



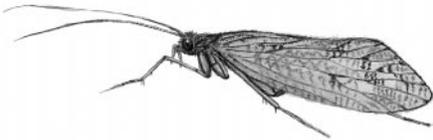
The Beginner's Guide to Caddis (Order Trichoptera)

by Ian Wallace

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Adult *Rhyacophila septentrionis*



Agapetus fuscipes larva in case

Caddis larvae, living in a case they have made, are some of the most familiar freshwater insects. They are thought to derive their name from Elizabethan street hawkers called caddice men who sold braid and had samples stitched to their coats. While the common name for the group is derived from the larva, the scientific name for the order, Trichoptera, alludes to the hairy covering of the adult's wings. A few species rely on the hairs to form the wing pattern in the same way that the related Lepidoptera rely on scales. However, in the majority of caddis the brown or grey pattern of the wings is in the membrane and cannot be removed by rubbing, unlike the Lepidoptera. There are 198 British and Irish species in 18 families.

Encountering adult caddis

As expected for an insect with an aquatic larval stage, you will encounter the largest number and variety of caddis near water. Many species fly in the early night and pass the day resting on bank-side vegetation from where they can be dislodged on to a beating tray. However you will find that, by energetic leaping, they will soon escape from the tray, even if they do not fly off. Beating into a sweeping net is more successful.

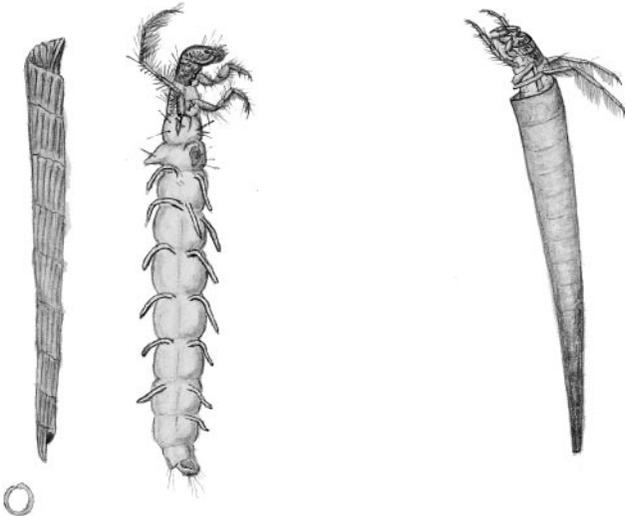
Many do form day-flying swarms over the water and the most familiar are the long-horned caddis of the family Leptoceridae, whose



antennae far exceed the body length. They form zig-zagging swarms close to the water surface a few feet from the shore. They may look easy to catch but have positioned themselves a certain distance from the bank. As you carefully wade out towards them you become the bank and they obligingly move away from you. Speed, luck and wet nets and clothes are the order of the day!



Adult *Mystacides longicornis*



Triaenodes bicolor case and larva

Leptocerus cineiformis larva and case.

Adults also come to light trap, even at a distance from water. Particularly common in traps away from water are the caddis that breed in sites that dry up over summer, which season is passed as an adult. These long-lived insects diapause in various places of which bunches of green ash keys are especially favoured – a fact drawn to my attention by Dr Jim O'Connor of the National Museum of Ireland, Dublin.



Adult caddis are imitated by fly-fishermen and several have been given angler's names.

Identifying adult caddis

Adult caddis can be pinned, or preserved in isopropyl alcohol, available from chemists. However, their identification is troublesome. Despite having patterned wings, only about a third of species can be identified using wing patterns AND there are currently no books showing the patterns anyway. Examination of the genitalia is necessary to get to species level in most cases, and the only in-print guide costs about £150. Enlisting the assistance of an expert is the only practical solution for most beginners.

Encountering the larval caddis

Any water body (except those that are dry for more than six months a year, or are moderately polluted, or worse) is likely to have caddis larvae.

