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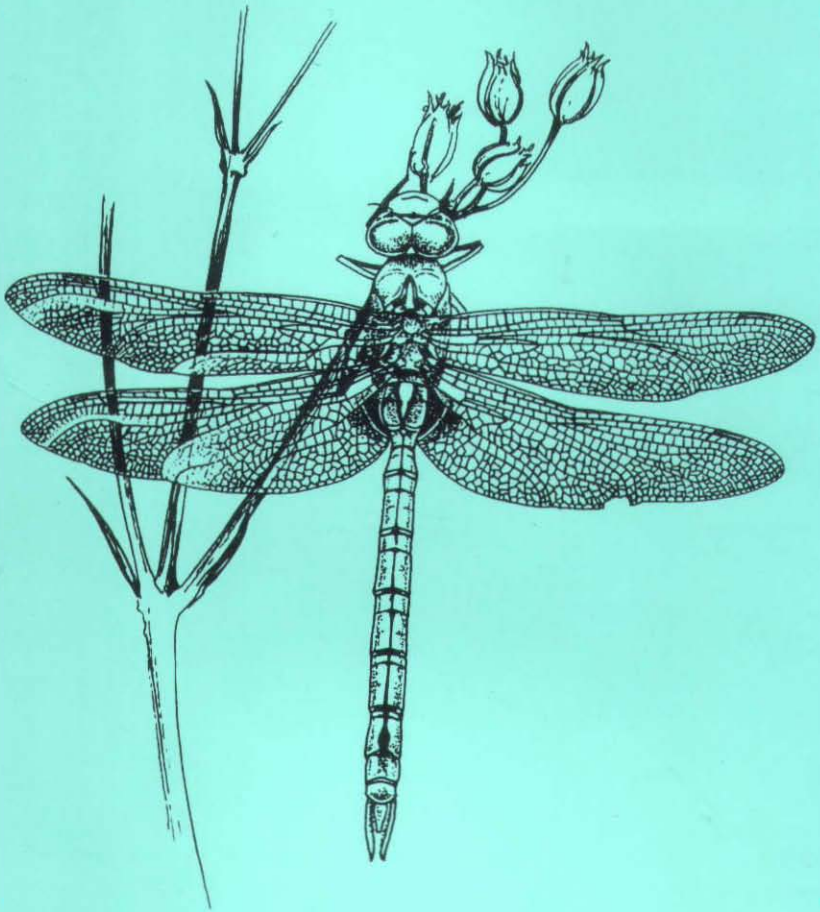

Editor: D. Tagg

member of the Societas Internationalis Odonatologica

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ADDRESSES

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Front Cover illustration: ANACIAESCHNA ISOSCELES by Ray Andrews.

Review of a method to monitor adult dragonfly populations

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Introduction

Jenkins (1986) surveyed an adult population of *Coenagrion mercuriale* using a modification of the Pollard Walk methodology that was originally developed for monitoring adult butterfly populations (Pollard *et al.*, 1975; 1977). Moore & Corbet (1990) provide guidelines for monitoring dragonfly populations that incorporate many of the principles employed by Pollard. In this paper I will review the methods used by members of the North of London BDS group to monitor the dragonfly fauna of a river.

In 1986 the Nature Conservancy Council and Lea Valley Parks Authority drew up a management plan that involved the periodic removal of aquatic vegetation from selected parts of the Cornmill Stream & Old River Lea SSSI. Before work began in 1986 I was asked to carry out a baseline survey of the site. Subsequent surveys were carried out to monitor the effects of the management on the dragonfly populations in 1987, 1991 and 1992. The surveys in 1986 and 1987 were carried out by me alone and the site was visited at least once a fortnight throughout the summer. However, in 1991 and 1992 each fortnightly site survey was conducted by a different member of the North of London BDS group. This was to enable the site to be surveyed frequently but without committing anyone person to a demanding schedule.

Site description

Cornmill Stream & Old River Lea SSSI (TU380015) lies immediately north of Waltham Abbey on the border of Essex and Hertfordshire. The site is roughly rectangular, 300m by 900m. The short southern end of the site is bounded by a dual carriageway road, the eastern side by the Cornmill Stream. The western side is demarcated by the Old River Lea and at the northern end is a channel linking the two rivers. The site supports about eighteen species of dragonfly including an important population of white-legged damselfly *(Platycnemis pennipes)* which is currently resident at only two other river systems in the London area (Brooks, 1989). For the purposes of the survey the site was divided into eight sections.

Objectives

In order to obtain comparable results, especially when each survey is to be carried out by a different surveyor, it is essential to standardise the survey methodology as much

as possible. By visiting the site only in optimum conditions for adult dragonfly activity and by each surveyor following the same recording routine many of the variables and possible sources of error can be reduced. The object of the survey is to produce consistent results that will show differences in the numbers of adult dragonflies from one part of the site to another and fluctuations in the population throughout the season and from one year to the next. Therefore it should be possible to monitor the effects that management of the site is having on the dragonfly populations.

Methods

Minimum conditions. The survey is invalid unless the following conditions are met.

1. The survey should not start earlier than 11am or later than 1pm.
2. The air temperature in the shade should be above 17°C.
3. There should be at least 50% sunshine. As each new section is entered the surveyor records whether or not a shadow is cast. Providing at least four out of the eight sections are recorded as sunny the survey is valid.
4. Wind conditions should be light. Leaves and branches moving are acceptable but if trees are bending the wind is too strong.

By following these conditions the survey should coincide with maximum dragonfly activity.

Recording

1. The surveyor is to walk round the site at a continuous slow stroll keeping to the banks of the river at all times.
2. In each section every identifiable specimen is recorded (whether perched or flying), in front and to either side but not behind the surveyor. For the purposes of the survey it does not matter if the same specimen is recorded more than once. The surveyor should not stop and search vegetation but keep walking.
3. In order to survey *Erythromma najas* adequately all floating-leaved vegetation must be examined. Therefore, the surveyor must stop periodically in each section and scan the floating leaves with one 180° sweep of the binoculars. The numbers of all species seen on the leaves is recorded.
4. It is impractical to distinguish *Enallagma cyathigerum* and *Coenagrion puella*, (males or females) from a distance. Consequently, these species are grouped together as "blue coenagrionids". However, if some specimens can be positively identified a note is made of which species is present.
5. The survey is always begun at the start of section 1 and completed sequentially to section 8.

Results and discussion

The survey methods produced remarkably consistent results within each season and from one season to the next, even though different surveyors were monitoring the site. One way of testing the consistency of the results is to compare the total number of

individuals of each species recorded during each survey throughout the year. If the survey is producing meaningful results then it is to be expected that each species will show a single peak in numbers at one period in the summer with a gradual rise in numbers in the early summer and a fall in numbers after the peak. With most species this has proved to be the case in each year of the survey.

