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NEW SPECIES OF ENTOMOBRYA FROM ETNA MOUNTAIN, SICILY (COLLEMBOLA ENTOMOBRYOMORPHA)

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Jordana R., Giuga L., Baquero E. – New species of *Entomobrya* from Etna Mountain, Sicily (Collembola Entomobryomorpha).

A new species of the genus *Entomobrya* Rondani, 1861 (Collembola, Entomobryidae) from Mount Etna in eastern Sicily is described. *Entomobrya siciliana* n. sp. is separated from all other known species by the following combination of characters: characteristic colour pattern, ratio antennae/head length ≈ 2, apical vesicle bilobated, labral papillae almost smooth, with two small projections on central ones, claw with 4 internal teeth and empodium with serrate external edge (leg III). The macrochaetotaxy is described.

For the identification and description of these species we used the set of characters proposed by JORDANA and BAQUERO (2005).

KEY WORDS: morphological characters, macrochaetotaxy, taxonomy.

INTRODUCTION

During a biological investigation in Sicily (Mt Etna) a new species of the genus *Entomobrya* was found on *Juniperus hemisphaerica* (C. Presl) at 1.790 m above sea level.

The holotype and 11 paratypes are deposited in the Museum of Zoology of the University of Navarra (MZNA).

The combined use of colour and macrochaetotaxy allows the identification of new species and provides a good description. The set of characters proposed by JORDANA and BAQUERO (2005), based on a constant and generally visible set of morphological characters (CHRISTIANSEN, 1958; CHRISTIANSEN and BELLINGER, 1980), including the dorsal macrochaetotaxy, has proven very useful for the identification of species within the genus *Entomobrya*.

ABREVIATIONS – Abd = abdominal segment, Ant = antennal segment, Th = thoracic segment

MATERIAL AND METHODS

The specimens were collected by putting a tray below shurbs and shaking them with a stick. A fine brush was used to sweep specimens fell into the tray directly into vials containing 75% ethanol.

The specimens were mounted in Hoyer medium, and one of them previously was cleared with Nesbitt solution. Observation of the slides was done using an Olympus BX51-TF microscope with a multi-viewing system and phase contrast, and a Zeiss «Axio Imager.A1» with differential interference contrast (DIC). For measurements, a UDA drawing attachment UIS (Universal Infinity System) and a scale calibrated with a Graticules Ltd. slide (1 mm/0.01 div) were used.

RESULTS

Entomobrya siciliana n. sp.
(Figs I, 1-7, II, 1-4 and Tabs. 1 and 2)

TYPE LOCALITY – The specimens examined were found in Sicily (Italy) on Mount Etna, collected over *J. hemisphaerica* in the area of Piano Provenzana (450 m northeast of Mt Conca), altitude of 1.790 m above sea level.

This site has a Oromediterranean subhumid bioclimate (BRULLO *et al*., 1996). The annual average precipitation is 1000-1300 mm. The landscape is made up of volcanic bedrock and vegetation was formed by sparse xerophilous grass and shrubs. Soil type in the collecting area is a Rock outcrop-Lithic Xerorthents (FIEROTTI *et al*., 1988).

TYPE MATERIAL – Holotype on slide, collected over *J. hemisphaerica*, 6.4.2011. R. Jordana, P. Alicata and L. Giuga leg. Coordinates: lat 37.795429° long 15.039037° (37°47'43.92"N, 15°02'20.11"E). One paratype in slide and 10 paratypes in ethyl alcohol. Deposited in the Museum of Zoology of the University of Navarra.

DESCRIPTION – Body length up to 1.8 mm excluding antennae. Body colour pattern as in figs I, 1 and 2, with a characteristic colour pattern, and a dark oval figure on a pale background in the abdominal segment IV.

Head: Eight ocelli, GH smaller than EF, almost imperceptible at light microscope. Antennae length 990 µm, almost three times the length of the head, Ant IV with apical vesicle bilobated. Relative length of Ant I/II/III/IV = 1/1.80/1.73/2.07 (from one specimen measured). Labral papillae almost smooth, only with very small projections on central ones, (fig. I, 3).

