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A DESCRIPTION OF THE NYMPH OF *BAETIS BUCERATUS* WITH NOTES ON AND A KEY TO THE OTHER SPECIES IN THE GENUS

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(With 6 figures in the text)

Descriptions of the nymphs of eight of the nine British species of *Baetis* were published by Macan (1950), who was then unaware that the ninth *Baetis buceratus* Eaton, had been described by Bogoescu (1933). In September, 1956, Dr. M. T. Wade took me to a place on the River Usk where he had taken *B. buceratus* the year before, and I was able to collect a number of nymphs, from which I later obtained imagines. The nymphs were not like those described by Bogoescu. The first purpose of this paper is therefore to make a description of the nymph of *Baetis buceratus*. As all the British species are now known, it is possible to construct a key to them and that is another purpose, but, in between, it seems desirable to interpolate some notes about the various species that have accumulated since the original descriptions were made. This is particularly desirable because, during the course of the work, I have had the advantage of collaboration with Dr. Gertrud Pleskot, who has pointed out to me several characteristic features that I had overlooked.

DESCRIPTION OF THE NYMPH OF *BAETIS BUCERATUS*

Material

The description is based on thirteen cast skins and thirty-seven whole nymphs; four cast skins and two whole nymphs have been dissected and mounted.

The nymph resembles that of *B. vernus* or *B. tenax* closely, and the following description is largely in the form of a comparison.

Markings

Fig. 2 shows the dorsal surface of the abdomen of a specimen which, needless to say, was chosen because it showed the markings particularly clearly. The central line and the four dots are to be seen on all the other specimens except one where a pale basal band extends far enough to cover the place where the proximal pair might be expected. On segments 3, 4, 5

and 6 of one specimen, pale lines run diagonally from each of the proximal dots to the centre of the fore margin of the tergum; a slight trace of such a marking, which I referred to as "the bird's foot mark" in the previous paper, is to be seen on segment 4 in fig. 2. The pale lateral areas are generally less clear than in the figure and may be absent. Moreover, the detached line at the side in fig. 2 is often fused with the rest of the dark central area which is, in consequence, straight-sided and not arched.

This pattern, particularly the central line and four dots, is the most distinctive feature of *B. buceratus*.

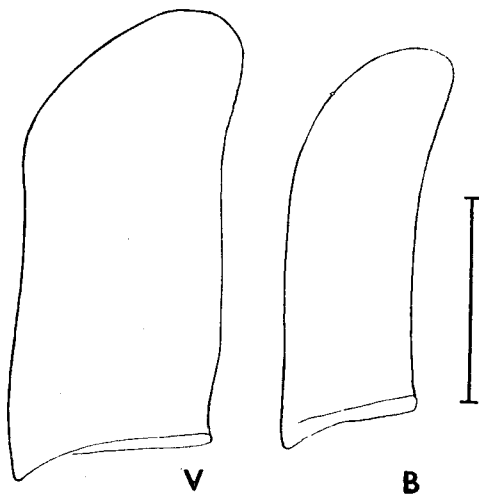


Fig. 1. Paraglossae of *vernus* (V) and *buceratus* (B). Scale line 0.1 mm. long.

Lengths

All the cast skins were between 5 and 6 mm. long, which is at least 1 mm. shorter than the smallest *B. tenax* (Macan, 1950, table 4). Apart from the fact that such a distinction is valid only for full-grown nymphs, I should hesitate to rely on it without knowing the life history of the two (or three if *B. vernus* and *B. tenax* really are distinct) species concerned. If it is like that of *Baetis rhodani*, in which nymphs originating from the quick summer generation may be no more than 5 mm. long, which is half the length of their parents who had a longer nymphal life including the winter, it is valueless. If the species have but one generation a year, it may be a valid distinction for full-grown nymphs.

To the naked eye specimens appear somewhat broader and more robust than those of *B. rhodani* and they have a reddish brown tinge and tails that are uniformly pale except at the extreme tip, which, when seen under a microscope, is darker. Unfortunately I have not had the experience of picking this species out of a collection containing *B. tenax* or *B. vernus* also.

Mouthparts

The paraglossae of *B. buceratus* are narrower relative to their length than those of *B. vernus* and *B. tenax* and of slightly different shape (fig. 1). This is a difficult character, since shape varies a little according to the exact angle at which the paraglossa is lying; a uniform sweep of the outer edge of the paraglossa of *B. buceratus* in contrast to a slight bulge in that of the other two species appears to be the most easily detectable feature. The other mouthparts seem to be identical.

