

Contribution to the study of European Ephemerellidae  
(Ephemeroptera). II. Description of the winged stages of  
*Ephemerella ikonomovi* PUTHZ, 1971, and *Serratella albai*  
GONZALES DEL TANAGO & GARCIA DE JALON, 1983

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The male imago of *Ephemerella ikonomovi* and the winged stages of *Serratella albai* are described for the first time and scanning electron micrographs of the genitalia are provided. *E. ikonomovi* was collected in Greece and Yugoslavia in July. Male and female have a light-coloured body with a characteristic brown pattern. *S. albai* was caught in Spain (near Salamanca) in August. Both sexes can be easily recognized by the small size and yellowish orange coloration.

#### INTRODUCTION

The first nymphal description of *Ephemerella ikonomovi* PUTHZ, 1971, based on material from Yugoslavia (Macedonia) was published by IKONOMOV (1961) under the name *Ephemerella spinosa* IKONOMOV, 1961 nec MAYO, 1951. This description was supplemented by TANASJEVIC (1979). BELFIORE (1982) gives some informations about larvae provisionally referred to *E. ikonomovi*. ALBA-TERCEDOR (1983) compared the nominal subspecies with *Ephemerella ikonomovi nevadensis* found in Spain (Sierra Nevada). For the winged stages of *E. ikonomovi* there are only short descriptions of the male subimago (IKONOMOV, 1961; TANASJEVIC, 1979) and one of the female imago (IKONOMOV, 1961). *Serratella albai* GONZALES DEL TANAGO & GARCIA DE JALON, 1983, from Spain was described only from the nymphs.

The present work describes the winged stages of both, *E. ikonomovi* and *S. albai*.

#### MATERIAL AND METHODS

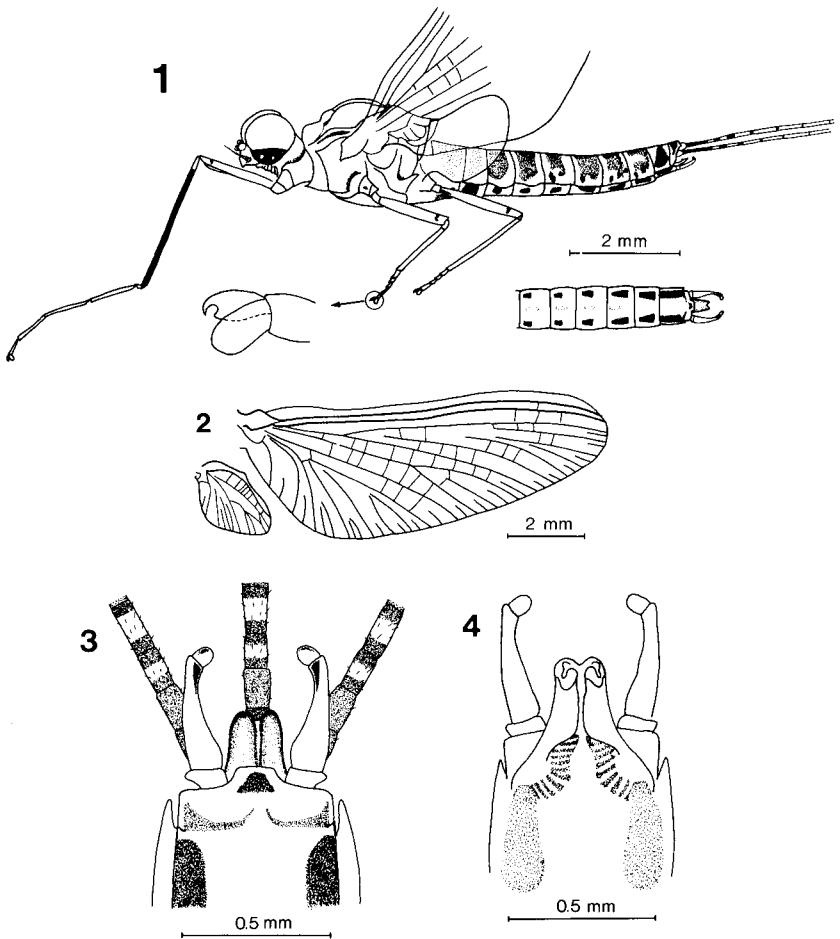
Larvae of *E. ikonomovi* and *S. albai* were collected by kicksampling in water. The subimagines were captured with an air-net when they emerged from the water surface. Some larvae and subimagines were reared to adults.

