

FIELD KEY TO THE INVERTEBRATE FAUNA OF A SMALL STONY HILL-STREAM

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An illustrated key to the macroscopic invertebrates of small stony hill-streams in the Long Mynd, Shropshire, is given, expanded to include all those likely to be commonly met with in streams of the same type elsewhere in Britain. 48 species, genera or higher taxa are distinguished on the basis of characters observable in the field.

INTRODUCTION

BIOLOGY students at Preston Montford Field Centre frequently study the streams of the Long Mynd (especially the one in Ashes Hollow), and since 1964 they have made use of various duplicated versions of an illustrated field key to the larger aquatic invertebrates found there. The present key is a revised and extended edition of these, published in parallel with the general ecological account by Arnold and Macan (1969) whose nomenclature it shares.

The figures are all drawn from Long Mynd specimens, and every point in the key has been checked with material collected there. Nevertheless the choice of characters for inclusion is, of course, seldom original, owing much in particular to the *Guide to Freshwater Invertebrate Animals* by Macan (1959), and to the several Freshwater Biological Association keys by him and other authors. The justification for the present work is that it deals selectively with a distinct type of habitat, and that it is based entirely upon characters which can be observed in the field with the aid of a good hand lens ($\times 10$ or $\times 15$). The latter point has an important bearing on the conservation of such ecosystems, since it means that the great majority of specimens collected can be examined on the spot and returned to the stream alive.

Small stony and rocky hill-streams constitute a specialized type of habitat whose fauna varies relatively little from place to place. The key has been extended to include all those macroscopic invertebrate animals which are likely to be commonly encountered in streams of this type anywhere in Britain. Those which have not actually been found in Long Mynd streams are mentioned in brackets at the point at which they would come out in the key, with their distinguishing features (if any) noted. Because this type of habitat grades into others in various directions, the choice of species for inclusion or omission here is somewhat arbitrary. Animals characteristic of more sluggish muddy streams (e.g. *Asellus*) and those associated with vegetation in very weedy streams are omitted, as are the restricted types found in higher mountain streams and lakes.

The key does not, of course, deal with fish and amphibia, nor with organisms less than about 0.5 mm. long, nor with terrestrial animals which have fallen into streams by accident.

EXAMINING AND IDENTIFYING SPECIMENS

Methods of collecting and sorting material from hill streams are well described elsewhere. Individual free-living specimens (especially small ones) are best examined in the field by holding the animal in the cupped hand or a white plastic teaspoon.

The teaspoon is not only useful for picking more delicate specimens out of the sorting dish, but also provides reflected light giving better background colour and illumination.

Not all stream animals are free-living: some Oligochaete worms live in tubes of mud and fine mineral sediment attached to the bottom, as do certain red-blooded midge larvae (Chironomids); these animals must be removed from their tubes for proper examination. The larvae of many species of caddis-fly build cases of "foreign" material such as stones, sand or plant fragments. It should be emphasized that members of this group are particularly difficult to identify, and although each species or genus tends to build a distinctive type of case, identification cannot safely be based on characters of the case alone.

The key takes identification as far as it is safe to go on macroscopic characters. This is usually to the genus but sometimes only to a family or even higher taxon where field determination is difficult (e.g. water-mites). In cases where determination is taken to the species level, there is only one species of its genus likely to be found in this habitat. In some cases further identification to species level may be of considerable ecological interest (e.g. *Leuctra*). For this purpose collected specimens will have to be examined with the aid of a microscope and the appropriate key.

USING THE KEY

The key is of the orthodox dichotomous type leading via a number in the right-hand margin to the next relevant couplet.

Mention is sometimes made of the taxonomic group reached at a particular separation, but the final destination (whether it be species, genus, family or higher group) is always printed in **small bold type**.

Unfamiliar technical and anatomical terms (e.g. pronotum, maxillary palp) should be looked up in an appropriate source, though most of them are made clear by the illustrations. The diagrams are in fact an integral part of the key and constant reference should be made to them while using it. The scale lines represent 1 mm., but are of course only approximate. Numbers in brackets in the key refer to the relevant figure.

