

A contribution to the Collembola fauna of Crete (Insecta: Collembola)

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Zusammenfassung: Die Ergebnisse von Collembola Aufsammlungen aus dem Jahre 2006 innerhalb von 7 Standorten der Weißen Berge (Westkreta) werden dargestellt und mit früheren Studien aus dem gleichen Gebiet verglichen. Insgesamt sind jetzt 36 Arten aus dieser Region Neunachweise für Kreta. Damit weist die Checkliste von Kreta 139 Arten auf. Neben weit verbreiteten europäischen Arten konnten auch einige charakteristische südeuropäische sowie seltene Arten nachgewiesen werden (z. B. *Triacanthella biroi* Stach, 1924, *Folsomides pocosensillatus* Fjellberg, 1993, *Cryptopygus orientalis* (Stach, 1947)).

Abstract: The results of Collembola samplings from 2006 in 7 sites of the White Mountains (West Crete) are presented and compared with earlier studies from the same region. A total of 36 species collected within this area are new records for Crete. Now the Collembolan checklist of Crete has 139 species. Besides widespread European species some characteristic Southern European and rare species were found (e. g. *Triacanthella biroi*, *Folsomides pocosensillatus*, and *Cryptopygus orientalis*).

Key words: Collembola, Crete, checklist, southern and endemic species

Introduction

The intensive study of collembolan fauna of Crete started in October 1972 (ELLIS 1976). He collected in 50 sampling sites of central Crete near Iraklion. Many samples were taken from the upper soil (mostly loam in various states (loose, crumbly, moist compact, humus-rich a. s. o.), moss

and litter layer (e. g. under *Quercus coccifera*) and aspirator collections. Altogether he found 93 Collembola species, with 15 new taxa. Most of these recorded species are included in the “Species list of the fauna Europaea” (last update 19 April 2007, www.faunaeur.org/species_list.php). Nearly 30 years later, the study of collembolan fauna was resumed by SCHULZ & LYMBERAKIS (2004), studying trap samplings from 4 sites near the village Anopolis (southern slope of White Mountains), and by SCHULZ (2006), collecting in more than 30 different sites within the Omalos plateau, also belonging to the White Mountains.

Material and methods

Collembolan sampling was carried out between 4-19 and 4-26-2006 in 7 various sites of the White Mountains (West Crete):

1. Omalos plateau, ephemeral natural pond, 2006-4-19 and 2004-4-24, 1050 m a. s. l., wet moss layer and upper loamy soil layer of the border area, additionally net collections from the water surface covered with *Ranunculus* spec.
2. Omalos plateau, large *Juncus* area, 2006-4-19, moss layer and loamy soil layer between *Juncus* spec.
3. Agia Irini valley, 2006-4-20, 960 m a. s. l., relatively humid moos under *Quercus* shrubs and on rocks.
4. Gingilos spring, 2006-4-21, 1700 m a. s. l., wet moss layer of rocks near the spring, litter layer under trees (*Quercus*, *Pinus*), and rather damp loamy soil under *Quercus* shrubs.
5. Samaria canyon, near the church Agios Nikolaos, 2006-4-24, 750 m a. s. l., moss layers of stonewalls rocks and wet litter (*Pinus*).
6. Samaria canyon, spring Rizia Sikias, 2006-4-24, 800 m a. s. l., very wet leaf and needle litter.
7. Xyloskalo mountain, 2006-4-25 and 2006-4-26, 1,300 m a. s. l., moist loam and moss under *Quercus* shrubs, aspirator collections from the underside of stones, rocks and bark.

Above all more than 120 samples were taken and selected in modified Berlese devices.

Results

Altogether 27 species were found. The following species list was established:

Brachystomellidae

Brachystomella parvula (Schäffer, 1896)

Cosmopolitan species, found in sites 1, 2, 6, 7.

Entomobryidae

Entomobrya handschini Stach, 1922

The present distribution is discussed by BAQUERO et al. (2008) and *E. handschini* seems to be distributed from Poland to Iran and to the south-east of the Black Sea, collected in site 7.

Lepidocyrtus vexillosus Loksa & Bogojevic, 1967

Southern European species, found in site 4.

