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Editors: P. Zidar, J. Štrus

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ISTIB 2011**

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Editors' preface

Nature is beautiful and science is exciting. The beauty of nature lies in detail and the message of science in generality. Exciting principles are best illustrated by well-chosen particulars.
(adapted from S.J.Gould, *Wonderful Life*).

Curiosity drives research and biologists explore life; among them a group of special people is interested in lifestyles of woodlice. Terrestrial isopods are unique crustaceans inhabiting different habitats worldwide: from seashores to deserts and caves, as well as human homes. They form a community of decomposers together with bacteria, fungi and other animals, transforming organic matter to soil and other substrates.

For the last thirty years, woodlice fans have met on different occasions to exchange their ideas and research results on woodlice biology. A survey of the seven symposia on the Biology of Terrestrial isopods, held between 1983 and 2007, will be presented by H. Schmalzfuss who says:

»Photographs and anecdotes are intended to give a personal impression to show that we are a rather normal group of human beings who have chosen a somewhat extravagant group of organisms to work with.«

The first meeting on Biology of Terrestrial isopods was held in London in 1983, organized by Cloudsley Thompson, S. L. Sutton and D. M. Holdich and sponsored by the Zoological Society. M. R. Warburg suggested the idea and presented a review on different aspects of isopod ecology. The second meeting was held in Urbino, Italy in 1987, organized by R. Argano, F. Ferrara, S. Taiti and H. Schmalzfuss under the auspices of Consiglio Nazionale delle Ricerche. The third meeting followed in 1990 in Poitiers, France and was organized by P. Juchault and P. Mocquard from Laboratoire de Biologie Animale de l'Université de Poitiers. More than 50 researchers and students shared the joy of seeing live woodlice displayed in the auditorium. The fourth meeting was organized by M. R. Warburg and E. Hornung in Technion, Haifa in 1997. In 2001 the fifth symposium was held in Iraklion, Greece, hosted by the Natural History Museum of Crete and organized by S. Sfenthourakis. The highlights of the meeting were field trips with enjoyable Greek landscape and woodlice diversity. The sixth meeting in 2004 with dynamic exchange of ideas and views on woodlice biology and ecotoxicology was hosted by University of Aveiro, Portugal, organized by S. Loreiro and A. Soares. In Tunis in 2007, the seventh meeting was hosted by University of Tunis and organized by F. Charfi-Cheikhrouha. We saw a mosaic of woodlice research from different countries.

This year the eighth meeting in Bled, Slovenia, brings together almost 70 participants contributing to knowledge on woodlice biology and exchanging ideas and experience in the fields of: systematics and biogeography; morphology and physiology; mineralized organic matrices; molecular biology and microbiology; evolutionary and developmental biology; ecology and ecotoxicology; woodlice and agro-systems.

In the last thirty years biology underwent large changes, discovering life in its different forms, deciphering genomes of many species, searching answers to environmental and climatic issues and educating people on how to conserve nature. Woodlice did not change during this

period, they are still here to be explored, described and used as experimental animals in laboratories worldwide, with a common goal: to keep life on the planet pleasant and sustainable. Let us come together at this meeting to share the joy of research and communication, and spread ideas and good will to younger generations.

We would like to thank all who participated with ideas and suggestions in planning and organizing the symposium. Special thanks to the members of the Programme and organizing committee for revisions of the manuscripts. This meeting is sponsored by the Slovenian Research Agency, The Crustacean Society, Micro+Polo d.o.o. (Leica), Scan d.o.o. (Jeol) and Alarix d.o.o..

