

***LUMBRICUS FRIENDI* COGNETTI, 1904 A NEW EXOTIC EARTHWORM IN NORTH AMERICA**

CSABA CSUZDI¹ AND KATALIN SZLÁVECZ²

ABSTRACT - Soil fauna of the Baltimore-Washington Metropolitan Area, MD was assessed as part of the Baltimore Ecosystem Study Long Term Ecological Research Site. The majority of earthworm species were European exotics, and one of them *Lumbricus friendi* Cognetti, 1904 proved to be a new species to the fauna of North America. The species is very similar to *L. terrestris*, thus a comparative description of the two species is given.

The spread of European lumbricid species has long attracted the attention of American zoologists. As early as at the turn of the twentieth century Eisen (1900) had already suggested that palearctic earthworm species were replacing the native North American fauna. Smith (1928) surveyed earthworms in Illinois for 30 years. He found that both the diversity and the abundance of introduced earthworms increased and correspondingly the abundance of indigenous species decreased dramatically. For example *Diplocardia communis* Garman, 1888 was one of the most common endemic earthworm species in the Champaign-Urbana region and by 1927 it was almost completely replaced by the European *Lumbricus terrestris* L.

The latest review on the North American lumbricids (Reynolds 1995) reported 25 European exotics out of a total of 36 species. The *Lumbricus* genus is represented by four species, *L. castaneus* (Savigny, 1826), *L. festivus* (Savigny, 1826), *L. rubellus* Hoffmeister, 1843 and *L. terrestris* L., 1758. All but *L. festivus* were reported from Maryland (Reynolds 1974). Among these four species, only *L. terrestris* belongs to the anecic group (Bouché 1977, Lavelle 1981), which builds long, vertical burrows.

As part of the Baltimore Ecosystem Study Long Term Ecological research (Pickett et al. 2001), we have been surveying the soil fauna in the urban and rural habitats of Washington-Baltimore Metropolitan Area. Sampling primarily takes place in mixed deciduous forests, parks, grasslands and agricultural fields. Earthworms are collected by extrac-

¹ Systematic Zoology Research Group of HAS, Department of Systematic Zoology, Eötvös Loránd University, H-1117, Pázmány P. sétány 1/C, Budapest, Hungary and Department of Zoology, Hungarian Natural History Museum, H-1088, Baross u. 13, Budapest, Hungary; csuzdi@zool.nhmus.hu. ² Dept. of Earth and Planetary Sciences, Johns Hopkins University, Baltimore, MD 21218, USA; szlavecz@jhu.edu.

tion using formalin or mustard solution, by digging and by handsorting. Animals are killed in 75 % ethanol, fixed in 4% formalin for several days and preserved in 75 % ethanol.

In several sites we found a large bodied earthworm, *Lumbricus friendi* Cognetti, 1904, which is new to the fauna of North America. It is an European species, known from the Atlantic region of Europe (Bouché 1972) (Fig. 1). In some localities *L. friendi* occurs together with *L. terrestris*. In other sites, such as the forests of the Smithsonian Environmental Research Center (Edgewater), or the experimental plots of the USDA Agricultural Research Center (Beltsville), *L. friendi* is the only large bodied anecic earthworm and it is often very abundant. For instance, on the no-till corn plots the density of *L. friendi* ranged between 56 and 84 individuals per m², whereas biomass varied between 44 g and 175 g (fresh weight) per m² (Szlávecz and Csuzdi unpubl.). It is difficult to assess the role this species plays in decomposition and other soil processes, because its natural history and ecology have not been sufficiently studied. As an anecic earthworm, it is likely to be ecologically similar to the much better known *L. terrestris*, in influencing soil structure, and biogeochemistry (e.g., Blair et al. 1995, Tomlin et al. 1995).

