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## EPHEMEROPTERA AND PLECOPTERA IN NORTH WALES

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## INTRODUCTION

During studies of the biology and distribution of Ephemeroptera and Plecoptera in some North Wales lakes (Brittain, 1971) extensive collections were made to obtain a clearer picture of the distribution of these two groups. The following records are mainly from lacustrine habitats and therefore some species recorded only rarely may be more common than appears. Most of the collecting was done in Caernarvonshire and Anglesey, but Merionethshire is also included in this survey. Previously published records, notably those of Brown (1943), Hynes (1967), Kimmins (1933, 1934), and Macan (1970), together with several unpublished records from the files of the Department of Applied Zoology, Bangor, are included. These files are under the supervision of Mrs. M. J. Morgan and further records for North Wales may be sent either to Mrs. M. J. Morgan, Department of Applied Zoology, University College of North Wales, Bangor, Caerns. or to the author. In the following text new county records are indicated with an asterisk (\*).

## EPHEMEROPTERA

*Ephemera danica* Müll. – Llyn Tegid (Lake Bala), Merioneth. (Graham & Jones, 1962).

*Caenis horaria* (L.). – Anglesey\*: common, sometimes abundant on muddy substrata in most lakes such as Llyn Coron (map reference 380/700) and Llyn Maelog (325/730). This species has rapidly become an important member of the large new reservoirs on the island, Llangedfni and Alaw. At Llangedfni Reservoir, Mrs. M.J. Morgan collected adults in a light trap during vi. 68: on the nights of 15th/16th and 16th/17th a few, on the night of 17th/18th enormous numbers. Dr. N. Jones also reported, "clouds on the wing", at the reservoir at 11 p.m., 17 vi. 64. The absence of the species from the mainland may be due to the absence of suitable substrata. *C. luctuosa* (Burm.) – Common in lakes on Anglesey and in Caernarvonshire (hereafter referred to as Caerns.), and probably also in Merionethshire (hereafter referred to as Merioneth.). Generally found on courser substrata than *C. horaria*, although the two species occur together in several habitats on Anglesey (Anglesey (Macan, 1970)).

*Ephemerella ignita* (Poda). – Caerns.\*: 4 vii. 68, outflow of Llyn Idwal (647/598), nymphs. Merioneth: in stomachs of trout from Llyn Tegid (Graham & Jones, 1962). I found nymphs abundant in a small stony stream at Bontddu, Merioneth. (670/200). Probably more widespread as the nymphs are only present for 2-3 months, during the summer (Macan, 1957). *E. notata* Etn. – Only recorded for Denbighshire (Macan, 1970).

*Ecdyonurus venosus* (F.). – Caerns. Macan (1970). In streams and small rivers from near sea-level to 530 m. Nymphs in a small stony stream at Bontddu, Merioneth. (670/200)\*, 2 viii. 68. Mature nymphs in April and May.

*Rhithrogena semicolorata* (Curt.) – Common in many fast-flowing streams in Caerns., and in the rivers Glaslyn, Rheadr fawr and Llugwy. Brinton collected adults from the R. Llugwy, v. 33 (Kimmins, 1934). *R. haarupi* Esb.-Pet. – The nymphs of this and the preceding species cannot be distinguished, but *R. haarupi* is only recorded from a small number of large rivers in Britain (Macan, 1970). Brinton collected an adult *R. haarupi* at Betws-y-Coed, 23 v. 31. (Kimmins, 1933), possibly originating from the River Conway.

*Heptagenia lateralis* (Curt.). – Caerns. (Harris, 1952). In streams and small rivers, common where present. Occurs up to 530 m in the Afon Duly'n (706/664) and also on the stony shores of Llyn Duly'n (703/666). *H. sulphurea* (Mull.). – Caerns. (Harris, 1952).

*Leptophlebia vespertina* (L.). – Caerns. (Harris, 1952). Common, often abundant, in most lakes and pools in both Caerns. and Merioneth.\*. Equally common on stony shores as in areas of aquatic vegetation. Occurs up to 530 m in Llyn-y-Foel (714/547). Adults most abundant in the latter half of May and throughout June, but I have taken them from early May to the beginning of August. On Anglesey\*, Mrs. M.J. Morgan took adults at Cors Goch N.R. (501/815) during June, 1966, 1968 and 1969. *L. marginata* (L.). – Common in Caerns. and Merioneth.\* (recorded by R.E. Brinton, in Kimmins (1934), from Llyn Pen-y-Parc (792/590), but so far not found on Anglesey. Often with *L. vespertina*, although usually in smaller numbers. Also found in some small streams. Adults common during April and early May, although as late as early June at high altitudes. *L. marginata*, in many localities, is larger at a given time than *L. vespertina* and emerges earlier (Brittain, 1971).

