

A COMPARISON OF THE NYMPHS OF THE BRITISH SPECIES OF
THE GENUS *EPHEMERA*

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Kimmins (1954) lists: *Ephemera vulgata* Linnaeus, 1758,

E. danica Müller, 1764,

E. lineata Eaton, 1870.

The nymphs of the first two have been distinguished by Petersen, whose paper I have not seen, Lestage (1916), Schoenemund (1930) and Percival and Whitehead (1926), that of the last is undescribed. The English and German authors have added little original to the full description given by Lestage and have been content to confirm the differences that he noted. They are:

	<i>E. danica</i>	<i>E. vulgata</i>
Head markings	joined together	not joined together
Sides of head	less convex	more convex
Clypeal projection	sides rather convex, front embayed, projections rather obtuse	sides nearly straight,* front more deeply embayed, projections distinctly sharper
Abdominal markings	on segments 6-9 a broad dark stripe and a narrow line inside it; on other segments markings frequently absent, and small and obscure when present.	on segments 2-9 a dark comma-like mark, with, on segments 7-9, a narrow line inside it.

* In Percival and Whitehead's figure, which is "from Lestage after Petersen," they are concave.

The first character is worthless in my experience as the pattern varies considerably. The second character is not to be found in Schoenemund's key nor is the difference categorically stated by Lestage, who merely asserts that the head of *E. vulgata* is round at the sides and makes no mention of the condition in *E. danica*. Percival and Whitehead were, I think, justified in concluding from his drawings that Lestage recognised this as a distinction. It is, however, a second worthless one, for the eye of the male is larger than that of the female and its size appears to increase as the time for metamorphosis draws near. Fig. 1: 1, 6, and fig. 1: 2, 8, show heads of nymphs of the two species taken in December; the eye of *E. danica* is longer, that of *E. vulgata* is broader and slightly more protuberant. Fig. 1: 3, shows the eye of a nymph of *E. danica* taken in May; it is distinctly more protuberant than that of *E. vulgata* taken in December. The specimens came from different places and the conjecture that the eye increases in size in the final instar needs further investigation but it may be said with confidence that the character cannot be used to distinguish the species.

The third character is more reliable but not nearly as clear as the illustrations in the three works quoted give one to believe, as the shape varies. Fig. 1: 1, 3, 4, 6, 7, show the clypeal process in *E. danica*; 4 shows an extreme example of convexity and it resembles the figures mentioned; 1 shows a more typical specimen, and 3 and 7 two in which the sides are as straight as in *E. vulgata*. There is a tendency for the sides of the projection to be more convex in the female than in the male; 7 shows a specimen in which the frontal bay is unusually shallow. Fig. 1: 2, 5, 8, show the process in *E. vulgata* in which it may be seen that, though the degree of convexity of the sides is not a reliable criterion, the frontal bay is deeper and wider and the lateral projections sharper in consequence. *E. lineata* is somewhat intermediate between the two.

The last character provides an excellent distinction, though there is the disadvantage that, as Schoenemund also notes, the pattern eventually disappears in preservative. Schoenemund makes in his key the qualification that the pattern distinguishes only older nymphs, Percival and Whitehead could tell apart nymphs down to 12.5 cm long, and I have examined nymphs of *E. danica* down to 5 cm long and still found the characteristic pattern.

Schoenemund's forecast that the nymph of *E. lineata* will prove to have the distinctive markings of the adult, as the other two have, is correct. The six narrow lines (fig. 2: L) are characteristic, though it should be noted that the broad triangular mark on *E. danica* (fig. 2: D) may be divided by a lighter line, giving a total of six dark marks on the whole tergum. They are not, however, as linear as those of *E. lineata*.

Careful examination has revealed only one character not mentioned by earlier workers. The fore tibia of *E. danica* is broad and its convex side is evenly rounded (fig. 3: D), that of *E. vulgata* (fig. 3: V) is narrower and the sides are straighter. The tibia of *E. lineata* is like that of *E. danica* but the femur is broader (fig. 3: L) than that of either of the other two species. The mid-tibia shows the same difference even more clearly.

