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*Nemoura rivorum*, a new species of Stonefly from the Northern Apennines (Plecoptera, Nemouridae)

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*Nemoura rivorum*, sp. n. belonging to the *N. flexuosa-marginata* group, is described. The species appears to be endemic to the Northern Apennines. It is a spring emerger, occurring in brooks and spring rivulets between 350 and 1,450 m a.s.l. The description is supported by drawings of the genitalia of the new species and of the related *N. flexuosa* AUB., *N. confusa* ZWICK, and *N. marginata* PICT.

Keywords: mountain stream fauna, Plecoptera, new species, Apennines.

INTRODUCTION

A revision of the specimens of the *Nemoura flexuosa-marginata* complex from the Northern Apennines, most of them recorded as *Nemoura flexuosa* AUB. by RAVIZZA, (1974, 1976), RAVIZZA & RAVIZZA DEMATTEIS, (1978, 1983), and RAVIZZA DEMATTEIS & RAVIZZA, (1994), revealed that they belong to a new species of which the description is the topic of this paper.

DESCRIPTION

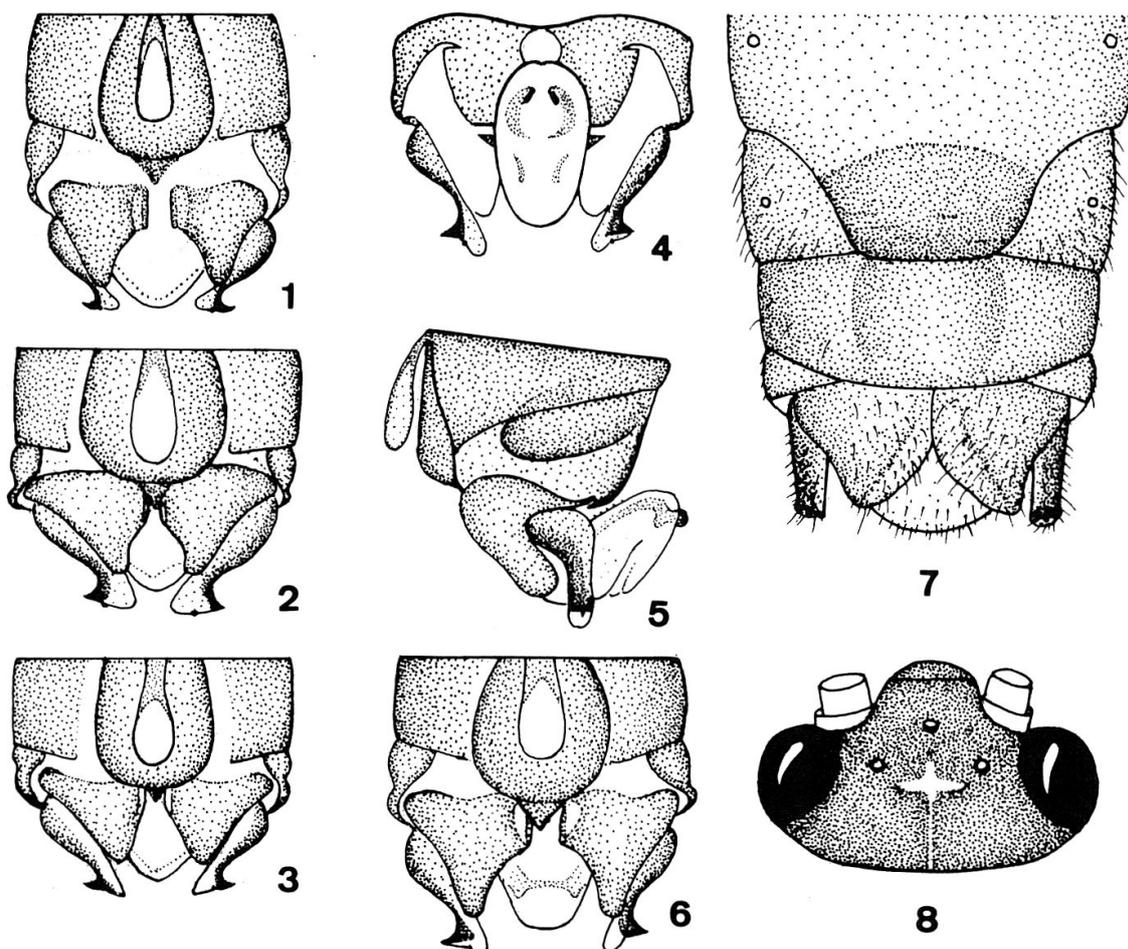
*Nemoura rivorum* sp. n.

