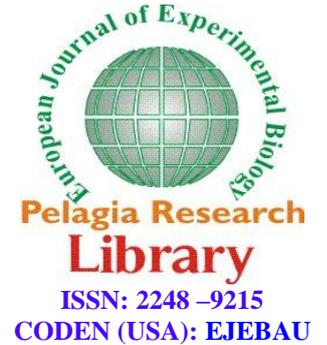




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## Contribution to the identification of Oligochaeta: Lumbricidae in the region of Annaba in eastern Algeria

Ibtissem Zeriri<sup>1\*</sup>, Aicha Tadjine<sup>1</sup>, Nawel Belhaouchet<sup>1</sup>, Houria Berrebbah<sup>1</sup>, Mohamed Reda Djebbar<sup>1</sup> and Mounia Baha<sup>2</sup>

<sup>1</sup>Laboratory of Cellular Toxicology, Department of Biology, Faculty of Sciences, Badji Mokhtar Annaba University, Annaba, Algeria

<sup>2</sup>Department of Biology, Ecole Normale Supérieure de Kouba, Algiers, Algeria

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### ABSTRACT

Earthworms are the essential components of the biological soil community. Several species of Lumbricidae became model organisms for soil ecology, the biodiversity, the biogeography, the evolution of the contamination and toxicology. Our knowledge of the taxonomy, the ecology of earthworms and their distribution in Algeria are limited and known male. This preliminary study was conducted to try to identify the different species of earthworms that live in the region of Annaba in eastern Algeria. The samples were taken from four locations in the region of Annaba. At the end of the study, four species belonging to four genera were determined: *Octodrilus complanatus*, *Nicodriluscaliginos uscaliginosus*, *Eisenia foetida*, *Allolobophora chlorotica*.

**Keywords:** Annaba, Eastern Algeria, Lumbricidae, Oligochaeta, Taxonomy.

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### INTRODUCTION

Soil fauna, which are usually divided according to the size of the organizations that comprise three separate groups, micro-, meso- and macro-fauna, covers many taxa [1-3]. It is an important source of biodiversity must be preserved because these organisms have essential roles in the maintenance of soil quality, which can be defined as the ability to provide a number of goods and services eco-systemic useful to human societies [4-8]. They also have a play important role in growth of plants[9].

Earthworms (Annelida, Oligochaeta) represent a major component of the soil macrofauna, in most terrestrial ecosystems, they dominate in biomass. They are often presented as bioindicators of the biodiversity of the soil quality [10]. In addition, they are considered as ecosystem engineers because they directly or indirectly modify the availability of resources for other species such as plants and microorganisms [11-12]. Earthworms play an important role in agricultural systems because they participate in the processes that influence the physical, chemical and biological components of the soil. In 1994, more than 3600 species of earthworms have been identified worldwide [13]. Some recent and current studies has undertaken on the distribution and systematics of this group in Africa [14-15]. However, our knowledge of wildlife worm terrestrial land in Algeria is still incomplete and insufficient [16-19] that must be addressed.

In our study, we identify the different earthworms collected from different sites of study selected in order to contribute to a study of the diversity, the abundance and the biogeography of the fauna of earthworms in the region.

## MATERIALS AND METHODS

### 2.1. Presentation of the study regions

Earthworms were collected from four sites from pristine locations several sites: the first site is a nursery located in the town of Sidi Amar is located 20 km from the Annaba province, the 2<sup>nd</sup> site is located in the area of the municipality of Chorfa 40 km east of Annaba and the 3<sup>rd</sup> site is the forest of the common Seraïdi what north of the province of Annaba, on the heights of the Massif Edough 850 meters and 13.3 kilometers from Annaba. The last site is the wilderness lake Tonga which is 5 kilometers southeast of the town of El-Kala (Figure 01). We present in the Table (1), the different species of earthworms that were harvested in describing particular locations and collecting dates and the type of vegetation at each site.

### 2.2. Sampling of animals

We used a physical method to extract soil animals. This method consists of digging in the soil to a depth of about 40cm. The search for earthworms is done with the hand. This method is used by many researchers [20-22]. The use of this method has been recommended by [23].

### 2.3. Identification and description of earthworms

In the laboratory, earthworms were studied morphologically, in the living state (before fixation) noting the length of the body, the coat color, the color gradient and the emission of mucus. Earthworms are then fixed by placing them in the 4% formalin, and then observed under a binocular microscope for identification based on external morphological study [24].



A: Siraidi; B: Sidi-Amar; C: Chorfa; D: The integral reserve of Lake Tonga

Figure 01: Map Annaba, showing different collection sites of earthworms

Table 1: Characteristic of the plot (location, date, type of vegetation) and different species collected

	Sampling sites	Dates of sampling	Vegetation	Number of earthworms	Species
Sidi Amar	nursery	April 2012		86	<i>Eiseniafoetida</i> (Michaelsen, 1900)
Chorfa	Field agriculture	March 2012	Onion, Tomato	100	<i>Octodrilus complanatus</i> (Dugès, 1828)
Seraïdi	forest	February 2012	Quercus suber	12	<i>Nicodrilus caliginosuscaliginosus</i> (Bouché, 1972)
Lac Tonga	Natural reserve	March 2012	bulrush, phragmites, cattails	54 04	<i>Eiseniafoetida</i> (Michaelsen, 1900) <i>Allolobophora chlorotica</i> (Gates, 1980)

## DISCUSSION AND CONCLUSION

Earthworms belong to the phylum Annelida and they are the largest members of Oligochaeta. Taxonomically, there are five main types of earthworms. These include; Moniligastridae, Megascolecidae, Eudrilidae, Glossoscolecidae and Lumbricidae [25-28]. Despite the richness and biodiversity of the fauna, oligochaetes have been little studied so far. The knowledge of this fauna presents huge gaps despite the work which have been performed by international

researchers between years 1887-1931. The taxonomy of earthworms in the world arouses a great discussion between different taxonomists, because unstable to this day. Identification keys change according to the authors. The morphological characteristics of the earthworm, the size, the number and arrangement of segments and color are of big value in the identification of the species.

