardens for food when dispersing or migrating, but the most obvious migrants, *M. corolla* and *E. balteatus*, are also regarded as resident. To summarize, 51 of the 88 species caught are regarded as part of the resident fauna of the garden and surrounding areas, while 37 species, including most of the woodland species, are casual or chance visitors.

The special significance of gardens for hoverflies is as sources of food in the form of abundant flowers which, in woodland or marshy sites, may be seasonally scarce. Gardens provide abundant food not only for residents but also for dispersing or migrating hoverflies and for those seeking breeding sites. They also provide refuge for a diversity of species including rarities whose habitats are threatened by encroaching urbanization. Several rare species were caught in 1976, when the proportion of species taken once only was unusually high; adverse, dry weather conditions evidently caused many species to range widely seeking food which was available in the garden.

There is no reason to suppose that the fauna of the study garden differs greatly from that of other gardens. The implication is that the hoverfly fauna of suburbia is abundant and diverse, and this can be attributed to the way in which gardens are maintained. Man-made they may be, and in that sense are unnatural, but they are far from impoverished. Indeed, the contrived plant and habitat diversity of gardens probably makes them attractive to a greater variety of species than are found in most 'natural' areas.

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**Correction**

Fraser, D., Arthur, D., Morton, J. K. and Thompson, B. K. 1980. Aquatic feeding by moose *Alces alces* in a Canadian lake. — Holart. Ecol. 3: 218–223.

In Tab. 5 the figures for *Eleocharis acicularis* were incomplete. The complete line should read:

| *Eleocharis acicularis* | Bay 5 | 3 | 1798±198 | 691±70 | 232±9 | 166±23 | 1401±149 | 1423±34 |

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