Both the abundance and the distribution of *L. friendi* (Fig. 2) indicate that the species is well established in the area. We propose that *L. friendi* might have been mistaken for the similar *L. terrestris*, and that *L. friendi* is likely to be found on other sites of this region. The fact that *L. friendi* occurs in many distant forests and an agricultural field indicates that it is not a

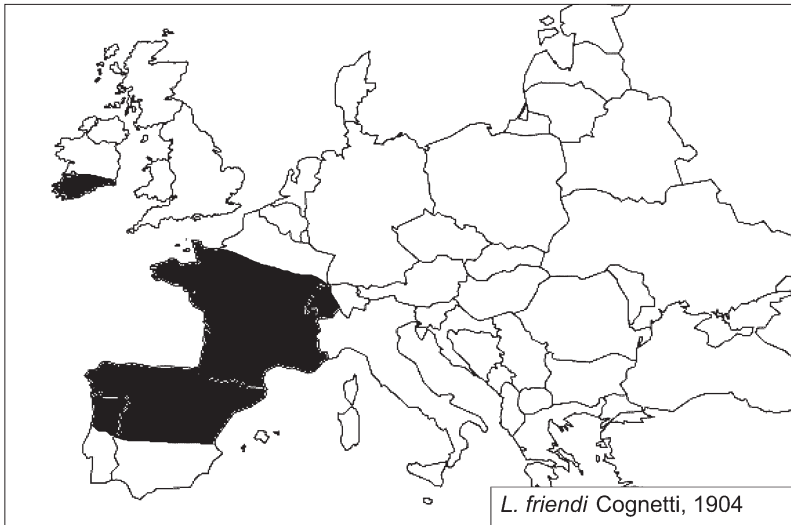


Figure 1. Distribution of *Lumbricus friendi* in Europe

recent introduction. A more detailed survey of its regional distribution might give a better insight into the history of this species in North America.

To avoid subsequent misidentification hereby we present a short description of *L. friendi*, and a comparison of the two species. For the description of *L. friendi* the original description by Cognetti (1904) was extended by our observations.

***LUMBRICUS FRIENDI* COGNETTI, 1904**

The body is 80–200 mm long and 0.5–0.8 mm wide. The color of the living animals is brown-violet or purple-violet on the dorsal part, and whitish ventrally (in *L. terrestris* the ventral part is usually yellowish). The first dorsal pore is situated in the intersegmental furrow of 7/8. The male pore is surrounded by a large, heart-shaped glandular tumescence (in *L. terrestris* the longitudinal slit is surrounded by a drop-shaped glandular part) (Fig. 3A-B). Genital papillae are usually found on segments 9–11, 29, 39–39 *ab* and throughout on the clitellum (in *L. terrestris* 9–11, 25–26, 37–38 *ab* and on the clitellum). Clitellum extends on segments 1/n 32,33–1/n 38,38. (1/n indicates that variable fraction of the segment in question is covered by the clitellum or the tubercles). The tubercles are present on 34–1/n 37 with large knob-shaped papillae on 34, 36 (in *L. terrestris* the clitellum is on 32–37, and the tubercula pubertatis is canoe-shaped, on 33–36) (Fig. 4 A, B).

Localities: Anne Arundel Co., Smithsonian Environmental Research Center, Edgewater: mature oak-tulip poplar forests, June-16-99, August-3-99, legit K. Szlávecz; young successional mixed forests (sweetgum, tulip poplar, black cherry), July-21-99, July-26-99,

