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with the author's good  
wishes*

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# A Key to the Nymphs of British Ephemeroptera

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## A KEY TO THE NYMPHS OF BRITISH EPHEMEROPTERA

By T. T. MACAN

**T**HIS key is written for the naturalist who does not possess a microscope and has only a hand-lens or small magnifying glass to aid his vision. It is also assumed that users of the key will be interested in the living nymph, which often has some characteristic feature, for example the way the tails of *Cloeon* curl down at the tip, lost at death. Nearly all the illustrations have been drawn specially from living specimens with the aid of no more than a hand-lens.

The problem of names immediately faces the author of such a work. Many Ephemeroptera have fishermen's names, but these refer only to particular stages and do not coincide with the species name of the naturalist. For example, *Baetis pumilus* and *Baetis niger* live in quite different kinds of places and the nymphs can easily be distinguished by the naked eye. The adults are less distinct and fishermen refer to them both as Iron Blue Duns when they are in the dun stage. When they change skins, males of both species become Jenny Spinners, females Little Claret Spinners (Harris 1952, "An Angler's Entomology", *New Naturalist*, No. 23, pp. 136, 137). Obviously none of these names can be applied to the nymphs, and accordingly only the Latin names have been used in this key.

Probably few readers will need any introduction to Harris's "An Angler's Entomology" in the *New Naturalist* series or to Kimmins' key to the adults in the Freshwater Biological Association's *Scientific Publication* series.

Nothing further in the way of introduction seems necessary, except to explain how a key works for the benefit of those not acquainted with this useful aid to identifying animals.

Starting on the left-hand side, opposite the figure I, the reader finds a set of characters before him; below, opposite the dash, there is an

alternative set of characters. He examines his specimen and decides which set of characters fits it. This decision made, he looks at the right hand margin where he finds either a name, in which case his quest is over, or a figure. This figure takes him further on in the key where, opposite the same figure in the left-hand margin, he finds another paired set of characters with which he must compare his specimen. He continues till finally he comes to a name in the right-hand margin. Occasionally there are characters in brackets; these apply to the group opposite the end of the line in which they occur and to some members of the alternative group.

Some lengths, measured from the front of the head to the tip of the abdomen, are given, though, since they can obviously refer only to full-grown nymphs, they are of limited value. The lines beside each drawing represent 1 millimetre. 25 mm. = 1 inch.

The smaller the nymph, in general, the less marked its distinguishing features. The younger nymphs, such for example as the *Cloeon* depicted in Fig. 9A, have no wing cases. Immediately after casting its skin, a nymph is light-coloured and it gradually darkens; nymphs nearing the time of emergence often have very dark wing-covers. It is important to bear these changes in mind when using the key.

1. Nymphs burrowing in mud or sand; gills feathery, held over the back; a projection from the mouthparts visible in front of the head; (this nymph, 25 mm. or more in length, excluding the tails, when full grown, is the largest found in Britain). (Fig. 1.) ... .. *Ephemera*

In rivers, lakes, and canals, *E. danica* usually in sand, *E. vulgata* in mud; the nymph of the rare *E. lineata* has not been described.

— Nymphs living among plants, or on stones, or in the surface layers of mud; gills not like this; nothing except the antennae projecting in front of the head ... .. 2

2. Crawling nymphs living in the surface layers of the mud; first pair of gills reduced to tapering filaments, second pair form a large rectangular flap which covers the rest; (these nymphs, about 6 mm. long, are the smallest found in Britain). (Fig. 2.) The body is usually covered with small particles of debris ... .. *Family Caenidae*

Six species in rivers, streams, lakes, and ponds.