*Paraleptophlebia submarginata* (Steph.). Caerns.\*. 4 iii. 70, a mature nymph collected by Mr. M.A. Lock in a stream containing abundant aquatic mosses at Rhyd-y-Groes, Pentir (580/670). Identified by the author.

*Ameletus inopinatus* Etn. – Previously recorded only from Scotland, the lake District and the Pennines (Macan, 1970). Caerns.\*: I found nymphs on 3 v. 70 in a small, fast-flowing stream at 840 m on Foel grach (695/657).

*Siphonurus lacustris* Etn. – Caerns. (Macan, 1951). Occurs in several of the larger Caernarvonshire lakes, usually in areas of *Littorella* or *Isoetes*, up to 600 m. Adults from late May to early August.

*Centropilum luteolum* (Müll.). – Anglesey\*: 2 iv. 68, nymph collected in Llyn Maeiog (328/727).

*Cloeon dipterum* (L.). – Not previously recorded, but often abundant in productive ponds and lakes, therefore more common on Anglesey than on the mainland. Caerns.\*: 16.xi.67, nymphs abundant in pond at Vaynol Park (541/694). Anglesey\*: 11.xii.68, nymphs in pond at Newborough Forest (423/659), Dr. O. Beaver. More than one generation per year in some habitats. *C. simile* Etn. – Caerns. (Macan, 1970). Sporadically in pools and lakes in Caerns. and Anglesey, usually in less productive habitats than those supporting *C. dipterum*. Anglesey\*: 23.iv.66, nymphs collected by J. Brummitt, Gors Goch N.R. (501/815); I collected nymphs from Llyn Hendref (398/765), 22.ii.68. Adults in May, June and September.

*Baetis niger* (L.). – Merioneth.\*: nymphs in a small stream (with aquatic mosses) at Bontddu (670/200), 2.viii.68. *B. muticus* (L.). – Collected by R.E. Brinton, v.33, River Llugwy, Caerns. (Kimmins, 1933). Also in stony streams and other small rivers up to about 300 m. *B. scambus* Etn. – Caerns.\*: 28.viii.68, nymphs common in outflow of Llyn Dinas (611/598); 4.vii.68, nymphs common in outflow of stream of Llyn Idwal (647/598). *B. rhodani* (Pict.). – Present in all three counties, although only previously recorded for Merioneth. (Harris, 1952). Common, found in streams and rivers (up to about 550 m) and extending into some of the more productive Anglesey lakes around the inflows and outflows. *B. vernus* Curt. – Caerns.\*: 28.viii.68, nymphs common in outlet of Llyn Dinas, the Afon Glaslyn (611/493); a weedy, deep area with a moderate current.

#### PLECOPTERA

*Taeniopteryx nebulosa* (L.). – Merioneth. (Hynes, 1967).

*Brachyptera risi* (Morton). – Recorded for all three counties (Hynes, 1967). Nymphs up to 400 m in the Afon Anafon (699/704). Adults in April and May.

*Protonemura praecox* (Morton). – Caerns. and Merioneth. (Hynes, 1967). In stony streams; adults from late May until mid-July. *P. meyeri* (Pict.). – First recorded for Caerns. by G.T. Porritt (1890, 1903) near Penmaenmawr and Aber. Hynes (1967), records it for all three counties. Common in streams and small rivers from sea-level to 630 m. Nymphs from September until May and adults in April and May (some adults in August at higher altitudes).

*Amphinemura standfussi* Ris. Merioneth. (Hynes, 1967). *A. sulcicollis* (Steph.). – Small numbers in many lakes in Caerns. and Merioneth. Common in large streams up to 525 m. Adults in May and June. Brown (1943) records it for Caerns., while Hynes (1967)

records it for all of N. Wales.

*Nemurella picteti* Klap. — In pools and ponds with emergent vegetation. Typical of limnocerene springs in the Aber and adjacent valleys at heights around 300 m. Caerns. and Merioneth. (Hynes, 1967). Anglesey\*: 22.v.68, nymphs from Llyn Pen-y-Parc (585/751). Emergence period long; adults from May until October.

