NATURAL HISTORY MUSEUM

Beginner's guide to identifying British ichneumonids

By Nicola Prehn and Chris Raper

Contents

Ichneumonids, species of the family Ichneumonidae, are difficult to identify because so many look similar. Identifications are usually made using tiny features only visible under a microscope, which makes the challenge even harder. This guide attempts to allow beginners to name 22 of the most identifiable or most frequently encountered species from eight of the 32 subfamilies in Britain. It is not a comprehensive guide but intended as an introduction, using characters that are often visible in photos or in the field.

For a more detailed guide, Gavin Broad's Identification Key to the Subfamilies of Ichneumonidae is a good introduction for people who have a microscope or very good hand lens.

Subfamily	Species
Alomyinae	*Alomya debellator*
Banchinae	*Lissonota lineolaris*
	Lissonata setosa
Ctenopelmatinae	*Opheltes glaucopterus*
Ichneumoninae	*Amblyjoppa fuscipennis*
	Amblyjoppa proteus
	Achaius oratorius
	Amblyteles armatorius
	Ichneumon sarcitorius
	Ichneumon suspiciosus
	Ichneumon xanthorius
	Ichneumon stramentor
	Callajoppa cirrogaster
	Callajoppa exaltatoria
Ophioninae	*Enicospilus ramidulus*
	Ophion luteus
	Ophion obscuratus
Pimplinae	*Ephialtes manifestator*
	Tromatobia lineatoria
	Perithous scurra
	Apechthis compunctor
	Pimpla rufipes
Rhyssinae	*Rhyssa persuasoria*
Tryphoninae	*Netelia tarsata*

Ichneumonids are wasps (order Hymenoptera, superfamily Ichneumonoidea) with a very narrow wasp waist between the middle (mesosoma, roughly equivalent to the thorax on other insects) and hind (metasoma, roughly equivalent to the abdomen on other insects) body parts. They have powerful chewing mandibles, two pairs of usually transparent membranous wings with complex venation and long antennae with 18 or more segments. They are invertebrates, so don't have a backbone.

All ichneumonids are **parasitoids** of other invertebrates – that is, their larvae infect and then kill a single host animal. This distinguishes them from **parasites**, which live off a host but don't usually kill them, and **predators**, which attack and consume many individuals of the same or different species.

In the UK we have approximately 2,500 species of ichneumonid. Making up almost 10% of all British insects, Ichneumonidae are an important insect group and one of the most diverse. Many of the species are poorly understood and are known from very few specimens – even large museums like the Natural History Museum will have gaps in their reference collections.

Body parts

The standard terms for an inchneumonid's three main body parts are: head, thorax and abdomen. Experts tend to use the words head, mesosoma (middle segment) and metasoma (hind segment) because wasps have odd bodies where the waist falls between the first and second segments of the abdomen. You might expect the narrow bit to be the first part of the abdomen but it's actually the second – the first segment is called the propodeum and is attached to the back of the thorax.

The pattern of wing veins is fairly predictable within a species and can be very useful in identification. Ichneumonids have a distinctly different wing venation to solitary wasps or sawflies.

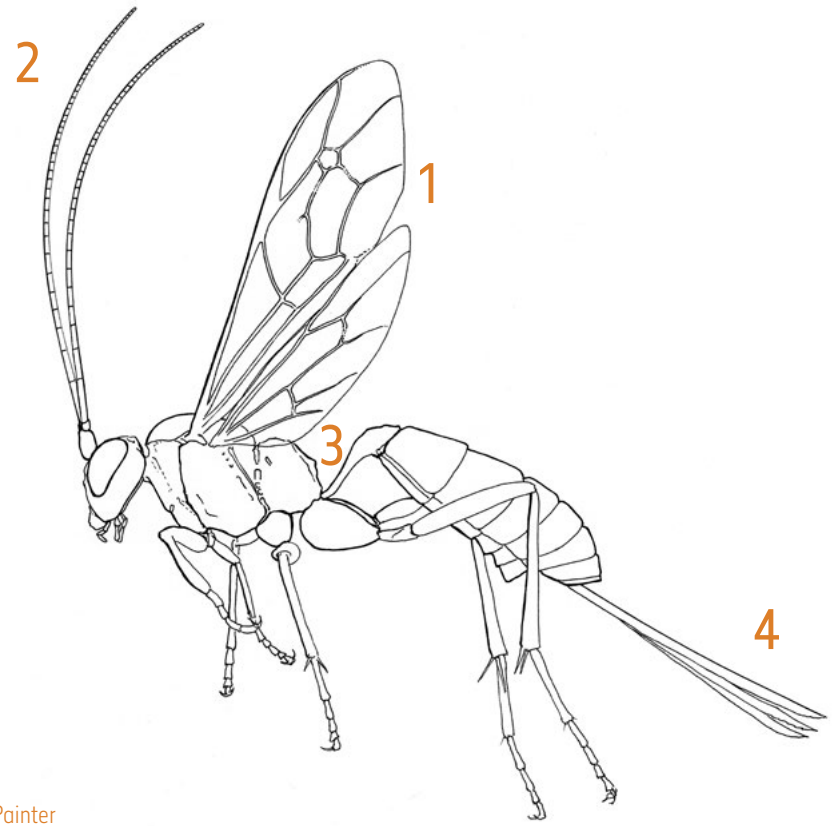
- Get as close as you can first
- Make sure there is enough light
- Take several photos from different angles
- If the insect is moving a lot it's easier to photograph from many angles. But if it's basking in the sun take a few dorsally, from above, and then tilt yourself over to get a few shots from the side
- Close-ups of the head are particularly useful
- Various angles of the head and body are useful to show colour and shape