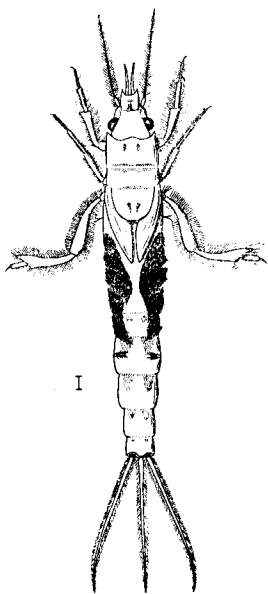


FIG. 1  
*Ephemera danica* from life

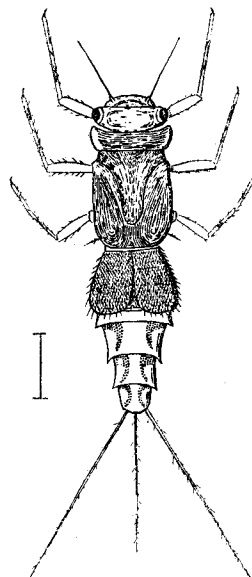


FIG. 2  
*Caenis* from life

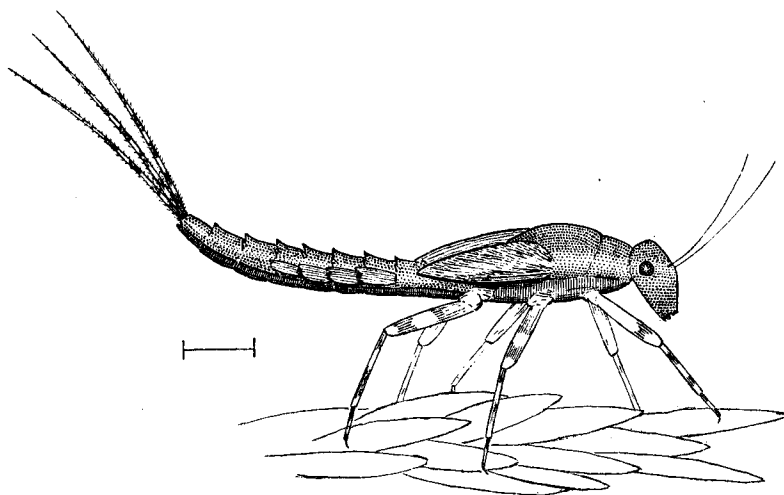


FIG. 3  
*Ephemerella ignita* from life

— Nymphs not living in the surface layers of the mud; more than two pairs of gills visible ... .. 3

3. Crawling nymphs found in vegetation and on stones; with apparently 4 pairs of gills (the fifth pair is small and hidden beneath the fourth); gills on the back, that is, if the nymph is looked at from above, the gills do not project beyond the sides of the body; (tails with short scattered bristles). (Fig. 3.) ... .. *Ephemere*

The tails of the common *E. ignita* are ringed with alternate light and dark bands, whereas those of the rarer *E. notata* are uniformly pigmented.

— Nymphs that can swim or are adapted to cling to the surface of stones; seven gills attached to the sides ... .. 4

4. Nymphs that cling to and crawl over (though much faster than the previous crawlers mentioned) the surface of stones and boulders; body, particularly the head and the innermost segments of the legs, flattened; gills consisting of a plate and a bunch of filaments.

(Family *Ecdyonuridae*) 5

— Nymphs that swim; body long and more or less round in section; gills never consisting of a plate and a bunch of filaments ... .. 7

5. Hind corners of the plate immediately behind the head projecting backwards; innermost segments of legs with chevron-like markings; tails never with alternating light and dark bands (Fig. 4A). *Ecdyonurus*

Four British species, difficult to distinguish; on stony bottoms in streams, rivers, and lakes.

— Plate immediately behind the head more or less rectangular (Fig. 4B, C); innermost segments of legs without chevron-like markings, or, if such markings be present, the tails are marked in alternating light and dark bands ... .. 6

6. Innermost segment of legs with a distinct dark spot in the middle (Fig. 4B); first gills very large and meeting beneath the body (as these gills are rather transparent this character is not always easy to see).

*Rithrogena*

*R. semicolorata* is very common in stony streams and rivers; *R. haarupi*, very similar though generally larger when full-grown, is known only from a few rivers.

— Innermost segment of legs without a dark spot in the middle;

first gills smaller than the rest and not meeting beneath the body.

*Heptagenia*

*Heptagenia lateralis* has four dark lines on the innermost segment of the legs, as shown in Fig. 4c. It occurs on stones in streams, rivers and lakes, mainly in areas poor in lime.

*H. sulphurea* usually has a strongly contrasting pattern rather like that of an *Ecdyonurus* and is immediately distinguished by the alternating light and dark bands on the tails. Also its seventh gill (the last) consists of a plate and filaments, not of a plate only as in the other species. It occurs in rivers and in calcareous lakes, and is the only one of these flattened nymphs commonly found in chalk rivers.

*H. fuscogrisea* has two conspicuous reddish bands running across the innermost segments of the legs. It is found in some of the calcareous Irish loughs. The nymph of *H. longicauda* is unknown.

