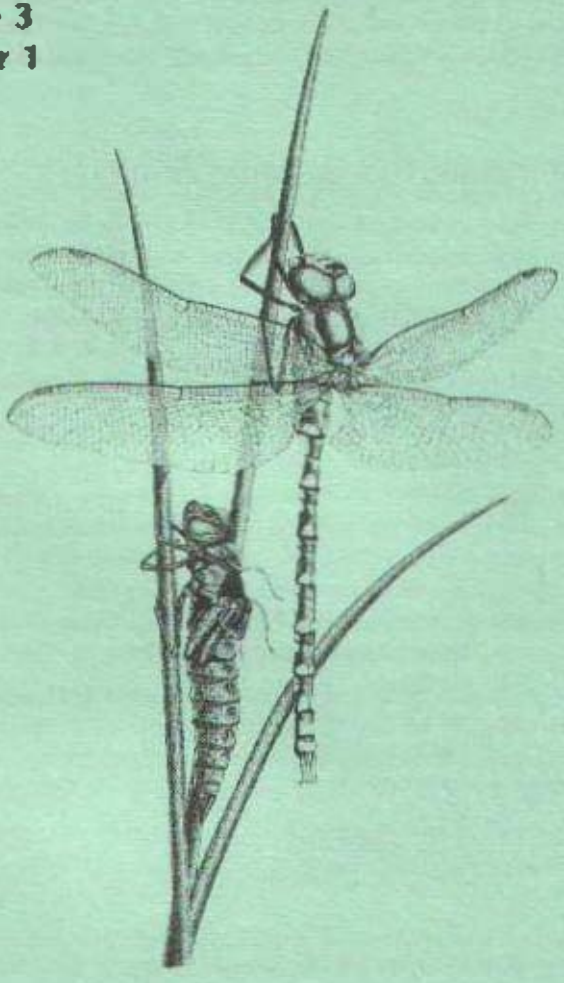
Journal of the British Dragonfly Society

Volume 3
Number 1

April
1987



Editor: S. J. Brooks
Assistant Editor: A. P. Brooks

affiliated to the Societas Internationalis Odonatologica

The *Journal of the British Dragonfly Society*, normally published twice a year, contains articles on Odonata that 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.).

ADDRESSES

Editor: S. J. Brooks
4, Nelson Road, London N8 9RU

Secretary: R. H. Dunn
4, Peakland View, Darley Dale,
Matlock, Derbyshire DE4 2GF

Organiser of Odonata Recording Scheme:
R. Merritt
38, New Road, Holymoorside,
Chesterfield, Derbyshire S42 7EN

Articles for publication in the *Journal* should be sent to the Editor. Instructions for authors appear inside the back cover. Membership applications should be sent to the Secretary. Completed forms should be returned to the Treasurer. Annual subscription £4, due 1st April.

Front cover illustration of *Aeshna cyanea* by Steven Jones.

Dragonflies on the Gwent and Somerset Levels and Moors

C. M. Drake

Nature Conservancy Council, Northminster House, Northminster, Peterborough, PE1 1UA

The largest lowland wetlands in south-west Britain are the Somerset Levels and Moors and the Gwent Levels. They form a single geological unit bisected by the Severn Estuary which is bordered by the clay coastal Levels, while inland the Somerset Moors comprise a mixture of peat, clay and alluvial deposits. The area is criss-crossed by drainage ditches which retain a rich flora and invertebrate fauna in the midst of intensive farming. The Nature Conservancy Council recently conducted surveys of the invertebrates associated with the ditches (Drake, 1986; Drake, Foster & Palmer, 1984) and this paper summarises the results for Odonata with notes on larval habitats.

In April, May and October 1983, 243 qualitative samples of aquatic invertebrates were collected from sites in Somerset and in April and May 1985, 152 samples were collected from Gwent ditches using a pond net for a standard search time of 45 minutes in Somerset and 60 minutes in Gwent. In mid-June to mid-July of the same years, terrestrial sampling was undertaken at a proportion of the same sites during which time adult dragonflies were recorded. The summer sampling was timed to coincide with the peak abundance of Diptera and Coleoptera and was in advance of the flight time of some Odonata which were probably under-recorded as a result.

Mud-dwelling larvae were also under-recorded because pond netting is strongly biased towards collecting weed-dwelling forms. Mr A. P. Foster collated the results for Somerset and he combined adult and larval records. These were kept separate for Gwent and this allowed some analysis

Seventeen species were recorded for the area (Table 1). Five of the species were not seen in Gwent although they are known from Wales (Coker & Fox 1985) and *Anax imperator* was not seen in Somerset.

Coenagrion puella was by far the most abundant species. Larvae collected on the Gwent Levels were found in virtually all regularly cleared ditches. However, they were conspicuously absent from shallow neglected ditches dominated by emergent vegetation to the exclusion of submergent and floating plants and also from heavily shaded sites which lacked significant amounts of vegetation. *Coenagrion pulchellum* was widespread over the survey area and was slightly more frequently seen in the southern Moors, eg North Moor, Southlake, West Sedgemoor and Wet Moor on both

Table 1. Odonata from the Gwent and Somerset Levels in 10 km grid squares within the 100 km square ST. The totals (T) for Somerset are the numbers of sites with records; for Gwent they are the numbers of records for larvae (L) and adults (A) which sometimes duplicate site records.

	Somerset													Gwent					
	33	43	32	42	33	34	34	44	35	45	46	47	T	33	38	39	48	L	A
Calopteryx virgo meridionalis		+											1			+		1	1
Coenagrion puella	+	+	+	+	+	+	+	+	+	+	+	+	133	+	+	+	+	129	63
C. pulchellum	+	+	+	+			+	+				+	33		+	+	+		8
Enallagma cyathigerum								+					2		+				1
Ischnura elegans	+	+	+	+	+	+	+	+	+	+		+	99	+	+	+	+	79	56
Pyrrhosoma nymphula	+	+	+	+	+		+	+	+	+	+	+	66		+	+	+	28	19
Aeshna cyanea	+	+	+		+			+		+		+	15	+	+	+	+	13	4
A. juncea								+					1						
A. mixta						+		+					2						
Anax imperator														+	+	+	+	+	6
Brachytron pratense	+	+	+	+		+	+	+	+	+	+	+	38		+	+	+	12	2
Libellula depressa	+							+					4			+		1	
L. quadrimaculata	+	+	+	+		+	+	+				+	42						
Orthetrum coerulescens								+					1			+			1
Sympetrum sanguineum								+					1						
S. [illegible]			+				+						2						
S. striolatum	+		+										5	+	+	+	+	33	13
Sites per square	30	35	44	37	3	13	13	56	9	3	2	7		7	39	34	34		

fen peat and clay soil. This distribution did not agree with the generalisation by Corbet *et al.* (1960) that the species is found at brackish sites. Adults were present at a variety of ditches including several botanically rich emergents-dominated sites. No attempt was made to separate the larvae of these two *Coenagrion*.