Caddis larvae fall into two categories. However, like the split between micro- and macro-moths, it is not entirely based on their taxonomy. The groups are the "cased" caddis, which make a transportable case, and the so-called "case-less" caddis. The latter term is very confusing as most live in a fixed shelter, with only four British species in one genus being truly free-living.

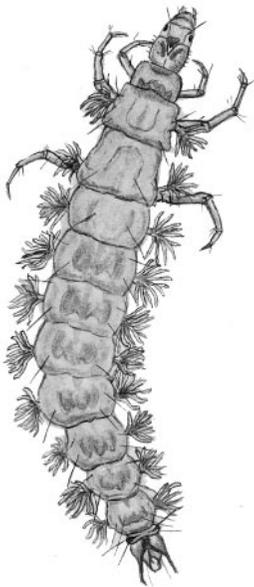
Caddis larvae should be preserved in alcohol such as isopropyl alcohol. Methylated or Surgical Spirit are possible but not ideal as they go cloudy on dilution and have other chemicals that could affect the colour patterning.

Identifying the caddis larva

Whereas there are no easy characters to identify groups of caddis adults, several groups of caddis larvae are easy to recognise. However, even then identification to the species requires a microscope and identification keys, but fortunately, the latter are comparatively inexpensive.

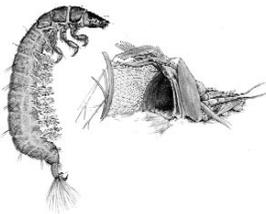
The "caseless" larvae

Rhyacophila larvae are unmistakable. These free-living predators of running water have green bodies, yellow and black heads and bunches of reddish gills along the sides of the body. There are four species.

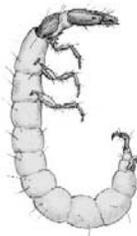


Rhyacophila dorsalis larva

Three families live in shelters based around nets. Hydropsychids, with their strong thoracic plates and bunches of white ventral gills, create a rather coarse meshed sieve to catch pieces of plant or very small animals floating in the current of streams and rivers. There are nine species. Philopotamids have white bodies and orange heads and live in a sock like net in fast flowing water. The mesh is very fine and catches single celled plants. There are five species. The last group of net makers are the Polycentropodids who live in both still and slowly flowing water. The nets of 12 of the 13 species are tangle traps, and act like underwater spider's webs to ensnare other animals; the enigmatic *Ecnomus tenellus*, our only representative of the family Ecnomidae also feeds this way. The exception in Polycentropodidae is *Neureclipsis bimaculata*, whose french horn shaped nets act as sieves for floating material. These can be conspicuous



Hydropsyde sp.
larva and net



Wormalldia sp.
larva and net



Holocentropus
picicornis
larva and net

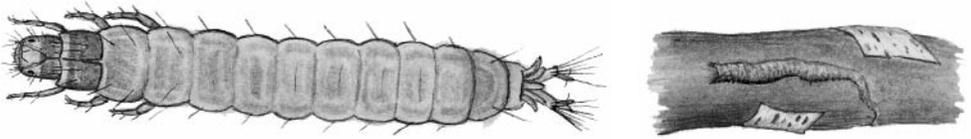


Neureclipsis
bimaculata net

The final group of shelter making caddis, the Psychomyiids, are very small and graze algae from the surface of rocks in still and flowing water. They create a tube to cover their activities and this ends up



meandering over the surface. Ten species live in this way and a further two, in the genus *Lype*, build their tubes on submerged rotting wood, on which they feed.



