

The Sedge of the Water

Dr Ian Wallace introduces the fly that makes an August evening – the skittering sedge; a.k.a. caddis or Trichoptera

The flies we know as caddis, sedges, or Trichoptera

Sedges, or caddis, or Trichoptera to give the group its scientific name, are a very significant group of aquatic insects found in most bodies of water. There are 198 species in the British Isles but only about half are likely to be encountered by people working rivers, large streams and lakes.

The adult caddis has four wings. Only the top pair is visible when the insect is at rest. They are held roof-like over the body and they are covered in fine hairs. The scientific name, Trichoptera, translates to hairy wings.

Most adult caddis are active in the first part of the night. Consequently we know little of their behaviour. This crepuscular lifestyle and the similarity of many wing patterns means that very few have common names: this applies especially to the smaller adults of silver sedge (*Odontocerum*) species. The table at the end of this article lists those common names known to the author – he would be pleased to hear of more. The night-active caddis are disturbed easily from bankside vegetation during the day and prove energetic if efforts are made to restrain them: the appropriate name of caperer is applied to one of them.

Some day-active caddis can be very conspicuous. Many waters will support a group collectively called silverhorns, or longhorns, which all have antennae much longer than the body. They form swarms of adults zig-zagging across the surface just off-

shore. These are males and there is intense competition for the best position in the swarm to grab females who are attracted by the mass spectacle. Every now and then, after a minor commotion in part of the swarm, a pair will be seen coupled together and leaving to complete mating on a nearby bush. Occasionally an individual will be seen to be dipping into the water – that is a female, dropping a little bag of eggs in a jelly, which will become stuck to an object on the bottom.

Dipping is an interesting and not well-understood phenomenon. Only some species that dip actually drop eggs in the process. It must be a risky procedure as fish might be waiting. One theory is that dipping enables the caddis to assess current speed and choose a suitable laying site, which is reached by then crawling underwater from a protruding stone or plant. A caddis that adopts this approach is the grannom. On rivers where this species is common, large day-time swarms will be seen in April. Females may well see crawling down exposed roots to lay their eggs underwater. If the roots are lifted carefully it may be found that they are covered with glutinous egg masses, looking like a bunch of watery grapes.

Most caddis eggs are inconspicuous. It is



Odontocerum albicorne adult

the resultant larvae, pupae and adults that come to the attention of observers.

The caddis life cycle shown below highlights the two groups, those that carry a portable case (the cased caddis) and those that do not. The latter group is called the caseless caddis. This is a little misleading as almost all do live in a shelter, but it is a fixed one, attached to something like a rock or log. They are evicted easily from such shelters.

The key to the success of caddis is the ability of the larvae to produce underwater-setting silk threads that are used to glue together particles of debris (or carefully-cut pieces, depending on the species) to make the shelter or portable case.

All caddis larvae produce a fixed concealment in which to moult their last larval skin to become a pupa. The pupa is the resting stage, analogous to the butterfly chrysalis and the adult slowly forms within the pupal skin. The pupal shelter of the caseless caddis usually is a new structure but the cased caddis use the transportable larval case, which they fix down and then seal the ends with grilles.

Protection afforded by a tough camouflaged case is significant. However, the case also is very important for respiration. The larva or pupa, by undulating the fringed abdomen within the case or shelter, pumps a strong flow of water over the body. Primitive caddis do not have this specialised mechanism; they are restricted to flowing water where the current brings the

Brachycentrus eggs. Most caddis eggs are inconspicuous and it is the resultant larvae, pupae and adults that come to the attention of observant anglers



oxygenated water. It is believed that the improve respiration created by the case enabled caddis to evolve into a successful still-water group.