Abbreviations are explained below.

2×	twice as	ant.	anterior	post.	posterior
>	more than	app.	appendage(s)	pr.	pair, pairs of
<	less than	c.	circa, approximately	pu.	pupa(e)
±	more or less	incl.	including	seg(s).	segment(s)
abd.	abdomen, abdominal	la.	larva(e)	thor.	thorax, thoracic
ad.	adult	ny.	nymph(s)	us.	usually

ACKNOWLEDGEMENTS

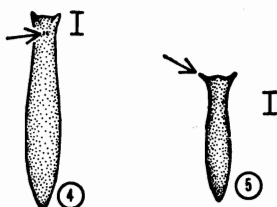
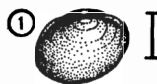
I am grateful to Dr. Macan and Faith Arnold (Mrs. Farnham) for helpful advice and criticism, and to Mr. Charles Sinker and past and present members of his staff for repeatedly testing and amending the key at various stages.

REFERENCES

- ARNOLD, F. N. and MACAN, T. T. (1969). Studies on the fauna of a Shropshire hill-stream. *Fld. Stud.*, **3**, 157-182.
- MACAN, T. T. (1959). *A guide to freshwater invertebrate animals*. 118 pp. Longmans, London. *Freshwater Biological Association, Scientific Publications*.
- No. 13. Macan, T. T. (1960). A key to the British fresh- and brackish-water gastropods.
- No. 16. Macan, T. T. (1965). A revised key to the British water bugs (Hemiptera-Heteroptera).
- No. 17. Hynes, H. B. N., Macan, T. T., and Williams, W. D. (1960). A key to the British species of Crustacea: Malacostraca occurring in freshwater.
- No. 20. Macan, T. T. (1961). A key to the nymphs of the British species of Ephemeroptera.
- No. 23. Reynoldson, T. B. (1967). A key to the British species of freshwater triclads.

KEY

1. Animal with shell secreted by body, resembling mussel, limpet or snail
MOLLUSCA 2
- Animal, not like mussel, limpet or snail (but may be in a protective case) 4
2. Shell-valves 2 (1) LAMELLIBRANCHIATA:
SPHAERIIDAE Pea Mussels **Pisidium**
or **Sphaerium**
Shell in one piece GASTROPODA 3
3. Shell ± conical and limpet-like but with 'hooked' top (2)
River Limpet **Ancylus fluviatilis**
Shell spirally coiled with large body whorl and small spire (3)
Wandering Snail **Limnaea pereger**
4. Body unsegmented and flattened, with ear-like lobes at ant. end, glides slowly over substrate
PLATYHELMINTHES: TRICLADIDA
Flatworms 5
- Body segmented (segs. may be hard to see), never 'gliding' 6
5. Eyes 2, close to midline; body dark or pale (4) **Crenobia alpina**
Eyes numerous round ant. margin; body black or brown (5) **Polycelis felina**
6. Soft-bodied worm without distinct head region, often redblooded, no macroscopic app. ANNELIDA: **Lumbriculidae**,
OLIGOCHAETA True Worms **Tubificidae**
or **Naiadidae**
- Us. firmbodied and with jointed limbs, but if wormlike (and sometimes also redblooded) then with <14 segs. and with distinct head region and/or app. (false legs, mouth-brushes) ARTHROPODA 7
7. 4 pr. or more of jointed thor. legs 8
3 pr. jointed thor. legs, or none 9



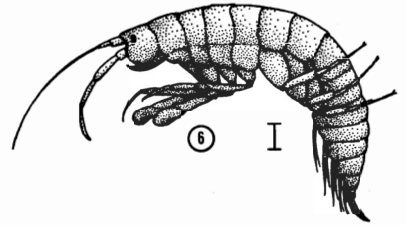
8. >4 pr. legs; body laterally compressed, swims on side (6)

