

Further insect and other invertebrate records from Glasgow Botanic Gardens, Scotland

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ABSTRACT

This paper is one of a series providing an account of the current status of the animals, plants and other organisms in Glasgow Botanic Gardens, Scotland. It lists mainly invertebrates that have been found in the Gardens over the past 20 years in addition to those reported in other articles in the series. The vast majority of these additions are insects, though some records of horsehair worms (Nematomorpha), earthworms (Annelida: Lumbricidae), millipedes (Diplopoda) and centipedes (Chilopoda) are included.

INTRODUCTION

This paper highlights some of the invertebrates that have been found in Glasgow Botanic Gardens (GBG), Scotland, principally in the 20 years since the previous invertebrate list was published (Hancock, 1999; hereinafter referred to as the "1999 list") and most of which are also not covered in other notes in the *Wildside Revisited* series (McInerny, 2021; Weddle, 2019a,b, 2021a-d).

Many of the invertebrates mentioned are non-lepidopteran species found in the moth trap. These are marked with an asterisk and were recorded by the author in the period from 2009. Some of these species were also in the 1999 list, but are included here to provide a complete record of species present in the moth trap. Also included are species in the "by-catch" from surveys of arachnids in the Gardens and glasshouses conducted by C. Cathrine in 2017-19.

This account does not list all the species that have been recorded in the last 22 years. The full list of species found in the Gardens, including the Kelvin Walkway and wooded slopes to the north can be found at www.gnhs.org.uk/biodiversity/GBG_splist.pdf, which shows the years when first and last recorded, and is updated regularly.

INSECTS

Ephemeroptera (mayflies)

Baetidae: **Baetis* sp.

Caenidae: **Caenis luctuosa* (angler's curse); **C. robusta*.

Ephemerellidae: **Serratella ignita* (blue-winged olive), found occasionally.

Heptageniidae: **Heptagenia sulphurea* (yellow may dun), common (in moth trap). **Rhithrogena semicolorata* was added in 2020.

Leptophlebiidae: **Habrophlebia fusca* (ditch dun). **Serratella ignita* (blue-winged olive), found occasionally in the moth trap. *Ecdyonurus* sp.

Odonata (dragonflies and damselflies)

Coenagrionidae: *Coenagrion puella* (azure damselfly), one record by the old pond outside the Kibble Palace in 2011. *Pyrrosoma nymphula* (large red damselfly), found by the new pond outside the Kibble Palace by Glasgow Countryside Rangers in 2017 during a Royal Society for the Protection of Birds (RSPB) Bioblitz.

Dermoptera (earwigs)

Anisolabididae: *Euborellia annulipes* (ring-legged earwig), a non-native recorded in the Euing Range found by E.G. Hancock in 2009, the first record for Glasgow.

Forficulidae: **Forficula auricularia* (common earwig), first record 2011 at the disused Kirklee Station, also found subsequently in the moth trap.

Psocoptera (bark-flies)

Trichopsocidae: *Trichopsocus dali*, recorded in 1909 (King, 1910), though not included in the 1999 list.

Elipsocidae: **Elipsocus abdominalis*, in the moth trap (2016), only known record for Glasgow.

Mesopsocidae: *Mesopsocus immunitus*, swept from *Eucryphia* sp. (Cunoniaceae) foliage (2019), only known record for Glasgow.

Hemiptera (true bugs)

Heteroptera

Acanthosomatidae: **Acanthosoma haemorrhoidale* (hawthorn shieldbug), two moth trap records.

**Pentatoma rufipes* (red-legged shieldbug), three records, in the moth trap on one occasion (2019).

**Elasmotherus interstinctus* (birch shieldbug), two found in the moth trap on two occasions, but not yet found elsewhere in GBG.

Anthocoridae: *Anthocoris nemorum* (common flower bug).

Corixidae: **Corixa panzeri*, in the moth trap on one occasion (2019); some other corixids have been seen but not yet identified in the new pond by Kibble Palace in 2017, and in the moth trap, 2020.

