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The stoneflies (Plecoptera) of the Corrib catchment area, Ireland

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Records for fifteen species of stoneflies (*Amphinemura sulcicollis, Nemoura avicularis, Nemoura cinerea, Nemurella pictetii, Protonemura meyeri, Leuctra fusca, Leuctra hippopus, Leuctra inermis, Capnia atra, Capnia bifrons, Diura bicaudata, Isoperla grammatica, Perla bipunctata, Chloroperla tripunctata* and *Siphonoperla torrentium*) from the Corrib catchment basin in the west of Ireland are presented.

Their distributional patterns are considered in relation to habitat characteristics, including water chemistry, and the general topographical and geological features of the area. Predation by fish on stoneflies in alkaline streams was also investigated.

Les Plécoptères du bassin versant du Lough Corrib, Irlande.

Les auteurs présentent la répartition de quinze espèces de Plécoptères (*Amphinemura sulcicollis, Nemoura avicularis, Nemoura cinerea, Nemurella pictetii, Protonemura meyeri, Leuctra fusca, Leuctra hippopus, Leuctra inermis, Capnia atra, Capnia bifrons, Diura bicaudata, Isoperla grammatica, Perla bipunctata, Chloroperla tripunctata* et *Siphonoperla torrentium*) dans le bassin du Lough Corrib, dans l'ouest de l'Irlande. Ils considèrent leur distribution en fonction des caractéristiques du milieu, y compris les propriétés physico-chimiques de l'eau, et des caractères topographiques et géologiques généraux de l'aire étudiée. Ils étudient aussi la prédation des Plécoptères par les poissons dans les cours d'eau alcalins.

Introduction

As part of an ongoing investigation of the freshwater communities in the Corrib catchment in the west of Ireland, we undertook a general study of the Plecoptera of that area (Fig. 1). This system, which drains approximately 3100 km^2 of geomorphologically diverse terrain, includes two large centrally located lakes, Lough Corrib and Lough Mask. These generally subdivide the area into contrasting eastern and western sections. The western part of the catchment includes much mountainous terrain with extensive blanket peat lands overlying granite, schist and quartzite. In places, there are podzolized grey-brown earth soils. Its standing waters are generally oligotrophic or oligodystrophic, and the streams and rivers, typically, have stony, unstable, substrates and a rapid overground run of waters. The eastern area is low lying with more productive shallow brown earth soils, overlying carboniferous limestone and glacial drift. The flow patterns are of a more gentle nature and substrata of rivers tend to be more stable. The alkaline waters, which tend to be more eutrophic than their western counterparts, are also largely unpolluted and much arterial drainage has been undertaken with a view to improving agricultural production. The climate of the catchment is temperate, being influenced by proximity to the Atlantic and the prevailing south-westerly air stream (Fig. 2A). Precipitation is high, about 1 100 mm per annum (Fig. 2B) and most streams are permanent.

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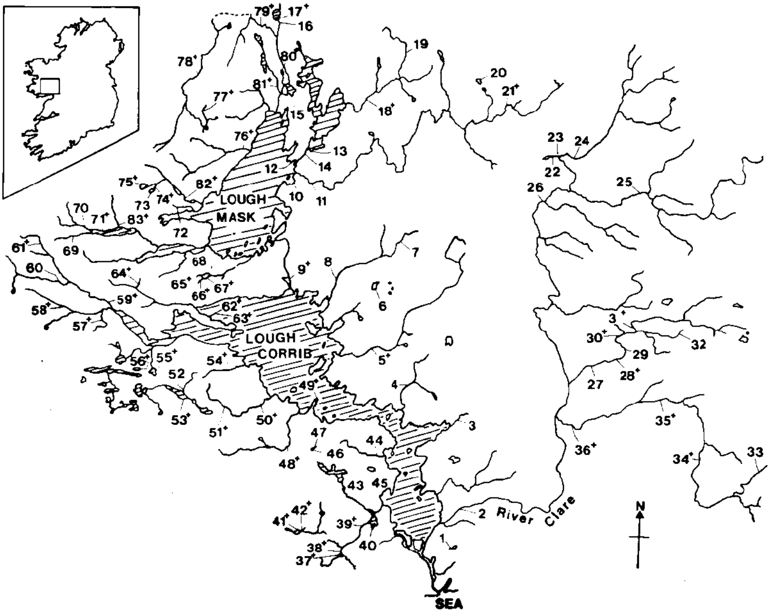