If you can get close-up, well-illuminated images taken from different angles, then it will usually help identify what you have seen. If the insect is moving around then it may be easier to get various shots from different angles. But, if it is basking in the sun then often you will have to take a few dorsally, from above, and then tilt yourself over to get a few shots from the side/lateral aspect. Also take close-ups of the head and body from other angles to show the colour and shape, if you have the opportunity. However, even with good quality photographs, most ichneumonids are difficult, if not impossible, to identify when a critical feature is not visible.

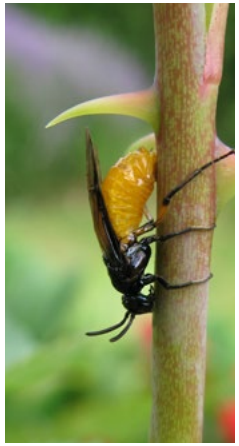
Do I have an ichneumonid?

To know if you have an ichneumonid, there are a few questions to ask yourself.

1. Does it have two pairs of mainly transparent wings with many veins criss-crossing them? The hind wings are usually much smaller than the forewings and are hooked onto the forewing so they can be partially obscured.
2. Does it have long antennae with more than 16 segments? Often you don't have to count every segment but if the antennae are much longer than the head and thorax then they probably qualify as long.
3. Does it have a narrow wasp waist between the middle and hind body segments? Often this can be slightly obscured by the wings but look carefully or try to get a side/lateral view.
4. Does it have an ovipositor on the tip of the abdomen? If so you may have a female ichneumonid. However, many insects also have ovipositors.

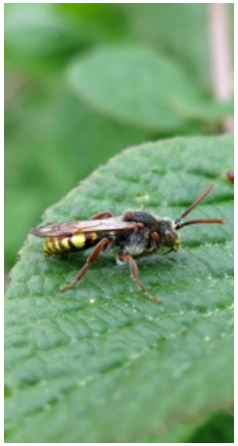


If you answered yes to these questions you probably have an ichneumonid. However, also compare to the photos below which are not ichneumonids but could be confused with them.



Rose sawfly - sawfly wasps lack a narrow, wasp waist, have short antennae, complex wing venation and do not sting

A typical social wasp (*Vespula germanica*) - heavily built with short antennae with classic black & yellow colour



A solitary cuckoo bee (*Nomada sp.*) - short antennae and a compact body shape

A spider-hunting wasp (Pompilidae) - long bristly legs and often have curling, relatively short antennae

Gasteruption sp. - long "neck", abdomen is attached high on the thorax well above the base of the legs. short antennae, hold their shortish wings down and close to the body

Which type of ichneumonid do I have?

When looking to identify your specimen, comparing your photos to others on the internet can be misleading as many images online are misidentified.

Large and/or colourful species

Mainly black-bodied species with orange legs – often with long ovipositors

Nocturnal, orange-bodied species – Sickle wasps

Others

The following species all have a narrow petiole (the first segment of the abdomen) and the females have a very short ovipositor which is not usually visible in the field.

Amblyjoppa fuscipennis

Amblyjoppa proteus

Achaius oratorius

Amblyteles armatorius

Ichneumon sarcitorius

Ichneumon xanthorius

Ichneumon stramentor

Callajoppa cirrogaster and *Callajoppa exaltatoria*

Possible confusions
Ichneumon suspiciosus

A large (16–25mm) and beautiful species with black head. It has a black thorax with a small cream spot and a bright orange abdomen – quite broad and no other colours on it. Can be confused with *Protichneumon pisorius*, but where *P. pisorius* has black tips on the hind tibia and tarsus, these features on *A. fuscipenni* are entirely orange.