These findings may be summarized in a key:

1. A distinct dark mark on all the abdominal terga except the first and last, those on segments 7, 8 and 9 barely twice as big as those on other segments (fig. 2: V). Fore tibia relatively narrow, bounded on the inner side by two straight edges joined by a curve (fig. 3: V). (Fore femur relatively narrow (fig. 3: V). Clypeal process with very slightly convex sides, a deep wide frontal bay and rather sharp forward projections (fig. 1: 2, 5, 8)) *vulgata*
- On abdominal terga 7, 8 and 9 the dark area is large, whereas on segments 3 and 4 at least it is small, obscure and often absent (fig. 2: D, L). Fore tibia broader and with the whole of the inner margin curved (fig. 3: D, L) 2
2. A large triangular mark on abdominal terga 7, 8 and 9; it may be divided into two and there is a narrow line inside it (fig. 2: D). Femora relatively narrow (fig. 3: D). (Clypeal process may have sides more convex than those of *vulgata*, the frontal bay is smaller and the forward projections more obtuse, fig. 1: 1, 3, 4, 6, 7) *danica*
- Three dark lines on abdominal terga 7, 8 and 9 (fig. 2: L). Femora broader (fig. 3: L) *lineata*

The following material was examined:

E. vulgata: 1 cast skin from Bottisham Lode, CB; 15 whole nymphs from the Kennet-Avon canal near Reading, BK. I am greatly indebted to Dr. K. H. Mann, who made a special collection for me in the canal.

E. danica: 2 cast skins and 12 whole nymphs from Windermere, WL; 5 whole nymphs from Bassenthwaite, CU; 1 whole nymph from the Kendal-Lancaster canal; 10 whole nymphs from Dodnash Stream, ES; 8 cast skins from R. Darent, WK; 4 cast skins from Tillingbourne, SR; 2 whole nymphs from Kennet-Avon canal near Reading, BK; 3 cast skins and 1 whole nymph from L. Sheelin, CV.

Ephemera lineata: 10 whole nymphs sent to me from Poland by Dr. Maria Keffermüller, whom I thank most sincerely.

This species was taken by Eaton near Reading, and there are subsequent records from three places lower down the Thames, but the most recent is 1902.

References

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- Lestage, J.-A., 1916. Contribution a l'étude des larves des éphémères paléarctiques. *Ann. Biol. lacust.*, 8: 244-253.
- Percival, E., and Whitehead, H., 1926. Observations on the biology of the mayfly, *Ephemera danica*, Müll. *Proc. Leeds phil. lit. Soc.*, 1:136-148.
- Schoenemund, E., 1930. Eintagsfliegen oder Ephemeroptera in *Die Tierwelt Deutschlands*, Teil 19.

Figures

1. Heads of *danica* (1, 3, 4, 6, 7) and *vulgata* (2, 5, 8):

1. *danica* ♀ from Dodnash stream, 23 mm. long.
2. *vulgata* ♀ from Kennet-Avon canal, 24 mm. long.
3. *danica* ♂ from Dodnash stream, 15 mm. long.
4. *danica* ♀ from Windermere, 23 mm. long.
5. *vulgata* ♂ from Kennet-Avon canal, 18 mm. long.
6. *danica* ♂ from Windermere, 15 mm. long.
7. *danica* ♀ from L. Sheelin, 20 mm. long.
8. *vulgata* ♂ from Kennet-Avon canal, 18 mm. long.

Scale line is 1 mm. long.

2. Dorsal pattern on abdomen of:

- V, *vulgata* ♂ from Kennet-Avon canal, 16 mm. long.
 D, *danica* ♀ from Windermere, 15 mm. long.
 L, *lineata* ♂ from Poland, 15 mm. long.

3. Anterior or inside surface of front leg of:

- V, *vulgata* ♂ from Kennet-Avon canal, 16 mm. long.
 D, *danica* ♂ from Windermere, 15 mm. long.
 L, *lineata* ♀ from Poland, 15 mm. long.

Scale line is 1 mm. long.

