

INVERTEBRATE ASSEMBLAGES OF LOW ORDER BRITISH AND AUSTRIAN STREAMS

P. E. Schmid & J.M. Schmid-Araya

Abstract

Species listings of meio- and macroinvertebrates in the streambeds of five low order British streams are compiled. The stream Afon Mynach (North Wales) had higher species richness (260 species) than streams in the Ashdown Forest. The percentage contribution of meiofaunal species accounted between 63% to 81.2% of the biodiversity of the benthic assemblage.

INTRODUCTION

It has long been recognised that species richness shows enormous geographical variation over several spatial scales. One widely accepted variation is that from the tropics to the poles but pronounced gradients can also occur on very local scales both within and among habitat types. Processes that can affect species richness are physical factors such as climate, and energy supply, historical factors such as speciation rates and dispersal and biotic interactions such as competition and predation (Ricklefs, 1987). Streams and rivers are sites of major significance that shelter biota that are central to fundamental ecological processes at local and global scales (Palmer et al. 1997). Invertebrates can directly or indirectly influence the decomposition of organic matter, as well as the uptake and transfer of materials and production. However, this effect in turn depends on the availability of dissolved oxygen, thus it is important that a balance between organic inputs and decomposition capacity exist in order to have a high biodiversity and consequently ecosystem functioning.

As part of a series to describe streams' species richness we compile here the species listings of five low order streams in the United Kingdom. We also report on species presence and relative frequencies of the testate amoeba of the gravel stream Oberer Seebach (Lower Austria, Austria) and the invertebrate densities in the Afon Mynach (North Wales, UK).

MATERIAL AND METHODS

Species compilation of five low order British streams

The streams examined encompassed low stream orders (1 to 3), and a variety of sediment type and hydraulic conditions. These were located in two areas: four streams in the Ashdown forest (southeast England, UK) and one stream in the Snowdonia National Park (North Wales, UK). The streams in the Ashdown Forest are two small first order (Broadstone and Lone Oak) that drain acidic heath and woodlands and two third order streams (Maresfield, Marsh Green) that flow through woodlands and agricultural lands. The first group has been classified as type I (high proportion of low shear stress areas even at high discharge) and the second group are type II and III (high discharge and low proportion of low shear stress areas; Lancaster & Hildrew 1993).

The stream in North Wales is summer warm (annual mean maximum temperature = 17.2°C), and it has a discharge range between 0.004 to 10.57 m³s⁻¹. The Afon Mynach drains farmlands and it is partly flanked by dense riparian vegetation.

Macroinvertebrate data were compiled from previous studies for the streams within the Ashdown Forest (e.g. Dobson 1990) and microcrustaceans from Rundle (1988). Other taxa such as testate

amoeba and soft-bodied meiofauna (i.e. microturbellarians, nematodes, oligochaetes, rotifers, chironomids) were identified by the authors in the course of several research studies.

The invertebrate data of Afon Mynach has been compiled from diverse research studies performed by the authors.

Quantitative sampling for testate amoeba in Oberer Seebach

Quantitative samples of the streambed sediments were taken in the Oberer Seebach between 1991 and 1994. Benthic samples were collected in riffle/pool areas of the research area 'Ritrodat' with modified Hess-samplers (mesh-net: 50µm) to sediment depths of 10-cm, using two different surface areas (100, 200 cm²). In addition, freeze-core samples with prior electro-positioning were obtained from sediment layers down to 40-

cm. The species composition of testate amoebae is based on data obtained from 311 (36 freeze-cores) samples. Abundances of Testacea were assessed by subsampling sediment samples (sample volume: ≤ 150 cm³) into ten 1ml subsamples and counting all individuals found in 1ml-graticule cells. Representatives of all species were individually mounted on slides, and identified under oil immersion to species level. Length, width and height of > 200 individuals of each species were measured using an eyepiece micrometer. Based on body measurements, species were identified following a.o. Beyens and Chardez (1984), Decloitre (1976, 1978), Deflandre (1929), Jung (1936) and Penard (1902).

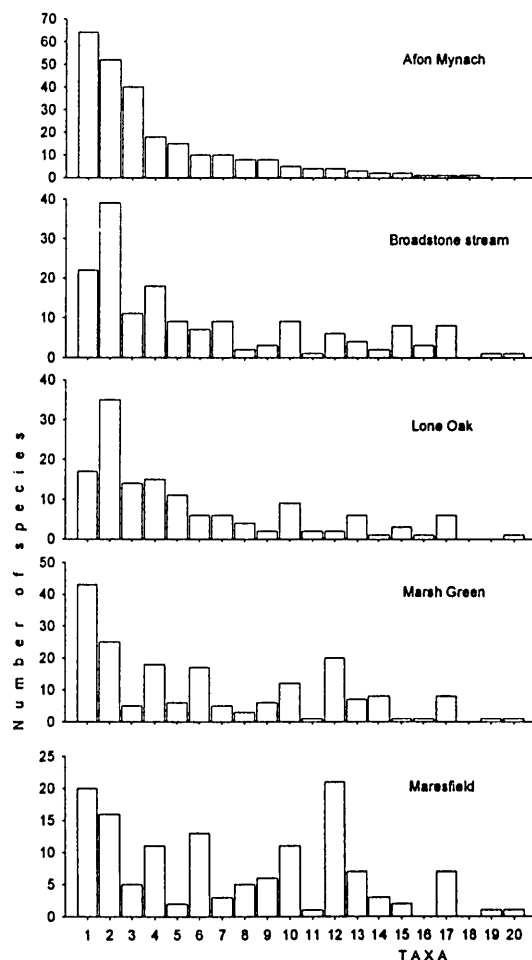


Fig. 1 Number of species of the most abundant benthic taxa found in the streambed of five low order British streams.

Quantitative sampling in Afon Mynach

Samples of the streambed sediments were taken in the Afon Mynach, a tributary of the River Dee in North Wales (52°57'N, 3°38'W; 260 m a.s.l.). Benthic samples were collected in riffle/pool areas of a 300-m stretch of the Afon Mynach with modified Hess-samplers (mesh-net: 50µm) using three different surface areas (100, 200 and 300 cm²). In addition, freeze-core samples with prior electro-positioning were obtained from sediment layers down to 40-cm. The sampling schemes were designed to collect and estimate

densities of all organisms of sizes ≥ 50 µm. The species composition is based on data obtained from 316 (36 freeze-cores) samples. Hess and freeze-core samples were collected bimonthly from November 1993 through November 1994 and seasonally from July 1996 to September 1997. In addition, five stand pipe traps were installed in the period between November 1993 and November 1994 in a riffle/pool zone down to depth of 40-cm, in order to sample live material of soft-bodied meio-invertebrates.

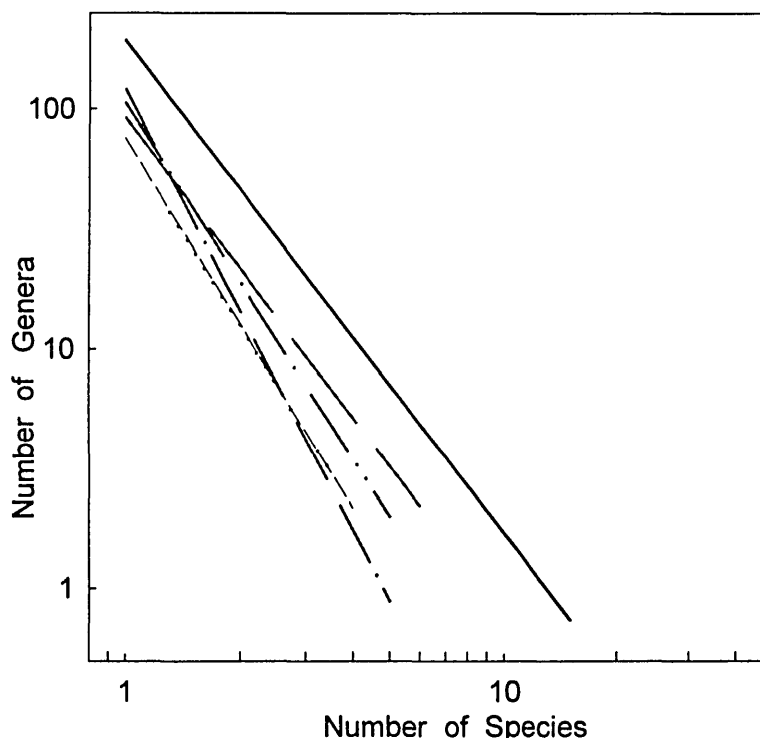


Fig. 2 Log-log plot of the frequencies of genera with different numbers of species for the streams Oberer Seebach (solid line), Afon Mynach (long dash line), Marsh Green (dash-dot-dot line), Maresfield (short dash line), Lone Oak (dotted line) and Broadstone (dash-dot line).

RESULTS AND DISCUSSION

Invertebrate species of five low order British streams

The taxa recorded from five British streams are summarised in the Appendix 1. A total of 574 taxa were recorded from these five streams. The highest species richness was found in the Afon Mynach (260 taxa), follow by the stream Marsh Green (201 taxa; Table 1). The rest of the

streams in the Ashdown Forest had between 147 to 176 species (Table 1).