Body: Length ratio Abd IV/III = 4. Trochanteral organ with approximately 20 setae (fig. I, 4). Claw with 4 internal teeth: first pair at 54% from the base of claw; 2 unpaired

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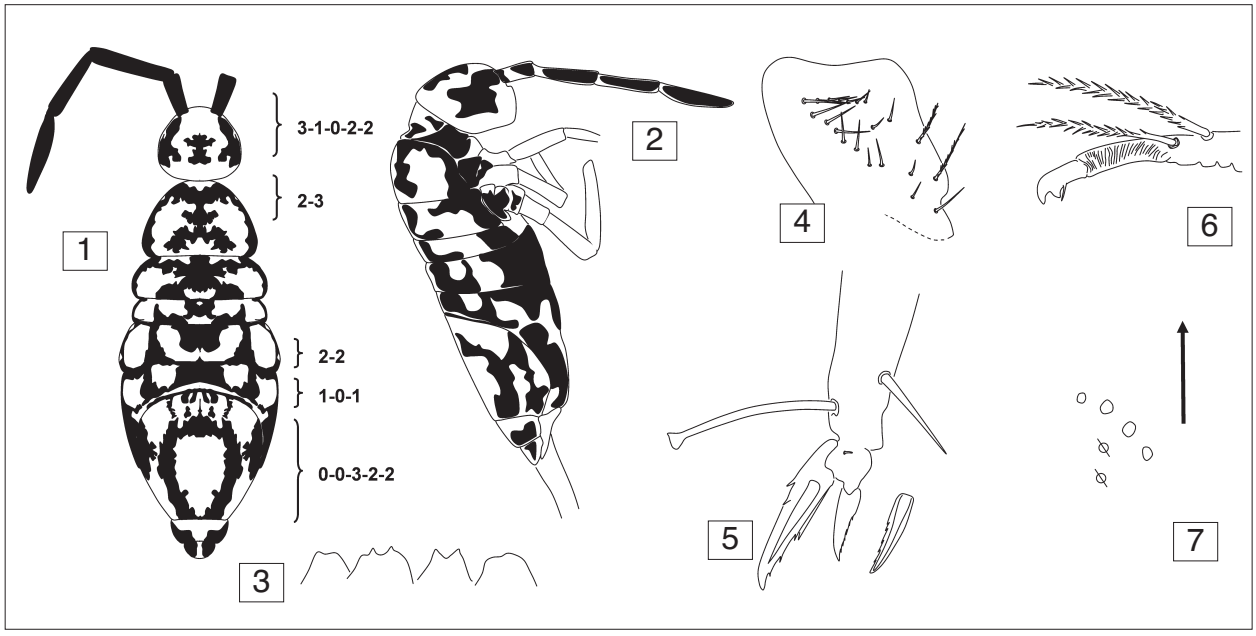

Fig. I – *Entomobrya siciliana* n. sp.: 1, colour pattern, dorsal; 2, colour pattern, lateral; 3, labral papillae; 4, trochanteral organ; 5, unguis and unguiculus; 6, tip of dens and mucro; 7, manubrial plate.