When a butterfly is ready to emerge as an adult it simply splits the chrysalis skin and crawls out. Things are a little more difficult for a caddis entombed in a solid shelter and under water. The pupal skin is thin and flexible. When the adult is ready to emerge it can manipulate the skin, which is furnished with two strong cutters at the front end to slice the cocoon. This allows the adult in the pupal skin to wriggle out. With fringed legs it makes its way rapidly to the surface where its special non-wettable surface helps it to break through the surface film, then rest there, held by surface tension. Some species swim ashore and beach instead. When the skin splits the adult caddis emerges with fully formed wings, then flies away to a nearby bush where its wings harden and it is ready to start the cycle again. The discarded shelter or case persists in the water for some time – sometimes years.

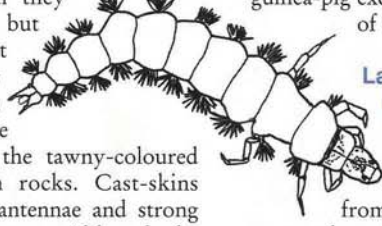
The passage between cocoon and water surface is hazardous; countless caddis are taken by fish at this time. The insects secrete a gas between the pupal skin and the adult-form. This helps them to the surface and assists them to shed the pupal skin. The gas

makes them appear silvery underwater; a conspicuous target. Many sedges emerge at night when they cannot be seen by fish but Daubenton's bat feeds at that time! Observers will be familiar with caddis pupae from the stomachs of fish and the tawny-coloured cast-skins beached on rocks. Cast-skins usually have only the antennae and strong mandibles as clear features. Although the caddis larvae and pupa have strong biting mandibles, the adult is a nectar feeder (if it feeds at all) using a flexible sucker-like mouth.

In a short article like this it is impossible to do justice to this diverse and numerous group of insects. Caddis breed in every type of water-body except the most transitory or polluted. A good introduction to a range of caddis is to lift up a medium-sized rock from a river or lake shore and look on or under it for caddis.

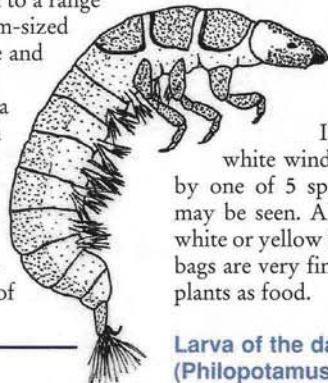
In flowing water a conspicuous flattened green caddis larva with bunches of gills along its sides, is one of four species of the genus *Rhyacophila* (the adult is the sand sedge). These are free-roving predators. A mound of

sand-grains, attached to a rock and containing something looking a bit like a leathery guinea-pig excreta is the shelter and cocoon of these caddis.



Larva of the sand sedge (*Rhyacophila*)

In flowing water, a dark coloured larva evacuating from a coarse mass of sand and plant pieces will be a Hydropsychid; there are 7 common species. Careful inspection will reveal a mesh net as part of the shelter of debris. Hydropsychids construct this to catch floating material in the form of small pieces of plant or, for some species, small animals being transported in the current.

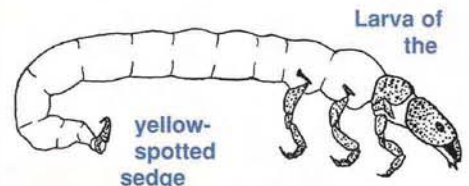


Larva of the grey flag or marbled sedge (*Hydropsyche*)

If the water is very swift, white wind-sock shaped bags inhabited by one of 5 species of the Philopotamidae may be seen. All of them have conspicuous white or yellow bodies and orange heads. The bags are very fine mesh to catch single celled plants as food.

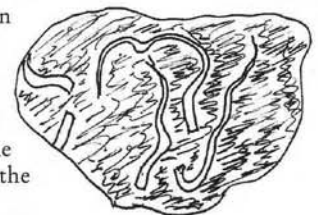
Larva of the dark spotted sedge (*Philopotamus*)

In still and flowing water, a fine amorphous mass of threads inhabited by a pinkish larva is produced by larvae of the family Polycentropodidae. Their way of life mimics the terrestrial spider in that the mass of threads is a tangle-trap for other animals. In streams the webs of one genus, *Plectrocnemia*, between rocks looks very like the webs of the house spider.

