

Species dossier:

Ironoquia dubia

Scarce brown sedge

July 2011



Adult *Ironoquia dubia*

Contact details

Ian Wallace, Curator of Conchology & Aquatic Biology
World Museum,

William Brown Street, Liverpool, L3 8EN

Tel: 0151 478 4385 Email: Ian.Wallace@liverpoolmuseums.org.uk



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***Ironoquia dubia* (Stephens, 1837)**
Scarce brown sedge
(Trichoptera: Limnephilidae)

Originally genus *Anabolia*, then *Allophylax*
has also been in genus *Stenophylax* and *Caborius*

Introduction

The Scarce brown sedge is a priority species within the UK Biodiversity Action Plan. The purpose of this dossier is to draw together available information on its distribution in the UK and its ecology in order to assist Government Agencies, Planning Authorities, landowners and conservation practitioners with the implementation of action to conserve this species in the UK.

The Scarce brown sedge was classified as Vulnerable in Shirt (1987) and RDB2 in Wallace (1991). It has no formal legal protection and is not listed in any schedule of the Wildlife and Countryside Act or in annexes to EU directives. However it is listed as threatened, endangered or critically endangered in various German regions, and it is classed as rare in Denmark, and “Near Threatened” in Norway, on the red list for Carinthia in Austria (information from various web-sites) and “presumed vulnerable” in Hungary (Nogradi & Uherkovich, 1999). However, in a few places in Europe it is actually common. In Telemark, Norway it was the commonest caddis at light (Andersen *et al*, 1990 and Andersen & Hansen, 1990). This was also a common caddis in Croatia being found in 30% of the streams investigated by Cuk & Vuckovic (2010). In the Netherlands it is common in two regions in the far east of the country but virtually absent from other areas (Higler, 2008). It is not known if it was ever locally common in the UK in for example, Windsor Forest.

Summary

The Scarce Brown Sedge (*Ironoquia dubia*) is one of Britain’s rarest caddis flies. It has certainly been recorded from one site in Suffolk, Windsor Forest, and a stream in south east Berkshire and another in an adjoining part of north east Hampshire.

Ecology

In England, this species breeds in streams that dry up or considerably diminish over summer and the majority of records across Europe describe the larval habitat as streams that dry up over summer e.g. Johansson & Nilsson (1994), Urbanic (undated). However it can be found in permanent streams and rivers including those that are slightly polluted as among the species recorded as having been found with it are the caddis *Hydropsyche angustipennis* (Curtis) and the water hog louse *Asellus aquaticus* L. e.g. Raczynska & Chojnack (2009). Andersen & Hansen (1990) review the previous ideas about this species distribution which is that it was restricted to lakes. Trond Andersen (pers.comms) has light trapped adults by small still and flowing waters e.g. Andersen *et al* 1993. He took a single male by a small pond, and Mora *et al* 2004, recorded it from an alder swamp. Dohler (1914) recorded it as a common larva in eastern Germany from both still and flowing water. Aki Rinne (pers.comms.) described the larvae as not easy to find in his part of Finland and being encountered occasionally in the slower and deeper parts of streams with the exits of ponds being a good site.

Ulmer (1909) and Lepneva (1966) describe it living amongst leaf litter and Aki Rinne says it lives in deep slow pools, which are sites for accumulation of such material.

The larva has more gill filaments per gill site than any other European limnephilid, which may reflect the lower oxygen concentrations amongst the decaying leaf litter. The two streams illustrated in Cuk & Vuckovic (2010) look superficially uninteresting, appearing to be canalised ditches running through grazed grassland. *Ironoquia dubia* larvae are said to eat plant material that fall into the water, and tree leaves are likely to be particularly important, and are used to make the cases (Lepneva, 1991; Cuk & Vuckovic, 2010). Mackay (1969) records that larvae of *I. lyrata* (Ross) had filamentous algae and pieces of vascular plants in their guts.