Miridae: **Campyloneura virgula*, a predatory bug generally found in trees, only six records for Glasgow, one in GBG, but bugs of this family are often overlooked. *Phytocoris tiliae*, an old record (Murphy, 1901), which was not included in the 1999 list. Eight other species of Miridae have been found in grassland in recent years.

Homoptera

Cicadellidae: **Empoasca vitis*, one specimen (2020), first record for Glasgow. **Edwardsiana alnicola*, one male (2020), notable-B (Kirby, 1992), first record for Scotland (Weddle, 2021b). **Fagocyba cruenta*, several males (2020). **Oncopsis flavicollis*, one specimen (2020), second record for Glasgow. **Zygina flammigera* one specimen (2020), first record for Glasgow.

Aphrophoridae: **Philaenus spumarius* (cuckoo-spit insect), one in trap (2020), common in GBG though not recorded until 2015.

Thysanoptera (thrips)

Thripidae: *Chaetanaphothrips orchidii* in the Begonia House in 2019, found by A. Sinclair.

Phasmida (stick insects)

Phasmatidae: *Carausius morosus* (laboratory stick-insect), resident in the Kibble Palace, first recorded there in 2006.

Megaloptera (alderflies etc.)

Sialidae: *Sialis* sp., probably *S. lutaria*, one recorded by S. Inglis beside the new pond outside the Kibble Palace in 2017 during a RSPB Bioblitz.

Neuroptera (lacewings)

Chrysopidae: green lacewings are seen quite frequently in the Gardens (pers. obs.) but none so far has been identified to species.

Hemerobiidae (brown lacewings): **Hemerobius atrifrons*, one record, 2016 (Weddle, 2019).

**Micromus variegatus* and **M. micans* found occasionally in the moth trap - the latter was included in the 1999 list, having been found in 1994 on a lime by E.G. Hancock.

Sisyridae (sponge-flies): **Sisyra fuscata*, first record of this family in Glasgow, one female and ten males found in 2020 among the mass of small insects that had accumulated at the bottom of the moth trap.

Trichoptera (caddisflies)

Various species occur frequently in the moth trap, sometimes outnumbering the moths. Adults of the following species were found in the moth trap in 2020 and are additional to the three species mentioned in the 1999 list.

Rhyacophilidae: **Rhyacophila dorsalis*.

Glossosomatidae: **Agapetus ochripes*. **Glossosoma boltoni*.

Hydroptilidae: *†*Agraylea multipunctata*. *†*A. sexmaculata*. *†*Allotrichia pallicornis*. *†*Hydroptila forcipata*. *†*H. sparsa*.

Polycentropodidae: **Polycentropus flavomaculatus*.

Psychomyiidae: **Psychomyia pusilla*.

Hydropsychidae: *†*Hydropsyche pellucidula*. *†*H. siltalai*.

Goeridae: **Goera pilosa*. **Silo pallipes*.

Lepidostomatidae: **Lepidostoma hirtum*.

Limnephilidae: **Anabolia nervosa*. **Halesus radiatus*.

**Limnephilus auricula*. **L. flavicornis*. **L. lunatus*.

**L. marmoratus*. **L. rhombicus*. **L. sparsus*.

**L. vittatus*. **Potamophylax latipennis*.

Leptoceridae: **Athripsodes albifrons*. **A. bilineatus*.

**Mystacides longicornis*. **Oecetis lacustris*.

Seven of these species (marked †) have not previously been recorded in Glasgow, and a further seven have not been recorded since the surveys of Binnie and King which were reported in Binnie (1876). *A. pallicornis* is nationally scarce but, as a micro-caddis that cannot be identified from the larva, it is undoubtedly under-recorded (Wallace, 2016). There are few records of *H. sparsa* from Scotland and it is "probably notable" here and in northern England (Wallace, 2016).