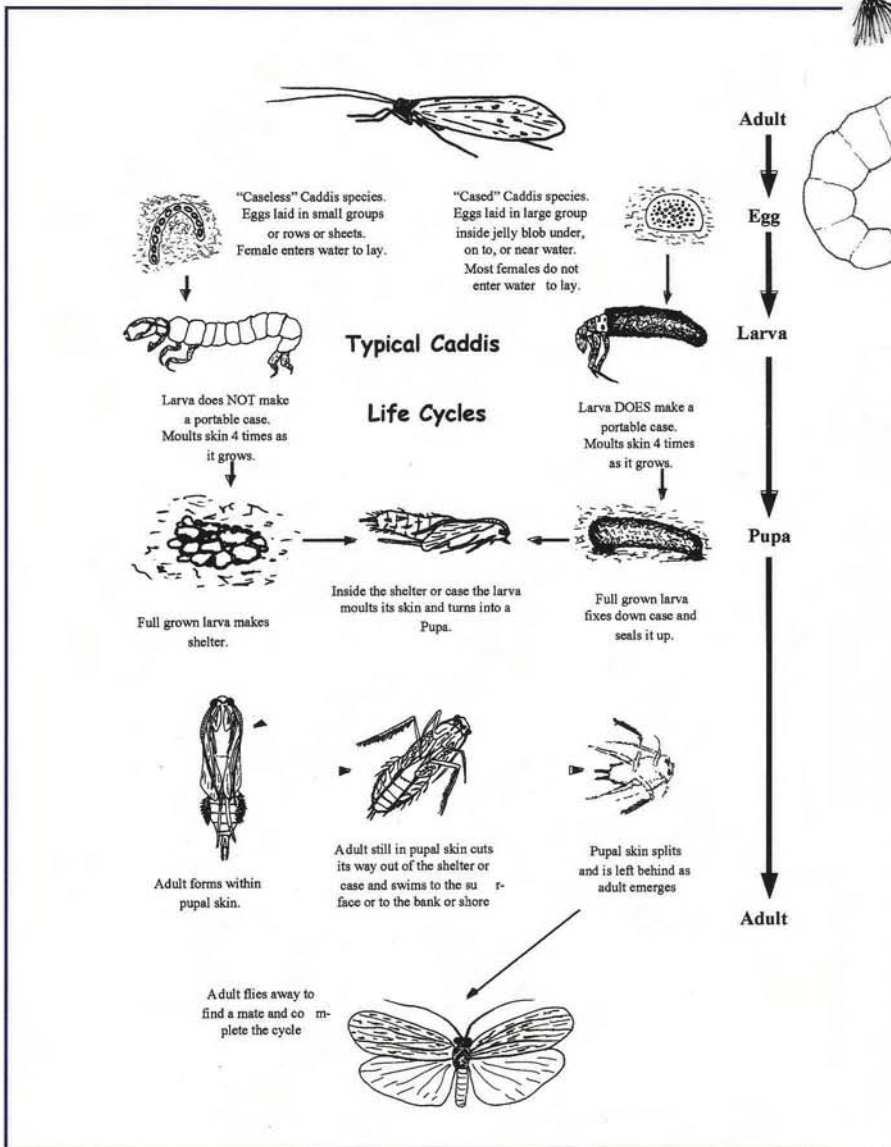


Larva of the yellow-spotted sedge (*Polycentropus*)

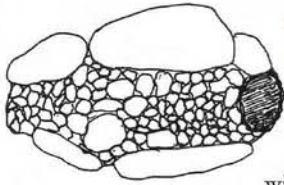
The final family of caseless caddis, the Psychomyiidae, is much more difficult to find. Their larvae live within a meandering gallery of silk disguised by silt and other material. The larvae feed on material growing on the rock at the mouth of the gallery, or on the walls of the gallery.



