Parasitoid wasps are an artificial grouping of Hymenopteran families that share similar life strategies, but are not necessarily related. It is therefore a polyphyletic group. It has been used here to group these families for convenience, but does not have taxonomic value.

Parasitoid wasps have been split between 20 separate Scottish Invertebrate Species Knowledge Dossiers. This first dossier includes species of conservation concern, summary family information, distribution data and identification guides for all Parasitoid wasps. The other dossiers provide detailed species lists for each super family and family known to occur in Scotland (as appropriate). The appropriate knowledge dossier for each family is indicated in the summary family information below.

A. NUMBER OF SPECIES IN UK: 6,418 (includes 28 introduced species)

B. NUMBER OF SPECIES IN SCOTLAND: 3,234 (200 only known from Scotland in UK context, 1,754 species certainly known to occur in Scotland, 1,479 which UK country of specimen collection is unknown, includes 12 introduced species)

C. EXPERT CONTACTS

Please contact scotland@buglife.org.uk for details.

D. SPECIES OF CONSERVATION CONCERN

Listed species

None – insufficient data.
Other species

A fairly large number of parasitoid wasps have been recorded only once, or in only one very restricted area, in Scotland. Among the biggest and most conspicuously distinctive are the acaenitine ichneumonids *Coleocentrus excitator*, which is probably a parasitoid of the cerambycid beetle *Asemum striatum* and is known in Britain from just a single specimen from the Black Wood of Rannoch (Shaw, M. R. 1986. *Coleocentrus excitator* (Hymenoptera: Ichneumonidae) new to Britain. *Entomologist's Gazette* 37 221-224), and *Acaenitus dubitator*, a parasitoid of the weevil *Cleonis pigra* (Nationally Notable B species) and known in Britain only from a short stretch of the East Lothian coast (Shaw, M. R. & Wahl, D. B. 1989. The biology, egg and larvae of *Acaenitus dubitator* (Panzer) (Hymenoptera, Ichneumonidae: Acaenitinae). *Systematic Entomology* 14 117-125). However, as long as the habitats remain in their present states there seems to be no obvious additional threat to either species.

Several other conspicuous species previously known only from Scotland in the British Isles appear not to have been seen since the first half of the 20th century - e.g. the pimplines *Pimpla arctica*, collected on Soay (Skye) in 1909, and *Dolichomitus diversicostae*, reared from the cerambycid *Acanthocinus aedilis* and collected in the 1930s and 40s in Deeside and at Nethy Bridge (probably in the latter cases at the saw mill that was then sited there, which processed Scottish timber also from further afield). It is unclear whether or not populations of these species still exist in Scotland; certainly much more collecting effort would be needed to assert with any confidence that they do not.

Particular threats

Because parasitoid wasps live at a high trophic level and are (often) extremely specialised – not infrequently being at least locally, and sometimes absolutely, monophagous – they are particularly prone to (local) extinction, especially if the population levels of their hosts oscillate. If there is no effective metapopulation structure local extinctions will be permanent, with a consequent contraction of distribution (and perhaps range). It is ironic that this very large group (about a quarter of the British insect fauna) is at the same time among the least understood and the most generally vulnerable of all our invertebrates, and our lack of knowledge has to be counted as a serious conservation issue in itself (cf. Shaw 1996, 2006; Shaw & Hochberg 2001, all listed in Other Information below).

Clearly any potential host of a parasitoid wasp that is itself of conservation concern should be investigated carefully for the presence of associated parasitoids, which (depending how host-specialised they are) may be at even more risk than their host. This approach offers probably the best way to generate lists of genuinely and demonstrably vulnerable parasitoid wasps, such as the microgastrine braconid *Cotesia melitaearum* which is restricted to the Marsh Fritillary butterfly (*Euphydryas aurinia*), with recent rearings in Britain only from Scotland. However, this will not paint the whole picture, as there are plenty of rare and probably endangered parasitoids that use common hosts – and rare hosts most often have only common and oligophagous parasitoids (unless the host has abnormal biology or is very phylogenetically isolated). Sadly, however, for the majority of parasitoid wasps there is literally no biological information whatsoever, making it all but impossible to assess their needs and conservation status.
### E. LIST OF SUPER FAMILIES AND FAMILIES KNOWN FROM SCOTLAND

The table below summarises species data for each of the super families (S) and families (F) of Parasitoid wasps known to occur in Scotland, and indicates which Scottish Invertebrate Species Knowledge Dossier includes the appropriate detailed checklist. The table indicates the total number of species known to occur in the UK (UKT), total number of species known to occur in Scotland (ScT), number of species only known from Scotland in a UK context (ScO), number of introduced species known in the UK (IUK) and number of introduced species known to occur in Scotland (ISC). Furthermore, it is not clear which UK country some specimens have been recorded from, therefore species that are certainly known to occur in Scotland (C) and those that are only known from the UK and lack a country of origin (UC) are also detailed in the table below. Species which are known from specimens of unknown country of origin may or may not occur in Scotland, or the UK.