Fig. 1. The rivers and lakes of the Corrib catchment basin showing the sites sampled. Sites in which stoneflies were found in are numbered with a plus (+) sign. Inset shows the position of the catchment in relation to Ireland. Erratum : instead of 3⁺ read 31⁺.

1. — Materials and methods

A general field survey of stoneflies was undertaken between November, 1981 and June, 1982. Nymphs were sampled using a pond net. These were dislodged from stony substrates by kicking and from samples of vegetation, collected by hand, into the net. An attempt was made to obtain representative and comparable samples from each site. Adult stoneflies were collected by hand from marginal stones, etc. Samples of fish stomach contents obtained during electrofishing surveys, August 1979 to May 1981, in tributaries of the Clare river, were also examined for stonefly adults and nymphs. Identifications of specimens obtained were mainly made using Hynes' (1977) key. Full-grown nymphs found in fish stomachs with characteristically darkened wing pads, which had sometines burst open to reveal the wings, were termed « emergents ». Specimens were preserved in 70% alcohol and individual measurements made using a binocular microscope to the nearest 0.5 mm. Body lengths were measured from the labrum to the posterior margin of the tenth abdominal tergite. In the case of adults, the distance from the labrum to wing tips, when folded over the body, was also measured.

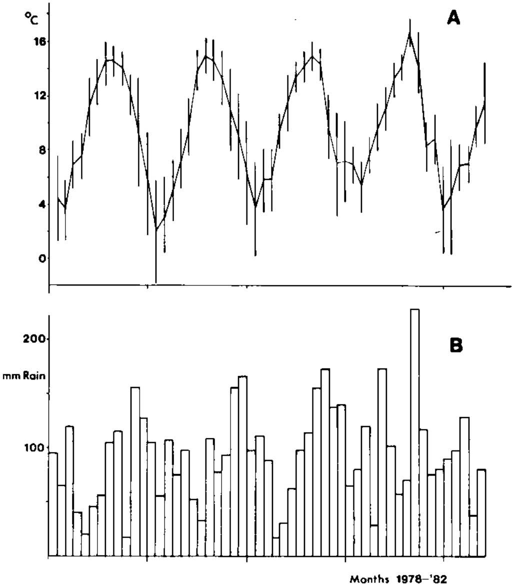

Fig. 2. Meteorological data for the months January 1978 until May 1982; A, air temperature in degrees centigrade, the vertical lines indicating the range about the mean; B, rainfall in millimetres.

General observations were made on the sites studied, including current speed in the case of lotic habitats, and samples of water were taken for laboratory analyses. The pH (Pye-Unicam 292 meter), conductivity (Radiometer CDM. 3 meter) at 20° C, total and calcium hardness (E. D. T. A. titration methods) of the water samples were recorded (Golterman & Clymo 1971). For statistical purposes waters with total hardness values of 50 mg/l and less are termed soft waters.

2. — Results

In the course of the general survey 98 samples were taken at 83 sites, and of these, 57 samples, representing 45 sites, contained stonefly nymphs or adults (Fig. 1). A total of 1840 nymphs and 60 adults were identified from these samples. In addition, 168 alate adults, 71 emergent adults and 532 stonefly nymphs found in salmonid fish stomach samples from the rivers, Abbert (sites 35, 36), Grange (sites 27, 28, 29, 30, 31), and Sinking (site 25) were identified to species level. The combined results of these samples included records of 15 of the 19 species of stoneflies definitely known to occur in Ireland. Locality data and details of the stoneflies found in the general survey of the catchment are given in the appendix. Map references are given relative to the Irish National Grid and approximate altitudes are given by reference to map contours. Specific localities are not given for specimens from fish stomach samples because of the mobility of the fish and the varying river stretches electrofished on different occasions. The results of water analyses at the 83 sampling sites (Fig. 1) are summarized in Fig. 3.