Ischnura elegans was widespread on the Moors but infrequent on the Somerset Levels compared to its abundance on the Gwent Levels where larvae were common to abundant in many brackish ditches and large water authority drains that were often subject to saline incursions. They were also present in most deeper, frequently maintained ditches with high covers of submerged vegetation but with low covers of floating and emergent plants. As the hydrosere progressed beyond the open, submergents-dominated stage, the frequency of *I. elegans* larvae decreased until they were scarce in shallow neglected sites (c. 40 cm deep on average) with vegetation rafts, mostly of *Berula erecta* and *Glyceria fluitans*, floating *Lemna* spp. or emergents. Although there was a large overlap with the distribution of *C. puella*, *I. elegans* was more abundant in both larger and more saline ditches and became scarce sooner than *C. puella* as ditches progressed to later hydroseral stages.

Pyrrhosoma nymphula was fairly evenly distributed over the area and, as with *I. elegans*, fewer were found on the coastal Somerset Levels than on the Gwent Levels. Larvae in Gwent were most frequent in ditches of a fairly late hydroseral stage and scarce in brackish and large open sites. The preferred ditches had a high cover of emergent vegetation (median 60%), lower cover of submergent plants (median 5-10%) and moderately shallow water (median depth 30-40 cm). Most sites were well away from the coast and from large arterial ditches known to be occasionally saline. Larvae were locally abundant on the one small area of peat on the Gwent Levels. Therefore, *P. nymphula* and *I. elegans* tended to be found together at relatively few sites. However, even *P. nymphula* was rarely recorded in the very shallow choked or heavily shaded ditches.

Enallagma cyathigerum and *Calopteryx splendens* were scarce, the latter being seen only at perennially flowing ditches where larvae were also found on the Gwent levels.

In contrast to the abundance of the Zygoptera, Anisoptera were uncommon. Larvae of *Libellula quadrimaculata* were frequent on the Moors, scarcer on the Somerset Levels and not seen in Gwent. The ditches in which larvae were found tended to be shallow (median depth 20-30 cm) with rather variable vegetation structures. Nearly all were frequently cleared sites with only 1-2 years having elapsed since their last clearance. A large proportion of sites (74%) were on or near peat soil. *Aeshna cyanea* was widely distributed but not often recorded considering that it is a common species in southern Britain. In Gwent, larvae were found mostly in moderately deep ditches dominated by submergent vegetation (median cover 80%) and little emergent cover (median 10%) although a few ditches were in a late hydroseral stage. The nationally uncommon *Brachytron pratense* was one of the most frequently encountered Anisoptera in both countries, especially as larvae which were present in a variety of sites ranging from annually cleared to neglected ditches. However, on the Gwent Levels they were very common in deeper ditches with dense and structurally diverse vegetation and in both counties the ditches contained an above average number of plant species. *Anax imperator* was seen only on the Gwent Levels where it was widespread and not infrequent. Larvae were found in six emergents-dominated ditches, four of which were brackish, and adults were seen most frequently over large ditches with open water. *Sympetrum* larvae were occasionally recorded on the Gwent Levels but they were usually too immature to identify to species. Adult *S. striolatum* were locally abundant in Somerset in late summer and became frequent on the Gwent Levels towards the end of the survey. All other Anisoptera were scarce, partly for the reasons given earlier.

Nationally, the abundance of *B. pratense*, *C. pulchellum* and *S. sanguineum* is declining rapidly. The two Levels and Moors contained major populations of the first two species which preferred slightly different stages of the hydrosere, although, in view of the broad range of ditches occupied by *B. pratense*, it is unclear why it is so scarce elsewhere. Ditches that were cleared annually contained as many species as those less frequently cleared and therefore the 2-3 year life cycle of some species, including *B. pratense*, was not the liability that might be imagined. Regular maintenance was essential to keep ditches at the favourable early stage of the hydrosere and a series of clearing cycles up to 10 years would provide a mosaic of ditch types suitable for the whole range of Odonata and other aquatic insects.

The areas with the greatest numbers of species were Caldicot Level, east of Newport in Gwent (12 spp) and the Moors of the lower Brue valley — Tadham, Tealham, Westhay, Catcott and Chilton (14 spp). Doubtless there are further species here, for example, there are old records for *S. sanguinium* on the Gwent Levels, *Lestes sponsa* and *A. imperator* on the central Moors and recent records for *C. virgo* in the Brue valley area (Chelmick, 1979).

References

Chelmick, D. G. 1979. *Provisional atlas of the insects of the British Isles, part 7. Odonata, dragonflie*

Coker, S. and Fox, T. 1985. *West Wales Dragonflies*. Mountain Books. 168 pp.

Corbet, P. S., Longfield, C. and Moore, N. W. 1960. *Dragonflies*. Collins, London. 260 pp.

Drake, C. M. 1986. *A survey of the invertebrates of the Gwent Levels*. Unpublished report, Nature Conservancy Council.

Drake, C. M., Foster, A. P. and Palmer, M. 1984. *A survey of the invertebrates of the Somerset Levels and Moors*. Unpublished report, Nature Conservancy Council.

Hatchmere — a clue in the search for Sites of Special Scientific Interest

A. A. Savage

Department of Biology, Crewe & Alsager College of Higher Education, Crewe, Cheshire, CW1 1DU

Sites containing ten or more species of Odonata are likely to be considered favourably by the Nature Conservancy Council for S.S.S.I. status. Furthermore, sites with many fewer species of Odonata may be so considered if other important organisms are present. In either case, firm evidence is required.