Another way of establishing consistency of results is to look at the distribution of adults around the site. Each surveyor would be expected to find a particular species favouring the same part of the site. Again this has proved to be the case with each surveyor recording, for example, *P. pennipes,* consistently peaking at the northern end of the site.

Some problems have been encountered when using this method. Numbers of *Ischnura elegans* and "blue coenagrionids" build up enormously during the summer so that they become difficult to count. This may lead to inaccurate counting and other species being overlooked.

By counting *E. cyathigerum* and *C. puella* together as "blue coenagrionids" data attributable to each individual species is being lost. Drawing conclusions about perceived trends in this grouping is also extremely speculative since they may have dissimilar ecologies. The results obtained from this grouping may be of little value.

The figures produced reveal only the relative numbers of adults present. They do not give an accurate representation of actual numbers of dragonflies present at the site. To do this exuvial counts or mark-recapture methods should be employed.

The methods are best suited to monitor damselflies and perching dragonflies (Libellulidae) rather than hawker dragonflies (Aeshnidae). The number of Aeshnidae encountered at the site was too low to produce meaningful results. Also they moved so freely around the site that the same individual is likely to be counted several times. However, this is a consistent error so should not affect any overall trends.

Certain parts of the river bank were inaccessible due to dense bankside vegetation. This meant that adults on or near the water could not be counted at these points. While this would result in a depression of the overall numbers for that section this would be a consistent error throughout the survey (unless the bankside vegetation were removed at some stage in the monitoring programme) and so would not affect the overall trends.

Conclusions

The modified Pollard Walk described above therefore seems to produce consistent results when monitoring adult dragonfly populations even when the results of different recorders are compared. The methodology is easy to use and is particularly

effective when monitoring relatively sedentary Odonata. The method has been used successfully to monitor an entire Odonata fauna and can be used to reveal the effects that management and natural phenomena have on dragonfly populations. For management purposes an assumption is made that the occurrence of peak numbers of adults at a particular section coincides with an optimum breeding site, but this does not seem unreasonable, especially in view of observed mating behaviour.

The method works well on linear systems (Jenkins, 1991) but has not been tested on ponds or lakes. The counting method does not indicate total numbers of dragonflies but relative numbers and these will be unaffected by most of the potential errors recognised in the methodology. The results indicate that the methodology is robust and can be very effective in monitoring the distribution of dragonflies around a site and indicating long-term trends in their numbers.

Acknowledgements

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A note on the British Dragonfly Society's survey of *Anaciaeschna isosceles* at Castle Marshes, Barnby, Suffolk, 1991-1992

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Introduction:

Anaciaeschna isosceles Müller, the Norfolk Hawker is restricted in Britain to the Broadland region of Norfolk and Suffolk. It is classed as an Endangered Species in the British Red Data Book for Insects and is also protected under the Wildlife and Countryside Act 1981/1985.

A.isosceles are found predominantly in dykes on grazing marshlands, which contain a diverse aquatic community of fauna and flora and which are usually hydrologically separate from polluted rivers and broads (Doarks, 1980, 1984, Driscoll, 1984).

In recent years, it has been observed that *A.isosceles* are only found on grazing marshlands where the aquatic plant Water Soldier *Stratiotes aloides* Linnaeus is present. The plant is usually partially emergent during the summer months and submerged in the winter. It is highly susceptible to pollution (Cook and Urmi-Konig, 1983). A large number of *S.aloides* plants in a dyke system will indicate good water quality and a site for a rich aquatic macrofauna (Higler, 1975), ideal for the existence of diverse and sizeable dragonfly populations.

The project was designed to try and isolate factors affecting the distribution and abundance of *A.isosceles* within a single study site, using results from two British Dragonfly Society (BDS) surveys and from measurements of various chemical and physical parameters made by one of the authors (OJL).

Methods:

20 visits were made to Castle Marshes on the following days in 1991:- 27, 28, 30 May; 6, 8, 9, 10, 11, 12, 13, 15, 16, 18, 19, 22, 24, 27, 28, 29 June and 2 July. While in 1992, 9 visits were made to the site on the following dates:- 4, 6, 9, 12, 15, 19, 23, 26 and 30 June.

A.isosceles exuviae were searched for on all the 51 dykes/dyke sections at the Suffolk Wildlife Trust (SWT) reserve at Castle Marshes, Barnby near Lowestoft. By systematically examining the acquatic vegetation along the edges and the middle of the dykes every 3/4 days, a constancy in the results was achieved.

The position of each exuviae was plotted on a large scale map. The species of the plant on which each exuviae was found, the orientation and the height of the exuviae above the water were recorded on a standard proforma.

Individual sumberged and floating *S.aloides* plants were counted along all the dykes or dyke sections. Plant counting was made possible by the characteristic individual rosette form of the species.

The following physical and chemical parameters of each dyke were measured: dyke depth, pH, ammonium and chloride concentration.

Results:

21 of the 51 dykes and dyke sections held *S.aloides* plants to a varying degree of abundance (see Figure 1).

Exuviae of *A.isosceles* were found in 9 dykes and dyke sections with *S.aloides*. None were found in dykes without *S.aloides*. In 1991, 326 exuviae were found in 7 dykes and dyke sections during a six week period. The number of exuviae per dyke varied from 4 to 184. In 1992, 215 exuviae were found in 5 dykes and dyke sections during a five week period. The number of exuviae varied from 1 to 184. The localities of the exuviae are shown in Figure 1.

Figure 1 shows that *A.isosceles* exuviae were confined to dykes with a high density of *S.aloides*. All the exuviae were found within 1 metre of a *S.aloides* plant. In 1991 78% of exuviae were found attached to *S.aloides,* in 1992 71%. 9% were attached to *Glyceria maxima* in 1991/1992 and 7% to *Juncus effusus*. In 1992 11% were attached to *Iris pseudacorus*. The average height of the exuviae was 10.8 cm above waterlevel. The differences between males and females on different plant species and different heights were not significant. 53% of the exuviae were in the middle of the dykes, mainly on *S.aloides,* 47% were on the edge of dykes and on a wider range of plant species. There were slightly more (30%) on the south sides of dykes than on the north, east and west sides. There was no significant difference between sexes.

In 1991 the first exuviae was found on 8 June, 77 exuviae were found on 11 June, 47 and 31 on 22 and 27 June respectively. In 1992, 86 exuviae were found on the first visit to the site on 4 June. 73 were found on 6 June, 35 on 12 June and no more than 6 per visit during the period after the 23 June.