In general, the water chemical factors monitored were inter-related and calcium hardness, total hardness and conductivity levels proved to be signifi-

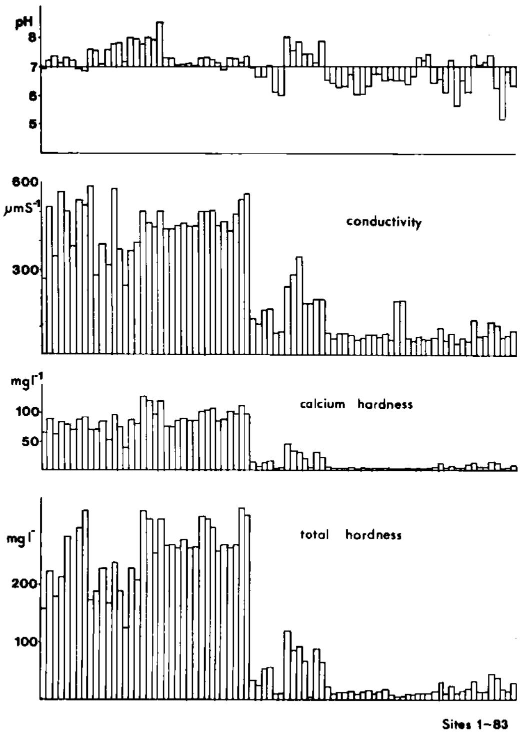

Fig. 3. The water chemical values found for the sites sampled.

cantly correlated ($P < 0.05$). Higher values were typical of the lowlying eastern parts of the catchment and, with the exception of some small limestone areas, the western water bodies tended to contain soft water with low conductivity values. A broadly similar pattern was observed in the case of pH values. For these reasons, total hardness was selected as a representative water chemical parameter for the following analyses. The values of total hardness for the sites investigated ranged from 4 to 334 mg/l $CaCo_3$, with a mean value of 126 mg/l $CaCo_3$.

The western sites contained more diverse stonefly populations. Twenty-three of the 31 western lotic sites contained stoneflies as did 11 of the 16 western lentic sites. However, in only 10 of the 30 eastern lotic and 1 of the 6 eastern lentic sites were stoneflies found. The distribution of stoneflies in rela-

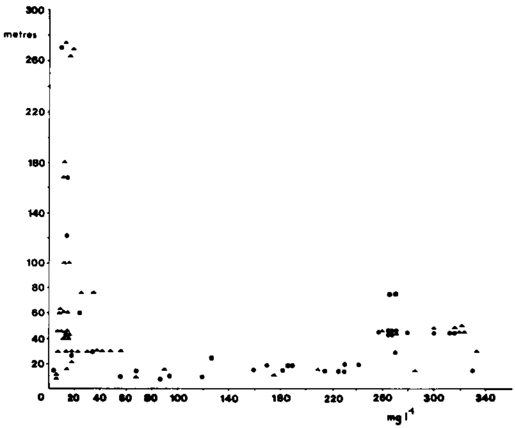

Fig. 4. The total hardness (mg/l $CaCO_3$) and altitude (metres) values for each site. Sites in which stoneflies were found are marked with a triangle, other sites with a dot.

tion to total water hardness and altitude is summarized in Fig. 4. The general patterns indicate significantly more frequent occurrences in the case of soft water habitats (χ^2 = 17,06,P < 0.001). However, all hard water sites studied were less than 76 m in altitude. When sites above this level were excluded from the analyses, there was still a significantly (χ^2 = 14.12, P < 0.001) more frequent occurrence of stoneflies in soft water sites. The ranges of total water hardness for sites at which stoneflies occurred and those at which they were not recorded were similar, but the mean values, 86 mg/l and 175 mg/l $CaCo_3$, respectively were quite different. The water hardness and altitude ranges found for each species are shown in Table I. Of the six commoner species two appear to have a restricted distribution, namely *Isoperla grammatica* below 61 m altitude, and *Siphonoperla torrentium* in soft waters.