Pseudosinella octopunctata Börner, 1901

Holarctic species, recorded from sites 1, 2, 4, 6, 7.

Hypogastruridae

Ceratophysella sigillata (Uzel, 1891)

Holarctic species, in Europe mostly in mountains, collected in site 7.

Triacanthella biroi Stach, 1924

Typical Mediterranean species, found in site 4.

Isotomidae

Cryptopygus orientalis (Stach, 1947)

Only records from Southern Asiatic countries and Southeast France, xerothermic species, collected in site 1.

Cryptopygus triglenus Ellis, 1976

Only known from Crete and the Canary Islands, found in site 7.

Desoria duodecimoculata (Denis, 1927)

Southern European species, found in site 4.

Folsomia ksenemani Stach, 1947

Frequently recorded in Central and Southern Europe, collected in site 7.

Folsomia manolachei Bagnall, 1939

Palaearctic species, eurytopic, found in sites 4, 7.

Folsomides parvulus Stach, 1922 sensu Fjellberg, 1993

Cosmopolitan species, xerophilous and psammophilous species, found in sites 4, 7.

Folsomides pocosensillatus Fjellberg, 1993

Before only known from the Canary Islands (inhabitant of driest sites) and Southern Portugal (abundant in shrub beech), on Omalos plateau found within the Agia Irini valley nearly 5 km away from the small church Agio Theodori (site 3).

Isotoma anglicana Lubbock, 1873

Central and Northern Europe, newer records from Central Asia, eurytopic species with high preference to open habitats POTAPOV (2001), collected in site 7.

Isotomurus cassagnai Deharveng & Lek, 1993

Southern European species, along brooks in lower mountains POTAPOV (2001), collected in site 2.

Parisotoma notabilis (Schäffer, 1896)

Cosmopolitan species, eurytopic species, found in sites 1, 7.

Proisotoma ripicola Linnaniemi, 1912

Many scattered records in Europe, according to THIBAUD & CHRISTIAN (1997) it is common in the Mediterranean, collected in site 2, 7.

Neanuridae

Anurida uniformis Gisin, 1953

Palaearctic species, found in site 7.

Friesea afurcata (Denis, 1926)

Southern species, collected in sites 1, 7.

Friesea truncata Cassagnau, 1958

Palaearctic species, common in many habitats, recorded from site 1.

Neelidae

Megalothorax minimus Willem, 1900
Cosmopolitan species, found in site 7.

Megalothorax cf. incertus Börner, 1903
Southern Europe, collected in site 4.

Onychiuridae

Protaphorura aurantiaca (Ridley, 1880)
Europe, found in site 1.

Sminthurididae

Sminthurides aquaticus (Bourlet, 1842)
Holarctic species, many specimens from the water surface (site 1).

Sminthurides parvulus (Krausbauer, 1898)
Widespread in Europe, found in site 4.

Sphaeridia pumilis (Krausbauer, 1898)
Holarctic species, collected in site 2.

Tullbergiidae

Mesaphorura italica (Rusek, 1971)
Palearctic species, forest and meadow soils, found in site 7.

Discussion

The 2006 collections resulted in 12 new species records for Crete. Most of the new recorded species are widespread in Europe (e. g. *F. manolachei*, *M. minimus*), but there are also some rare species (e. g. *C. orientalis*, *F. pocosensillatus*) and characteristic Southern European species (e. g. *D. duodecimoculata*, *P. ripicola*). A typical Mediterranean species is *T. biroi*. This species was recorded from South of France, Italy and Serbia. Together with the earlier findings from the White Mountains (see above), we have now 59 species records from this area (36 of these species are new for Crete, see table 1). There are now 139 Collembola species for Crete. This

number is based on the species list from ELLIS (1976) with 84 true species (4 are synonyms now and 5 species only genus spec.), the “Species list of the fauna Europaea” with 76 species (20 species of ELLIS are not listed) and the 36 new species records from the present study. In comparison with other Mediterranean islands the Collembola fauna of Crete is rather well studied, as according to the “Species list of the fauna Europaea” we have 45 species records for Corsica, 85 for Sicily, 44 for Sardinia, 37 for Malta and 45 for the Balearic Islands. Even the Greek mainland has only 50 species. All the collections of the White Mountains clearly offered genera which are well adapted to the Mediterranean climate: *Folsomides* and *Cryptopygus* ELLIS (1977).