The number of species per group shown in Fig. 1 strongly demonstrate that the species-richest group were either Chironomidae or Rotifera, a result that resembles the gravel stream Oberer Seebach in Austria (Schmid-Araya & Schmid 1995).

Table 1. Summary of invertebrate taxa found in diverse streams/ivers. MY: Afon Mynach (North Wales, UK); BRS: Broadstone, LK: Lone Oak, MG: Marsh Green and MF: Maresfield (Ashdown Forest, South England, UK);

TAXA	MY	BRS	LK	MG	MF
1 PROTOZOA					
<i>CILIOPHORA</i>	1	1	0	0	0
<i>TESTACEA</i>	40	11	14	5	5
<i>HELIOZOA</i>	1	0	0	0	0
2 CNIDARIA	1	1	0	0	0
3 TURBELLARIA	15	9	11	6	2
4 TREMATODA	0	0	0	0	0
5 GASTROTRICHA	1	1	1	1	1
6 ROTIFERA	52	39	35	25	16
7 NEMATODA	10	9	6	5	3
8 NEMATOMORPHA	0	0	0	0	0
MOLLUSCA					
9 GASTROPODA	2	1	0	1	1
10 BIVALVIA	0	1	0	1	0
11 POLYCHAETA	0	0	1	0	0
12 HIRUDINOIDEA	2	0	0	1	2
13 OLIGOCHAETA	18	18	15	18	11
14 TARDIGRADA	1	2	1	1	1
15 ACARI	10	7	6	17	13
INSECTA					
16 EPHEMEROPTERA	8	3	2	6	6
17 PLECOPTERA	5	9	9	12	10
18 TRICHOPTERA	4	6	2	20	21
19 MEGALOPTERA	1	1	1	1	1
20 ODONATA	0	1	1	2	0
21 COLEOPTERA	8	2	4	3	5
22 PLANNIPENIA	0	0	0	0	0
23 HYMENOPTERA	0	0	0	0	0
DIPTERA					
24 FAM. PSYCHODIDAE					
25 FAM. CHIRONOMIDAE	64	22	17	43	20
26 FAM. CERATOPOGONIDAE	1	2	1	2	2
27 FAM. SIMULIDAE	4	1	2	1	1
28 FAM. TIPULIDAE	1	0	0	0	0
29 FAM. ATHERICIDAE	0	0	0	1	0
30 FAM. EMPIDIDAE	1	0	0	1	1
31 FAM. LIMNONIIDAE	2	8	3	1	2
32 FAM. CYLINDROTOMIDAE	0	0	0	0	0
33 FAM. PTYCHOPTERIDAE	0	1	0	0	2
34 FAM. CULICIDAE	0	0	0	0	0
35 FAM. THAUMALEIDAE	0	0	0	0	0
36 FAM. DIXIDAE	0	0	0	0	0
37 FAM. STRATIOMYIDAE	0	0	0	0	0
38 FAM. TABANIDAE	0	0	0	0	0
39 FAM. SYRPHIDAE	0	0	0	0	0
40 FAM. RHAGIONIDAE	0	0	0	1	0
41 FAM. EPHYDRIDAE	0	0	0	0	0
42 FAM. DOLICHOPODIIDAE	0	0	0	0	0
43 COLLEMBOLA	0	1	0	0	0
CRUSTACEA					
44 CLADOCERA	2	2	1	8	3
CLASS COPEPODA					
45 O. CYCLOPOIDA	1	8	6	8	7
46 O. HARPACTICOIDA	3	4	6	7	7
47 CLASS OSTRACODA	1	3	1	1	0
CLASS MALACOSTRACA					
O. PERACARIDA					
48 S.O. AMPHIPODA	0	1	1	1	1
49 S.O. ISOPODA	0	1	0	1	1
50 PISCES	0	0	0	1	1
TOTAL	260	176	147	202	146
PERCENT MEIOFAUNA	81.2	74.4	79.6	69.7	63.0

Only in the Maresfield stream the Trichoptera constituted the most speciose group (Fig.1).

Table 1 also evidences that from the five benthic assemblages the percentage contribution of species within the meiofaunal size (50-500µm) ranged between 63 to 81.2%. These values coincide with that of the gravel stream Oberer Seebach where meiofaunal biodiversity accounts for 63%, and the Breitenbach meiofaunal sized organisms are 60% of the stream community (Zwick 1993).

The frequency distribution of genera with different numbers of species (Fig. 2) showed linear relationships with negative slopes for five British streams and the Austrian Oberer Seebach. The slopes differed significantly between them (ANCOVA $P < 0.05$) with the highest slope for Broadstone stream and the the lowest slope values for the Oberer Seebach and Afon Mynach. The high slope values represents streams with more genera consisting of single species mostly coinciding with acidic streams (Broadstone, Lone Oak; Fig. 2). In contrast, circumneutral streams have several multispecies genera.

Testate amoeba in the stream Oberer Seebach

A total of 54 Testacea species belonging to 13 genera were found in the bed sediments of the Oberer Seebach during 1991 and 1994 (Table 2). The genera *Diffugia* and *Centropyxis* represented 63% of all species in the assemblage. In terms of densities the assemblage was numerically dominated by small-sized species (< 60µm), such as *Centropyxis minuta* and *Phryganella hemisphaerica*, (Table 2) reaching densities $> 2 \times 10^5$ ind.dm⁻².

Due to these high densities, testate amoebae are likely to constitute the most abundant benthic group, 90% of all meio- and macroinvertebrate taxa, in the stream community of the Oberer Seebach.

Relative invertebrate densities in the Afon Mynach

During the sampling period 1993-1997, a total of 260 meio- and macrobenthic species were recorded (Appendix 2). The shell-bearing amoebae were the numerically most abundant taxon in the streambed sediments of the Afon Mynach, contributing with 65.8% to the total meio- and macrozoobenthic densities. The benthic rotifers contributed numerically with 11.1% to the total density.

References

- Beyens, L & Chardez, D. (1984) Testate Amoebae (Rhizopoda. Testaceae) from South-West Ireland. *Archiv für Protistenkunde* 128: 109-126.
- Decloitre, L. (1976) La Genre *Arcella* EHRENBURG. *Archiv für Protistenkunde* 188: 291-309.
- Decloitre, L. (1978) La Genre *Centropyxis* I. Complements a jour au 31. Decembre 1974 de la Monographie du genre parue en 1929. *Archiv für Protistenkunde* 120: 63-85.
- Deflandre, G. (1929) La Genre *Centropyxis* STEIN. *Archiv für Protistenkunde* 67:332-375.
- Dobson, M.K. (1990) *Animal communities and litter retention in streams: Field manipulations*. Thesis University of London, 201pp.
- Jung, W. (1936) Thekamöben ursprünglicher lebender deutscher Hochmoore. *Abh. Landesmuseum Westfalen* 7: 1-87.
- Lancaster, J. & Hildrew A.G. 1993. Characterising in-stream flow refugia. *Canadian Journal of Fisheries and Aquatic Sciences*, 50, 1663-1675.
- Palmer, M. E., Covich, A.P., Finlay B.J., Gibert, J., Hyde, K.D., Johnson R.K., Kairesalo, T., Lake, S. Lovell, C.R., Naiman, R.J., Ricci, C. Sabater & Strayer, D. (1997) Biodiversity and ecosystem processes in freshwater sediments. *Ambio*, 26, 571-577
- Penard, E. (1902) *Faune Rhizopodique du bassin du Leman*. Kündig, Edit. Geneve.
- Ricklefs, R.E. (1987) Community diversity : Relative roles of local and regional processes. *Science*, 235, 167-171.
- Rundle, S. (1988): *The micro-arthropods of some Southern English streams*. Thesis University of London, 195pp.
- Schmid-Araya, J. M. & Schmid, P.E. (1995) The invertebrate species of a gravel stream. *Jahresbericht Biologische Station Lunz* 15:11-21.
- Zwick, P. (1993) Ökologie von Fließgewässern. *Biologie*, 5, 316-321.

Appendix 1. The invertebrate and vertebrate species composition of British streams: the Afon Mynach (North Wales), and the Broadstone stream, Lone Oak, Marsh Green and Maresfield (Ashdown Forest, Southeasten England).