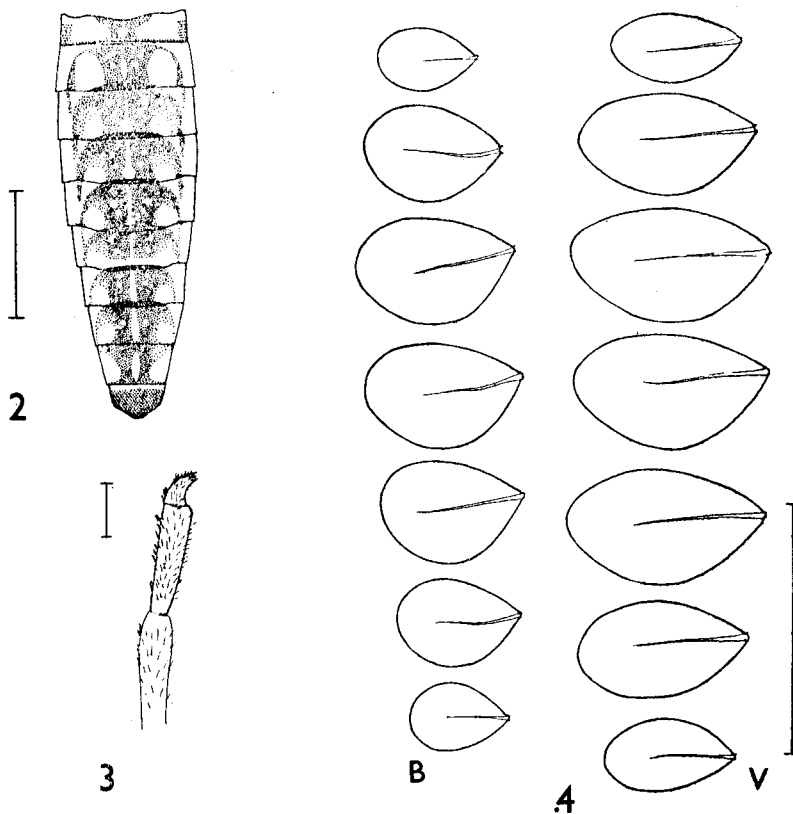


Fig. 2. Dorsal abdominal pattern of *bucерatus*. Scale line 1 mm. long.

Fig. 3. Maxillary palp of *atrebatinus*. Scale line 0.1 mm. long.

Fig. 4. Gills of *bucерatus* (B) and *vernus* (V). Scale line 1 mm. long.

Legs

The legs afford no distinction between the three species under discussion, but are described here because examination of them has revealed hitherto unnoticed characters separating species groups in the genus *Baetis*. It is convenient, when referring to upper and lower margins and so on, to consider

that all legs are lying as in fig. 5. Along the top of the femur of each leg is a row of relatively long spines that are generally distinctly clavate as in fig. 5 but which are sometimes parallel-sided and pointed at the tip. Accompanying them and outnumbering them are smaller spines, those nearer the margin pointed, those away from the margin frayed at the end. There are more of