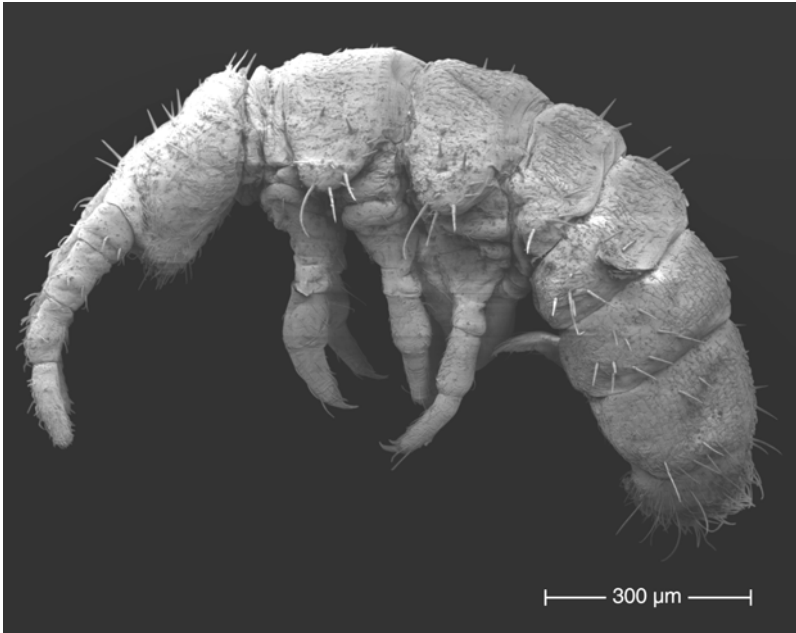


Figure 1: *Dimorphotoma porcella* Ellis, 1976 – endemic species of Crete, only the males have strong thorns on antennae, head, thorax and abdomen (ecomorphosis).

There are 11 endemic species in Crete (ELLIS (1976) 10 and one SCHULZ & LYMBERAKIS (2006)). Two of these species show morphological changes (ecomorphosis), thorns on body and antennae (*Dimorphotoma porcella*, (figure 1) and a “crown” on abdomen (*Proisotoma anopolitana* (figure 2)).

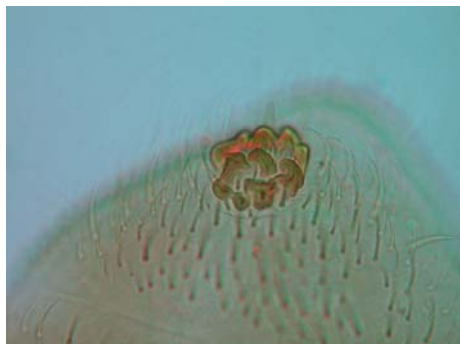


Figure 2: *Proisotoma anopolitana* Schulz & Lymberakis, 2006 – endemic species of Crete with a “crown” on abdomen V (posteriorly of 0.04–0.07 mm diameter).

Table 1: Collembola species list (in alphabetical order) of the White Mountains (West Crete) – collections from 1990-1992 (SCHULZ & LYMBERAKIS 2006), 2004 (SCHULZ 2007) and 2006 (this paper).

Family/Species	1990–1992	2004	2006	new
Brachystomellidae				
<i>Brachystomella parvula</i> (Schäffer, 1896)		+	+	
Dicyrtomidae				
<i>Dicyrtoma fusca</i> (Lubbock, 1873)	+			+
Entomobryidae				
<i>Entomobrya bimaculata</i> Stach, 1963	+			+
<i>E. handschini</i> Stach, 1922		+		
<i>E. multifasciata</i> (Tullberg, 1871)	+			
<i>E. muscorum</i> (Nicolet, 1842)	+			
<i>E. schoetti</i> Stach, 1922		+		+
<i>Heteromurus major</i> (Moniez, 1899)		+		
<i>H. nitidus</i> (Templeton, 1835)		+		
<i>Lepidocyrtus instratus</i> Handschin, 1924	+			+
<i>L. lignorum</i> (Fabricius, 1775)	+			
<i>L. vexillosus</i> Loksa & Bogojevic, 1967	+			+
<i>Orchesella cincta</i> (L., 1758)	+			+
<i>O. hungarica</i> Stach, 1929		+		+