*Diagnosis*

A medium-sized *Nemoura* species belonging to the *N. flexuosa-marginata* group (ZWICK, 1970). The male of *N. rivorum* sp. n. (Figs 4-6 and 9-12) differs from that of the related *N. confusa* ZWICK, *N. flexuosa* AUB., and *N. marginata* PICT. by details in both the apical sclerites of the epiproct (Figs 13-15) and the shape of the apical sclerotized part of the cerci (Figs 1-3).

*Description*

Macropterous in both sexes. Head dark-brown or black with a central small transversal reddish or yellowish spot just behind the posterior ocelli (Fig. 8). Antennae darkened, palps and legs yellowish. Pronotum dark-brown or black, subtrapezoidal or subrectangular with rounded corners. Wings hyaline with darkened veins. Abdomen either yellowish or off-white. Body length: male 5.5-7.5 mm, female 7.5-10.0 mm; forewing length: male 6.5-8.5 mm, female 8.0-10.5 mm.



Figs 1-7. Genitalia of *Nemoura* species of the *flexuosa-marginata* group. Tip of the ♂ abdomen in ventral view of *N. confusa* ZWICK (1), *N. flexuosa* AUB. (2), and *N. marginata* PICT. (3). Tip of the ♂ abdomen of *N. rivorum* n. sp. in dorsal (4), lateral (5), and ventral (6) view. Tip of the ♀ abdomen of *N. rivorum* n. sp. in ventral view (7).

Fig 8. Head of *N. rivorum* n. sp. in dorsal view.

Male abdomen. Hypoproct longer than wide, with a quite large vesicle from one and a half to twice as long as wide. Paraprocts, covered with many bristles, rounded at the tip with the inner edge weakly concave. Cerci, as usual, sclerotized on their outer side and membranous whitish on the inner side up to their tip (Figs 4-6). Epiproct about as wide in its distal third as in the basal one. Each of the two paired ventral sclerites bears a row of 10-15 quite long spines. The apical sclerite at the distal part of each ventral sclerite extends onwards and upwards; its outer side, which is a little concave, supports a variable number of quite short teeth. In many specimens the outer anterior side of the apical sclerite, when seen at high magnification (200x or more), shows a squamous or granular surface. The arched sclerite connected to the apical portion of each ventral sclerite is a little enlarged in its proximal half and progressively thinner distally (Figs 9-12).

Female abdomen (Fig. 7). Pregenital plate well developed and produced onto the 8th sternum. This produced portion is well pigmented; its subrectilinear posterior margin reaches the 9th sternum. Cerci and paraprocts of normal shape.

Mature nymph. General colour brown or light-brown. Body length: male 5.0-6.5 mm, female 6.5-8.0 mm. Head, including eyes, about as wide as the pronotum. Pronotum subtrapezoidal about one and a half time wider than long. The margins of the pronotum bear a fringe of short bristles. Abdominal terga from twice to two and a half time as wide as long, with a sparse fringe of bristles at the hind margins. The longest of these bristles are as long as half of the pigmented length of the corresponding tergum. Cerci on average as long as the abdomen, with whorls of bristles at distal margin of each segment. 6th and 7th segment of the cerci as long as wide, and the 10th and 11th twice as long as wide.