In 1991, 190 of the exuviae were males and 133 were females. In 1992 197 were males and 103 were females.

Most adult male and female *A. isosceles* were observed on dykes with abundant *S. aloides,* but members of both sexes were also seen flying over dykes with a low density

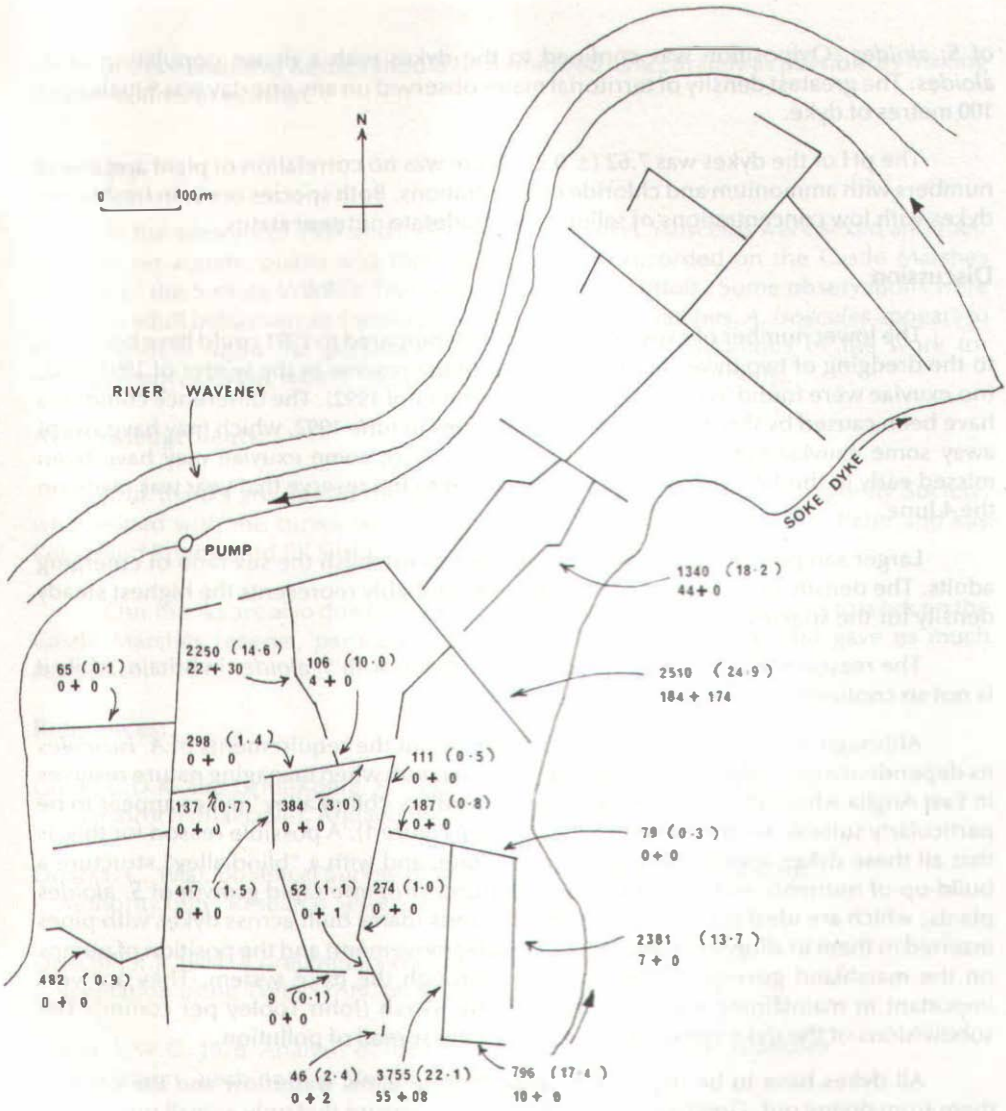

Figure 1). Distribution of *S. aloides* and exuviae of *A. isosceles* at Castle Marsh Reserve 1991-92. For each dyke section indicated, the upper figure shows the numberof *S. aloides* plants (number per metre), the lower figure the number of exuviae of *A. isosceles* found in 1991 + those found in 1992. No *S. aloides* or *A. isosceles* exuviae were found in the other ditches shown.

of *S. aloides*. Oviposition was confined to the dykes with a dense population of *S. aloides*. The greatest density of territorial males observed on anyone day was 9 males per 100 metres of dyke.

The pH of the dykes was 7.62 (± 0.2). There was no correlation of plant and insect numbers with ammonium and chloride concentrations. Both species occur in freshwater dykes with low concentrations of salinity and moderate nutrient status.

Discussion

The lower number of exuviae found in 1992 compared to 1991 could have been due to the dredging of two dykes in the south east of the reserve in the winter of 1991/1992, (no exuviae were found in these dykes in the summer of 1992). The difference could also have been caused by the frequent heavy rainstorms in June 1992, which may have swept away some exuviae before they could be found. Also, some exuviae may have been missed early in the 1992 season, since the first visit to the reserve that year was made on the 4 June.

Larger samples of exuviae will be required to establish the sex ratio of emerging adults. The density of 9 males per 100 m of dyke, probably represents the highest steady density for the species.

The reason why *A. isosceles* is confined to dykes with *S. aloides* in Britain, while it is not so confined on the continent is unknown.

Although much remains to be discovered about the requirements of *A. isosceles* its dependence on *S. aloides* must be taken in to account when managing nature reserves in East Anglia where the two species occur. Subsidiary "blind alley" dykes appear to be particularly suitable for both plant and insect (see Figure 1). A possible reason for this, is that all these dykes appear to have a low flow rate, and with a "blind alley" structure a build-up of nutrients and high water temperatures promote rapid growth of *S. aloides* plants, which are ideal for *A. isosceles*. Earth bunds (dams built across dykes with pipes inserted in them to allow a certain degree of water movement) and the position of pumps on the marshland govern the flow of water through the dyke system. They are very important in maintaining water quality at Castle Marsh (John Tooley per comm). The subdivisions of the dyke system help to control the spread of pollution.

All dykes have to be dredged at some time to allow waterflow and the prevent them from drying out. Great care should be taken to ensure that only a small proportion of dykes with abundant *S. aloides* are dredged in anyone year. Colonisation by *S. aloides* and hence *A. isosceles* may be quite slow, especially if interconnecting dykes are dredged in the same operation. To discover whether the process can be accelerated 25 *S. aloides* plants were put in two dykes following their dredging in 1991/92. Recolonisation by *A. isosceles* in these dykes will be observed in subsequent years. Whether or not this trial is successful, a carefully planned system of dredging should be instituted to facilitate natural recolonisation by the plant and insect from neighbouring

dykes or dyke sections. Results should be monitored as accurately as possible by making regular counts of exuviae.

