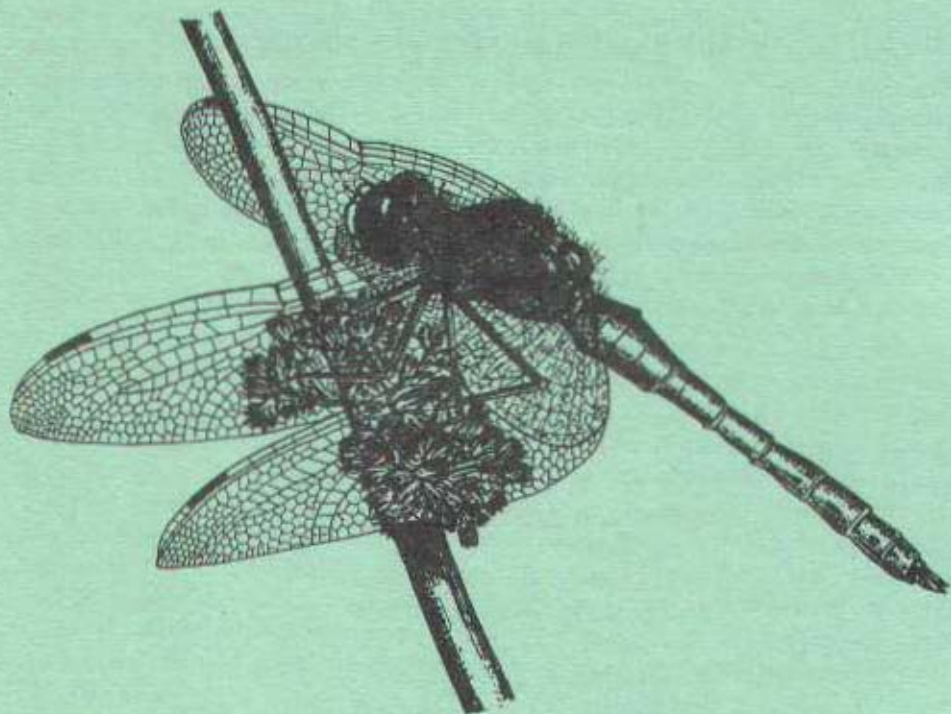


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S. and A. Brooks



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The *Journal of the British Dragonfly Society*, normally published twice a year, contains articles on Odonata which have been recorded from the United Kingdom. The aims of the British Dragonfly Society (B.D.S.) are to promote and encourage the study and conservation of Odonata and their natural habitats, especially in the United Kingdom. The B.D.S. is affiliated to the Societas Internationalis Odonatologica (S.I.O.).

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The dragonflies of mid-Powys

Martin Peers

Gorse Bank, Llangammarch Wells, Powys LD4 4AA.

Mid-Powys possesses quite a lot of suitable habitat for dragonflies and the present survey, which was started in May 1981, has shown that the paucity of records received by the national recording scheme reflected a lack of recorders rather than dragonflies. For the purpose of the present survey, records were collected from some 26 ten-kilometre squares. Most of these were visited at least three or four times (some many more times than that) and different kinds of habitat were selected by reference to the relevant Ordnance Survey maps and my existing knowledge of the terrain. Some ninety suitable sites were visited and all of these supported some damselflies or dragonflies. Nine sites boasted ten or more species, thus making them of national importance. Habitats visited included shallow, slightly acid upland pools, lakes and pools at lower altitudes, marshy areas, mountain streams and the main rivers.

Of the rivers, the Wye, Ithon and Lŷon were found to be the most important. However, the effects of acid rain on the upper Lŷon (Ormerod, 1985) have made inroads on *Odonata* populations there; further downstream they are less affected because of calcareous bedrocks on many of the feeder streams. Although the Lŷon (and the upper reaches of the Ithon and Wye) are typical fast-flowing upland rivers and therefore of limited value for a wide diversity of species, the middle reaches of the Wye and the lower Ithon have several slower-moving stretches, which are conducive to a more varied *Odonata* population. Thus, while the upper and middle Wye was found to have eleven species along its length, the Ithon supported nine and the Lŷon only eight. No doubt the importance of these rivers may be attributed to the quality of the water and the rich marginal vegetation along much of their lengths. Among the species which one would have expected to find, the ubiquitous *Pyrhosoma nymphula*, *Ethalagma cyathigerum* and *Calopteryx virgo* occurred in all suitable areas, while *Calopteryx splendens* and *Coenagrion puella* were much more local and occurred mainly along the more open and slower-moving stretches of the lower Ithon and middle Wye. Of the other species recorded, *Cordulegaster boltonii* and *Aeshna juncea* tended to occur only in the upper reaches, while *Aeshna cyanea* and *Sympetrum striolatum* preferred the lower areas. One species, *Platycnemis pennipes*, was much more local but occurred in several suitable locations alongside the lower Ithon and the middle Wye, where it was found most often in adjacent hay meadows or luxuriant riverside vegetation, invariably in the company of *Calopteryx splendens*.