Jasna Štrus
Chair

Primož Zidar
Co-chair

Bled, June 2011

Content

Plenary lectures

Sket B: AQUATIC ISOPODS (Crustacea: Isopoda) OF THE WIDER DINARIC AREA.....	11
Luquet G: MECHANISMS OF MINERALIZATION IN CRUSTACEANS.....	17
Van Gestel CAM: SOIL ECOTOXICOLOGY: STATE OF THE ART AND FUTURE DIRECTIONS.....	25

Oral Presentations

Systematics and biogeography

Bedek J, Taiti S: PRELIMINARY TAXONOMIC EVALUATION AND DIVERSITY OF <i>Alpioniscus (Illyrionethes)</i> TAXA IN THE DINARIC KARST.....	31
Judd S, Taiti S: PRELIMINARY TAXONOMY AND BIOGEOGRAPHY OF THE SUBFAMILY BUDELUNDIINAE VANDEL (ARMADILLIDAE) IN WESTERN AUSTRALIA.....	33
Kamilari M, Klossa-Kilia E, Kiliass G, Sfenthourakis S: PHYLOGEOGRAPHY OF GREEK ENDEMIC <i>Trachelipus</i> SPECIES (ISOPODA, ONISCIDEA).....	35
Gongalsky KB, Kuznetsova DM: MAPPING WOODLICE POPULATION AT A LOCAL SCALE IN NORTH-WESTERN CAUCASUS, RUSSIA.....	37
Kuznetsova DM, Gongalsky KB: FACTORS AFFECTING WOODLICE DISTRIBUTION OVER THE PLAIN TERRITORY OF THE FORMER USSR.....	39
Kashani GM, Schmalfuss H: <i>Porcellio brevicaudatus</i> BRANDT, 1833 AND ITS SYNONYMS FORMERLY CONSIDERED SYNONYMS OF <i>Hemilepistus reaumurii</i> (MILNE-EDWARDS, 1840).....	41

Morphology and physiology

Taiti S, Filippelli M, Bedek J, Baratti M: MOLECULAR AND MORPHOLOGICAL ANALYSES IN TWO GENERA OF TRICHONISCIDAE WITH AND WITHOUT GLAND-PILIFEROUS ORGANS (ISOPODA, ONISCIDEA).....	43
Csonka D, Halasy K, Mrak P, Štrus J, Hornung E: ECO-MORPHOLOGICAL COMPARISON OF THREE <i>Armadillidium</i> SPECIES (CRUSTACEA: ONISCIDEA).....	45
Vittori M, Žnidaršič N, Štrus J: MOLT CYCLE AND CUTICLE FORMATION IN THE SUBTERRANEAN TRICHONISCID <i>Titanethes albus</i>	47
Štrus J, Milatović M, Tušek-Žnidarič M: DIFFERENTIATION OF EPIDERMIS AND DIGESTIVE SYSTEM IN EMBRYOS OF TERRESTRIAL ISOPOD <i>Porcellio scaber</i>	49

Mineralized organic matrices: imaging, structure and composition

Ziegler A, Fabritius H, Hennig S, Hild S: ANALYSIS OF CATIONS IN THE ECDYSIAL FLUID OF <i>Porcellio scaber</i> AND THEIR EFFECT ON MINERAL DEPOSITION.....	51
Seidl B, Ziegler A: ELECTRON MICROSCOPIC AND PREPARATIVE METHODS FOR THE ANALYSIS OF ISOPOD CUTICLES.....	53
Ruangchai S, Reisecker C, Hild S, Ziegler A: STRUCTURE AND MINERAL PHASE DISTRIBUTION WITHIN THE JOINT CUTICLE OF <i>Porcellio scaber</i> LATREILLE, 1804.....	55
Huber J, Ziegler A: STRUCTURE AND ELEMENT DISTRIBUTION WITHIN THE PARS INCISIVA OF THE MANDIBLES OF <i>Porcellio scaber</i> LATR., 1804.....	57

Evolutionary and developmental biology

Achouri MS, Charfi-Cheikhrouha F: REPRODUCTIVE PHENOLOGY AND LIFE HISTORY OF ALBINOS FORM IN <i>Porcellionides sexfasciatus</i> OF MOROCCO.....	59
--	----