Amphinemura sulcicollis (Stephens) was recorded at twenty sites, mainly western streams, and had both wide altitudinal and water hardness ranges. Small nymphs were observed in November but most growth occurred from January to April with emergence in late April and May. The species was frequently preyed upon by trout in the Rivers Grange and Abbert. The body lengths of the adults (34♂, 33♀) (5.0-6.5 mm, ♂♂ and 5.0-8.0 mm, ♀♀) were generally larger than the values given by Hynes (1941) and Lillehammer (1974) for this species.

Nemoura avicularis Morton was found at three sites, all western and lowlying. These were soft water habitats and included a single lentic record. However, adult specimens (2♂, 1♀) were obtained in trout stomach samples, taken in April, from the R. Abbert, in the eastern side of the catchment. The only previous records of this species in Ireland are those of O'Connor and Bracken (1978) who collected nymphs of the species in two lakes, L. Dan, Co. Wicklow, and L. Sillan, Co. Cavan. However, O'Connor (pers. comm.) has further specimens including one adult male from L. Ree, Co. Westmeath.

Nemoura cinerea (Retzius), a euryoecious species, was found at nine sites, though never in great numbers. It occurred in both sides of the catchment and in both lakes and rivers. The water hardness of the sites, up to 100 m altitude, was variable. Adults were taken from R. Grange trout sampled in April.

Nemurella pictetii (Klapálek) was found at four western soft water sites of varying altitudes. The greatest densities occurred in shallow trickles and the only lentic record (site 62) refers to a site where one of these streams enters L. Corrib (site 63). Indeed, the size distribution of the nymphs at site 67 is such that some individuals may be semivoltine.

Protonemura meyeri (Pictet) is a common species, recorded in sites varied in terms of both water chemistry and altitude. This species was only taken in lotic habitats. Nymphal growth was observed throughout the winter period and emergence occurred in April and early May.

Leuctra fusca (L.) was recorded at six sites, all lotic and lowlying. However, this is a summer growing form and has probably been overlooked at many of the sites visited in winter and spring. Adults (49♂, 45♀) were common in fish stomach samples from the three rivers electrofished, during July, August and September.

Leuctra hippopus Kempny showed a marked preference for lotic habitats and was found generally in the western parts of the catchment. Adults of both sexes found at site 74 (268 m) in February and April included brachypterous individuals.

Leuctra inermis Kempny exhibited a similar distribution to *L. hippopus*. The nymphs were later growing than *L. hippopus* and the earliest recorded adults (4♀) were obtained in May.

Capnia atra Morton adults (2♂, 1♀), all short winged, were collected but once, on the shore of a small high altitude corrie lake. However, it may also occur in upper Lough Corrib (B. Connolly pers. comm.). The only previous Irish record of this species is that of King and Halbert (1910), confirmed by O'Connor (1978), in a similarly glaciated lake (628 m altitude) in Co. Kerry.

Capnia bifrons (Newman) was only encountered in small numbers at three lowlying sites. Three adult females were obtained from trout stomach contents from the R. Abbert, sampled in April.

Diura bicaudata (L.) was found at three soft-water sites of varying altitude. Fifteen adults were taken from among stones on lake shores during April, and included both long and short winged females and micropterous males. The wing venation of these specimens varied considerably.

Isoperla grammatica (Poda) was found to be widely distributed in lowlying (maximum 61 m) lotic habitats, including both soft and hard waters. Nymphal populations were composite, with nymphs as small as 2. 5 mm occurring in May. However, the flight period, the longest recorded for any of the species, extended from April to August.

Perla bipunctata Pictet was recorded at three lowlying soft water sites of varying altitude. Adults (4♂, 1♀) were collected on one occasion, 31 May 1982, when a third cohort, of 3.0 mm nymphs, appeared. The female extruded a single egg mass of 1 389 ova in the laboratory. The males were brachypterous.