In North America the full grown larvae of autumn flying *Ironoquia* species leave the water and aestivate in damp leaf litter at the margin of the drying water body (Flint, 1958, Williams & Williams, 1975, Wiggins, 1977, Whiles, *et al*, 1999). This would appear the most likely aestivation and pupation site for *I. dubia*. Ulmer (1909) gives dead leaves as the pupation site, but does not indicate if it is out of the water. All but one species found with *I. dubia* in streams that dry up emerge as adults before the water goes and then aestivate as that stage until autumn. However, there are no records anywhere of *I. dubia* being found before autumn. Trond Andersen did not record it by any adult trapping method until late summer and autumn (T. Andersen, pers.comms) and Higler (2008) shows a short flight period from the middle of September to the first week in October. Lepneva (1971) noted that in a ditch in Russia, where larvae were common, that pupae were never found – the larvae just disappeared and she presumed it was because they pupated out of water. Further evidence that *I. dubia* in England also adopts this strategy comes from the failure by Peter Hiley to rear through any of his four larvae by confining them to water when they were ready to pupate; he devised a technique that was highly successful with other members of the family (Hiley, 1973). Failure to rear larvae by normal techniques is a feature of accounts of the genus in North America.

Whiles *et al* (1999) noted that the larvae of *Ironoquia plattensis* Alexander & Whiles, pass two months as a diapausing larva and do not actually pupate until September. This behaviour resembles that of several other limnephilids of permanent water bodies, such as *Potamophylax* and *Halesus* which prepare for pupation but remain as a larva for many weeks until autumn. Flint (1958) comments that the leaf litter within which *I. parvula* (Banks) aestivates is no different from the leaf litter of the forest that surrounded the seasonal pool where the species lives. *I. parvula* has a pupa that shows significant adaptations to a terrestrial existence in lacking gills, having a simple posterior case closing membrane and having greatly reduced rear appendages. The pupa of *I. plattensis* which is found in the general grassland litter surrounding the larval site, does not seem to have been described, but Alexander & Whiles (2000) indicate it is a species very close to *I. parvula*. In contrast, Williams & Williams (1975) note the similarity of their *I. punctatissima* (Walker) pupae to the description of the pupa of *I. dubia*, by Dohler (1914) where the adaptation, compared with other aquatic limnephilids is restricted to a reduction in size of the rear appendages; Dohler himself notes also the presence of additional setae on the anterior part of the head and long setae on the posterior appendages and that the pupal case closing membranes are set a little way inside the case rather than at the extreme ends. *I. punctatissima* larvae which had migrated from the water body were reared to the pupal stage by keeping the cases in a water film. Gills, retained by both *I. dubia* and *I. punctatissima* would seem a possible liability in dry conditions and it is thus speculated that the litter within which *I. dubia* aestivates is quite moist. It may be significant that Dohler, (1914), who makes it clear he encountered very few pupae, makes no mention of them living outside the water, suggesting the diapausing site is close to the water, so presumably moist. Wisseman & Anderson (1987) suggest that a film of water maintained by capillary action was used by the pupae of another semi-terrestrial limnephilid *Cryptochia*. Ian Wallace has reared the pupae of many varied

limnephilds to the adults by keeping them in tubes with moist filter paper. However this method only worked with pupae that had matured a little, i.e. had dark eyes. Pupae with red eyes had just moulted and appeared to deform under their own weight, become infected with bacteria and die; pre-pupae also seemed unable to moult successfully to the pupa. This suggests some structural and/or behavioural adaptation in *Ironoquia* that would be interesting to investigate. Ross (1944) noted that in *Neophylax*, another North American genus where the larvae persist in dried up streams until autumn, larvae were able to pupate as long as they were in a damp place such as under a stone, but perished if they became truly dry. Graham Vick told me that the Windsor streams dried completely, and the caddis fauna observed in March 2011 reflected temporary streams, but the presence of larvae of *Plectrocnemia conspersa* (Curtis) in both the mainstream and the tributary where *I. dubia* were Malaise trapped, suggests that moisture remains; *P. conspersa* is not usually regarded as an inhabitant of temporary streams but was found in such by Sommerhauser *et al* (1997). The stream banks at Windsor and Millbarn are steep and the larvae would have to climb vertically to escape the stream bed. Extensive shoals of dead leaf packets and woody debris occur in meanders on the stream bed and it seems likely these are the aestivating site.