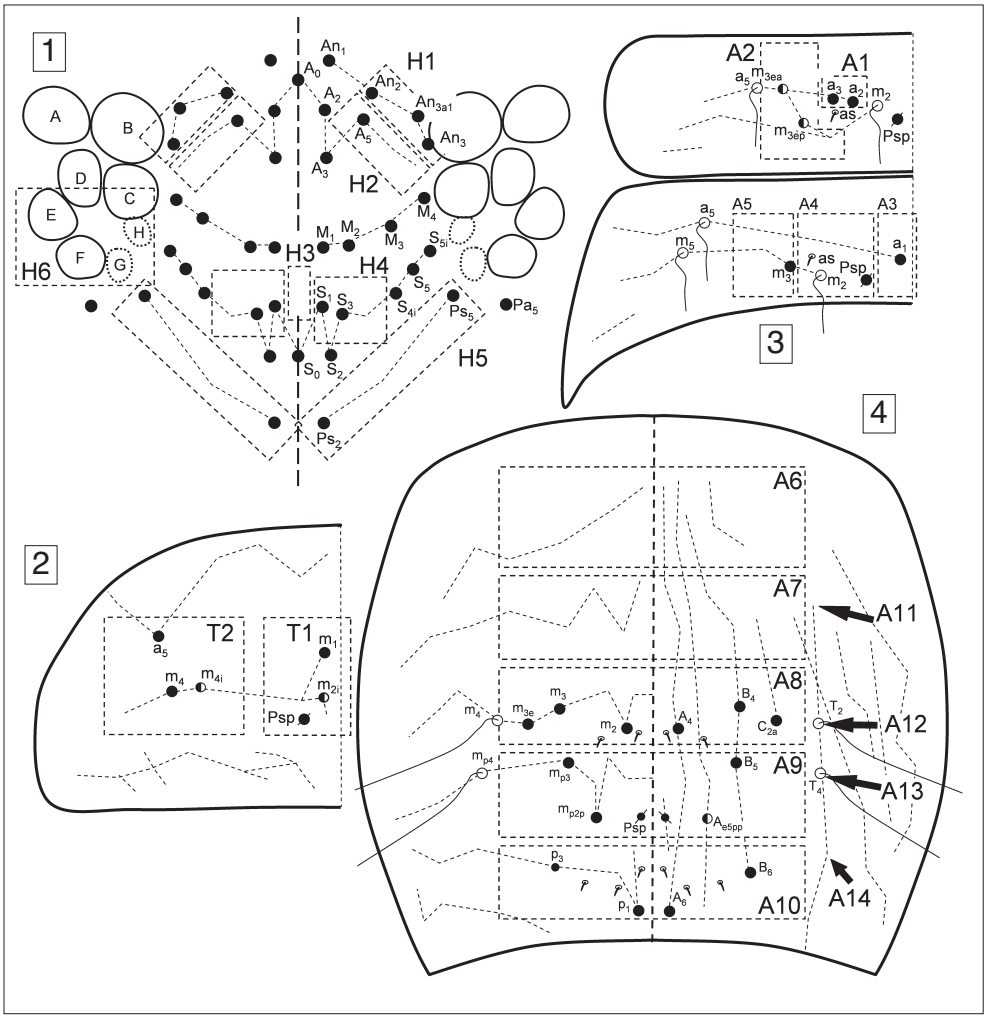

Fig. II – *Entomobrya siciliana* n. sp. Macrochaetotaxy: 1, head; 2, Th II; 3, Abd II-III; 4, Abd IV.

Table 1 – Comparison the species with similar colouration or sharing part of the macrochaetotaxy. Differences with the new species in bold. "-" means "no data"; Dif. means: number of differences between the new species and other species respectively. For meaning of characters, see Table 2.

	Character (Ch.)																									
	1	2	3	4	5	6	7	8	11	12	14	15	17	18	19	20	21	22	23	25	27	29	30	35	36	Dif.
Simplified formula	Head								Th II					Abd II		Abd III			Abd IV							
E. fimbaensis	3	1	0	2	2	**2**	2	2	2	3	4	**2**	1	2	**3**	1	**2**	**2**	0	**5**	3	2	2	**1**	4	7
E. handschini	3	1	0	**3**	2	**3**	2	**3**	**4**	**6**	4	**2**	**0**	2	**5**	**0**	**2**	**2**	0	**3**	**4**	**3**	2	2	4	14
E. lawrencei	3	1	0	2	2	1	2	**1**	2	3	4	–	–	2	2	1	0	1	0	**2**	**2**	2	2	-	4	4
E. luqueensis	3	1	0	2	2	1	2	?	2	3	4	**1**	**0**	2	2	1	**2**	1	**4**	**2**	3	2	2	2	4	5
E. luquei	3	1	0	**3**	2	**2**	2	2	2	3	**3**	**1**	**0**	2	2	1	0	1	0	0	3	2	2	2	**5-6**	**6**
E. maroccana	3	1	0	2	2	1	**1**	**1**	2	3	4	**2**	**0**	2	**3**	1	**2**	1	0	0	3	2	2	**1**	–	7
E. multifasciata	3	1	0	2	2	**2**	**1**	1-2	2	3	4	3	**0**	2	2	1	**2**	1	0	**2**	3	2	2	2	4	5
E. nicoleti	3	1	0	**3**	**3**	1	2	**1**	2	3	4	**1**	**0**	2	2	1	0	1	0	0	3	2	2	**1**	3-4	6
E. quinquelineata	3	1	0	2	2	1	2	**1**	2	3	4	**1**	**0**	2	2	1	**2**	1	0	**3(4)**	3(4-5)	2	2	**1**	4	6
E. vadelli	3	1	0	2	2	**2**	2	**1**	2	3	4	**1**	1	2	2	1	**2**	1	0	0	3	2	2	2	**3**	**5**
***E. siciliana* n. sp.**	3	1	0	2	2	1	2	2	2	3	4	3	1	2	2	1	0	1	0	0	3	2	2	2	4	–

Table 2 – Set of characters of the species *Entomobrya siciliana* n. sp. Number of specimens observed: 2. Simplified macrochaetotaxy formula in bold.