### Affinities

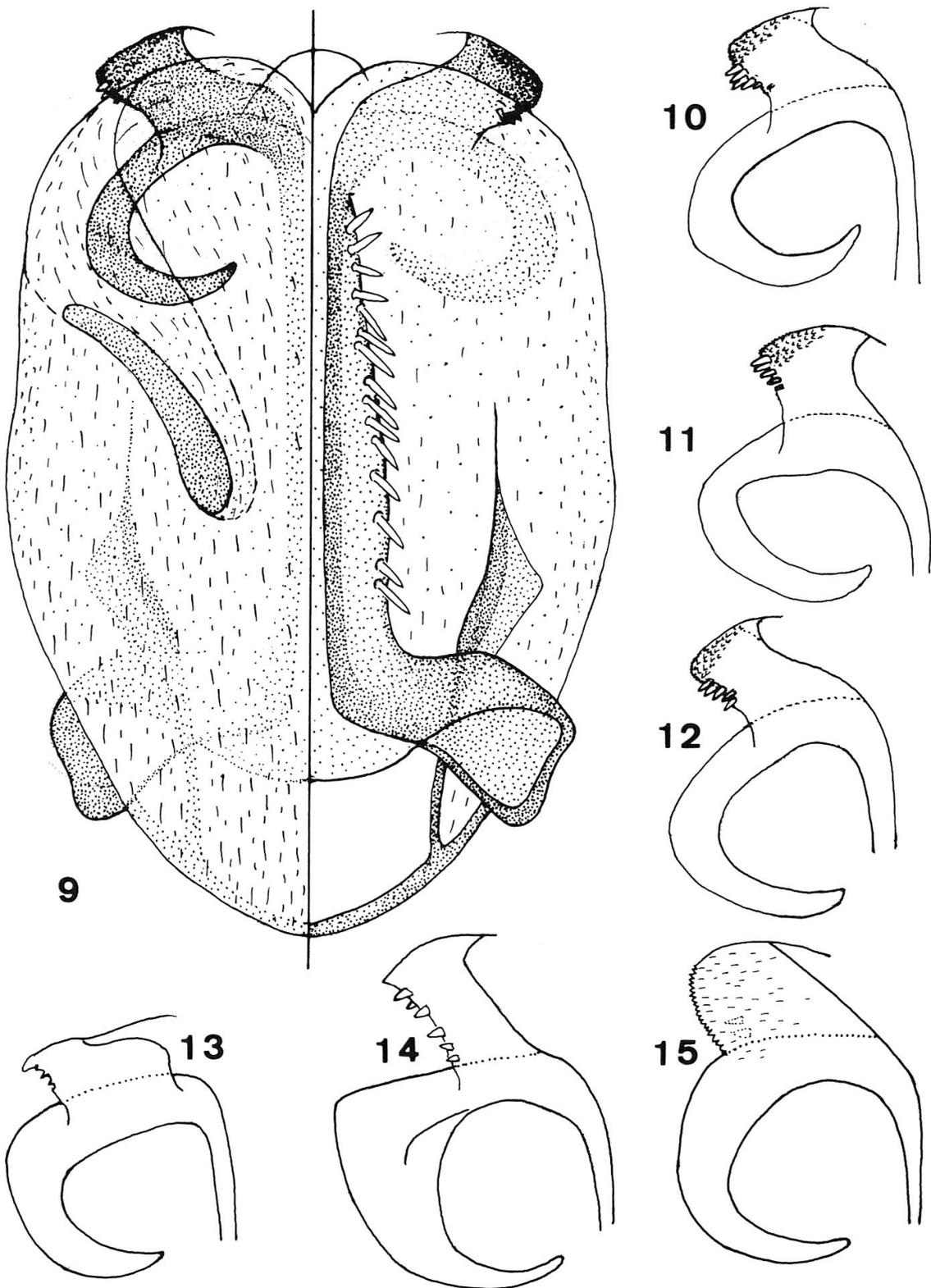
By the structure of the sclerites of the epiproct, the paraprocts and the cerci, *N. rivorum* is clearly related to *N. confusa* ZWICK, *N. flexuosa* AUBERT, and *N. marginata* PICTET. The male of *N. confusa* differs from that of *N. rivorum* mainly by the sclerite pattern of the epiproct, the arched sclerite much dilated in the middle and looking like a shoulder, the apical sclerite twice as long as wide, armed with a few shorter stocky thorns (Fig. 14), and by the different shape of the tip of the cerci (Fig. 1). The male of *N. flexuosa* differs from that of *N. rivorum* by the different shape of both the cerci tip and the apical sclerite of the epiproct as shown in Figs 2 & 15. The male of *N. marginata* is distinguished from that of *N. rivorum* by the shorter and wider apical sclerite of the epiproct (Fig. 13) and by the different shape of the tip of cerci (Fig. 3).