Chloroperla tripunctata (Scopoli) was collected in three sites, all lowlying soft water streams. Only nymphs were obtained.

Siphonoperla torrentium (Pictet) was abundant in both stony rivers and stony lake shores of the western catchment. Of the commoner species, this had the lowest mean and narrowest range of water hardness values. Adults (4♂, 2♀), all longwinged, were obtained at site 75 in May.

The degree of association between the seven most frequently recorded species was calculated by means of chi-square tests (Southwood 1966). This indicated a very highly significant positive association ($P < 0.001$) between *A. sulcicollis* and *P. meyeri* and highly significant positive associations ($P < 0.01$) between all three species *A. sulcicollis, L. inermis* and *L. hippopus*. Likewise, a highly significant positive association ($P < 0.01$) was demonstrated between *P. meyeri* and *I. grammatica*. In contrast the association between *N. cinerea* and *S. torrentium* was significantly negative ($P < 0.05$). These were the only associations found to be significant.

3. — Salmonid predation on Plecoptera

The stomach contents of 1 592 brown trout (*Salmo trutta L.*) and 493 Atlantic salmon parr (*Salmo salar L.*) from the Abbert, Grange and Sinking rivers, were analysed. All the fish were captured between 10. 00 and 17. 00 hours. In all, 108 276 prey organisms were recorded in trout stomachs and 840 (0. 77%) of these were Plecoptera. A total of 21 503 prey organisms were recorded in salmon stomachs, of which 194 (0. 9%) were Plecoptera. Of these Plecoptera, 771 (75%) were identified to species ; *A. sulcicollis* (356), *N. avicularis* (3), *N. cinerea* (10), *P. meyeri* (87), *L. fusca* (125), *L. inermis* (1), *C. bifrons* (3), *I. grammatica* (186).

In all rivers, April was the only month when Plecoptera were an important dietary component, especially among 1 + group fish, then accounting for 3·5% of the total number of prey organisms.

The consumption patterns of the nymphal, emergent, and adult phase of the four commoner species of Plecoptera varied interestingly. The ratio of nymphs to emergents to adults shows a similar pattern for *A. sulcicollis* (1 : 0. 21 : 0. 20) and *P. meyeri* (1 : 0. 18 : 0. 12). In the case of *I. grammatica* proportionately more nymphs were recorded (1 : 0. 01 : 0. 03). In contrast to these three species, there were few nymphs and emergents but large numbers of adults of *L. fusca* (1 : 0. 21 : 4). Furthermore, greater numbers of nymphs of all four species were recorded immediately prior to, and during, the emergence period of that species.

4. — Discussion

Nineteen species of Plecoptera are definitely known to occur in Ireland. However, records requiring confirmation exist for several further species. The species not found in this survey, but believed to occur in Ireland, are *Brachyptera risi* (Morton), *Protonemura praecox* (Morton), *Perlodes microcephalus* (Pictet) and *Dinocras cephalotes* (Curtis).

In general, the stoneflies preferred the soft waters of the western side of the catchment, even irrespective of their altitude. The influence of water hardness, or any of the correlated chemical factors, is unlikely to be direct, however, for such factors are closely related to the productivity, and hence flora and fauna, of the waters (Egglishaw 1968). Likewise, altitudinal distributions would reflect topographical and geological influences on the aquatic environment peculiar to the catchment. A recent survey of the Plecoptera of British rivers by Bird (1983) similarly found that « the diversity of the stonefly fauna increased with increasing slope and decreasing alkalinity. »

The absence of *I. grammatica* in sites above 61 m is interesting in that other studies (Hynes 1941 ; Minshall 1969 ; Meinander 1972) have also noted a limitation in the upper altitudinal range for this species. Contrarily, Brinck (1949) recorded the species in all the altitudinal ranges he studied. The arctic-alpine *C. atra* is considered a glacial relict (Brinck 1949 ; O'Connor 1978) and *D. bicaudata* may also be (Brinck 1949). The occurrence of *S. torrentium* commonly in the soft waters of lakes and streams of the western catchment and its complete absence from the hard waters of the eastern catchment is also

Table I. The distribution of each species with regard to the total hardness and altitude values of those sites it was collected in. Total values for all the sites Plecoptera were found in and all the sites sampled are also presented.

