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Second contribution to the knowledge of the springtail fauna of the White Mountains (Lefká Óri) in West Crete

(Insecta: Collembola)

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Abstract: This paper describes the results of Collembola collecting in more than 30 sites of the White Mountains. The collections are mostly based on moss and upper soil-layer samples. Besides widespread species, some rare species were found (e.g. *Anurophorus coiffaiti* and *Cryptopygus triglenus*). 12 species are new for Crete.

Key words: Collembola, species list, mountain region, Crete

Introduction

The "Species list of the fauna Europaea" lists 76 springtail species or subspecies for the island Crete (last update March 2005, http:// faunaeur.org/species_list.php). These data are mainly based on ELLIS (1976). He collected within the Iráklion region (sampling list with 50 sites). A recent study of the collembolan fauna from Crete was published by SCHULZ & LYMBERAKIS (2006). They recorded 22 Collembola species (pitfall trap samples from 4 sites near the mountain village Anopolis, western Crete). The present contribution continues the study of collembolan fauna of Crete, especially of its mountain regions.

Material and methods

Collembolan sampling was carried out between 5-24 and 6-9-2004 in nearly 30 different sites. More than 200 samples (mostly moss and litter

layer) were taken and extracted in modified Berlese devices. Additionally an aspirator was used for collecting springtails from stones.

Fig. 1: Mountain area near the Kallergi cottage. Many aspirator collections from the stones were taken here.

List of the most intensively sampled sites

Site number	Characteristics
1	Samaria canyon, 2004-5-24, Vrisi spring, 640m a.s.l., wet moss layer and *Pinus* litter.
2	Samaria canyon, 2004-5-24, Agios Nikolaos spring, 750m a.s.l., wet moss layer.
3	Samaria canyon, 2004-5-24, Riza Sikias spring, 880m a.s.l., moss layer and *Quercus* litter.
4	Samaria canyon, 2004-5-24, Neroutsiko spring, 1.010m a.s.l., wet moss layer.

5	Gingilos spring, 2004-5-25, 1.700m a.s.l., relatively damp moss layer of stones and under *Quercus* shrubs.
6	Xyloskalo mountain (1.300m a.s.l.) to Kallergi cottage (1.677m a.s.l.), 2004-5-27, 2004-5-30 and 2004-6-2, relatively damp moss layer of stones, litter under *Quercus* shrubs. Additionally, many collections (aspirator) from stones (fig. 1).
7	Agia Irini valley, 2004-6-3, Heroktena brook, 821m a.s.l., moss layer of trees and stones near edge of the brook.
8	Omalos plateau, ephemeral natural pond (fig. 2), 2004-6-8 and 2004-6-9, 1.050m a.s.l., moss and upper soil layer (relatively wet) at the shore line, additional collection of springtails with a net from the water surface and its vegetation (*Ranuncúlus*).
9	Omalos plateau, margins of water - filled ditches, 2004-6-8, 1.050m a.s.l., moss layer, upper soil layer.

Results - Species list (in alphabetical order)

Brachystomellidae

Brachystomella parvula (Schäffer, 1896)
Found in sites 2, 7, and 9. Cosmopolitan species (FJELLBERG 1998).

Entomobryidae

Entomobrya handschini Stach, 1922
Recorded in site 6. Mostly a southern European species (xerophilous, thermophilous, CHRISTIAN 1987).

Entomobrya schoetti Stach, 1922
Site 8. In wet moss layer. Southern European species. Newest record published by JORDANA & BAQUERO (1999) from a lucerne field in Navarra, Spain. First record for Crete.

Heteromurus major (Moniez, 1899)
Site Xirokefalia (mountain region nearly 4km north of the village Omalos), 2004-5-31, 860m a.s.l., thermophilous species (southern Europe).

Heteromurus nitidus (Templeton, 1835)
Found in site 6. Holarctic species.

Fig. 2: Ephemeral natural pond of the Omalos plateau. Many *Sminthurides aquaticus* specimens were collected from the water surface.

Orchesella hungarica Stach, 1929
Site 6 and 7. Distributed in southern Europe (only a few records). First record for Crete.

Pseudosinella decipiens Denis, 1924
Recorded in site 2. Relatively common in Europe. First record for Crete.

Pseudosinella fallax (Börner, 1903)
Found in site 5 and 9. Distributed in southern Europe. First record for Crete.

Pseudosinella octopunctata Börner, 1901
Recorded in site 5. Distributed in Europe, South Africa, and America (CHRISTIAN 1987). First record for Crete.

Hypogastruridae

Ceratophysella denticulata (Bagnall, 1941)
Collected in site 7. Eurytopic species; cosmopolitan (FJELLBERG 1998). First record for Crete.

Willemia intermedia Mills, 1934
Site 6. Holarctic species (FJELLBERG 1998). First record for Crete.

Xenylla maritima (Tullberg, 1869)
Site Xirokefalia. Found in *Pinus* litter. Cosmopolitan species, common in dry habitats (THIBAUD et al. 2004).

Xenylla brevisimilis brevisimilis Stach, 1949
Recorded in sites 2, 6, 7, 9 and Xirokefalia. Inhabitant of forest zones (Europe, North Africa, Canary Islands, THIBAUD et al. 2004). First record for Crete.