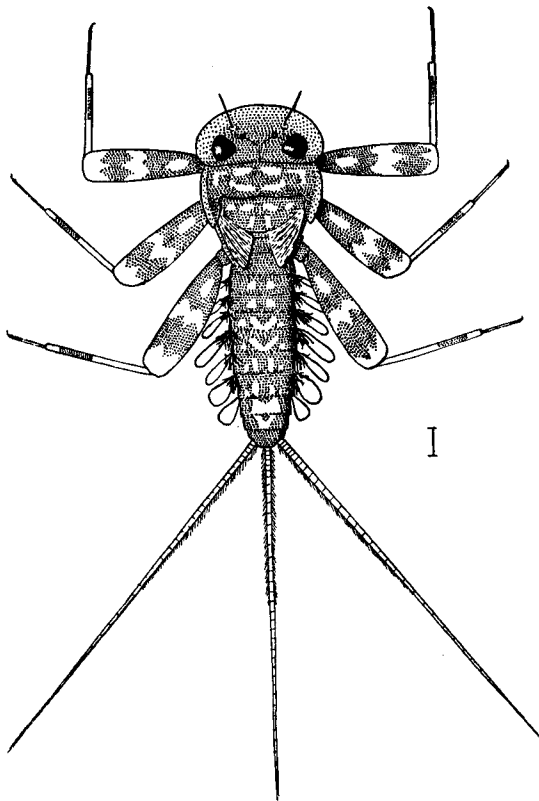


FIG. 4A  
*Ecdyonurus venosus* from life

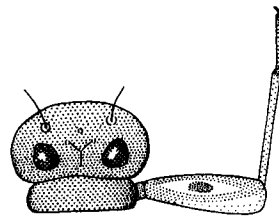


FIG. 4B  
*Rithrogena semicolorata*

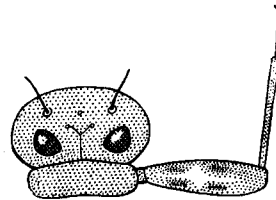


FIG. 4C  
*Heptagenia lateralis*

7. Swimming laboured; tails as long or longer than the body and with short sparse hairs on both sides; gills as in Figs. 5B, C, or D; (nymphs usually dark reddish brown). (Fig. 5.) ... Family *Leptophlebiidae*

Two species of *Leptophlebia* have swollen bases to the gills (Fig. 5B), though the swelling is less and less marked with decreasing size. Both occur in lakes and fish-ponds, particularly those in moorland surroundings. Three species of *Paraleptophlebia* have strap-like gills (Fig. 5A, c). They are usually found in flowing water as is also *Habrophlebia fusca*, distinguished at once by its many-branched gills (Fig. 5D).

— Swimming quick; tails never as long as the body and with longer, more close-set hairs, on both sides of the middle one but only on the inside of the outer two; gills shaped like the head of a tennis racket, a beech leaf,

