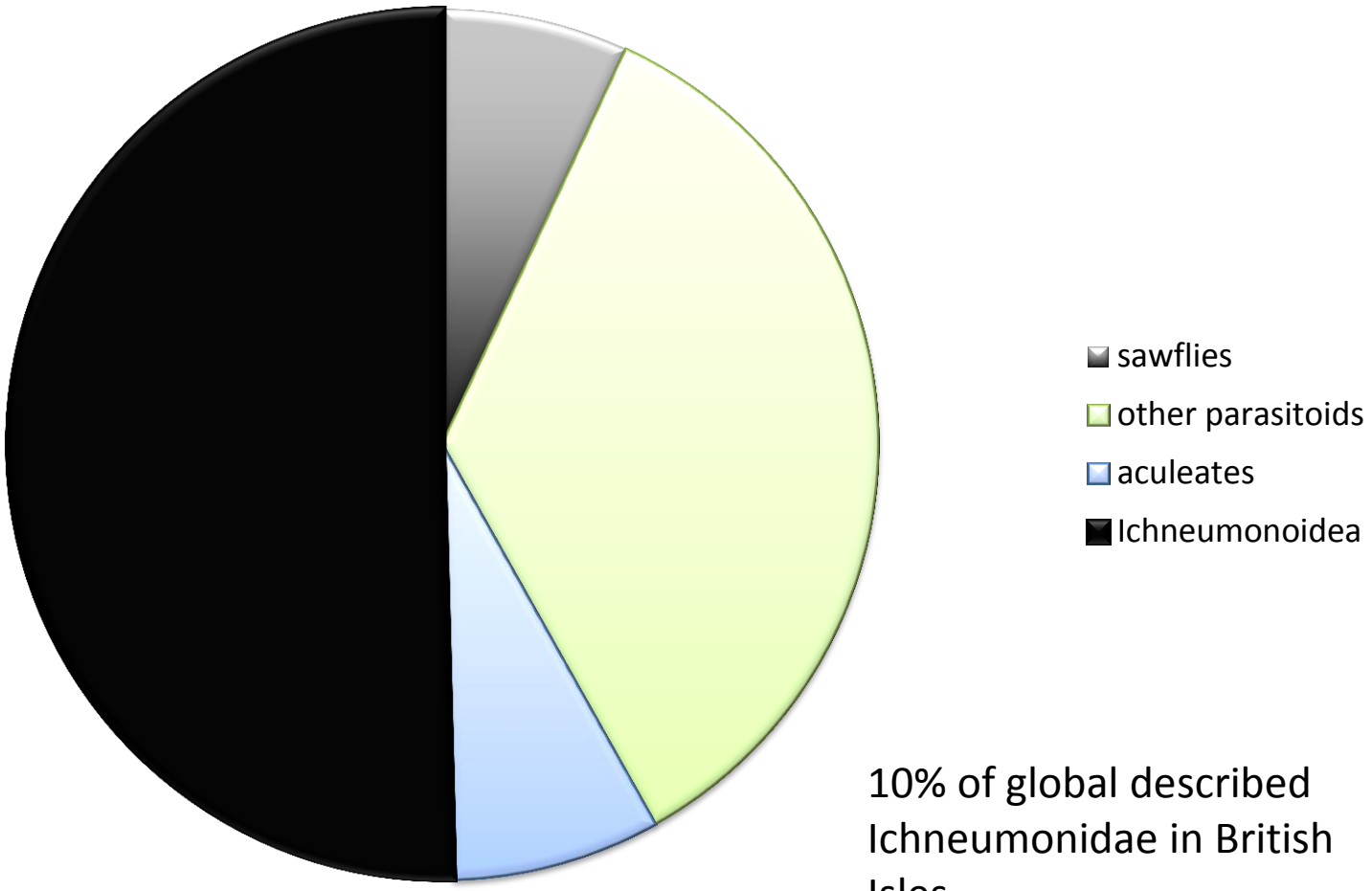
Ichneumonid Wasps

Why they are the most species-rich family of British insects and why you should love them

Gavin Broad

Ichneumonoidea



10% of global described Ichneumonidae in British Isles

Handbooks for the Identification of British Insects
Vol. 7 Part 12

Ichneumonid Wasps (Hymenoptera: Ichneumonidae): their Classification and Biology

Gavin R. Broad, Mark R. Shaw & Michael G. Fitton

Ichneumonid Wasps (Hymenoptera: Ichneumonidae) G.R. Broad, M.R. Shaw & M.G. Fitton

The plot and the characters









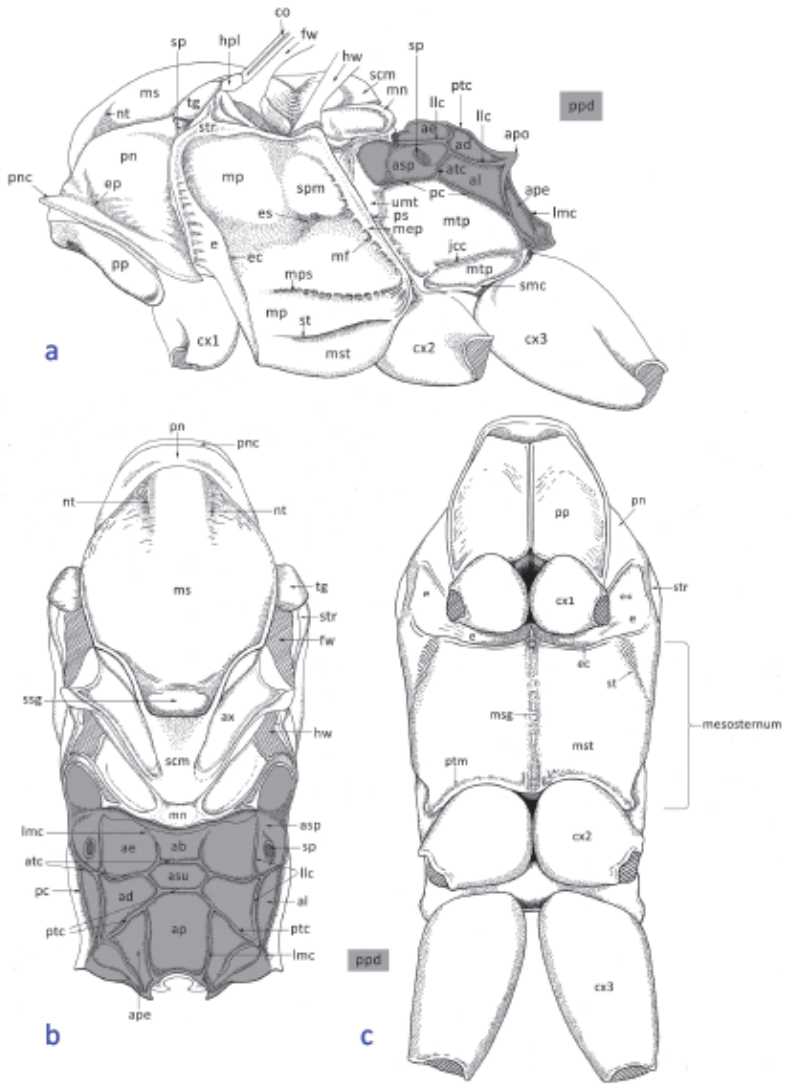


Figure 11. Stylised ichneumonid mesosoma (thorax plus propodeum), with propodeum shaded: (a) lateral view, (b) dorsal view, (c) ventral view. Abbreviations: ab - area basalis; ad - area dentipara; ae - area externa; al - area lateralis; ap - area petiolaris; ape - area postero-externa; apo - apophysis; asp - area spiracularis; asu - area superomedia; atc - anterior transverse carina; ax - axilla; co - costa; cx1 - fore coxa; cx2 - mid coxa; cx3 - hind coxa; e - epicnemium; ec - epicnemial carina; ep - epomia; es - episternal scrobe; fw - fore wing; hpl - humeral plate; hw - hind wing; jcc - juxtacoxal carina; llc - lateral longitudinal carina; lmc - lateromedian longitudinal carina; mep - mesepisternum; mf - mesopleural furrow; mn - metanotum (postscutellum); mp - mesopleuron; mps - mesopleural (precoxal) sulcus; ms - mesoscutum; msg - medial sternal groove; mst - mesosternum; mtp - metapleuron; nt - notaulus; pc - pleural carina (separating propodeum from metapleuron); pn - pronotum; pnc - pronotal collar; pp - propleuron; ppd - propodeum; ps - pleural sulcus; ptc - posterior transverse carina; ptm - posterior transverse carina of the mesosternum; scm - scutellum (mesoscutellum); smc - submetapleural carina; sp - spiracle; spm - speculum; ssg - scuto-scutellar groove; st - sternaulus; str - subtegular ridge; tg - tegula; umt - upper division of the metapleuron.

99 figures continued:

b

bb

c

cc

100(99). Apterous, with no remnants of wings (**a**) ..... some **Phygadeuontinae** (p. 260)
[Apterous individuals will always belong to *Gelis*, *Thaumatogelis* or *Polyaulon*, most specimens will be found to be *Gelis* species. Schwarz (2001, 2002b) keys out females of *Thaumatogelis* and *Gelis*, respectively. Schwarz (1995) keys out the genera with apterous females.]