Summary

In the seasons of 1991 and 1992, 541 exuviae of *A. isosceles* were sexed and their position on aquatic plants and their localities were recorded on the Castle Marshes reserve of the Suffolk Wildlife Trust (SWT) at Barnby, Suffolk. Some observations were made on adult behaviour and water chemistry. At Castle Marshes, *A. isosceles* appears to be dependent upon the presence of *S. aloides*. The implications of the work for management of dykes with *A. isosceles* in them are discussed briefly.

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Our thanks are due to the following members of the British Dragonfly Society, who helped with the survey work, John and Gill Brook, Geoff Hooton, Peter and Kay Reeve and Ronnie and Jill Silsby.

Our thanks are also due to the Suffolk Wildlife Trust for enabling us to work on the Castle Marshes reserve, particularly to the Warden John Tooley who gave us much assistance.

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Crepuscular flight in *Aeshna mixta* Latr. (Anisoptera: Aeshnidae)

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Introduction

The diel rhythm of flight in *A. mixta* is little known. Studying the behaviour of maturing specimens BROWNETT (1962) found that feeding flight occurred significantly more often during afternoon and evening than in the morning. The latest evening record was after sunset. This fact seems to be surprising because the species is well known to use the latest sunlight (e.g. ROBERT, 1958), but not the twilight period. In this respect, PETERS (1987) did not consider *A. mixta* a crepuscular flyer.

In the province Tarragona, S-Catalonia, NE-Spain, the author investigated crepuscular activities in *Anax imperator* Leach. At the same time informative oberservations were also made on *A. mixta,* and these are reported here.

Observations

At a pond on the golf course near Montroig-del-Camp *A. mixta* was recorded patrolling in small numbers during sunlight on 1st October 1992. After sunset one male was seen in continuous patrol flight over water for at least a quarter of an hour ($18.^{15}$ - $18.^{30}$h, about 20.5°C, 1000-100 lx; local sunset at $18.^{09}$ h). It remained unclear when this male disappeared from the water, because with increasing darkness it became impossible to separate it from the *Anax* specimens present.

Next morning the earliest male arrived at the water before sunrise ($6.^{51}$ h, 16.1°C, 70 lx; local sunrise at $7.^{05}$ h). The earliest tandem formation occurred at $7.^{27}$ h (16.3°C, 2000 lx). Continuous patrol flight took place until observations ceased at $9.^{30}$h.

On 20th October 1992, just after sunset ($18.^{04}$ h; local sunset at $18.^{02}$ h) a male was observed feeding on mosquitoes near a pond by a gravel pit,north of Cambrills. At $18.^{05}$ h he interrupted his feeding flight, started typical patrol flight at the water for about one minute, and then continued feeding in the surroundings of the pond.

Discussion

The phenomenon of crepuscular flight in European dragonflies has been known since at least the late nineteenth Century (early review with mention of *Boyeria irene* (Fonsc.), *Aeshna grandis* (L), *A. juncea* (L.), *A. viridis* Eversm., *Anax imperator* Leach, and *Somatochlora metallica* (Vander L.) in WESENBERG-LUND, 1913; CORBET, 1962). In later years the list of crepuscular dragonflies was extended with other species, particularly

Anax parthenope (Sel.) (BILEK, 1964; JURZITZA, 1964) and *Aeshna subarctica elisabethae* Djak. (SCHMIDT, 1964).

The fact that *A. mixta* is also among these species, is a recent finding. STARK (1980) reported feeding flights of *A. mixta* during dusk. OTT (1989) and BROWNETT (1992) also mentioned continuous feeding extending to twilight after sunset. These observations resemble the reports of crepuscular feeding in other aeshnid dragonflies as mentioned above, but crepuscular feeding swarms that can particularly be seen in *A. parthenope*, in *A. mixta* are only reported from northern Africa (DUMONT, 1972).

The Spanish results have shown that crepuscular flight activities can reflect feeding as well as sexual appetence. The latter is also confirmed by OTT (1987, 1989) who documented patrol flight and tandem formation during twilight after sunset.

Copulation and oviposition apparently can be started early in the morning when other species are not yet on the wing (ROBERT, 1958; OTT, 1987). MILLER and MILLER (1985) reported the species being already active near sunrise.

Summarizing all these recordings of twilight flight, there are sufficient facts to consider *A. mixta* a species with maximum duration of diel flight activity. Because flight occurs during both twilight periods, *A. mixta* can be regarded as an eocrepuscular species (sensu CORBET, 1962). It is noteworthy that in this species twilight flight can seamlessly turn into diurnal flight (and vice versa). That is in contrast with *Anax imperator*. This species shows - during the adult stage - distinct temporal gaps between crepuscular and diurnal patrol flight, in which it is absent from the water (CORBET, 1957; JöDICKE, in prep.). Further investigations are needed to understand the conditions for twilight flight and its role in sexual activity on the one hand and feeding activity on the other.

Acknowledgements

Thanks to Betty Smith and Philip Corbet for helpful comments on the manuscript.

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Variations of the blue markings on segments 7, 8 & 9 in *Ischnura Elegans*

A 

A. Mature male. Rosewarne Mill, Camborne, Cornwall
May 22 1991

B 

B. Mature male. Rosecroggan Pool, Camborne
June 12 1992

C 

C & D. Female *F. Violacea.* Bissoe, Cornwall
Trust for Nature conservation. July 19. 1992

D 

Steven Jones
Hyfield, Chapel Hill, Brea, Camborne, Cornwall

MALADAPTIVE GUARDING IN THE COMMON BLUE DAMSELFLY *(ENALLAGMA CYATHIGERUM)*

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Females of the Common Blue damselfly, *Enallagma cyathigerum* (Charpentier), normally oviposit under water on submerged vegetation. Males usually guard the region of their female's descent by hovering nearby, but they do so only briefly probably because a rival male is able to seize an ovipositing female only when she is at or close to the surface. Males thus benefit from submerged oviposition in that they are freed from the prolonged periods of contact tandem guarding which characterise the oviposition of many other coenagrionids. They may thus have more time for encountering further females. After oviposition females return to the surface where many are rescued by males and are taken to the bank in tandem. Males are rewarded if the females accept copulation (Miller, 1990; see also Fincke, 1986).