In Algeria, the state of current knowledge of the fauna of earthworms is still limited. For this reason, we have tried to anticipate possible future discoveries mentioning, for each gender, species absent from Algeria but most susceptible to be encountered, because of their biogeographical distribution known at this time.

The taxonomic study of earthworm population in our region, revealed that sampled in eastern Algeria species belong to the family Lumbricidae, Four Genus earthworms (*Octodrilus*, *Nicodrilus*, *Eisenia*, *Allolobophora*) corresponding to four species: *Octodrilus complanatus*, *Nicodrilus caliginos uscaliginosus*, *Eisenia foetida*, *Allolobophora chlorotica*, whose distribution presents a great variation according to four study sites (Table 2).

Tableau 2: Comparison between characteristics of species of earthworms of the family Lumbricidae

Characters	<i>Octodrilus complanatus</i>	<i>Nicodrilus caliginosus</i>	<i>Eisenia foetida</i>	<i>Allolobophora chlorotica</i>
Length (mm)	70-198 mm	36 - 168 mm	35-65 mm	40-50 mm
Dimensions	5-13 mm	2.8 – 5 mm	2-3 mm	2,5-4 mm
No. Of segments	122-189	76 - 150	92-106	90 - 116
Color	dark grey or brownish cutaneous pigmentation	Brown cutaneous pigmentation	Purplish red pigmentation cutaneous	green to greenish brown pigmentation cutaneous
form	Cylindrical with flattening clitellian and cauda	Cylindrical flattened at the caudal level	Cylindrical with light caudal flattening	cylindrical
Prostomium	Epilobic 1/3 closed	Epilobic 1/2 open (in some individuals 1/3 closed )	Epilobic, 1/2 closed	Epilobic, 1/3
Clitellum	1/2 28-37	(26) 27 - (32) 34	26-32	30-36(37)
Shape of clitellum	saddle	Saddle with walls smooths	Saddle, developed enough	iridescent
Setae	Not geminates	geminates	Closely geminated	Closely geminated
No of seminal vesicle	four pairs	four pairs	four pairs	four pairs
Position of seminal vesicle	9 - 12	9, 10, 11	9, 10, 11,12	9-12

#### Family Lumbricidae CLAUS, 1880

##### \*Genus *Octodrilus* (Omodeo, 1956)

##### *Octodrilus complanatus* (Dugès, 1828)

This species was collected in the region of the town Chorfa. This species was described for the first time by [29]. This earth worm occupies nearly all the entire Mediterranean [30], it was reported in the small and large Kabylie by [31], at the Mitidja [16] and the Algerian North [17].

##### \*Genus *Nicodrilus*

##### *Nicodrilus caliginosus caliginosus* (Bouché, 1972)

This species was collected in the forest of the common Seraidi, it has been reported in all regions studied in the North of Algeria [24], its area geographic distribution rather vast.

##### \*Genus *Eisenia* (Michaelsen, 1900; sensu Omodeo, 1956)

##### *Eisenia foetida* (Savigny, 1826)

This species has been found in two locations of the sampling stations, the first station is the wilderness of Lake Tonga and the 2<sup>nd</sup> station is the nursery Sidi Amar. *Eisenia foetida* is a typical cosmopolitan species, although its origin is certainly European, it has been reported on other continents: Japan, Hawaii, the Americas, India, Australia, New Zealand and South Africa. Never in the Maghreb and in Sardinia, may be introduced by humans from manure brought from India. It has not been reported in North Algeria [24].

##### \* Genus *Allolobophora* (Eisen, 1874)

##### Espèce *Allolobophora chlorotica* (Gates, 1980)

This species was collected from the wilderness lake Tonga. Originally from Palaearctic, it is ubiquitous, is located in damp places, signaled by [30] in the Azores, Madeira, Portugal, Canary, Italy and imported in Syria, it occupies a very vast area of distribution on the whole of Europe and Asia Minor.

This species is also known from temperate in zones of the Americas, where it was probably introduced by human transport [23]. Indicated for the first time in Algeria at the Mitidja in 1997 and in the region of Annaba at the level of the El Kala station [24].

In conclusion, earthworms are very important organisms, their roles are found not only in the environment, but also extended towards the agriculture. They are also prey to a vast range of invertebrate and vertebrate predators. Several species of earthworms become model organisms for the ecology, the toxicology, the physiology and the

reproductive biology. The earthworm arrives in the whole world and they are on the species of 1800, it is important to precisely identify and classify these organisms. Our knowledge is always limited of earthworm in some parts of the region of Annaba. Thus, we thought that each faunistic study will be useful to complete the fauna of Algeria. We hope that these results will be useful for understanding the diversity of species in the region of Annaba

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