CRUSTACEA: AMPHIPODA

Freshwater Shrimp **Gammarus pulex**

4 pr. legs; body globose, small, swims on front ARACHNIDA

Water-mites **Hydracarina**



9. 3 pr. jointed thor. legs; animal may be in case of sand, stones or vegetable matter 10

No jointed thor. legs; animal may be in case of mud or chitin DIPTERA la. and pu. 43



10. Animal skates or jumps on water surface 11

Animal lives under water 12

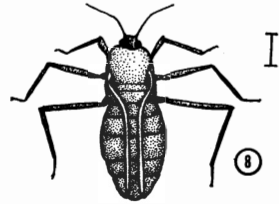
11. Animal 2 mm. or less long, jumping by forked ventral organ (7)

Springtails **Collembola**

Animal >2 mm. long, skating; ad. has 2 orange stripes along abd. (8)

HETEROPTERA la. and ad.

Water Cricket **Velia caprai**



12. Animal lives in a case of foreign material (see introduction) some

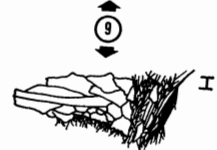
TRICHOPTERA la. Cased caddis 13

Animal not in case 16

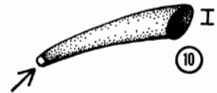


13. Case of vegetable matter: leaves, stems etc. (9) most **Limnephilidae**

Case of stones or sand 14



14. Case of sandgrains formed into a smooth curved cylinder, us. with a larger stone at one end; head pale brown (10) **Odontocerum albicorne**



(*Sericostoma personatum* is similar but lacks large stone and has dark brown head. Certain limnephilids have smooth curved cylindrical cases of small stones)

Case of small stones, not streamlined 15

15. Case with larger stones along each side (11) **Glossosoma**

Case without larger stones laterally (12) **Agapetus**



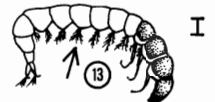
(*Rhyacophila* pu. is greenish, has brown chitinous case within stony case; for its caseless la. see 18)

16. La. with pr. hooks at post. end some TRICHOPTERA la. Caseless caddis 17

La. without post. hooks, or ad. 20

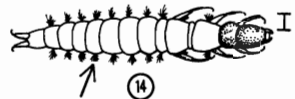
17. With abd. gills 18

Without abd. gills 19



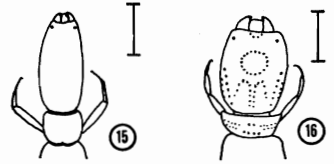
18. Gills beneath abd. segs.; animal brownish (13) **Hydropsychidae**

Gills on sides of abd. segs.; animal greenish (14) **Rhyacophila**



(for its pu. see 15)

19. Head yellow-brown without dark markings; post. margin of pronotum conspicuously darkened **(15)**
Philopotamus montanus



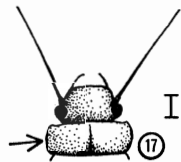
Head and pronotum dull green or brown with black dots **(16)** **Polycentropidae**

20. Body with 2 or 3 hairlike processes, $> \frac{1}{3}$ body length, at post. end 21
 Body without long hairlike processes
 COLEOPTERA Beetles 38

21. 2 processes at post. end PLECOPTERA ny. Stoneflies 22

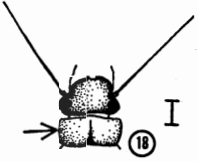
- 3 processes at post. end EPHEMEROPTERA ny. Mayflies 31
 (caution: one or more processes may be broken off short)

22. Whitish tufted gills on thor. at base of all 3 pr. legs 23



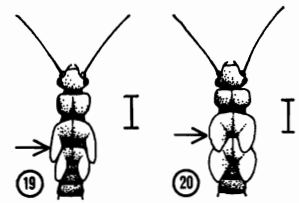
- No gills at base of legs, or gill-bunches ant. to 1st pr. only 24

23. Pronotum $> 2 \times$ wide as long; last abd. seg. dark above **(17)** **Dinocras cephalotes**



- Pronotum $< 2 \times$ wide as long; last abd. seg. yellow above **(18)** **Perla bipunctata**