Species	Number sites present	Altitude range (metres)	Total Hardness (mg/l $CaCo_3$)	
			Mean	Range
A. sulcicollis	20	15-274	66	8-316
N. avicularis	3	15-76	36	14-68
N. cinerea	9	9-100	111	6-334
N. pictetii	4	9-183	10	6-14
P. meyeri	21	9-274	104	8-324
L. fusca	6	30-46	121	14-322
L. hippopus	20	12-274	46	8-322
L. inermis	20	15-268	68	8-322
C. atra	1	271	20	20
C. bifrons	3	9-46	11	6-242
D. bicaudata	3	29-271	19	8-30
I. grammatica	15	15-61	118	6-324
P. bipunctata	3	30-268	23	14-42
C. tripunctata	3	30-46	21	8-24
S. torrentium	21	15-274	22	8-90
All species	45	9-274	53	6-334
All sites	83	9-274	126	4-334

notable though the actual factors determining its distribution may be complex. It may, for example, be unable to compete successfully with other benthic invertebrates in more productive waters. Brinck (1949) believed *C. bifrons* to occur in only hard eutrophic waters. It was, however, found in western upper Lough Corrib in waters of low hardness, though after heavy rain. In each of the three sites the species was collected in, there was abundant aquatic vegetation.

Interaction of the environmental factors, life cycles, and dietary preferences can largely account for the species associations noted. The negative association between *N. cinerea* and *S. torrentium* cannot indicate competitive exclusion since the former is herbivorous, the latter generally carnivorous and their substratum preferences are clearly different

(Hynes 1941 ; Brinck 1949). Competition between the positively associated species is precluded or minimised by various factors. In the case of *I. grammatica* and *P. meyeri*, both of which were widely distributed in lotic habitats, differences in diet have been shown by Hynes (1941) and Brinck (1949). Substratum preferences may also result in microhabitat differences between the *Leuctra* species and *A. sulcicollis*. The two *Leuctra* species associated and *L. fusca*, which on occasion was found in the same sites as both other *Leuctra* species, have important differences in their life cycles (Mackereth 1957 ; Hynes 1961). In this study adults of *L. hippopus* were found in February and April, *L. inermis* in May and *L. fusca* from July to September. Different growth periods and size differences of the co-existing nymphs of these species probably minimize competitive interactions. Size differences between nymphs of *A. sulcicollis* and *P. meyeri*, which have similar microhabitats and flight periods, may also be important.

Elliott (1967) showed the nymphs of *A. sulcicollis, P. meyeri, L. hippopus* and *L. inermis* to occur in greater numbers in the drift in the month « just prior to the period of greatest emergence activity. » Several authors have subsequently concluded that the nymphs of various species of Plecoptera have a greater propensity to drift at the end of their nymphal period (Bishop & Hynes 1969 ; Thomas 1970 ; Madsen 1976 ; Stoneburner & Smock 1979 ; Krueger & Cook 1981). Such an increased incidence in the drift would explain the observed increased predation by salmonids on *A. sulcicollis, P. meyeri, L. fusca*, and *I. grammatica* nymphs in the weeks immediately prior to and during their emergence period. The increased activity of the *I. grammatica* population in spring, when both 2. 5 mm and 13. 0 mm (adult size) nymphs were found in benthic samples from the River Abbert, possibly explains the greater numbers of nymphs eaten by salmonids in these months. Concerning *Leuctra* species Allen (1941) noted the apparent lack of availability of nymphs to salmon parr. This may reflect an either different pre-emergence or post-emergence behaviour of *L. fusca* compared to the other species studied.