Coleoptera (beetles)

Species found in the course of C. Cathrine's arachnid surveys (2017-2019) are marked +.

Dytiscidae (diving beetles): **Agabus* sp., one in the moth trap in 2019.

Carabidae (ground beetles): *Amara eurynota*. *A. ovata*.

+*A. similata*. *Bembidion lampros*. **Bradycellus*

harpalinus. **B. sharpi*. *B. verbasci*. **Harpalus rufipes*

(turnip mud beetle). *Nebria brevicollis*. +*Pterostichus*

strenuus. +*Trechus obtusus*. +*T. quadristriatus*.

Hydrophilidae (water scavenger beetles): **Helophorus*

aequalis. **H. brevipalpis*. **Hydrobius fuscipes*. In

addition, a large number of a rather small species, as yet unidentified, was found in a Heath trap in the Children's Garden in 2016.

Ptiliidae: +*Acrotrichis danica*, first Glasgow record, scarce in Scotland (Cathrine, pers. comm.).

Staphylinidae (rove-beetles): **Deleaster dichrous*,

designated "nationally notable B" (Hyman, 1994) on

account of its rarity, though apparently not currently

designated; found each year from 2015-20; the gravel-

covered benches in the Long Pit and the similarly-

covered raised beds beside the moth trapping site may

be suitable habitats as this species normally frequents

the edges of stony streams; it has also been found in

moth traps in South Lanarkshire. +*Medon apicalis*,

"notable" (Hyman, 1994). +*Metopsia clypeata*. +*Stenus*

bimaculatus. +*S. brevipennis*. +*S. brunripes*. +*S.*

clavicornis. +*S. impressus*. +*S. ossium*. +*S. picipes*. +*S.*

similis. +*Tachinus proximus*. +*Tachyporus*

chrysomelinus /*dispar*. +*Xantholinus linearis*. *X.*

longiventris.

Scarabaeidae (dung beetles and chafers): **Aphodius*

rufipes one record from the moth trap (2019), not

recorded elsewhere in GBG, though common in moth

traps generally, there are records from moth traps and

pitfall traps elsewhere in Glasgow (pers. obs. and

Glasgow Museums Biological Records Centre

(GMBRC)). **Serica brunnea* (brown chafer).

Elateridae (wireworms): one, probably *Athous*

haemorrhoidalis but unconfirmed, found by The

Conservation Volunteers (TCV) in 2017, though likely to be common in the wilder areas of the Gardens.

Cantharidae (soldier beetles): **Malthodes marginatus*, one of the smaller species in this group (2016).

Dermestidae: *Anthrenus verbasci* (carpet, or museum, beetle), on ox-eye daisy (*Leucanthemum vulgare*) in 2020.

Coccinellidae (ladybirds): **Calvia quattuordecimguttata* (cream-spot ladybird): of 12 GBG records (1983-2019) only one was in the moth trap. **Halyzia sedecimguttata* (orange ladybird), of nine GBG records, all since 1999, five were in the moth trap, the first of which was found by G. Irving in 2002 and is therefore among the earliest sightings of this species in the Clyde area (Weddle, 2011). *Coccinella septempunctata* (7-spot ladybird), surprisingly not recorded in the Gardens until 2017 when the RSPB Wildlife Area was established.

Latridiidae: †*Cartodere nodifer*.

Oedemeridae (false blister beetles): †*Oedemera virescens*, one in the wildlife area in 2020, this species has recently become locally common in the Clyde area, though "nationally rare" in the U.K. (Philp, 2014).

Cerambycidae (longhorn beetles): one, thought to be *Clytus arietis* (wasp beetle), found during the 2015 Bioblitz by A. Malcolm, but flew away before its identity could be confirmed.

Chrysomelidae (leaf beetles): *Altica* sp. (flea beetle). *Gastrophysa viridula* (green dock beetle). *Oulema melanopus* s.l. (cereal leaf beetle).

Apionidae (weevils): †*Protapion apricans* (clover seed weevil).