Larval galleries on a rock of the small red sedge (*Tinodes waeneri*)



Most caddis species make transportable cases. Caddis with cases made of sand grains predominate in streams both because it is the most abundant case-building material and because its weight helps to stop them being swept away. The most obvious use of ballast is by the three members of the family Goeridae (medium sedge and black sedge) which incorporates pebbles in the sides of the case; this family is especially common in the chalk rivers.

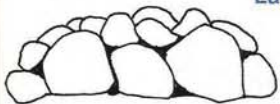


Larval case of the medium sedge *Goera pilosa*

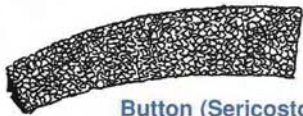
Observers will notice that some cases have a small black strap protruding from the front end. This is the breathing gill of a parasite of the caddis, a kind of wasp, that goes under-water to lay its egg on the caddis. The parasitoid grub of the wasp slowly drains away the caddis larva's energy and ultimately kills it.

Tortoise-shaped cases can cover some rocks in rivers and streams. These belong to larvae of the family Glossosomatidae, which graze algae and fine plant debris from the surface and anchor their cases with silk threads to prevent them being dislodged.

Larval case of the tiny grey sedge (*Agapetus*)



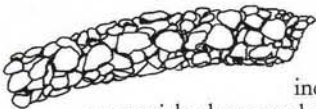
A smooth tubular sand-grain case and a larva with a flat-fronted plain dark head is *Sericostoma personatum* otherwise known as the Welshman's Button. A similar case but with the larva having a yellow head with an anchor mark is the Silver Sedge *Odontocerum albicorne*.



Larval case of the Welshman's Button (*Sericostoma personatum*)

Large cases of coarse sand-grains are of the large cinnamon sedge (*Potamophylax*)

Potamophylax larval case

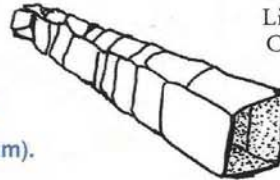


Another very common case-type incorporates one or more sticks that extend well beyond the end of the rest of the case. Small cases of this type (only about 3 mm wide), attached to a stone will be of the Black Silverhorns (*Mystacides*). Larger cases (around 7 mm wide) will be of species such as the brown sedge, (*Anabolia nervosa*) which has a conspicuous black blotched head, or the caperer (*Halesus*).



Another common case will be seen to have a distinct square cross-section at least at

the front end; the rear end may be of sand grains. It is unusual in being straight. This is the small silver sedge (*Lepidostoma hirtum*).

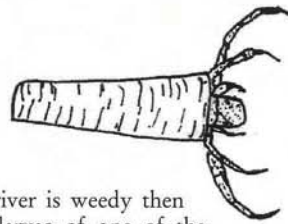


Larval case of the small silver sedge (*Lepidostoma hirtum*)

Unfortunately, as distinctive as this case is, it cannot be used to identify the species with complete certainty.

The grannom makes a square cross-section case when young. This fascinating species anchors its case to a stone or a plant, front end into the current and then sits with out-stretched arms, a bit like a praying mantis, to grab anything floating past that might be edible.

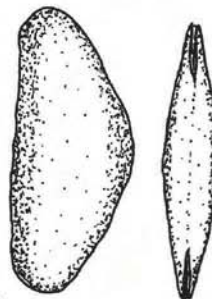
Larva of the grannom (*Brachycentrus subnubilus*) in its case.



If the stream or river is weedy then almost certainly the larvae of one of the cinnamon sedges, *Limnephilus lunatus*, will be present. Unfortunately it can make cases entirely of sand grains or entirely of plant material or a mixture of both and it may be smooth or rough in outline and it may or may not have long sticks protruding at the front end. It does not have a distinctive case and is one of the large groups of caddis that cannot be identified easily.