During the period 1980-85, the highest number of Odonata species in a single tetrad in Cheshire was recorded in 57L (Gabb, 1985). Fourteen species were recorded and, of these, thirteen were from Hatchmere (SJ552722) which lies within the tetrad. Thus, the question arises — why is Hatchmere so rich in Odonata? — and, perhaps more importantly, what can we learn from Hatchmere which may enable us to identify similarly rich places?

Theinemann's second law of biocoenotics is a useful starting point: he states, somewhat freely translated, that the number of species within a habitat decreases as that habitat deviates from the mean environmental conditions (Theinemann, 1950). Furthermore, there is evidence that the law applies in Cheshire (Savage, 1985). The deviations from the norm may refer to any environmental factors but three fundamental ones may be considered and checked by any investigator. These are water chemistry, vegetation, and the nature of the substratum. The principal factor, at first, is awareness rather than precise measurement!

A general impression of water chemistry may be gained by measuring pH (acidity-alkalinity) and electrical conductivity. An indication of pH may be gained by using the test kits available from garden centres; simply add a drop of indicator to a water sample and compare the colour with the chart. The measurement of conductivity requires special apparatus but I can arrange for samples to be measured (estimation
Cheshire, it is often closely related to pH). Collect approximately 100 ml (0.2 pint) of water in a small polyethylene bottle. Firstly, wash the bottle five times in tap water. On site, wash the bottle five times with the water to be sampled, then fill with sample and send for measurement as soon as possible. The electrical conductivity is an approximate measure of the chemical substances dissolved in the water (total dissolved solids). Convenient and acceptable units are micro Siemens per centimetre at a standard temperature of 25° C (μS cm-1 k 25).

The pH of water bodies in Cheshire varies from 3.5 in some peat mosses to 9 in some meres and flashes. Conductivity varies from 40 µS cm^{-1}k25 to 30,000 in an inland saline lake; the meres vary from 140-900. Odonata nymphs have not been found, so far as I am aware, above c. 7,000 although oviposition has been seen (Reynolds, 1979; Savage, 1982; Savage & Pratt, 1976). In Hatchmere pH is c. 6.7 and conductivity c. 440 µS cm^{-1} k 25. Thus it is just about in the middle of the range of the meres and in agreement with Theinemann's second law. One would expect a high species diversity.

A water body starts simply as a water filled hollow and is devoid of appropriate vegetation. With time, plants begin to grow in and around the water, slowly it becomes totally overgrown, and open water disappears. The process make take a few decades in a small pond or thousands of years in a large mere. In either case the mean is a partly overgrown water body. The type of vegetation depends on water chemistry which, in turn, depends on the relative proportions of rain water and ground water. In acid waters of low conductivity, mosses and sedges develop; in alkaline waters of higher conductivity, water lilies and reeds. For identification of higher plants, see Haslam *et al.*, (1975).

Again, Hatchmere is a good example of an intermediate stage in the encroachment of vegetation. Parts of the shore have dense reed-beds while in other parts they are thin or entirely absent. The Northwest part of the original mere basin has become filled with peat and is acid (Lind, 1949). Acid bog conditions prevail in this area although the amount of standing water is limited and may not provide a permanent breeding habitat for Odonata. However, the range of habitat diversity is likely to encourage species diversity.

The substratum of a water body is dependent upon water chemistry, surface geology and vegetation. It will be clear from the foregoing text that there will be a variety of substrata in Hatchmere. The principal difference is between the East and West sides. The former is sandy with low concentrations of organic matter, especially in open water, while the latter is peaty and highly organic. Student studies during the past fifteen years show that there are significant communities on the two sides; the distribution of nymphs of *Erythromma najas* appears to be related to differences in substrata. Again, the range of habitat diversity is related to species diversity.

Odonata are carnivorous and territorial animals throughout their life histories. These two facts suggest that suitable water bodies should be productive and of reasonable size or, perhaps, that the combination of these environmental factors should reach a certain minimum. Area is not likely to be a limiting factor in meres but may be in ponds. It seems likely that closely grouped ponds should provide more

suitable conditions for Odonata than isolated ponds. We should make a determined attempt to discover and investigate groups of ponds containing moderately productive water (300 -600 µS cm^{-1} k 25) with encroaching vegetation and variation in substrata. We may thus provide evidence for the establishment of new S.S.S.I.s, some ideas for management, and more protection for Odonata.

Acknowledgement

Thanks are due to Mr David Kitching for providing a computer print-out of the Odonata recorded at Hatchmere.

References

Gabb, R. 1985. *Cheshire dragonflies.* Annual Report.

Haslam, S. M., Sinker, C. A. & Wolseley, P. A. 1975. British water plants. *Field Studies* 4: 242-351.

Lind, E. M. 1949. The natural history and vegetation of some Cheshire meres. *Memoirs and Proceedings of the Manchester Literary and Philosophical Society* 90: 1-20.

Reynolds, C. S. 1979. The limnology of the eutrophic meres of the Shropshire-Cheshire plain. *Field Studies* 5: 93-173.

Savage, A. A. 1982. The survival and growth of *Gammarus tigrinus* Sexton in relation to salinity and temperature. *Hydrobiologia* 94: 201-212.

Savage, A. A. 1985. The biology and management of an inland saline lake. *Biological Conservation* 31: 107-123.

Savage, A. A. & Pratt, M. M. 1976. Corixidae (water boatmen) of the Northwest Midland meres. *Field Studies* 4: 465-476.

Theinemann, A. 1950. Verbreitungsgeschichte der Süsswassertierwelt Europas. *Die Binnengewässer* 18: 1-809.

Dragonfly conservation and the National Trust

David Clements

National Trust Biological Survey, Spitalgate Lane, Cirencester, Glos., GL7 2DB

The National Trust is the largest private landowner in Britain today, holding over 500,000 acres of land "of historic interest or great natural beauty". These lands are held for the nation, and most are held "inalienably" — that is, they cannot be sold, mortgaged or developed, except under very special circumstances, following application to the Secretary of State.