24. Elongate ny. with wing-pads \pm parallel to body; hind legs when stretched back alongside abd. not reaching its tip 25



- Wing-pads set obliquely to body; hind legs when stretched back alongside abd. reaching beyond its tip 26

25. Wing-pads parallel-sided **(19)** **Leuctra**
 Wing-pads convex in outline **(20)** **Chloroperla**

26. Ventral view of abd. shows 9th sternum extended backwards to cover last 2 segs. **(21)**; each seg. of tarsus longer than preceding seg. **(22)** **Brachyptera risi**



- Ventral view of abd. not as above; 2nd seg. of tarsus shorter than 1st seg. **(23)** 27



27. Last seg. of abd. completely encircled by a ring of chitin of same width all round **(24)**; mandibles elongate; swims by moving whole abd. from side to side; distinct light and dark pattern on head and thor. PERLODIDAE 28



- Last seg. of abd. encircled by incomplete ring of chitin which is broad on top but narrows at sides to 2 points beneath **(25)**; mandibles short, stout; swimming movement laboured NEMOURIDAE 29



28. Chitinous rings round 1st 4 abd. segs.
 have clear gap between dorsal and
 ventral halves (26); body not
 densely hairy **Perlodes microcephala**



Chitinous rings round only 1st 2
 abd. segs. divided (27); body
 densely covered with black hairs
 **Isoperla grammatica**



(Diura bicaudata has 2 divided rings, but is
 only sparsely bristly)

29. No gills just behind head **Nemoura**
 (Nemurella picteti lives in slower water,
 incl. mossy runnels)

Gills present on underside just
 behind head 30

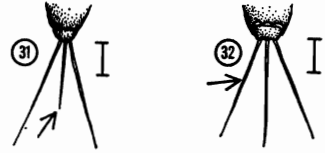
30. 3 sausage-shaped gills on either side
 of midline (28) **Protonemura**
 2 bunches of 5-8 filaments on either
 side of midline; body often coated
 with particles of detritus (29)
 **Amphinemura sulcicollis**



31. Animal living in bottom sediment
 (silt, mud etc.); gills either of
 dense-fringed filaments or hidden
 by covers 32

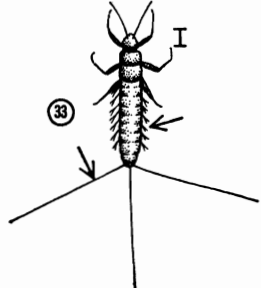
Animal swimming, crawling or
 clinging to stones; gills neither
 dense-fringed nor hidden by covers 33

32. Animal large (up to 25 mm.), with
 fringed gills held over back;
 mandibles with long projecting
 points used for burrowing (30) **Ephemera danica**
 Animal small (up to 10 mm.), with
 flap-like gill-covers on back **Caenis**



33. Middle post. process shorter than 2
 lateral ones (31) **Baetis**
 Middle post. process not shorter 34

34. 3 post. processes and legs have
 alternate pale and dark bands not
 coinciding with seg. junctions
 (32) **Ephemerella ignita**
 3 post. processes without pale and
 dark bands 35



35. Body not flattened; 3 post. processes
 as long as body and held at wide
 angle; gills of narrow filaments
 (33) **Paraleptophlebia submarginata**

Body dorsiventrally flattened; 3
 post. processes not at wide angle;
 gills of a plate and bunch of
 filaments 36

36. Body with post. projections on
 pronotum; dark and light W-
 shaped marks on each femur (34) **Ecdyonurus**
 No projections on pronotum; femur
 not as above 37



37. Single dark spot on each femur (35)

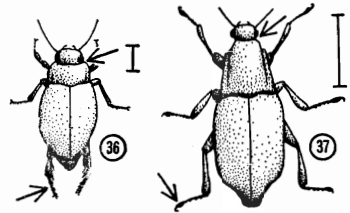
Rhithrogena semicolorata

No dark spot on femur . . . *Heptagenia lateralis*



38. Adult beetle with hard wing-covers over membranous wings 39

La. with no trace of wings or wing-covers 41

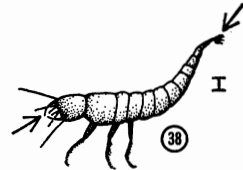


39. Head sunk into thor. so front of body has smooth outline; hind legs flattened with fringing hairs; active swimmer (36).

