FSC
Bringing Environmental Understanding To All

Illustrated key to the British False Scorpions (Pseudoscorpions)

By Gerald Legg with Francis Farr-Cox
and with line drawings of the species by Richard Jones

AIDGAP
Aids to Identification in Difficult Groups of Animals and Plants

Front cover image: a preserved Large Tree Chernes, *Dendrochernes cyrneus*

The size, form and position of 'hairs' are often useful in identifying species. As well as **setae** (short hairs) that cover the body and appendages, there are special very long pointed sensory hairs called **trichobothria** (singular: **trichobothrium**). The key refers to trichobothria on the tip of the abdomen and on the fourth tarsus (tarsus of leg 4). Trichobothria projecting at the tip of the abdomen are best seen by looking at the animal lying on both its dorsal side and its ventral side. Trichobothria on the tarsi emerge from the dorsal side and so are best seen in side view. Dead specimens can be held in position if they are placed in a small dish and supported in a bed of fine sand (or tiny glass beads as used by sandblasters).

◑ Denotes the species is phoretic

When you have worked through the key and think you have made an identification compare the overall appearance of your specimen with the line drawing. Do not pay undue attention to the shape or size of the abdomen as this can change a lot if the animal has just fed or is gravid.

Before you start look at **Structure** overleaf. Note that the jaws and last segment of the pedipalps comprise a hand with two fingers – one fixed one movable. The key is for adult specimens. If there is no sign of a gential operculum you may have an immature animal. indicates a microscope is needed.

All the line drawings show the species to scale at 7.5x life size. Silhouettes show the species at approximately life size.

Start here • Is the abdomen divided down the middle?

- Yes → Divided. Only some species have obvious eyes
- No → Undivided. All species have eyes

Undivided. All species have eyes

Are the jaws large, nearly as long as the head thorax and is the jaw hand about the same width as the palpal hand? ◑

- Yes → Are the palps dark?
  - Yes → **5. DARK-CLAWED CHTHONID** *Chthonius tenuis*
  - No → Is there a dimple in the hand (viewed from the side)? Finger/hand ratio near 1:1 ◑
    - Yes → Are the eyes poorly developed, the teeth of the palps blunt and close together, not triangular and spaced apart? ◑
      - Yes → **1. HALBERT'S CHTHONID** *Chthonius halberti*
      - No → **6. STRAIGHT-FINGERED CHTHONID** *Chthonius orthodactylus*
    - No → **4. COMMON CHTHONID** *Chthonius ischnocheles*
- No → Is it from the east coast,on or near the shore (above high tide) and are there 2 large and 2 tiny setae on the rear edge of the head-thorax?
  - Yes → **2. KEW'S CHTHONID** *Chthonius kewi*
  - No → **3. DIMPLED-CLAWED CHTHONID** *Chthonius tetrachelatus*

At the front of the animal there are two sets of paired appendages, the obvious pedipalps and jaws which are closer to the body. The jaws and the last segment of the pedipalps are comprised of a hand with two fingers – one fixed, one movable.

Jaw hand much narrower than the palpal hand

Hands shorter than fingers

Eyes well developed. Are there 4 similar-sized setae on the rear edge of the head-thorax?

Has been found inland

10. SHORE NEOBISID *Neobisium martimum*
From the top of the upper shore to the splash zone in rock crevices where it shelters from the tide. South and south-west

Divided. Only some species have obvious eyes

How many eyes, 4 or 2?

