

THE *Collembola poduromorpha* FAMILIES: NEANURIDAE AND ODONTELLIDAE OF SOME LOCALITIES OF NORTHEASTERN ALGERIA

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Résumé

Une liste de 17 espèces de collemboles appartenant à deux sous familles des Neanuridae (Frieseinae et Pseudachorutinae) et à la famille des Odontellidae. La liste dressée indique que les Frieseinae sont particulièrement diversifiés avec six espèces du même Genre (Friesea). Les Pseudachorutinae comportent sept espèces, la plupart des espèces rencontrées sont déjà connues dans la région euro méditerranéenne. Les Odontellidae sont représentées par 4 espèces nouvelles pour le pays et toute l'Afrique du Nord. Le caractère original le plus inattendu de cette faune est la présence d'espèces jusque là endémiques et connues uniquement en région tropicale africano-américaine.

Mots-clés : *Neanuridae, Frieseinae, Pseudachorutinae, Odontellidae; Nord-est algérien.*

Abstract

A list of the 17 species of Collembola belongs to two sub-families of Neanuridae (Frieseinae and Pseudachorutinae) also to family of Odontellidae. The made list indicates that Frieseinae is particularly diverse with six species of the genus (Friesea). The Pseudachorutinae include 7 species, most of species met previously known in the Europe-Mediterranean region. The Odontellidae are represented by 4 species new for Algeria and al North African region. The most unexpected character of this fauna is the presence of endemic species and known only in African's American's tropics.

Key words: *Neanuridae, Frieseinae, Pseudachorutinae, Odontellidae, Northeastern Algeria.*

ملخص

قائمة من 17 سلالة تنتمي إلى عائلتين من Neanuridae هما Frieseinae و Pseudachorutinae من جهة و إلى عائلة Odontellidae من جهة أخرى. تشير هذه القائمة إلى أن Frieseinae غلى وجه الخصوص متنوعة محتوية بذلك على ست سلالات من نفس النوع : Friesea. أما Pseudachorutinae فتحتوي على سبع سلالات معظمها معروف على مستوى المنطقة الأوروبية للبحر المتوسط. في حين هناك أربع سلالات جديدة ف الوطن و في إفريقيا الشمالية تمثل عائلة Odontellidae. الطبع الخاص لهذه الكائنات هو تواجد سلالات لحد الآن مستوطنة و لم تكن معروفة إلا في المنطقة الإستوائية الأفر - أمريكية.

Knowledge of the biological diversity of the invertebrates of Algeria has made great progress in recent years. But this progress has been uneven, and some large groups have not benefited as as Collembola.

Studies on the knowledge of Collembola of Algeria are very limited and old. One of the most extensive researches on Collembola of Algeria, conducted by Cassagnau (1963) in the area of Bône (Annaba). In 1980 the bibliographic synthesis of Thibaud and Massoud (1980). The last important work which is of Hamra Kroua (2005).

This work is done in five locations in Northeastern Algeria belonging to different bioclimatic zones: Edough (Annaba), Azzaba and Ouled Habeba (Skikda), Taya (Guelma), Beni Haroun (Mila).

MATERIEL AND METHODS

Previous locations (fig.1) have been explored over the years 2010 to 2013 the samples collected are analyzed in the laboratory of Biosystematics and Ecology of Arthropods, University Constantine 1 by the method of Berlése.



Figure 1 : Map of Northeastern Algeria and position of harvesting areas.

Edough is a crystallophyllian massif, it is part of the East Coast chain of such rises to over 1008 m (36°90' North, 07°65' East). The region belongs to the Mediterranean climate. The vegetation is dense and diverse; there is the *Quercus coccifera*, *Quercus suber* and *Quercus faginea ssp. Mirbeckii*, (Aouadi, 1989). The humid atmosphere also promotes the development of many epiphytes such as ferns, lichens and moss.

Ouled Habeba belongs to the bioclimatic sub-humid mild to sub-humid wet (36 ° 48 'North, 06 ° 97' East) at an altitude of 932 m.