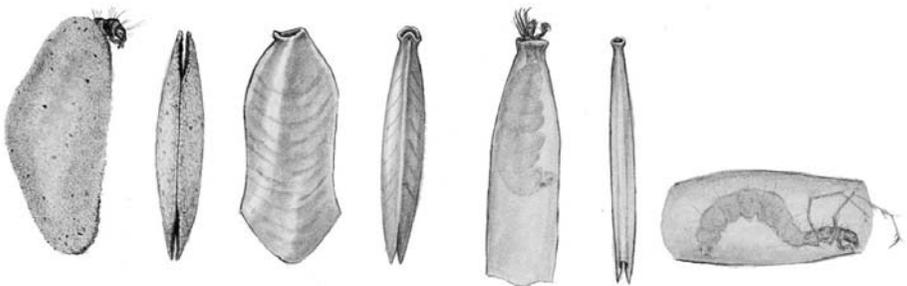
Lype sp. larva and tunnel

The “cased” larvae

The majority of caddis have larvae that build transportable cases, and with experience, many can be identified to species level. However, for the beginner, a depressingly large number are not particularly characteristic having cases that could be best described as being made of sand grains, or haphazardly connected plant material, or a mixture of sand grains and incorporated plant fragments, depending on what is available. For that reason it is not possible to provide features to enable identification of most cased caddis larvae. However, a few are very distinctive.

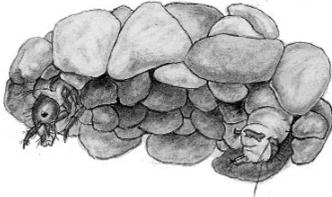
The micro-caddis of the family Hydroptilidae have cases only a few millimetres long but most of the genera make distinctive cases and all are laterally flattened.

Most species cannot be identified beyond genus level.



Selection of Hydroptilidae cases

L to R: *Hydrophila* sp., *Ithytrichia* sp., *Oxyethira* sp., *Tricholeicobiton fagesii*



Apatitus fuscipes larva in case

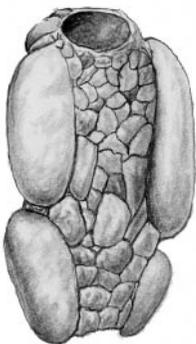
Another very distinctive group, and very common on rocks in running water, and occasional lake shores, are the six species of Glossosomatidae. They make their rounded humped cases of coarse sand grains. If the ventral side is examined it will be seen that the two case openings are identical i.e. there is no front and back, and the larva uses

both alternately as front. For some unknown reason only two species are found in southern Britain. They graze algae and fine settled organic matter from the surface of rocks.

Several other caddis make humped cases i.e. if looked at from the side, the top edge overhangs the bottom edge, even after normal case curvature is taken into account. Humped cases of coarse sand grains in small spring streams are made by *Apatania muliebris* a species without males. The females lay fertile eggs without need of mating. Similar ones on stony lake shores are of *Apatania wallengreni* which does have the normal arrangement of male and female. Cases like this from a river will probably be *Ceraclea annulicornis* or, if smooth due to being made of small sand grains – *Ceraclea dissimilis*.

Being dislodged then washed away, is always a problem for caddis. This is tackled by the three species of Goeridae which incorporate large ballast grains into the sides of their cases.

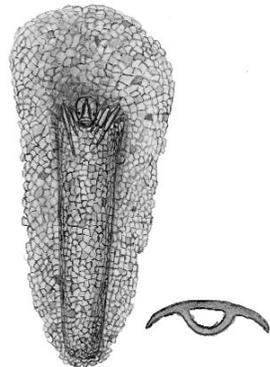
Bare sandy bottoms may appear to be an exposed position for a caddis larva but *Molanna* has case extensions that completely obscure the head from above.



Goera sp. case



Apatania muliebris
case



Molanna augustata larva and case
from below and cross section



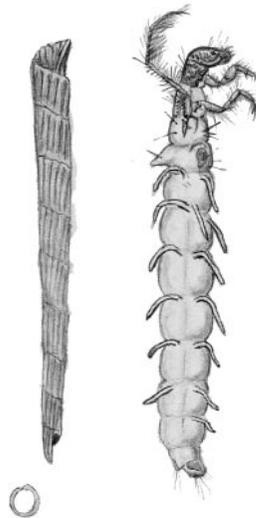
Limnephilus stigma case

Sampling a weedy pond or lake any time from autumn to late spring will collect chunky cases that have the pieces of cut plant material attached transversely, rather than lengthways. A group of five *Limnephilus* species make this “log-cabin” type of case and one of them, *L. stigma*, which uses grass blades, produces one of the bulkiest of all caddis cases in the form of a shaggy barrel shaped item.

