

DINARIC LAND LEECH *XEROBDELLA ANULATA* (AUTRUM, 1958) (HIRUDINEA: XEROBDELLIDAE) IN SERBIA - THE EASTERNMOST RECORD IN EUROPE

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Xerobdella anulata is a rare species of land leech endemic to the Dinaric Alps, distributed from southern Slovenia to northern Montenegro. Previously, the only known locality where this species had been recorded in Serbia was the village of Rastište on Mt. Tara, in the far west of the country. In this article, we present the second record of *X. anulata* in Serbia, found in the village of Sokolac, near Ljubovija. A single specimen was discovered on land near a stream in an area with a limestone substrate. We briefly describe the collected specimen, with particular emphasis on the arrangement of the gonopores. Despite the significant lack of distributional data for this species, we believe that western Serbia and the Podrinje region represent easternmost limit of species' complete distribution.

Key words: Annelida, gonopore, limestone**Vujić, M. & Gojšina, V.: Dinarska kopnena pijavica *Xerobdella anulata* (Autrum, 1958) (Hirudinea: Xerobdellidae) u Srbiji – najistočniji nalaz u Europi. Nat. Croat., Vol. 34, No. 2, _____, 2025, Zagreb.**

Xerobdella anulata rijetka je vrsta kopnene pijavice koja je endem Dinarida i rasprostranjena je od južne Slovenije do sjeverne Crne Gore. Do sada je jedino poznato nalazište ove vrste u Srbiji bilo u selu Rastište na planini Tari, na krajnjem zapadu zemlje. U ovom članku predstavljamo drugi nalaz *X. anulata* u Srbiji, u selu Sokolac u blizini Ljubovije. Jedan primjerak pronađen je na tlu, u blizini potoka, na području s vapnenačkom podlogom. Ukratko opisujemo prikupljeni primjerak, s posebnim naglaskom na raspored gonopora. Unatoč značajnom nedostatku podataka o rasprostranjenosti ove vrste, smatramo da zapadna Srbija i područje Podrinja predstavljaju njezinu istočnu granicu rasprostranjenosti.

Ključne riječi: Annelida, gonopora, vapnenac

Xerobdellidae Moore, 1946 is a family of land leeches (Annelida: Hirudinea), represented in Europe by three species: *Xerobdella anulata* Autrum, 1958, *X. lecomtei* von Frauenfeld, 1868, and *X. praealpina* Minelli, 1971. The distribution of this genus is limited to the European regions surrounding the Alps and the Dinaric Alps. The Dinaric endemic species *X. anulata* was originally described from Bosnia and Herzegovina (AUTRUM, 1958), and its currently known range extends from southern Slovenia to northern Montenegro. It is the only known species of its genus in that region (BRIGIĆ *et al.*, 2022). In Serbia, the species had previously been recorded only once, on Mt.

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Tara, which at that time represented the easternmost known occurrence of the species (GROSSER, 2020). In this article, we report the second record of *X. anulata* from Serbian territory.

A single specimen was found on 23 April 2025 in the village of Sokolac near Ljubovija (44°16'08.0"N, 19°25'35.8"E), western Serbia (Fig. 1). The specimen was discovered on the moist bank of a stream, in an area with well-developed leaf litter over a limestone substrate (Fig. 2A-D). A narrow forest belt has developed along the Sokolska reka stream, dominated by *Alnus rohlenae* Vít, Douda & Mandák and *Sambucus nigra* L. The ground vegetation is largely composed of *Hedera helix* L. and *Aegopodium podagraria* L. The specimen was found beneath a wooden plank, alongside several earthworms. The habitat is subject to moderate anthropogenic pressure, as it is located adjacent to the Orthodox Monastery of St. Nikolaj of Žiča, as well as the nearby tourist attractions Soko Grad and the Soko Grad Waterfall. The expansion of the monastery complex, along with human activities in the surrounding area, such as deforestation, mowing, tourism, and pollution, could potentially have a negative impact on the local population of *X. anulata*.