– Brachypterous or micropterous, wings present but reduced (**aa**) ..... some **Cryptinae** (p. 165) and **Phygadeuontinae** (p. 260)
[Both cryptine tribes and Phygadeuontinae have brachypterous representatives and the subfamilies are not easy to separate due to simplification of the mesosoma concomitant with wing reduction. Horstmann (1993) provides keys to the genera and species of both subfamilies (not treated as such then) with brachypterous females. Schwarz (1994) provides an updated key to brachypterous females of *Gelis*.]

a

aa

Subfamily **ACAENITINAE**

This relatively small subfamily comprises about 281 species in 29, mainly small, genera (updated from Yu *et al.*, 2012) found in the Holarctic and the Old World tropics, with one genus (*Arotes*) reaching South America (Castillo *et al.*, 2011). In Britain only six species in five genera have been found, all rarely and three of them not for many years. The wider European fauna comprises about 30 species in eight genera.

Figure 25. *Acaenitus dubitator* (Panzer).

Recognition. Acaenitinae females are easily recognised by the large, elongate hypopygium, although this is not so pronounced in *Leptacoenites* and the non-British *Procinetus* Förster (which has erroneously been recorded as British; Fitton, 1981). Other useful characters to help with recognition (including of males) are: the clypeus with a median or subapical declivity, or if flat then the labrum widely exposed; the clypeus often with a median tooth; the hind wing with the nervellus intercepted above the centre; the propodeum rather flat, without distinct dorsal and posterior slopes; the fore and mid claws sometimes with an accessory tooth; and the long ovipositor, lacking a notch but with weak teeth on the lower valves. Even within the limited British fauna the species are diverse morphologically, making it difficult to characterise the subfamily, though most are readily recognisable as acaenitines.

Systematics. Similarities between the larvae of Orthocentrinae (in the modern sense) and Acaenitinae have been recognised since Townes *et al.* (1960) separated the Acaenitinae from the Pimplinae *s. l.* This pattern of relationships has been confirmed by subsequent studies (Wahl, 1986; 1990; Wahl & Gauld, 1998; Quicke *et al.*, 2009), with Acaenitinae always being recovered within the pimpliformes group of subfamilies. The Diacritinae (biology completely unknown) and Acaenitinae are likely to be basal taxa in the clade of koinobiont endoparasitoid pimpliformes (Wahl & Gauld, 1998; Quicke *et al.*, 2009). Many authors recognise two tribes within Acaenitinae, Acaenitini and Coleocentrini, but Wahl & Gauld (1998) found that the Coleocentrini are defined only by the absence of apomorphies relative to Acaenitini and argued that tribes should not be recognised, and we follow that here. No study has adequately addressed the issue of the monophyly of the subfamily, although in Quicke *et al.*'s (2009) results, the Acaenitinae were never monophyletic as *Procinetus* always fell outside of the clade comprising the other genera (the *Coleocentrus*-group were sparsely sampled). Also, there are some distinct similarities between acaenitines and collyriines (Sheng *et al.*, 2012) and various authors had included *Collyria* with the acaenitines in the past.

The constituent genera are very narrowly defined, resulting in a relatively large number of species-poor genera and a trickle of newly described genera for species that do not fit current generic definitions (e.g. Sheng & Sun, 2010a); several undescribed taxa in BMNH do not fit within any genera as currently defined.

Biology. The few reliable rearing records for Acaenitinae are from Coleoptera. Records from xylophagous Hymenoptera and Lepidoptera have been repeated frequently in the literature but there seem to be no carefully isolated host records to support these assertions. Aubert (1969) lists various cerambycids as hosts for several species of acaenitine but his primary sources provide little information. Wahl (1990) records two separate rearings of the North American *Arotes amoenus* Cresson from a species of Melandryidae. Some other records are consistent, for example those of *Phaenolobus* species reared from cerambycid larvae in plant stems, with several records (including European specimens in BMNH) from *Phytoecia* and *Oberea* species (e.g. Fiori, 1947; Haeselbarth, 1983; Scaramozzino, 1982; Wahl, 1986). There are, intriguingly, several records of *Phaenolobus* species being reared from Sesiidae (Lepidoptera), the most credible of which is that of the non-British *P. saltans* (Gravenhorst) being reared from a sesiid mining *Euphorbia* stems in Iran (Karimpour *et al.*, 2007), but parasitoids seem to have been reared in all instances from infested roots rather than from isolated hosts and several species of Cerambycidae are known to infest *Euphorbia* roots. Records of *Procinetus decimator* (Gravenhorst) being reared from the noctuid moth *Gortyna flavago* (Denis & Schiffermüller) relate to misidentifications of *Lissonota digestor* (Thunberg) (Banchinae). Previously published statements suggested variously that acaenitines are ectoparasitoids or endoparasitoids, although Wahl (1986) surmised that they were endoparasitoid, based on the larval head capsule.

Figure 26. *Coleocentrus excitator* (Poda).

Figure 27. Morphology of Acaenitinae: (a) *Acaenitus dubitator* (Panzer) face; (b) *Coleocentrus croceicornis* (Gravenhorst) face; (c) *Leptacoenites notabilis* (Desvignes) face; (d) *Phaenolobus terebrator* (Gravenhorst) head; (e) *P. terebrator* fore tarsus claws; (f) *A. dubitator* hypopygium; (g) *Coleocentrus excitator* (Poda) hypopygium; (h) *P. terebrator* aedeagus.

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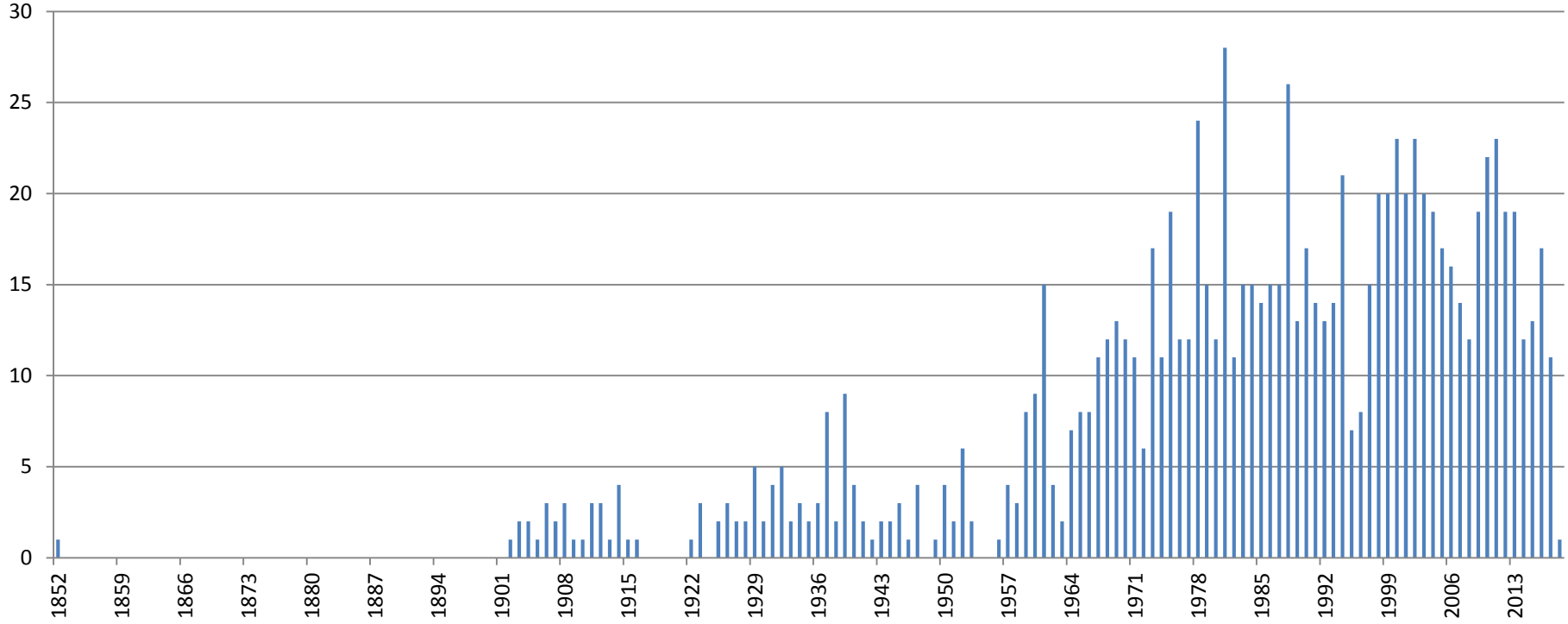
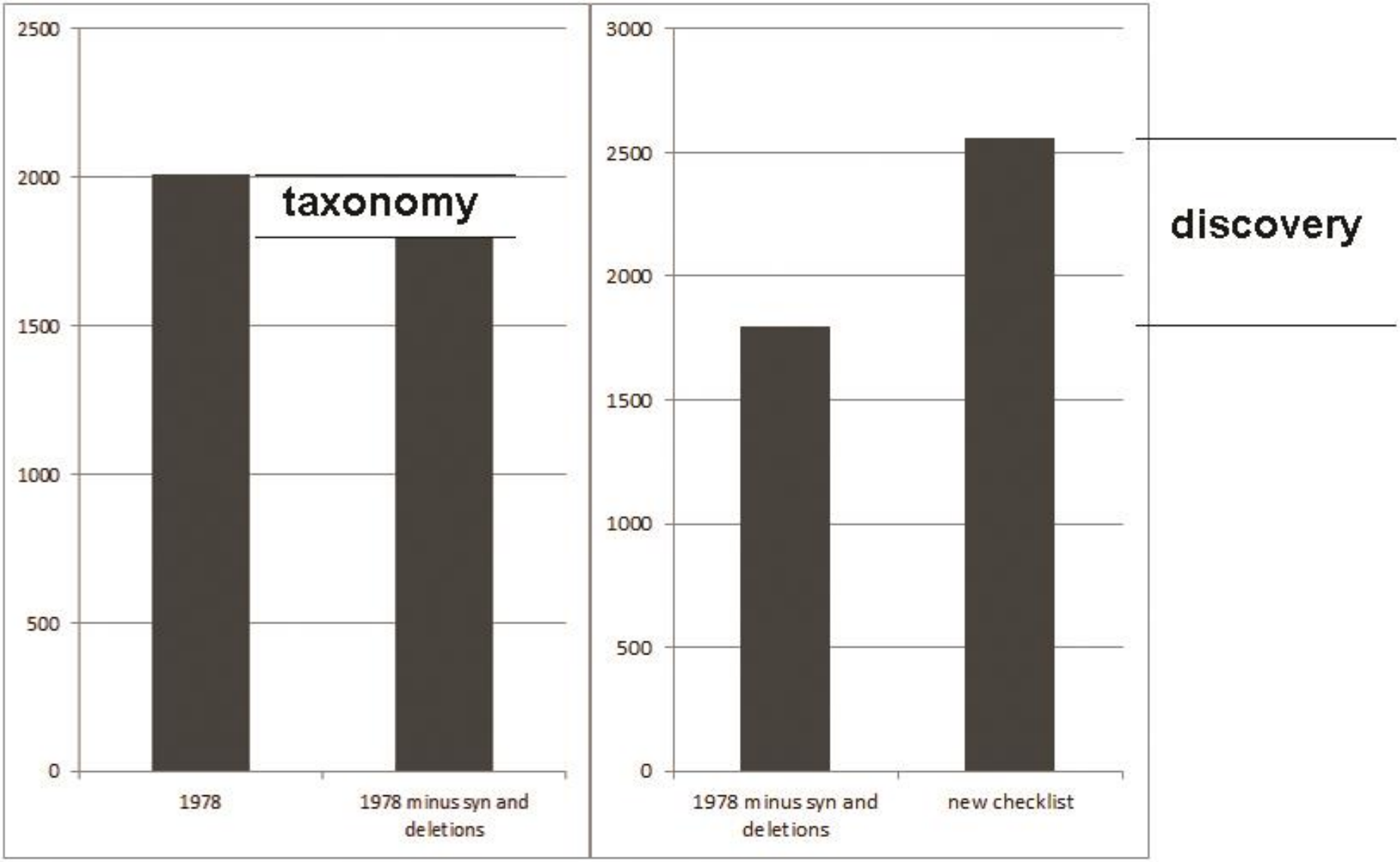
Original species descriptions are rarely useful