Tiny kidney shaped sand-grain cases up to 4mm long are made by *Hydroptila* one of the micro-caddises.

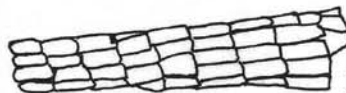
Larval case side and top view of a micro-caddis (*Hydroptila*).



Cases with the front-opening, strongly overhung by the top lip are a variety of longhorned caddis. Look especially for patches of freshwater sponge as a fascinating group of three of these species do eat sponges. As that food is packed with spicules of naturally secreted glass, it must be like eating a glass-fibre sandwich.

In stillwater many cases are made of plant material. One type is a long cylinder made of equally-cut pieces of plant-leaf or root joined in a spiral. Large cases (over 7mm wide) are of the family Phryganeidae. Very slender cases, up to 20mm long by 3mm wide, probably are of the bicolor sedge (*Triaenodes bicolor*) which will row through the water with long fringed hind legs; rare relatives can be found in weed beds in rivers and saltmarsh ditches.

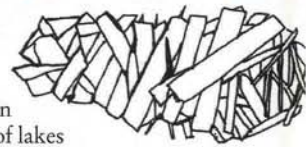
Larval case of the Peter Sedges (*Agrypnia*)



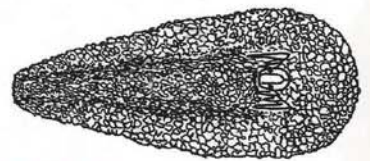
Another distinctive and very common case can be described as of log-cabin construction with cut pieces arranged at 90%

to the long axis of the case. A group of caddis of the genus *Limnephilus* make such a case with the commonest in many lakes being *Limnephilus marmoratus* (one of the Cinnamon Sedges).

Larval case of the cinnamon sedge (*Limnephilus marmoratus*)



The final caddis larva to be described, (Molanna), lives on bare sandy bottoms of lakes and ponds and a shield-shaped expansion to the case obscures it from the eye of fishes. It moves in a series of leaps rather than always revealing its presence by steady movement. It feeds on midge larvae and worms. The case-extensions and leaping movement also probably help to prevent the prey escaping.



Underside view of a sedge that has no common name - Molanna

Identifying Caddis

Although there are books to identify all adults and most larvae, there remains much to be learnt about caddis. An example would be one of the best known caddis - the grannom (*Brachycentrus subnubilus*) It can be present in huge numbers but also apparently disappear, as it has done from rivers such as the Test and the Teifi. Yet in rivers where it has apparently disappeared it may be present in steady but low numbers.

There are identification keys to most larvae but currently there is no British up-to-date key to the adults. However a new key to is in preparation. A simple identification key to distinctive groups of larvae and adults is being tested. Even without an identification key to hand it is worth looking at the caddis in your river as a diverse assemblage means a healthy river.

In case of difficulties with identifying caddis or their larvae, contact the author who can discuss how best to help you.

The National Trichoptera Recording Scheme

The author runs The National Trichoptera Recording Scheme: this aims to amass distribution data and habitat preferences for all the British species of caddis so that anyone can see, from a series of maps, what they might expect to find in any part of the country. The data also will be used to assist site managers. The hope is to have initial set of interim distribution-maps available through the National Biodiversity Network Gateway by about 1996. Thanks to the statutory water-quality agencies, there is a dataset of 0.75 million records, mainly to family rather than species level. It will be a huge task to edit these for the recording scheme. These records