- 4 eyes → Is the palpal femur relatively short, about 1.25x longer than the tibia?
  - No → **7. BOG CHELIFER** *Microbisium brevifemoratum*
    Very rare; resembles *Neobisium carcinoides*
    Found in Sphagnum and alder carr †
  - Yes → Palpal femur at least 1.6x longer than the tibia. Is the galea long and flat and the movable finger of the palps as long as the hand? And was it on the seashore below spring tide and may be covered by tide?
    - Yes → Galea high convex tubercle, 'humped'. Movable finger of the palps longer than hand. Are there large upright pointed teeth at intervals among the rounded teeth of the fixed finger of the palps? And is the epistome rudimentary or a low triangle? ◑
      - Yes → **8. MOSS NEOBISID** *Neobisium carcinoides*
        Most widespread species; found from woodlands to moorland
        It is possible that it may occur just on the seashore above extreme high water spring tide level
      - No → **9. CARPENTER'S NEOBISID** *Neobisium carpenteri*
        Coastal, from splash zone or above in extreme high water spring tidal debris, salt marsh and sand dune debris. Easterly
    - No → Palpal femur at least 1.6x longer than the tibia. Is the galea long and flat and the movable finger of the palps as long as the hand? And was it on the seashore below spring tide and may be covered by tide?
      - Yes → **11. REDDISH TWO-EYED CHELIFER** *Roncus lubricus*
        Galea a low rounded tubercle; dry woodland litter/soil, under stones in woods
      - No → **12. CAMBRIDGE'S TWO-EYED CHELIFER** *Roncreagris cambridgei*
        Galea elongate and branched; under stones in woods, quarries, etc.
- 2 eyes → Is galea on movable finger of jaws a distinct branched process (best seen against a dark background)?
  - Yes → **12. CAMBRIDGE'S TWO-EYED CHELIFER** *Roncreagris cambridgei*
    Galea elongate and branched; under stones in woods, quarries, etc.
  - No → **11. REDDISH TWO-EYED CHELIFER** *Roncus lubricus*
    Galea a low rounded tubercle; dry woodland litter/soil, under stones in woods

Femur

Palps stout. Palpal hand longer than the fingers, 1.2x. Is there a trichobothrium on the fourth tarsus and trichobothria on the end of the abdomen? Are the body setae serrated? ◑

- Yes → **26. OAK TREE CHELIFER** *Larca lata*
  One of rarest species in Europe
- No → **27. LAZY CHELIFER** *Withius piger*
  Very rare; vagrant

Was it under tree bark?

- Yes → **24. HOUSE SCORPION** *Chelifer cancroides*
  Rare
- No → **22. POWELL'S CHERNES** *Allochernes powelli*
  In barns etc; a slightly larger setae on top surface of fourth tarsus, near the claw

Was it by the seashore not covered by the tide, on sand dunes, salt marsh, sea wall?

- Yes → Are the palpal fingers slightly longerthan the hand (1.2x)? ◑
  - Yes → **24. HOUSE SCORPION** *Chelifer cancroides*
    Rare
  - No → Palps stout. Palpal hand longer than the fingers, 1.2x. Is there a trichobothrium on the fourth tarsus and trichobothria on the end of the abdomen? Are the body setae serrated? ◑
    - Yes → **26. OAK TREE CHELIFER** *Larca lata*
      One of rarest species in Europe
    - No → **27. LAZY CHELIFER** *Withius piger*
      Very rare; vagrant
- No → **25. MARRAM GRASS CHELIFER** *Dactylochelifer latreillii*
  In litter, beneath drift wood; dry-ish conditions

Is the species apparently blind with no eyes present?