2500
2000
1500
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taxonomy
1978
1978 minus syn and deletions
3000
2500
2000
1500
1000
500
0
discovery
1978 minus syn and deletions
new checklist

Diversion #1: wasps in art

Diversion #1: wasps in art

Redi,
c.1600

Diversion #1: wasps in art

Tessa Farmer, 2016

Lissonota lineolaris probing for *Apamea* larvae

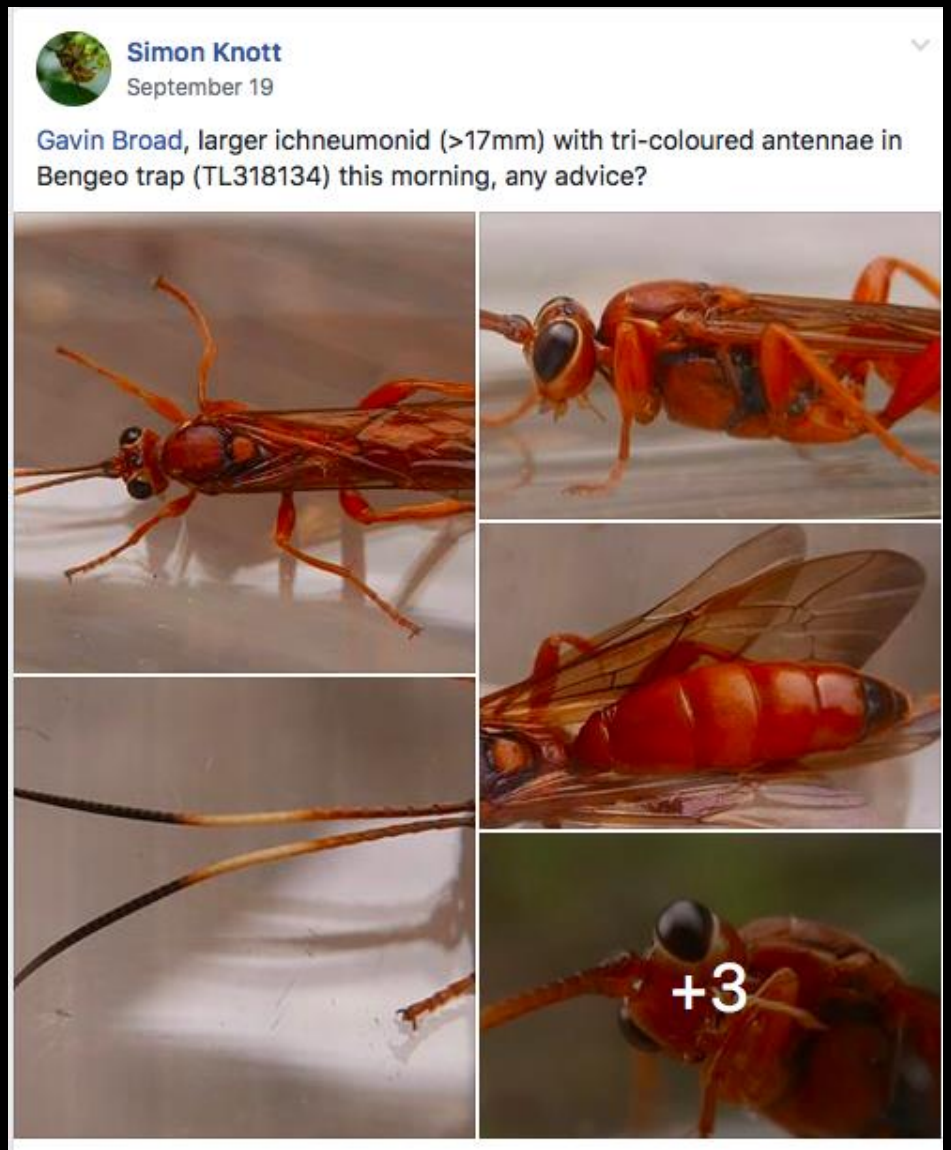
Glyptini

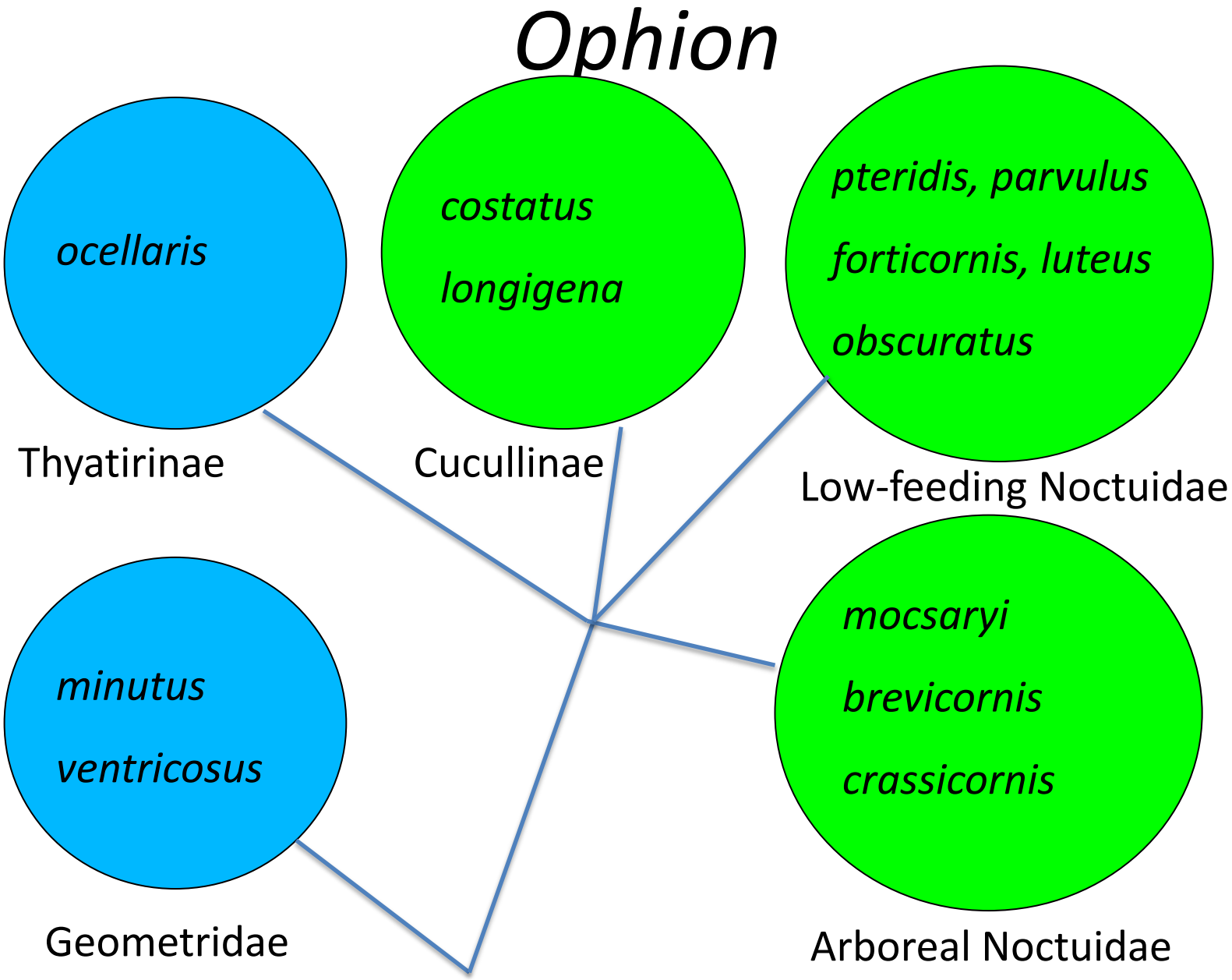
Parasitoids of Tortricidae

Diversion #2: wasps in popular culture

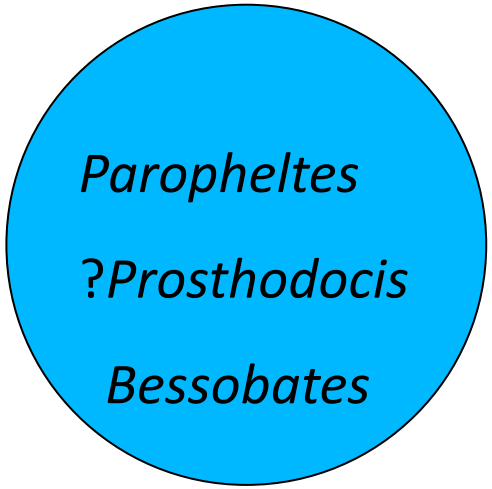
Alien, Fortitude

Social media

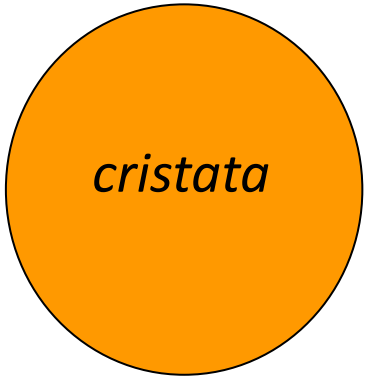



Ophion
ocellaris
Thyatirinae
costatus
longigena
Cucullinae
pteridis, parvulus
forticornis, luteus
obscuratus
Low-feeding Noctuidae
minutus
ventricosus
Geometridae
mocsaryi
brevicornis
crassicornis
Arboreal Noctuidae