Giraud I, Lafitte A, Bouchon D, Grève P, Cordaux R: THE IMPACT OF ENDOSYMBIONTS ON THE EVOLUTION OF SEX DETERMINATION IN THE ISOPOD <i>Armadillidium vulgare</i>	61
Le Clec'h W, Raimond M, Braquart-Varnier C, Bouchon D, Sicard M: <i>Wolbachia</i> CAN CAUSE EARLY DEATH OF <i>Porcellio dilatatus dilatatus</i>	63
<i>Molecular biology and microbiology</i>	
Chevalier F, Sicard M, Bertaux J, Herbinière J, Morel F, Bouchon D, Grève P, Braquart-Varnier C: <i>Armadillidium vulgare</i> – <i>Wolbachia</i> ASSOCIATION: IMPACTS ON HOST IMMUNE SYSTEM AND IMMUNOCOMPETENCE.....	65
Cerveau N, Bouchon D, Berges T, Grève P: MOLECULAR EVOLUTION OF THE ANDROGENIC HORMONE OF TERRESTRIAL ISOPODS.....	67
Grandjean F, Verne S, Séchet E, Taiti S, Vilisics F, Sfenthourakis S, Johnson M: <i>Wolbachia</i> DIVERSITY WITHIN <i>Porcellionides</i> SPECIES COMPLEX.....	69
Chevalier F, Herbinière-Gaboreau J, Charif D, Mitta G, Gavory F, Wincker P, Grève P, Braquart-Varnier C, Bouchon D: THE FIRST REFERENCE TRANSCRIPTOME IN ISOPODS.....	71
Marcadé I, Doublet V, Raimond R, Souty-Grosset C: TRAITS OF THE MITOCHONDRIAL GENOME OF ISOPODS.....	73
Kostanjšek R, Milatovič M, Štrus J: CELLULOLYTIC ENZYMES OF ENDOGENOUS ORIGIN IN THE DIGESTIVE SYSTEM OF <i>Porcellio scaber</i>	75
Montesanto G, Ciolfi S, Marri L, Paccagnini E, Lupetti P, Dallai R, Caruso D, Lombardo B M: PATENT INFECTION OF IRIDOVIRUS IN SICILIAN ONISCIDEA (CRUSTACEA, ISOPODA).....	77
<i>Ecology and ecotoxicology</i>	
Drobne D, Lestan D, Udovič M: ISOPOD BIOASSAYS TO EVALUATE LEAD (Pb), ZINC (Zn) AND CADMIUM (Cd) IMMOBILIZATION EFFICIENCY FROM POLLUTED SOIL....	79
Kolar L, Žižek S, Zidar P: SENSITIVITY OF TERRESTRIAL ISOPODS TO TWO VETERINARY PHARMACEUTICALS POTENTIALLY PRESENT IN SOIL, FOOD OR FAECES.....	81
Hornung E, Végh A, Vilisics F, Szabó P: TEMPORAL PATTERNS OF SEX RATIO IN TERRESTRIAL ISOPODS (CRUSTACEA, ONISCIDEA).....	83
Hassall M, Moss A: EFFECTS OF SIMULATED CLIMATE CHANGE ON ECOLOGY AND BEHAVIOUR OF TERRESTRIAL ISOPODS.....	85
Müller H, Zimmer M: DOES INTRASPECIFIC VARIATION IN ISOPODS TRANSLATE INTO DECOMPOSITION PROCESSES?.....	87
Broly P, Devigne C: AGGREGATION IN WOODLICE: ANALYSIS OF SOCIAL COMPONENT OF THE PROCESS.....	89
Wood CT, Schlindwein CCD, Soares GLG, Araujo PB: FEEDING RATES OF <i>Balloniscus sellowii</i> (ISOPODA, ONISCIDEA): THE EFFECT OF LEAF LITTER DECOMPOSITION STAGE AND PHENOLIC AND FLAVONOID CONTENT.....	91
Drahokoupilová T, Tuf IH: MARKING AND ITS INFLUENCE ON BEHAVIOUR OF COMMON PILL WOODLOUSE.....	93
Antonović I, Brigić A, Sedlar Z, Bedek J: TERRESTRIAL ISOPOD COMMUNITIES IN A SMALL PEAT BOG AND SURROUNDING FOREST IN NORTHWEST CROATIA.....	95
Tajovský K, Hošek J, Hofmeister J: TERRESTRIAL ISOPODS (ONISCIDEA) IN FRAGMENTED FORESTS OF CENTRAL EUROPEAN LANDSCAPE.....	97
Khemaissia H, Souty-Grosset C, Nasri- Ammar K: BIODIVERSITY OF TERRESTRIAL ISOPODS IN COASTAL WETLANDS (TUNISIA).....	99
Hamaied-Melki S, Achouri MS, Charfi-Cheikhrouha F: TERRESTRIAL ISOPOD DIVERSITY IN THE WADI TAHADDART CATCHMENT AREA (N-W MOROCCO).....	101