On a hot day in July, 1992, I watched a female Common Blue float up to the water surface where she lay struggling, 20 m from the bank of a gravel pit near Oxford. She had been ovipositing under water amid deep stands of *Elodea* and *Potamogeton* and now she lay helpless, trapped in the meniscus. Several males attepted to rescue her by grasping her with their legs and forming a tandem but each abandoned her after only a few seconds. The reason for their failure was soon apparent: the posterior 5 abdominal segments of a male were firmly clamped by the claspers to her pronotum (Fig. 1). No male is normally able to dislodge the claspers of another so the female could not be rescued.

She was however able to raise and beat her forewings, thereby slowly propelling herself towards the bank, dragging her outspread hind wings and body through the water. She progressed at about 5 cm sec-1 along the surface like a slow hovercraft or hydrofoil, and as she did so further males attempted unsuccessfully to seize her. After 10 mins she reached the bank where she climbed out on a reed, and some time afterwards the male's abdominal segments dropped off. She was lucky to survive since I had seen many other females seized by small pike *(Esox lucius)* under water or at the surface.

During submerged oviposition, a female's forewings remain dry because they are shielded between the hindwings: this enables them to be used for propulsion after re-surfacing. In the American species *Enallagma hageni* Fincke (1986) found the 81% of females can fly off from the surface immediately after submerged oviposition. However, I have found only about 2% of female *E. cyathigerum* are able to do this (Miller, 1990), but the reason for the difference is not clear.

Dissection showed that the female I had watched had no egg in her lateral oviducts. She had therefore probably completed oviposition successfully before surfacing. Perhaps her guarding male had been snapped at by a small pike as they both

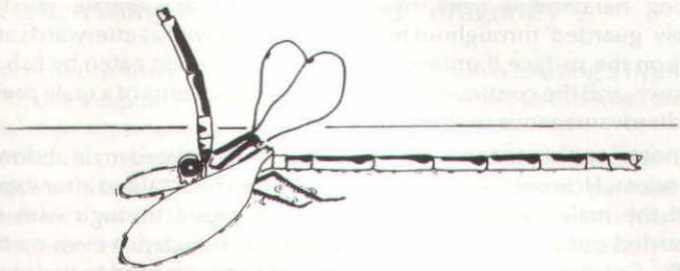

Fig. 1. A female Common Blue Damselfly at the water surface after oviposition. She carries the terminal segments of a male clamped to her pronotum.

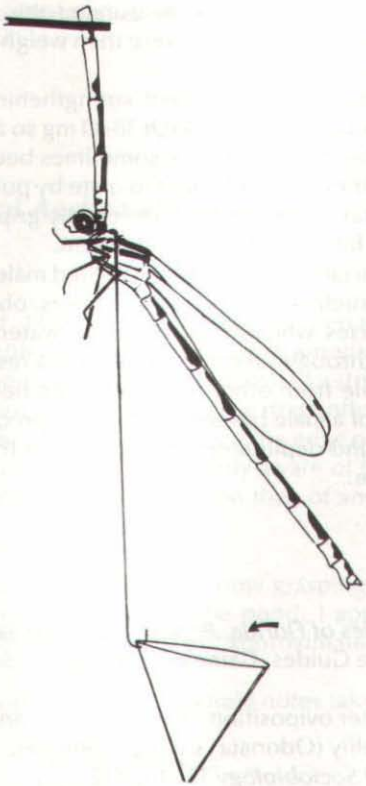

Fig. 2. Method of measuring the strength of the tandem clasp. Sand is poured into a small bucket attached to the female until the weight is just sufficient to pull the female from the male's grip.

descended below the surface; the male sometimes submerges with the female when there is strong harassment from rival males. If so the female must have been inappropriately 'guarded' throughout her oviposition as well as afterwards at the surface. Many females on the surface,if unrescued, are probably soon eaten by fish while others eventually drown,and the continued 'guarding' by the remains of a male prevents rescue and must be disadvantageous to the female.

I have not been able to force an intact male, or an isolated male abdomen, to grasp a female in tandem. However the tandem clasp is often maintained after capture of a pair in a net, and the male's abdomen can then be snipped through with scissors - an operation I carried out a few times with considerable reluctance even on the *Common* Blue Damselfly. Cut abdomens remained alive and firmly clasped to their females for up to 4 hours, and in one case over night when kept in the 'fridge at 4°C. By holding the male abdomen, attaching a tiny aluminium foil bucket to the female and slowly filling it with sand until the pair was just pulled apart, a measure of the strength of clasping was obtained (Fig. 2) The sand, bucket and female were then weighed giving a mean value of 2.096 g (n=6) with a maximum of 4.82 g.

An interesting outcome was the apparent strengthening of the tandem grip in response to pulling on the female. Females weigh 30-40 mg so a male could theoretically support several females. Males in tandem have sometimes been seen to try to dislodge their perched females when they were reluctant to mate by pulling on them, alternately flying up and biting at their tarsi. The claspers can clearly grip tightly as is also evident when rival males jostle a pair but fail to break the tandem.

The maintenance of the tandem clasp by an isolated male abdomen has been seen in other species of damselfly such as *Ischnura elegans* (pers. obs.) and *Argia apicalis* (Fig. 65 in Dunkle, 1990). In species which oviposit above water and in which the male normally remains in tandem throughout oviposition, such a response is adaptive since it continues to shield the female from other males allowing her to oviposit unmolested even when the anterior part of a male has been eaten by a predator. However in species which oviposit under water and depend on other males for their rescue, the response may be said to be maladaptive.

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Fincke, O.M. 1986. Underwater oviposition, male vigilance, and female multiple mating in a damselfly (Odonata: Coenagrionidae). *Behavioural and Ecological Sociobiology* 18: 405-412.

Miller, P.L. 1990 The rescue service provided by Male *Enallagma cyathigerum* (Charpentier) for females after oviposition. *Journal of the British Dragonfly Society* 6: 8-14.

A final thought on distinguishing between Odonata and Anisoptera when using the English word "dragonfly".

In the previous Journal I suggested, as an alternative to using a hyphen, it would be preferable to use a capital D when referring to Dragonflies as Odonata and lower case for dragonflies as anisopterans - and I asked for feedback.

Bastiaan Kiauta suggested using "true dragonflies" for anisopterans. On occasions I feel this could be clumsy - he would like the matter discussed, perhaps at Osaka in August. Graham Vick, while in agreement with losing the hyphen, was less happy about the D/d distinction. He pointed out, correctly, that it led illogically to an order Dragonflies with a capital and other orders (beetles, bugs, butterflies, etc.) without. Charles Bennett (also against hyphens) suggested that the upper and lower cases should be used in reverse. This simple solution appeals to me and I would like to see anisopterans referred to as Dragonflies and odonates as a whole as dragonflies.