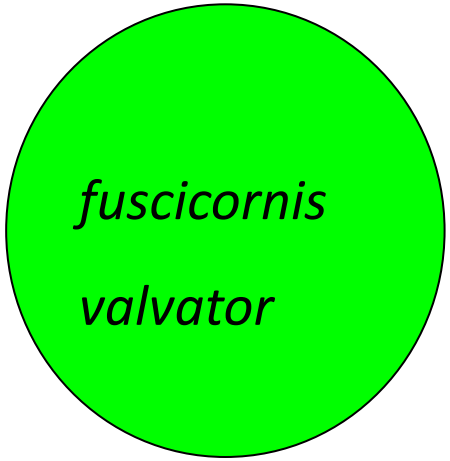
Netelia



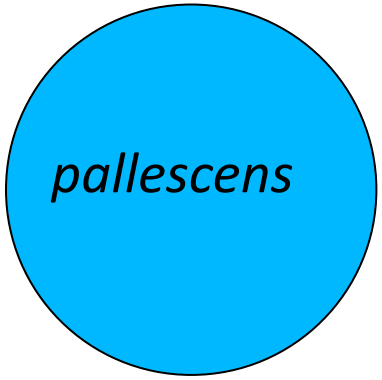
Geometridae



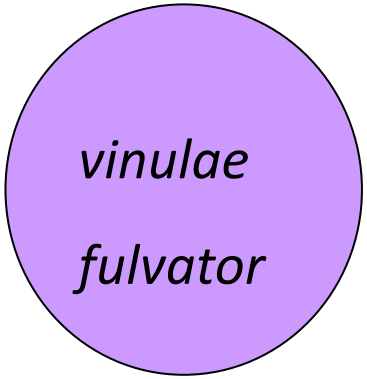
All sorts



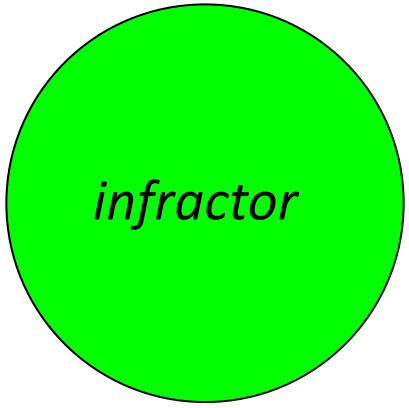
Low-feeding Noctuidae



Thyatiridae

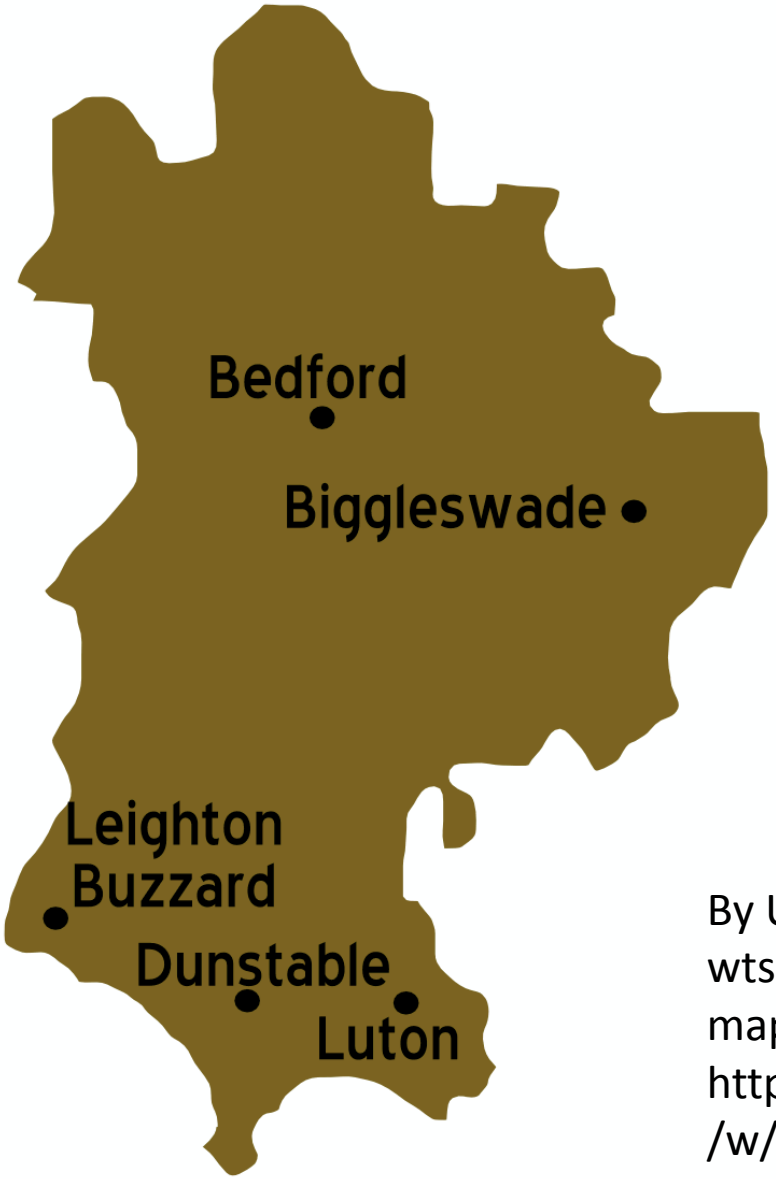


Notodontidae



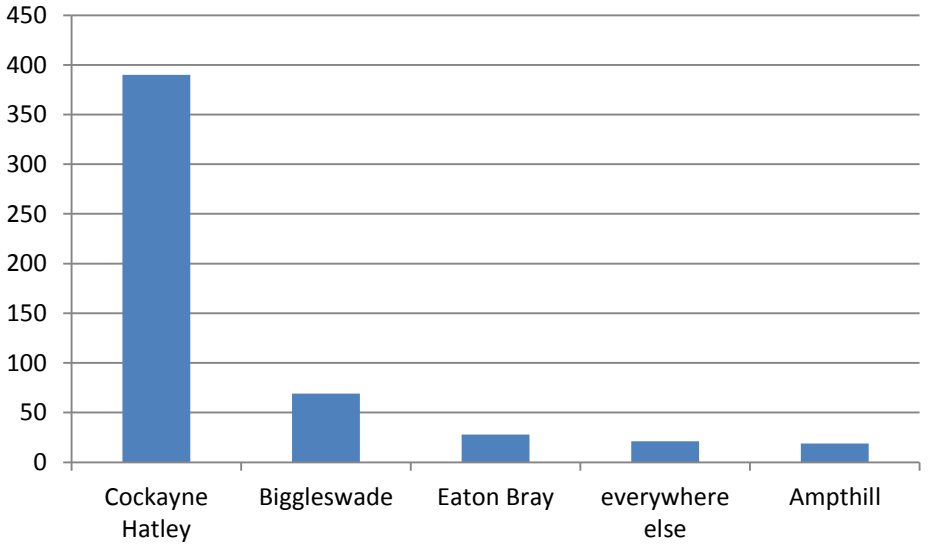
Arboreal Noctuidae

What's in Bedfordshire?



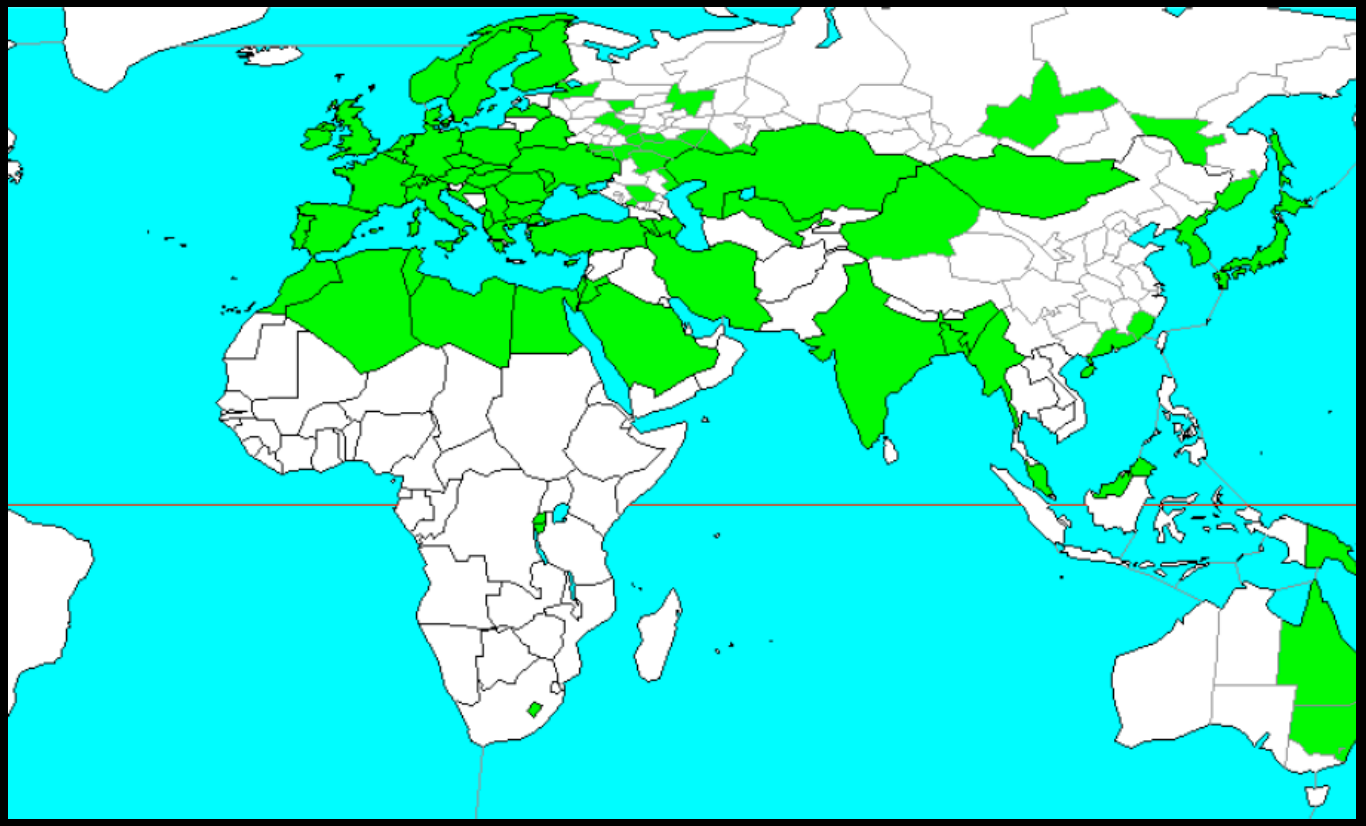
Beds nocturnal Ichneumonoidea

- 527 individuals
- 427 records
- 65 species



Netelia testacea

How much don't we know?



This is not its range

Netelia testacea

Arctiidae-*Hyphantria cunea*
Cimbicidae-*Cimbex femorata; Cimbex lutea; Palaeocimbex carinulata; Pseudoclavellaria amerinae;*
Geometridae-*Eupithecia subfuscata; Lycia hirtaria; Operophtera brumata; Phigalia pilosaria;*
Lasiocampidae-*Dendrolimus albolineatus; Dendrolimus pini; Dendrolimus spectabilis;*
Lymantriidae-*Orgyia antiqua;*