Since by far the majority of the Trust's properties are in the open countryside, it is only natural that the Trust should have become a major force in the conservation of the natural environment. With many hundreds of miles of rivers and streams, and thousands of lakes, ponds and pools, it must also play a major part in the conservation of dragonflies and damselflies.

The National Trust owns many properties which are outstanding in the number or variety of Odonata which they support. Examples which spring to mind include Horsey Mere in Norfolk, Wicken Fen in Cambridgeshire, Brownsea Island in Dorset, Dudmaston in Shropshire, Dowrog Common in Dyfed, some of the New Forest Commons, Langham's Pond at Runnymede and Frensham Little Pond in Surrey. The Trust has properties which support such rarities as *Aeshna isosceles*, *Brachytron pratense*, *Gomphus vulgatissimus*, *Libellula fulva*, *Leucorrhinia dubia*, *Ischnura pumilio*, *Coenagrion mercuriale* and *C. pulchellum*. The rare Irish damselfly *Coenagrion lunulatum* occurs on one of the Trust's properties in Northern Ireland.

The site for the latter species was discovered by the National Survey. Since 1979, the Trust has been carrying out a biological survey of its properties in England and Wales, and in 1985, an additional survey was set up to cover Northern Ireland. Sites for several of the rarities mentioned above have come to light in this way. The survey consists of visits by a small team of botanists and zoologists, who assess the conservation interest of each property, and formulate appropriate management suggestions to preserve and enhance this interest, in conjunction with the Trust's Advisers on Conservation. Most of the water-bodies examined have at least some biological interest, and care must be taken to ensure their conservation in a form which is suitable for a whole range of aquatic plants and animals.

Suggested management may involve rotational part-dredging to prevent silting-up, restriction of grazing stock, or the clearance of overshadowing trees and scrub. Steps may be taken to control pollution from adjacent land-use, or to restrict access or

recreational use by the public, especially where sensitive species or communities are involved. Such conservation inevitably favours dragonflies and damselflies, and sometimes management is specifically designed to favour Odonata populations, such as at the chain of ponds at Dudmaston. Here, clearance of overshadowing trees and of encroaching aquatic vegetation will maintain the balance which supports a fauna of some 14 species of Odonata, including *Isciniura pumilio*, *Sympetrum sanguineum* and *Aeshna mixta*. At the fish pond at Longshaw, in Derbyshire, which supports one of the very few county sites for *Libellula quadrimaculata* (including the form *praenubila*), as well as *Sympetrum danae*, plans are in-hand to insert a silt-trap into a drainage channel which is adversely affecting the quality of the site. On the Long Mynd in Shropshire, the old reservoirs have been modified, in co-operation with Severn Trent Water Authority, to favour the unusually diverse upland dragonfly fauna. In all three cases, advice was sought from the pool of dragonfly specialists which has been steadily developing in recent years.

The National Trust's Biological Survey is, of necessity, a brief one. Survey-visits are generally short, and occur at only one time of the year, so our records are inevitably incomplete. We are unable to carry out longer-term studies on the dragonfly faunas of given properties, and we therefore rely heavily on specialist help from local naturalists, and organisations like the British Dragonfly Society. Many of you have recorded Odonata on Trust properties from time to time, but these records seldom get passed on to the Trust itself. When one considers the difficulty of protecting a site about which nothing may be known, it becomes clear that help from interested specialists is much to be welcomed. I would therefore urge anyone who has any dragonfly information relating to National Trust properties to get in touch with us, through our Cirencester Office. Such information will be treated in confidence, and can be used to help direct the Trust's management-effort with much greater sensitivity and effect.

Although the collecting of insects on Trust properties is prohibited by our special byelaws, recording is still to be encouraged, and in any event, collecting is not generally a problem in the Odonata. The Trust does recognise that some species simply cannot be identified in the field with any confidence, and the taking of specimens by *bona fide* researchers is permitted, through the issue of a special permit by our relevant Regional Office. Any members who would be interested in obtaining permits for insect recording and study on particular properties, should contact this office initially for further details. We look forward to hearing from you.

Odonata of a Buckinghamshire/Middlesex lakeland site: an overview of the years 1978-1986

N. M. Shennan

24, Bridge Road, Uxbridge, Middlesex, UB8 2QW

For over nine years, the odonate fauna of a complex of lakes, scrubland and woodland edge, sporadically dissected by the courses of the Rivers Frays, Misbourne and Colne, and of the Grand Union Canal, have been the subject of detailed ecological study by the author. It is intended, in this short report, to give some insight into the species which have been recorded at the site, and to the ways in which the variety of habitats have influenced the development of the fauna.

The site was visited on at least one occasion per month between January and March and during November and December (to sample larvae), and on at least one occasion per week between April and October, each year between 1978 and 1980, and between 1983 and 1986. During 1981 and 1982, research commitments caused some visits to be missed, although, on average, one visit per month was achieved during these two years. Each visit was made between 07:00 and 16:30 BST during the summer, and between 10:00 and 13:00 GMT during the winter. Only the flying adults will be discussed in the present report; the larval studies are intended for future publication.

The site straddles the boundary between Buckinghamshire and the old county of Middlesex. Located on an axis along the line of the grid references of TQ057857 and TQ051877, it is a heterogeneous mixture of disused gravel extraction pits of varying sizes and flora, of deep, sluggish lowland river (Rivers Fray and Colne), shallower fast-flowing alkaline river (River Misbourne flowing south-east from Denham, Buckinghamshire), and of old, frequently used canal (Grand Union).

The flora of the site is, similarly, varied, and has been described in more detail elsewhere (Shennan, 1985). Of importance to the odonate fauna are extensive areas of *Phragmites communis*, *Typha angustifolia*, and vast floating carpets of *Ranunculus aquatilis* and *Callitriche palustris*. Shelter is afforded to odonates during inclement weather by extensive areas of stunted *Salix* spp., as well as by considerable growth of *Carex* spp., and of *Rubus fruticosus*.