Jill Silsby

A probable sighting of *Aeshna affinis* in Avon.

J. D. Holmes.

On the 14th August, 1992, I visited a small pond on the outskirts of north Bristol, Avon. The weather was settled, with sun and a small amount of cloud cover.
At about 1.15 p.m. my attention was suddenly drawn to a strikingly bright blue dragonfly, approximately the same size as *Aeshna mixta*. The dragonfly was hawking backwards and forwards about two feet above the ground along the edge of a small section of the pond. As the insect flew towards me, I was particularly aware of the exceptionally bright blue eyes which were of a more intense colouration than of any individual I had previously observed.

After a short period of flight, the dragonfly, now grasping a small item of insect prey, settled on low vegetation by the edge of the pond. I approached it and for about a minute, I observed it at rest from a distance of approximately two feet.

The following description is based on field notes taken at the time.

Eyes:	very bright blue.
Frons:	blue-green.
Thorax:	brown with two narrow greenish marks on the dorsal surface at the front, and with pale greenish yellow stripes along the side.

Abdomen: very bright blue markings along the main length. A backwardly dissected, central, bright blue spear shaped marking prominent on the second abdominal segment.

Unfortunately, I was visiting the pond during my lunch break and had no camera with me. The second visit made the next day was unsuccessful in rediscovering the insect.

I have had many years experience of observing dragonflies in this country and am very familiar with the appearance of *Aeshna mixta*. There is no doubt whatsoever in my mind that this individual was not a male *Aeshna mixta*. In my opinion, the only possible dragonfly which fits the specimen I observed is the male of *Aeshna affinis*.

The illustrations on page 90 of "The Dragonflies of Europe" (Askew 1988), accurately reflect the impression I had of the very bright blue nature of this dragonfly, and of the contrast with the much more subdued and less extensive blue colouring of *Aeshna mixta* males, the latter of which I have observed at close quarters on many occasions.

The only previous record of *Aeshna affinis* for Britain which I've been able to discover is of one male taken on August 5th 1952 on Romney Marsh, Kent. (Corbet, Longfield and Moore 1960).
It would be very interesting to know of any other historical records for this species in Britain, or indeed of any other sightings of this or other migrant dragonflies during the summer of 1992.

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Askew, R.R., 1988. The Dragonflies of Europe. Harley Books, Colchester.

Corbet, P.S., Longfield, C., and Moore, N.W., 1960, 1985. Dragonflies. New Naturalist Series. Collins, London.

Notes and Observations

Compiled by **Alan Paine**
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My thanks to everybody who has sent in their observations. It would appear 1992 was a good year for the Red-vained Darter *(Sympetrum fonscolombei)*, but despite the huge butterfly migration during July no dragonflies were reported as being involved. A number of first and last dates were received, and a summary of some of these appears later; the more we get the more we can keep track of any flight period changes. Just for once no mixed pairings were reported.

All records refer to 1992 unless stated otherwise. It has been pleasing to receive a few older records. These are just as valuable as recent records, as it helps to build up a more comprehensive picture of our odonata; any older records will always be very welcome. It would also be interesting to know if any of the events reported for British odonata occur in other countries.

For the next issue could all contributions reach me by July 10th please. Many thanks.

BEHAVIOUR

On July 28th a pair of Broad-bodied Chasers *(Libellula depressa)* were noted mating close to the surface of a small pond on Esher Common, Surrey. After mating the female immediately began ovipositing, with the male flying above her. He went for her again, but she avoided him and flew off with him in pursuit. They then reappeared flying slowly in a straight line across the pond, with the male flying close beside and slightly behind the female. They turned and flew back along exactly the same path. Four such identical passes were made. (L)

Could this be a form of courtship/bond pairing behaviour ?? - Sub-Ed.

On 15th August at Little Bradley Pond, Bovey Tracey, Devon, a male Common Darter *(Sympetrum striolatum)* was seen to alight coupled to a very dead female which had a shrivelled abdomen; it was considered the male was unable to uncouple himself. (E)

On 29th August a female Ruddy Darter *(Sympetrum sanguineum)* was noted sunning herself on a shed roof in Trimley St. Mary, Suffolk, mid-afternoon. It then flew onto a tree, and it was still there at 22:00. After a night of very strong winds and continuous heavy rain, it was found to be still present the next morning; it was checked several times during the day and after dark and was still there at 23:05. The following morning (31st) it was still present, but its positional angle had slightly changed. It was noted on three occasions, but it had flown off by 10:25 and was not seen again. (I)

How long can a dragonfly go without food ?? - Sub-Ed.

On 26th May 1990 many New Forest streams contained very little water. Dockens Water, normally a fast flowing brook was merely a series of pools with trickles in between, and Downy Emeralds *(Cordulia aenea)* were seen ovipositing in one of the pools. This species would not be seen when the streams are flowing normally. (A)

ODONATA AS PREY .....

On October 10th at Thursley Common, a pair of Common Darters *(Sympetrum striolatum)* ovipositing in a bog pool suddenly became a struggling mass on the waters' surface. The female immediately released and flew off, and it was found that the male had been caught by a Raft Spider *(Dolomedes fimbratus)*. The Darter ceased struggling within a minute the *Dolomedes* then spun an anchor thread to a pond weed and returned to the Darter's thorax, no doubt intent on devouring it. During a brief search another *Dolomedes* was found with a carcass of a male Black Darter *(Sympetrum danae)*. (M)

On May 24th 1991, during a "mass synchronised" emergence of Blue-tailed Damselflies *(Ischnura elegans)* and Azure Damselflies *(Coenagrion puella)* along the Basingstoke Canal near Pirbright camp, a partially-emerged *puella* was attacked by a Wood Ant, hauled from its exuvia, and carried off. All this happened on an emergent *Juncus* stem about three feet from the bank, so the Wood Ant could not get far!! (M)

.....AS PREDATORS.....

On 26th June at Spruce Hill SSSI near Crawley, Sussex, an Emperor *(Anax imperator)* caught and killed a White Admiral butterfly, apparently dropping part of the insect in long grass. (F)

On 27th June a male Black-tailed Skimmer *(Orthetrum cancellatum)* was seen at Wicken Fen, Cambridgeshire, carrying a *Bombus lapidarius* (Red-tailed Humble-bee). (I)

On 31st July a Brown Hawker *(Aeshna grandis)* was patrolling a path down to a pool at the Saltwells LNR, when it was attacked by a Comma butterfly, whose territory this presumably was. The Aeshna was driven off, but the performance was repeated again. This time the Comma was caught and held, and then eaten by the Aeshna. (D)

..... AND AS BOTH!!