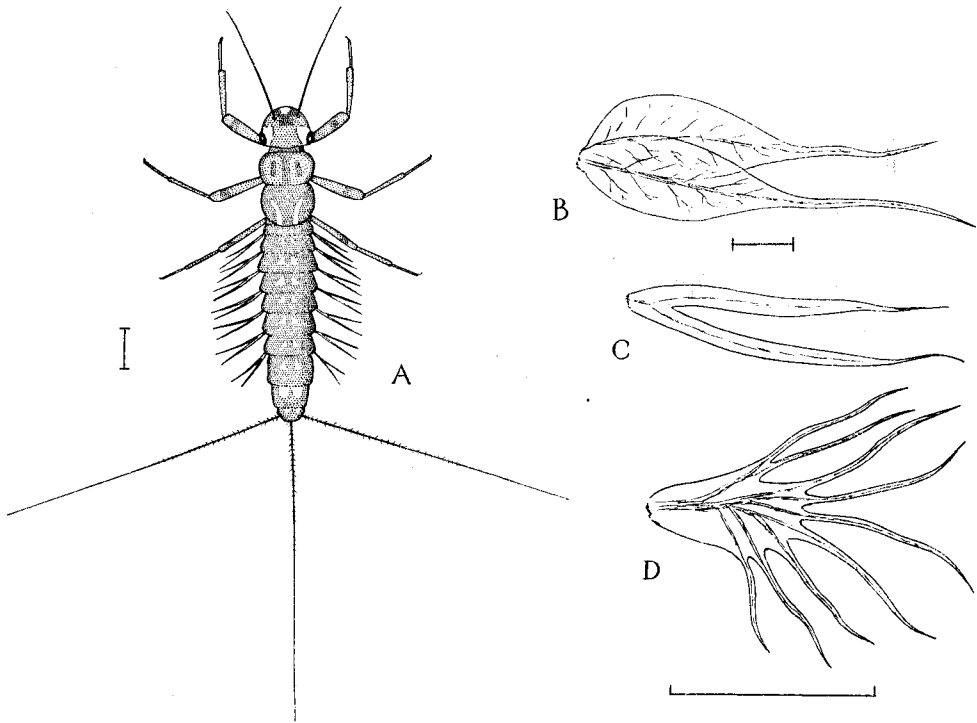


FIG. 5 A *Paraleptophlebia submarginata* from life  
 B Gill of *Leptophlebia*  
 c Gill of *Paraleptophlebia*  
 D Gill of *Habrophlebia*

or a conventional heart; each gill consisting of a single plate or some, never more than 6, may consist of two plates ... .. 8

8. All three tails of more or less the same length and marked with dark rings (Fig. 7) (which are easily distinguishable on specimens, though less so on drawings, from the rings due to the segmentation of the tails), a black band (Fig. 6), or both (Figs. 8, 9, 10) ... .. 9

— Middle tails shorter than the outer ones; tails with (Fig. 11B) or without (Fig. 11A) a black band, but never with dark rings ... 14

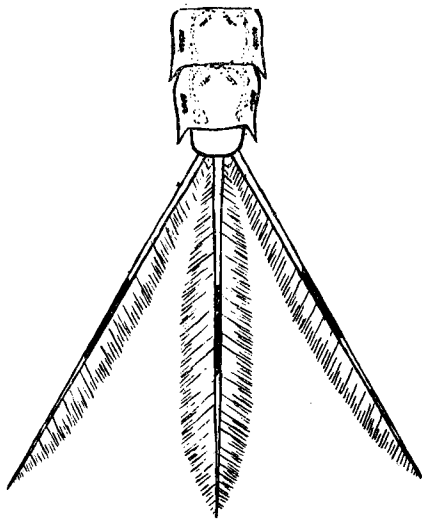


FIG. 6A  
Hind end of *Siphonurus lacustris*  
from life

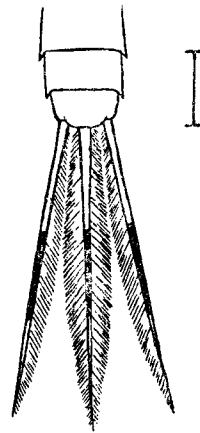


FIG. 6B  
Hind end of *Ameletus inopinatus*  
from life

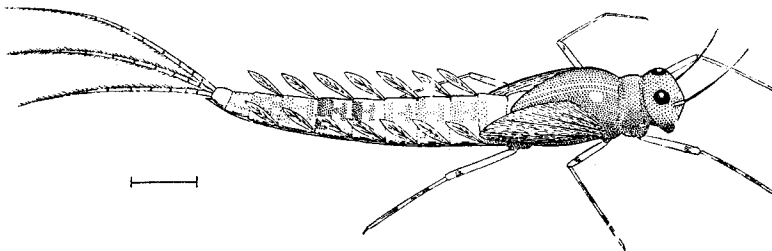


FIG. 7  
*Centroptilum luteolum* from life



9. Hind corners of last few abdominal segments produced into pointed projections (Fig. 6A, B); tails with a dark band but never with dark rings; (the projections at the corners of the last few abdominal segments are conspicuous in *Siphonurus*, but not in *Ameletus*, which at first glance is likely to be taken for a *Baetis* nymph. It is distinguished from this genus by the possession of three tails of equal length) ... 10

— Hind corners of last few abdominal segments not produced into pointed projections; tails with dark rings and with or without a dark band as well ... .. 11