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APPENDIX

SITE	LOCALITY	GRID REFERENCE	ALTITUDE (mètres)	DATE(s) SAMPLED	SPECIES FOUND [N = *Nymph(s)* ; ♂, ♀ = *Adult(s)*]
5	Black R.	M 256 491	15	19.11.1981	I. grammatica (2N)
9	Cong R.	M 148 552	12	18.11.1981	L. hippopus (1N)
17	Coolie L.	M 137 823	15	22. 4.1982	N. cinerea (1N)
18	Mullingar Bridge	M 223 734	30	22. 4.1982	N. cinerea (1N)
21	Robe R.	M 363 724	46	22. 4.1982	A. sulcicollis (10N) N. cinerea (2N) P. meyeri (2N)
28	Grange R.	M 477 477	46	1.12.1981	P. meyeri (1N)
				18. 5.1982	L. fusca (37N) L. inermis (1N) I. grammatica (23N)
30	Grange R.	M 481 499	46	1.12.1981	A. sulcicollis (1N) P. meyeri (2N) I. grammatica (1N)
31	Grange R.	M 498 503	46	1.12.1981	A. sulcicollis (1N) P. meyeri (1N) I. grammatica (2N)
34	Killaclogher R.	M 560 378	46	4.12.1981	P. meyeri (6N) C. bifrons (2N)
35	Abbert R.	M 519 435	46	4.12.1981	P. meyeri (5N) I. grammatica (1N)
36	Abbert R.	M 436 408	46	18. 5.1982	L. fusca (52N) L. hippopus (7N) L. inermis (7N) I. grammatica (29N)
37	L. Kipp	M 198 284	76	13. 5.1982	S. torrentium (1N)
38	R. Kipp	M 198 285	76	7. 1.1982	A. sulcicollis (1N) N. avicularis (2N) P. meyeri (1N) L. hippopus (4N) I. grammatica (2N) S. torrentium (14N)
				13. 5.1982	L. inermis (9N) I. grammatica (1N) S. torrentium (16N)
39	R. Kipp	M 222 310	30	29.10.1981	S. torrentium (2N)
				7. 1.1982	A. sulcicollis (2N) P. meyeri (7N) L. hippopus (6N) L. inermis (16N) I. grammatica (2N) S. torrentium (41N)
				28. 4.1982	A. sulcicollis (7N) N. cinerea (1N) P. meyeri (1N) I. grammatica (1N) S. torrentium (4N)
41	L. Slieveaneena	M 160 303	100	28. 4.1982	S. torrentium (2N)
42	R. into L. Slieveaneena	M 160 304	100	28. 4.1982	N. cinerea (1N)
48	Drimeen R.	M 148 408	15	7. 1.1982	A. sulcicollis (1N) P. meyeri (1N) L. hippopus (3N) L. inermis (1N) S. torrentium (8N)
49	L. Corrib at Ard	M 170 418	15	8. 2.1982	N. avicularis (1N) C. bifrons (1N)
50	Owenriff R.	M 114 425	30	13.11.1981	L. hippopus (1N) S. torrentium (1N)
				7. 1.1982	A. sulcicollis (6N) P. meyeri (1N) L. hippopus (1N) I. grammatica (5N) S. torrentium (12N)
				5. 5.1982	P. meyeri (4N) L. fusca (8N) I. grammatica (1N) S. torrentium (9N)
51	Bunowen R.	M 084 423	46	26. 2.1982	L. hippopus (6N) L. inermis (3N) I. grammatica (1N) S. torrentium (4N)
53	L. Bofin	M 042 437	43	5. 5.1982	S. torrentium (3N)
54	Barnagorteeny	M 098 463	30	26. 2.1982	A. sulcicollis (4N) P. meyeri (6N) L. inermis (11N) I. grammatica (2N) C. tripunctata (4N) S. torrentium (5N)
55	Loughaunierin	M 013 455	41	15. 4.1982	S. torrentium (35N)
56	L. near Loughaunierin	M 994 458	41	15. 4.1982	S. torrentium (36N)
57	Shaughnesy's Bridge	L 962 509	30	13.11.1981	L. hippopus (7N) L. inermis (1N)
				31. 5.1982	L. fusca (1N) L. hippopus (3N) L. inermis (1N) S. torrentium (3N)
58	Fáilmore R.	L 925 522	61	26. 2.1982	A. sulcicollis (1N) L. hippopus (3N) L. inermis (4N) S. torrentium (7N)
59	Bealanabrack R.	R 964 527	15	8. 2.1982	N. cinerea (1N)
61	Joyce's R.	L 903 590	46	26. 2.1982	A. sulcicollis (3N) P. meyeri (25N) L. hippopus (9N) L. inermis (59N) I. grammatica (9N) C. tripunctata (2N) S. torrentium (87N)
62	L. Corrib at Dooros	M 060 515	9	8. 2.1982	N. cinerea (11N) N. pictetii (2N) C. bifrons (1N) I. grammatica (1N)
63	Stream at Dooros	M 060 515	9	8. 2.1982	N. cinerea (4N) N. pictetii (181N)
64	Dooghtar R.	L 999 541	61	8. 2.1982	P. meyeri (1N) L. hippopus (3N) S. torrentium (1N)
65	Cloghbrack R.	M 036 560	61	26. 2.1982	A. sulcicollis (1N) P. meyeri (15N) L. hippopus (78N) L. inermis (2N) I. grammatica (18N) S. torrentium (18N)
66	Coolin L.	M 066 552	168	23. 3.1982	S. torrentium (9N)