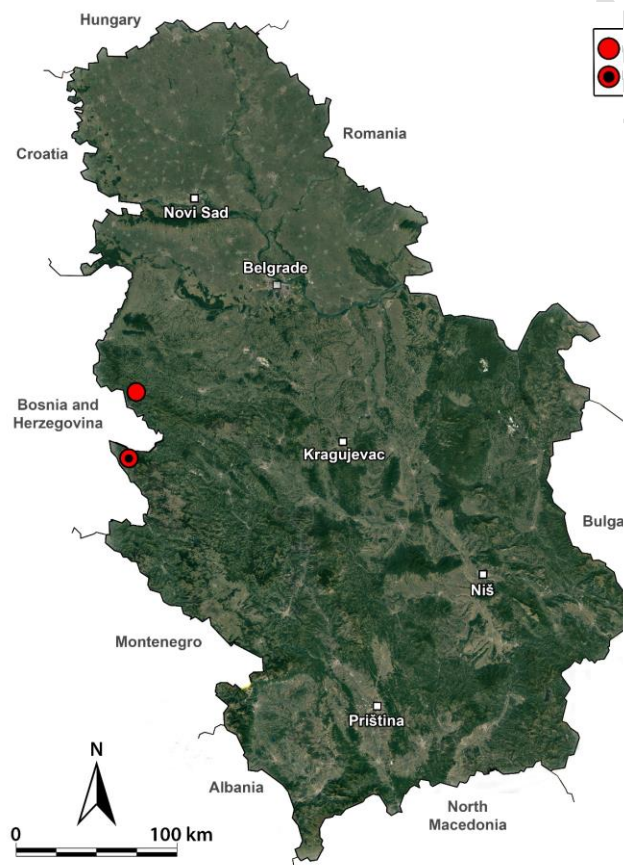


Fig. 1. The distribution map of *Xerobdella anulata* Autrum, 1958 in Serbia.

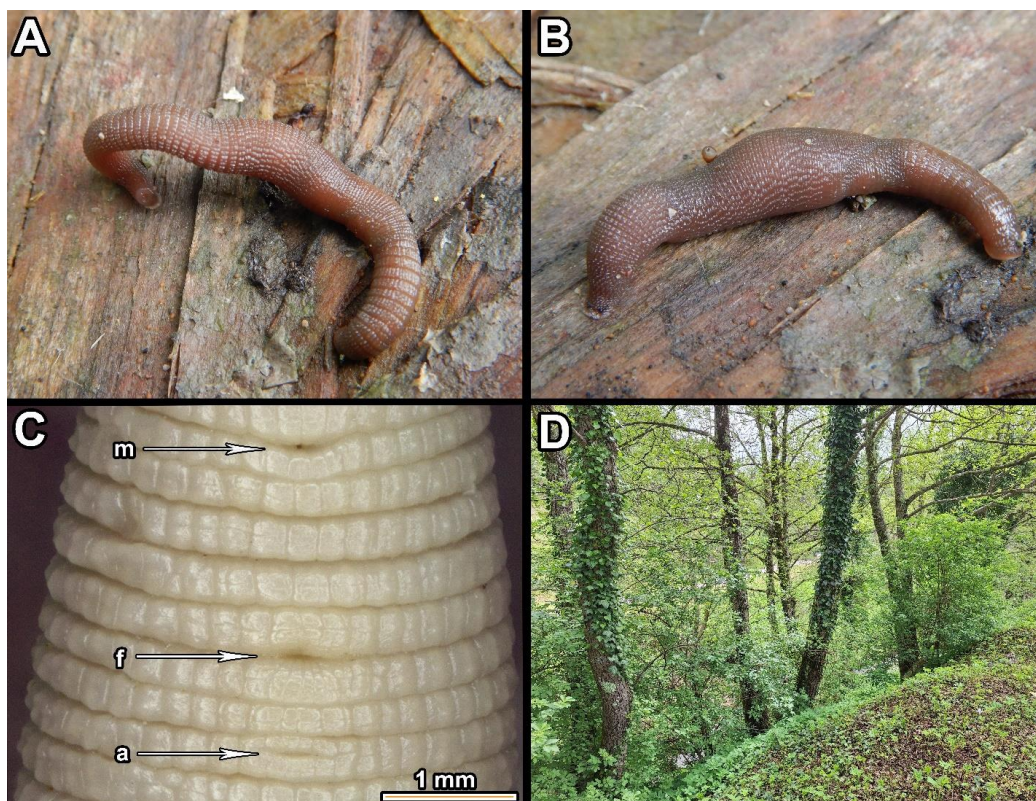


Fig. 1. *Xerobdella anulata* Autrum, 1958 from the village of Sokolac, W Serbia. A-B) the habitus of living specimen; C) gonopores; m – male gonopore; f – female gonopore; a – accessory female gonopore; D) the habitat where *X. anulata* was recorded in the village of Sokolac, Serbia.