Woodlice and agro-systems

Fraj M, Charfi-Cheikhrouha F, Souty-Grosset C : TERRESTRIAL ISOPODS DIVERSITY IN BIZERTE AGROSYSTEM..... 103

Poster Presentations

Systematics and biogeography

Campos-Filho IS, Araujo PB: NEW SPECIES AND NEW RECORDS OF SCLEROPACTIDAE (CRUSTACEA: ISOPODA: ONISCIDEA) FROM BRAZIL..... 107

Karasawa S, Honda M: THE DIVERSITY OF THE FAMILY ARMADILLIDAE (CRUSTACEA, ONISCIDEA) IN JAPAN..... 109

Khisametdinova DD: TERRESTRIAL ISOPODS (ISOPODA, ONISCIDEA) OF THE ROSTOV REGION, SW-RUSSIA..... 111

Kashani GM: FIRST RECORD OF THE TERRESTRIAL ISOPOD *Hemilepistus elongatus* BUDDÉ-LUND, 1885 (ISOPODA; ONISCIDEA) FROM IRAN..... 113

Niikura M, Yahata K: GENETIC DIVERSITY OF THE SEMI-TERRESTRIAL ISOPOD *Tylos granuliferus* IN JAPAN..... 115

Yamaki A, Shimomura M, Watanabe H, Karube H, Kishimoto T: ASELOTTE ISOPODS (CRUSTACEA: ISOPODA) FROM SOIL HABITAT IN SOUTHERN JAPAN..... 117

Morphology and physiology

Musarra Pizzo G, Montesanto G, Caruso D, Lombardo BM: LIFE CYCLE AND POSTEMBRYONIC DEVELOPMENT OF *Porcellio scutellorum* (CRUSTACEA: ISOPODA: ONISCIDEA)..... 119

Drobne D, Novak S, Hocevar M, Godec M, Jenko M: SEM INVESTIGATION OF SURFACE CHARACTERISTICS OF ISOPOD DIGESTIVE GLAND CELLS INFECTED BY INTRACELLULAR BACTERIA..... 121

Mineralized organic matrices: imaging, structure and composition

Mrak P, Žnidaršič N, Tušek-Žnidarič M, Gruber D, Klepal W, Štrus J: CUTICLE STRUCTURE IN *Porcellio* EMBRYOS AND MANCAS..... 123

Žnidaršič N, Tušek-Žnidarič M, Štrus J: CYTOSKELETAL CONNECTIONS BETWEEN EXOSKELETON AND HYPODERMIS IN PREMOLT ISOPODS..... 125

Evolutionary and developmental biology

Suzuki S, Kuramochi T, Ueno M: FEMALE COPULATIVE TIMING IN THE SEMI-TERRESTRIAL ISOPOD *Tylos granuliferus*..... 127