On July 14th at Cors Fochno NNR, Dyfed, a male Blue-tailed Damselfly *(Ischnura elegans)* was seen clasping a male Small Red Damselfly *(Ceriagrion tenellum)* as it might do if mating. Closer inspection showed that the *Ischnura)* was actually biting at the posterior margin of the *Ceriagrion's* thorax. After about five minutes a wing dropped off the struggling *Ceriagrion*, and the *Ischnura* continued to gnaw at the exterior end of the abdomen. On returning to the spot about twenty minutes later the *Ischnura* had gone and the *Ceriagrion* was still alive but apparently doomed, with two wings missing and the abdomen shrivelled to less than half its original size. (B)

On June 18th 1984 along the R. Thames near Goring a female Club-tailed Dragonfly *(Gomphus vulgatissimus)* was seen perched on a Hawthorn branch. It was astride and consuming a female Banded Demoiselle *(Calopteryx splendens)*. (A)

EXPANSION/MIGRATION etc

On May 27th an immature male Hairy Hawker *(Brachytron pratense)* was seen at Alvecote Pools NR, "the first Warwickshire record for over 50 years, the previous report being in the Rugby area during the 1930s". (H)

On May 26th a Club-tailed Dragonfly *(Gomphus vulgatissimus)* was photographed at Llanymnech Rocks, near Pant, Shropshire, possibly a new record for this site. (H)

On June 19th along the R. Avon at Keynsham, Bristol, 6 Scarce Chasers *(Libellula fulva)* were caught. The following day, walking along the R.Avon east from Keynsham 58 were seen (including 7 mating pairs). The observer was later told that another person had seen over 50 on a different stretch of the river, which gives a total of at least 100 along the R.Avon between Keynsham and Swineford. A single individual was seen about a mile away on the R.Chew in late June. Apparently this species was present along the Avon in 1991 and also at Bradford-on-Avon, Wiltshire, also in 1991. (K)

On June 20th a male Ruddy Darter *(Sympetrum sanguineum)* was seen at Croft Pascoe Pool, Goonhilly Downs. It was almost certainly a migrant, as the nearest breeding colony reported as being 25 miles to the north. Additionally, to add to the migrant theory, there were 4 male Red-veined Darters *(Sympetrum fonscolombei)* also present. (G)

Regarding this latter species, we have had report from Cornwall of 2 in May and at least 6 in June; from Devon, 1 in May and 3 in June; from East Anglia, 2 in August; and of a possible 1 in Avon in June.

(C,E,G,I,O)

FIRST DATES

White-legged Damselfly *(Platycnemis pennipes)*	June 13	Gunnislake, Cornwall.	(O)
Red-eyed Damselfly *(Erythromma najas)*	May 17	Alvecote Pools NR.	(H)
Emerald Damselfly *(Lestes sponsa)*	May 22	Wicken Fen.	(I)
	June 19	Alvecote Pools NR.	(H)
Brown Hawker *Aeshna grandis*	June 11	Alvecote Pools NR.	(H)
Migrant Hawker *(Aeshna mixta)*	July 18	WelneyWWT.	(I)
	July 23	Alvecote Pools NR.	(H)
Ruddy Darter *(Sympetrum sanguineum)*	June 27	Wicken Fen.	(I)
	June 27	WelneyWWT.	(I)
	June 28	Alvecote Pools NR.	(H)
Common Darter *(Sympetrum striolatum)*	June 14	Alvecote Pools NR.	(H)

LAST DATES

First, some additional ones for 1991:

Banded Demoiselle *(Calopteryx splendens)*	Sept 1	Alvecote Pools NR.	(H)
Emerald Damselfly *(Lestes sponsa)*	Sept 1	Alvecote Pools NR.	(H)
Red-eyed Damselfly *(Erythromma najas)*	Sept3	Alvecote Pools NR	(H)
Azure Damselfly *(Coenagrion puella)*	Sept 19	Alvecote Pools NR.	(H)
Broad-bodied Chaser *(Libellula depressa)*	SeptS	Camel Trail, Wadebridge	(G)
Ruddy Darter *(Sympetrum sanguineum)*	Sept22	Alvecote Pools NR.	(H)

Now for some 1992 dates:

Emerald Damselfly *(Lestes sponsa)*	Sept 16	Alvecote Pools NR	(H)
	Sept27	Waldegrave Pool, Priddy, Somerset.	(K)
	Sept27	Spruce Hill SSSI, Nr. Crawley	(F)
Red-eyed Damselfly *(Erythromma najas)*	Sept27	Spruce Hill SSSI	(F)
Common Blue Damselfly *(Enallagma cyathigerum)*	Sept27	St. John, Cornwall	(O)
Common Hawker *(Aeshna juncea)*	Oct15	Tresco, Isles of Scilly	(O)
Emperor *(Anax Imperator)*	Sept 19	St. John, Cornwall	(O)
Broad-bodied Chaser *(Libellula depressa)*	Sept 11	Steviock, Cornwall	(O)
Black Darter *(Sympetrum danae)*	Sept27	Spruce Hill SSSI	(F)
	Oct4	Davidstow Airfield, Cornwall	(K)
Ruddy Darter *(Sympetrum sanguineum)*	Oct 17	Welney WWT	(I)
Common Darter *(Sympetrum striolatum)*	Oct 18	Polbathie, Cornwall	(O)
	Nov3	Warsash, Southampton	(J)
	Nov7	Dunwich, Suffolk	(I)
	Nov24	Esher Common, Surrey	(N)

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BOOK REVIEW

Dragonflies of the Bristol region. Simon Randolph. City of Bristol Museums and Art Gallery. 86 pp., illustrations and maps. £4.95 (pb). (Available from the author at 2 Burghley Road, St. Andrews, Bristol).

It is encouraging to see the rate at which these local dragonfly guides are appearing. This new one covers a wider area than might be expected from its title as it takes in not only Avon but south Gloucestershire and eastern Somerset as well. This being so, it takes in a widely varied area of country from streams and ponds in limestone areas to upland heaths and acidic boggy lowland.

It is this latter habitat in the much threatened Somerset Levels that will probably be the best known area to most readers of this guide which tells us that no less than 350 square kilometres of the Levels lie within the area covered. This variety means that the region has 25 breeding species, though one of these was very much a 'stop press' addition to the book.

This late addition helps to emphasise the value of these local guides. It is *Cordulegaster boltonii* which I would have assumed would be found in several places in the region. Not so, and the book also illustrates the rarity of *Cordulia aenea* with just two widely separated sites known and the scarcity of Aeshna juncea. By contrast, some local species such as *Brachytron pratense* and *Coenagrion pulchellum* are well represented in the area.