Mosely (1939) suggests that the adults must be very retiring as they were so rarely seen by collectors. Crichton & Baker (1959) cite communications with Swedish colleagues indicating that *Ironoquia dubia* never leaves the stream bed during flight. Graham Vick took adults in a Malaise trap by, and at the same level, as the stream (Vick, 1992). Crichton light-trapped only a single adult among thousands of caddis light-trapped or suction trapped at Millbarn Pond over several years (e.g. Crichton, 1960; Crichton, 1965). Only a few metres away was the breeding site where Hiley took a larva (Hiley, 1970); the stream at that point is in a gully so stream-bed flying adults would not venture into a trappable position. That situation is markedly different by a small stream in Telemark, south east Norway, where this species was one of the dominant caddis and light-trapped in large numbers (Andersen *et al* 1990).

History in Britain

It was added to the British list by Stephens (1837) with the locality being described as “in the vicinity of the metropolis”. A large number of records cited in that work have London, near London, or in the vicinity of the metropolis as localities. Among the small number of other places he mentions as being in the London district are Ripley in Surrey and Hertford. Whilst not suggesting that *Ironoquia dubia* came from either place it gives an idea of the possible radius of his Metropolitan district. The Stephens’ collection at the Natural History Museum London, entirely lacks data. This was presumably the same record that was referred to as “London” by Hagen (1859) and “in the vicinity of the metropolis” in McLachlan (1865).

The next British specimen was a female light-trapped by Claude Morley at Monk Soham, where he lived, which is in Suffolk, in September 1906, Morton (1908). Originally Morton identified this as *Phacopteryx brevipennis* Curtis, but later corrected it. The known habits of this species suggests the breeding site was probably close by.

The next records were made by Donisthorpe at Windsor Forest on the 2nd October 1931 and again on 18th September 1932 (Donisthorpe, 1932). Graham Vick was the next person to find it in Windsor Forest, in 1991, from the Badger’s Brook and a tributary (Vick, 1992). It is within the bounds of possibility that the radius of the

Metropolitan District referred to by Stephens (1837) could have encompassed the Windsor Forest.

Crichton took an adult at light at Millbarn Pond, in Berkshire (Crichton & Baker, 1959, Crichton, 1960). This led Peter Hiley to take a larva from its exit stream, the Lockram Brook, on the 3rd April 1968, (Hiley, 1970).

Hiley searched similar streams, and was successful in the Pamber Forest on 25th March 1969.

There are no other reliable British records. Parfitt (1858) recorded it from Exeter, but no voucher specimens are known and this record is not cited by McLachlan in his later works, where other Parfitt records are noted. Consequently it is thought this record can be ignored.

European distribution

The Fauna Europaea website lists this species from the following countries and major regions, listed alphabetically: Austria; Belarus; Belgium; Czech Republic; Denmark; Estonia; Finland; Germany; Hungary; Latvia; Lithuania; Netherlands; Romania; Russia (Central); Russia (North West); Slovakia; Slovenia; Sweden; United Kingdom; Cuk & Vuckovic (2010) add Croatia to this list. It is on the list for Iberia but that has not been accepted by Malicky & Barnard in Fauna Europea (2005).

Why has *Ironoquia dubia* declined

This seems to be a species mainly of the northern parts of central and eastern Europe and is missing from the west of the continent. We are on the western edge of its range. It may have been unable to spread from an initial colonisation. Despite being recorded from a range of habitats abroad, it may, in common with other species at the edge of their range, been forced to be much more selective. Over the past 40 years this species does seem to have declined from three to two and now no known current sites. If the suggestion that this species aestivates in the litter on the stream bed is correct, then a major summer flood that occurred a few years ago could have been serious in washing away the litter and its enclosed *Ironoquia dubia* cases (Graham Vick, pers.comms.).