Parasitoid wasps are extremely poorly recorded, with many species only known from a single specimen. As is clear from the data summarised in the table below, some super families and families are better recorded than others, although all are poorly recorded. This group would benefit hugely from increased recording.

<table>
<thead>
<tr>
<th>Family / Superfamily</th>
<th>Parasitica Dossier</th>
<th>UKT</th>
<th>ScT</th>
<th>ScO</th>
<th>C</th>
<th>Uc</th>
<th>IUK</th>
<th>ISC</th>
</tr>
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<tbody>
<tr>
<td>F Aphelinidae</td>
<td>2</td>
<td>42</td>
<td>9</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>1</td>
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<tr>
<td>F Braconidae</td>
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<td>1,310</td>
<td>455</td>
<td>37</td>
<td>387</td>
<td>68</td>
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<td>71</td>
<td>0</td>
<td>6</td>
<td>65</td>
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<td>0</td>
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<tr>
<td>F Encyrtidae</td>
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<td>234</td>
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<td>6</td>
<td>31</td>
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<td>3</td>
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<tr>
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<td>2</td>
<td>11</td>
<td>309</td>
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<td>1</td>
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<td>0</td>
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<tr>
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<td>93</td>
<td>58</td>
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<td>3</td>
<td>55</td>
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<tr>
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<td>8</td>
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<tr>
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<td>1,154</td>
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<tr>
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<td>2</td>
<td>0</td>
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<td>64</td>
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<td>0</td>
<td>1</td>
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<td>0</td>
</tr>
<tr>
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<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
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<tr>
<td>F Torymidae</td>
<td>18</td>
<td>113</td>
<td>42</td>
<td>2</td>
<td>12</td>
<td>30</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
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<td>19</td>
<td>37</td>
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<td>0</td>
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<td>13</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
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</tr>
</tbody>
</table>
F. DISTRIBUTION DATA

a) The upcoming British Isles check list, parts of which are already available in draft at http://www.nhm.ac.uk/research-curation/staff-directory/entomology/g-broad/index.html, will attempt to indicate (by E, S, W, I, M) occurrence of species in England, Scotland, Wales, Ireland (the whole island) and the Isle of Man. This should assist conservation and recording initiatives, which currently are mostly organised through similar divisions of the British Isles.

b) For a few groups of Ichneumonoidea the collection at the National Museums of Scotland has been catalogued in outline, giving distributional records at Vice County level or more precisely for rarely collected species, in the following papers:


c) There is an embryonic recording scheme for nocturnal ichneumonoids (mainly more or less orange and often large species, including the genus Netelia and the subfamily Ophioninae) run by Gavin Broad (g.broad@nhm.ac.uk); distribution data will be available on the NBN Gateway on a genus by genus basis, with Netelia the first to be mapped.

d) A recording scheme for Chalcidoidea (a small group of mostly relatively big and distinctive Chalcidoidea with swollen hind femora) is run by Steve Compton (S.A.G.Compton@leeds.ac.uk).

G. IDENTIFICATION GUIDES

a) Barnard, P.C. (ed.). 1999. Identifying British Insects and Arachnids: an annotated bibliography of key works. Natural History Museum and Cambridge University Press. [Pages 197-319 of this comprise a structured and annotated list of keyworks and other identification literature for the order Hymenoptera in Britain up to the end of 1997. Only selected works (e.g. keys including most or all British taxa in the group concerned) after that date are listed below. The very many recent papers that deal with just one or two British species are usually referenced as part of the annotation in the upcoming British Isles check list (see above) and not repeated here.]


f) Royal Entomological Society Handbooks for the Identification of British Insects are in preparation for parasitoid wasps as follows, but may take some years to complete:

i) Eulophidae (excl. Tetrastichinae)

ii) Ichneumonidae: key to subfamilies, biological outlines, guide to identification works.

iii) Ichneumonidae: Cryptinae: Cryptini

iv) Ichneumonidae: Banchinae

v) Ichneumonidae: Diplazontinae

vi) Ichneumonidae: Pimplinae, Poemeniinae, Rhyssinae (2nd edn)

vii) Ichneumonidae: Metopiinae

g) Draft keys to groups of nocturnal Ichneumonoidea (more or less orange species) are available from Gavin Broad in connection with the recording scheme (see above).

H. OTHER INFORMATION

a) Overview literature (further more detailed references are included within these texts and a more exhaustive list is available on request at scotland@buglife.org.uk):


ix) Gauld, I. D. & Hanson, P. (eds). 1995. The Hymenoptera of Costa Rica. OUP/NHM. [Contains a wealth of general biological information, comprehensively reviewed]


This document should be referenced as:


This document provides information on species known to occur in Scotland at the time of publication. This document does not provide a definitive list of species occurring in Scotland. The list of species known to occur in Scotland may change as further information is gathered.

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