The existence of *Gomphus vulgatissimus*, further down the Wye in Herefordshire, prompted me to search one or two possible locations along the Powys Wye, but without success.

Of the other rivers in mid-Powys, none appeared to compete with those mentioned above, although the Teme and Lugg appeared to support about five or six species, while those running south or west out of Mynydd Eppynt (with the notable exception of the Honddu) had not more than four. Undoubtedly, this has something to do with the fact that the rivers in mid-Powys have a greater diversity of species until they leave the county.

Among other good sites for Odonata in the area, the shallow, slightly acidic, upland pools in the north and west are especially good for species like *Libellula quadrimaculata*, *Sympetrum dunae* and *Aeshna juncea*, with *Lestes* local. Nearby streams are utilised by *Cordulegaster boltonii* and *Pyrhosoma nymphula*. In Radnorshire, there are several pools above the Elan Valley and to the north-west of Llanbadarn Fynydd, where up to eight or nine species may be seen during the year, while typical moorland pools may also be found in the hills between Builth Wells and Painscastle. In north Breconshire, on the other hand, important moorland pools are to be found at Pont-y-llyn, near Builth Wells (where I have recorded *Anax imperator*), and at Cors-yr-Hwch, above Caban Coch in the Elan Valley. Moreover, at one or two flashes on the south-facing Cambrian Mountains above Abergwesyn, may be seen the locally rare *Orthetrum coerulescens*.

One moorland pool near Glasewni also supports a pair of *Libellula depressa*, at more than 400 metres above sea-level. This species also may be found further east, at Disgwylla Hill Newchurch, an excellent site which contains several small pools and springs, as well as a feeder stream for the River Arrow nearby. In this one area, twelve species were recorded on five visits in 1983-4. Two other interesting upland pools, which were located during this survey, are those at Mountainhead, near Llangunllo, and the spring near Upper House Farm, to the north of Bleddfa. However, since these pools are surrounded by sheepwalk, rather than moorland, they support a mixture of some species which prefer slightly acidic habitat (and are on the edge of their range here) such as *Aeshna juncea* and *Lestes sponsa*, alongside those which are found at more neutral or alkaline sites, such as *Aeshna cyanea* and *Sympetrum striolatum*.

At lower altitudes, the larger lakes are not the best local sites for Odonata. Perhaps Llyn and Llyn-gwyn (near Rhayader). Typical species found at these lakes during the survey included *Ischnura elegans*, *Coenagrion puella* and *Sympetrum striolatum*, while *Aeshna cyanea* and *Lestes sponsa* appeared to be more local.

As elsewhere in the country, the smaller pools are among the best sites for seeing a wide diversity of species. Among several such pools at lower altitudes in mid-Powys, one of the best is to be found at the Llyn, near Newbridge. Some 14 species were recorded here between 1982 and 1984, and these included *Anax imperator* and *Libellula depressa*. At Camddwr Pools, near Llangantymarch Wells, some 15 species have been noted annually since 1981, including *Orthetrum coerulescens* and *Anax imperator*. Both of these sites have been re-excavated since 1976, a factor of no small significance. However, a small ox-bow pool, with varied waterside vegetation, close to the River Hoddru at Castell Madoc, four miles north of Brecon, has no evidence of excavation and yet boasts ten species of Odonata. Finally, attention should be made of Rhosgouch bog (now a NNR), where Bob Haycock has recorded eight species, since it testifies to the importance of lowland marsh and fen for this insect, a habitat that is becoming very difficult to find nowadays in mid-Powys.

For an insect group which has suffered a ten percent loss of species in just 25 years (Chelminck *et al.*, 1980), the conservation of suitable sites for Odonata in Powys is vital. The rivers, especially the Wye and Ithon, hold good populations of the two *Colopteryx* species, as well as being significant for *Platycnemis pennipes*. Furthermore, the smaller pools (especially those which are slightly acid with plenty of marginal vegetation) are vital for certain species and yet are under threat from "acid rain" and afforestation in the uplands, while drainage through "land improvement" poses a threat at lower altitudes. With such problems, it is encouraging to see the purchase, by the National Trust, of a large area of the Cambrians to the south of the Elan Valley reservoirs. Furthermore, the NCC and conservation volunteers have dug more shallow pools near the Llyn at Newbridge, while a local farmer did the same at Fountainhead in 1979. Positive actions like these are essential as a counter to the negative forces of modern forestry and farming, if this ancient Order of insects is to survive, in its present numbers, in mid-Powys.