The region of Azzaba belongs to the eastern part of the Numidian chain at an altitude not exceeding 200 m (36°90' North, 07°65' East). Our work is done within a thicket of cork oak (*Quercus suber*), moss and litter on ground mastic.

The region of Taya in Guelma (36°50' North, 07°09' East) at an altitude of 1006 m. It belongs to the bioclimatic sub-humid to cold winter and hot and dry summer. We took in a thicket *Quercus faginea* and moss on soil.

The region of Beni Haroun (Mila) belongs to the sub-humid bioclimatic zone at an altitude of 139 m (36°36' North, 06°16' East). Our work was carried out in a thicket of *Ceratonia siliqua*, *Quercus suber* and litter of lentisk

RESULTS

We give in Table 1 the complete list of species of *Frieseinae* and *Pseudachorutinae* harvested in different localities, their status and their biogeographical membership.

DISCUSSION AND CONCLUSION

The sub familia of Frieseinae

-*Friesea albida*: This is specie with a blue coloration of the body. Tegumentary granulation is relatively thin. Chaetae of the body smooth and pointed. Sometimes the chaetae of the last abdominal tergum are wider. Antennal segment IV with 6 subcylindrical sensilla. Apical vesicle simple. The sensory organ of antennal segment III is formed by the 5 typical sensilla. Buccal cone truncated. Labrum typical for the genus, with the pappillate chaetae L. Mouthparts characteristic for the genus: mandibles with 8 teeth. It is hémiedaphique specie extracted from moss on soil in the forest of *Quercus faginea* in Edough, and *Quercus suber* litter in Oum Laouina (Azzaba).

-*Friesea ladeiroi*: chaetae of the body smooth and acute, slightly serrated on the last abdominal tergum. No chaetae a2 on abdomen V. Buccal Cone truncated. Labrum typical of the genus, with the pappillate chaetae L. Mouthparts characteristic of the genus. Mandibles with 8 teeth; 8 pairs of cornéules and absence of the OPA. Tibiotarsi I, II, III with 17, 17 and 16 pointed chaetae. Claw with a small inner tooth. Ventral tube with 4 pairs of chaetae. Rétinacle and furca absent; the location of the furca present 4-6 microchaetae. Mediterranean specie, hémiedaphique encountered in moss on soil and on trees in forest litter of *Quercus faginea*, moss on rock and on soil in Edough. In Oum Laouina (Azzaba) and Ouled Habeba in litter of

Quercus suber and lentisk. In Beni Haroun the species was collected for the first time in the litter of *Pistacia lentiscus*.

-*Friesea laouina* has recently been described (Deharveng & Hamra Kroua, 2004), the first species *afurcata-ladeiroi* group reduced eyes (4 + 4). It is hémiedaphique species found in different types of forest litter in all localities except Beni Haroun.

-*Friesea mirabilis*: This specie is close to *F.mirabilis* but differs from it by the following characters: 8 + 8 eyes. Tibiotarsi I, II and III with 17, 17 and 16 chaetae (18, 18 and 17 in *F.mirabilis*). Claw without teeth. Widespread specie found in moist soil under moss in the forest of *Quercus faginea* in Edough and litter of *Quercus suber* in Azzaba and litter of Carob (*Ceratonia siliqua*) in Beni Haroun. It is hémiedaphique species.

-*Friesea major*: With reference to its large size compared to other species of endemic *mirabilis* group of Algeria (Edough) recently described by Hamra-Kroua & al (2009). Ordinary chaetae tall and serrated especially on post-tergites. Macrochaetae not clearly differentiated to the mésochaetae.

It is hémiedaphique specie collected in litter of *Quercus faginea* in Edough (Annaba), in litters of *Quercus suber* and lentisk litter in Oum Laouina (Azzaba) at Djebel Taya (Guelma) and Ouled Habeba (Skikda).

-*Friesea espunaensis*: Endemic in Spain (Jordana et al, 1997). Is considered in this paper as new to Algeria and North Africa. Is harvested in moss on soil and forest litter of *Quercus faginea* of Edough. Mouthparts truncated. Labium typical of the genus, with the pappillate chaetae L. Mouthparts characteristic of the genus. Mandibles with eight teeth. Eight pairs of cornéules. It hasn't postantennal organ. Dorsal chaetotaxy as in *F. mirabilis*.