Noctuidae-*Acronicta alni; Acronicta cuspis; Acronicta leporina; Acronicta megacephala; Acronicta psi; Acronicta psi; Acronicta rumicis;*
Acronicta tridens; Acronicta tridens; Actinotia radiosa; Amphipyra pyramidea; Archanara geminipuncta; Autographa gamma; Cucullia argentea; Cucullia artemisiae; Cucullia asteris; Hada plebeja; Lacanobia contigua; Lacanobia oleracea; Lacanobia pisi; Mesogona oxalina; Perigrapha i-cinctum; Polychrysia moneta; Polymixis polymita; Pseudaletia convecta; Shargacucullia lychnitis; Shargacucullia scrophulariae; Spodoptera exempta; Spodoptera littoralis; Spodoptera litura; Tiracola plagiata; Tiracola plagiata;
Nolidae-*Bena prasinana;*
Notodontidae-*Cerura bifida; Cerura vinula; Clostera anachoreta; Clostera curtula; Harpyia milhauseri; Harpyia terrifica; Neoharpyia verbasci;* **Nymphalidae**-*Araschnia levana; Polygonia egea;*
Pyralidae-*Cnaphalocrocis medinalis;*
Sesiidae-*Paranthrene tabaniformis; Sesia calliformis;*
Sphingidae-*Hyles euphorbiae; Laothoe amurensis; Laothoe populi; Mimas tiliae.*