Acknowledgements

This article would never have been written without the publication of the late Cyril Hammond's (1983) book or the encouragement given to me by Bob Haycock (then NCC warden of the Brecon Beacons National Park) to undertake a survey of the dragonflies of north Breconshire and Radnorshire (now mid-Powys).

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A large emergence of *Anax imperator*

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In the spring of 1983 I built a garden pond which measured approximately 15ft x 6ft with a capacity of about 500 gallons. The main purpose was to attract dragonflies, frogs and newts, and therefore no fish were introduced. A few plants and dragonfly larvae were added but the larvae which were introduced were not identified.

In the first summer six species were seen ovipositing in the pond: *Libellula quadrimaculata*, *L. depressa*, *Anax imperator*, *Aeshna cyanea*, *Ischnura elegans* and *Stagnum viridulum*. In 1984 the same species were again seen ovipositing and in addition *Coenagrion puella* and *Pyrhosoma nymphula*. Since the pond was built *Aeshna mixta*, *Aeshna juncea*, *Cordulegaster boltonii* and *Leucospiza sponso* have also visited the garden.

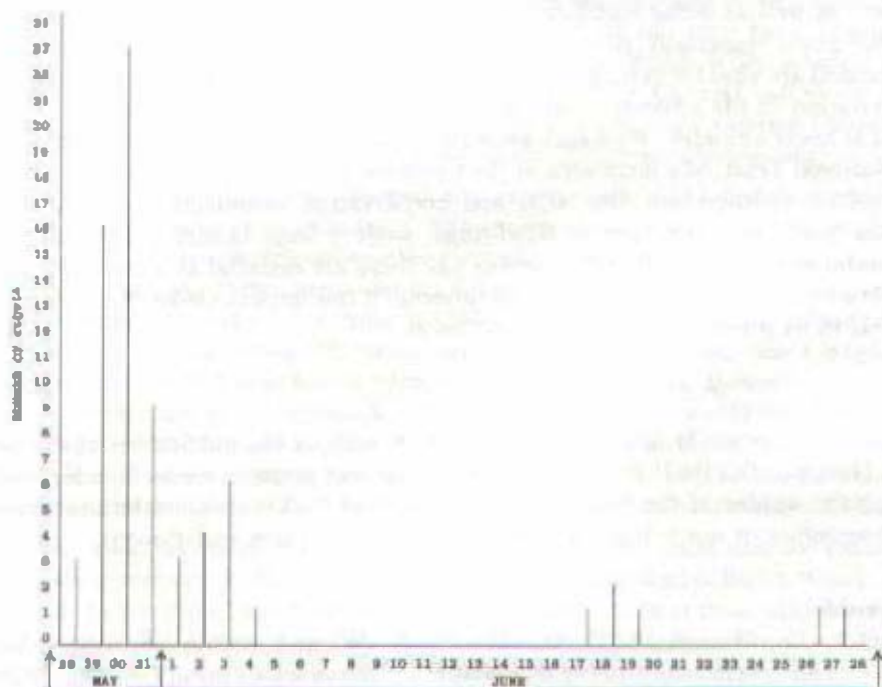


Fig. 1 Numbers of *Anax imperator* exuviae collected from a small pond during 1985.

This year, 1985, has been exceptional in that 71 *Anax imperator* emerged between May 28th and June 27th (Fig. 1). Nearly all the *A. imperator* emerged between early and late evening and flew off in the early morning, directly away from the garden. Probably, as happened last year, I will not see any of them again until the females return to oviposit. The large number of larvae were probably supported in my pond by frog tadpoles. In February between 11 and 15 clumps of frog spawn were laid, and from all these eggs possibly no more than 30 young frogs left the pond. I kept a few dragonfly larvae indoors in an aquarium and observed one larva devour three small tadpoles in a quarter of an hour. No wonder the numbers went down so quickly in the pond. Smooth and palmate newts breed very successfully in the pond. They have a much higher survival rate than the frogs possibly because they spawn later in the year when most of the *Anax* have emerged.