- Yes → Dull brown coloured; setae clubbed. Are there trichobothria on the end of the abdomen? ◑
  - Yes → Is there a trichobothrium on the fourth tarsus? ◑
    - Yes → Was it under tree bark, rotting wood? (Could get a phoretic specimen.)
      - Yes → **17. COMMON TREE CHERNES** *Chernes cimicoides*
        Beneath bark and in damp rotting wood
      - No → **21. SMALL CHERNES** *Pselaphochernes dubius*
        Woodland soil
    - No → **23. WIDER'S TREE CHERNES** *Allochernes wideri*
      Under tree bark; no long setae on fourth tarsus
  - No → Is it a large species, body >3mm long, and in dry rotting wood? (Could get a phoretic specimen.)
    - Yes → Was it in compost/manure? Is the trichobothrium in the **middle** of the fourth tarsus?
      - Yes → **20. COMPOST CHERNES** *Pselaphochernes scorpioides*
        Manure, compost heaps ◑
      - No → **19. TERRIBLE-CLAWED CHERNES** *Dinocheirus panzeri*
        In barns, poultry houses, pigeon lofts, nests; dry conditions; trichobothrium-like setae on the fourth tarsus near the terminal claw ◑
    - No → **18. LARGE TREE CHERNES** *Dendrochernes cyrneus*
      Dry decaying wood; under bark of south facing trees. Very rare. RDB. Ancient woodland indicator ◑
- No → Are the body setae clearly pointed (without club-like tips)?
  - Yes → Is the trichobothrium on the fourth tarsus in the middle of the tarsus? ◑
    - Yes → **15. SAVIGNY'S SHINING CLAW** *Lamprochernes savignyi* ◑
      Fourth tarsus
    - No → Trichobothrium on fourth tarsus towards the body. Is first joint of the pedipalp raised as a knob?
      - Yes → **16. CHYZER'S SHINING CLAW** *Lamprochernes chyzeri*
        More robust than *L. nodosus*; first joint of palp conical and pointed; femur 0.6-0.62mm ◑
        L. chyzeri
        L. nodosus
        These two species can be easily confused
      - No → **14. KNOTTY SHINING CLAW** *Lamprochernes nodosus*
        Delicate animal; first joint of palp with rounded top; femur 0.5-0.57mm ◑
  - No → Pale, tiny species with circular depression on the head-thorax?
    - Yes → **13. BOOK SCORPION** *Cheiridium museorum*
      Found in barn, poultry house, pigeon loft, thatch debris; old book stores and warehouses; dry conditions
      Circular depression
    - No → Pale, tiny species with circular depression on the head-thorax?

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Introduction

Most people who see a pseudoscorpion for the first time are fascinated. It is probably because they are so tiny (1.3–4.2mm) yet have an intriguing body shape that is still discernible to the naked eye. Pseudoscorpions or false-scorpions are the fourth most numerous order of arachnids (the 8-legged invertebrate group which includes the spiders). Although there are only 27 different species in the British Isles there are over 2,000 species worldwide. They are never large animals, the biggest species, which is a yet undescribed species from Pakistan, is only 15mm long.

The enlarged and lobster-like second pair of appendages, the pedipalps, give a pseudoscorpion the superficial appearance of a scorpion, albeit tailless, hence pseudoscorpion or false scorpion. As aggressive hunters they catch their prey using these formidable weapons which vary in shape and size depending on their favoured prey. Once caught the prey is chewed by jaws called chelicerae and digestive juices are poured into the victim. The resulting soup is then sucked-up into the mouth.

Although many species have eyes, these are only sensitive to light levels. For pseudoscorpions to accurately navigate, find prey and mate, they feel their way using special long sensory hairs – the trichobothria – many of which are on the pedipalps. Others on the rear of the animal enable it to know what is behind. The chelicerae of some species have a special knob or longer process on the tip of the moveable finger. This 'galea' produces silk which is used to make silken chambers in which the animal can moult, hibernate or look after its young. Chambers made by pseudoscorpions can sometimes be found beneath tree bark.

Mating involves no direct sexual contact. The male would be a nice meal for the female so he keeps away! Sperm are transferred to the female 'indirectly' – the male produces a silken spermatophore that he deposits on the ground on top of which is a packet of sperm which the female picks up with her genitalia. An examination of the underside of the abdomen can determine the sex of an individual, males usually having a more complex and distinctive genital area than females. Young do not have this distinct genital area. Some species fertilise their eggs soon after mating whilst others store the sperm for future use. By storing sperm these species can exploit temporary habitats like a rotting log, compost heap or birds' nest allowing a single female with eggs and sperm to start a new population.

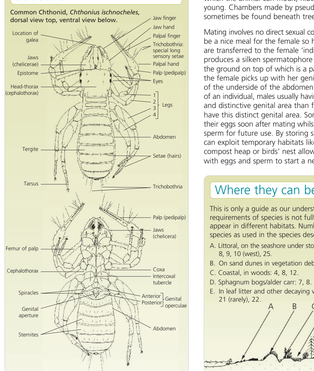
Eggs are not laid but glued together and attached to the female's genital opening and hatch as protonymphs which also remain attached and are fed with 'milk' produced by the ovary. The protonymphs grow and moult into deutonymphs, then moult again into tritonymphs and finally into adults. In some species protonymphs remain with their mother in the silken chamber and hence they have never been seen in the wild. To move around, those in soil, leaf litter, etc., just walk, but those in transient habitats, like compost heaps, hitch-hike – they attach themselves to flies, beetles, parasitic wasps and harvestmen and get a lift to a new habitat, a process known as phoresy (◑ phoretic).