Some of the finest craft-skilled caddis larvae use carefully cut pieces of plant material to make their cases. Joining pieces in a spiral fashion is popular. If the case is large and the larva has a propensity to leave it, the investigator will have found one of the five species of the family Phryganeidae. If the case is small and slender and the larva within rows itself and the case through the water by vigorous beating of the fringed back legs then the larva will be *Triaenodes bicolor* if from still water, or the genus *Ylodes* if from running or brackish water.



Phrygaena sp. case

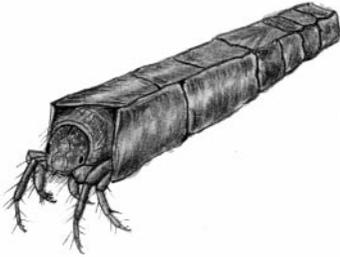


Triaenodes bicolor case and larva

In rivers, a distinctive square section case will be of *Lepidostoma birtum*. If it is fixed firmly to a piece of vegetation with the larva sitting with outstretched legs to catch passing particles then it will be from one



of the angler's great early spring flies the Grannom *Brachycentrus subnubilus*. Older Grannom larvae have cases that are rounded in section. *Lepidostoma* also constructs a case with the posterior end of sand grains and circular in cross-section, and that is also the situation for *Crunoecia irrorata* that inhabits tiny trickles.

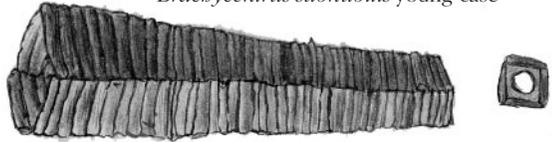


Lepidostoma hirtum larva and case

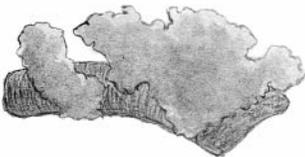


Crunoecia irrorata larva and case

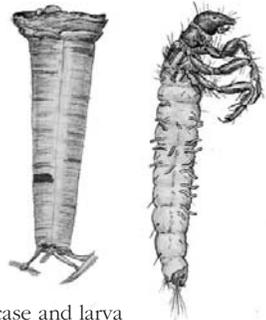
Brachycentrus subnubilus young case



A caddis case is made of a tube of silken threads to which other items are attached, and some caddis dispense with the external material. *Leptocerus tineiformis* makes a slender case and rows through the water of ponds and lakes using its fringed legs. A group of three species in the genus *Ceraclea* that have cases made only of silk feed on freshwater sponge and often attach disguising pieces of sponge to their cases. Some caddis change to a silk case later in growth. A relative of *Leptocerus tineiformis* starts with sand grains then abruptly changes to only silk, and the Grannom starts with plant pieces and ends with mainly a case of silk.



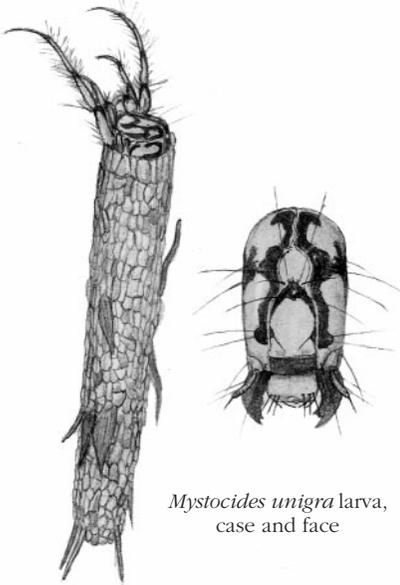
Ceraclea albimacula case,
with sponge attached