The sub-familia of Pseudachorutinae : is represented by six genus and seven species.

-*Pseudachorutella asigillata*: With blue color. Tegumentary granulation is relatively large. Chaetae of the body short, smooth and acute. The sensory organ of antennal segment III is formed by the 5 typical sensilla. Absence of the OPA. European specie reported as new for Algeria (Hamra Kroua, 2005). It is hémiedaphique specie encountered in Edough in moss on trunk of *Quercus faginea* and in Beni Haroun.

-*Pseudachorutes subcrassus*: This is hémiedaphique species encountered in Edough and Azzaba. Considered in this paper as news for Algeria and North Africa. Grayish, medium size with short furca. Species Widespread in Europe, the Mediterranean, Caribbean and Asian center.

-*Pseudachorudina meridionalis*: Reported in the Mediterranean region and Europe. It is hémiedaphique specie found in Azzaba and Guelma, gray-purple with furca, medium size and large with blackish color.

-*Pratanurida boeneri*: This species is included in the genus *Pratanurida* because of its reduced furca and mucro incompletely separated from the dens. Tegumentary granulation thin. The chaetae of the head and the first tergites of the body are short, smooth and acute It is hémiedaphique species extracted from the wood of *Quercus suber* in the massive of Edough, Guelma and Ouled Habeba. Euro-Mediterranean specie. Reported as new species in Algeria and North Africa by Hamra Kroua (2005).

-*Kenyura sp.*: The absence of PAO (Post Antennal Organ), and the limited number of eyes, put this *Pseudachorutinae* in *Kenyura* genus. The Algerian species is new for science. It differs from Afro-American species by its large size, mucron not welded to the dens and the presence of (6 + 6) cornéules against (0-4 + 0-4) in Afro-American's species. The Algerian species, new to science, differs from Afro-American species by its large size, its not welded to the dens mucron and the presence of 6 + 6 cornéules (0-4 + 0-4) in Afro-American species.

In fact, apart from the PAO, this new species has characters of *Furculanurida*, genus and also African-American. It approaches *Furculanurida duodecimoculata* (Thibaud & Massoud, 1980). The only North African species of the genus described from Morocco, characterized by a large development S setae on the tergites, short and stocky furcula and multidentate mandible. The Algerian species differs by its great size (more than 2 mm, against 0.9 mm for other species).

A new species that can be assigned to the genus *Kenyura* has been discovered. *Kenyura* was so far limited to tropical regions of Africa and America. Its presence in the Taya massif of Guelma extends its distribution range of more than 3000 km to the north. It is also the first record of *Kenyura* in a non-tropical region. The species is currently under description. (Fig.2)

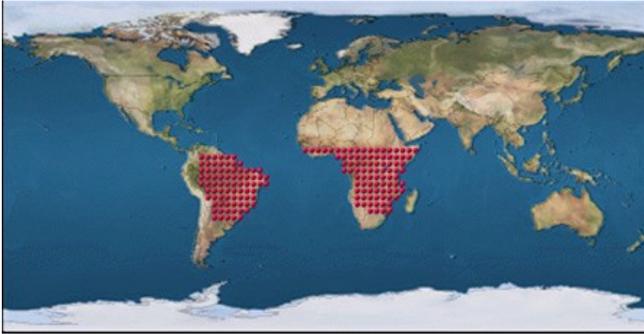


Figure 2 : Biogeographic range of *Cephalachorutes* sp. : Afro-tropical. (Bellinger & al, 2014)

● : Valid region

-*Cephalachorutes* sp1:

Our specimens are very similar to the known species *Cephalachorutes minimus* described by Massoud, 1963 in the region of the East African steppe. Arbea & al (2013) note and consider this species as a synonym of *C. minimus* and names *Cephalachorutes cf. minimus*.