Verne S, Grandjean F: *Wolbachia* SYMBIOTIC FEMALES ARE NOT THAT SEXY... IMPACT OF *Wolbachia* ON MULTIPLE PATERNITY IN *Armadillidium vulgare*..... 129

Molecular biology and microbiology

Lombardo BM, Barbuto M, Montesanto G, Alfano N, Galimberti A, Bellati A, Caruso D, Casiraghi M: DNA BARCODING AND CLASSICAL TAXONOMY: AN INTEGRATED APPROACH TO THE IDENTIFICATION OF ONISCIDEAN ISOPODS..... 131

Grandjean F, Le Clec'h W, Delaunay C, Bitome Y, Johnson M: MULTI -INFECTION OF *WOLBACHIA* IN NATURAL POPULATIONS OF *Armadillidium vulgare*..... 133

Ecology and ecotoxicology

Oberfrank A, Végh A, Lang Z, Hornung E: REPRODUCTIVE STRATEGY OF *Protracheoniscus politus* (C. KOCH, 1841) (ONISCIDEA: CRINOCHEETA: AGNARIDAE).... 135

Baini F, Bologna MA, Taiti S : WOODLICE ASSEMBLAGES OF PLANTED AND NATIVE FORESTS IN CENTRAL ITALY..... 137

Khemaissia H, Djelassi R, Souty-Grosset C, Nasri- Ammar K: DIVERSITY OF TERRESTRIAL ISOPOD SPECIES ALONG A TRANSECT IN THE LAGOON SYSTEM OF ICHKEUL IN TUNISIA..... 139

<u>Vilisics F, Bogyó D, Thomas S, Moretti M</u> : COMMUNITY COMPOSITION AND DISTRIBUTION OF DECOMPOSER SPECIES IN URBAN AREAS OF SWITZERLAND.....	141
<u>Szekeres S, Fülöp D, Szabó P, Hornung E, Vilisics F</u> : INTRA-POPULATION DIFFERENCES IN LITTER CONSUMPTION OF <i>Porcellio scaber</i> LATREILLE, 1804.....	143
<u>Agodi A, Barchitta M, Valenti G, Lombardo BM, Montesanto G, Messina G, Caruso D, Oliveri Conti G, Sciacca S, Ferrante M</u> : EVIDENCE OF mtDNA AMPLIFICATION IN RESPONSE TO BENZENE EXPOSURE: <i>Armadillo officinalis</i> DUMÈRIL, 1816 AS A BIOINDICATOR OF AIR QUALITY (CRUSTACEA, ISOPODA, ONISCIDEA).....	145
<u>Messina G, Montesanto G, Pezzino E, Barchitta M, Sciandrello S, Agodi A, Caruso D, Lombardo BM</u> : ANALYSIS OF THE TERRESTRIAL ISOPOD COMMUNITY OF THE HUMID COASTAL AREA OF “SALINE DI TRAPANI E PACECO” IN RELATION TO PLANT AND ENVIRONMENTAL PARAMETERS (CRUSTACEA, ISOPODA, ONISCIDEA).....	147
<u>Quadros AF, Bugs PS, Araujo PB</u> : INTRASPECIFIC AND INTERESPECIFIC DIFFERENCES IN DEATH-FEIGNING BY TERRESTRIAL ISOPODS.....	149
<u>Zidar P, Hribar M, Štrus J</u> : EFFECTS OF INSECTICIDE WITH PYRETHRINS ON TERRESTRIAL ISOPODS (CRUSTACEA: ISOPODA) AS NONTARGET ORGANISMS.....	151
<u>Novak S, Drobne D, Valant J, Pipan Tkalec Ž, Pelicon P, Vavpetič P, Falnoga I, Remškar M</u> : TISSUE ACCUMULATION AND TOXIC POTENTIAL OF INGESTED TiO ₂ NANOPARTICLES BY A TERRESTRIAL ISOPOD (<i>Porcellio scaber</i> , ISOPODA, CRUSTACEA).....	153
<i>Woodlice and agro-systems</i>	
<u>Deschamps D, Souty-Grosset C, Bourdon B, Freyssinel G, Mallet M, Carreric G</u> : BIODIVERSITY OF SOIL MACROFAUNA IN AGROSYSTEMS (WESTERN FRANCE).....	155
<u>Fraj M, Charfi-Cheikhrouha F, Souty-Grosset C</u> : IS ISOPOD DIVERSITY INFLUENCED BY CULTIVATION TYPES?.....	157
List of participants	161
Index of participants	163