Aeshna cyanea also breeds in the pond and I have seen it ovipositing in some peculiar places. For example in my garden shed, in the fence and also in my ankle, through my sock, while I was standing at the edge of the pond. It did actually oviposit in the peat at the edge of the pond, well above the water line, afterwards. Whether my dark brown socks looked like peat I do not know but perhaps this was the reason.

When building this pond I had no idea that it would attract so many species of Odonata in such a short time. It has become a great source of interest and pleasure to myself and my family.

Some observations of *Aeshna cyanea* (Müller) ovipositing in unusual substrates

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Between 1st and 8th September 1985, I constructed a small garden pond. The pond was roughly rectangular in shape and measured 4 m x 3 m. During the following two days I planted small areas of *Juncus effusus*, *Juncus articulatus*, *Eleocharis palustris* and *Schoenoplectus lacustris* to act as emergent vegetation and added a little *Potamogeton natans*, *Elodea canadensis* and *Myriophyllum spicatum*.

On 11th September the same year, the weather was warm and sunny and I sat near the edge of the pond. I was wearing a brown woollen jumper and brown corduroy

trousers. Suddenly, the familiar clatter of wings announced the arrival of a dragonfly. A female *A. cyanea* flew one quick circuit of the pond and then landed on my jumper. It then proceeded to oviposit in the arm-folds of my jumper. Fascinated, I watched. Seen in action at such close quarters, the ovipositor looked a formidable structure and it was also interesting to note that during oviposition, the anal appendages bent up at right angles to the dorsal surface of the abdomen. After some time, I removed the dragonfly from the jumper and released it into the air. Immediately, the insect returned to the jumper. I repeated this procedure a number of times but the persistent creature kept returning to the jumper. As I would have preferred the insect to oviposit at the pond and not on me, I eventually threw it into the air and hurried inside the house to watch from the window. After a few circuits of the pond the dragonfly finally flew off. Not once did it oviposit at the pond. No further dragonflies visited the pond that day, but after much careful search been inserted into the jumper.

The following day was also sunny and again I sat beside the pond. This time I was wearing a blue shirt and blue jeans. After half an hour, a female *A. cyanea* appeared. Whether it was the same insect as the day before, I cannot say. On this occasion, I was totally ignored — but so was the pond. The insect proceeded to oviposit in some soil on a flower bed some 2 m from the pond and also 1 m up a wooden fence 3 m from the pond. After 5 minutes the insect departed and did not return. Shortly afterwards the weather broke and no further sightings were made. However, the two observations made me realise how quickly new sites are visited by some Hawker dragonflies.

I also wondered if *A. cyanea* females preferred brown coloured substrates when they oviposited. Often I have noticed *A. cyanea* oviposit in muddy banksides, floating logs and the stone-walling of ponds and, certainly, the media chosen at my pond (jumper, soil and fence) were all brown. In addition, I speculated whether the prelarvae that hatched from the fence could survive the 3 m journey to the pond.

Indeed, the oviposition habits of *A. cyanea* are obviously quite diverse and, to say the least, curious!

Aeshna caerulea* (Ström) breeding at Blenn Eighe N.N.R.*Richard Gabb****72, Chester Road, Poynton, Cheshire**

At mid-day on 25th June 1985 I was searching the edge of a bog pool on the south side of Loch Maree in Ross-shire.

resting on Common Cotton Grass (*Eriophorum angustifolium*). The exuvia was a few inches below. This appears to be the first observation of a freshly emerged *A. caerulea* and associated exuvia in Britain.

Emergence from the water had probably taken place some hours earlier as the insect's wings were fully expanded and the first flight took place within one hour of discovery. Lack of colouration was typical of a freshly emerged insect but the spots on the abdomen were a pale lilac blue. The spots on segment 6 and 7 were shaped like inverted commas whilst those on segment 9 were sharply rectangular (Fig. 1). On segment 10 the lilac markings were joined posteriorly but divided anteriorly by a black tapering wedge, rather than the bar and circle shown by Hammond (1983). There were also vestiges of antehumeral stripes. The specimen was noticeably smaller than *A. juncea*. The only other species observed at the site was *Pyrthosoma nymphula* but it appeared suitable for other breeding species including *Somatochlora arctica*.



Fig. 1. Apical abdominal segments of male *Aeshna caerulea*, dorsal view.

The bog pool was in a natural depression and situated about 30 m from the side of the loch. It was bordered by a stream edged with Birch (*Betula pubescens*), Holly (*Ilex aquifolium*) and Scots Pine (*Pinus sylvestris*). The pool measured about $4\frac{1}{2} \times 3$ m. It was larger than others nearby and differed by having areas of open water up to 15 cm deep between hummocks of *Sphagnum*, rather than having a total covering of *Sphagnum*.