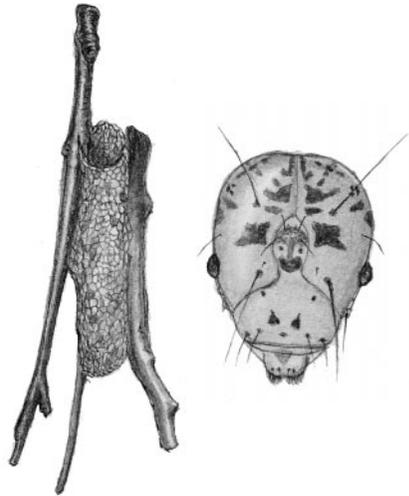
Brachycentrus subnubilus older case and larva



Although cases made of a tube of sand grains to which long sticks are attached are made by several species, two deserve singling out. Both have black marked yellow heads. If the case is small and the hind legs of the larva are considerably longer than the other legs it will be of the genus *Mystacides*. If the hind and middle legs are of a similar length and the head is particularly blotchy it will be *Anabolia nervosa*. It is said that the sticks assist the larva to hold station against strong current but it will probably also make it harder for a fish to approach close enough to Hoover up the larva.

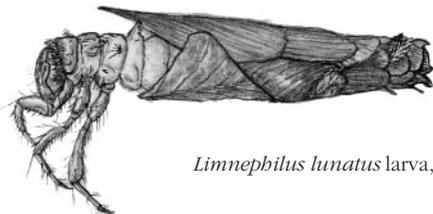


Mystacides unigra larva, case and face

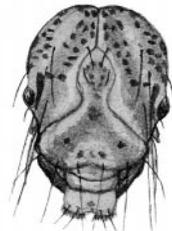


Anabolia nervosa larval case and face

It is unfortunate that Britain's commonest large caddis *Limnephilus lunatus* does not have a distinctive case, or head pattern. However, a caddis from flowing water, in a straight case of plant material with or without sand grains at the front end and with a banded head, is likely to be *Limnephilus lunatus*.

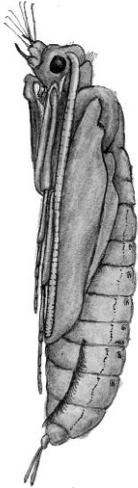


Limnephilus lunatus larva, case and face





Encountering caddis pupae



Pupa of *Goera* sp.

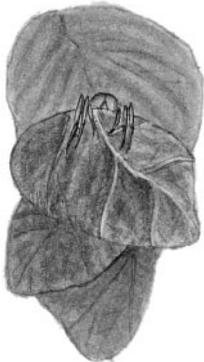
When full grown, all free-living and shelter dwelling caddis make a case of stones or plant debris, attached to a stone or large plant, in which to pupate; cased caddis larvae also attach their cases and then seal up both ends, apart from small grilles to allow passage of oxygenating water.

To emerge, the adult, still in its pupal skin, cuts out of the case or shelter using special mandibles. It then rapidly swims to the surface of the water or the bank, using fringed legs. It is assisted in reaching the surface by a bubble of gas secreted between the adult and the skin. This however makes them appear as a silvery bubble that is very conspicuous to fish. Large numbers of caddis are predated at this time. Many species emerge at night when the fish cannot see them – but waiting Daubenton's bats can detect these juicy mouthfuls.

A successful individual splits the pupal skin, the adult rapidly emerges expanding its wings in a few seconds as it wriggles out of the skin, then flies to a nearby bush to dry its wings for a few minutes. The pupal shuck floats away, an empty husk.

Rearing caddis

It may be difficult to identify caddis but they can be interesting to keep. Do not try to rear any of the free-living or shelter makers unless you



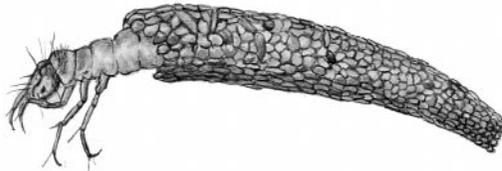
Glyptotaelius pellucidus
larva and case

have the ability to create a strong uni-directional current. Cased caddis can be kept with varying degrees of success. A good group to start with are those that live in ponds, such as the "log-cabin" limnephilids. They will usually eat dead leaves of trees like sycamore – but do not over feed, and a *little* aeration might be helpful.