WOODLICE ASSEMBLAGES OF PLANTED AND NATIVE FORESTS IN CENTRAL ITALY

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ABSTRACT: Effects of reforestation on woodlice assemblages were studied in three ca. 20-year-old regenerating plantations and were compared to an old native mixed oak forest (*Quercus cerris* and *Quercus frainetto*) in Latium (central Italy). The three plantations were reforested with native tree species (holm-oak *Quercus ilex*, Turkey-oak *Quercus cerris* and downy-oak *Quercus pubescens*) in areas which had been previously used for agricultural purposes. Material collected by pitfall traps was used for comparison of species richness and structural parameters in the four forest types. One sampling site for each forest type was chosen, and each site was sampled monthly during a one year sampling. Our results show that the woodlice assemblages of the plantations were more simply structured with a low species richness and diversity while the native mixed forest shows slightly higher values with three exclusive species. The woodlice assemblages of the plantations in comparison to the native mixed oak forest are characterized by the dominance of a few more euriecioid and vagile species, a condition typical of immature successional stages.

Keywords: Isopoda, Oniscidea, diversity, forest plantations, central Italy.

1. Introduction

Expanding woodlands into areas previously deforested and intensively used for agricultural purposes may be a goal of nature conservation (Finch, 2005). There are many studies on the effects of plantations and forest succession on species composition and diversity of soil arthropod communities, indicating that logging, reforestation and forest succession have important effects on the environment and different arthropod assemblages (Barrocas et al., 1998; Finch, 2005; Yu et al., 2008). Since the 1980s, extensive tree plantations have been established on fields cultivated in the past and then abandoned in the “Castel di Guido” farmland, near Rome. The aim of this study was to compare species richness, abundance and structural parameters of woodlice assemblages in three different about 20 years old monospecific forest plantations, and in a native mixed oak forest.

2. Materials & Methods

2.1 Study area

The farmland is located along the Tyrrhenian side of central Italy (Rome, Latium). It ranges from 10 to 80 m a.s.l. and extends for over 2,000 ha. Woodlice assemblages were sampled at four sites, each representing a different habitat: i) native mixed oak forest dominated by *Q. cerris* and *Q. frainetto*, ii) plantation with Turkey-oak (*Q. cerris*), iii) plantation with holm-oak (*Q. ilex*), iv) plantation with downy-oak (*Q. pubescens*).

2.2 Sampling methods

Woodlice were sampled using pitfall traps (95 mm in diameter, 500 ml in volume) containing 150 ml

of wine vinegar and sodium chloride. Eight traps were used for each sampling station, for a total of 32 traps. Traps were located ca. 15 m apart from each other in order to avoid the autocorrelation and depletion effect (Digweed et al., 1995; Baker and Barmuta, 2006). Pitfall traps were active from March 2009 to February 2010; all traps were emptied and refilled once a month.

2.3 Data analysis

The abundance of all collected woodlice was determined. The species richness (S) and the Shannon's diversity indices (H', H'max) were used as measures for community diversity. Community evenness was estimated by Pielou's index (J'). Overall values of S, H', H'max and J' were calculated for each site. Differences between sites were tested with a Kruskal–Wallis ANOVA test, taking the monthly values of S, H' and J' calculated for each site as replicates. When significant differences were found, subsequent Mann–Whitney U-tests were applied for pairwise comparisons among native forest and plantations.