Character	Location	Description	Range of values	*E. siciliana* n. sp.
Ch.1	H1 (Head)	An_2–An_3	1-6	**3**
Ch.2	H2	A_5–A_7	1-3	**1**
Ch.3	H3	S'_0	0-1	**0**
Ch.4	H4	S_1-S_3-S_4	0-3	**2**
Ch.5	H5	Ps_2-Ps_3-Ps_5	0-3	**2**
Ch.6	labral papillae	simple and smooth papillae (1), wrinkled or with some projections (2), a chaeta-like projection (3)	1-3	1
Ch.7	ocelli GandH size	= EandF (1), <EandF (2)	1-2	2
Ch.8	apical antennal retractile bulb	no bulb (0), lobe simple (1), bilobate (2), trilobate (3)	0-3	2
Ch.9	ratio Ant/Head	> or = 3 (1), > or = 2 < 3 (2), < 2 (3)	1-3	2
Ch.10	anterior dorsal mane Th II Mc	with Mc type 1 (1), without Mc or type 2 (2)	1-2	1
Ch.11	T1	chaetae number m_1–m_{2i2} or >4 (5)	0-5	**2**
Ch.12	T2	chaetae number a_5, m_4–m_5 or >8 (9)	0-9	**3**
Ch.13	smooth chaetae on tibiotarsi	not or 1 in tibiotarsi III = 0, double file = 1	0-1	0
Ch.14	claw internal teeth	1(1), 2(2), 3(3), 4(4)	1-4	4
	paired teeth of claw	distance from claw base, in %	–	54
	first unpaired teeth of claw	distance from claw base, in %	–	75
Ch.15	claw dorsal tooth	basal = 1, internal teeth level = 2, between pair teeth and basis = 3	1-3	3
Ch.16	claw internal edge	without ciliation (0), with ciliation (1)	0-1	0
Ch.17	external empodium	smooth (0), serrate (1)	0-1	1
Ch.18	A1 Abd II	a_2–a_3	0-2	**2**
Ch.19	A2 Abd II	m_3 series chaetae number	0-7	**2**
Ch.20	A3 Abd III	a_1	0-1	**1**
Ch.21	A4 Abd III	above m_2 chaetae number	0-3	**0**
Ch.22	A5 Abd III	m_3–m_4 series chaetae number	0-4	**1**
Ch.23	A6 Abd IV	a_1–a_5 (A_1–D_1) chaetae number; >8 (9)	0-9	**0**
Ch.24	A7 unpair chaeta	ma_0 (A_{03})	0-1	0
Ch.25	A7 Abd IV	ma_1–ma_4 (A_2–E_1) chaetae number; >9 (10)	0-10	**0**
Ch.26	A8 unpaired chaeta	m_0 (A_{04})	0-1	0
Ch.27	A8 Abd IV	m_1–m_3 (A_{4a}–C_{2a}) chaetae number; >5 (6)	0-6	**3**
Ch.28	A9 unpaired chaeta	mp_0 (A_{05})	0-1	0
Ch.29	A9 Abd IV	mp_1–mp_3 (A_5–B_5) chaetae number; >6 (7)	0-7	**2**
Ch.30	A10 Abd IV	p_{1a}–p_3 (A_6–B_6) chaetae number; >5 (6)	0-6	**2**
Ch.31	A11 Abd IV	T_1 (ma_{4e}) as trichobothrium	0-1	0
Ch.32	A12 Abd IV	T_2 (m_4) as trichobothrium	0-1	1
Ch.33	A13 Abd IV	T_4 (mp_4) as trichobothrium	0-1	1
Ch.34	A14 Abd IV	T_6 (p_4) as trichobothrium	0-1	0
Ch.35	ratio Abd IV/III	2 < R < 4 (1), R > 4 (2)	1-2	2
	manubrium and dens	total length, in micrometers	–	730
Ch.36	manubrial plate	chaetae number; >10 (11)	0-11	4
Ch.37	manubrial plate	pseudopores 1-2	1-2	2
Ch.38	mucro	sub-apical tooth, without (0), normal (1), big (2), smaller (3)	0-3	1
Ch.39	mucro	basal spine, absent (0), present (1)	0-1	1