	Afon Mynach	Broadstone	Lone Oak	Marsh Green	Maresfield
PROTOZOA					
CILIOPHORA					
Fam. Tracheliidae					
Trachelius ovum Ehrenberg		+			
Peritricha					
Vorticella cf. campanula Ehrenberg	+				
TESTACEA					
Fam. Diffugiidae					
Diffugia acuminata Ehrenberg	+		+		
Diffugia avellana Penard	+				
Diffugia oblonga Ehrenberg		+	+		
Diffugia oblonga var. parva Thomas		+	+		
Diffugia oblonga var. lacustris P.	+				+
Diffugia elegans Penard	+	+			
Diffugia elegans var. teres Penard	+				
Diffugia brevicolla Cash		+			
Diffugia corona Wallich			+		
Diffugia sp. 3MG				+	
Diffugia sp. 2MG				+	
Diffugia lanceolata Penard	+				
Diffugia lebes Penard	+				
Diffugia linearis (Penard)	+				
Diffugia lobostoma Leidy	+				
Diffugia penardi (Penard)	+				
Diffugia pyriformis Perty (D. oblonga E.)	+				
Diffugia pyriformis var. clavicornis Penard	+				
Diffugia pyriformis var. lata Jung	+				
Diffugia pyriformis var. parva Thomas	+				
Diffugia pyriformis var sp. 1	+				
Diffugia globulosa Dujardin	+				
Diffugia globulus (Ehrenberg)	+				
Pontigulasia bigibbosa Penard	+		+		
Pontigulasia spectabilis Penard	+				
Pontigulasia compressa Rhumbler		+	+		
Pontigulasia cf. bryophila Penard				+	
Fam. Plagiopyxidae					
Plagiopyxis callida Penard		+			+
Fam. Centropyxidae					
Centropyxis constricta (Ehrenberg)		+			
Centropyxis sp. 1MG				+	
Centropyxis aculeata (Ehrenberg)	+				
Centropyxis aërophila Deflandre	+				
Centropyxis ecornis Leidy	+				
Centropyxis discoides (Penard)	+				
Centropyxis hirsuta Deflandre	+				
Centropyxis (Cyclopyxis) kahli Deflandre	+				
Centropyxis minuta Deflandre	+				
Fam. Arcellidae					
Arcella gibbosa Penard		+	+		
Arcella discoides Penard	+	+			
Arcella polypora Penard	+				
Arcella rotundata Playfair	+				
Arcella vulgaris Ehrenberg	+				
Arcella sp.2BRS		+			
Arcella sp. 2LK			+		
Arcella sp. 1MG				+	
Fam. Cyphoderiidae					
Cyphoderia ampulla Ehrb.	+	+	+		+
Cyphoderia trochus Penard	+				

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

Fam. Nebelidae				
Hyaloshenia papilio Leidy		+		
Lesquereusia modesta Rhumbler		+		
Nebela penardiana Deflandre				+
Nebela collaris Penard		+		
Nebela dentistoma Penard		+		
Nebela sp.1LK			+	
Quadrulella symmetrica (Wallich)			+	
Fam. Euglyphidae				
Euglypha acanthophora Ehrenberg		+		
Euglypha strigosa Ehrenberg			+	
Trinema enchelys (Ehrb.)		+	+	
Reticulobosa				
Cryptodiffugia sp.			+	
SO. Testaceareticulosa				
Phryganella acropodia (Hertwig & Lesser)		+		
Phryganella hemisphaerica Penard				+
Phryganella nidulus Penard		+		
HELIOZOA				
Actinosphaerium eichhorni Ehrenberg		+		
CNIDARIA				
HYDROZOA				
Hydra viridissima		+		
Hydra sp.			+	
TURBELLARIA				
O. CATENULIDA				
Fam. Catenulidae				
Catenula lemnae Ant. Duges			+	
Soumina turgida Zacharias		+	+	+
Fam. Stenostomidae				
Rhyncoscolex simplex Leidy		+	+	
Stenostomun leucops (Ant. Duges)		+	+	+
Stenostomum grabbskogense Luther			+	
Stenostomum sp. 2BRS			+	
O.MACROSTOMIDA				
Fam. Microstomidae				
Microstomum cf. lineare O.F.M.		+		
Fam. Macrostomidae				
Macrostomum sp.		+		+
O. LECITHOEPITHELIATA				
Fam. Prorhynchidae				
Prorhynchus stagnalis M. Schultze		+	+	+
Geocentrophora sp.		+		+
O.PROLECITHOPHORA				
Fam. Otomesostomatidae				
Otomesostoma auditivum (Du Plessis)		+		
O. NEORHABDOCOELA				
Fam. Dalyellidae				
Microdallyella ?sp.				+
Castrella sp.		+		
Fam. Thyphloplanidae				
Thyphloplana viridata (Abildgaard)		+		
Castrada sp.				+
Mesostoma?				+
Phaenocora unipunctata (Ørsted)		+		
Limnoruanis romanae Kolasa		+	+	+
Fam. Polycystididae				
Gyratrix hermaphroditus EHRB.				+
Rhabdocoela gen. sp.1BRS			+	
Rhabdocoela gen. sp.3LK				+
Rhabdocoela gen. sp.4LK				+
Rhabdocoela gen. sp.1MG				+
Rhabdocoela gen. sp.2MG				+
Rhabdocoela gen. sp.3MG				+

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

Rhabdocoela gen. sp. 4MG						+
Rhabdocoela gen. sp.5MG						+
Rhabdocoela gen. sp.4MY	+					
Rhabdocoela gen. sp.7MY	+					
TRICLADIDA						
Polycelis sp.						+
Phagocata vitta Duges	+					
GASTROTRICHA						
Chaetonotus laroides Marcolongo	+					
Chaetonotus sp. 1		+	+	+		+
ROTIFERA						
MONOGONONTA						
Fam. Brachionidae						
Brachionus angularis Gosse						+
Brachionus calyciflorus Pallas						+
Keratella cochlearis (Gosse)						+
K. cochlearis var. tecta f. typica (Lauterborn)						+
K. quadrata (O.F.M.)						+
Keratella serrulata Ehrenberg				+		
Notholca squamula (O.F.M.)	+					
Fam. Euchlanidae						
Euchlanis deflexa (GOSSE)	+					
Euchlanis sp.	+			+		+
Euchlanis sp. 2MY	+					+
Trichotria tetractis tetractis (Ehrb.)		+		+		
Fam. Colurellidae						
Colurella uncinata (O.F.M.)	+					
Colurella sp.		+		+		+
Lepadella ovalis (O.F.M.)	+					+
Lepadella patella patella (O.F.M.)		+		+		+
Fam. Lecanidae						
Lecane (s. str.) luna (OFM)	+	+		+		
Lecane (s. str.) flexilis (Gosse)	+	+		+		
Lecane (Monostyla) lunaris Ehrb.	+	+		+		
Lecane (Monostyla) sp.	+					
Fam. Proalidae						
Proales theodora Wulfert	+					+
Proales fallaciosa Wulfert		+				
Proales globulifera (Hauer)	+					
Proales sp.				+		
Proales sp.1MY	+					
Proales sp.2MY	+					
Proalinopsis caudatus (Collins)	+					
Proalinopsis squamipes Hauer		+		+		
Fam. Notommatidae						
Drilophaga bucephalus Vejdovsky	+	+				
Cephalodella apocolea Myers		+		+		
Cephalodella arcuata Wulfert	+					
Cephalodella gibba (Ehrb.)	+			+		+
Cephalodella incila Wulfert	+					
Cephalodella ventripes Dixon-Nuttall		+				+
Cephalodella sp. 3LK				+		
Cephalodella sp. 4MY	+					
Notommata pachyura (Gosse)	+					
Notommata sp.1MY	+					
Notommata sp.1MG						+
Pleurotrocha petromycon Ehrb.						+
Taphrocampa annulosa Gosse	+			+		
Resticula sp.				+		
Fam. Gastropodidae						
Gastropus hyptotus (Ehrb.)						+
Fam. Synchaetidae						
Synchaeta pectinata Ehrb.						+
Polyarthra dolichoptera Idelson						+

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

Fam. Asplanchnidae

Asplanchna priodonta Gosse

+

Fam. Dicranophoridae

Dicranophorus difflugiarum (Penard)

+

Dicranophorus forcipatus (O.F.M.)

+

Dicranophorus lütkeni-sigmoides (Bergendal)

+

+

+

Dicranophorus robustus var. europaeus Wulfert

+

Dicranophorus uncinatus Milne

+

+

+

Dicranophorus sp.

+

+

Dicranophorus sp. 2BRS

+

Dicranophorus sp.4MY

+

Aspelta sp. 1

+

+

Aspelta sp. 2

+

+

Aspelta circinator (Gosse)

+

Paradicranophorus sp.1

+

Wierzejskiella velox Wiszniewski

+

Encentrum incisum Wulfert

+

Encentrum grande Western

+

+

+

Encentrum mustela (Milne)

+

Encentrum longipes WULF.

+

Encentrum putorius WULF.

+

Encentrum sp. 1LK

+

Encentrum sp.1

+

Kostea wokei Koste

+

Fam. Testudinellidae

Testudinella incisa (Ternetz)

+

Testudinella sp.

+

+

Fam. Flosculariidae

Ptygura sp.

+

+

Fam. Filiniidae

Filinia sp.

+

BDELLOIDEA**Fam. Habrotrichidae**

Habrotricha bidens (Gosse)

+

+

Habrotricha collaris (EHRB.)

+

+

Habrotricha constricta? (Dujardin)

+

Habrotricha sylvestris BRYCE

+

Habrotricha rosa? Donner

+

+

Habrotricha sp. 2 BRS

+

Habrotricha sp. 2 LK

+

Habrotricha sp.2 MF

+

Habrotricha sp.3 MF

+

Habrotricha sp.1 MY

+

Habrotricha sp.2 MY

+

Habrotricha sp.3 MY

+

Fam. Philodinidae

Macrotrachela plicata (Bryce)

+

Macrotrachela quadricornifera Milne

+

+

Macrotrachela timida? Milne

+

+

Macrotrachela libera? Donner

+

Macrotrachela sp. 3BRS

+

Macrotrachela sp. 4BRS

+

Macrotrachela sp. 4LK

+

Rotaria rotatoria (Pallas)

+

+

+

+

+

Rotaria rotatoria form B (Pallas)

+

Rotaria neptunoida Harring

+

+

+

Rotaria sordida (Western)

+

+

+

Rotaria tardigrada (Ehrenberg)

+

Rotaria sp. 3BRS

+

Dissotrocha macrostyla (Ehrb.)