To find pseudoscorpions start by getting some woodland leaf litter, spread it out it over a white sheet and wait... and wait – pseudoscorpions defend themselves from disturbance by 'lying low'. They will usually start to move when all the other invertebrates have run off the sheet and you have decided to start again with another load of leaves! When they do appear, if you touch them with a tiny leaf from the front you will see another defence they have – a very fast reverse gear! Once spotted make a clear, 'no-man's-land area', around the individual so it can't easily hide and use a fine lightly moistened paint brush or a small blade of licked grass) to pick them up. For the better equipped enthusiast pseudoscorpions can be found more efficiently using a variety of standard invertebrate techniques e.g. Tullgren funnel and D-vac (a very fine collecting bag is needed as the species are tiny).

You can view them with a x20 hand-lens and be able to identify some of the commoner species. However, it is virtually impossible to identify many without the use of a binocular microscope, and in some cases a compound microscope. Getting the lighting right will greatly improve the chance of seeing some of the features, especially the various hairs and bristles that distinguish some species. When using this key take into account the habitat the specimen was found in. It is important to realise that some species will be relatively easy to identify because of colour, habitat and size, but others may be much more difficult to differentiate.

Structure

Common Chthonid, *Chthonius ischnocheles*, dorsal view top, ventral view below.



Where they can be found

This is only a guide as our understanding of the habitat requirements of species is not fully known so species could appear in different habitats. Numbers refer to individual species as used in the species descriptions and the key.

A. Littoral, on the seashore under stones, in crevices: 1, 2 (east), 3, 8, 9, 10 (west), 25.
B. On sand dunes in vegetation debris, under drift wood: 1, 25.
C. Coastal, in woods: 4, 8, 12.
D. Sphagnum bogs/alder carr: 7, 8.
E. In leaf litter and other decaying vegetation: 4, 6, 8, 11, 12, 21 (rarely), 22.
F. In bird and mammal nests: 4 (damp), 8, 13, 19, 23, 24 (rarely), 26 (in decaying trees).
G. Beneath tree bark and in dead wood: 4, 14 (rarely),16, 23, 17, 18 (very dry).
H. Among moss, lichen, litter, etc. (woodland, heathland, grassland): 4, 5, 8.
I. Among stored products in barns, warehouses and old buildings: 4 (rarely),13, 19, 22, 24, 27.
J. Among grass stem bases and rhizomes (tussocks), (away from the sea): 4, 5, 6, 8.
K. Under stones and in rock crevices: 1 (coastal), 2, 3, 4, 5, 8, 9, 10, 11, 12.
L. In manure and compost heaps: 14, 15, 20.
M. In dwellings (excluding phoretic species that may pop in): 13, 24.

British species

Some of these images are taken from live specimens others from preserved specimens so the colours may not be true.

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1. **Halbert's chthonid** *Chthonius halberti*

1.2mm. Originally at Malahide, Co. Durham in 1915 and under stones on and below the high water mark in Axmouth, Devon this rare species has recently been found at Charnel near Kimmeridge, Dorset.

2. **Kew's chthonid** *Chthonius kewi*

1.4-1.8mm; preserved specimen which is somewhat dark, in reality very similar in appearance to the following (3). Found and probably restricted to the east coast (Norfolk to Kent) in drift-line debris, timber and under stones. However there have been records from Dorset, Sussex, Lincolnshire and Notts.

© Andy Marcuse

3. **Dimpled-clawed chthonid** *Chthonius tetrachelatus*

1.3-1.9mm; preserved specimen. Widespread but especially near the coast. Easily confused with a more recent species, *C. kewi* (2). It occurs in strandline debris, under brick and stones and may be synanthropic.