Curculionidae (weevils): †*Barypeithes araneiformis* (spider weevil). †*B. pellucidus* (hairy spider weevil). **Cionus scrophulariae* (figwort weevil). †*Leiosoma deflexum*. *Orchestes fagi* (beech leaf miner). †*Otiorynchus singularis* (clay-coloured weevil). †*Sitona lineatus* (pea-leaf weevil).

Lepidoptera (butterflies and moths)

Hancock (1999) lists no butterflies. However, of the 26 native or migrant butterfly species that have been recorded in Glasgow over the last two centuries, 12 have been recorded in the Gardens. Although there are no GBG records of butterflies prior to 1983, it must be remembered that the Glasgow city boundary has expanded markedly since the mid-19th century when sites such as Possil Marsh, Kelvingrove and Glasgow Botanic Gardens (or "Kelvinside" as the site was then known) are often recorded simply as "near Glasgow".

All butterfly species recorded in GBG are listed below. Of these, the following are recent arrivals, or re-arrivals, in south-west Scotland:

Pieridae: *Anthocharis cardamines* (orange-tip), arrived in Glasgow in 1980 after an absence from the Clyde area of over a century; was first recorded in the GBG in 1994 and is now the most frequently recorded butterfly there.

Nymphalidae: *Polygonia c-album* (comma), first recorded in the Gardens in 2016; its recent history is fully described by McInerny (2021). *Aphantopus hyperantus* (ringlet), though present in the Clyde area until the mid-20th century, there are no 19th or early

20th century records within the city; it arrived back in the Clyde area in the 1980s, but did not become established in Glasgow until the 1990s, though there was a one-off sighting in 1984 (R. Sutcliffe, pers. comm.), and it was not recorded in the Gardens until 2019.

Three of the species are migrants.

Pieridae: *Colias croceus* (clouded yellow), flies in from north Africa and southern Europe up the west coast of Scotland, but less common this far inland; the first Glasgow record was in 1938, but thereafter there were few records until 1992 when there were 40 records, one of which was in GBG. Of the relatively few sightings in subsequent years, none was in the Gardens.

Nymphalidae: *Vanessa cardui* (painted lady), a migrant from north Africa, but breeding at several points on its journey to Scotland and beyond; although there are 19th century records from the Clyde area, it was not recorded in Glasgow until 1944, and not in GBG until 2019, which was a "painted lady year" when there was a notable influx of many tens of millions of individuals countrywide. *V. atalanta* (red admiral), another migrant, but there is evidence of over-wintering in the Clyde area in recent years; in the 19th century it was described as "common in the Clyde area, and abundant in some years" (Dalglish, 1901), but the first specifically Glasgow record was in 1922, and the first in GBG was in 1992.

The remaining GBG species are resident in the Glasgow area:

Nymphalidae: *Aglais io* (peacock), rare in Scotland until the mid-1990s when there was a very notable migration into Scotland, leading to new populations being established, from which the numbers have increased (R. Sutcliffe, pers. comm.); numbers may be augmented by migrants later in the year, against this background there is a surprisingly early GBG record in 1983, but it was not seen regularly there until the last five or six years. *A. urticae* (small tortoiseshell), first recorded in GBG in 1992. *Maniola jurtina* (meadow brown), though generally common in and around Glasgow, there are only two records from GBG, both in 2019.

Pieridae: *Pieris brassicae* (large white), first recorded in GBG in 2006. *P. rapae* (small white), first recorded in GBG in 2007. *P. napi* (green-veined white), not recorded in GBG until 2011, though now the commonest *Pieris* species.

An account of the moths in the Gardens is given by Weddle (2019b). However, another 26 species have been recorded in the subsequent two years (pers. obs.). Of those, the following are worthy of note:

Argyresthiidae: **Argyresthia trifasciata* non-native invasive, on juniper (*Juniperus* sp.) and Leyland cypress (*Cupressus × leylandii*).