+

+

Dissotrocha aculeata Ehrb.

+

+

+

+

Embata hamata (MURRAY)

+

Embata laticeps MURRAY

+

Philodina acuticornis odiosa Milne

+

+

+

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

<i>Philodina citrina</i> Ehrb.	+			+	
<i>Philodina flaviceps</i> Bryce	+	+		+	+
<i>Philodina roseola</i> Ehrenberg	+				
<i>Philodina</i> sp. 2BRS		+			
<i>Philodina</i> sp.5MY	+				
<i>Mniobia</i> cf. <i>punctulata</i> Bartos		+			
<i>Mniobia obtusicornis</i> Murray				+	
<i>Mnobia</i> sp.1MY	+				
<i>Adineta steineri</i> Bartos				+	
NEMATODA					
O. TYLENCHIDA					
Fam. Criconematidae					
<i>Criconema demani</i> (Micoletzky)				+	
<i>Criconema sphagni</i> Micoletzky	+				
<i>Criconema</i> sp.		+			
O. MONONCHIDA					
Fam. Mononchidae					
<i>Mononchus</i> sp.		+			
<i>Mylonchulus</i> sp.		+			
<i>Prionchulus muscorum</i> (Dujardin)	+				
<i>Prionchulus punctatus</i> Cobb		+		+	
<i>Nigrionchus</i> sp.					+
Fam. Anatonchidae					
<i>Anatonchus tridentatus</i> (de Man)	+				
<i>Nullonchus</i> sp.					+
O. DORYLAIMIDA					
Fam. Dorylaimidae					
<i>Dorylaimus asymphydorus</i> Andrassy		+			
<i>Dorylaimus stagnalis</i> Dujardin	+				
<i>Dorylaimus</i> sp.MF					+
<i>Dorylaimus</i> sp.MG				+	
Fam. Qudsianematidae					
<i>Eudorylaimus</i> sp.				+	
Fam. Thornenematidae					
<i>Mesodorylaimus</i> sp.		+			
Fam. Nygolaimidae					
<i>Nygolaimus</i> sp.				+	
Fam. Aporcelaimidae					
<i>Aporcelaimus obtusicaudatus</i> (Bastian)				+	
O. ENOPLIDA					
Fam. Ironidae					
<i>Ironus</i> sp.		+			
Fam. Tobrilidae					
<i>Tobrilus</i> cf. <i>allophysis</i> (Steiner)				+	
<i>Tobrilus helveticus</i> (Hofmänner)				+	
<i>Tobrilus gracilis</i> (Bastian)	+				
<i>Tobrilus steineri</i> (Micoletzky)	+				
<i>Tobrilus</i> sp.		+			+
Fam. Tripylidae					
<i>Trypila</i> sp.				+	
Fam. Rhabdolaimidae					
<i>Rhabdolaimus aquaticus</i> de Man	+				
O. ARAEOLAIMIDA					
Fam. Plectidae					
<i>Plectus geophilus</i> de Man	+				
<i>Plectus</i> sp.1MY	+				
<i>Plectus</i> sp.1BRS		+			
O. RHABDITIDA					
Fam. Neodiplogasteridae					
<i>Fictor fictor</i> (Bastian)	+				
Fam. Mermithidae					
Mermithidae Gen. Sp.				+	

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

MOLLUSCA**BIVALVIA**

Pisidium sp.		+			+
--------------	--	---	--	--	---

GASTROPODA

Ancylus fluviatilis Muller	+				+
----------------------------	---	--	--	--	---

Planorbis sp.		+			
---------------	--	---	--	--	--

Bythinella sp.	+				
----------------	---	--	--	--	--

Bythinia sp.					+
--------------	--	--	--	--	---

POLYCHAETA**Fam. Nerillidae**

Troglochaetus beranecki Del.				+	
------------------------------	--	--	--	---	--

Fam. Aelosomatidae

Aelosoma hemprichi (Ehrb.)	+	+	+		+
----------------------------	---	---	---	--	---

Aelosoma hyalinum Bunke	+				
-------------------------	---	--	--	--	--

Aelosoma quaternarium Ehrenberg	+				
---------------------------------	---	--	--	--	--

Aelosoma sp.		+			+
--------------	--	---	--	--	---

OLIGOCHAETA**Fam. Naididae**

Chaetogaster diaphanus (Gruithuisen)	+	+			+
--------------------------------------	---	---	--	--	---

Chaetogaster diastrophus (Gruithuisen)	+		+		
--	---	--	---	--	--

Chaetogaster sp.2MG					+
---------------------	--	--	--	--	---

Chaetogaster sp.3MY	+				
---------------------	---	--	--	--	--

Nais alpina Sperber	+				
---------------------	---	--	--	--	--

Nais communis Piguet	+	+	+	+	+
----------------------	---	---	---	---	---

Nais elinguis Müller	+			+	+
----------------------	---	--	--	---	---

Nais simplex Piguet		+			
---------------------	--	---	--	--	--

Nais pseudobtusa Piguet			+	+	+
-------------------------	--	--	---	---	---

Pristinella bilobata (Bretscher)	+	+		+	
----------------------------------	---	---	--	---	--

Pristinella jenkiniae (Stephenson)	+	+		+	+
------------------------------------	---	---	--	---	---

Pristina aequiseta Bourne		+			
---------------------------	--	---	--	--	--

Pristina menoni (Aiyer)			+		
-------------------------	--	--	---	--	--

Pristina proboscidea Beddard				+	
------------------------------	--	--	--	---	--

Vejdovskyella comata (Vejdovsky)	+		+	+	
----------------------------------	---	--	---	---	--

Stylaria lacustris (L.)			+	+	
-------------------------	--	--	---	---	--

Slavina appendiculata (Udekem)		+			
--------------------------------	--	---	--	--	--

Homochaeta sp.			+		
----------------	--	--	---	--	--

Fam. Tubificidae

Aulodrilus pluriseta (Piguet)		+		+	+
-------------------------------	--	---	--	---	---

Spirosderma velutinus (Grube)		+		+	
-------------------------------	--	---	--	---	--

Rhyacodrilus coccineus (Vejdovsky)				+	
------------------------------------	--	--	--	---	--

Limnodrilus hoffmeisteri (Claparede)				+	
--------------------------------------	--	--	--	---	--

Tubifex nerthus (Michaelsen)				+	
------------------------------	--	--	--	---	--

Tubificidae Gen. sp.		+			
----------------------	--	---	--	--	--

Fam. Enchytraeidae

Cernosvitoviella atrata (Bretscher)	+	+	+		
-------------------------------------	---	---	---	--	--

Cernosvitoviella immota? (Knöllner)					+
-------------------------------------	--	--	--	--	---

Marionina argentea (Michaelsen)		+	+	+	
---------------------------------	--	---	---	---	--

Achaeta sp.		+	+		
-------------	--	---	---	--	--

Mesenchytraeus sp.			+		
--------------------	--	--	---	--	--

Enchytraeidae Gen. sp. 3BRS		+			
-----------------------------	--	---	--	--	--

Enchytraeidae Gen. sp. 4BRS		+			
-----------------------------	--	---	--	--	--

Enchytraeidae Gen. sp. 5LK			+		
----------------------------	--	--	---	--	--

Enchytraeidae Gen. sp. 1MY	+				
----------------------------	---	--	--	--	--

Enchytraeidae Gen. sp. 2MY	+				
----------------------------	---	--	--	--	--

Fam. Lumbriculidae

Lumbriculus variegatus Müller		+	+	+	+
-------------------------------	--	---	---	---	---

Stylodrilus heringianus Claparede	+				
-----------------------------------	---	--	--	--	--

Trichodrilus sp.			+		+
------------------	--	--	---	--	---

Fam. Lumbricidae

Eiseniella tetraeda Savigny	+				
-----------------------------	---	--	--	--	--

Eiseniella sp.					+
----------------	--	--	--	--	---

Fam. Haplotaxidae

Haplotaxis gordioides (Hartmann)	+				
----------------------------------	---	--	--	--	--