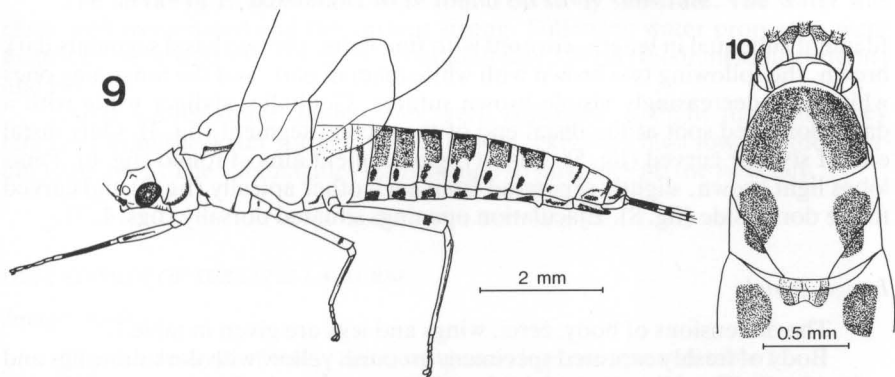
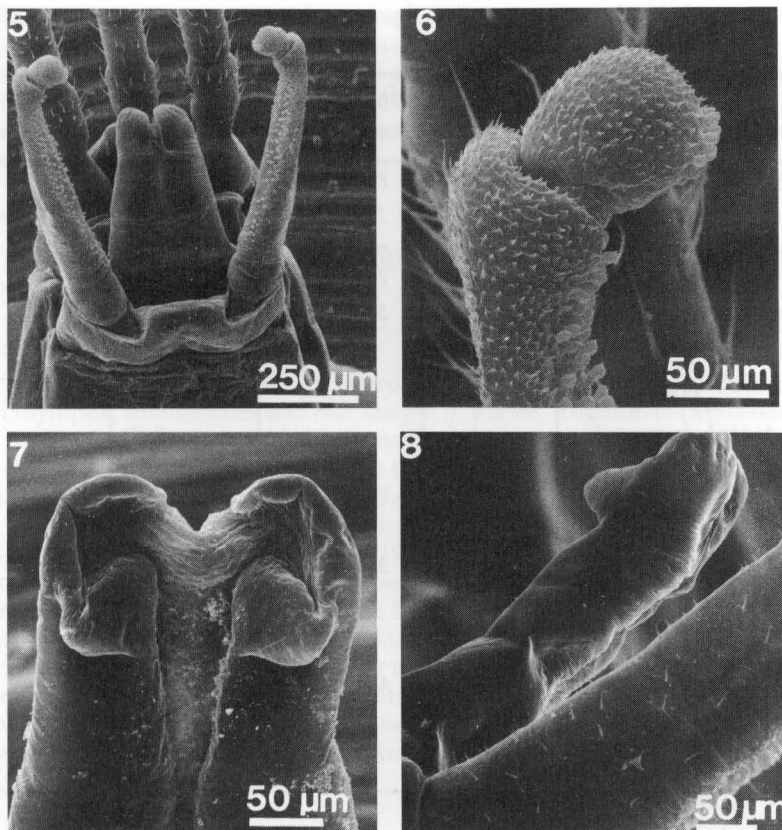
The material is kept frozen or in alcohol in our institute. Specimens were examined in alcohol from alcohol or deep frozen material with a dissecting microscope. The male genitalia were prepared for the scanning electron microscope (SEM) investigations as described by STUEDEMANN *et al.* (1987).

*Imago, male*

The dimensions of body, cerci, wings and legs are given in table 1.