*Nemoura cinerea* (Retz.). — Mainly in lakes and pools with emergent vegetation, but also in small streams at high altitude (c. 750 m). Adults from April to July, main emergence in May and early June. Caerns. (Brown, 1943). Recorded for both mainland counties by Hynes (1967). Anglesey\*: 30.vi.65 and on four subsequent occasions in May and June; imagines taken by Mrs. M.J. Morgan at Cors Goch N.R. (501/815). I collected adults from Llyn Pen-y-Parc (585/751). *N. avicularis* Morton. — Recorded from the mainland counties by Hynes (1967) where it is common in many of the lakes. Absent from the lakes on Anglesey. Adults from the end of February to June, main emergence in March and April. *N. cambrica* (Steph.). — Hynes (1967) recorded it for both Caerns. and Merioneth. *N. erratica* Claassen. — Merioneth. (Hynes, 1967) Caerns.\*: 10.v.68, nymphs common in stream above the Ffridd, Aber (659/707) at 270 m (coll. J.F. Wright): 17.v.69, mature nymph in small stony stream at 600 m on Tryfan (662/596).

*Euleuctra geniculata* (Steph.). — Recorded for all three counties (Hynes, 1967) and for two localities, both in the Llyn Peninsula (Brown, 1943). Adults at the side of the Afon Glaslyn in the region of Llyn Dinas, August and October. *Leuctra inermis* Kempny. — Caerns. and Merioneth. (Hynes, 1967). In rivers such as the Glaslyn, Dwyryd and Rheadr fawr, and in small streams (up to 600 m). Adults in April and May. *L. hippopus* Kempny. — In small numbers in Caernarvonshire lakes such as Dinas and Mymbur and in streams (up to nearly 900 m); In 1966, J. Brummit recorded it in the Conway Valley and stated, "in every stream and can be taken in hundreds by sweeping streamside vegetation at the right time of the year". Adults in April and May. Recorded for all three counties by Hynes. *L. nigra* (Oliv.). — Caerns. and Merioneth. (Hynes, 1967) Found in small stony streams, where adults emerged in May. *L. fusca* (L.). — First recorded by Bainbridge, 18.x.33, from the River Lledr, Caerns. (Kimmins, 1934): Hynes (1967) recorded it from all three counties. Abundant in Llyn Dinas and Llyn Cwellyn; a 'late' species, most growth being accomplished in the summer, the adults emerging during September, October and November. *L. moselyi* Morton. — Merioneth. (Hynes, 1967).

*Capnia bifrons* (Newman). — Merioneth. (Hynes, 1967); Graham & Jones, 1962). Caerns.\*: 19.v.70, adult female taken while sweeping lakeside vegetation at Llyn Cwellyn (557/554).

*Perlodes microcephala* (Pict.). — Caerns., nr. Penmaenmawr (G.T. Porritt, 1890); nr. Pwllheli (Brown, 1943); Merioneth, (Hynes, 1967). Anglesey\*: 7.vi.71, male adult, Cors Erddreniog N.N.R. (coll. & det. Mrs. M.J. Morgan). In streams and occasionally on stony lake shores, emergence from April to June.

*Diura bicaudata* (L.). — Hynes (1967) recorded it for both mainland counties. In the higher altitude lakes (e.g. Llyn Glaslyn); occasionally in lakes at lower altitudes and in streams. Adults in May.

*Isoperla grammatica* (Poda). — Caerns. (Brown, 1943). Hynes (1967) registered it from all three counties. Common in rivers and streams, and occurring in small numbers in some lakes especially near inflows and outflows. Emergence in North Wales from April to August.

*Dinocras cephalotes* (Cur.). — So far not found on Anglesey. Common in rivers and hill streams around Aber, Caernarvon, and in streams in Cwm Idwal, Caerns. (300-400 m).

*Perla bipunctata* Pict. — Merioneth. (Hynes, 1967). Caerns.: Afon Erch and the Afon Rhyd-hir in the Llyn Peninsula. (Brown, 1943). Nymphs common in the stony, fast-flowing Afon Rheadr fawr, near Aber, Caerns.

*Siphonoperla torrentium* (Pict.). — Caerns. (Brown, 1943) and all N. Wales (Hynes, 1967). Common in many Caernarvonshire lakes, adults in May and June. Also in stony streams throughout the region up to nearly 600 m. *Chlorperla tripunctata* (Scop.). — So far not found on Anglesey, but Hynes (1967) records it for all the mainland counties. Not as common as *S. torrentium* and only found in running water.

