Contribution to the identification of Oligochaeta: Lumbricidae in the region of Annaba in eastern 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, Nicodrilus caliginosus, Eisenia fetida, Allolobophora chlorotica.

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

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 2nd site is located in the area of the municipality of Chorfa 40 km east of Annaba and the 3rd 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].

![Figure 01: Map Annaba, showing different collection sites of earthworms](image)

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

<table>
<thead>
<tr>
<th>Sampling sites</th>
<th>Dates of sampling</th>
<th>Vegetation</th>
<th>Number of earthworms</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sidi Amar</td>
<td>nursery</td>
<td>April 2012</td>
<td>86</td>
<td>Eisenia foetida (Michaelsen, 1900)</td>
</tr>
<tr>
<td>Chorfa</td>
<td>Field agriculture</td>
<td>March 2012</td>
<td>100</td>
<td>Octodrilus complanatus (Dugès, 1828)</td>
</tr>
<tr>
<td>Seraïdi</td>
<td>forest</td>
<td>February 2012</td>
<td>12</td>
<td>Nicodrilus caliginosus (Bouché, 1972)</td>
</tr>
<tr>
<td>Lac Tonga</td>
<td>Natural reserve</td>
<td>March 2012</td>
<td>54</td>
<td>Eisenia foetida (Michaelsen, 1900)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04</td>
<td>Allolobophora chlorotica (Gates, 1980)</td>
</tr>
</tbody>
</table>

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 caliginosus uscaliginosus, Eiseniafoetida, Allolobophora chlorotica, whose distribution presents a great variation according to four study sites (Table 2).

### Table 2: Comparison between characteristics of species of earthworms of the family Lumbricidae

<table>
<thead>
<tr>
<th>Characters</th>
<th>Octodrilus complanatus</th>
<th>Nicodrilus caliginosus</th>
<th>Eisenia foetida</th>
<th>Allolobophora chlorotica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (mm)</td>
<td>70-138 mm</td>
<td>56 - 168 mm</td>
<td>35-65 mm</td>
<td>40-50 mm</td>
</tr>
<tr>
<td>No. Of segments</td>
<td>132-189</td>
<td>76 - 150</td>
<td>92-100</td>
<td>90 - 116</td>
</tr>
<tr>
<td>Color</td>
<td>dark grey or brownish</td>
<td>Brown cutaneous pigmentation</td>
<td>Purplish red pigmentation cutaneous</td>
<td>green to greenish brown pigmentation cutaneous</td>
</tr>
<tr>
<td>form</td>
<td>Cylindrical with flattening ciliations and cauda</td>
<td>Cylindrical flattened at the caudal level</td>
<td>Cylindrical with flat caudal flattening</td>
<td>cylindrical</td>
</tr>
<tr>
<td>Prostomium</td>
<td>Epilobic 1/3 closed</td>
<td>Epilobic 1/2 open (in somemindividuals 1/3 closed)</td>
<td>Epilobic, 1/2 closed</td>
<td>Epilobic, 1/3</td>
</tr>
<tr>
<td>Ciliaturn</td>
<td>1/2 26-37</td>
<td>(26) 27 - (32) 34</td>
<td>26-32</td>
<td>30-36-37</td>
</tr>
<tr>
<td>Shape of ciliaturn</td>
<td>saddle</td>
<td>Saddle with walls smooths</td>
<td>Saddle, developed enough</td>
<td>iridescent</td>
</tr>
<tr>
<td>Setae</td>
<td>Not geminates</td>
<td>geminates</td>
<td>Closely geminated</td>
<td>Closely geminated</td>
</tr>
<tr>
<td>No of seminal vesicle</td>
<td>four pairs</td>
<td>four pairs</td>
<td>four pairs</td>
<td>four pairs</td>
</tr>
<tr>
<td>Position of seminalvesicle</td>
<td>9 - 12</td>
<td>9, 10, 11</td>
<td>9, 10, 11,12</td>
<td>9-12</td>
</tr>
</tbody>
</table>

**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 earthworm occupies nearly all the entire Mediterranean[30], it was reported in the small and large Kabylie by[31], at the Mitidjia[16] and the Algerian North[17].

*Genus Nicodrilus*

**Nicodrilus caliginosus uscaliginosus** (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)

**Eiseniafoetida** (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 2nd station is the nursery Sidi Amar. *Eiseniafoetida* 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 Allolobophorachlorotica** (Gates, 1980)

This species was collected from the wilderness lake Tonga. Originally from Paleaartic, 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 distributionen 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 Mitidjia 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.

Acknowledgement

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REFERENCES