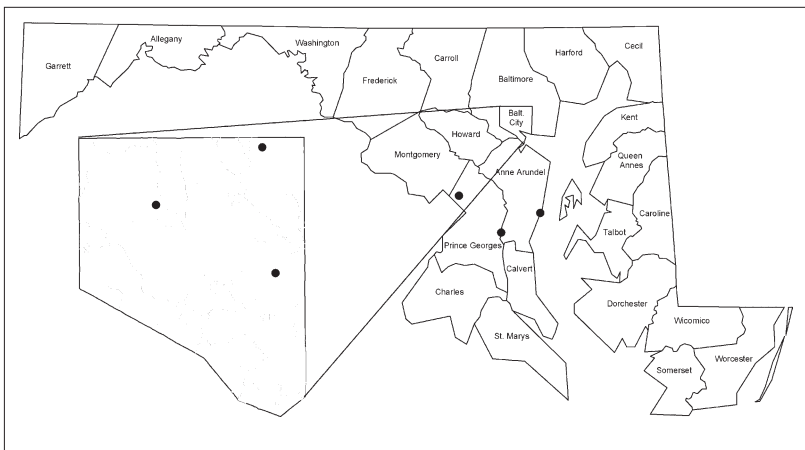


Figure 2. Map of Maryland showing all the counties and Baltimore City. Dots indicate presently known localities of *Lumbricus friendi*.

legit K. Szlávecz; mixed Virginia pine-sweetgum forest patch, April-18-99, legit K. Szlávecz. Jug Bay Wetlands Sanctuary, April-1-02. Prince Georges Co., USDA Agriculture Research Center Beltsville: corn-soybean-wheat rotation plots April-20-01, legit Cs. Csuzdi and K. Szlávecz; mixed oak-tulip poplar deciduous forest April-25-99, legit Cs. Csuzdi and K. Szlávecz. Baltimore City: Patterson Park, grassy woodland 7-16-00, legit K. Szlávecz; Druid

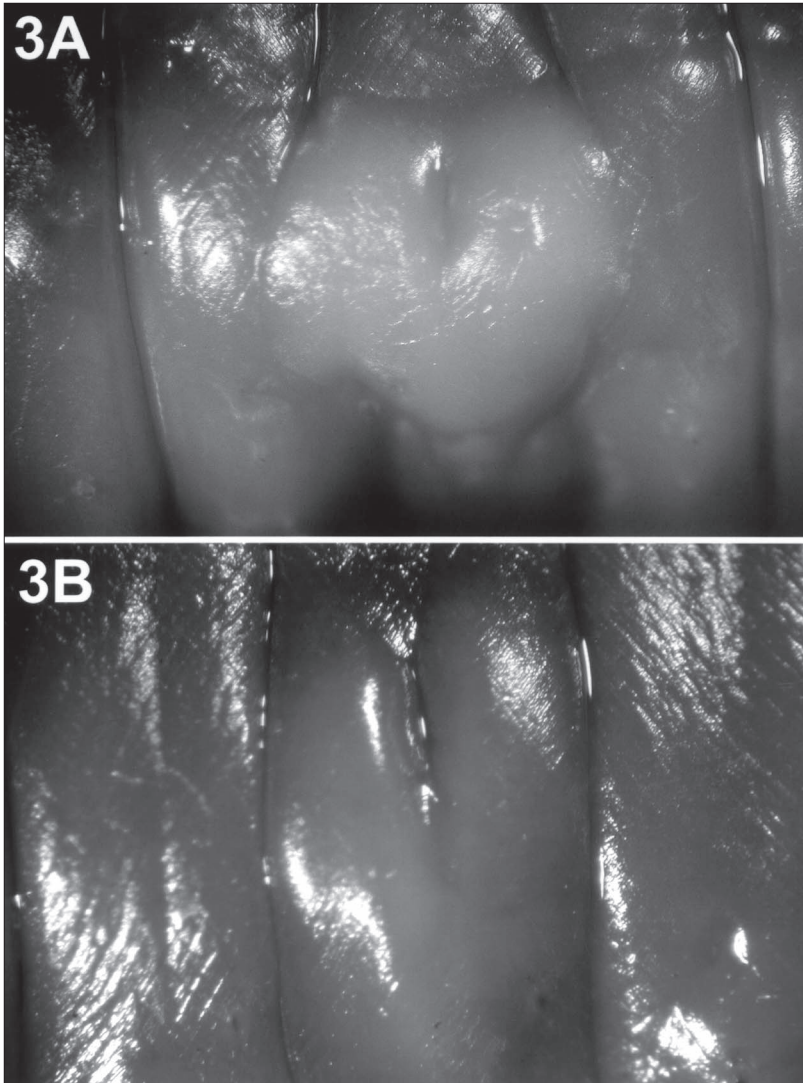


Figure 3. A. Male pore of *Lumbricus friendi*. B. Male pore of *Lumbricus terrestris*.