Habitat: gardens and woodland

Hosts: the adult emerges from the pupa of the small elephant hawk-moth

Male with entirely black antennae

Female with black antennae with a white band in the middle

Female ©Gail Hampshire

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

A large (20–25mm), mainly jet-black species with a small yellow/cream spot on the back of the thorax. This species has dusky borders to the tips of the wings. Can be confused with many other, usually smaller, black species.

Hosts: eggs are laid in the caterpillar of the elephant hawk-moth and adults emerge from the pupa

Male with white bands on hind legs and entirely black antennae

Female with entirely black hind legs and a white band on the antennae

Flight period:

Jan	Feb	Mar	Apr	May	**Jun**	Jul	Aug	Sep	Oct	Nov	Dec

This is a medium-sized species (11–15mm) and has a black body with white spots. The precise pattern of white around the inner margin of the eyes, the white bands on each pair of legs together with the white band on the first abdominal segment are distinctive. The second, larger pale band on the abdomen is often absent. Can be confused with other black Ichneumoninae with white spots.

Habitat: hedgerows and copses

Hosts: butterfly and moth larvae and the adult emerges from the pupa

White around the upper orbit of the eyes

Black-and-white bands on first metasomal segment and legs

©David Anderson

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

One of the many medium to large (15mm) black-and-yellow banded species. The spine on the top of the thorax together with a precise colour pattern on the abdomen in both sexes distinguishes them from the many other very similar species. Watch out for other species with extra spots of yellow or white on the abdomen.

Males are distinctive in having wide yellow stripes on the abdomen with a black stripe between, together with a yellow tip to the abdomen and broadly black hind femur. Females are similarly distinctive but the yellow bands on the abdomen are narrower and curved, rather ring shaped.

Habitat: Roadside, hedgerows, gardens and clearings. Adults are often seen feeding on umbellifers.

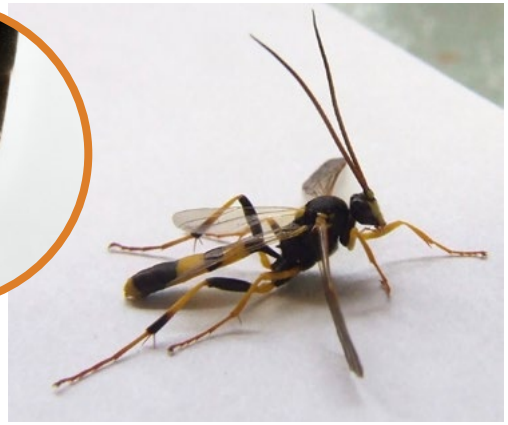
Hosts: Moth pupae. Often reared on the large yellow underwing.

Spine on the thorax on both males and females

Female ©Mick Massie

Female

Male - yellow tip on the abdomen



Male ©Nicola Prehn

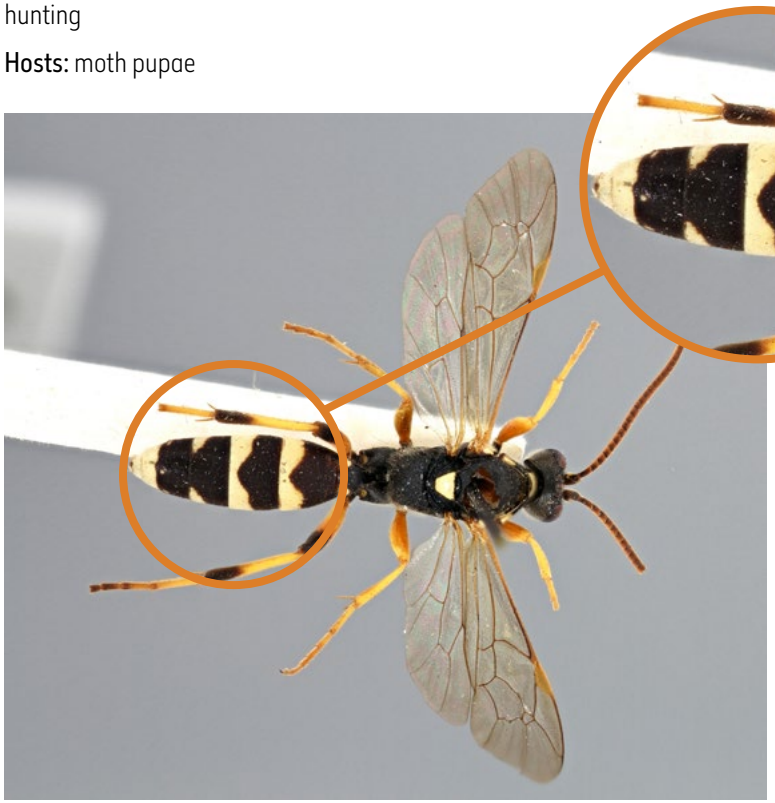
Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Another of the medium to large (female=10mm, male=14mm) black-and-yellow species. The size, shape and precise colour patterns are distinctive to this species. The female has a wide red band followed by a narrower black band, a second narrower red band and then black until the white spot at the tip. The males are longer with broad white bands across the abdomen at the hind edges of the segments, with conspicuous indentations on the second and third segments. The bands on the first and fourth segments are usually broken. Both sexes have hind femurs tipped with black.