The female of *N. rivorum* is very similar to all the species belonging to the *N. flexuosa-marginata* group, from which it is very difficult, if not impossible, to be separated on the basis of the pregenital plate shape or of any other characters pertaining to external anatomy.

The mature nymph of *N. rivorum* is difficult to separate from other species within the *N. flexuosa-marginata* complex. This is because the present characteristics used to discriminate *Nemoura* nymphs, chiefly based on the pattern of bristles, do not help in separating many closely related species.

### Material examined

Italy. Northern Apennines, ♂ Holotype, Ligurian Apennines, Savona, Porassino rivulet, 700-750 m a.s.l., 25.V.1982. Paratypes, ibidem, 700-750 m a.s.l., 6.V.1974, 2 ♂♂; 8.IV.1982, 8 ♂♂ 7 ♀♀; 25.V.1982, 18 ♂♂ 18 ♀♀; 20.VI.1983, 3 ♀♀; 26.IV.1994 5 ♂♂ 2 ♀♀. Other paratypes, Montenotte Superiore, headwaters of the Erro stream, 700-750 m a.s.l., 3.VI.74 1 ♂ 1 ♀. Pontinvrea, Tortone brook, 600-700 m a.s.l., 6.V.1974, 2 ♂♂ 1 ♀. Pontinvrea, Erro stream, 1 ♂. Sassello Veirera, brook, 850 m, 11.V.1994 1 ♀. Neirone, rivulet tributary to the Neirone stream, 350 m, 2.I.1978, 1 ♂. Campomorone, Passo d. Bocchetta m 770 a.s.l., 23.IV.1975, 1 ♂ 1 ♀. Comuneglia spring rivulet tributary to the Vara stream, near Biscia pass, 800 m a.s.l. 10.IV.1988, 21 ♂♂ 18 ♀♀; 1.V.1988, 13 ♂♂ 13 ♀♀; 21.V.1989, 3 ♂♂ 3 ♀♀; 17.VI.1989, 1 ♀. Comuneglia, spring brook tributary to the Vara stream, 720 m a.s.l., 10.IV.1988, 1 ♂ 2 ♀♀; 1.V.1988, 2 ♂♂ 1 ♀. Lombard Apennines, Casanova Staffora, Casanova brook, 570 m a.s.l., 1 ♂. Emilian Apennines, Ferriere, brook tributary to the lake Moo, 1,110-1,225 m a.s.l., 14.V.1974, 6 ♂♂ 1 ♀; 15.V.1975, 4 ♂♂ 2 ♀♀; 6.VI.1975, 7 ♂♂ 5 ♀♀. Bedonia, headwaters of the Lecca stream 1,450 m, 8.VI.1976 1 ♂. Corniglio Lagdei, headwaters of the Parma stream 1,250 m, 12.VI.1977 1 ♂.