Hill Park, mixed oak-tulip poplar forest, July-14-00, legit K. Szlávecz, Mt. Pleasant, mixed oak-beech forest, July-23-01, legit K. Szlávecz.

Material is deposited in the Hungarian Natural History Museum and at the Department of Earth and Planetary Sciences, Johns Hopkins University.

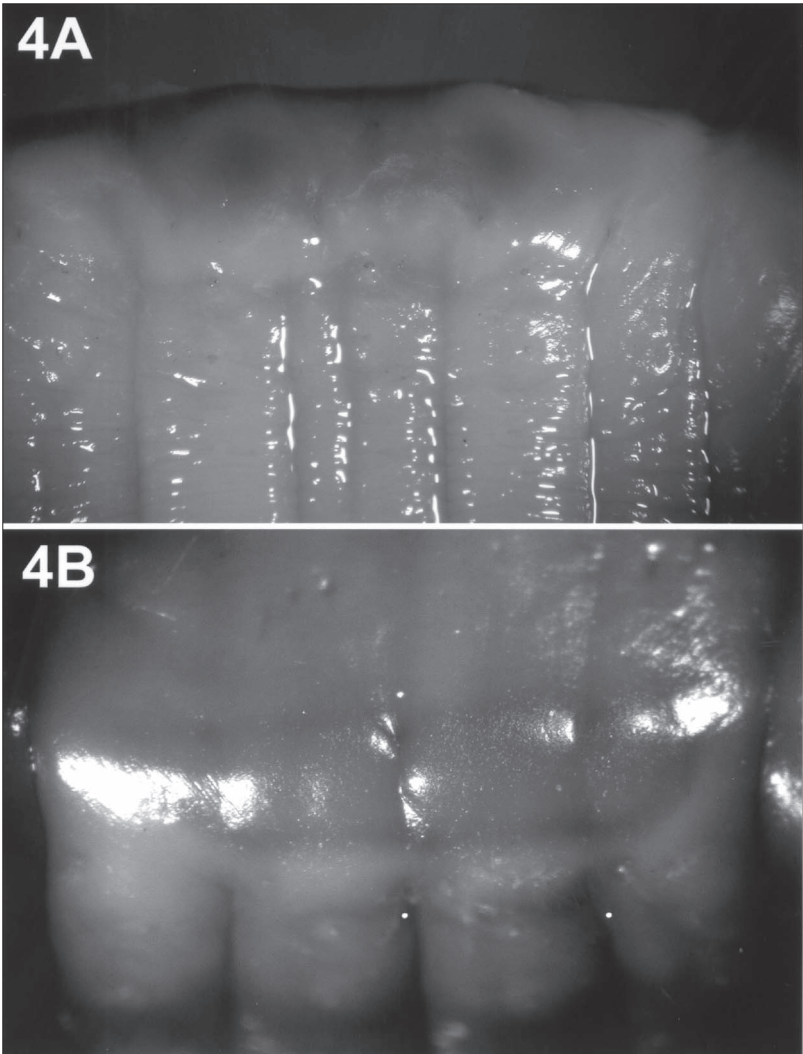


Figure 4. A. *Lumbricus friendi*, ventro-lateral view of the clitellar region with the tubercula pubertatis. B. *Lumbricus terrestris*, ventro-lateral view of the clitellar region with the tubercula pubertatis.

ACKNOWLEDGEMENTS

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