Body of freshly captured specimens white and brown, drawings as in fig. 1. Head brown and white, upper part of eye ochreous, lower part black. Thorax white with brown sutures. Wings hyaline, venation hyaline except for subcosta of forewing which is slightly brown; costal area white, opaque (fig. 2). Legs generally white except for claws and fourth tarsal segment; distal part of femura with a dark spot on the inner and outer face; protibia dark except for a small proximal white zone. Tarsal claws dissimilar, one pointed, the other blunt (fig. 1). Abdominal sternites white with a brown, trapezoidal blot on each side (fig. 1). Central ganglia slightly grey. Tergites 1 to 8 brown with white margins; tergites 5 to 8 with two lateral dark spots, tergites 9 and 10 with very dark areas. Cerci and terminal





Figs. 1–10. *Ephemerella ikonomovi*: 1: Male imago, general view with details of the claws and ventral view of the sternites. 2: Wings. 3: Male genital apparatus (penis with styli and styli plate and styli) and base of cerci and terminal filament, ventral view. 4: Male genital apparatus, dorsal view. 5: Last abdominal segment, apico-ventral view. 6: Terminal segment of the styli. 7: Penis lobes with ejaculation openings, apico-dorsal view. 8: Penis, lateral view. 9: Female imago, last abdominal segments, ventral view.

Tab. 1. Dimensions (in mm) of body, cerci, wings and legs of *Ephemerella ikonovici* and *Serratella albai*.

	<i>Ephemerella ikonovici</i>		<i>Serratella albai</i>	
	male imago	female imago	male imago	female imago
body	8.0	8.2	6.4	6.1
cerci	7.8	7.5	7.3	5.9
anterior wing	7.8	9.3	6.4	7.2
posterior wing	2.1	2.4	1.6	1.7
fore leg: total length	7.0	3.9	6.0	3.1
femur	1.5	1.4	1.3	1.1
tibia	2.7	1.6	2.7	1.2
tarsus	2.8	0.9	2.0	0.8
tarsal segment I	1.0		0.7	
tarsal segment II	0.8		0.7	
tarsal segment III	0.7		0.4	
tarsal segment IV with claw	0.3		0.2	
mid leg : total length	3.5	3.6	2.1	2.6
femur	1.5	1.5	0.8	1.0
tibia	1.3	1.5	0.9	1.0
tarsus	0.7	0.6	0.4	0.6
hind leg: total length	3.8	4.4	2.8	3.1
femur	1.6	1.8	1.1	1.1
tibia	1.6	1.9	1.2	1.4
tarsus	0.6	0.7	0.5	0.6

filament subequal in length, covered with fine hairs; the two basal segments dark brown, the following two brown with white median part, and the remaining ones white with decreasingly visible brown sutures. Genitalia: styliger white with a dark elongated spot at the distal end of the second segment (fig. 3). Only distal end of styliger curved (fig. 5). Last styliger segment almost round (fig. 6). Penis lobes light brown, slightly separated from each other apically (fig. 7) and curved to the dorsal side (fig. 8). Ejaculation openings situated dorsally (figs. 4, 7).

#### *Imago, female*

The dimensions of body, cerci, wings and legs are given in table 1.

Body of freshly captured specimens greenish yellow with dark drawings and spots (fig. 9). The coloration of the female imago given by IKONOVIC (1961) generally agrees with the patterns on our specimens. Head grey with black eyes. Thorax yellowish white with brown sutures. Wings hyaline with transparent venation, except for costa, subcosta and the distal part of veins R and M which are light brown (fig. 2). Femur yellow with dark spot on both sides apically; tarsi yellowish grey; protibia black except the ends; meso and metatibiae yellowish grey

(fig. 9). Abdomen yellow with brown maculation. Tergites 2 to 8 brown basally and yellow apically, with two longitudinal brown lines in the middle and a dark oval spot on each side. Tergites 9 and 10 yellow with dark distal region. Sternites yellow, each segment bearing a well-marked dark lateral spot on each side. Last sternite (subanal plate) rounded, brown with a median triangular yellow area in the middle of the proximal part (fig. 10).

### *Subimagines*

Coloration of the subimagines slightly darker than that of the imagines. Wings brown with brown venation.

### *Geographical distribution*

Material examined: Greece (Ipiros): river Voidomatis in Klidonia; alt. 500 m; nymphs, subimagines and one imago; 9.VII.88. Yugoslavia (Macedonia): river Radlka in Vokovija; alt. 1350 m; nymphs; 13.VII.88. Yugoslavia (Kosovo): river Ibar in Zupce; alt. 800 m; nymphs; 15.VII.88. Our samples of *E. ikonovski* contain some 120 larvae and nymphs, 10 subimagines and 20 imagines.