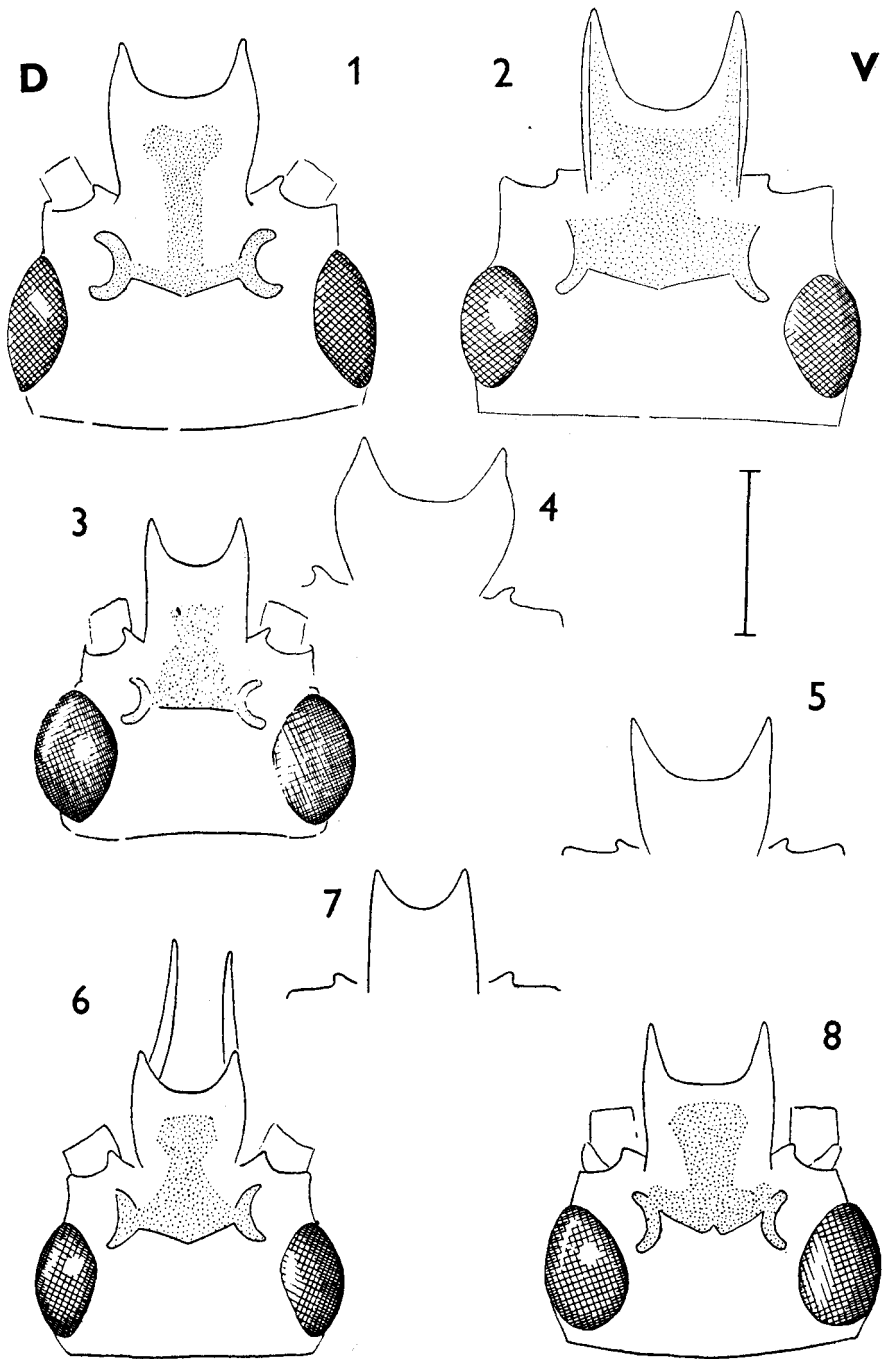


Fig. 1.

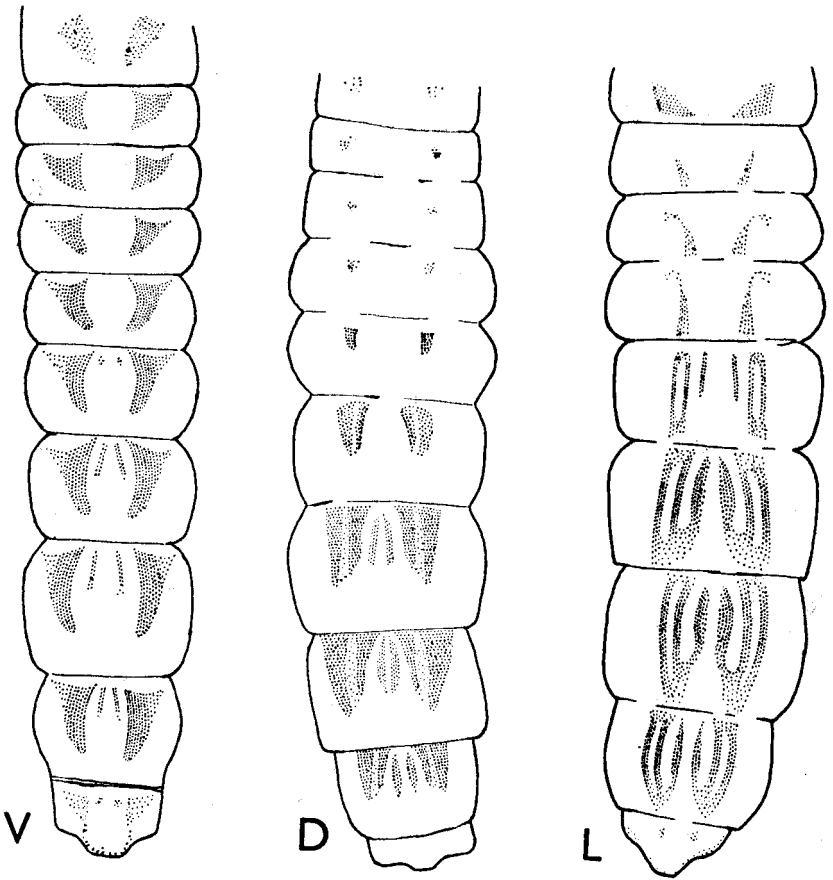


Fig. 2.