Isotomidae

Anurophorus coiffaiti Cassagnau & Delamare, 1955
Site 7 and Xirokefalia. Newer records from Armenia, Ukraine and Israel. First record for Crete. Last abdominal segments with characteristic structure (Fig. 3).

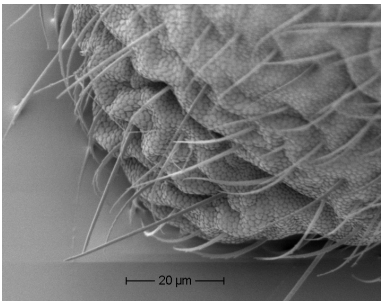
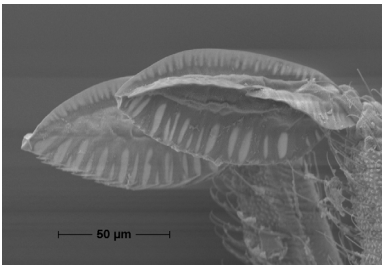


Fig. 3: *Anurophorus coiffaiti* – abdominal segments 5 and 6 with distinct wrinkles.

Cryptopygus triglenus (Ellis, 1976)
Site 6. Until now only known from the type locality and the Canary Islands (FJELLBERG, personal information).

Folsomides parvulus Stach, 1922
Found in site 5. Cosmopolitan species (xerophilous and psammophilous, POTAPOV 2001).



Parisotoma notabilis (Schäffer, 1896)
Recorded in site 1 and 5. Cosmopolitan, eurytopic species, often in high abundances (POTAPOV 2001).

Fig. 4: *Sminthurides aquaticus* – two mucros (terminal part of the furca) with broad lamellae (lateral view), which enable this species to jump on the water surface.

Proisotoma ripicola Linnaniemi, 1912
Found in site 5 and 9. Widely distributed in the Mediterranean. First record for Crete.

Onychiuridae

Protaphorura armata (Tullberg, 1876)
Site 9. Cosmopolitan species. First record for Crete.

Sminthuridae

Sminthurides aquaticus (Bourlet, 1842)
Recorded in site 8. Holarctic species (widespread and abundant on water surfaces, BRETFELD 1999) (fig. 4). First record for Crete.

Tullbergiidae

Metaphorura affinis (Börner, 1902)
Site 5. Xerophilous species (Europe).

Paratullbergia macdougalli (Bagnall, 1936)
Site 5. Eurytopic species (Europe), relatively rare. First record for Crete.

Only juvenile specimens of the following genera were found: *Bourletiellida, Cyphoderus, Desoria, Folsomia, Friesea, Isotomurus, Lepidocyrtus, Micranurida, Onychiurus*.

Discussion

Altogether 22 species were found. Many of these species are widespread. Some rare species were also found (*Cryptopygus triglenus, Paratullbergia macdougalli* and *Anurophorus coiffaiti*). The number of juvenile specimens was high. 13 recorded species are new for Crete. In combination with the findings of SCHULZ & LYMBERAKIS (2006), 28 species are now new for this island. Due to the use of different collecting methods, there is a clear difference in species composition between these two studies of the Collembolan fauna of western Crete. Only *Xenylla maritima* was found in both studies.

Comparison of species lists (* first record for Crete)

Family	SCHULZ & LYMBERAKIS (2006)	SCHULZ (this paper)
Brachystomellidae		*Brachystomella parvula*
Dicyrtomidae	*Dicyrtoma fusca**	
Entomobryidae	*Entomobrya bimaculata**	*Entomobrya handschini*
	Entomobrya multifasciata	*Entomobrya schoetti**
	Entomobrya muscorum	
		Heteromurus major
		Heteromurus nitidus
	*Lepidocyrtus instratus**	
	Lepidocyrtus lignorum	
	*Lepidocyrtus vexillosus**	
	*Orchesella cincta**	*Orchesella hungarica**
	*Orchesella montana**	
		*Pseudosinella decipiens**
		*Pseudosinella fallax**
		*Pseudosinella octopunctata**
	*Seira domestica**	
Hypogastruridae	*Ceratophysella armata*	*Ceratophysella denticulata**
	*Hypogastrura papillata**	
		*Willemia intermedia**
	Xenylla maritima	*Xenylla maritima*
		*Xenylla b. brevisimilis**
Isotomidae		*Anurophorus coiffaiti**

Family	SCHULZ & LYMBERAKIS (2006)	SCHULZ (this paper)
		Cryptopygus triglenus
		Folsomides parvulus
	*Isotoma anglicana**	
	Isotoma viridis	
	*Isotomurus palustris**	
		Parisotoma notabilis
	*Proisotoma anopolitana**	*Proisotoma ripicola**
	*Pseudisotoma sensibilis**	
Neanuridae	*Pseudachorutella sigillata**	
Onychiuridae		*Protaphorura armata**
Sminthuridae	*Sminthurus multipunctatus**	*Sminthurides aquaticus**
	*Spatulosminthurus flaviceps**	
Tomoceridae	*Tomocerus minor**	
Tullbergiidae		*Metaphorura affinis*
		*Paratullbergia macdougalli**

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