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

HIRUDINOIDEA**Fam. Erpobdellidae**

Erpobdella sp. +

Fam. Glossiphoniidae

Glossiphonia complanata L. +

Glossiphonia sp. +

Helobdella stagnalis L. +

Fam. Piscicolidae

Piscicola sp. +

TARDIGRADA

Macrobotus ampullaceus Thulin +

Macrobotus sp.1 + + + + +

Macrobotus sp. 2BRS +

ACARI**Oribatei****Fam. Phthiracaridae**

Phthiracarus sp. + +

Fam. Parasitidae

Parasitidae Gen. Sp.1 +

Parasitidae Gen. Sp.2 +

Oribatei Gen. Sp. +

Hydrachnella**Fam. Sperchontidae**

Sperchon cluifeifer Piersig + + +

Sperchon glandulosus Koenicke +

Sperchon papillosus Thor +

Sperchon setiger Thor + +

Sperchon squamosus Kramer +

Sperchon violaceus Walter +

Sperchon sp.1 +

Sperchonopsis verrucosa (Protz) +

Ljania bipapillata Thor + + + +

Lobohalacarus weberi Walt. + +

Fam. Lebertiidae

Lebertia rufiventris Koen. +

Lebertia salebrosa Koen. + + +

Lebertia sp. 1 BRS + + +

Lebertia sp. 1LK + +

Lebertia sp. 2LK + +

Lebertia sp. 3LK + +

Lebertia sp. 4LK +

Protzia eximia Protz + +

Soldanellonyx monardi Walter + +

Torrenticola amplexa (Koenicke) + +

Torrenticola anomala (Koch) +

Fam. Hygrobatidae

Hygrobates fluviatilis (Ström) + + +

Hygrobates nigromaculatus (Lebert) +

Atractides acutirostris (Motas) +

Atractides nodipalpis clavipes (Thor) +

Atractides nodipalpis pennatus (Viets) +

Atractides tener Thor + +

Brachypoda modesta Thor +

Aturus scaber Kramer +

Fam. Hydrodromidae

Hydrodroma torrenticola (Walter) +

EPHEMEROPTERA**Fam. Baetidae**

Baetis muticus (Linneaus) +

Baetis rhodani Pictet + + +

Baetis scambus Eaton +

Baetis sp. + +

Fam. Leptophlebiidae

Paraleptophlebia submarginata (Stephens) + + + +

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

Habrophlebia sp.						+
Fam. Caenidae						
Caenis rivulorum Eaton	+	+		+		
Ephemera danica Muller			+	+		+
Fam. Heptageniidae						
Ecdyonurus helveticus Eaton	+					
Rhithrogena semicolorata (Curtis)	+					
Rhithrogena sp.				+		+
Fam. Ephemerellidae						
Ephemerella ignita (Poda)	+			+		+
PLECOPTERA						
Fam. Taeniopterygidae						
Brachyptera risi (Morton)						+
Fam. Nemouridae						
Amphinemoura sulcicollis Stephens		+	+	+		+
Nemurella pictetii (Klapalek)		+	+	+		+
Nemoura cinerea (Retzius)		+	+	+		+
Nemoura cambrica Stephens		+	+	+		+
Nemoura dubitans Morton			+			
Nemoura avicularis Morton			+	+		+
Protonemura meyeri (Pictet)				+		
Fam. Leuctridae						
Leuctra fusca (L.)	+	+				
Leuctra inermis Kempny						+
Leuctra hippopus Kempny	+	+	+	+		
Leuctra nigra (Oliver)		+	+	+		+
Leuctra geniculata (Stephens)	+			+		+
Isoperla grammatica (Poda)		+		+		+
Fam. Perlodidae						
Perlodes microcephala (Pictet)	+					
Diura bicaudata (L.)				+		
Fam. Chloroperlidae						
Siphonoperla torrentium (Pictet)	+	+	+	+		+
TRICHOPTERA						
Fam. Rhyacophilidae						
Rhyacophila dorsalis Curtis	+	+		+		+
Rhyacophila oblitterata Mc Lachlan				+		
Rhyacophila septentrionalis Mc Lachlan	+					
Fam. Glossosomatidae						
Agapetus fuscipes Curtis				+		+
Glossosoma sp.				+		
Fam. Hydropsychidae						
Hydropsyche pellucida (Curtis)				+		+
Hydropsyche siltalai Dohler	+			+		+
Fam. Polycentropodidae						
Polycentropus flavomaculatus (Pictet)				+		+
Plectrocnemia conspersa Curtis		+	+	+		+
Fam. Psychomyiidae						
Lype reducta (Hagen)				+		+
Tinodes dives Pictet						+
Fam. Limnephilidae						
Anabolia nervosa (Curtis)				+		
Chaetopteryx villosa (Fabricius)				+		+
Drusus annulatus (Stephens)						+
Glyphotaelius pellucidus (Retzius)						+
Halesus sp.				+		+
Limnephilus sp.				+		+
Micropterna sequax McLachan		+		+		
Potamophylax cingulatus (Stephens)		+	+			+
Potamophylax latipennis (Curtis)				+		+
Potamophylax rotundipennis (Brauer)		+				+
Fam. Goeridae						
Goera pilosa (Fabricius)				+		+
Silo pallipes (Fabricius)				+		+

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

Fam. Leptoceridae					
Mystacides sp.				+	+
Oecetis sp.				+	+
Fam. Seriscotomatidae					
Seriscotoma personatum (Spence)	+	+		+	+
MEGALOPTERA					
Sialis fuliginosa Pictet	+	+	+	+	+
ODONATA					
Cordelugaster boltonii (Donovan)		+	+	+	
Calopteryx sp.				+	
COLEOPTERA					
Fam. Dytiscidae					
Oreodytis sanmarkii (Sahlberg)	+				
Platambus maculatus (L.)		+	+	+	
Stictotarsus duodecimpustulatus (Fab.)				+	
Agabus didymus (Olivier)			+		
Hydaticus sp.			+		
Fam. Elmidae					
Elmis aenea (Müller)	+			+	+
Esolus parallelepipedus (Müller)	+				
Limnius volckmari (Panzer)	+				+
Oulimnius major (Rey)	+				
Oulimnius tuberculatus (Müller)					+
Riolus subviolaceus (Müller)	+				
Riolus sp.					+
Fam. Gyrinidae					
Gyrinus caspidus Menetries	+				
Fam. Hydraenidae					
Hydraena gracilis Germar	+				+
Helodidae Gen. Sp.					
		+	+		
DIPTERA					
FAM. CHIRONOMIDAE					
Subfam. Tanypodinae					
Tribe Macropelopiini					
Apsectrotanypus trifascipennis (Zetterstedt)		+	+	+	+
Macropelopia goetghebueri (Kieffer)	+	+	+	+	+
Tribe Natarsiini					
Natarsia nugax (Walker)	+				
Natarsia sp.		+		+	+
Trissopelopia sp.			+		
Tribe Pentaneurini					
Ablabesmyia longistyla Fittkau	+				
Ablabesmyia sp.				+	
Conchapelopia melanops (Meigen)	+				
Conchapelopia sp.		+		+	+
Krenopelopia sp.		+			
Nilotanypus dubius (Meigen)	+				
Paramerina divisa (Walker)	+				
Paramerina sp.		+			
Thienemannimyia laeta (Meigen)	+				
Trissopelopia longimana (Staeger)	+	+			
Zavrelymyia barbatipes (Kieffer)	+	+	+		
Zavrelymyia sp.2BRS			+		
Subfam. Prodiamesinae					
Prodiamesa olivacea (Meigen)	+	+	+	+	+
Subfam. Diamesinae					
Diamesa insignipes (Kieffer)	+				
Diamesa cf. thienemanni (Kieffer)	+				
Potthastia gaedii (Meigen)	+				
Potthastia longimana (Kieffer)				+	
Subfam. Orthocladinae					
Brillia modesta (Meigen)	+	+		+	+
Bryophaenocladus sp.	+		+		
Chaetocladus sp.			+		

