

Recent Distribution of the Freshwater Crustacean *Asellus Aquaticus* (Linnaeus, 1758) (Isopoda; Crustacea) in Serbia (2007-2013 Period)

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Abstract

Asellus aquaticus (Linnaeus, 1758) is the widespread and common Palearctic freshwater isopod found typically in the slow-current watercourses with rich organic debris. In Serbia there is a lack of data regarding both distribution and general ecology of this common freshwater species. This paper based on intensive field research covering almost entire territory of Serbia in 2007-2013 period aims to shed more light on the presence of this freshwater crustacean in our country. According to our findings, *A. aquaticus* is widely distributed throughout the investigated area. It was registered in vast variety of habitats, from large Pannonian lowland rivers, to small highland streams. It was found to be an important member of benthic communities and the dominant crustacean species in some habitats, such as small Pannonian streams. Regarding its high tolerance to organic pollution, and high overall adaptability, such wide distribution is expected. Presence of other *A. aquaticus* subspecies, besides type subspecies, as well as presence of *Proasellus* is not detected. Obtained data should result in more effective involvement of this species in a regional/national system of freshwater ecological status assessment.

Keywords: *Asellus aquaticus*, field research, habitat, distribution, Serbia.

Introduction

Asellus aquaticus (Linnaeus, 1758) is the widespread and common Palearctic freshwater isopod (Verovnik et al, 2005; Fauna Europea, 2013). As Verovnik et al (2004) speculate it probably originates in temperate northern Asia, because most of *Asellus* species have a predominantly east Palearctic distribution. The species is morphologically, ecologically and genetically variable with few subspecies distinguished, most of them found in karstic western Balkan (Verovnik et al, 2004). The nominotypic subspecies *A. aquaticus aquaticus* inhabits the most of species range, and in the further text it will be referred as *A. aquaticus*. In the Dinarides (mountainous and karstic areas) *A. aquaticus carsicus* is the most common subspecies (Sket, 1994). It differs from type subspecies by having an enlarged area of pleopods IV-V and shape of male pleopods I (Sket, 1994).

Besides *Asellus* genus, in the region of interest and neighboring countries, another representative of Asellidae is present – genus *Proasellus* Dudich 1925 (Fauna Europea, 2013). The main morphological differences, useful for separation of these two asellid genus, are head shape and colour pattern of head, as well as pleopod I in males i.e. pleopod II in females. An overview of these taxonomic characters is provided in Wouters & Vercauteren, 2009. This species exhibits sexual dimorphism, with males being larger, due to breeding with precopulatory mate-guarding, which is not uncommon in crustaceans (Ridley and Thompson, 1979). The maximum body length of males is up to 20 mm, while in females is up to 15 mm (Wouters & Vercauteren, 2009). Tolba and Holdich (1981) found that specimens from polluted sites have significantly lower body size, than those from clean sites.

Asellus aquaticus is detritivore, feeding primarily on coarse particulate organic matter, fungi (Rossi and Fano, 1979) and algae (Moore, 1975). An autumn-shed leaves constitute a large part of the diet (Graça

et al, 1994). Thus, although it is present in a wide array of freshwater habitats including rivers, lakes, springs and subterranean waters, even brackish waters (Gruner 1965), it avoids oligotrophic freshwater habitats like fast-flowing mountain streams and mires (Verovnik et al., 2005). The species commonly occurs in lower stretches of water courses with plenty of vegetation and trees (Williams, 1962; Graca et al, 1994). *Asellus aquaticus* is relatively tolerant to a range of pollutants and therefore has been used as a bioindicator (Maltby 1991). According to the AQEM database (AQEM, 2002), *A. aquaticus* is an alfa-mesosaprobic taxon, and a good indicator of organic pollution, with saprobic value of 2.80 and weighting factor 3 (Moog 2002).

For Serbia, excluding BAES database (Simić et al, 2006) there is no concise data regarding this taxon findings and overall distribution. Karaman (1952) analyzed races of *A. aquaticus*, while Paunović (2007) in his investigation of large part of Serbian freshwater macroinvertebrate communities, found *A. aquaticus* as one of the frequent taxa in larger rivers (catchments over 4000 km²).

This paper based on intensive field research covering almost entire territory of Serbia in 2007-2013 period aims to shed more light on the recent presence of this freshwater crustacean in this region.