teeth, the first one at 75% from the base, the most distal one minute (87%); dorsal tooth not basal, between base and paired teeth. Empodium blade-like, with serrate external edge on leg III at its two final third (fig. I, 5), and tenent hair spatulated and very long (1.33 times longer than unguis). Manubrium and dens length 730 µm. Manubrial plate with 4 chaetae forming an arch and 2 pseudopores (fig. I, 6). Mucronal subapical tooth similar to the terminal one; mucronal spine present (fig. I, 7).

Chaetotaxy: Simplified formula: 3-1-0-2-2/2-3/2-2/1-0-1/0-0-3-2-2 (fig. I, 1). Head chaetotaxy as in figure II, 1. Thorax chaetotaxy: T1 area on Th II with 2 macrochaetae (m_1 and m_{2i} present); T2 area on Th II with 3 macrochaetae (a_5, m_4 and m_{4i}) (fig. II, 2). Abdomen chaetotaxy (figs II, 3 and 4): A1 and A2 areas on Abd II with 2 macrochaetae. Abd III with 1 macrochaeta on areas A3 and A5. Abd IV macrochaetotaxy as in figure II, 4.

Complete list of characters habitually considered for the identification of *Entomobrya* species in Table 2.

BIOLOGY – Found over *J. hemisphaerica*, 1.790 m above sea level, probably eating lichens or fungus, present on the plant.

DISCUSSION.

The new species share colour pattern with the species that present a pigmentation with a longitudinal stripes pattern, as *E. fimbaensis* Baquero and Jordana, 2008, *E. handschini* Stach, 1922, *E. lawrencei* Baquero and Jordana, 2008, *E. luqueensis* Baquero, Arbea and Jordana, 2009, *E. maroccana* Baquero and Jordana, 2008 and *E. quinquelineata* Börner, 1901. Curiously, all of them have a particular and some similar pattern of pigmentation on Abd IV; but the macrochaetotaxy, and other morphologic characters, make easy to distinguish them.

Other species, with different colouration as transversal stripes, or with little pigmentation, share with the new species part of the macrochaetotaxy (very useful to compare the species): *E. luquei* Jordana and Baquero, 2006, *E. multifasciata* (Tullberg, 1871) Brook, 1883 and *E. vadelli* Jordana and Baquero, 2005.

E. nicoleti (Lubbock, 1868) Brook, 1884, in its most dark form, can be very similar to the new species, but the antennal apical vesicle, the dorsal tooth of the unguis, the empodium shape and the head macrochaetotaxy allow separate them.

The Table 1 resumes the characters that allow distinguishing the mentioned species.

ETYMOLOGY – The species name of the new species make reference to the place where the specimens were captured.

REFERENCES

BRULLO S., MINISSALE P., SPAMPINATO G., 1996 – *Caratteristiche bioclimatiche della Sicilia*. - Giornale Botanico Italiano, 130 (1): 177-185.

CHRISTIANSEN K., 1958 – *The Nearctic members of the genus* Entomobrya *(Collembola)*. - Bulletin of the Museum of Comparative Zoology, 118(7): 1-545, 24 pl.

CHRISTIANSEN K, BELLINGER P., 1980 – *Family Entomobryidae. The Collembola of North America North of the Rio Grande.* Grinnell College, Iowa, December, 1980, 3: 785-1042.

FIEROTTI G., DAZZI C., RAIMONDI, S., 1988 – *Carta dei suoli della Sicilia* (1:250.000). Istituto Agronomia Generale Università Palermo.

JORDANA R., BAQUERO E., 2005 – *A proposal of characters for taxonomic identification of* Entomobrya *species (Collembola, Entomobryomorpha), with description of a new species*. - Abhandlungen und Berichte des Naturkundemuseums Görlitz, 76 (2): 117-134.