Dytiscidae

(e.g. *Oreodytes rivalis*)

Head not sunk into thor., front of body not streamlined; legs not flattened but last tarsal seg. swollen; poor swimmer us. found clinging to plants **ELMIDAE** 40



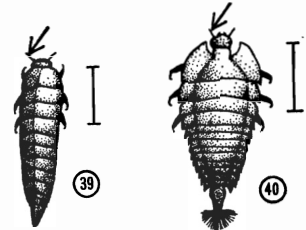
(ad. **HYDROPHILIDAE** have maxillary palps us. longer than club-tipped antennae)

40. Body 3 mm. or less in length . (37)

Elmis aenea

(*Helmis maugei*)

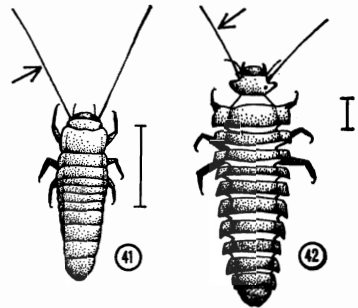
Body > 3 mm. in length . **Lathelmis volkmari**



41. Jaws conspicuous, sickle-shaped; body ± cylindrical with 2 spiracle-bearing processes at post. end (38)

Dytiscidae

Jaws inconspicuous; body us. flattened dorsiventrally, without processes at post end 42



42. Antennae as long as head, < 1/4 length of body; body flattened or cylindrical (39)

Elmidae

(e.g. *Elmis aenea* (40))

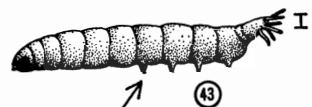
Antennae > 1/4 length of body; body flattened (41) (42)

Helodidae

(ad. terrestrial)

43. Abd. with 4 or more pr. prolegs, or without prolegs but with post. spiracles ringed by 5-6 hairy processes **TIPULIDAE** Craneflies 44

Abd. with fewer than 4 pr. prolegs 46



44. Abd. without prolegs other **Tipulidae**

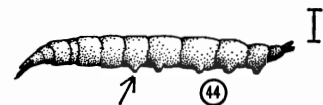
Abd. with prolegs 45

45. 4 pr. prolegs (43)

Pedicia rivosa

5 pr. prolegs (44)

Dicranota



46. La. without wing-cases, not in chitinous pu. case 47

Pu. with distinct swollen wing-cases on thor., or in $\frac{1}{2}$ -conical case of chitin fixed to substrate 49

47. Body us. attached to substrate (but never in mud tube), narrow-waisted and swollen at post. end; end; 1 pr. prolegs on 1st thor. seg. only **(45)** Buffalo gnat **Simulium**

Free-swimming (or in mud tube fixed to substrate), not swollen at post. end; > 1 pr. prolegs Midges 48

48. Prolegs on 1st thor. and last abd. segs.; sausage-like "anal gills"; characteristic figure-of-8 wriggling movement; often redblooded; some species live in tube of mud and sand fixed to substrate. **(46)** **Chironomidae**

Prolegs on 1st and 2nd abd. segs., bristles on 1st thor. seg.; U-shaped when at rest; never in mud tube **(47)** . . . **Dixa**

49. Covered by $\frac{1}{2}$ -conical chitin case fixed to substrate, with pr. breathing tufts often projecting from ant. opening **(48)** **Simulium**

Not in chitin case (may be in mud tube); wing-cases on thor. 50

50. Pr. feathery breathing tufts on thor.; may be in mud tube . **(49)** **Chironomidae**

Pr. trumpet-shaped breathing siphons on thor.; body bent into U-shape, hanging vertically from surface film **(50)** **Dixa**