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

<i>Corynoneura edwardsi</i> Brundin	+				
<i>Corynoneura lobata</i> grp. Edwards		+	+	+	
<i>Corynoneura</i> sp.					+
<i>Cricotopus</i> (C.) <i>annulator</i> (Goetg.)	+				
<i>Cricotopus</i> (C.) <i>bicinctus</i> (Meigen)	+				
<i>Cricotopus</i> (C.) <i>curtus</i> Hirvenoja				+	
<i>Cricotopus</i> (C.) <i>fuscus</i> (Kieffer)				+	
<i>Cricotopus</i> (C.) <i>tremulus</i> (Linnaeus)	+				
<i>Cricotopus</i> (C.) sp. 3	+				
<i>Cricotopus</i> (l.) <i>sylvestris</i> (Fabricius)	+				
<i>Epoicocladius flavens</i> Malloch				+	
<i>Eukiefferiella breviceps</i> (Kieffer)	+	+		+	
<i>Eukiefferiella claripennis</i> Lundbeck	+			+	
<i>Eukiefferiella clypeata</i> Kieffer	+				
<i>Eukiefferiella coerulescens</i> (Kieffer)	+	+			
<i>Eukiefferiella devonica</i> (Edwards)	+			+	
<i>Eukiefferiella ilkleyensis</i> (Edwards)				+	
<i>Eukiefferiella minor</i> (Edwards)	+			+	
<i>Georthocladius luteicornis</i> (Goetghebuer)		+			
<i>Heleniella ornatocollis</i> (Edwards)	+				
<i>Heterotanytarsus</i> sp.		+	+		
<i>Heterotrissocladius marcidus</i> (Walker)	+	+	+	+	+
<i>Krenosmittia camptophleps</i> (Edwards)	+				
<i>Limnophyes</i> sp.	+		+		
<i>Mectriocnemus</i> sp.				+	
<i>Nanocladius rectinervis</i> (Kieffer)	+			+	+
<i>Orthocladius</i> (Eu.) <i>thienemanni</i> Kieffer	+				
<i>Orthocladius</i> (O.) <i>frigidus</i> (Zetterstedt)	+				
<i>Orthocladius</i> (O.) <i>rubicundus</i> Meigen	+			+	
<i>Orthocladius</i> (O.) cf. <i>wetterensis</i> (Brundin)				+	
<i>Orthocladius</i> sp. 1MF					+
<i>Orthocladius</i> sp. 1MY	+				
<i>Orthocladius</i> sp. 2MY	+				
<i>Parakiefferiella coronata</i> (Edwards)				+	
<i>Paracladius albicola</i> (Zetterstedt)				+	
<i>Paracladius conversus</i> (Walker)	+				
<i>Paramectriocnemus stylatus</i> (Kieffer)	+		+	+	+
<i>Paraphaenocladius impensus</i> (Walker)	+			+	
<i>Paraphaenocladius irritus</i> (Walker)	+				
<i>Paraphaenocladius pseudirritus</i> Strenzke	+				
<i>Paratrichocladius skirwithensis</i> (Edwards)	+			+	
<i>Paratrichocladius rufiventris</i> (Meigen)				+	
<i>Psectrocladius psilopterus</i> (Kieffer)		+	+		
<i>Rheocricotopus effusus</i> (Walker)	+				
<i>Rheocricotopus fuscipes</i> (Kieffer)	+			+	+
<i>Symposiocladius lignicola</i> (Kieffer)	+			+	
<i>Synorthocladius semivirens</i> (Kieffer)	+			+	
<i>Thienemaniella vittata</i> Edwards	+			+	
<i>Thienemaniella</i> cf. <i>morosa</i> Edwards	+				
<i>Thienemaniella</i> sp.					+
<i>Tvetenia bavarica</i> Goet.	+			+	+
<i>Tvetenia calvescens</i> Edwards	+			+	+
<i>Tvetenia discoloripes</i> (Goetg.)	+				
<i>Tvetenia verralli</i> (Edwards)				+	
Subfam. Chironominae					
Tribe Chironomini					
<i>Demicryptochironomus vulneratus</i> (Zettlers)	+				
<i>Microtendipes</i> cf. <i>chloris</i> (Meigen)	+				
<i>Paratendipes</i> cf. <i>albimanus</i> (Meigen)				+	
<i>Polypedilum albicorne</i> (Meigen)	+	+			
<i>Polypedilum convictum</i> (Walker)	+			+	+
<i>Polypedilum cultellatum</i> Goetg.	+				
<i>Polypedilum laetum</i> (Meigen)				+	+
<i>Polypedilum pullum</i> (Zetterstedt)				+	

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

Polypedilum sp.			+		
Chironomus/Einfeldia?	+		+	+	
Harnischia sp.				+	
Stenochironomus sp.	+			+	
Stictochironomus sp.					+
Tribe Tanytarsini					
Cladotanytarsus cf. mancus (Walker)	+				
Micropsectra artrofasciata Kieffer	+				
Micropsectra attenuata Reiss	+				
Micropsectra bidentata (Goetghebuer)		+	+		+
Micropsectra sp.				+	+
Rheotanytarsus pentapoda Kieffer	+				
Stempellina bausei (Kieffer)	+				
Tanytarsus brundini Lindeberg	+				
Tanytarsus sp. 1MY	+				
Tanytarsus sp. 1LK			+		
FAM. CERATOPOGONIDAE					
Bezzia sp.	+	+	+	+	+
Probezzia sp.				+	+
Stilobezzia sp.		+			
FAM. SIMULIDAE					
Simulium dunfellense Davies			+		+
Simulium naturale Davies			+		
Simulium zetlandense Davies				+	
Simulium (S.) argyreatrum Meigen	+				
Simulium (Eu.) aureum Fries	+				
Simulium (N.) cryophilum (Rutzov)	+				
Simulium (S.) reptans (Linnaeus)	+				
Simulium sp.		+			
FAM. TIPULIDAE					
SF. LIMONIINAE					
Pedicia sp.	+	+	+	+	
Hexatoma sp.		+			
Dicranota cf. bimaculata Schummel	+				
Dicranota sp.		+	+		+
Limnophila sp.		+			
Rhypholophus sp.		+			
Limonia modesta (Meigen)		+			
Limonia sp.		+			
Elaeophila sp.		+			+
Helius sp.			+		
SF. TIPULINAE					
Tipula sp.	+				
FAM. ATHERICIDAE					
Atherix cf. marginata (F.)				+	
FAM. EMPIDIDAE					
Hemedromia sp.				+	+
Wiedemannia cf. oedorum (Vaillant)	+				
FAM. RHAGIONIDAE					
Chrysophylus auratus (Fabricius)				+	
FAM. PTYCHOPTERIDAE					
Ptychoptera sp.		+			+
Diptera Gen. Sp.					+
COLLEMBOLA					
Isotomodes sp.		+			
CRUSTACEA					
CLADOCERA					
Alona quadrangularis (O.F.M.)	+	+		+	+
Alona rustica T. Scott		+	+	+	+
Alona guttata Sars				+	+
Chydorus piger O.F.M.	+				
Simocephalus exspinosus (Koch)				+	
Biapertura affinis (Leydig)				+	

Afon Mynach Broadstone Lone Oak Marsh Green Maresfield

Bosmina sp.				+	
Daphnia sp.				+	
Ceriodaphnia sp.				+	
COPEPODA					
CYCLOPOIDA					
Eucyclops serrulatus (Fischer)	+			+	+
Paracyclops fimbriatus (Fischer)	+	+		+	+
Paracyclops affinis Sars					+
Paracyclops poppei (Rehb.)				+	+
Acanthocyclops vernalis (Fischer)	+			+	
Acanthocyclops robustus (Sars)	+	+		+	+
Acanthocyclops viridis (JUR.)	+				
Diacyclops languidus (Sars)		+	+	+	
Diacyclops languidoides (Lilljeborg)		+	+		
Macrocyclops fuscus (Jurine)		+		+	
Macrocyclops albidus (Jurine)			+	+	+
Tropocyclops prasinus (Fischer)		+	+		+
HARPACTICOIDA					
Bryocamptus zschokkei (Schmeil)	+	+	+	+	+
Bryocamptus echinatus (Mrazek)				+	+
Bryocamptus pygmaeus (Sars)	+	+	+	+	+
Bryocamptus minutus (Claus)			+	+	+
Bryocamptus weberi (Kessler)			+		
Attheyella crassa (Sars)		+		+	+
Moraria brevipes (Sars)	+	+	+		
Moraria poppei (Mrazek)			+	+	
Moraria duthei (T & A Scott)					+
Camphocamptus staphylinus Jurine				+	+
OSTRACODA					
Candona candida (O.F.M.)				+	
Candona lucida (Müller)		+	+		
Cryptocandona vavrai Kaufmann		+			
Cryptocandona reducta Alm		+			
Cypridopsis subterranea (Wolf)	+				
AMPHIPODA					
Gammarus pulex (L.)				+	+
Niphargus aquilex Schiodte		+	+		
ISOPODA					
Asellus aquaticus L.		+		+	+
PISCES					
Cottus gobio L.				+	+

Appendix 2. Species composition and relative frequency (%) in each taxonomic group based on 316 benthic samples collected in the Afon Mynach between 1993 and 1997.