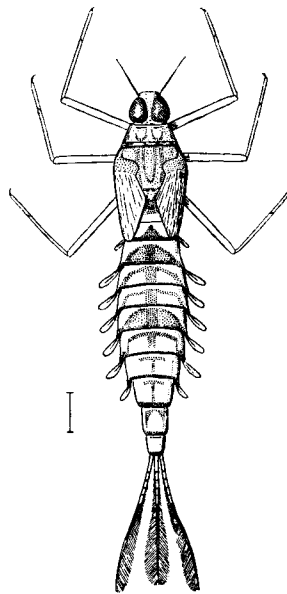


FIG. 8  
*Centropilum pennulatum* from life

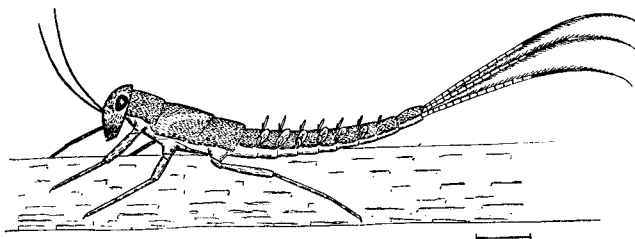


FIG. 9A  
*Cloeon dipterum*, half grown, from life

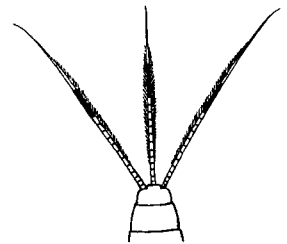


FIG. 9B  
Hind end of  
*Cloeon dipterum* from life

10. Gills large, first two or first six consisting of two plates; full-grown specimens 14–18 mm. long (which makes them second in size to *Ephemera* and distinctly larger than any other swimming nymph).

*Siphonurus*

Three species, none particularly common; in lakes and slowly running water.

— Gills rather small and all consisting of one plate; full-grown specimens 10 mm. long; (in life the tails are held close together, Fig. 6B).

*Ameletus inopinatus*

In the Lake District this species has been found only in becks above 1,000 feet; in the north of Scotland it has been found in lakes.

11. About seven distinct dark rings on the tails, but no dark band; all the gills single and shaped like a beech leaf; length 6–8 mm.; (a small sandy-coloured species, usually with a clearly defined variegated pattern on the upper surface of the abdomen). (Fig. 7).

*Centroptilum luteolum*

In lakes and rivers where the current is not fast.

— Dark rings and a dark band on the tails; gills of other shape, some consisting of two plates; full-grown specimens larger ... 12

12. About 5 dark rings on the tails between the dark band and the body; sandy-coloured with a variegated pattern in which the contrast between dark and light is strong; (first six gills double with one plate much larger than the other, round at the tip, shaped rather like a royal tennis racket; tails held close together in life); length 8–10 mm. (Fig. 8.) ... .. *Centroptilum pennulatum*

In rivers where the current is not too fast, scarcer than *C. luteolum*.

— More than 5 dark rings on the tails between the dark band and the body; sandy-coloured, usually without strong contrast between the light and dark areas of the pattern on the upper surface ... .. 13

13. In life the tails, seen from above, are held well apart (Fig. 9B), in the side view they are curved downwards in a characteristic way (Fig. 9A); the hairs fringing the tails are not very obvious and do not extend to the tip, which gives the end a lash-like appearance (Fig. 9B); dark band on tails broad, a little beyond the middle, about 12 dark rings