IKONOV (1961) mentions larvae in Yugoslavia (Macedonia) from mid-April to mid-September. TANASIEVIC (1979) gives many localities in Yugoslavia (Bosnia and Herzegovina), where she found larvae from April to August and subimagines from June to August. Material from Italy (Sicily) which was only provisionally referred to *E. ikonovski* by BELFIORE (1982) belongs, according to our observations, to the same species as our material. The defining characters of this species are also mentioned in the description of *E. ikonovski nevadensis* collected in Spain (Sierra Nevada) by ALBA-TERCEDOR, 1983. The records enlarge the known geographical distribution of *E. ikonovski* to the Northern Mediterranean area.

### *Ecology*

The larvae of *E. ikonovski* were found on stony substrate. The water was clear, well oxygenated and the current strong. Following water properties were measured: temperature 15 to 20 °C, conductivity 350  $\mu$ S (medium ionic content) and pH 7.75.

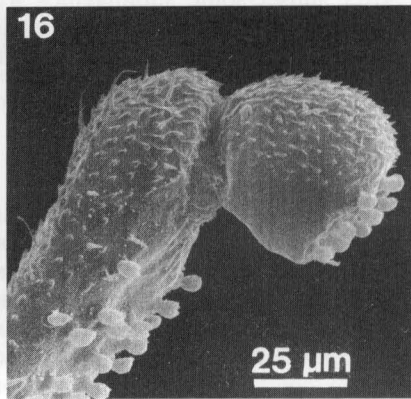
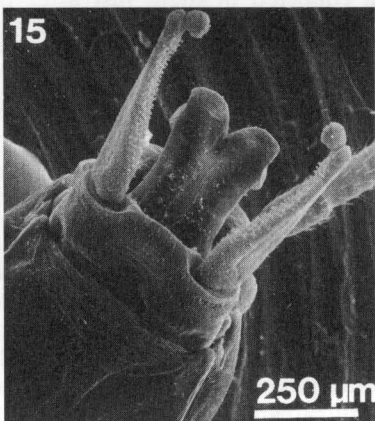
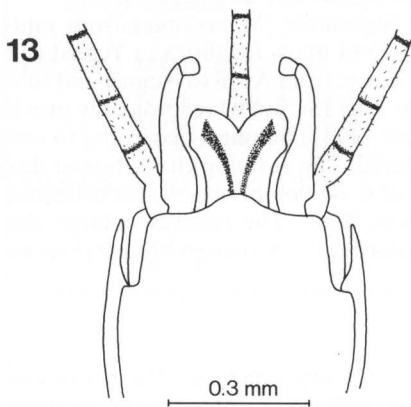
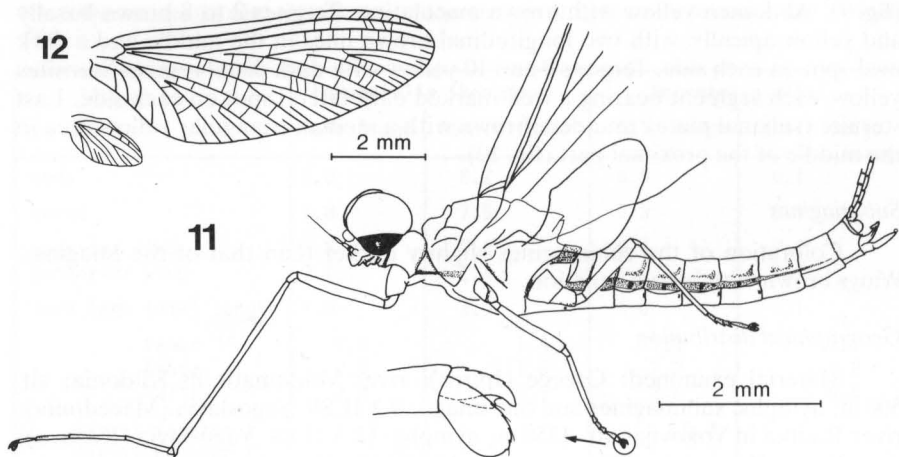
After sunset some subimagines were collected in flight just after they emerged from the water surface; others flew quickly very high towards the river-ain vegetation. The subimagines transformed to imagines on the next day.