Habitat: usually seen nectaring on umbellifers or flying through foliage hunting

Hosts: moth pupae



Male with yellow-and-black banding on the abdomen

Female with orange-and-black banding and a white tip to the abdomen

Female ©Simon Robson

Male ©Gail Hampshire

Flight period:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

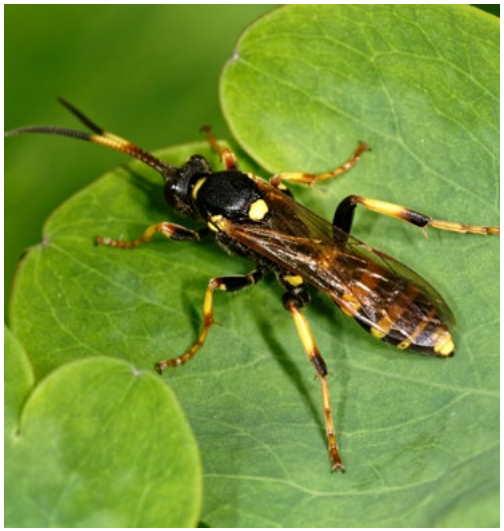
Another of the medium to large (15mm) black-and-yellow species.
The precise colour pattern on the abdomen in both sexes is distinctive in this species. The female has a yellow patch on the base of the leg and several yellow stripes across the abdomen with broad black stripes in between.
The male is similar to many other species of *Ichneumon* with an extensively yellow abdomen, but the first segment is yellow to the posterior as is the base of the hind leg.

Habitat: usually seen feeding on umbellifers or flying through foliage hunting

Hosts: butterfly and moth pupae

Female with yellow stripes on the abdomen

Male with a yellow first segment on the abdomen



Female ©Ron James

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Another of the medium to large (13–18 mm) black-and-yellow species. The precise pattern on the abdomen in both sexes is distinctive in this species. The female has entirely yellow first and second segments on the abdomen with a yellow spot at the tip. Other species have different combinations of white, yellow and red. The male is illustrated to show how different the sexes are. Males cannot be separated easily from many other species of *Ichneumon*. A great many species share the same abdominal colour pattern, with black hind coxae.

This was often called *Ichneumon stramentarius* but that was found to be a misidentification, so was given the (potentially confusing) replacement name of *Ichneumon stramentor*.

Habitat: hedgerows and clearings

Hosts: moth pupae, frequently reared from large yellow underwing and setaceous hebrew character

Female with a long tapered abdomen ending with a yellow spot and black antennae with a white band

Male without a yellow tip to the abdomen and entirely black antennae

Female ©Henk Wallays

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Both these species of *Callajoppa* are parasitoids of hawk-moths. They are two of the largest Ichneumonidae in Britain but can be hard to tell apart. Both are similar in coloration and have pale markings at the base of the antennae as well as yellow colouration around the eyes and at the base of the abdomen. The wings of both species are distinctly yellow, which gradually darkens to brown at the edges.

When comparing the two, the paler markings of *cirrogaster* are more extensive – the metasoma usually has a pale fourth segment as pale as the second and third segments and the wings are weakly darkened at the edges. In *exaltatoria*, the metasoma is black from the fourth segment and the wings have a strongly defined black margin.

Habitat: mainly in woodland and parks where large hawk-moths are found

Hosts: Hawk-moth caterpillars, emerging from the host pupa. Frequently reared from pupae of large species such as pine hawk-moth.