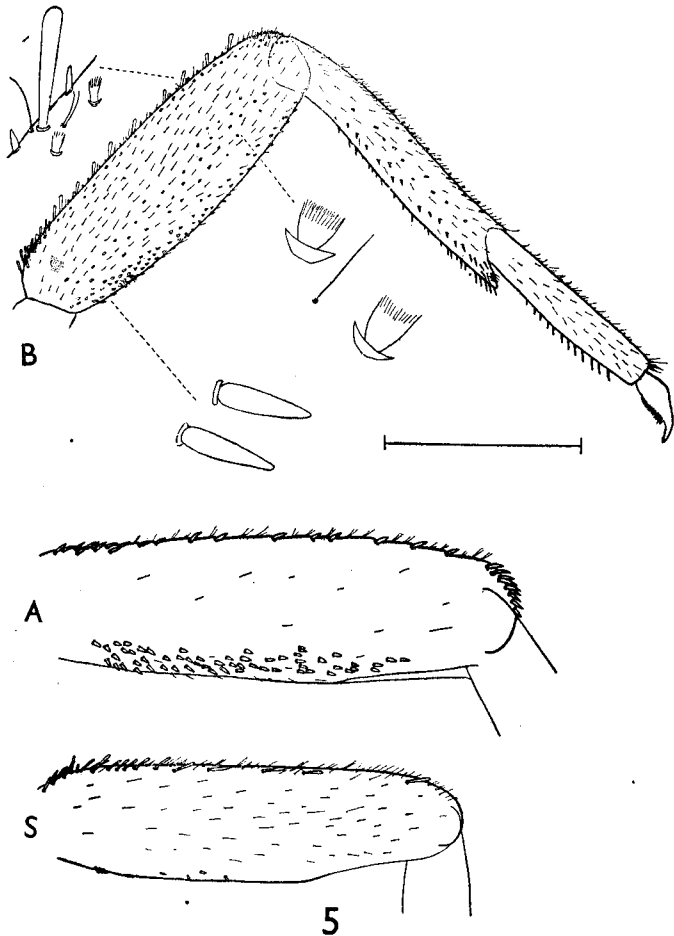


Fig. 5. B, Leg of *buceratus*; the individual spines are drawn freehand and are not all to the same scale. A, Femur of *atrebatinus*. S, Femur of *scambus*. Scale line 0.5 mm. long.

these in a zone down the middle of the femur but they are not as long. Along and near the lower margin pointed spines are rather numerous. On the tibia also there are frayed spines near the middle and pointed spines near and along the lower margin. A row of pointed spines is set along the lower edge of the tarsi. All segments bear hairs which are finer than shown in fig. 5.

The Abdomen

The upper surface of the terga is decorated with little semilunar ridges which are generally more than a diameter apart (fig. 6 B). Similar objects on *B. vernus* and *B. tenax* are closer together and, in the transverse axis, each one is generally separated from a neighbour by a distance less than its own diameter (fig. 6 V).

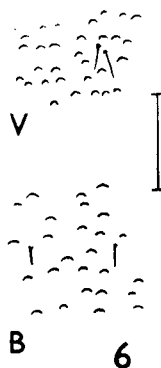


Fig. 6. Sculpturing on abdominal terga of *vernus* (V) and *buceratus* (B). Scale line 0.05 mm. long.

Gills

The gills are shorter than those of *B. tenax* and *B. vernus* (fig. 4).

B. vernus Curtis and *B. tenax* Eaton

Neither Dr. Pleskot nor I can find any difference between these two species apart from some very small ones in the spines of the legs. In some specimens from Derbyshire identified as *B. tenax* by Mr. D. E. Kimmins, the spines on the surface of the femur were more variable in size and appeared to be cleft at the tip and not frayed. On specimens named *B. vernus*, the spines were less frayed than on *B. buceratus* and those near the margin were similar to those near the middle.

They differ from *B. buceratus*, to summarize, in pattern on abdominal terga, in shape of gill, in sculpturing on abdominal terga, and in shape of paraglossa. It is possible also that the nymphs of *B. buceratus* could be picked out from a mixed collection by their browner colour and broader build. There is also a size difference which may prove to be valid for mature nymphs.

B. rhodani (Pictet)

Dr. Pleskot has pointed out to me that this species is unique in bearing small pointed spines articulated not only to the gills but to the terga and to the base of the antennae as well.

B. atrebatinus Eaton

My original description was based on nymphs that I had not recognized as distinct in the field and perhaps, therefore, my first field impressions are worth recording. I did not know what species it was when I saw it in the

Kennet and Avon Canal near Reading in May, 1954, but recognized it at once as an unfamiliar species. I wrote "A long nymph, obviously narrower than *B. rhodani*. Colour difficult to describe because it varies a good deal according to the stage of development, but there is a gingery look about the nymph. This is particularly obvious on the tails which show little variation in intensity of pigment." There are generally four light dots near the centre of each segment. The proximal ones are often somewhat elongate and curved inwards, and the two on each side may be more or less fused.

The spines along the upper margin of the femora are not similar in size and shape to those of *B. pumilus* and *B. niger* as stated in the previous publication (p. 164); they are somewhat shorter (fig. 5 A). A group of similar spines forms a tuft at the end of the femur. In *B. vernus*, *tenax*, *rhodani* and *bucерatus* there are small spines in this place but no long ones. In *B. bioculatus* and *B. scambus* small scales project. The maxillary palp appears to have a small segment at the tip. This is bent inwards and there is also an inward projection of the end of the segment before it (fig. 3).