Zygoptera

Of the Zygoptera, one of the most obvious species of the site is *Calopteryx splendens*. Males will form large aggregations on warm summer days (the largest numbers usually in the first and second weeks of July) on clumps of vegetation skirting

the smaller, quieter lakes of the site, and the banks of the Rivers Frays and Colne. They favour mature *Carex* clumps both as aggregative sites and as shelter from rain, although I have frequently observed them near many other species fringing the above areas, including *Sambucus nigra*, *Salix caprea*, and even *Crataegus monogyna*. Walking through a clump of *Carex* after a brief summer shower can generate superb clouds of male *C. splendens*. They are notably aggresive both to conspecific males, as well as to males of *C. virgo*. The latter is considerably scarcer at the site, although can be found with reasonable regularity around the Misbourne, a faster flowing, clearer river, which courses through open meadow, but is overhung with smaller trees and shrubs. I have most frequently encountered *virgo* in late June and early July, although in warm summers, I have found them as late as the second week in September.

The commonest zygopteran over most of the site is *Ischnura elegans*. It is most frequent over the margins of the smaller lakes, where it is commonly observed coursing over the *Phragmites* beds. The dramatic conflicts of males can be seen enacted commonly throughout the summer, and I have observed male and female pursuit flight prior to copulation many times, every year. Surprisingly, although *Enallagma cyathigerum* is very common, it is scarce on the larger gravel pits, where *I. elegans* does very well. It is, nevertheless, extremely common over the margins of the smaller ponds, and around the slowest stretches of the Rivers Frays and Colne, as well as the Grand Union Canal. It is commonest in the four-week period from mid-June to mid-July, but can be very common up to the end of August, and as late as the first week in September in exceptional years (e.g. during 1978 and 1983). I have been fortunate enough to observe the submergence of the ovipositing female on a few occasions, this often occurring near to mats of *R. aquatilis*. The longest period I have timed so far lasted 39 minutes between 14:22 and 15:01 hrs 16th July 1980, on the River Frays.

I have most frequently seen *Coenagrion puella* on the slowest stretches of the River Frays, and on the smallest lake in the complex, both located near to the grid reference TQ054862, although the lake is not shown on the older O.S. maps. The number of *C. puella* vary quite dramatically, and the species can be extremely common in some years (e.g. 1978–81 and 83), and scarce in others (e.g. 1984 and 85). During warm afternoons in mid-summer, they can be seen energetically coursing over the water meadow to the immediate south-east of the main site (at TQ057861), close to the River Frays. *C. pulchellum*, however, has never been common at the site. The majority of records of this species date between 1978 and 1982, with none being recorded in 1985 and 1986. All occurrences of *pulchellum* originate from the water meadow habitat to the south-east of the principal site.

Confined to the shallower margins of the River Frays, to the small lake at TQ054862 mentioned above, and to the margins of one other lake in the site at

TQ054872. *Lestes sponsa* usually occurs quite commonly in late July and early August. In some years, I have observed *L. sponsa* fluttering within quite stagnant, bramble-, and reed-filled ditches at the latter lake, and on one occasion, a female ovipositing in such a location, at the base of the stem of some *Festuca rubra*, which had become immersed by the water level in the ditch.

Erythromma najas is common on the slowest stretches of the Rivers Frays and Colne, mainly during early July. Males and females make use of the water meadow parallel to the Frays, and can commonly be seen resting on stems of coarse grasses, *Filipendula ulmaria*, and *Epilobium* spp., which fringe both the Colne and the Frays.

Two remaining species have been recorded at the site, but only very rarely. *Pyrrhosoma nymphula* is recorded annually, but usually not until late in July and early August. The majority of records originate from the area of the River Misbourne, but it has occurred at some of the clearest, older lakes. On some occasions, I have seen male *P. nymphula* attack other small Zygoptera in the area of the River Misbourne, and so the possibility of it being a scarce breeding species should not be discounted. *Platycnemis pennipes* has been seen in four of the nine years covered, in the region of the Rivers Frays (July 1981, July 1983), and Colne (June 1980, August 1981) and in marginal vegetation fringing the lake at TQ054862 (August 1978).

Anisoptera

Aeshna grandis is the commonest aeshnid of the site. It frequents just about every marginal zone in the area, and is dramatically territorial, one male even "buzzing" a startled Wren which made the dubious decision to sing from an exposed perch on a stem of *Phragmites*. I have seen female *A. grandis* landing on floating vegetable debris in the lakes, presumably to oviposit. The main flight period for this species at the site is the middle of July, but I have found it as early as the second week in June. *A. cyanea* is also very common, but is more localised, preferring the shallower, clearer waters of the River Misbourne, and the small peripheral pools that this river forms in the water meadows through which its course runs. *A. cyanea* occurs rather later than *grandis*, and I have no earlier records for this species than the last week of June. The final aeshnid, the smaller, distinctive *A. mixta*, to be recorded at the site is a relatively recent addition. It is a species that I recorded initially during the summer of 1981, but subsequently, I have found it every year, although varying in frequency from common to scarce. It is invariably the last odonate to appear, and the last to disappear each year, and late August is the best period to see it at the site.

Anax imperator is, fortunately, common at the site in most years, although a small decrease in numbers has been observed over the past two years. It is the earliest species of large odonate to occur, with a particularly early record on the 27th May

1983, but the majority occurring during the middle of June to late July. Along with *A. mixta*, it is also a late species to disappear, with one record of a male on 12th September 1981. The dramatically coloured males never fail to put on a spectacular display of aerial aggression, on some warm days these lasting for the whole afternoon, with the aggressor eventually resting by coasting along the margins of the water, or close to the trees which fringe the lakes.

Orthetrum cancellatum is a common site from late June to the end of July, dashing low over the margins of the deeper river stretches and along the more linear stretches of the smaller lakes like diminutive Kingfishers. They have increased in numbers over the period from 1981 to the present, and have started to patrol sections of the more recently extracted pits towards the north-west of the site.

Libellula depressa is frequently observed from late May until mid-July in most years. It is scarcer than the preceding species, and is localised around the deeper, more vegetated lakes and in the slowest parts of the River Frays. It seems to be more sensitive to daily variations in temperature than other odonates at the site, with virtually all observations being confined to the period from noon to approximately 14:00 hrs BST.