Another intriguing caddis to rear is *Glyptotaelius pellucidus*. Look out for jelly eggs on leaves of trees that overhang ponds and ditches or in places where ponds and ditches will be when the water level rises. Only one other British caddis lays like this – the large and superb *Nemotaulius punctatolineatus* of

Highland blanket bogs. Keep the egg mass moist but not wet until tiny dark larvae can be seen moving within the jelly. Submerging it will let them escape. They feed on dead tree leaves and it is useful to have both sycamore (for food) and oak (for case making); the case is a flat affair. Collect leaves from the pond rather than from the ground as they will have both lost the rather toxic tannins and developed the micro-fungi and bacteria which are what the larvae are really after as food when they eat leaves.

Though it is easy to rear many cased caddis larvae, it is surprisingly difficult to get successful emergence of an adult from the pupal skin. It is best to place the sealed up cases into a shallow and not vertical edged bowl filled with water, but also lined with netting up which the caddis pupa can climb. Even then, many refuse to emerge and become eventually water-logged and die several days later. Incidentally, Britain's only terrestrial caddis, *Enoicyla pusilla* of the Wyre Forest woodlands, is also difficult to rear to the adult, usually dying during pupation.



Enoicyla pusilla larva and case

Assistance with identification

Due to the absence of cheap books, I am prepared to identify voucher examples of caddis adults but not bulk samples and only if asked in advance of sending material please. I need to schedule work carefully!

I am also able to confirm the identity of caddis larvae. Again I would want to do voucher specimens only. I would preferably want the collector to have tried to use the available keys first.

After a little familiarity many caddis adults and larvae can be identified in the field. My aim is to increase the pool of people interested in, and recording caddis, rather than just add to the sum total of records, valuable though that is.

Caddis Recording Scheme

There is a national caddis distribution recording scheme operated under the auspices of the Biological Records Centre, CEH Monks Wood,



Abbots Ripton, Huntingdon, Cambridgeshire PE28 2LS. Details of how to contribute records, the aims of the scheme and some of its current projects, can be obtained from the Biological Records Centre, or from its web-site or from me personally.

Further reading

- Hickin, N.E. (1967) *Caddis Larvae* published by Hutchinson, London
(a good introduction to caddis larvae, with some lovely illustrations but out-of date for identification of larvae; the key to pupae however remains serviceable)
- Macan, T.T. (1973) A key to the adults of the British Trichoptera *Scientific Publications of the Freshwater Biological Association*, Number 43.
(long out-of-print, and with a few errors, but worth obtaining if you can. A list of problems that might be encountered when using Macan is available from Ian Wallace at Liverpool Museum)
- Malicky, H. (1983) *Atlas of the European Trichoptera* Junk, The Hague.
(very expensive, and as it covers all the European species it is not a book for the beginner)
- Edington, J.M. & Hildrew, A.G. (1995) A revised key to the Caseless Caddis Larvae of the British Isles *Scientific Publication of the Freshwater Biological Association*, Number 53
(the definitive key to identify caseless caddis larvae)
- Wallace, I.D., Wallace, B. & Philipson, G.N. (2003) A revised key to the Cased Caddis Larvae of the British Isles *Scientific Publication of the Freshwater Biological Association*, in press.
(the definitive key to identify cased caddis larvae)
- Wallace, I.D. (1991) A review of the Trichoptera of Great Britain *Research and survey in nature conservation* No. 32, published by the Nature Conservancy Council, Northminster House, Peterborough, UK
(a distribution summary for every British species; a few are out of date but an update is available from Ian Wallace at Liverpool Museum.)



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