The pool contained a wide range of both emergent and bankside vegetation and was not shaded by trees. Among the emergent plants were Bog Pondweed (*Potamogeton polygonifolius*), Bogbean (*Menyanthes trifoliata*), Common Cotton Grass (*E. angustifolium*) and *Scirpus caespitosus*. Other plants included Bog Myrtle (*Myrica gale*), Cross-leaved Heath (*Erica tetralix*), Purple Moor Grass (*Molinia caerulea*), Heather (*Calluna vulgaris*), Common Sundew (*Utricularia rotundifolia*), Great Sundew (*U. anglica*), Tormentil (*Potentilla erecta*) and Bog Asphodel (*Narthecium ossifragum*). The across and contained *E. tetralix*, *M. caerulea*, *M. gale* and *N. ossifragum*. There was a single plant of *Salix* sp. about $\frac{1}{2}$ m in height.

The weather was overcast, windy and cool. No air or water temperatures were taken and the pH was not measured. The exuvia was deposited with the reserve warden.

Acknowledgements

Identification was confirmed by the NCC warden for the reserve, Tim Cliford.

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A note on the discovery of *Coenagrion hastulatum* (Charp.) in Britain

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Coenagrion hastulatum (Charp.) was first discovered in Britain at Aviemore, Scotland in 1900 (McLachlan, 1900). Earlier British lists, notably Stephens (1829), sometimes included *C. hastulatum* but this name was frequently employed in error for *Enallagma cyathigerum* before Charpentier described the latter species in 1840. Nevertheless, there are specimens of the true *C. hastulatum* in at least one British collection which predate its discovery in 1900 by many years. This is the famous Dale collection which, since 1906, has been housed in the Hope collections at Oxford University Museum. There are five specimens; a sixth, originally included in this series of *C. hastulatum*, was renamed *E. cyathigerum* by Lucas in 1908. The five, four males and a female, are well preserved and readily recognisable as *C. hastulatum*. The males are remarkably uniform in their abdominal markings, the second segments all displaying the 'classic' spear-shape. In my experience, this mark is usually very variable.

The specimens bear the following labels: 'Scotd R.W.' (two males) and 'Mus. Child' (a male and a female), written in apparently the same hand. The remaining male lacks any labels. Below the series are three labels: 'hastulatum Charp.', 'scoticum' and 'Sutherland'. These are in similar type-face and the former, at least, must have been added after 1900. The specimens were originally housed in one of Dale's deal cabinets but were transferred to a new drawer, containing *C. hastulatum*, *C. pulifera*, *C. pulchellum* and *Enallagma cyathigerum*, during the late 1950's. The original order of specimens and labels would have been maintained exactly during the transfer (G. C. McClavin, pers. comm.).

The 'R.W.' of the labels is Richard Weaver. In 1904, Lucas wrote that 'Mr. C. W. Dale informs me he has a specimen of *Agrion hastulatum* taken by Mr. Richard Weaver in Sutherlandshire in 1842'. Judging from the labels in the Hope collection, Weaver had, in fact, collected not one but five specimens from this unknown locality. There is at least one contemporary reference to these specimens. Selys (1846) refers to 'a variety [of *E. cyathigerum*], the *Agrion scoticum*, Dale MSS, collected in Scotland'. Selys mentions that he did not himself examine the collection; if he had done so, he might well have established the true identity of Weaver's specimens and duly added *C. hastulatum* to the British list. As it was, they remained in their drawer for sixty years, presumably under the label '*Agrion scoticum*', until 1908 when Lucas examined them. The use by Dale of the manuscript name, *Agrion scoticum*,

independently attested by Selys, indicates that Weaver's specimens were at least recognised as a new 'variety' from the start, and not incorporated into a series of *E. cyathigerum* or another related damselfly.

That Weaver collected *C. hastulatum* in Suther and seems to rest on the testimony of Dale (Lucas, 1909), but Weaver is known to have been an entomologist of integrity and there seems little reason to doubt it. Corroborative evidence may still exist in manuscript in Dale's or Weaver's papers. The best possible confirmation, however, would be to rediscover the species in Sutherland. Murren and Merritt (1983) suggest Strath Oykel, whose riverine vegetation bears a close resemblance to the haunts of *C. hastulatum* in Speyside and Deeside, as a suitable place to begin a search.