The specimen was collected manually and preserved directly in 70% ethanol. It is stored in the collection of the Institute of Zoology – Faculty of Biology, University of Belgrade, Serbia. Photographs of the living specimen were taken with a Nikon Coolpix W300 digital camera, while the preserved specimen was photographed using a Nikon SMZ800N stereomicroscope equipped with a Nikon DS-Fi2 camera. A Nikon DS-L3 control unit was used to set the scale bars. The specimen was identified as *X. anulata* based on the diagnostic characters provided by GROSSER (2020): (i) the specimen was found on land; (ii) its coloration corresponds with the described pattern - uniformly blackish dorsally and slightly lighter ventrally; (iii) longitudinal furrows crossing the annuli form a reticulated pattern, more pronounced dorsally than ventrally; (iv) three genital openings are clearly visible in the ventral view; (v) the arrangement of genital pores is consistent with the description. Regarding the last character, BRIGIĆ *et al.* (2022) reported intraspecific variability in the arrangement of genital pores and categorized the variations into three types: (i) four annuli between the male and female gonopores; (ii) four and a half annuli; and (iii)

five annuli. They also noted that the position of the gonopores, whether in the furrow between annuli or in the middle of an annulus, is variable but generally correlated with the number of separating annuli. The first recorded specimen of *X. anulata* in Serbia, reported by GROSSER (2020), had four and a half annuli between the male and female gonopores, three and a half annuli between the female and accessory female gonopores (see GROSSER, 2020; Fig. 2A), and the positions of the gonopores matched the description by BRIGIĆ *et al.* (2022): the female gonopore was located in the furrow between annuli, while the male and accessory female gonopores were in the middle of annuli. The specimen we recorded shows a different gonopore arrangement compared to the one from Mt. Tara described by GROSSER (2020), but matches one of the specimens from Croatia described by BRIGIĆ *et al.* (2022): the male and female gonopores are separated by five full annuli, and both are located in the furrows. The accessory female gonopore in our specimen is situated in the middle of an annulus and is separated from the female gonopore by two and a half annuli. BRIGIĆ *et al.* (2022) did not specifically describe the position of the accessory female gonopore, while GROSSER (2020) reported a separation of three and a half annuli between the female and accessory female gonopores. GROSSER (2020) emphasized that the position of the accessory female gonopore relative to the female gonopore is an important character in distinguishing *X. anulata* and *X. lecomtei* from *X. praealpina*. The specimen we collected shows a smaller distance - two and a half annuli - between the female and accessory female gonopores. We interpret this arrangement as intraspecific variability. Other morphological features are consistent with the diagnostic characters described by GROSSER (2020) and BRIGIĆ *et al.* (2022): the specimen was found on land, with a contracted body length of approximately 35 mm; it is brownish dorsally and slightly lighter ventrally (ochre-colored after preservation in 70% ethanol); the reticulated pattern is clearly visible dorsally and less pronounced ventrally; the eye arrangement and presence of oral palps are consistent with the specimens described by BRIGIĆ *et al.* (2022).

According to various authors, this species is either extremely rare or simply rarely encountered (GROSSER, 2020; BRIGIĆ *et al.*, 2022). It remains unclear whether *X. anulata* is genuinely rare in Serbia or merely under-recorded due to the lack of systematic research. Faunistic studies on Hirudinea in Serbia have primarily focused on aquatic species (GROSSER *et al.*, 2014; MARINKOVIĆ *et al.*, 2022), which is understandable given that the terrestrial *X. anulata* is among the much rarer

representatives of this group. The finding of *X. anulata* presented in this article represents the easternmost known record of the species, since it is located slightly eastern than previously published record from Serbia in GROSSER (2020), from the village of Rastište, Tara Mt. It may be assumed that western Serbia and the Podrinje region represent the eastern limit of its range. However, further research on the distribution of *X. anulata* in Serbia is necessary to draw more definitive conclusions.

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