Species	Common name	January	February	March	April	May	June	July	August	September	October	November	December
<i>Phryganea bipunctata/grandis</i>	Great Red Sedge (Murragh, Ireland)												
<i>Agrypnia varia</i>	Speckled Peter												
<i>Agrypnia obsoleta</i>	(Dark) Peter												
<i>Limnephilus lunatus/marmoratus</i>	Cinnamon Sedge												
<i>Halesus</i> spp	Caperer												
<i>Anabolia nervosa</i>	Brown Sedge												
<i>Glyptotaelius pellucidus</i>	Mottled Sedge												
<i>Potamophylax/Stenophylax</i> spp	Large Cinnamon Sedge												
<i>Sericostoma personatum</i>	Welshman's Button												
<i>Brachycentrus subnubilus</i>	Grannom/Greentail												
<i>Lepidostoma hirtum</i>	Small Silver Sedge												
<i>Goera pilosa</i>	Medium Sedge												
<i>Silo</i> spp	Black Sedge												
<i>Odontocerum albicorne</i>	Silver or Grey Sedge												
<i>Mystacides azurea/nigra</i>	Black Silverhorns												
<i>Mystacides longicornis</i>	Grouse Wing												
<i>Athripsodes/Ceraclea</i> spp	Brown/Black Silverhorns												
<i>Oecetis</i> spp	Longhorns												
<i>Triaenodes bicolor</i>	Bicolor Sedge												
<i>Rhyacophila dorsalis</i>	Sand Fly												
<i>Agapetus</i> spp	Tiny Grey Sedge /Micro Caddis												
<i>Hydropsyche</i> spp	Grey Flag												
<i>Hydropsyche contubernalis</i>	Marbled Sedge												
<i>Cyrnus/Polycentropus/Holocentropus</i>	Yellow Spotted Sedge												
<i>Tinodes waeneri</i>	Small Red Sedge												
<i>Psychomyia pusilla</i>	Small Yellow Sedge												
<i>Philopotamus montanus</i>	Dark Spotted Sedge												

are from the larger rivers, so there remains great scope for amateurs to record data, especially from smaller streams, lakes, ponds and canals. Dr. Ian Wallace would be pleased to hear from you!

The flight times of the adult caddis

Table Above: The author and Dr Peter Barnard, specialist at The Natural History Museum, London, have listed the peak flight times for the caddis known to the authors to have common names. If you know of other species with common names please contact Ian Wallace.

Where the abbreviation "spp" is used this indicates that more than one species is included.

For further information For adult caddis

Goddard, J. (1991). 'Trout Flies of Britain and Europe' published by A.C.Black of London. Illustrates many of the adults that can be identified by use of wing colour and shape.

Macan, T.T. (1973) 'A Key to the Adults of the British Trichoptera' published by the Freshwater Biological Association but long out of print. Out of date and misleading for some species, as would be expected for a work that is 30 years old, but most species can be named successfully using it.

Malicky, H. (1983) 'The Atlas of European Trichoptera', published by Junk of the Hague and £190 at last query. Shows the genitalia of all British species, amongst lots of European ones; genitalia are the definitive way to identify the adults.

Price, Taff (1989) 'The Angler's Sedge: Tying and Fishing the Caddis' published by Blandford Press, London. Illustrates many of the adults that can be identified by use of wing colour and shape

For caddis larvae

Edington, J.M. & Hildrew, A.G. (1995) 'Caseless Caddis Larvae of the British Isles', published by the Freshwater Biological Association. The definitive key to identify caseless caddis larvae.

Wallace, I.D., Wallace, B. & Philipson, G.N. (2003) 'Cased Caddis Larvae of the British Isles', published by the Freshwater Biological Association. The definitive key to cased caddis larvae.

LaFontaine, G. (1981) 'Caddisflies', published by Winchester Press. American and therefore of no use for identification in Britain, but full of interesting information as it covers caddis from a fishing perspective.

Dr Ian Wallace is a curator at National Museums Liverpool, runs The National Trichoptera Recording Scheme and collaborates with other riverfly recording schemes and specialists from The John Spedan Lewis Trust for the Advancement of the Natural Sciences and The Natural History Museum to deliver Riverfly Workshops.

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