In addition to the characters, which are traditionally used for the taxonomy of Pseudachorutinae, the following chaetotaxic characters were found to vary between species:

- seta c3 on head, - number of dorso-external setae on th. II and th. III,- seta a2 on abd. IV, setae al on abd. V: 2+2 (al present) or 1+1 setae (al absent) between, - S setae - seta M on tibiotarsus.

Our specimens are close to *Cephalachorutes minimus* by the following characters (Massoud, 1963): 5+5 eyes, mandible with 4 small teeth, pigment present and claw untoothed. This species cited herin for the first time for North Africa. Its presence in the Guelma region extends its distribution range of more than 3000 km to the north. (Fig.3).

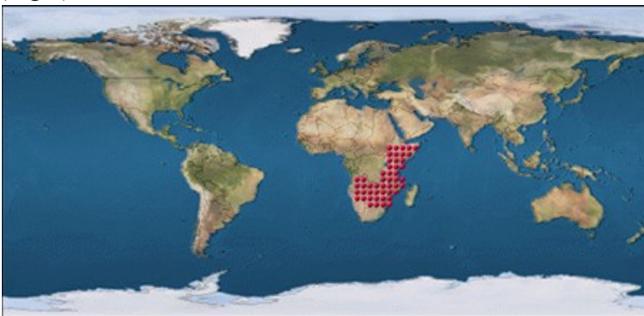


Figure 3: Biogeographic range of gender *Kenyura*. African American tropics (Bellinger & al, 2014).

● : Valid region

The family of Neanuridae is represented by two of 4 sub-families: -Frieuseinae is exceptionally represented by 6 species of the same genus (*Frieusea*). *Pseudachorutinae* is the second sub-family which is represented by 7 species includes 6 genera. The family of *Odontellidae* is represented by 4 species of the same genera (*Superodontella*).

The most unexpected original character of this fauna is the presence of species so far endemic of biogeographical distant regions: it's the case of *Kenyura* genus and *Cephalachorutes*.

The *Kenyura* genus is known in Afro-American Tropical (1 species of Kenya ; *Kenyura africana* , one case of Côte d'Ivoire ; *K.multisensa* and 3 species in south America: *K. nicaraguaensis*, *K.delicata*, *K.monoculata*, *K. porcula*) (Palacios & Deharveng 2010).

The *Cephalachorutes* genus includes 14 species worldwide distributed on the following regions: Sino-Japanese, West African Rain Forest, East African Steppe, Madagascar, Continental South-east Asia, Malaysian and New Caledonia. (Bellinger & al, 2014). The region of Guelma reveals exceptional species' diversity: in addition of the last new species (*Superodontella tayaensis*) this locality hosts *Kenyura* sp. and *Cephalachorutes cf. minimus*. This is the original character in collembolan fauna of Northeastern. Collembola of Algeria's well-known by the results of this work. However; the country's biodiversity remains unknown. First, the survey was limited to a few stations. Then the forest habitats sampled only a small part of existing habitats.

Finally, the cited number of taxa has been collected in only one station in a single specimen, so there is a high proportion of rare species, and we can expect new discoveries which require expanding the exploration to other habitats and geological structures. The most unexpected character of this fauna is the amazing exceptional diversity of genus *Frieusea* (6 species).

The taxonomic study is limited at two families: *Neanuridae* and *Odontellidae*; reveal the presence of a total of 17 species. Our results permit to enrich the national heritage Collembola by a contribution of 9 new species for the country which are new to science.

All the new species for the country are as well new for North Africa, which shows that the North-eastern Algeria has a very different fauna from that of the neighboring countries in the Mediterranean circum.