4. **Common chthonid** *Chthonius ischnocheles*

Males 1.6mm, females 2.4mm. One of the two most likely found species (*Neobisium carcinoides* (8) is the other). A widespread distribution, but not far into Scotland. It occurs in leaf litter and humus of woodlands, hedgerows even the coastal strandline (*C. tetrachelatus* (3) favours this microhabitat too), beneath stones, bricks, and even in birds' nests.

5. **Dark-clawed chthonid** *Chthonius tenuis*

Males 1.3mm, females 2.3mm. The dark palps, pale legs and general colouration make this an easy species to identify. Found in leaf litter, humus and beneath stones it appears to prefer well drained habitats on sandstone, sands and chalk.

6. **Straight-fingered chthonid** *Chthonius orthodactylus*

Males 1.9mm, females 3.0mm; preserved specimen. The status of this species has been put in doubt but it is distinct enough to be included here in the British fauna. Records are largely from the south-east and south Wales occurring in dead leaves and grass tussocks.

7. **Bog neobisid** *Microbisium brevifemoratum*

1.6-2.4mm. Our most recent addition to the British fauna, only found in two localities, both raised Sphagnum bogs. At first glance it could be confused with *N. carcinoides* (8) as this is often found in Sphagnum, but the stubby femora and its overall size clearly identify it. If in doubt compare with a known *N. carcinoides* specimen. Records especially needed.

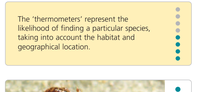
8. **Moss neobisid** *Neobisium carcinoides*

2.2-3.0mm. Our commonest and most widespread species previously know as *N. muscorum*. It can be found from Lands End to the Orkney Isles, favouring damp leaf litter of woodlands, hedgerows, but will also occur in margins of Sphagnum bogs, beneath stones, on heathlands, grasslands, birds' nests, in moss and even on the seashore.

9. **Carpenter's neobisid** *Neobisium carpenteri*

3.3mm; preserved specimen. Colour not typical due to preservation. Originally found in 1909 beneath *Arbutus* bark and in moss on the coast of Glengariff. Found off the Essex coast in the 1950s. Further ones matching the description found in a Welsh quarry. It has been suggested the original specimen was a form or subspecies of *N. sichyrum*. All this suggests we are dealing either with a misunderstood species or more than one species.

The 'thermometers' represent the likelihood of finding a particular species, taking into account the habitat and geographical location.



10. **Shore neobisid** *Neobisium maritimum*

3.2mm. Found along the Welsh coast, Atlantic coast, and Channel coast as far west as and including the Isle of Wight. It tolerates submergence at high tide and hides in rock crevices and beneath stones from the top of the upper shore to the splash zone.

11. **Reddish two-eyed chelifer** *Roncus lubricus*

2.0-2.5mm. A tritonymph is shown, which has the characteristic reddish palps and femora. It appears to be restricted to the southern half of Britain and favours dry leaf litter, particularly beech, poplar and sycamore. It can also be found under stones in woods and hedges.

12. **Cambridge's two-eyed chelifer** *Roncocreagris cambridgei*

1.2-2.0mm; histologically fixed/preserved specimen. A western/south-westerly species that favours driest deciduous woodland litter and beneath stones. More common along the coast.

13. **Book scorpion** *Cheiridium museorum*

1.3-1.4mm. Our of our tiniest species, almost mite-sized can be found in very dry barn debris, chicken refuse, thatch, packaging, lofts, old nests, etc.

14. **Knotty shining claw** *Lamprochernes nodosus*

1.8-2.2mm. Easily confused with *L. chyzeri* (16), but has smaller palpal femora and tibia lengths both of 0.5mm. A synanthropic species preferring rich dung and compost heaps but has also been found in rotting wood where *L. chyzeri* is more typically found. Phoretic on flies.

© Paul Richards

15. **Savigny's shining claw** *Lamprochernes savignyi*

1.5-1.7mm; preserved specimen. A cosmopolitan synanthropic species found in compost and manure heaps, plant beds and is commonly phoretic on flies. Palpal femur length is around 0.36mm and the tibia 0.4mm.