Taxa /Species	(%)	Taxa /Species	(%)
PROTOZOA		HYDROZOA	
HELIOZOA		<i>Hydra viridisima</i> L.	100.00
<i>Actinosphaerium eichhorni</i> EHRENBERG	100.00	GASTROTRICHA	
TESTACEA		<i>Chaetonotus laroides</i> MARCOLONGO	100.00
Fam. Arcellidae		TURBELLARIA	
<i>Arcella discoidea</i> PENARD.	0.37	O. CATENULIDA	
<i>Arcella polypora</i> PENARD	1.52	Fam. Stenostomidae	
<i>Arcella rotundata</i> PLAYFAIR	2.76	<i>Rhynchoscolex cf. simplex</i> LEIDY	0.04
<i>Arcella vulgaris</i> EHRENBERG	1.24	<i>Stenostomum leucops</i> ANT. DUGES	26.72
Fam. Centropyxidae		Fam. Macrostromidae	
<i>Centropyxis aculeata</i> (EHRENBERG)	5.09	<i>Macrostromum sp.</i>	0.64
<i>Centropyxis aërophila</i> DEFLANDRE	2.60	Fam. Microstromidae	
<i>Centropyxis ecornis</i> LEIDY	1.06	<i>Microstromum cf. lineare</i> O.F.M.	1.53
<i>Centropyxis discoidea</i> (PENARD)	0.09	O. LECITHOEPITHELIATA	
<i>Centropyxis hirsuta</i> DEFLANDRE	43.17	Fam. Prorhynchidae	
<i>Centropyxis (Cyclopyxis) kahli</i> DEFLANDRE	1.09	<i>Prorhynchus stagnalis</i> M. SCHULTZE	3.20
<i>Centropyxis minuta</i> DEFLANDRE	3.41	<i>Geocentrophora sp.</i>	0.09
Fam. Diffugiidae		Fam. Thyphloplanoidae	
<i>Diffugia acuminata</i> EHRENBERG	0.09	<i>Limnoruanis romanae</i> KOLASA	2.86
<i>Diffugia avellana</i> PENARD	5.03	<i>Thyphloplana viridata</i> (ABILDGAARD)	0.21
<i>Diffugia elegans</i> PENARD	0.93	<i>Rhabdocoela gen. sp.1</i>	2.40
<i>Diffugia elegans var. teres</i> PENARD	0.03	<i>Rhabdocoela gen. sp.2</i>	8.77
<i>Diffugia globulosa</i> DUJARDIN	0.30	<i>Rhabdocoela gen. sp.3</i>	3.57
<i>Diffugia globulus</i> (EHRENBERG)	2.30	<i>Rhabdocoela gen. sp.4</i>	25.30
<i>Diffugia lacustris</i> PENARD	2.42	<i>Rhabdocoela gen. sp.5</i>	14.63
<i>Diffugia lanceolata</i> PENARD	0.50	<i>Rhabdocoela gen. sp.6</i>	7.17
<i>Diffugia lebes</i> PENARD	0.12	TRICLADIDA	
<i>Diffugia linearis</i> (PENARD)	1.19	<i>Phagocata vitta</i> Duges	2.87
<i>Diffugia lobostoma</i> LEIDY	0.19	HIRUDINEA	
<i>Diffugia penardi</i> (PENARD)	3.69	Fam. Glossiphoniidae	
<i>Diffugia pyriformis</i> PERTY (D. oblonga E.)	10.32	<i>Glossiphonia complanata</i> L.	25.0
<i>Diffugia pyriformis var. clavicornis</i> PENARD	0.04	<i>Helobdella stagnalis</i> L.	75.0
<i>Diffugia pyriformis var. lata</i> JUNG	0.05	ROTIFERA	
<i>Diffugia pyriformis var. parva</i> THOMAS	0.21	MONOGONONTA	
<i>Diffugia pyriformis var. sp. 1</i>	0.38	Fam. Brachionidae	
<i>Pontigulasia bigibbosa</i> PENARD	1.55	<i>Notholca squamula</i> (O.F.M.)	0.04
<i>Pontigulasia spectabilis</i> PENARD	0.18	Fam. Euchlanidae	
Fam. Nebelidae		<i>Euchlanis deflexa</i> (GOSSE)	1.01
<i>Hyaloshenia papilio</i> LEIDY	0.06	<i>Euchlanis sp.1</i>	0.13
<i>Lesquereusia modesta</i> RHUMBLER	0.30	<i>Euchlanis sp.2</i>	0.01
<i>Nebela collaris</i> PENARD	0.08	Fam. Colurellidae	
<i>Nebela dentistoma</i> PENARD	0.17	<i>Colurella uncinata</i> (O.F.M.)	1.35
Reticulobosa		<i>Lepadella ovalis</i> (O.F.M.)	1.50
<i>Phryganella acropodia</i> (HERT. & LESSER)	1.96	Fam. Lecanidae	
<i>Phryganella nidulus</i> PENARD	0.24	<i>Lecane flexilis</i> (GOSSE)	3.70
Fam. Euglyphidae		<i>Lecane luna</i> (O.F.M.)	0.18
<i>Euglypha acanthophora</i> EHRENBERG	0.47	<i>Lecane (Monostyla) lunaris</i> (EHRENBERG)	0.26
<i>Trinema enchelys</i> (EHRENBERG)	3.33	<i>Lecane (Monostyla) sp.</i>	1.21
Fam. Cyphoderiidae		Fam. Proalidae	
<i>Cyphodeira ampulla</i> EHRENBERG	1.31	<i>Proalopsis caudatus</i> (COLLINS)	0.84
<i>Cyphodeira trochus</i> PENARD	0.16	<i>Proales globulifera</i> (HAUER)	0.11
CILIATA*		<i>Proales theodora</i> (GOSSE)	11.27
Peritricha		<i>Proales sp.1</i>	3.02
<i>Vorticella cf. campanula</i> EHRENBERG	100.00	<i>Proales sp.2</i>	0.37

Fam. Notommatidae		Fam. Tobrilidae	
<i>Drilophaga bucephalus</i> VEJDOVSKY	0.91	<i>Tobrilus gracilis</i> (BASTIAN)	19.52
<i>Cephalodella arcuata</i> WULF.	0.12	<i>Tobrilus steineri</i> (MICOLETZKY)	14.60
<i>Cephalodella gibba</i> (EHRENBERG)	6.17	MOLLUSCA	
<i>Cephalodella incila</i> WULF.	10.31	GASTROPODA	
<i>Cephalodella sp.</i>	1.21	Fam. Ancyliidae	
<i>Notommata pachyura</i> (GOSSE)	0.03	<i>Ancylus fluviatilis</i> MÜLLER	95.24
<i>Notommata sp.1</i>	0.05	Fam. Hygrobiidae	
<i>Taphrocampa sp.1</i>	0.04	<i>Bythinella sp.</i>	4.76
Fam. Dicranophoridae		Fam. Aelosomatidae	
<i>Aspelta sp.1</i>	0.22	<i>Aelosoma hemprichi</i> EHRENBERG	8.24
<i>Aspelta sp.2</i>	1.75	<i>Aelosoma hyalinum</i> BUNKE	1.04
<i>Dicranophorus difflugiarum</i> (PENARD)	0.09	<i>Aelosoma quaternarium</i> EHRENBERG	2.74
<i>Dicranophorus forcipatus</i> (O.F.M.)	0.51	OLIGOCHAETA	
<i>Dicranophorus uncinatus</i> MILNE	0.50	Fam. Naididae	
<i>Dicranophorus sp.1</i>	0.02	<i>Chaetogaster diaphanus</i> (GRUITHUISEN)	35.50
<i>Encentrum putorius</i> WULF.	0.16	<i>Chaetogaster diastrophus</i> GRUITHUISEN	8.71
<i>Encentrum longipes</i> WULF.	0.12	<i>Chaetogaster sp.2</i>	1.16
<i>Encentrum sp.1</i>	1.10	<i>Nais alpina</i> SPERBER	3.19
<i>Paradicranophorus sp.1</i>	0.10	<i>Nais communis</i> PIGUET	24.33
BDELLOIDEA		<i>Nais simplex</i> PIGUET	2.87
Fam. Habrotrochidae		<i>Pristinella jenkiniae</i> (STEPHENSON)	0.34
<i>Habrotrocha bidens</i> (GOSSE)	0.09	<i>Pristinella bilobata</i> (BRETSCHER)	5.37
<i>Habrotrocha collaris</i> (EHRENBERG)	10.31	<i>Vejdovskyella comata</i> VEJDOVSKY	0.15
<i>Habrotrocha sylvestris</i> BRYCE	0.17	Fam. Enchytraeidae	
<i>Habrotrocha sp.1</i>	0.20	<i>Cernosvitoviella atrata</i> (BRETSCHER)	6.07
<i>Habrotrocha sp.2</i>	0.26	<i>Enchytraeidae gen. sp. 1</i>	0.16
<i>Habrotrocha sp.3</i>	0.12	<i>Enchytraeidae gen. sp. 2</i>	0.01
Fam. Philodinidae		Fam. Lumbricidae	
<i>Rotaria neptunoida</i> HARRING	0.77	<i>Eiseniella tetraeda</i> SAVIGNY	0.02
<i>Rotaria rotatoria</i> (PALLAS)	0.79	Fam. Lumbriculidae	
<i>Rotaria sordida</i> (WESTERN)	10.68	<i>Stylodrilus heringianus</i> CLAPAREDE	0.01
<i>Rotaria tardigrada</i> (EHRENBERG)	5.48	Fam. Haplotaxidae	
<i>Dissotrocha aculeata</i> (EHRENBERG)	1.17	<i>Haplotaxis gordioides</i> (HARTMANN)	0.09
<i>Dissotrocha macrostyla</i> (EHRENBERG)	3.51	TARDIGRADA	
<i>Embata laticeps</i> MURRAY	0.42	<i>Macrobotus ampullaceus</i> THULIN	100.00
<i>Philodina acuticornis</i> MILNE	11.93	ACARI	
<i>Philodina citrina</i> EHRENBERG	0.40	Fam. Sperchontidae	
<i>Philodina flaviceps</i> BRYCE	2.98	<i>Sperchon clupeifer</i> PIERS.	51.41
<i>Philodina roseola</i> EHRENBERG	1.19	<i>Sperchon setiger</i> THOR	15.42
<i>Philodina sp.1</i>	0.63	<i>Sperchon violaceus</i> WALT.	15.42
<i>Mnobia sp.1</i>	0.49	<i>Sperchon sp.1</i>	3.02
NEMATODA		Fam. Lebertiidae	
Fam. Criconematidae		<i>Lebertia sp.1</i>	6.03
<i>Criconema sphagni</i> MICOLETZKY	0.07	Fam. Hygrobatidae	
Fam. Anatonchidae		<i>Hygrobates fluviatilis</i> (STRÖM)	4.52
<i>Anatonchus tridentatus</i> (de MAN)	15.36	<i>Atractides acutirostris</i> (MOTAS)	0.50
Fam. Dorylaimidae		<i>Atractides nodipalpis clavipes</i> (THOR)	1.00
<i>Dorylaimus stagnalis</i> DUJARDIN	5.52	Fam. Aturidae	
Fam. Mononchidae		<i>Ljania bipapillata</i> THOR	2.18
<i>Prionchulus muscorum</i> (DUJARDIN)	0.43	Fam. Hydrodromidae	
Fam. Neodiplogasteridae		<i>Hydrodroma torrenticola</i> (WALT.)	0.50
<i>Fictor fictor</i> (BASTIAN)	31.70	CRUSTACEA	
Fam. Plectidae		CLADOCERA	
<i>Plectus geophilus</i> de MAN	2.31	Fam. Chydoridae	
<i>Plectus sp.1</i>	3.05	<i>Alona quadrangularis</i> O.F.M.	99.13
Fam. Rhabdolaimidae		<i>Chydorus piger</i> O.F.M.	0.87
<i>Rhabdolaimus aquaticus</i> de MAN	7.46		