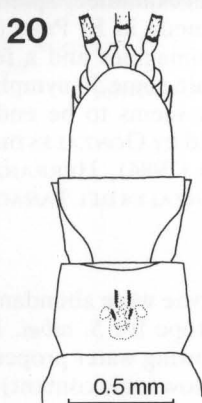
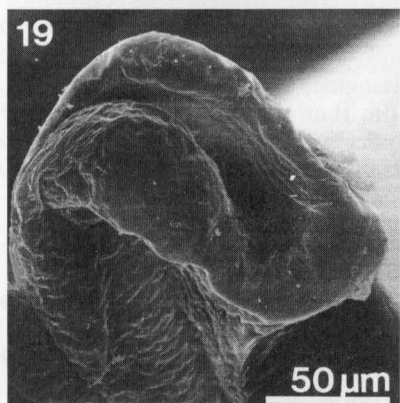
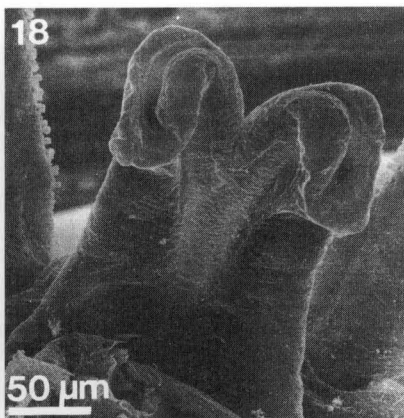
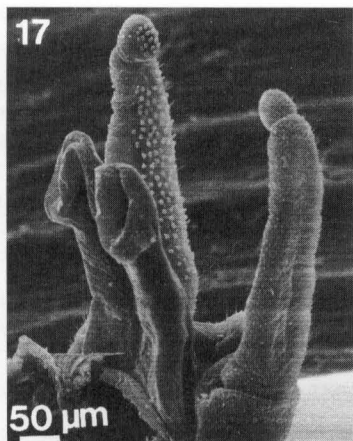
## DESCRIPTION OF *SERRATELLA ALBAI*

### *Imago, male*

The dimensions of body, cerci, wings and legs are given in table 1.

Body of freshly captured specimens yellow (fig. 11). Head yellow, with a brown ring on the second segment of the antennae. The three ocelli prominent and orange at their internal lower part. Compound eyes bearing a dark grey lower part and a big reddish orange upper part. Thorax orange. Wings hyaline with slightly opaque costal area. Venation transparent except for the yellowish costa and subcosta (fig. 12). Legs white, with brown dissimilar claws (fig. 11).





Figs. 11–20. *Serratella albai*: 11: Male imago, general view with details of the claws. 12: Wings. 13: Male genital apparatus with base of cerci and terminal filament, ventral view. 14: Male genital apparatus, dorsal view. 15: Male genital apparatus, apico-ventral view. 16: Terminal segment of the styliger. 17: Male genital apparatus, latero-dorsal view. 18: Penis, dorsal view. 19: Penis lobe with ejaculation opening, dorsal view. 20: Female imago, last abdominal segments, ventral view.

Abdomen yellow, tergites slightly red-brown laterally. Sternites with two light brown maculae on the anterior part and small dark spots at the corners. A grey line stretches laterally along the abdomen (fig. 11). Cerci and terminal filament subequal in length, covered with fine hairs; white with fine red-brown joints (fig. 13). Genitalia with white styliger. Styliger plate often with a median rounded extension (fig. 13). Long segment of styliger broad at the base and narrower towards the apex (fig. 15). Terminal segment trapezoidal (fig. 16). Penis lobes curved to the dorsal side (fig. 17), narrow at the base, broad and separated apically (fig. 18). Penis white and transparent with brown well visible ejaculation canals (figs. 13, 14). Ejaculation openings situated dorsally (figs. 14, 17, 18, 19).

### *Imago, female*

The dimensions of body, cerci, wings and legs are given in table 1.

Body of freshly captured specimens bright orange-yellow. Head yellow with white upper part. Base of the three ocelli brown and compound eyes greenish-grey. Thorax orange. Legs yellow with brown dissimilar claws. Wings like in the male. Abdomen yellow with grey lateral ganglion line. Seventh sternite with four maculae in the middle, sometimes elongated, sometimes forming small dots (fig. 20).

### *Subimagines*

Coloration similar to that of imagines. Claws and tarsi darker, and wings greyish brown and opaque.