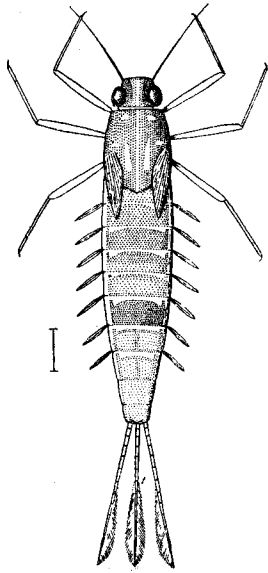


FIG. 10  
*Proclæon rufulum*  
from life

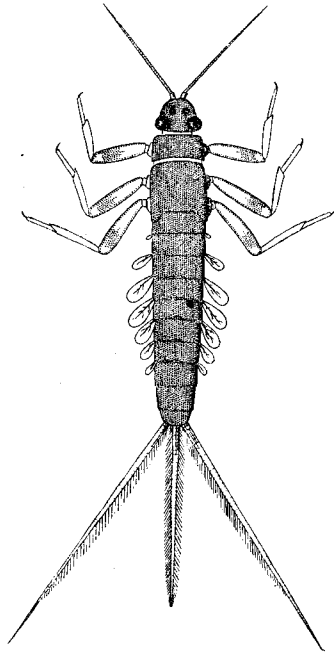


FIG. 11A  
*Baetis pumilus*

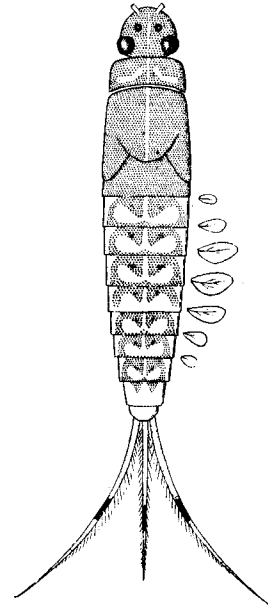


FIG. 11B  
*Baetis scambus*

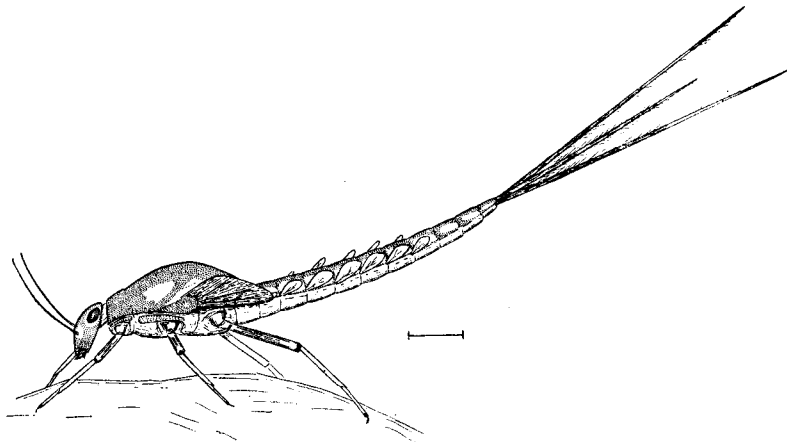


FIG. 12  
*Baetis rhodani* from life

between it and the body; usually light-coloured without a strongly contrasting pattern; first six gills double; generally in stagnant water.

*Cloeon*

*C. dipterum* is the common species in ponds in fertile land, *C. simile* is often found with it but occurs also in deep weed-beds in lakes.

— In life the tails are held rather close together; hairs fringing them usually thick and extending to the tip; dark band on tails rather narrow and situated well beyond the middle, about 9 rings between it and the body; usually darker than preceding and with a more contrasting pattern, though the contrast is not as strong as in *Centroptilum*; all gills single; generally in running water. (Fig. 10.) ... .. *Procloeon rufulum*

In rivers where the current is not too fast.

14. Tails with a distinct dark band. (Fig. 11B) ... .. 15

— Tails light or with a slight darkening near the middle but never with a distinct dark band. (Fig. 11A) ... .. 16

15. Upper surface of abdominal segments uniformly pigmented and dark brown, or almost black in mature nymphs (Fig. 11A), except, in some specimens, for a yellow line running longitudinally down the middle from the front of the head to the eighth abdominal segment (in an intermediate condition there is a small light triangle at the apex of each segment); thorax relatively narrow and end of abdomen relatively broad, so that the body does not taper strongly from the widest part to the tip; gills symmetrical, i.e. shaped like the head of an ordinary tennis racket, the first distinctly smaller than any other (Fig. 11A) ... .. *Baetis niger*

In streams and rivers with rooted plants.

— Upper surface of abdominal segments yellowish-grey with a light and dark pattern, the fifth segment often being extensively light and forming a dot easily visible to the naked eye; body less narrow in front and tapering more strongly behind the widest part; gills less symmetrical, i.e. shaped more like the head of a royal tennis racket, the first and last, which are the smallest, being of about the same size. (Fig. 11B.)

*B. scambus* and *bioculatus*

In rivers.

16. Very like *B. niger*, except that there is no dark band on the tails.

*B. pumilus*

Mainly in stony streams.

— Very like *B. scambus* and *B. bioculatus*, with the same exception, and also that the abdominal pattern has less contrast, being sometimes of a uniform straw colour.

*B. rhodani* (Fig. 12), *tenax*, *vernus* and *atrebatinus*  
*B. rhodani* is widespread but commonest in stony streams and rivers; the other three occur in slower rivers where there is vegetation.