Tortricidae: **Clavigesta purdeyi* (pine leaf-mining moth), first Glasgow record and second in Scotland (Weddle, 2019a).

Erebidae: **Eilema depressa* (buff footman), recent arrival in Scotland; first Glasgow record.

Noctuidae: **Leucania comma* (shoulder-striped wainscot), "Watching brief only" (Scottish Biodiversity List, 2020).

Diptera (two-winged flies)

Since the 1999 list, recording of this group has been restricted mainly to hoverflies and species that have been found in the moth trap. Some 40 of the larger insects from the trap have so far been identified to species, though there is often an accumulation of very small flies in the base of the trap; these include nematoceran species such as Chironomidae (non-biting midges), together with Psychodidae (moth flies) and Dolichopodidae (long-legged flies), as well as further species from the families mentioned below.

Tipulidae (craneflies): **Tipula staegeri*. **T. oleracea*. **T. paludosa*. **T. rufina*. **T. montium*.

Limoniidae: **Ilisia maculata*. **Rhipidia maculata*.

Trichoceridae (winter gnats): **Trichocera regelationis*.

Ceratopogonidae (biting midges): **Culicoides impunctatus*.

Stratiomyidae (soldier flies): **Beris chalybata* (murky-legged black legionnaire). **Chorisops tibialis* (dull four-spined legionnaire). **Microchrysa polita* (black-horned gem).

Empididae: **Rhamphomyia flava*.

Syrphidae (hoverflies): **Episyrphus balteatus* (marmalade hoverfly). **Melanostoma mellinum*. **Syrphus torvus*, a relatively rarely-recorded species in this area, which was netted in the RSPB wildlife area in 2017.

Agromyzidae: **Chromatomyia syngenesiae* (chrysanthemum leaf-miner), found in a glasshouse and determined from the adult by dissection by B. Warrington (2018); a common species, until recently recorded as **Phytomyza atricornis*, which is now known to be an aggregate. **Phytoliriomyza melampyga*, leaf-mines in Himalayan Balsam (*Impatiens glandulifera*) growing on the banks of the River Kelvin.

Tachinidae: **Dexiosoma caninum*.

Hymenoptera (bees, wasps etc.)

24 records have been added to the list in the last 22 years; these include the honey bee (*Apis mellifera*) and the common wasp (*Vespa vulgaris*).

Cynipidae: *Andricus quercuscalicis* (oak knopper gall, agamic), was recorded in 2020 on oak (*Quercus robur*) (pers. obs.); this wasp is listed as an invasive species and requires Turkey oak (*Quercus cerris*) for the alternate sexual generation; there is a Turkey oak in the Gardens, ca. 320 m away from the oak, near the Main Gate (R. Gray, pers. comm.).

Colletidae: *Colletes daviesanus* (Davies' colletes), recorded once in 2017 though probably common in the Gardens; listed in the Scottish Biodiversity List (2020) as occurring in fewer than six 10 km squares in Scotland. However, a recent increase in recording effort has significantly increased the known distribution (National Biodiversity Network (NBN), 2020), and it should be remembered that it is likely there are further records as

yet unsubmitted to NBN, which would include this and other recent records in the GMBRC database.

Megachilidae: *Osmia rufa* (red mason bee), recorded on four occasions between 2011 and 2018; also listed on the Scottish Biodiversity List (2020), but as "Watching brief only".

Apidae: *Nomada panzeri* s.l. (Panzer's nomad bee), recorded once in 2012 at the disused Kirklee Station (pers. obs.); this is the only Glasgow record.

OTHER INVERTEBRATES

Few invertebrates other than those listed above and in other papers in the *Wildside* series have been recorded in the Gardens over the last 22 years. The following species from other groups, some of which are earlier records, are worthy of mention:

Nematomorpha (horsehair worms)

Gordiidae: *Gordius* sp., one found in the River Kelvin by TCV during the 2016 Bioblitz (A. Malcolm), and identified by P. Maitland from a photo. It is the only horsehair worm recorded in the GMBRC database-

Annelida (segmented worms)

Lumbricidae (earthworms): *Aporrectodea caliginosa* (grey worm), one found in the main lawn by J. Dempster during a "worm-charming" event in the 2017 Bioblitz.

