

MAYFLIES (EPHEMEROPTERA) IN LINCOLNSHIRE

BY T. E. LANGFORD

Macan (1961) summarized all the available data on the distribution of Ephemeroptera in Britain, by means of vice-county maps. These show that authoritative records from Lincolnshire are scarce, only three species being recorded from South Lincolnshire (vice-county 53) and one species from North Lincolnshire (vice-county 54).

During the period from August 1961 to January 1965, regular biological surveys of Lincolnshire pools, streams and rivers were carried out, mainly to establish criteria on which to base pollution assessments. From these surveys, nymphs of ten Ephemeropteran species were recorded from South Lincolnshire and thirteen from North Lincolnshire. This paper presents the list of species recorded, together with the dates and locations of new records. Nomenclature is in accordance with that used by Macan.

DESCRIPTION OF THE AREA

Northern Lincolnshire was described by Langford (1964) and the majority of collections were from this region. South Lincolnshire is topographically similar to the Northern vice-county, being an area of low relief with soft, calcareous surface rocks, low-lying coastal marshes and drained fen. The maximum altitudes in the upland areas of both vice-counties are approximately 500 feet (160 metres), but whereas North Lincolnshire has two upland areas (a limestone ridge and chalk wolds) the southern vice-county has only limestone uplands.

Generally, the watercourses of both regions consist of two physical types:

(1) The small, free-flowing streams of the Wolds and limestone uplands.

(2) The slow-flowing (often static) canalised and impounded rivers of the fen and coastal region. During periods of dry weather and very low spring flows, these reaches are practically static, as the sea-doors and outfall sluices are closed. This static condition may last for three to six months depending upon the summer precipitation.

The region as a whole differs markedly from the other regions in Britain in which comprehensive studies of fresh-water invertebrate faunas have been carried out (Carpenter, 1924 *et seq.*; Percival and Whitehead, 1929; Butcher, Longwell and Pentelow, 1937; Macan, 1940 *et seq.*; Jones, 1948a; Hynes, 1952, 1961b; Brown, Cragg and Crisp, 1964).

Further details of the region are given by Langford (1964) and Langford (in preparation).

METHODS OF SAMPLING

Collections were taken at 195 predetermined stations using a pond net of 20 meshes per inch in a standardised procedure. Of these stations 167 were in North Lincolnshire and 28 in South Lincolnshire.

The method for sampling the macrofauna of the wadeable streams was outlined by Langford (1964) and used originally by Hynes (1961b).

Collections from the deeper pools and rivers were made by digging the distal rim of a triangular pond net, about 2 inches (5cm) into the substrate and dragging the net about 1½ feet (0.5 metres) toward the operator. The mouth of the net was kept facing the operator.

During the times when the canalised reaches were flowing, a similar method of sampling was used but the open mouth of the net was directed upstream.

Ten per cent formalin was added to all collections in the field. Sorting was carried out by hand in the laboratory.

SPECIES RECORDED IN THE SURVEYS

Of the forty-seven British Ephemeroptera listed by Macan (1961), only fifteen are recorded from Lincolnshire, even though surveys were planned to include all the seasons and all types of habitat. Species recorded by Macan are shown by an asterisk (*) and my own records are shown by the initials T.E.L. Brief notes on the distribution of species within the region, are included.

EPHEMERIDAE

Ephemera danica (Müll.).—**53***: 27.i.64, River Witham at Little Ponton (SK 929320); rare in the Witham catchment area. **54**: 18.vii.61, Thornton Beck (TA 061959) (T.E.L.); rare, in a few clean sandy reaches.

EPHEMERELLIDAE

Ephemereilla ignita (Poda).—**53***: River Witham at Colsterworth (SK 929238); rare, in a few stony riffles. **54**: 31.vii.62, River Rase at Tealby (TF 159907) (T.E.L.); rare, but abundant in Wold streams.