© Trevor Pendleton

16. **Chyzer's shining claw** *Lamprochernes chyzeri*

1.8-2.0mm; preserved specimen. There are a paucity of records, possible resulting from confusion with *L. nodosus* (14). Palpal femur and tibia length both usually 0.6mm. It can be found beneath bark on old and dying trees, especially aspen but also beech and birch and is also phoretic on flies.

17. **Common tree chernes** *Chernes cimicoides*

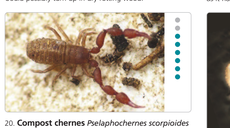
2.2-2.3mm. This widespread species can be found under the bark of dry, dead and over-mature trees, particularly oak, beech, elm and willow. In ancient woodland it can occur with our largest and one of our rarest species, the Large tree chernes (18).

18. **Large tree chernes** *Dendrochernes cyrneus*

3.5-4.2mm. Our largest and one of the rarest species listed in the Red Data Book. It likes old very dry decaying wood or beneath the bark, often exposed to the sun. Oaks are favourite, but it has been found associated with beech and elm. Regarded as being associated with ancient woodland. Phoretic on ichneumons and beetles.

19. **Terrible-clawed chernes** *Dinocheirus panzeri*

2.1-2.6mm; preserved specimen. A mainly synanthropic species occurring in hay, straw and grain refuse in barns and warehouses, old chicken-houses and pigeon lofts. Also found in the nests of birds, mammals and ants. Could possibly turn up in dry rotting wood.



20. **Compost chernes** *Pselaphochernes scorpioides*

1.5-2.0mm. Distinctive trichobothria on its rear end and on the tarsus of leg four. This species favours rich decaying organic matter and is often synanthropic being found in compost, manure and damp rotting straw. It has also been found in leaf litter, dead wood and red-ant nests. It may turn up indoors as this is a phoretic species, hitchhiking on flies.

21. **Small chernes** *Pselaphochernes dubius*

1.5-1.7mm. Similar but smaller to (20) and lacking the trichobothrium on tarsus of leg four. Apparently associated with calcareous conditions in grassland and woodland litter, under stones and occassionally in rotting wood.

22. **Powell's chernes** *Allochernes powelli*

2.2-2.3mm; preserved specimen. No trichobothria on its rear end. Largely synanthropic. Found in barn and stable refuse, but has been found in dead wood which the following species (22) prefers and so can easily be misidentified. *Dinocheirus panzeri* (19) can occur in similar habitats but can be separated from the *Allochernes* species as it has trichobothria on the end of the abdomen.

23. **Wider's tree chernes** *Allochernes wideri*

2.2-2.5mm. Associated with dead and over-mature oak, beech and elm trees beneath bark and in rotting wood (dry-lightly damp; not wet rot). See species (22) above and possible confusion over identification.

24. **House scorpion** *Chelifer cancroides*

2.6-3.5mm; preserved specimen. Synanthropic in stables, barns, flour mills, grain stores, warehouses and thatch. Note, owing to misidentification the illustration of *Chelifer cancroides* in the Linnean Synopsis is actually *Larca lata* (26).

25. **Marram grass chelifer** *Dactylochelifer latreillii*

2.3-3.1mm. A very distinctive species easily identified with its chocolate brown palps and thorax. Lives among marram grass leaf-basses, litter and debris and beneath drift wood above the strand-line, on saltmarshes, sand dunes and seawalls.

26. **Oak tree chelifer** *Larca lata*

1.7-2.1mm; preserved specimen. One of our rarest and most recently discovered species. It appears to prefer old nests in ancient trees and is only found in old forests of north-west Europe where it is regarded as rare. A single record of this species in Windsor Great Park. Records particularly needed.

27. **Lazy chelifer** *Withius piger*

2.3-3.0mm; preserved specimen. A rare synanthropic species associated with stored food products, especially grain, and warehouse debris. Probably introduced to the British Isles in ships' cargo.

Further information

Further images of the UK species, help with identification and details of the UK recording scheme can be found at **www.chelifer.com**

Most of the superb pen and ink illustrations of the British species by Richard E. Jones were first published by the Linnean Society of London and Estuarine and Brackish-Water Sciences Association:

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(Out of print but second hand copies can be found).

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