COPEPODA**CYCLOPOIDA***Acanthocyclops viridis* (JUR.) 100.00**HARPACTICOIDA***Bryocamptus pygmaeus* (SARS) 14.39*Bryocamptus zschokkei* (SCHMEIL) 79.35*Moraria* sp. 6.26**OSTRACODA***Cypridopsis subterranea* (WOLF) 100.00**INSECTA****EPHEMEROPTERA**

Fam. Heptageniidae

Ecdyonurus helveticus EATON 5.23*Rhithrogena semicolorata* (CURTIS) 0.43

Fam. Baetidae

Baetis muticus (LINNAEUS) 0.70*Baetis rhodani* PICTET 21.72*Baetis scambus* EATON 38.83

Fam. Leptophlebiidae

Paraleptophlebia submarginata (STEPHENS) 0.50

Fam. Ephemerellidae

Ephemerella ignita (PODA) 20.03

Fam. Caenidae

Caenis rivulorum EATON 12.56**PLECOPTERA**

Fam. Leuctridae

Leuctra hippopus (KEMPNEY) 60.24*Leuctra fusca* (LINNE) 0.52*Leuctra geniculata* (STEPHENS) 0.14

Fam. Perlodidae

Perlodes microcephala (PICTET) 0.30

Fam. Chloroperlidae

Siphonoperla torrentium (PICTET) 38.80**COLEOPTERA**

Fam. Dytiscidae

Oreodytis sanmarkii (SAHLBERG) 1.77

Fam. Elmidae

Elmis aenea (MÜLLER) 23.93*Esolus parallelepipedus* (MÜLLER) 3.53*Limnius volckmari* (PANZER) 8.83*Riolus subviolaceus* (MÜLLER) 51.78*Oulimnius major* (REY) 4.12

Fam. Gyrinidae

Gyrinus caspidus MENETRIES 1.34

Fam. Hydraenidae

Hydraena gracilis GERMAR 4.71**MEGALOPTERA**

Fam. Sialidae

Sialis fuliginosa PICTET 100.00**TRICHOPTERA**

Fam. Hydropsychidae

Hydropsyche siltalai DOHLER 78.30

Fam. Rhyacophilidae

Rhyacophila dorsalis CURTIS 16.42*Rhyacophila septentrionalis* MCLACHAN 0.86

Fam. Sericostomatidae

Sericostoma personatum (SPENCE) 4.42**DIPTERA****FAM. CERATOPOGONIDAE***Bezzia* sp. 1 100.00**FAM. CHIRONOMIDAE**

SF. TANYPODINAE

Tribe Macropelopiini

Macropelopia goetghebueri (KIEFFER) 0.01

Tribe Pentaneurini

Ablabesmyia longistyla FITTKAU 0.20*Conchapelopia melanops* (MEIGEN) 8.90

Tribe Pentaneurini

Natarsia nugax (WALKER) 0.01*Nilotanypus dubius* (MEIGEN) 0.03*Paramerina divisa* (WALKER) 0.14*Thienemannimyia laeta* (MEIGEN) 0.09*Trissopelopia longimana* (STAEGER) 3.53*Zavrelimyia barbatipes* (KIEFFER) 0.01

SF. DIAMESINAE

Diamesa insignipes (KIEFFER) 0.99*Diamesa* sp. cf. *thienemanni* 0.01*Potthastia gaedii* (MEIGEN) 0.14

SF. PRODIAMESINAE

Prodiamesa olivacea (MEIGEN) 0.01

SF. ORTHOCLADIINAE

Brillia modesta (MEIGEN) 0.16*Bryophaenocladus* sp. 1 0.01*Corynoneura edwardsi* BRUNDIN 4.72*Cricotopus* (C.) *annulator* (GOETG.) 0.09*Cricotopus* (C.) *bicinctus* (MEIGEN) 1.09*Cricotopus* (I.) *sylvestris* (FABRICIUS) 0.01*Cricotopus* (C.) *tremulus* (LINNE) 0.02*Cricotopus* (C.) sp. 3 0.04*Eukiefferiella brevicar* (KIEFFER) 0.05*Eukiefferiella claripennis* LUNDBECK 0.94*Eukiefferiella clypeata* KIEFFER 5.28*Eukiefferiella coerulescens* (KIEFFER) 0.05*Eukiefferiella devonica* (EDWARDS) 0.06*Eukiefferiella minor* (EDWARDS) 0.02*Heleniella ornaticollis* (EDWARDS) 0.01*Heterotrissocladus marcidus* (WALKER) 0.07*Krenosmittia camptophleps* (EDWARDS) 0.07*Limnophyes* sp. 1 0.04*Nanocladus rectinervis* (KIEFFER) 0.40*Orthocladus* (Eu.) *frigidus* (ZETT.) 0.13*Orthocladus* (O.) *rubicundus* MEIGEN 0.67*Orthocladus* (Eu.) *thienemanni* KIEFFER 0.08*Orthocladus* sp. 1 8.24*Orthocladus* sp. 2 1.87*Paracladius conversus* (WALKER) 0.02*Parametricnemus stylatus* (KIEFFER) 0.03*Paraphaenocladus impensus* (WALKER) 0.01*Paraphaenocladus irritus* (WALKER) 0.01*Paraphaenocladus pseudirritus* STRENZKE 0.01*Paratrichocladus skirwithensis* (EDWARDS) 4.99*Rheocricotopus effusus* (WALKER) 0.50*Rheocricotopus fuscipes* (KIEFFER) 0.11*Symposiocladus lignicola* (KIEFFER) 0.01*Synorthocladus semivirens* (KIEFFER) 2.68*Thienemanniella vittata* (EDWARDS) 0.11*Thienemanniella* cf. *morosa* EDWARDS 0.09*Tvetenia* cf. *bavarica* GOETG. 0.10*Tvetenia clavescens* EDWARDS 1.42*Tvetenia discoloripes* (GOETG.) 0.05

SF. CHIRONOMINAE

Tribe Chironomini

<i>Demicryptochironomus vulneratus</i> (Z.)	0.01
<i>Microtendipes</i> sp. cf. <i>chloris</i>	0.01
<i>Polypedilum albicorne</i> MEIGEN	6.47
<i>Polypedilum convictum</i> (WALKER)	18.19
<i>Polypedilum cultellatum</i> GOETG.	0.11

Tribe Tanytarsini

<i>Cladotanytarsus</i> cf. <i>mancus</i> (WALKER)	0.01
<i>Micropsectra artrofasciata</i> KIEFFER	11.58
<i>Micropsectra attenuata</i> REISS	5.38
<i>Rheotanytarsus pentapoda</i> KIEFFER	7.91
<i>Stempellina bausei</i> (KIEFFER)	0.02
<i>Tanytarsus brundini</i> LINDEBERG	1.93
<i>Tanytarsus</i> sp. 1	0.05

FAM. EMPIDIDAE

<i>Wiedenmannia</i> sp. cf. <i>oedorum</i> (VAILLANT)	100.00
---	--------

FAM. SIMULIDAE

<i>Simulium</i> (S.) <i>argyreatrum</i> MEIGEN	32.12
<i>Simulium</i> (Eu.) <i>aureum</i> FRIES	5.74
<i>Simulium</i> (N.) <i>cryophilum</i> (ROBTSOV)	61.75
<i>Simulium</i> (S.) <i>reptans</i> (LINNAEUS)	0.39

FAM. TIPULIDAE

SF. TIPULINAE

<i>Tipula</i> sp.	3.78
-------------------	------

SF.. LIMONINAE

<i>Dicranota bimaculata</i> SCHUMMEL	93.57
<i>Pedicia</i> sp. 1	2.65

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Jahresbericht der Biologischen Station Lunz](#)

Jahr/Year: 1999

Band/Volume: [1995-98_016](#)

Autor(en)/Author(s): Schmid Peter-Eric, Schmid-Araya Jenny M.

Artikel/Article: [Invertebrate assemblages of low order British and Austrian streams. 51-72](#)