Of the two *Sympetrum* species to occur at the site, only *S. striolatum* is common. It is most frequently found on the smaller lakes, but commonly hunts over the gravel causeways linking them, during the late afternoon. I have seen adults in tandem, but have never witnessed oviposition at the site. They are usually seen in the last week of July and the first two weeks in August, but I have an early record from 14th June in 1983. Over the nine year period, the only other *Sympetrum*, *S. sanguineum*, has been recorded twice, on the 29th August 1978 and 2nd September 1983. The late dates of these two records, both concerning males, suggest that they may have been immigrants.

The two remaining anisopteran species recorded at the site are both scarce visitors although I found a larva of one of these, *Cordulia aenea* this winter (10 January 1987) in the River Frays. Adults of *C. aenea* are most usually seen in the last half of June and early June around the marginal vegetation of the River Frays and bordering lakes. I photographed a resting mature female in June 1983.

The last species, *Cordulegaster boltonii*, has occurred three times, on the 2nd August 1981, 15th July 1983 and 1st August 1983 (the last two dates possibly referring to the same individual). The two dates from 1983 concern females, the 1981 record concerns a male. All sightings were made in a 500 metre stretch of the River Frays from TQ053863 to 056861, and the 1981 male was found clasping a mist net being used to capture acrocephaline warblers for ringing, and was later released unharmed after being photographed.

References

Shennan, N. M. 1985. Relationships between morphology and habitat selection by male Sedge Warblers *Acrocephalus schoenobaenus*. *Ringing and Migration* 6: 97-101.

The coexistence of *Coenagrion hastulatum* (Charpentier) and *C. puella* (L.) at a site in Perthshire

John Paul

Flat 113, Ivy Lane, Osler Road, Headington, Oxford

On 12 July 1986 I visited the well-known site for *Coenagrion hastulatum* near Pitlochry, Perthshire, where the species is known to breed in a well-vegetated pond amongst coniferous woodland. Due to the overcast nature of the weather, few Odonata were on the wing. I resorted, therefore, to sifting through the dense emergent vegetation for adults. Of Anisoptera I recorded but one teneral specimen of *Sympetrum danae*, whereas the Zygoptera presented a rich assemblage of species. About one hundred insects were subjected to close examination and of these, about 25 were *C. hastulatum* (I do not state exact figures as some insects may have been counted twice). Only two female *C. hastulatum* were seen. Other species found were: *Enallagma cyathigerum* (c. 60); *Lestes sponsa* (c. 10); *Pyrrhosoma nymphula* (c. 5) and rather surprisingly, a single male *C. puella*. This specimen was retained and comparison with typical examples from southern England shows no difference in morphology, markings, nor in its dimensions from the typical form.

I find it remarkable that there should be an overlap in the ranges of a species of boreo-alpine distribution (*C. hastulatum*) and of *C. puella* whose predilection is for southern, lowland sites. Whilst I understand that there may be coexistence of the two species on the North European Plain, my experience of *C. hastulatum* in Norway and Austria is that it does not share sites with *C. puella*.

It is possible that *C. puella* is a temporary colonist of the Pitlochry site; it might have dispersed northwards during the hot summers of a few years ago. There is no previous record of this insect from Perthshire, although there is a recent record from Angus (Merritt, R., pers. comm.). If, on the other hand, *C. puella* were to be considered as a permanent but scarce member of the Perthshire fauna, then one wonders if other members of the genus *Coenagrion* might be lurking, undetected at sites in Scotland.

How far will larvae of *Orthetrum cancellatum* (L.) travel for their emergence?

Brian P. Pickess

Syldata, Arne, Wareham, Dorset, BH20 5BJ

On the 3rd June 1985 around mid-morning on a warm and slightly breezy day I visited a private lagoon of some 0.4ha, which was created in October 1981 on the Arne Peninsula, nr Wareham, Dorset.

The lagoon is oblong, being approximately 145m x 45m and runs southwest to northwest. At it southwestern end it is 2.5m deep, with a sandy bottom and it shallows to 1m at its northwestern end but has a peaty bottom. There are five vegetated islands and along the southern shore there is a metre wide sandy beach with clumps of Soft Rush, *Juncus effusus*. From the beach it leads into an assemblage of wet heath species dominated by Purple Moor-grass, *Molinia coerulea*, mixed with Dorset Heath, *Erica ciliaris*, and Bog Myrtle, *Myrica gale*. There is also a little Ling, *Calluna vulgaris*, Cross-leaved Heath, *E. tetralix*, and a scattering of unvegetated patches of clayey sand. The whole area is unshaded and receives the sun throughout the day.

As I walked through the heathland vegetation teneral *O. cancellatum* were being put to flight. I must have disturbed at least 30 individuals, mostly between 2m and 5m from the lagoon edge. When they took to the air some only went a few metres, others made flights of 10m - 15m, or more. I concluded from their behaviour that they were newly emerged, but being a little way from the lagoon thought that they had already made a brief maiden flight.

The incident was not thought of again until, when visiting the lagoon on the 17th June, 1986 at 10.30 hrs in warm but overcast conditions, teneral *O. cancellatum* were again encountered flying up as I walked through the vegetation. I then began to look for insects before they were put to flight. An individual was located and when I got very close, I was surprised to find that it was still beside its exuvia. I then realised it was some 3m from the lagoon edge. I began to wonder whether I had drawn the wrong conclusions from my observations the previous year. With the help of Richard Knight and Julian Pickess we began a search for more exuviae. After a genetal search of the southern and south-western part of the heathland vegetation a further 58 exuviae of this species were found.

Most exuviae, some still with teneral insects nearby, were found in the heathland vegetation mainly between 1m and 4m from the lagoon sedge. However, on a wider sweep of the area an exuvia was discovered at about 10m from the lagoon edge, a

further four more were found at this distance. I was even more surprised when I found two more exuviae at about 15m and one finally at 17m from the waters edge! Most of the larvae seemed to have preferred to emerge from tops of *E. ciliaris*, a few were found on *M. gale* but only 2 or 3 on the *Molinia* and only one on *J. effusus*.