Recent Survey Work

Brenda and Ian Wallace did not find larvae on a visit to Hiley's Pamber Forest site in spring 1984. In 2009, Graham Vick ran Malaise traps alongside the Badger Brook, site of his 1991 captures, and also visited the Lockram Brook. This was unsuccessful. In 2009 Adrian Chalkley kindly investigated the stream next to where Morley had lived at Monk Soham, but again without success. In March 2011, Ian Wallace and Graham Vick searched unsuccessfully for the larvae in the Millbarn Pond stream and the Windsor Forest stream, where adults had been previously encountered. Whilst not always looking specifically for *Ironoquia dubia*, Graham Vick has made many visits over the years to the Pamber Forest streams, but not encountered this species.

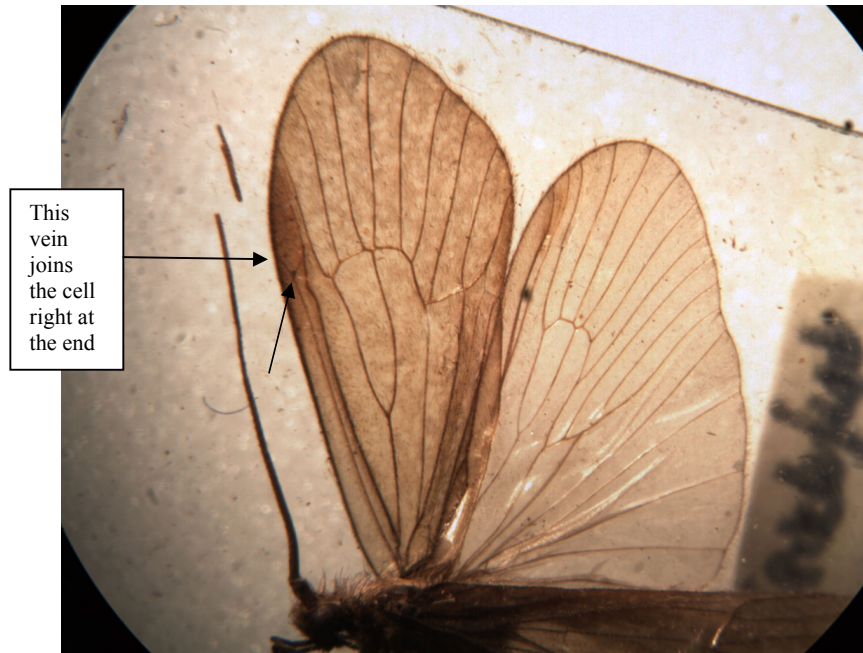
Survey methods

Malaise traps are probably a good way to locate the species, but must be used with great caution as it is clear the adults do not move away from their breeding site and a whole population could theoretically be entrapped; placing damp tissue paper in the