A nymph described and figured by Grandi (1948) appears to be more like that of *Acentrella lapponica* described and figured by Ulmer (1943).

B. bioculatus (Linnaeus) and *B. scambus* Eaton

The separation of these two based on the number of hairs on the tip of the labial palp, which can probably only be counted reliably on a mounted specimen under high-power magnification, is not very satisfactory.

I originally stated that there are no small spines along the top of the femora in these species, but this is not true and careful examination does reveal a few small ones. Some of them are frayed but such spines are absent from or very scarce in the middle of the femur. Near and along the lower margin, spines are fewer than in the *bucерatus-vernus-tenax* group (fig. 5 s), but this does not hold good for the tarsi.

B. niger (Linnaeus) and *B. pumilus* (Burmeister)

In these two also spines are found only near the margins of the femora. The relatively long, tapering pointed spines along the top of the femora are unlike those of any other group and the occurrence of similar spines along the upper margin of the tibia is a unique feature.

Key

1. Along the top of the femora there are short pointed spines, of which the number in a group at the distal end is about the same as the number along the shaft (fig. 5 A). Labrum with a close-set row of 15-20 bristles just behind the anterior margin (Macan, 1950, fig. 2 A); labium with a small glossa, a broad paraglossa and a wide penultimate joint to the palp (Macan, 1950, fig. 6 A). About 20 teeth on the claws. Maxillary palp with two inward projections near the tip (fig. 3). (A narrow brownish-red species which may have two or four dots near the centre of each abdominal tergum. Upper tooth of mandibles set back (Macan, 1950, fig. 4 A). First gill smaller than all the rest. *atrebatinus*

1. Spines along the top of the femora, if pointed, longer, and always more numerous along the shaft than in the apical group. Labrum with up to 10 bristles well spaced apart behind the anterior margin; labium of other shape. 10-16 teeth on the claws. Maxillary palp without any projections 2
2. Along the top of the femora there are relatively long, tapering pointed spines (Macan, 1950, fig. 1); similar spines along the top of the tibiae. Mandible with outermost tooth pointed and set back (Macan, 1950, fig. 4N, P). Gills rather elongate with strongly denticulate margins (Macan, 1950, fig. 1 and fig. 6 P), the first smaller than all the rest. The body tapers less from the thorax to the tip of the abdomen and, apart from light markings which may or may not be present along the middle line, is uniformly pigmented and dark except in the early stages and at the beginning of each instar 3
 - Along the top of the femora the spines, if pointed, are more parallel-sided; no long spines along the top of the tibiae. Mandible with outer tooth broad, truncate and not set back (Macan, 1950, fig. 4 S, R). Gills less elongate, with less strongly denticulate margins and the first and last of about the same size (fig. 4). The body tapers more and, if uniformly pigmented, is generally light 4
3. Tails with a distinct black band near the middle. Prosthema of right mandible as in other species (Macan, 1950, fig. 4 N) *niger*
 - Tails may be a little darker near the middle than elsewhere, but they never show a distinct black band. Prosthema of right mandible represented by two hairs (Macan, 1950, fig. 4 P) *pumilus*
4. Tails with a distinct black band in the middle. Long clavate spines along the upper margin of the femora; between them a small number of very small spines; no or very few small spines in the middle part of the femora (fig. 5 S). Two rows of bristles on outer margin of paraglossae *scambus* and *bioculatus*
 - Tails without a distinct black band in the middle. Long clavate or pointed spines along the upper margin of the femora; between them small spines, some pointed, some frayed at the end, are more numerous than they are; small frayed spines in a band right along the middle of the femur (fig. 5 B). Three rows of bristles on outer margin of paraglossa 5
5. Small pointed spines in addition to scale-like objects on the terga, on the edges of the gills and on the bases of the antennae *rhodani*
 - No spines on these places 6
6. With four dots on the abdominal terga (fig. 2). Gills relatively shorter (fig. 4 B). Semilunar marks on the abdominal terga generally separated by a distance greater than their diameter (fig. 6 B). Paraglossae relatively longer (fig. 1 B) *buceratus*

6. Without four dots on the terga. Gills relatively longer (fig. 4 v). Semilunar marks on the abdominal terga generally separated by a distance less than their diameter (fig. 6 v). Paraglossae relatively shorter (fig. 1 v).....*vernus* and *tenax*

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