After this visit and its revelations I found myself asking, how far will a larva travel to emerge? I found a few references suggesting that such travelling away from the water was not unknown in some species but *O. cancellatum* was not mentioned. Corbet (1962) cites movements of *Anax imperator* going 6m, *Pyrrhosoma nymphula* 10m and *Gomphus vulgatissimus* travelling 20m. d'Aguilar *et al.* (1986) only give a passing reference to the effect that some species 'even travel several metres'. Lucas (1900) cites observations of *Calopteryx splendens* travelling across a canal tow path, so probably at least two or three metres was covered and an *Aeshna*, possibly *cyanea* travelling 10 yards. In Longfield (1949) a brief mention is made of this behaviour 'sometimes (larvae) walking quite a distance before settling down' and in Corbet *et al.* (1960) reference is made to 'the wandering behaviour of *Cordulegaster boltonii* may have a protective significance'.

Obviously movements of some distance away from water to emerge is not unknown. To travel more than a metre or two from the water presumably will put the larvae at a greater risk of being predated but it might be a risk worth taking. So do *O. cancellatum* normally travel some distance away from water to emerge? Certainly at the Arnesite suitable emergence sites were plentiful, so why did some travel seemingly long distances? One cannot help but ask whether these wandering larvae actually get to their emergence site in a straight line from the water or, cover even longer distances in reality? All these long-travelled larvae emerged successfully, so it would seem that they were not disadvantaged by the journey. There is obviously some scope for further research in 1987.

A final point that occurs to me is that often we carry out population studies by finding the exuviae; are we missing some individuals by assuming that they are all going to be located within a metre or two of the waters edge?

References

Corbet, P. S., Longfield, C. and Moore, N. W. 1960. *Dragonflies.* Collins, London. 260 pp.

Corbet, P. S. 1962. *A biology of dragonflies.* Witherby, London. 247 pp.

d'Aguilar, J., Dommanget, J-L. and Prechac, R. 1986. *A field guide to the dragonflies of Britain, Europe and North Africa.* Collins, London. 336 pp.

Longfield, C. 1949. *The dragonflies of the British Isles.* Warne, London. 256 pp.

Lucas, W. J. 1900. *British dragonflies.* Upcott Gill, London. 356 pp.

A population study of *Coenagrion mercuriale* (Charpentier) at a New Forest site. Part 3. Diurnal variation.

D. K. Jenkins

7, Lakewood Road, Ashurst, Hampshire SO4 2DH

The method of counting *mercuriale* used in this study was given in Part 1 (Jenkins, 1986a). In the present study, since the approximate distribution of *mercuriale* along the streams was already known, it proved convenient to count with tally counters, instead of making a blank map. With one counter in each hand males and females could be counted separately although a special note was made of the few single females.

In Part 2 (Jenkins, 1986b) a survey of several different regions of the same general area was described covering the 1985 flight season. From this work, it seemed possible that differences in total numbers recorded at different sites might be influenced by the time of day at which the counts were made. In order to clarify this point, two sites were chosen that had previously shown a wide difference in population density and counts were made at regular intervals during the day. Luckily, it proved possible to count at Upper Crockford stream on 26th June and then at Upper Peaked Hill west stream on 28th June under nearly identical weather conditions, in what eventually proved to be the only hot settled period of the 1986 flight season. After completing the normal fortnightly counts, this week was also found to coincide with maximum numbers at Peaked Hill but was 1-2 weeks earlier than maximum at Crockford.

Jenkins (1986b) reported that the maximum count in 1985 of *mercuriale* at Upper Crockford was about 360 between 11 a.m. and 12 a.m. whilst the maximum count at Upper Peaked Hill west was about 150 between 1.15 p.m. and 1.45 p.m. although the population at the latter site had emerged rather earlier. However total numbers do not give a realistic comparison of the sites since the length of stream surveyed at Upper Crockford was about 1.25K m whereas the Peaked Hill site was only 0.7Km. Thus the density of *mercuriale* at Upper Crockford calculated from the maximum count was about 3 per 10 metres of stream in 1985 compared with 2 per 10 metres at Peaked Hill. In 1986, for the same time of day, the corresponding figures were estimated to be about 2 per 10 metres and 7 per 10 metres respectively. Whether these marked differences are due to short or long term changes can hopefully be monitored by similar counts in future years. Certainly over the last three years the population at Upper Crockford has slowly decreased and, but for the remarkable density of insects at Peaked Hill, this might easily be ascribed to the continuous long cold weather experienced in January 1985 and February 1986. As can be seen from Figures 1 and 2 the densities of

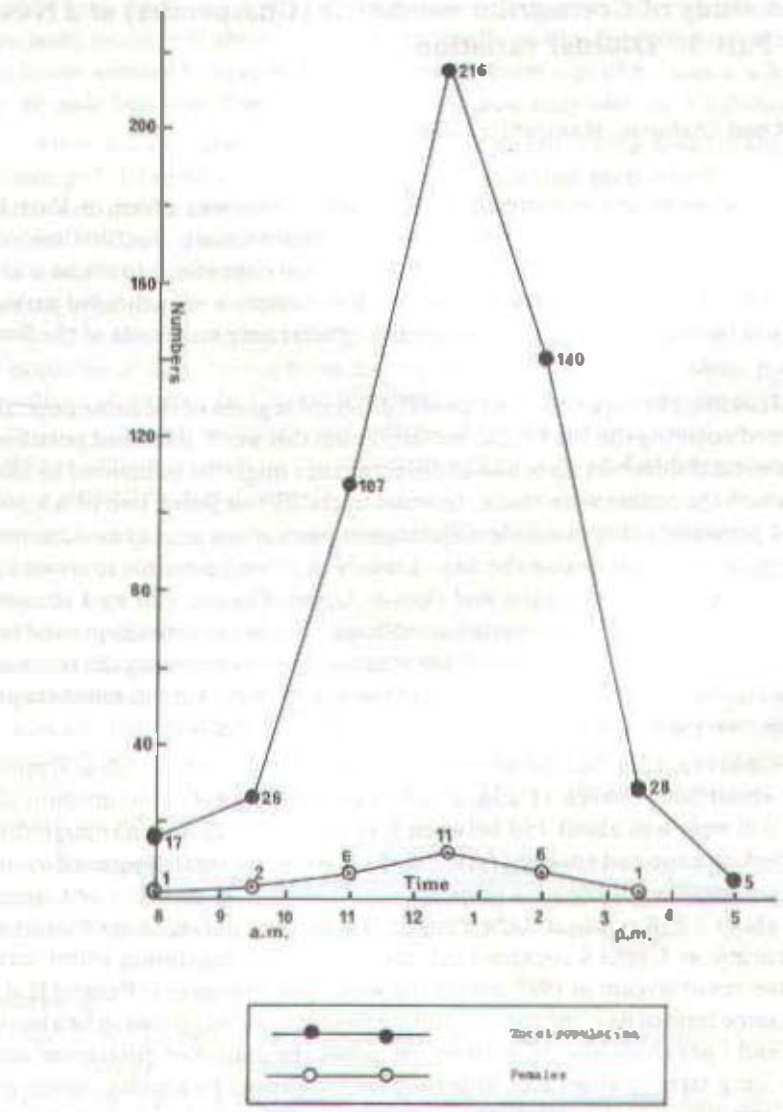


Figure 1. Population fluctuations of *Coenagrion mercuriale* during the day of June 26th, 1986 at Upper Crockford Stream.