Family/Species	1990–1992	2004	2006	new
<i>O. montana</i> Stach, 1960	+			+
<i>Pseudosinella decipiens</i> Denis, 1924		+		+
<i>P. fallax</i> (Börner, 1903)		+		+
<i>P. octopunctata</i> Börner, 1901		+		
<i>Seira domestica</i> (Nicolet, 1842)	+			+
Hypogastruridae				
<i>Ceratophysella armata</i> (Nicolet, 1841)	+			
<i>C. denticulata</i> (Bagnall, 1941)		+		+
<i>C. sigillata</i> (Uzel, 1891)			+	+
<i>Hypogastrura papillata</i> Gisin, 1949	+			+
<i>Triacanthella biroi</i> Stach, 1924			+	+
<i>Willemia intermedia</i> Mills, 1934		+		+
<i>Xenylla brevisimilis</i> Stach, 1949		+		+
<i>X. maritima</i> (Tullberg, 1869)	+	+		
Isotomidae				
<i>Anurophorus coiffaiti</i> Cassagnau & Delamare, 1955		+		+
<i>Cryptopygus orientalis</i> (Stach, 1947)			+	+
<i>C. triglenus</i> Ellis, 1976			+	
<i>Desoria duodecimoculata</i> (Denis, 1927)			+	+
<i>Folsomia ksenemani</i> Stach, 1947			+	
<i>F. manolachei</i> Bagnall, 1939			+	+
<i>Folsomides parvulus</i> Stach, 1922		+	+	
<i>F. pocosensillatus</i> Fjellberg, 1993			+	+
<i>Isotoma anglicana</i> (Lubbock, 1873)	+		+	+
<i>I. viridis</i> Bourlet, 1839	+			
<i>Isotomurus cassagnai</i> Deharveng & Lek, 1993			+	+
<i>I. palustris</i> (Müller, 1776)	+			
<i>Parisotoma notabilis</i> (Schäffer, 1896)		+	+	
<i>Proisotoma anapolitana</i> Schulz & Lymberakis, 2006	+			+
<i>P. ripicola</i> Linnaniemi, 1912		+		+
<i>Pseudisotoma sensibilis</i> Tullberg, 1876	+			+
Neanuridae				
<i>Anurida uniformis</i> Gisin, 1953			+	+
<i>Friesea afurcata</i> (Denis, 1926)			+	
<i>F. truncata</i> Cassagnau, 1958			+	+
<i>Pseudachorutella asigillata</i> (Börner, 1901)	+			
Onychiuridae				
<i>Protaphorura armata</i> (Tullberg, 1876)		+		+
<i>P. aurantiaca</i> (Ridley, 1880)			+	+

Family/Species	1990–1992	2004	2006	new
Sminthuridae				
<i>Megalothorax incertus</i> Börner, 1903			+	
<i>M. minimus</i> Willem, 1900			+	+
<i>Sminthurides aquaticus</i> (Bourlet, 1842)		+	+	+
<i>S. parvulus</i> (Krausbauer, 1898)			+	+
<i>Sminthurus multipunctatus</i> Schäffer, 1896	+			
<i>Spatulosminthurus flaviceps</i> (Tullberg, 1871)	+			
<i>Sphaeridia pumilis</i> (Krausbauer, 1898)			+	
Tomoceridae				
<i>Tomocerus minor</i> (Lubbock, 1862)	+			+
Tullbergiidae				
<i>Mesaphorura italica</i> (Rusek, 1971)			+	
<i>Metaphorura affinis</i> (Börner, 1902)		+		
<i>Paratullbergia macdougalli</i> (Bagnall, 1936)		+		+

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