Acknowledgement

I thank Dr. G. C. McGavin, Assistant Curator of the Hope Collections, for kindly showing me Dale's original specimens.

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The incidence of *Hemianax ephippiger* (Burmeister) in Britain and Ireland

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The purpose of this note is to correct several minor errors that occurred in an article (Halstead, 1985) about *Hemianax ephippiger*, to set the record straight regarding two records cited in the aforementioned article, and to add two further records.

To deal with the four minor errors first:

- a) It is the second abdominal segment which is blue in male *H. ephippiger*, not the first abdominal segment.
- b) The single female *H. ephippiger* captured in Dublin was caught on 12th October 1913, according to the reference given, not 12th October 1910.
- c) The specimen from the Shetland Islands was captured on the island of Fietlar, not Fellar — obviously, just a typing error.
- d) The specimen reported to have been collected in St. Albans in 1968 was in fact collected in Tunbridge Wells (Davies, pers. comm. 10th September 1985).

The article states that "A third specimen of this very rare vagrant was found in Cornwall in 1980 (Merritt, 1981), and Chelmick (1979) reported a record of it in 1974." The Cornwall record was passed to me just prior to the printing of the *Odonata Recording Scheme Newsletter* no. 5, and I included the information I was given, namely, that a "just alive specimen was found in Cornwall last year" on the basis of my personal knowledge of the recorder. Subsequent enquiries, however, failed to produce any back-up information, and I can only assume that the person concerned had second thoughts about the validity of the identification. Anyway, the record must be disregarded.

With regard to the 1974 record reported by Chelmick (1979), the date given is an error (Chelmick, pers. comm.) and should have been 1971; a reference to a specimen captured in Leeds that year.

I include a list, as follows, of the six records known to me of *H. ephippiger* from Britain and the single record from Ireland:

- 1) A female was captured on 24th February 1903 in Devonport and sent to the British Museum (Natural History) by J. H. Keys (Corbet *et al.*, 1960).
- 2) A female was captured on 12th October 1913 in Dublin and sent (presumably) to the National Museum of Ireland by A. Douglas (Corbet *et al.*, 1960).

- 3) A single specimen was picked up from the pavement in the centre of Tunbridge Wells, Kent, one evening in late October 1968 by D. A. L. Davies' son, and is now in D. A. L. Davies' collection.
- 4) A single specimen flew into a hayrick on the island of Fetlar, in the Shetland Islands, and was passed by a crofter to R. Tulloch, an R.S.P.B. warden. He sent it to his colleague, B. P. Pickess, in Dorset who forwarded it to the British Museum (Natural History) where the specimen now resides. No date is given for the capture, but it occurred in the late 1960s/early 1970s (Pickess, pers. comm.).
- 5) A male was taken from the side of a lorry by the driver, in Hunslet, Leeds, on 28th October 1971 and passed to J. H. Flint, in whose collection the specimen resides.
- 6) A female was caught and photographed at Portland Bill, Dorset, on 11th August 1983 by M. Rogers. The photograph was passed to B. Pickess and thence to D. Chelmick and R. Merritt for corroboration.
- 7) A male was caught on 18th July 1984 at Dibden, Hampshire. It had become trapped in the windscreen-wiper of a car and was passed by the car's owner to K. H. Halstead, a neighbour, who in turn showed the specimen to A. and N. Weistead who confirmed the identification (Halstead, 1985). A photograph of the specimen was shown at the British Dragonfly Society's meeting at Leeds University on 26th October 1985.

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Separating adult *Aeshna suharcnica* (Wlk.) from *Aeshna juncea* (L.)

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Several Odonatologists have speculated that some predominantly north European species of dragonfly may also exist in northern Britain, and that only the lack of suitable keys in English has prevented such species from being discovered.

Morton (1927) and Clausen (1984) refer to the possibility of *Aeshna subarctica* occurring in Britain, especially in Scotland. Clausen (1984) describes the exuviae of *A. subarctica* and *Aeshna juncea* and shows that possibly the best feature that separates the two species is the shape of the male genitalia, visible on the ventral surface of the exuviae. However, the ratio of the length of the cerci to the length of the paraprocts is also a useful means of separation and our own experience suggests that with the majority of specimens this is possible without actual measurement. Clausen (1984) gives ratios between 0.48 and 0.52 for *A. juncea* and between 0.59 and 0.68 for *A. subarctica*.