Figs 9-15. Epiproct and apical sclerite of species of the *Nemoura flexuosa-marginata* group. 9: Epiproct of *N. rivorum* n. sp. showing the internal sclerites drawn by transparency in dorsal (left half) and ventral (right half) view. 10-12: Variability of the apical and arched sclerite of *N. rivorum* n. sp. 13-15: Apical and arched sclerite in dorsal view of *N. confusa* ZWICK (14), *N. flexuosa* AUB. (15), and *N. marginata* PICT. (13), after ZWICK, 1970.

Holotype ♂ and 81 ♂♂ 66 ♀♀ paratypes are at present in the Ravizza collection. Other paratypes have been deposited in the collections of the Musée zoologique, Lausanne, Switzerland (3 ♂♂ 3 ♀♀), the Max-Planck Limnologische Flußstation, Schlitz, Germany (6 ♂♂ 4 ♀♀), Dr. G. Vinçon, Grenoble, France (5 ♂♂ 5 ♀♀), and Dr. R. Fochetti, Rome, Italy (4 ♂♂ 2 ♀♀).

### Etymology

The name *rivorum* is derived from the Latin word *rivus* = brook, as almost all the specimens of this species were collected in the headwaters of brooks or in spring rivulets on both slopes of the Northern Apennines.

### Ecological notes

*N. rivorum* n. sp. is a spring emerger, with a flight period from March to June. A single newly emerged male, collected at 350 m a.s.l. at the beginning of January, is considered an abnormal, precocious emergence. The adults have been chiefly found on the branches of the trees along the banks of brooks and rivulets. It is a rheophilic, stenothermal cold water species living at altitudes from 350 to 1,450 m a.s.l. in brooks and spring trickles flowing through broadleaved woods; especially *Fagus*. *N. rivorum* n. sp. appears to be more abundant in spring rivulets flowing on the slopes facing the Ligurian sea than those belonging to the Po river catchment.

### Zoogeographical remarks

*N. rivorum* n. sp. seems to be localized in the north section of the Apennines. Several collections in the adjacent eastern section of the Ligurian Alps did not produce any specimens of this species. A few specimens of *Nemoura*, made available by Dr. G. VINÇON, from the catchment of the Roya stream (Maritime Alps, France) and from the catchment of the neighbouring Nervia stream (Ligurian Alps, Italy) appear to be closely related to *N. rivorum* n. sp. However, there are certain distinct morphological characteristics in both the apical sclerite of the epiproct and the shape of cerci of the males. More specimens of this alpine form are needed to determine if they belong to *N. rivorum* or to a separate subspecies.

### ACKNOWLEDGEMENTS

We are very grateful to our colleagues and friends Prof. PETER ZWICK, Schlitz, Germany, and Dr. GILLES VINÇON, Grenoble, France, who made available specimens of *Nemoura confusa*, *N. flexuosa*, and *N. marginata* for comparison and drawing. We thank very much Dr. JOHN E. BRITAIN, Oslo, Norway, who kindly corrected and improved the English text.

### RÉSUMÉ

Les auteurs décrivent *Nemoura rivorum* une nouvelle espèce appartenant au groupe de *N. flexuosa-marginata*. La description est accompagnée par des dessins de l'extrémité de l'abdomen de l'adulte de *N. rivorum* sp. n. et de ceux des trois espèces les plus proches. Le mâle de *Nemoura rivorum* n. sp. diffère de ceux des espèces affines *N. flexuosa* AUB., *N. confusa* ZWICK et *N. marginata* PICT, par la structure du sclérite apical de l'épiprocte et par la forme des cerques. La femelle et la nymphe sont difficiles à séparer de celles des espèces susdites, étant très semblables par leurs caractères morphologiques. *N. rivorum* n. sp. est une forme printanière, répandue dans les Apennins septentrionaux, où elle habite surtout les petits cours d'eau issus de sources des Apennins Liguriens entre 350 et 1,450 m d'altitude.

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