Table 1 : Inventory of two families of Collembola's species harvested in some localities of Northeastern Algeria

	Species	Collected localities						
		Geographica l distribution	Statut	Ed	Az	Gu	O.H	B.H
Familia Neanuridae Börner, 1901 sensu Deharveng, 2004								
Sub familia Frieseinae <u>Massoud, 1967</u> -a								
1	<i>Friesea albida</i>	Eu-Médit	°	X	X			
2	<i>Friesea ladeiroi</i>	Médit	°	X	X		X	X
3	<i>Friesea laouina</i>	End.	°	X	X	X	X	
4	<i>Friesea mirabilis</i>	L.R	°	X	X			X
5	<i>Friesea major</i>	End.		X	X	X	X	
6	<i>Friesea espunaensis</i>	Medit.	*,+	X				
Sub familia <u>Pseudachorutinae Börner, 1906</u>								
7	<i>Kenyura sp.</i>	T-Af-Am.	*,+			X		
8	<i>Pseudachorutes sp</i>	Ind.	?	X		X	X	X
9	<i>Pseudachorutella asigillata</i>	Hol.	°	X				X
10	<i>Pseudachorutes subcrassus</i>	L.R	*,+	X	X			
11	<i>Cephalachorutes cf minimus</i>	Afro-tropic.	*,+			X		
12	<i>Pseudachorudina meridionalis</i>	Eu-Médit.	°		X	X		
13	<i>Pratanurida boernerii</i>	Eur.	°	X		X	X	
III- Familia Odontellidae <u>Massoud, 1967</u>								
14	<i>Superodontella tayaensis</i>	End.	°		X			
15	<i>Superodontella lamellifera</i>	L.R	X	X		X		
16	<i>Superodontella vallvidrerensis subalpina</i>	Eu-Médit	X					
17	<i>Superodontella vallvidrerensis vallvidrerensis</i>	Eu-Médit	X					

Regions: Ed.: Edough; Az.: Azzaba; Gu.: Guelma; OH.: Ouled Habeba; BH.: Beni Haroun

Statu: *: News for Algeria. +: New for North Africa, ; ? Undetermined. °: known for Algeria. En.; Endemic

REFERENCES

- [1]. Aouadi.B. , 1989: La végétation de l'Algérie Nord orientale. Histoire des influences anthropiques et cartographie à 1/200.000. Thèse Doct. , Univ.] . Fournier. Lab. Eco. Végétale. 109p.
- [2]. Arbea J.I., Brahim-Bounab H. & Hamra Kroua S., 2013. Collembola Poduromorpha from Guelma Province (Northeastern Algeria), with description of a new Superodontella species (Collembola: Odontellidae). *Zootaxa* 3709 (2): 177–184.
- [3]. Bellinger & al, 2014: Bellinger P.F., Christiansen, K.A. & Janssens, F., 1996-2013. Checklist of the Collembola of the World. <http://www.collembola.org>
- [4]. Bedos A.& Deharveng L., 1991.Cephalachorutes gen. n., a new genus of tropical Neauridae (Collembola). *Tijdschrift Voor Entomologie* 134: 145-153.
- [5]. Cassagnau P., 1963 -Les Collemboles d'Afrique du Nord avec une étude de quelques espèces du Nord-Constantinois. *Bul. Soc. Hist Nat. Toulouse.* 95 (1-2), 197-206.
- [6]. Deharveng L. & Hamra-Kroua S., 2004- Une nouvelle espèce de Friesea Dalla Torre, 1895, du massif de l'Edough, Nord-Constantinois, Algérie (Collembola, Neauridae). *Bull. Soc. entomol. de France*, 109 (2) :141-143.
- [7]. Hamra-Kroua S., 2005- Les Collemboles (Hexapoda, Arthropoda) du Nord-Est algérien: Taxonomie, Biogéographie et Ecologie. Thèse de Doctorat d'état N°221. Université Mentouri Constantine. N° 221, 248 p, 24 pl.
- [8]. Hamra-Kroua S., Jordana R. & Deharveng L., 2009- A new Friesea of the mirabilis-group from Algeria (Collembola: Neauridae: Frieseinae).
- [9]. Jordana R. et Arbea J.I. 1997. Fauna Iberica, Collembola : Poduromorpha. Museo Nacional de Ciencias Naturales, Consejo Superior de Investigaciones Científicas, Madrid. 8, 807 p.
- [10]. Thibaud J.-M. et Massoud Z., 1980– Etude des Collemboles de certains milieux du Maroc et considérations biogéographiques sur la faune du Maghreb. *Revue suisse Zool.*, 87, 2, 513-548.