These are not its hosts
These are not its hosts

Netelia ~~*testacea*~~ *fulvator*

NBN

recording scheme

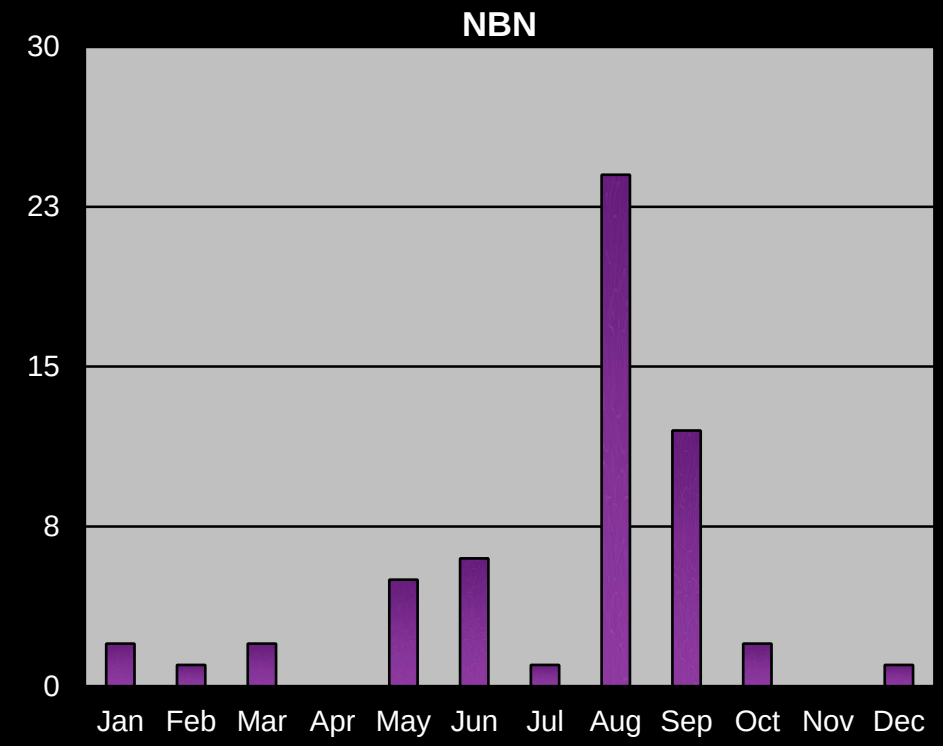


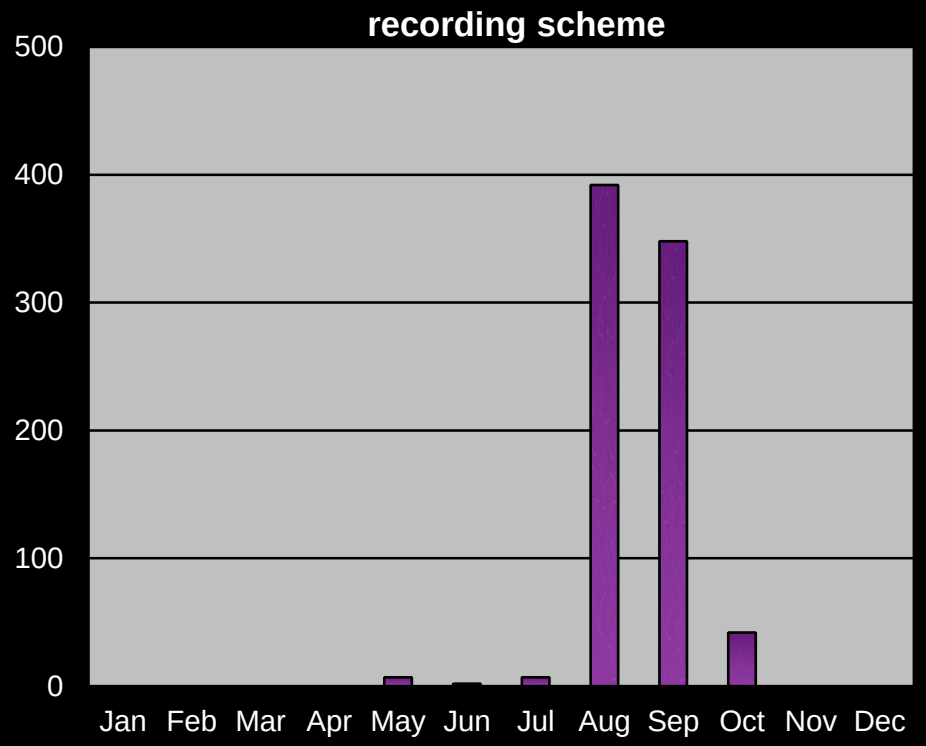


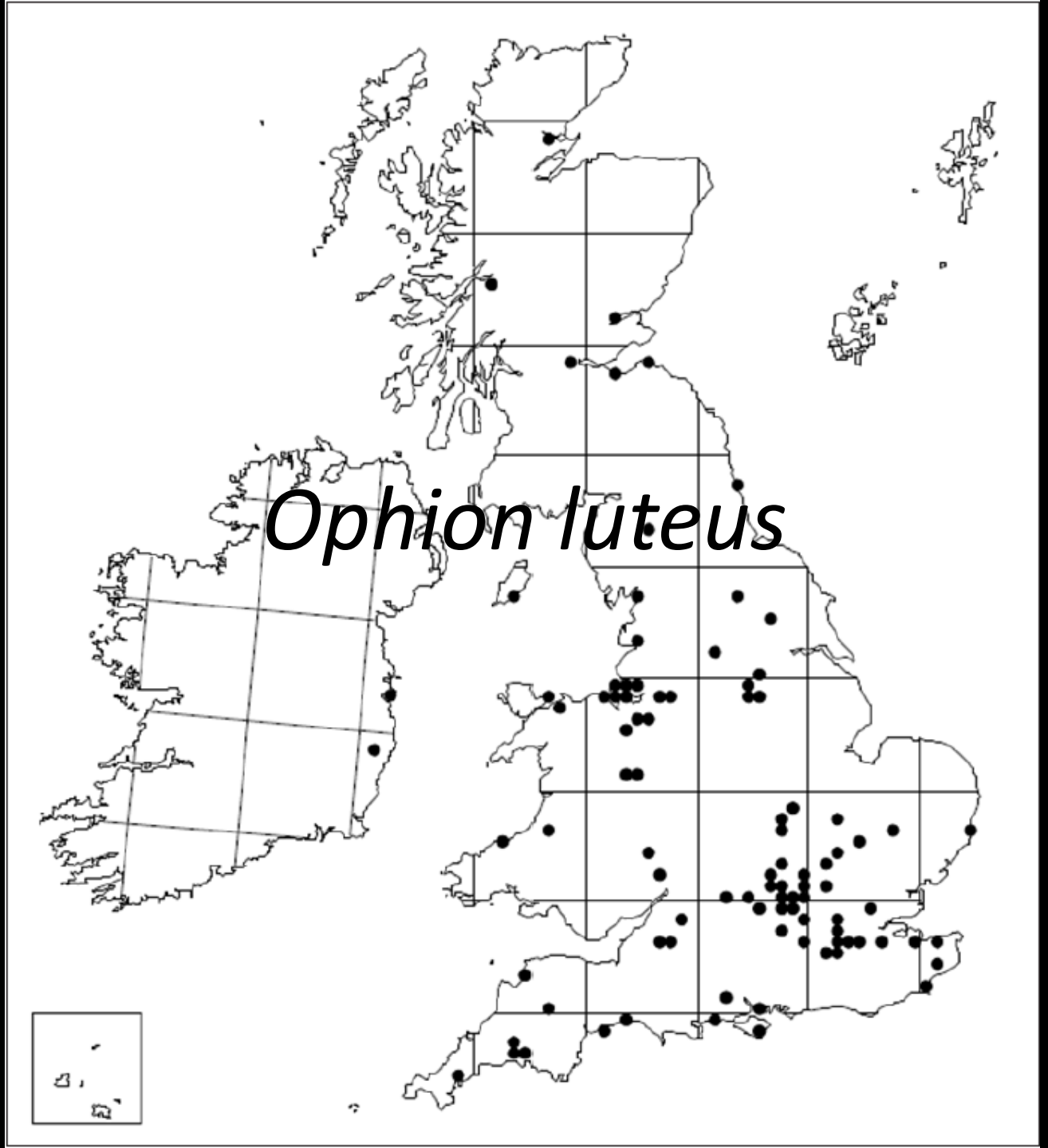
Ophion luteus