Material and Methods

Macroinvertebrate samples were collected using a hand net (25x25 cm, 500 µm mesh size) twice per year, in the period summer/autumn within the Annual Water Quality Monitoring Program by Hydrometeorological Service of Serbia and Serbian Environmental Protection Agency and investigations performed by the Institute for Biological Research "Siniša Stanković" in the 2007-2013 period. The multi-habitat sampling procedure (Hering et al, 2004) and the AQEM protocol (AQEM, 2002) were applied. All samples were preserved using 70% ethanol or 4% formaldehyde solution, further processed in the laboratory and specimens of *A. aquaticus* were separated. Identification was done by using appropriate taxonomic keys.



Figure 1: Localities where *Asellus aquaticus* was found during 2007-2013 period in Serbia.

Results and Discussion

According to our results, *A. aquaticus* is widely distributed throughout the investigated area. The species was recorded at 65 sampling sites situated at 45 watercourses and one reservoir (Grište) (Figure 1). Most of localities where this crustacean was recorded, by the national watercourse typology, belong to Type 3 rivers - small to medium size rivers to 500 m.a.s.l. altitude, with domination of large fractions of substrate (Official Gazette of the Republic of Serbia, 74/2011). *Asellus aquaticus* was found to be the dominant crustacean species at 26 localities situated at 24 watercourses in Serbia in the investigated period: Gunjevac/Ub River, Šarbane/Ub River, Crvena Jabuka/Tamnava River, Piroman/Tamnava River, Čuprija/Tamnava River, Bridge on Ibar highway/Beljanica River, Beli Brod/Kolubara River, Paraćin/Crnica River, Rogot/Lepenica River, Orašje/Jasenica River, Šengolj/Đetinja River, Brđani/Despotovica River, Bivolje/Rasina River, Raška/Raška River, Pukovac/Pusta Reka River, Bujanovac/Binačka Morava River, Ristovac/Južna Morava River, Trnovče/Velika Morava River, Knjaževac/Svrljiški Timok River, Vražognac/Crni Timok River, Inđija/Inđijski potok Stream, Starčevo/Nadel Canal, Hetin/Stari Begej Canal, Srpski Itebej/Plovni Begej River, Novi Bečej/Tisa River, Novi Bečej/DTD Canal, Melenci/DTD Canal, Banatska Palanka/DTD Canal and Novo Miloševo/Kikinda Canal. In Vojvodina, *A. aquaticus* was present at 16 sampling sites located at 15 watercourses (mainly artificial water bodies - stretches of the Danube-Tisa-Danube (DTD) Canal and watercourses Type 5 - Pannonian Plain watercourses, except those belonging to Type 1 (Official Gazette of the Republic of Serbia, 74/2011). Smaller watercourses with plenty of detritus and riparian vegetation where found to be typical habitats (Figure 2), which corresponds to literature data (Williams, 1962; Graca et al, 1994).



Figure 2: The Nadel Canal (Starčevo locality) – typical habitat of *A. aquaticus* in Serbia.

Although in investigated area other representatives of asellids, such is genus *Proasellus*, could be present, in this investigation their presence was not confirmed. Morphologically all found specimens were more or less uniform, and belong to type species *A. aquaticus* (Figure 3).

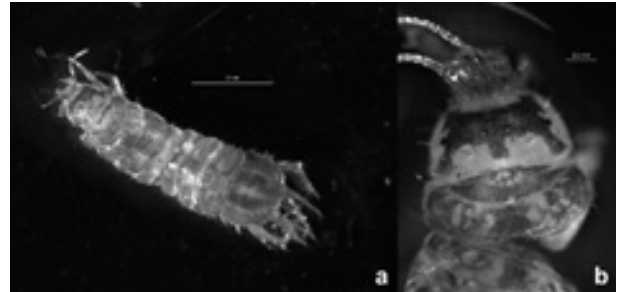


Figure 3: Specimen of *A. aquaticus* (a. the whole specimen; b. the head) from Serbia (the Nadel Canal).

As conclusion, regarding high tolerance to organic pollution, and high overall adaptability, such wide distribution of this taxon is expected. It is confirmed as an important member of freshwater macroinvertebrate communities in smaller moderately polluted and organic rich, streams, such as Pannonian streams and canals, but it was recorded in some clean mountain watercourses, such as Sopotnica River, confirming its adaptability. Obtained data, along with future detailed investigations, will lead to better understanding of this species diversity, resulting in more effective involvement of this species in a system of freshwater ecological status assessment.

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