Callajoppa cirrogaster female

Callajoppa exaltatoria female

Callajoppa cirrogaster male

Callajoppa exaltatoria male

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Many photos of *Ichneumon* are labelled as *Ichneumon suspiciosus*. However, these are often misidentified without realising that this is just one of many ichneumonids with a very similar colour pattern.

Below are true images of *Ichneumon suspiciosus*, but it is not usually possible to identify similar individuals from photographs due to the visual similarity across species (a large genus with 50 British species).

Female

Male

Mainly black-bodied species with orange legs

The following species can be large and impressive, particularly the females which are often seen with a noticeably long ovipositor.

Lissonota lineolaris

Ephialtes manifestator

Tromatobia lineatoria (females only)

Perithous scurra (females only)

Apechthis compunctor (females only)

Pimpla rufipes (black slip wasp. females only)

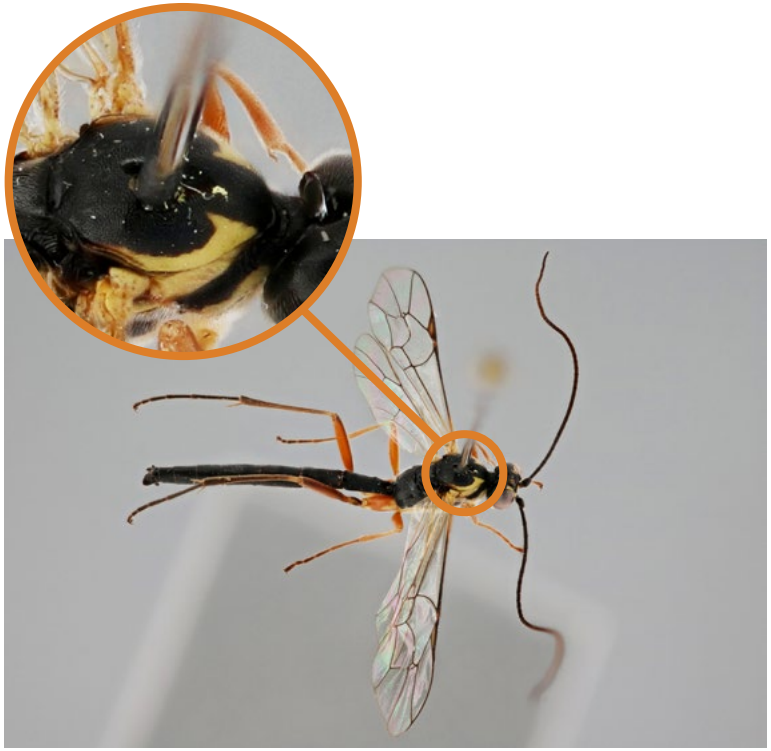
Rhyssa persuasoria (sabre wasp)

Possible confusions - *Lissonata setosa*

This species has a distinct yellow stripe running along the edge of the thorax plus a deep groove on the back of the head. Can be confused with many other black ichneumonids with long ovipositors and can be difficult to identify if you can't see the necessary features on the thorax and head.

Habitat: Meadows. Females can often be seen probing in grass seed heads with their ovipositor.

Hosts: moth larvae of the genus *Apamea*, which feed initially in grass seed heads



Male with a broad yellow stripe on upper edge of thorax

Deep groove on the back of the head

Female ©Andy Sands

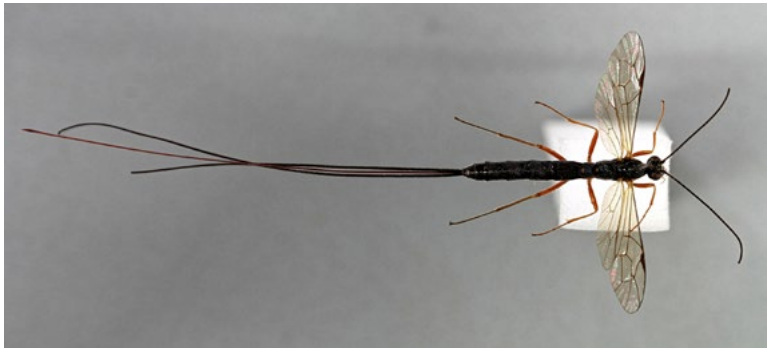
Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

An entirely black species with orange legs. The female has an extremely long ovipositor (up to 6cm) for probing the nests of solitary bees and wasps, together with the wide, pale brown clypeus on the lower face. Males are not as conspicuous, but can be recognised among many similar, mostly black ichneumonids by a fringe of long, curved hairs along the leading edge of the forewing, together with a wide, pale brown clypeus. Can be confused with species of *Dolichomitus* and various *Pimplinae*.