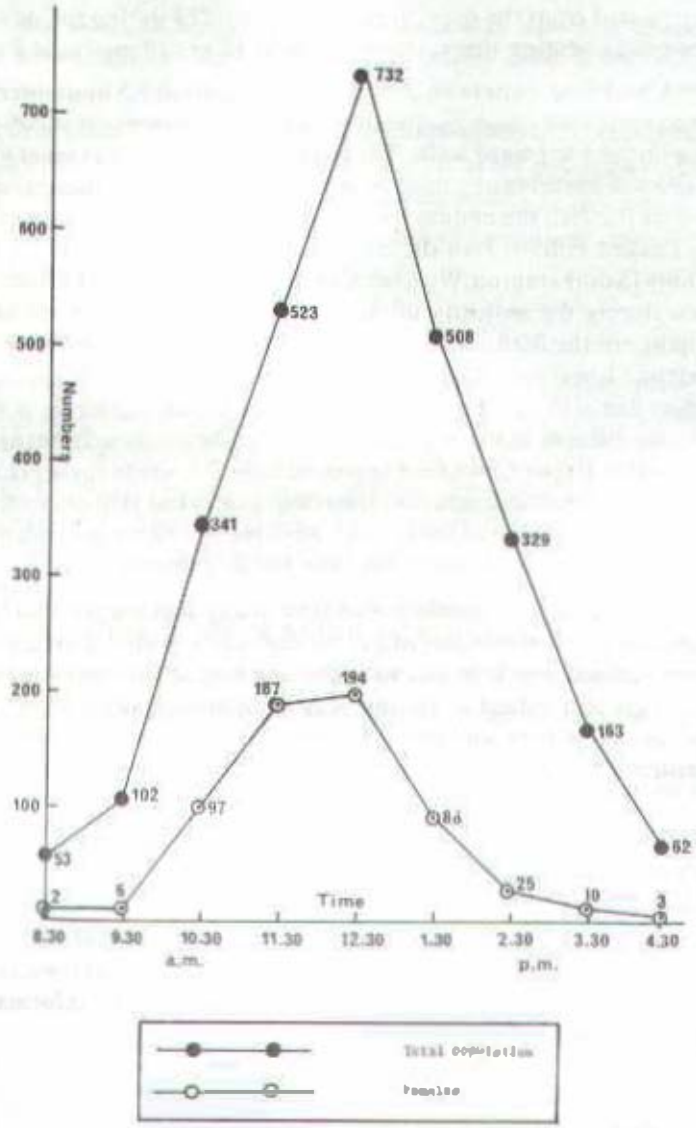


Figure 2. Population fluctuations of *Coenagrion mercuriale* during the day of June 28th, 1986 at Peaked Hill West.

mercuriale calculated from the maximum counts recorded during the day are higher than at the normal counting times, reaching about 10 per 10 metres at Peaked Hill.

At Upper Crockford, counts on 26th June were made at 1.5 hour intervals due to the distance and somewhat rough ground involved and, as in previous surveys, counting was only done on the northward walk. The terrain and length of stream at Peaked Hill west stream allowed counting at 1 hour intervals, otherwise conditions were the same. At Crockford on the 26th the midday air temperature was 27°C with wind easterly, 4 knots and at Peaked Hill on 28th the corresponding values were 26°C, wind south easterly, 4 knots (Southampton Weather Centre, pers. comm.). On both days skies were cloudless during the majority of the survey period but some cloud appeared around 3.30 p.m. on the 26th. The results obtained are shown in Figs 1 and 2 and indicate an almost linear increase and decrease with time with a surprisingly sharp peak in numbers just after midday. There is also a very great difference in numbers of female *mercuriale* present at the two sites which may be partly accounted for by the fact that the count at Upper Crockford appeared to be 1-2 weeks earlier than the time of maximum annual numbers, whereas the count at Peaked Hill coincided with the maximum. In both cases most of the females were present either in tandem or *in cop.* with males. Lone females numbered less than ten at all times.

The high rate of change in numbers with time of day does suggest that the original method of counting at specified times of day for each site is probably even less accurate than had been realised but it is felt that this method is still useful as a guide to population changes and indeed is the only way of examining several sites within the constraints of available time and the vagaries of the weather. Obviously the most accurate measurement of total population must involve counting between 12 a.m. and 1 p.m.

One problem which has not yet been resolved is where *mercuriale* go when not at the water. Certainly during the present work it was observed that as the number of male *mercuriale* along the edge of the stream decreased there was an increase in males seen some 20-30 metres away on the edge of the heather moor near the Upper Crockford site although very few females were seen. It is hoped that some information on this aspect can be obtained in 1987 since there appears to be no information in the literature specific to *mercuriale*.

References

Jenkins, D. K. 1986a. A population study of *Coenagrion mercuriale* (Charpentier) at a New Forest site. Part 1. *Journal of the British Dragonfly Society* 2 (1): 17-20.

Jenkins, D. K. 1986b. A population study of *Coenagrion mercuriale* (Charpentier) at a New Forest site. Part 2. Lower Crockford Stream and its Peaked Hill tributary. *Journal of the British Dragonfly Society* 2 (2): 37-41.

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 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 '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.

CONTENTS

Printed by Amberwise Printing Limited, Grindon, Bakewell, Derbyshire.