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SITE	LOCALITY	GRID REFERENCE	ALTITUDE (mètres)	DATE(s) SAMPLED	SPECIES FOUND [N = *Nymph(s)* ; ♂, ♀ =) *Adult(s)*]
67	R. into Coolin L.	M 062 550	183	23. 3.1982	A. sulcicollis (45N) N. pictetii (171N) P. meyeri (3N) L. hippopus (12N) L. inermis (69N)
71	L. Nafooey	L 960 599	29	19. 4.1982	D. bicaudata (4♀)
74	Nambrackanagh R.	M 011 641	268	13.11.1981	L. hippopus (30N)
				19. 4.1982	A. sulcicollis (3N) P. meyeri (1N, 2♀) L. hippopus (4N, 1♀) L. inermis (1N) P. bipunctata (1N)
				26. 5.1982	A. sulcicollis (1♀)
				31. 5.1982	A. sulcicollis (10♀, 6♂) L. hippopus (1♀, 2♂) L. inermis (3♀)
75	L. Nadirkmore	M 005 641	271	19. 4.1982	A. sulcicollis (1N) P. meyeri (1♀) L. hippopus (1♀) C. atra (1♀, 2♂) D. bicaudata (1N, 3♀, 3♂)
				26. 5.1982	D. bicaudata (1♀) S. torrentium (1♀, 3♂)
				31. 5.1982	D. bicaudata (4♀) S. torrentium (1♀, 1♂)
76	Glensaul R.	M 098 680	30	19. 4.1982	A. sulcicollis (9N) L. inermis (2N) I. grammatica (3N) P. bipunctata (9N) C. tripunctata (11N) S. torrentium (17N)
77	Glennagashleeny	M 060 701	274	2. 2.1982	A. sulcicollis (1N) P. meyeri (7N) L. hippopus (3N) S. torrentium (1N)
78	Aille R.	M 055 757	61	2. 2.1982	A. sulcicollis (6N) N. avicularis (18N) N. pictetii (1N) P. meyeri (8N) L. hippopus (30N)
79	Aille R.	M 113 804	30	2. 2.1982	A. sulcicollis (1N) P. meyeri (39N) L. hippopus (5N) I. grammatica (1N)
80	Derrew L.	M 139 762	25	30.11.1981	N. cinerea (1N)
81	Cloonee	M 131 746	21	30.11.1981	L. hippopus (4N)
82	Owenbrin R.	M 044 632	46	31. 5.1982	A. sulcicollis (3N, 1♀, 1♂) L. fusca (57N) P. bipunctata (6N, 1♀, 4♂) S. torrentium (1N)
83	R. into L. Nafooey	L 966 598	30	31. 5.1982	A. sulcicollis (9N) P. meyeri (1N) L. fusca (8N) L. hippopus (4N) L. inermis (132N, 1♀) D. bicaudata (1N)