Habitat: : hedgerows and woodland areas

Hosts: Pupae of solitary bees and wasps. Often reared from bee hotels.



Female showing the long ovipositor that can be twice the length of the body

Male showing fringe of hairs on the leading edge of the forewing

Frontal wide and pale brown clypeus

Female ©Dave Skingsley

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

A small (5-10mm) and rather beautiful ichneumonid with black abdomen, orange and yellow striped thorax and black head with bold yellow markings. This, combined with a relatively short ovipositor, should distinguish this species.

Habitat: often indoors or in out-buildings where spiders have lain eggs

Hosts: spider egg sacs

Female top of the head showing cream stripes on the inner orbits

Short ovipositor

Female ©Stephen Plant

Flight period:

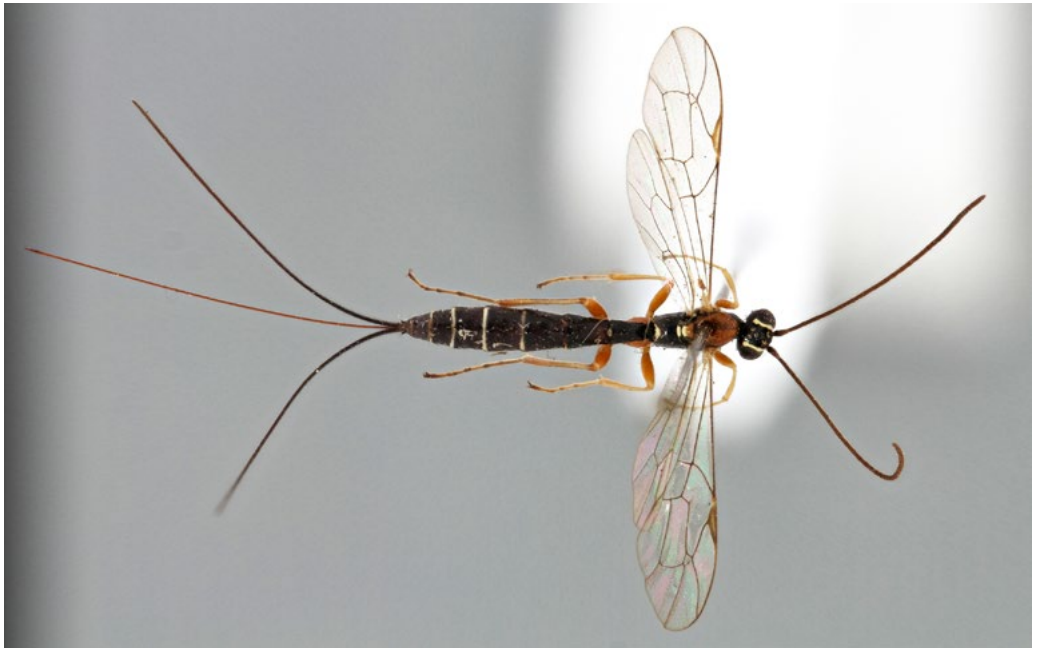
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

A fairly small (6–14mm) species with brightly coloured, red-and-yellow-striped thorax. This species can be distinguished from *Tromatobia lineatoria* by the longer ovipositor in females.

Other British *Perithous* have a relatively much shorter ovipositor; or have a red propodeum (with white spots) plus a sinuous ('wavy') ovipositor tip; or are predominantly black on the thorax.

Habitat: hedgerows

Hosts: solitary wood and stem-nesting aculeate Hymenoptera



Female – long ovipositor relative to the length of the forewing

Female ©Laurence Counter

Flight period:

Jan	Feb	Mar	Apr	May	**Jun**	**Jul**	**Aug**	**Sep**	Oct	Nov	Dec

A small to medium species (7–15mm) that is black with orange legs without cream banding on the hind tibia. Very similar looking to *Pimpla rufipes* but the ovipositor on the female has a downward curve on the tip. Unfortunately, males are indistinguishable from some other species in the field or from photos. Other species of *Apechthis* have white banding on the hind tibiae.

Habitat: hedgerows

Hosts: Lepidoptera pupae. Often reared from butterflies.

Female with a downwardly curving ovipositor

Female ©Dave Caulfield

Flight period:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Mainly black-bodied species with orange legs – *Pimpla rufipes* (black slip wasp. females only)

This black species with orange legs can easily be mistaken for *Apechthis compunctor* being similar in shape and size (10 –15mm), although some *Pimpla rufipes* are very large. The key difference between the two is in the female ovipositor which in *P. rufipes* is straight and lacks the downward curved tip. For this reason, the males, which don't have an ovipositor, are indistinguishable from photographs. Other species of *Pimpla* and the related genus *Itoplectis* have white-banded hind tibiae and are usually smaller.