3. Results & Discussion

3.1 Species diversity and abundance

A total of 1311 terrestrial isopod specimens belonging to 14 species were collected (Table 1). The total number of individuals collected per site ranged from a minimum of 253 in the mixed oak forest to a maximum of 403 in the downy-oak plantation. Dominant species in all the sites are *Chaetophiloscia elongata*, *C. sicula*, *Philoscia muscorum* and *P. cf. affinis*. In the three plantations there is a high degree of dominance restricted to

single species (*P. muscorum* in *Q. ilex*, *P. cf. affinis* in *Q. pubescens* and *P. sicula* in *Q. cerris*) while in the mixed forest there is the co-dominance of *C. sicula* and *P. muscorum*. The total number of woodlice species collected per site ranged from a minimum of five in the Turkey-oak plantation to a maximum of 12 in the mixed oak forest (Table 2). Shannon's index (H' , H' max) and evenness (J') were higher in the native mixed oak forest.

Kruskal-Wallis ANOVA showed significant differences ($p < 0.05$) among sites for S , H' and J' . Pairwise comparisons among native forest and plantations showed significant differences ($p < 0.05$) for S and H' between the native forest and the Turkey-oak plantation and between the native forest and the holm-oak plantation.

3.2 Discussion

In the three plantation sites both the dominant species and most of the species with a lower occurrence are all euriecioid and not restricted to forest habitats. The native forest site is characterized by the presence of a lower number of specimens and a larger number of species, some of them are specialized to forest habitats (e. g. *Cylisticus gracilipennis*, *Acaeroplastes delattinii* and *Porcellio pumicatus*). These results together with the values of the diversity indices show that the woodlice assemblages in the plantations are

characteristic of immature successional stages in comparison with the mixed oak forest.

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Table 1. Abundance of woodlice specimens caught by pitfall traps in the different sites. Nat. = Native mixed oak forest; downy-oak = *Q. pubescens* plantation; Turkey-oak = *Q. cerris* plantation; holm-oak = *Q. ilex* plantation.

	Nat.	downy-oak	Turkey-oak	holm-oak
<i>Chaetophiloscia elongata</i> (Dollfus, 1884)	0	9	192	2
<i>Chaetophiloscia hastata</i> Verhoeff, 1929	7	2	0	0
<i>Chaetophiloscia sicula</i> Verhoeff, 1908	90	44	88	8
<i>Philoscia cf. affinis</i> Verhoeff, 1908	1	203	0	11
<i>Philoscia muscorum</i> (Scopoli, 1763)	64	78	33	255
<i>Trachelipus arcuatus</i> (Budde Lund, 1885)	4	3	0	1
<i>Acaeroplastes delattinii</i> Verhoeff, 1951	8	0	0	0
<i>Porcellionides pruinosus</i> (Brandt, 1833)	14	0	14	38
<i>Porcellio dilatatus</i> Brandt, 1833	29	0	0	0
<i>Porcellio laevis</i> Latreille, 1804	2	0	10	0
<i>Porcellio pumicatus</i> Budde Lund, 1885	1	0	0	0
<i>Cylisticus gracilipennis</i> Budde Lund, 1885	3	64	0	0
<i>Armadillidium vulgare</i> (Latreille, 1804)	30	0	0	2
<i>Armadillidium</i> sp.	0	0	0	1
Total	253	403	337	318

Table 2. Number of species (S), Shannon's index (H' , H' max), and Pielou's index (J') at different sites.

	S	H'	H' max	J'
Native mixed oak forest	12	1,785	2,485	0,718
<i>Q. pubescens</i> plantation	7	1,345	1,946	0,691
<i>Q. cerris</i> plantation	5	1,135	1,609	0,705
<i>Q. ilex</i> plantation	8	0,74	2,079	0,356