### *Geographical distribution*

Material examined: Spain (Salamanca): river Portugal at its confluence into the river Agueda in El Payo (same locality as nymphal holotype); alt. 700 m; nymphs, subimagines and a few imagines; 18. to 22.VIII.88. Our samples of *S. albai* contain some 50 nymphs, 40 subimagines and 40 imagines.

*S. albai* seems to be endemic to the Iberian Peninsula as shown by the localities cited by GONZALES DEL TANAGO & GARCIA DE JALON (1983), GONZALES DEL TANAGO (1984), HERRANZ & GONZALES DEL TANAGO (1985), GARCIA DE JALON & GONZALES DEL TANAGO (1986) as well as by our observations.

### *Ecology*

The larvae were abundant on *Ranunculus baudotti* GORDON which presents an ideal biotope for *S. albai*. In this place the river Portugal was flowing very quietly. Following water properties were measured: temperature 18°C, conductivity 30  $\mu$ S (low ionic content).

After sunset, the subimagines emerged. Some were collected in flight, others flew immediately towards the riverain vegetation. Only a few imagines were caught in flight. The collected subimagines transformed to imagines after one or two days, depending on air temperature.

### RÉSUMÉ

Le présent travail offre la première description de l'imago mâle de *Ephemerella ikonovici* et des stades ailés de *Serratella albai*. Les descriptions sont complétées par des photos des pièces génitales prises à l'aide du microscope électronique à balayage. *Ephemerella ikonovici* a été récoltée en Grèce et en Yougoslavie en juillet. Le mâle et la femelle présentent des dessins typiques bruns sur fond clair. *Serratella albai* a été capturée dans la province de Salamanca en Espagne, durant le mois d'août. Les adultes, mâles et femelles, se reconnaissent aisément par leur petite taille et leur teinte jaune-orange.

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## BIBLIOGRAPHY

- ALBA-TERCEDOR, J. 1983. *Ephemerella (Chitonophora) ikonomovi nevadensis* n. ssp. de Sierra Nevada, Espana (Ephemeroptera, Ephemerellidae). *Bol. Asoc. esp. Entom.* 6 (2): 285–293.
- BELFIORE, C. 1981. Note faunistiche, tassonomiche ed ecologiche su alcuni efemerotteri nuovi per l'Italia (Ephemeroptera). *Boll. Ass. Romana Entomol.* 35: 1–8.
- GARCIA DE JALON, D. & GONZALES DEL TANAGO, M. 1986. Ephemeroptera, Plecoptera y Trichoptera de los principales ríos de Malaga. In: *Proc. II Simp. El Agua en Andalucia*, Pulido Bosch, A. (ed.): 331–346.
- GONZALES DEL TANAGO, M. 1984. Contribution to the zoogeography of the Spanish Ephemeroptera. In: *Proc. IVth Intern. Confer. Ephemeroptera*, LANDA, V. et al. (eds.): 135–145.
- GONZALES DEL TANAGO, M. & GARCIA DE JALON, D. 1983. New Ephemerellidae from Spain (Ephemeroptera). *Aquatic Insects* 5 (3): 147–156.
- HERRANZ, J. M. & GONZALES DEL TANAGO, M. 1985. Efemeropteros, Plecopteros y Tricópteros de la cuenca del alto Tajo (Guadalajara). *Bol. Asoc. esp. Entom.* 9: 35–53.
- IKONOMOV, P. 1961. Eintagsfliegen (Ephemeroptera) Mazedoniens Fam. Ephemerellidae. *Acta Mus. Maced. Sci. Nat.* 8 (3): 53–74.
- PUTHZ, V. 1971. Namensänderung einer Eintagsfliegenart (Ephemeroptera). *Mitt. Dtsch. Ent. Ges.* 29 (4): 43.
- STUEDEMANN, D., LANDOLT, P. & TOMKA, I. 1987. Complément à la description de *Arthroplea congener* BENGTSOON, 1908 (Ephemeroptera) et à son statut systématique. *Bull. Soc. Fib. Sc. Nat.* 76 (1/2): 144–167.
- TANASIJEVIC, M. 1979. Prilog poznavanju vrste *Ephemerella ikonomovi* PUTHZ (Insecta, Ephemeroptera). *Godis. Biol. Inst. Univ. Sarajevo* 32: 163–169.

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