For dragonfly enthusiasts visiting Scotland, we offer some features that may assist in separating adult *A. subarctica* from *A. juncea*, two very similar looking species. First, however, a few words about habitat may prove useful in deciding where to start looking for *A. subarctica*. In our experience, where *A. subarctica* is found on the continent, the habitat usually consists of sheltered acid pools and even large lakes, especially those with extensive rafts of *Sphagnum* moss around the perimeter of the water. These floating *Sphagnum* margins often encroach many metres into the water. *Leucorrhinia dubia* is frequently also present at such sites. To date, we have found no habitat quite like this in Scotland, although some in the Glen Affric area bear a resemblance. However, even on the continent, new sites are being found for *A. subarctica*, and it has recently been discovered in the Vosges mountains in France (Lohmann, 1981).

Although there are distinct differences in flight behaviour between *A. subarctica* and *A. juncea*, it is not easy to separate the species on the wing until experience has been gained and so specimens should be netted and closely examined using a x10 hand lens. The following characters should enable specimens of both sexes to be identified.

a) Thoracic markings.

On the side of the thorax there exists a small hole called the spiracle. Males of *A. subarctica* have a clearly defined yellow marking that extends beneath the spiracle (Fig. 1a). In *A. juncea*, the yellow markings usually end before the spiracle (Fig. 1b). This distinction also applies to females. However, as the occasional specimen of *A. juncea* may also have some markings beneath the spiracle, this feature should only be used as a means of identification in conjunction with the following characters:

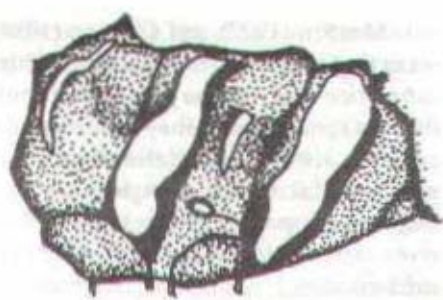
b) Head markings (both sexes).

In mature *A. juncea*, there are two yellow spots behind the head. In mature *A. subarctica* the back of the head is entirely black.

If the specimen being examined exhibits the well-defined marking beneath the spiracle and an entirely black rear of the head, then it will probably be *A. subarctica*. Final determination of the species should be confirmed by examining the accessory genitalia of males and the ovipositor valves of females. Here the hand lens is essential.



1a



1b

Fig. 1a. *Aeshna subarctica*, male. Left lateral view of thorax. Note yellow mark beneath spiracle.

Fig. 1b. *Aeshna juncea*, male. Left lateral view of thorax. No yellow mark beneath spiracle.

c) Accessory genitalia of males.

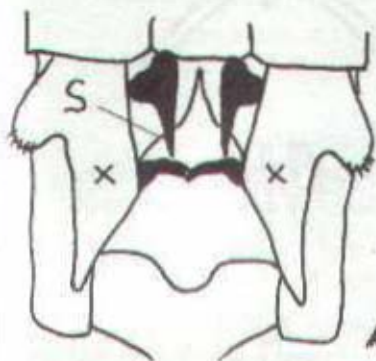
This apparatus is situated on the ventral surface of segment 2 of the male abdomen. Viewed ventrally, the accessory genitalia of *A. subarctica* appears as in Fig. 2a (penis not illustrated). When section x-x is viewed caudally, two prominent hamular processes can be seen forming a flattening arch with their blunt apices touching (Fig. 2b). In *A. juncea*, these processes project more ventrally and often they do not touch; the apices of the processes are acute and hooked (Fig. 3b). Also, there is an easily observed difference in the spines (S) of the anterior lamina: in *A. juncea* these spines are strongly curved and widely divergent (Fig. 3a), while in *A. subarctica* the curvature is less marked and they are sub-parallel (Fig. 2a).

These diagnostic features should be quite sufficient to separate the two species.

d) Ovipositor valves in females.

In *A. juncea*, the genital valves (into which the ovipositor blade retracts) have a distinct flattened ventral surface (Fig. 4c), whereas in *A. subarctica* the valves are more regularly curved and there is no flat ventral surface (Fig. 4b). These differences can be most easily appreciated in a caudal/ventral view.

The differences in the female genitalia are perhaps more difficult to appreciate than are those in the male genitalia. However, when specimens of the two species are both available at the same time, so that a comparison can be made, no difficulty should be experienced.