Diplopoda (millipedes)

It seems that the 1999 list did not take into account unpublished records generated in 1996 by G. Corbet and therefore did not include the following species found on that visit:

Blaniulidae: *Archiboreoiulus pallidus* (spotted snake millipede). *Boreoiulus tenuis*.

Chordeumatidae: *Melogona scutellaris*.

Craspedosomatidae: *Nanogona polydesmoides* (eyed flat-backed millipede), found again in 2009 (M. Burns *et al.*).

Julidae: *Ophiulus pilosus*. *Tachypodoiulus niger* (white-legged snake millipede).

Another species was found in 2009 by M. Burns *et al.*:

Polydesmidae: *Polydesmus angustus* (common flat-backed millipede).

Chilopoda (centipedes)

Geophilidae: *Geophilus insculptus*, recorded in 1996 by Corbet but not included in the 1999 list.

DISCUSSION

The comparative lack of records of many invertebrate groups in GBG, particularly in earlier years, may be partly because the local recorders were more focused on the biodiversity "hot-spots" in and around the City, such as Possil Marsh, and therefore tended to neglect what was at first a private estate, and then essentially a public garden. Another possible factor is that pesticides were widely used in the Gardens and glasshouses prior to the 1980s (A. Sinclair, pers. comm.), which would have discouraged recording. One significant exception is the woodlice recorded by Patience in the glasshouses and elsewhere in the Gardens in the early 20th century (Hancock, 1999), though many of them have not been

recorded there since, no doubt due to subsequent improvements in plant hygiene. The lack of butterfly records in the second half of the 20th century prior to 1983 may be due to visiting naturalists taking them for granted (E.G. Hancock, pers. comm.), as, even if pesticides prevented them breeding in the Gardens, adults could easily visit from neighbouring domestic gardens.

The establishment of the RSPB wildlife area in 2016 has had a significant effect on the invertebrates recorded in the Gardens, partly because of the perennial wildflowers planted there, but also because of the unmown grass. The area features a "bee-wall" intended to encourage nesting by solitary bees, and as a hibernaculum for these and other insects, but there is as yet no clear sign of it being used, at least by solitary bees. The adjacent Chronological Border has also yielded some interesting pollinator species, as have the various beds in the new Herb Garden and the nearby beds used for teaching horticulture.

As mentioned above, there is often an accumulation of small insects in the moth trap which can be extremely difficult to identify to species. These include nematoceran groups mentioned above under Diptera, and parasitic Hymenoptera. I have retained a number of specimens, mainly small (<5 mm) beetles, that are potentially identifiable. As discussed by Weddle (2021b), many of these small species may be merely under-recorded, in part because of their size, and in many cases because their identification requires dissection, which usually requires specialist skills.

The use of a "bug vac" – a motorised suction device - in the 2019 arachnid surveys facilitated the collection of the beetles marked "+" above, and other specimens from groups such as Hemiptera, which are yet to be identified. There can be no doubt that this and other techniques, such as pitfall traps and Malaise traps, would add considerably to the knowledge of the invertebrate population, though the practicalities of implementing most of these methods in a public green-space may well limit their coverage.

The Friends of the River Kelvin in the person of the late Allan Twigg organised the local anglers in a "Citizen Science" project to record "river-flies" – mayflies, lacewings and caddisflies - by kick-sampling the aquatic larvae. These were identified only to family, and are not included here, but the project highlights yet another technique that could potentially generate further additions to the species list. There is also scope for more recording of leaf-mines and galls. In summary, if there were enough willing recorders and identifiers, the invertebrate list could be augmented for many years to come.

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