The book gives a good local map for each species, covering a full page with kilometre square records, and in some species the national map is inset alongside. Maps are quite a strong point of this guide in fact as three more full page area maps are reproduced to clarify various aspects of topography etc. There is no attempt to be a species guide, except for separating the two Coenagrions and this is quite reasonable I feel in a guide of this type. One can in fact identify 21 species (just!) from the drawings. These excellent drawings are by Brian Edwards as is the whole design of the book and he has done an excellent job of giving it a lively and attractive appearance.

Criticisms are few and minor. It is a pity that *Libellula* is prominently mis-spelt in two of the three species (an errata slip is included). I would not say that dull purplish-brown was a good description of the wing colour of female *Calopteryx virgo* and a slip has occurred in the statement that the area covered is the south and western limit of Coenagrion pulchellum when the national map alongside shows it to reach Devon and Cornwall. A mention of *Ishnura pumilio* to alert readers to its possible occurrence, as it is found just across the River Severn in the Forest of Dean, might have been a useful idea.

These are minor quibbles though and do not detract from an excellently presented guide which gives an insight into the great amount of field work that has gone into preparing it. The price is very reasonable too.

D. Tagg

Recent odonatological publications

Andries, J.C., Belemtougri, G. & Tramu, G. 1991. Multiple peptide immunoreactivities in the nervous system of Aeshna cyanea. Histochemistry96 (2) : 139-148.

Anholt, B.R. 1991. Measuring selection on a population of damselflies with a manipulated phenotype. Evolution 45 (5) : 1091-1106.

Buchwald, R. 1991. Libellenfauna and Vegetation. Bech. Verh. Ges. Ökol. 2 : 45-62.

Cham, S.A. 1991. Dragonflies (Odonata), Report of the Recorder. Bedfordshire Naturalist 45 : 71-74.

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Conrad, K.F. & Pritchard, G. 1992. An ecological classification of odonate mating systems. J. Linn. Soc. 45 : 255-269.

Michiels, M.K. 1992. Consequences and adaptive significance of variation in copulation duration in Sympetrum danae. Behav.Ecol.Sociobiol. 29 (6) : 429-433.

Moore. N.W. 1991. Suggestions on the possible improvements of the Warwickshire nature reserves for dragonflies. Warwickshire Wildlife 78 : 15.

Reeve, P. 1991. Dragonfly expert visits. Warwickshire Wildlife 78 : 15.

Rehfeldt, G. 1992. Impact of predation by spiders on a territorial damselfly. Oecologia 89 : 550-556.

Thompson, D.J. 1991. Size based dispersal prior to breeding in a damselfly : conflicting evidence from a natural population. Oecologia 87 : 600-601.

Wooton, R.J. 1992. Functional morphology of insect wings. Annual Rev. Ent. 37 : 113-140.

Van Buskirk, J. 1992. Crowding and cannibalism in the dragonfly Aeshna juncea. Bull. N.Am. Benthol Soc. 9 (1) : 112.

INSTRUCTIONS TO AUTHORS

Authors are asked to study these instructions with care and to prepare their manuscripts accordingly, in order to avoid unnecessary delay in the editing of their manuscripts.

Manuscripts should be typewritten using black ribbon, double-spaced, on one side of the page only and with margins at least 25 mm at the left, top and bottom; text pages should be numbered. Footnotes should be avoided.

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

Use of these terms is acceptable: 'exuviae' for cast skin (plural 'exuviae'); 'larva' (instead of 'naiad' 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:

Hammond, C.O. 1983. *The dragonflies of Great Britain and Ireland*. 2nd edition (revised by R. Merritt). Harley Books, Colchester. 116 pp.
Longfield, C. 1949. The dragonflies of the London area. *The London Naturalist* 28: 90-98.

The titles of journals should be written out in full.

Tables should be typed, each on a separate, unnumbered page.

Legends for illustrations should be typed together in sequence on a single unnumbered page.

Illustrations (figures) should be prepared in black ink, and scaled to allow a reduction of 1.5 to 3 times. Lettering should be neat and uniform.

The legend for each table and illustration should allow its contents to be understood fully without reference to the text. The approximate position of each table and figure should be indicated in the text.

LATIN AND ENGLISH NAMES OF BRITISH ODONATA

ZYGOPTERA	DAMSELFLIES
Calopteryx virgo	Beautiful demoiselle
Calopteryx splendens	Banded demoiselle
Lestes sponsa	Emerald Damselfly
Lestes dryas	Scarce Emerald Damselfly
Platycnemis pennipes	White-legged Damselfly
Pyrrhosoma nymphula	Large Red Damselfly
Erythromma najas	Red-eyed Damselfly
Coenagrion mercuriale	Southern Damselfly
Coenagrion scitulum	Dainty Damselfly
Coenagrion hastulatum	Northern Damselfly
Coenagrion lunulatum	Irish Damselfly
Coenagrion armatum	Norfolk Damselfly
Coenagrion puella	Azure Damselfly
Coenagrion pulchellum	Variable Damselfly
Enallagma cyathigerum	Common Blue Damselfly
Ischnura pumilio	Scarce Blue-tailed Damselfly
Ischnura elegans	Blue-tailed Damselfly
Ceriagrion tenellum	Small Red Damselfly

ANISOPTERA	DRAGONFLIES
Aeshna caerulea	Azure Hawker
Aeshna juncea	Common Hawker
Aeshna mixta	Migrant Hawker
Aeshna cyanea	Southern Hawker
Aeshna grandis	Brown Hawker
Anaciaeschna isosceles	Norfolk Hawker
Anax imperator	Emperor Dragonfly
Hemianax ephippiger	Vagrant Emperor Dragonfly
Brachytron pratense	Hairy Dragonfly
Gomphus vulgatissimus	Club-tailed Dragonfly
Cordulegaster boltonii	Golden-ringed Dragonfly
Cordulia aenea	Downy Emerald
Somatochlora metallica	Brilliant Emerald
Somatochlora arctica	Northern Emerald
Oxygastra curtisii	Orange-spotted Emerald
Libellula quadrimaculata	Four-spotted Chaser
Libellulafulva	Scarce Chaser
Libellula depressa	Broad-bodied Chaser
Orthetrum cancellatum	Black-tailed Skimmer
Orthetrum coerulescens	Keeled Skimmer
Sympetrum striolatum	Common Darter
Sympetrum nigrescens	Highland Darter
Sympetrum fonscolombei	Red-veined Darter
Sympetrum flaveolum	Yellow-winged Darter
Sympetrum sanguineum	Ruddy Darter
Sympetrum danae	Black Darter
Leucorrhinia dubia	White-faced dragonfly

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