Ophion scutellaris

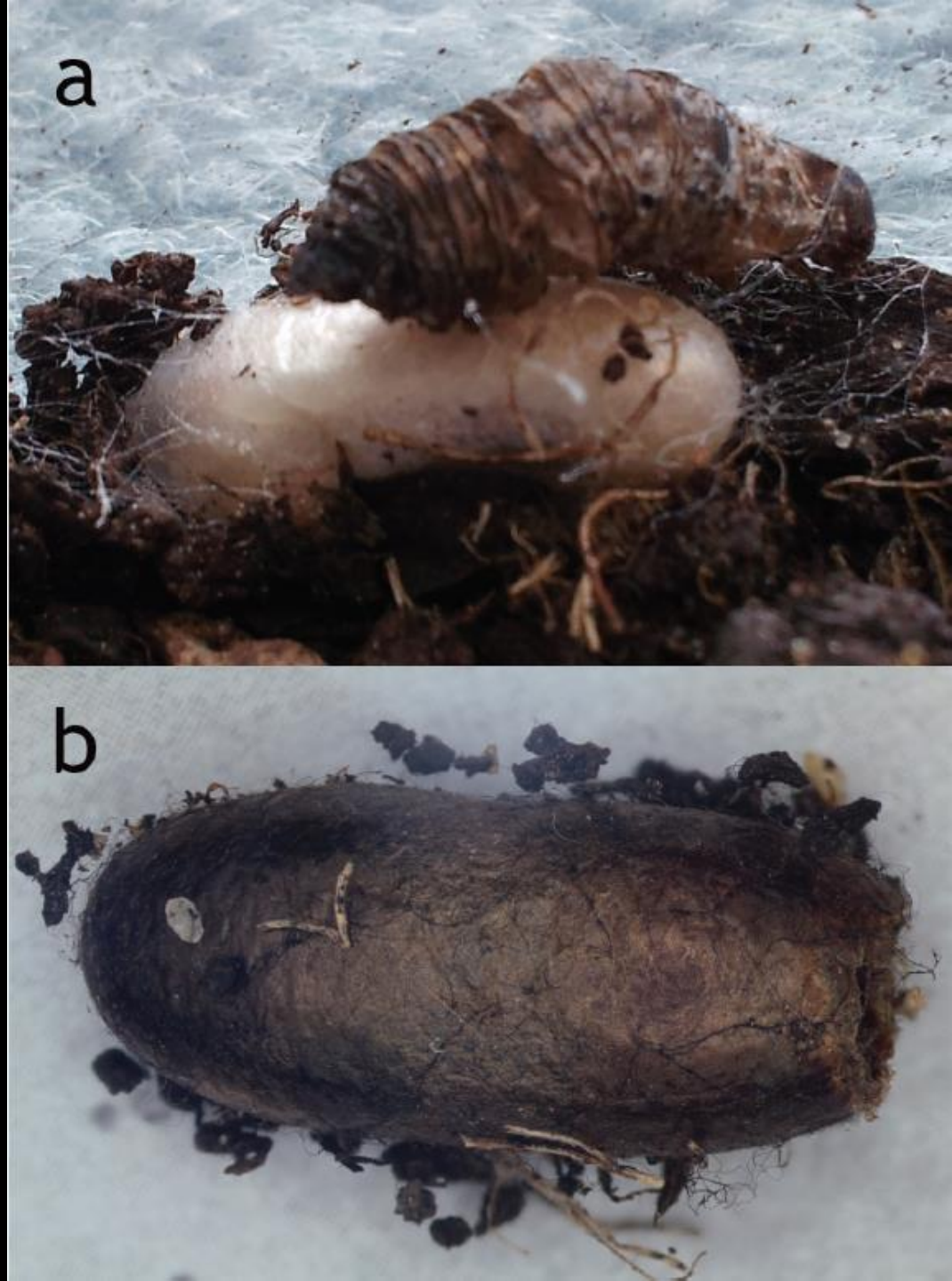
Ophion luteus



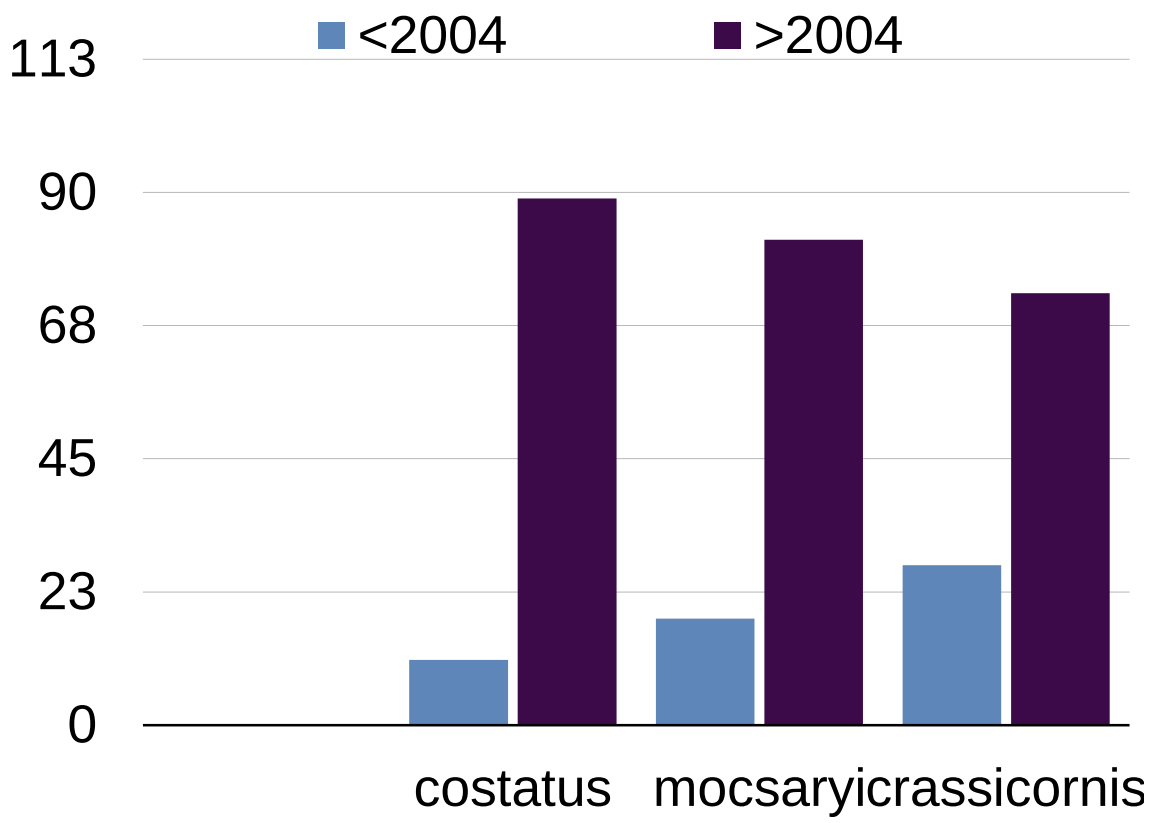



Ophion luteus

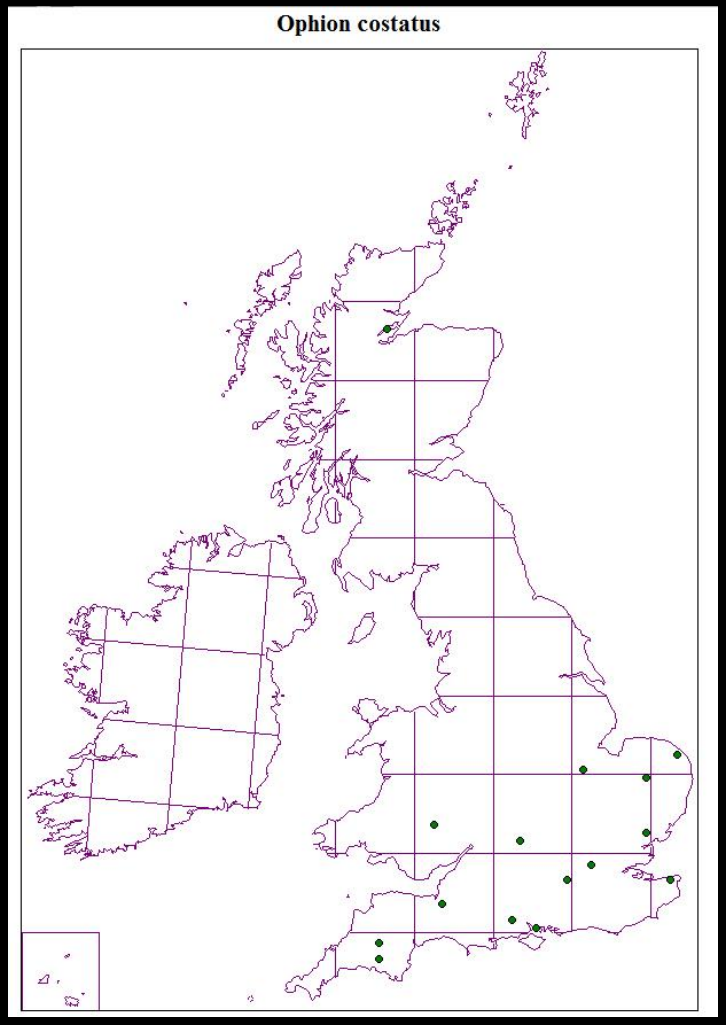
Parasitoid of *Agrotis* species, especially Heart & Dart