CAENIDAE

Caenis horaria (L.).—**53**: Outflow from Denton Reservoir (SK 871340) (T.E.L.); also common and abundant in the Witham. **54**: 12.xii.63, Great Eau at Grayton Grange (TF 451868) (T.E.L.); common in clean silted rivers and pools.

C. moesta Bengtss.—**53**: 27.i.64, River Witham at Long Bennington (SK 841443) (T.E.L.); common, often with *C. horaria*. **54**: 23.ii.62, Great Eau at Cloves Bridge (TF 469905) (T.E.L.); rare, but abundant where it occurs.

C. macrura Steph.—**53**: 4.vi.64, River Witham at Claypole (SK 842489) (T.E.L.); present in four places only.

C. robusta Eaton.—**54**: 28.v.64, Bellwater Drain (Hobhole System), at Helmholme Bridge (TF 406586) (T.E.L.); found in two places only

BAETIDAE

Baetis rhodani (Pict.).—**53**: 4.vi.64, River Witham at Claypole (SK 842849) (T.E.L.); **54***: 26.ix.61, River Lud at Louth (TF 321872); common and abundant.

B. vernus (Curt.).—**53**: 4.vi.64, River Witham at Barkston Bridge (SK 928414) (T.E.L.); common and abundant. **54**: 23.x.62, River Rase at Bishopbridge (TF 032911) (T.E.L.); common in lower reaches of streams.

B. bioculatus (L.).—**53**: 4.vi.64, Witham at Colsterworth (SK 929238) (T.E.L.); nymphs common in summer months (June–August).

B. pumilus (Burm.).—**54**: 10.i.63, River Rase at Bully Hill (TF 031911) (T.E.L.); rare, only in uppermost reaches of Wold streams.

Cloeon simile Eaton.—**53**: 4.vi.64, River Witham at Beckingham (SK 874540) (T.E.L.); common in slow reaches. **54**: 23.ix.62, Great Eau at Withern (TF 425827) (T.E.L.); common, often with *C. dipterum*.

C. dipterum (L.).—**54**: 16.x.62, River Ancholme at Bishopbridge (TF 031911) (T.E.L.); fairly common in slow rivers and pools.

Centroptilum luteolum (Müll.).—**53**: 4.vi.64, River Witham at Claypole (SK 842489) (T.E.L.); common in slow rivers. **54**: 4.viii.64, Great Eau at Withern (TF 425827) (T.E.L.); common, often together with *Cloeon* spp.

LEPTOPHLEBIIDAE

Habrophlebia fusca (Curt.).—54: 13.vii.64 Middle Rasen, on the River Rase (TF 095895) (T.E.L.); rare, very few nymphs taken.

Paraleptophlebia submarginata (Steph.).—54: 31.vii.62, River Rase tributary at Market Rasen (TF 115888) (T.E.L.); rare, few nymphs at three stations.

In collections from the Bellwater Drain near Boston, and from Burton Gravel Pits near Lincoln, a few small *Caenis* nymphs were found which had a curiously shaped pronotum, unlike any described by Macan (1961). After examination of the material Dr. Macan suggested that the nymphs were *Caenis robusta* but further examinations of material is necessary before this can be confirmed.

DISCUSSION

The absence of species usually associated with torrential mountain streams is not unexpected in view of the topology of the region. Among these absentees the most notable are the flattened species of the Ecdyonuridae. Other absentees are found, however, among the species associated with slower rivers i.e. Siphonuridae and *Leptophlebia* spp. and it is probably that the paucity of the Ephemeroptera fauna is due to factors other than the physical features of the water bodies in the region. This apparent paucity of Ephemeroptera is discussed elsewhere (Langford in preparation).

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Research Officer (Biologist), Central Electricity Research Laboratories, Cleve Road, Leatherhead.

Now C.E.R.L., Fresh-water Biology Unit, c/o Midlands Region Research & Development Dept., Hams Hall Power Station, Lea Marston, Sutton Coldfield, Warwickshire May 21st, 1965.