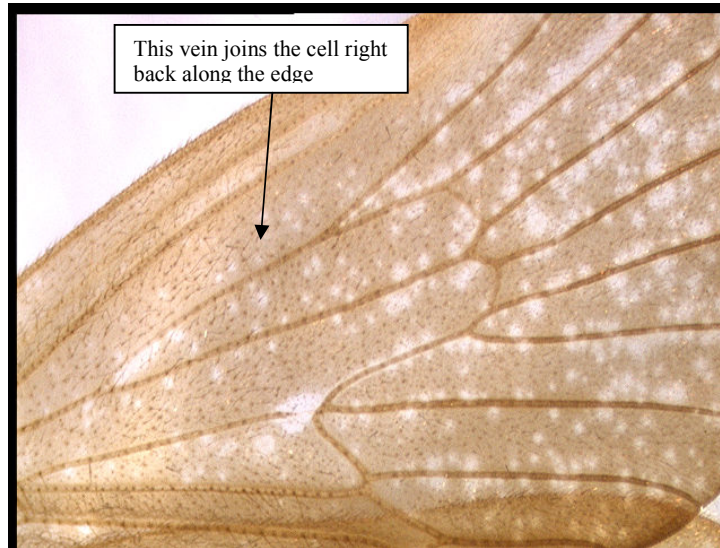
trap bottle rather than preservative, and of course frequent visits to the trap are suggested. Light trapping right next to and at the same level as the stream is also likely to be successful, and adults could be released after capture and identification. Fortunately, the short flight period means trapping effort can be focussed. Larval searches in early spring are also worth-while. Pupal cases could be sought in dead leaves at the margins and if this is done in October, before the streams re-fill then only empty cases would be encountered and the population not damaged. However, egg masses might be encountered and injured, particularly as pupation sites are likely to be the dampest parts and desirable for egg-laying.

Identification

Currently, adults can be identified using Macan (1973) or Malicky (2004); a new key to adult UK caddis, authored by Peter Barnard and Emma Ross is expected to be published in 2011. With experience it is expected that the adults could be distinguished in the field. They are most similar to *Micropterna* and *Stenophylax* with which they occur but they are much smaller, with the anterior wing being only 10-12mm as opposed to 15mm to 25mm for those other two genera (data from Mosely, 1939). Those species are also notable for a pale yellow triangle in dorsal view, composed of the pale bent edge of the wing; the photograph of *Ironoquia dubia* suggests this is lacking. There is also a wing venation character that appears to be apparent in the photograph that will assist in identification. (see Figure).



Micropterna sequax McLachlan © Ian Wallace



© Graham Vick

Wallace *et al* (2003) provide features to enable the certain identification of larvae. The long, narrow and strongly curved case is unlike that of any other species that is likely to be encountered where it lives and field identification should be possible; *Micropterna* species found commonly at Windsor in March 2011 have a shorter, broader and much less strongly curved case. The larva also has a conspicuous pale middle stripe and numerous gill filaments, should a de-cased larva be encountered.

The egg stage is un-described, but that of North American species seems to be typical for those limnephilids of temporary water bodies being in a group laid within a hemisphere of jelly placed under debris on the dry stream bed, where there is retained moisture. This is the usual method for temporary water body limnephilids; the larvae hatch but do not escape from the jelly (eclose) until the water returns (Wiggins, 1973)

The pupa has been described by Ulmer e.g. (1909) and Dohler (1914). Ross (1944) mentions the numerous gill filaments as a way of separating these larvae (as *Caborius*) from other limnephilids. However, he notes that the gills collapse into a shapeless bundle. This will make it difficult to distinguish the number of filaments in pupal exuviae, without careful teasing and examination. Live pupae will normally be encountered within the distinctively shaped case making it unnecessary to rely on the enclosed pupa for confirmation.



Ironoquia dubia © Aki Rinne



Ironoquia dubia © Aki Rinne



Ironoquia dubia © Walter Pfliegler

Threats

The main threats include:

1. Pollution events
2. Unsympathetic dredging, ditching and engineering works. Dead leaves and debris on the bottom and at the side of the streams when they are in the dry phase are the site for aestivating larvae and pupae and egg-laying and should not be disturbed.
3. Marginal vegetation and trees provide larval food and probably create suitable shaded conditions for the adult so their removal could be detrimental.

Action plan for the Scarce brown sedge (*Ironoquia dubia*)

- 1 Engage with planning authorities and the Environment Agency to ensure that this species is taken into account in developments. Windsor Forest has Special Area for Conservation status, as well as being a SSSI. Pamber Forest is also a SSSI but the Lockram Brook, and sites around Monk Soham have no designation.
- 2 Ensure that the species is represented on all relevant LBAPs.
- 3 Consider occasional, or opportunistic searches at the Windsor Forest and Pamber Forest sites.