Habitat: hedgerows feeding on flowers

Hosts: butterfly and moth pupae

Female showing a short, straight ovipositor

Female ©Ken Gartside

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

An easy species to identify due to the striking pattern of small white spots along the entire length of the thin, black body (not just the abdomen), red legs, long ovipositor and large size (10–40 mm). If you look closely you should also see it has transverse ridges on the top of the thorax, at the front, which it uses to brace itself as it emerges from the wooden burrow it has pupated.

Large females are the largest ichneumonids in Britain, though some can be considerably smaller. The ovipositor is longer than the length of the body.

Habitat: Particularly common in pine forests where large horntail wasps burrow into dead timber. Very frequently seen around log piles.

Hosts: wood wasps

Female – showing white spots along the side of both the abdomen and thorax with a long ovipositor

Female ©Jaswinder Boparai

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

This is just one of many black ichneumonids with orange legs that cannot be identified from photos and are easily confused with other species.

Nocturnal, orange-bodied species – sickle wasps

The following species are nocturnal and often found in light traps. They are typically large and slender wasps and many look similar, so the four listed here are the most easily identified.

Enicospilus ramidulus

Ophion obscuratus

Opheltes glaucopterus

Netelia tarsata

Possible confusions - *Ophion luteus*

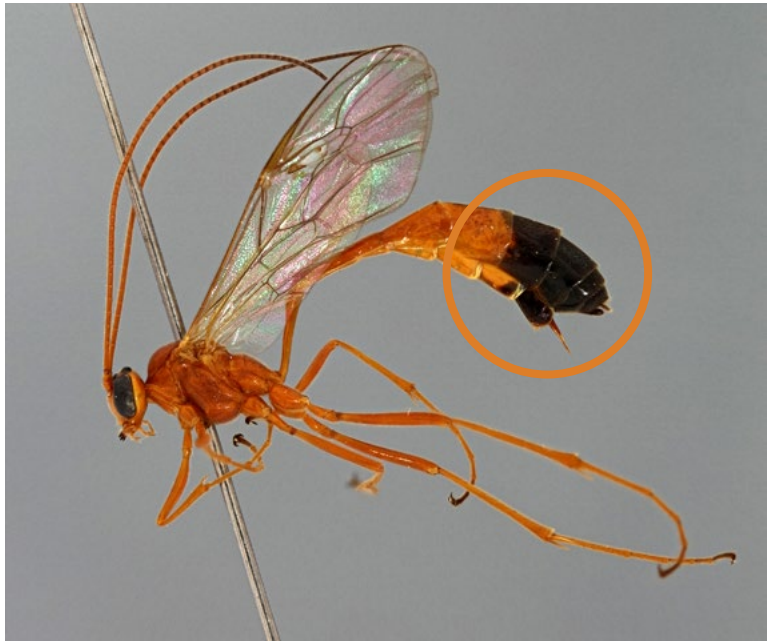
Wing comparison

All *Enicospilus* species are predominantly orange-bodied and most have floating pieces of orange chitin, called sclerites, in the middle of the wing membrane (see wing comparisons), which makes them distinctive.
E. ramidulus is a common species regularly found in light traps and easily identified by the distinctive black tip to its abdomen.

The other species in the genus *Enicospilus* can be identified using the keys in: Broad and Shaw (2016) The British Species of *Enicospilus* (Hymenoptera: Ichneumonidae: Ophioninae).

Habitat: nocturnal, though the males can be found flying by day

Hosts: moth caterpillars (Noctuidae, especially Hadeninae)



Showing distinctive black tip to the abdomen

Flight period:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

A large slim orange-bodied wasp (15–22 mm) easily identified by the distinctive cream stripes on the body and the wing venation. The wings lack areolets and the discosubmarginal cell is elongated, looking a bit like a horse head – a feature of the subfamily Ophioninae. Can be confused with many other sickle wasps but these mostly lack the distinctive pale stripes on the body. *Ophion forticornis* is similar but seems to occur only on sand dunes, flying in May. These nocturnal wasps are attracted to light and *Ophion obscuratus* flies through winter, unlike other *Ophion* species.

Habitat: Nocturnal. Occurs almost everywhere.