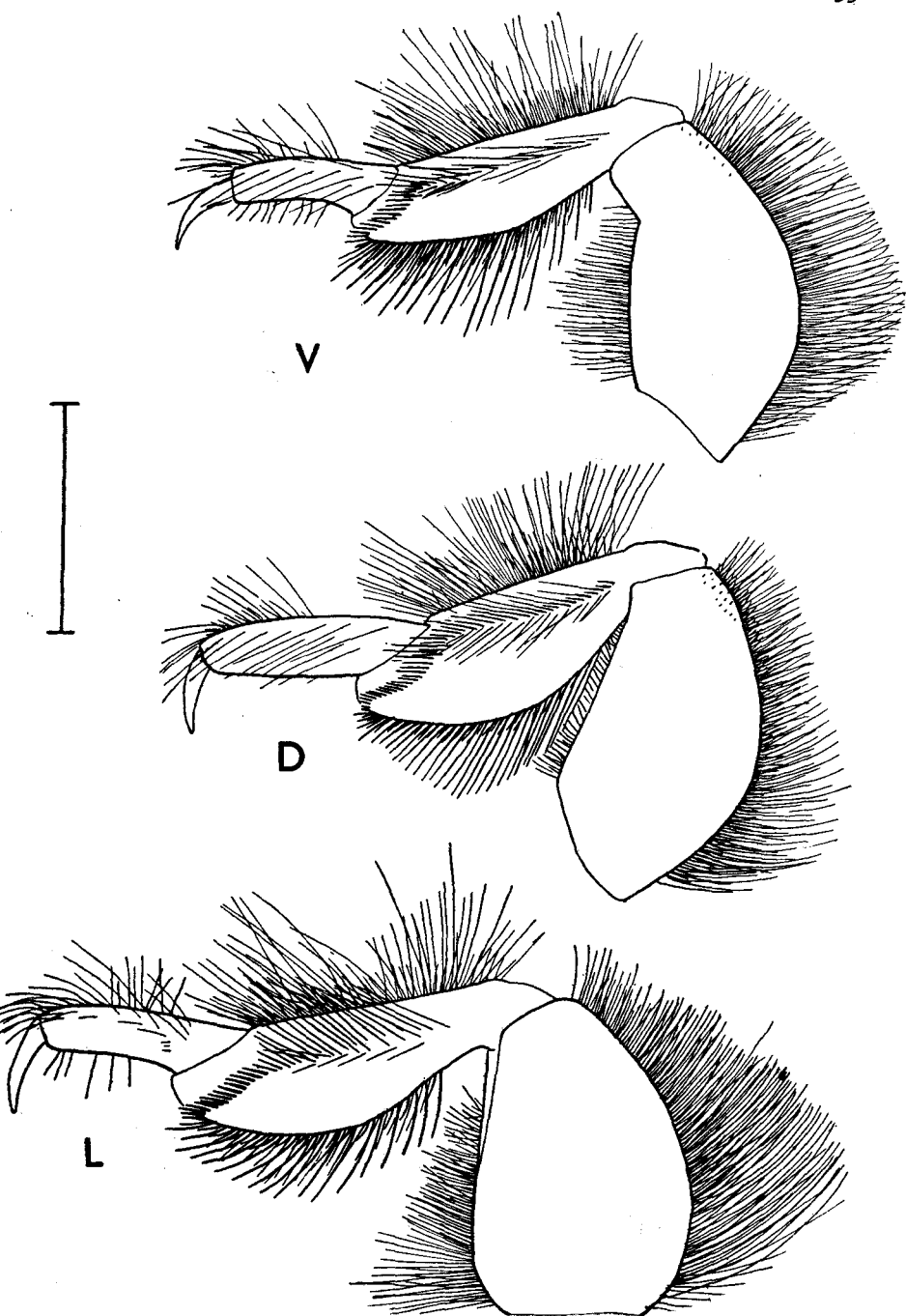


Fig. 3.

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