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Appendix 1 Records of (*Ironoquia dubia*) from the UK

Locality	grid reference	Vice County	Source	Stage	Recorder name	Determiner name	Day	Month	Year
London, "vicinity of the metropolis"	?	?	Stephens (1837)	adult	Stephens, J.F.	Not known			pre 1837
Monk Soham	TM21-65-	25	National Museums Scotland	adult	Morley, C	Morton, K.J.		9	1906
Monk Soham	TM21-65-	25	Morton (1908)	adult	Morley, C	Morton, K.J.		9	1906
Windsor Forest	SU9--7--	22	Donisthorpe (1932)	adult	Donisthorpe, H. St. J.	Kimmins, D.E.	2	10	1931
Windsor Forest	SU9--7--	22	Natural History Museum London	adult	Donisthorpe, H. St. J.	presumed Kimmins, D.E.	2	10	1931
Windsor Forest	SU9--7--	22	Donisthorpe (1932)	adult	Donisthorpe, H. St. J.	Kimmins, D.E.	18	9	1932
Windsor Forest	SU9--7--	22	Natural History Museum London	adult	Donisthorpe, H. St. J.	Kimmins, D.E.	18	9	1932
Windsor Forest	SU9--7--	22	Donisthorpe (1936)	adult	Donisthorpe, H. St. J.	Donisthorpe, H. St. J.			pre 1936
Millbarn Pond, Wokefield	SU672663	22	Crichton & Baker (1959)	adult	Crichton, M.I.	Crichton, M.I.			1957

Millbarn Pond, outflow	SU672663	22	Hiley (1970), (1973)	larval	Hiley, P.D.	Hiley, P.D.	3 & 4	4	1968
Pamber Forest	SU617603	12	Hiley (1970), (1973)	larval	Hiley, P.D.	Hiley, P.D.	25	3	1969
Badger's Brook, Windsor Forest	SU925753	22	Vick (1992)	adult	Vick, Graham	Vick, Graham			1994
Badger's Brook, Windsor Forest, tributary of	SU926753	22	Vick (1992)	adult	Vick, Graham	Vick, Graham			1994



Fig. 1 Distribution of confirmed records in UK (adapted from NBN Gateway)

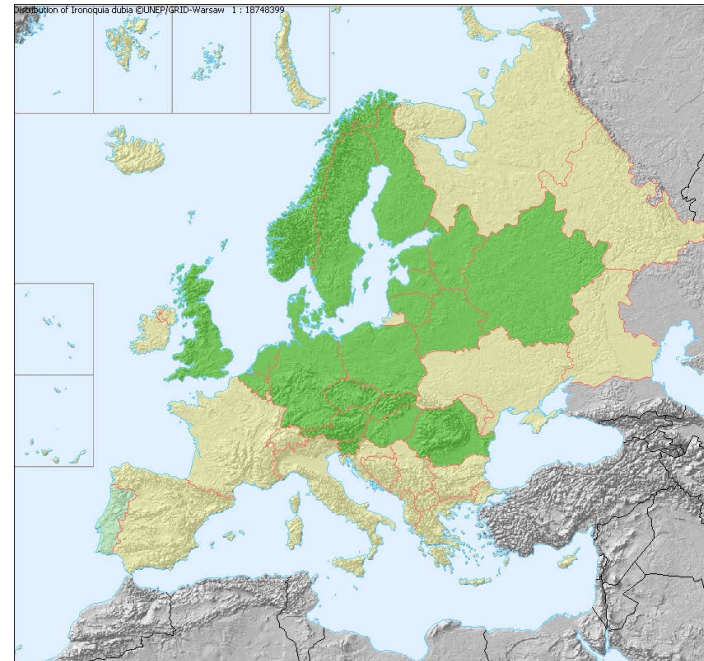


Fig. 2 Distribution of *I. dubia* in Europe (from Fauna Europaea) (Bright Green = Present Light green unconfirmed Beige = No data)