Hosts: moth caterpillars (Noctuidae, escpecially *Mythimna*)

Showing distinctive cream stripes on the body

©Gavin Tite

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

A large orange species easily confused with Ophioninae. However, the tip of the abdomen and the sides of the thorax are black. Unlike Ophioninae, the forewing has a small areolet (see wing comparisons) and the first metasomal segment is not petiolate (skinny) but rather broader and with deep lateral pits (glymmae).

Habitat: Nocturnal. Occurs near birches and other trees where the host feeds.

Hosts: sawfly larvae of the family Cimbicidae

Showing black on the tip of the abdomen and along the thorax

©Gavin Broad

Flight period:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

The genus *Netelia* is commonly confused with *Ophionines* but can be distinguished by the presence of an areolet in the forewing (see wing comparisons), a broader structure to the first metasomal segment (rather similar to *Opheltes* above) and narrow, twisted mandibles. There are many similar species of *Netelia* but *N. tarsata* is relatively distinctive as the forewing has a short vein (cu-a) nearly aligned with the long vein (Rs+M). The thorax has a short black stripe and the ovipositor obviously protrudes.

Habitat: Nocturnal. Occurs almost everywhere.

Hosts: pug moth larvae *(Eupithecia)*.

A broader first metasomal segment

©Gail Hampshire

Flight period:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

A large wasp (20mm) with a red or orange body, antennae and legs. The wings are clear with black veins and a very short *ramellus* (see wing comparisons) and the body often has an arched appearance. These nocturnal wasps are common in Britain and are often attracted to light traps in August and September.

Although very similar to other large orange wasps, closer inspection reveals a combination of features unique to *O. luteus* and pictured below. It has a long trochantellus on the hind leg and sharp grooves in the mandibles often show considerable wear.

Habitat: nocturnal woodland and farmland, often found in light traps

Hosts: hart and dart moth caterpillars (*Agrotis exclamationis*)

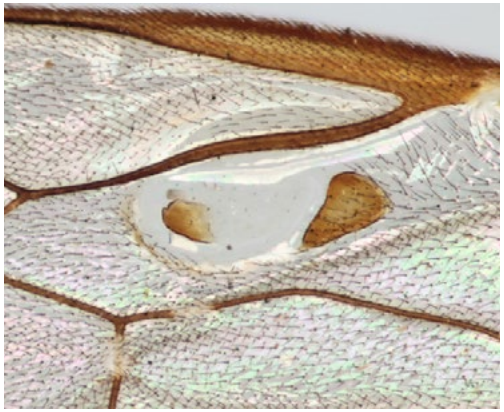
Long trochantellus on the hind legs

Sharp groove in the mandibles

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Close inspection of the wing venation will help to distinguish between similar nocturnal genera.



1. *Eniscospilus ramidulus* – showing floating chitin (sclerites) in the discosubmarginal cell.

2. *Ophion obscuratus* – showing an elongated discosubmarginal cell, characteristic of Ophioninae, which lacks an areolet.

3. *Opheltes glaucopterus* – showing a small areolet.

4. *Netelia tarsata* – showing a small areolet within a clear wing.

Medium sized (10–18mm) black wasp with broad orange bands on the abdomen and orange on the lower leg joints. In females the antenna is pale at the base and the hind tarsus is a dark reddish brown. Males have a darkly tipped third tibia and the abdomen is frequently black. Often confused with other Ichneumoninae but the relatively stout legs and antennae are quite distinctive, along with the wide, hairy clypeus at the base of the face.

Very similar to *Alomya semiflava*, however, this species only flies in August and September and the hind wing nervellus is intercepted higher. In comparison, both the base of the antenna and the hind tarsus of the female *A. semiflava* are dark. In the male, the hind tibia is entirely testaceous and is rarely all black.

Habitat: Often found feeding on aphid honeydew and umbellifers in hedgerows. Females often found on the ground hunting for swift moth larvae.

Hosts: Probably swift moth (genus *Hepialus*) but has not been reared. The similar *Alomya semiflava* parasitises caterpillars of the common swift, which it mummifies.

Female showing pale antennae and orange lower leg joints

Male showing black antennae and dark tip to the hind tibia

Male ©Gail Hampshire

Flight period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				■	■	■	■	■			

This guide was compiled by the Natural History Museum's Angela Marmont Centre for UK Biodiversity. The authors would like to thank Dr Gavin Broad for his invaluable expertise and guidance in selecting species, loaning specimens to be photographed and generally keeping us headed in the right direction.

Further reading

- Key to Species of Netelia in Britain and Ireland Gavin Broad
- Keys for the Identification of British and Irish Nocturnal Ichneumonidae Gavin Broad