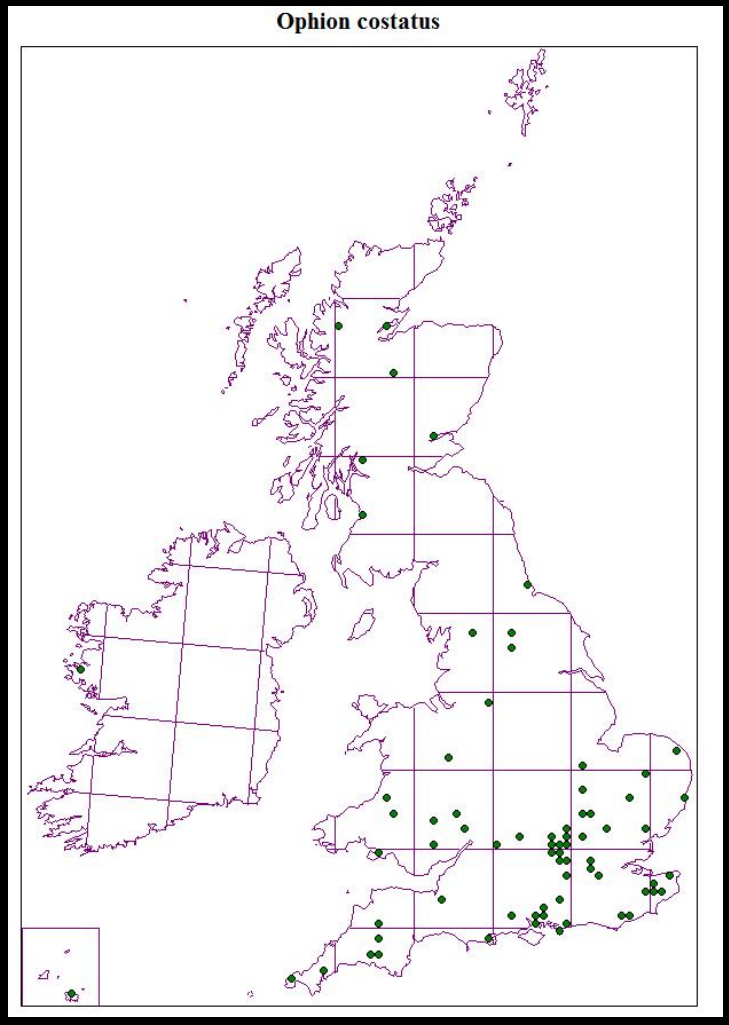


Ophion abundance

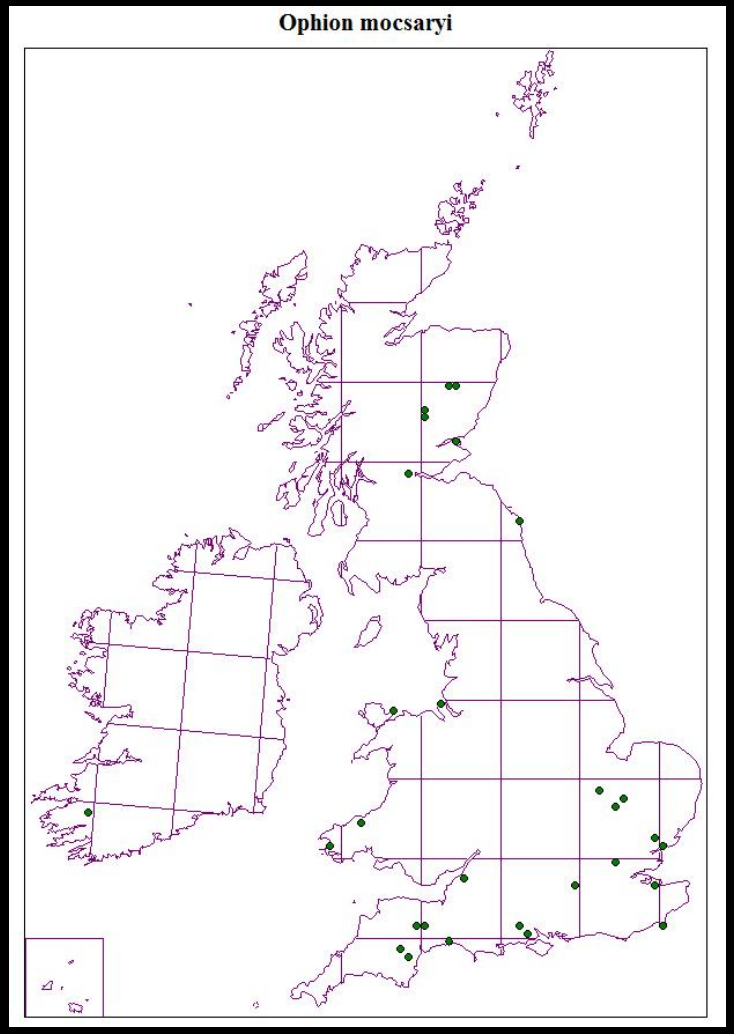


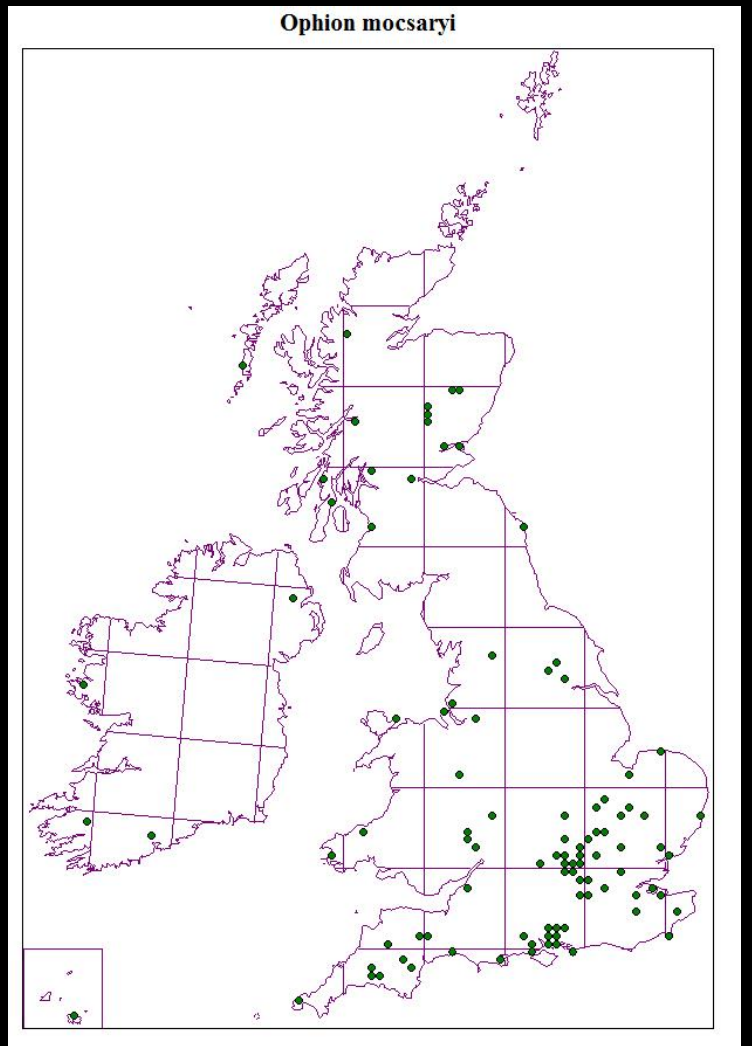
Ophion distribution





Ophion distribution






HORNS
BOTANICAL
FEATHERS
Ted the Wasp!

Misidentification rate

- *Netelia testacea s.l.*
- Munich - 82.5%, NHM - 77%
- *Netelia testacea s.s.*
- Munich - 97.9%, NHM - 99.3%
- *Ophion luteus* in Munich - 82.2%

Diversion #3: wasps in medical engineering

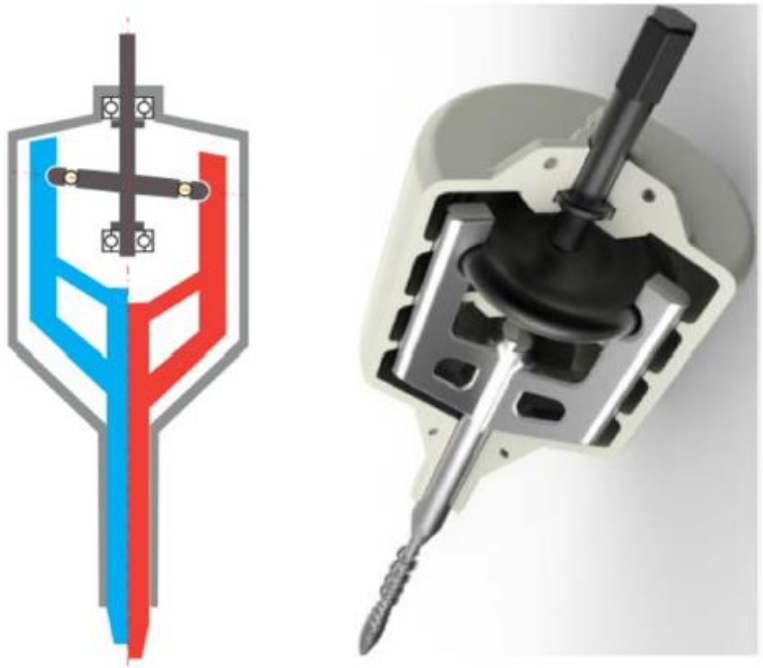
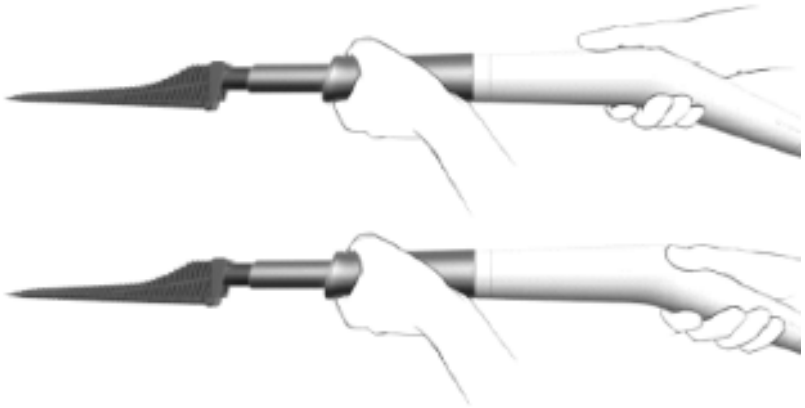


Figure 7: Transmission to convert the rotational motion of the motor into the linear motion of the drill bits.



Thank you!

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