## EPHEMEROPTERA – CHECK LIST

	Caerns.	Merioneth.	Anglesey
<i>Caenis horeria</i> (L.)	—	—	+*
<i>C. luctuosa</i> (Burm.)	+*	—	+
<i>Ephemerella ignita</i> (Poda)	+*	+	—
<i>Ecdyonurus venosus</i> (F.)	+	+*	—
<i>Rhithrogena semicolorata</i> (Curt.)	+	—	—
<i>R. haarupi</i> Esb-Pet.	+	—	—
<i>Heptagenia lateralis</i> (Curt.)	+	—	—
<i>H. sulphurea</i> (Müll.)	+	—	—
<i>Leptophlebia vespertina</i> (L.)	+	+*	+*
<i>L. marginata</i> (L.)	+	+*	—
<i>Paraleptophlebia submarginata</i> (Steph.)	+*	—	—
<i>Amelotus inopinatus</i> Etn.	+*	—	—
<i>Siphonurus lacustris</i> Etn.	+	—	—
<i>Centropitulum luteolum</i> (Müll.)	—	—	+*
<i>Cloeon dipterum</i> (L.)	+*	—	+*
<i>C. simile</i> Etn.	+	—	+*
<i>Baetis niger</i> (L.)	—	+*	—
<i>B. muticus</i> (L.)	+	—	—
<i>B. scambus</i> Etn.	+*	—	—
<i>B. rhodani</i> (Pict.)	+*	+	+*
<i>B. vernus</i> Curt.	+*	—	—
Total number of Species (21):	18	6	7

## PLECOPTERA – CHECK LIST

	Caerns.	Merioneth.	Anglesey
<i>Taeniopteryx nebulosa</i> (L.)	—	+	—
<i>Brachyptera risi</i> (Morton)	+	+	+
<i>Protonemura praecox</i> (Morton)	+	+	—
<i>P. meyeri</i> (Pict.)	+	+	+
<i>Amphinemura standfussi</i> Ris.	—	+	—
<i>A. sulcicollis</i> (Steph.)	+	+	+
<i>Nemurella picteti</i> Klap.	+	+	+*
<i>Nemoura cinerea</i> (Retz.)	+	+	+*
<i>N. avicularis</i> Morton	+	+	—
<i>N. cambrica</i> (Steph.)	+	+	—
<i>N. erratica</i> Claassen	+*	+	—
<i>Euleuctra geniculata</i> (Steph.)	+	+	+
<i>Leuctra inermis</i> Kempny	+	+	—
<i>L. hippopus</i> Kempny	+	+	+
<i>L. nigra</i> (Oliv.)	+	+	—
<i>L. fusca</i> (L.)	+	+	+
<i>L. moselyi</i> Morton	—	+	—
<i>Capnia bifrons</i> (Newman)	+*	+	—
<i>Perlodes microcephala</i> (Pict.)	+	+	+*
<i>Diura bicaudata</i> (L.)	+	+	—
<i>Isoperla grammatica</i> (Poda)	+	+	+
<i>Dinocras cephalotes</i> (Curt.)	+	+	—
<i>Perla bipunctata</i> Pict.	+	+	—
<i>Siphonoperla torrentium</i> (Pict.)	+	+	+
<i>Chloroperla tripunctata</i> (Scop.)	+	+	—
Total number of Species (25):	22	25	11

+ recorded, — not recorded, \* new county record.

## DISCUSSION

The number of mayfly species recorded for North Wales is now 21 out of a total of 47 for the whole of the British Isles. Although lacking in productive habitats, Caernarvonshire has the richest Ephemeropteran fauna, at least according to the number of species recorded so far. The much lower number for Merionethshire is more a reflection of the lack of collecting than any fundamental difference in the freshwater fauna (cf. stoneflies). Being an island, Anglesey would be expected to have a poorer mayfly fauna than the mainland, but the absence of fast-flowing stony rivers and oligotrophic lakes is of at least equal importance.

The stonefly fauna of Caernarvonshire and Merionethshire is richer in species than that of Anglesey; 22 and 25 species respectively as compared with only 11. This difference, as with the Ephemeroptera, is due largely to the absence of oligotrophic habitats on the island. An investigation of the differences in the lacustrine mayfly and stonefly faunas of Caernarvon, and Anglesey will be the subject of future papers by the author.

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## SUMMARY

Twenty-three new county records are given for Ephemeroptera and Plecoptera in Caernarvonshire, Merionethshire, and Anglesey. Notes on nymphal habitats and flight periods in North Wales are given where known. Revised check-lists for the two groups in North Wales are presented.

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