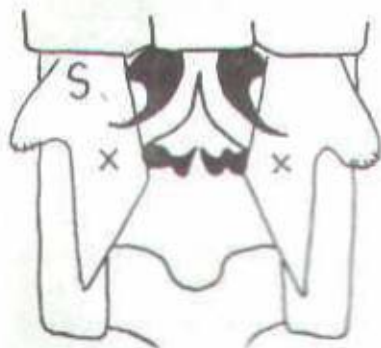
2a



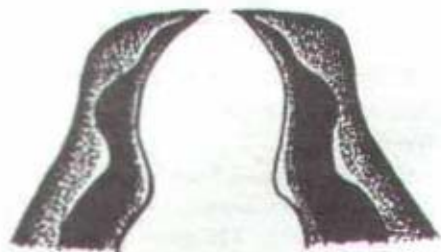
2b

Fig. 2a. *Aeshna suborelica*, male. Accessory genitalia, ventral view.

Fig. 2b. Section x-x, caudal view.



3a



3b

Fig. 3a. *Aeshna juncea*, male. Accessory genitalia, ventral view.

Fig. 3b. Section x-x, caudal view.

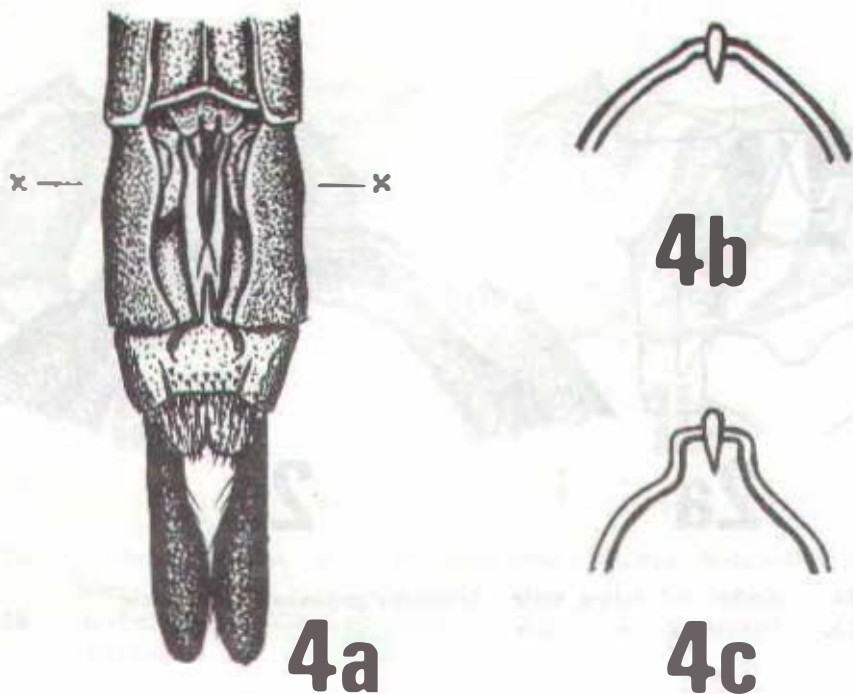


Fig. 4a. *Aeshna subarctica*, female. Genital valves, ventral view.

Fig. 4b. *Aeshna subarctica*, female. Section x-x, caudal view.

Fig. 4c. *Aeshna juncea*, female. Section x-x, caudal view.

The *A. subarctica* material that we have used for this article was taken in Sweden and Finland; the *A. juncea* material examined included specimens taken in Britain, Fennoscandia, Austria, Germany (Bavaria) and Switzerland.

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Words that are to appear in italics (e.g. names of genera and species, though not of families) should be underlined.

Use of these terms is acceptable: 'exuvia' for cast skin (plural 'exuviae'); 'larva' (instead of 'nymph' or 'nymph'); 'prolarva' to designate the first larval instar.

References cited in the text should be in the form '(Longfield, 1949)' or '... as noted by Longfield (1949)'. All references cited in the text (and only these) should be listed alphabetically at the end of the article in this form:

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CONTENTS

PEERS, M., The dragonflies of mid-Powys.....	95
PHILPOTT, A. J., A large emergence of <i>Anax imperator</i>	98
DUNN, R. H., Some observations of <i>Aeshna cyanea</i> (Müller) ovipositing in unusual substrates.	99
GABB, R., <i>Aeshna caerulea</i> (Sjörm.) breeding at Bienn Fiehe N.N.R.	101
MARREN, P., A note on the discovery of <i>Coenagrion hastulatum</i> (Charp.) in Britain	103
MERRITT, R., The incidence of <i>Hemianax ephippiger</i> (Burmeister) in Britain and Ireland	105
DUNN, R. H. and VICK, G. S., Separating adult <i>Aeshna subarctica</i> (Wlk) from <i>Aeshna juncea</i> (L.)	106