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On the identity and geographical distribution of *Entomobrya handschini* Stach, 1922 (Collembola, Entomobryidae)

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Abstract

The study of some specimens of *Entomobrya handschini* from different museums throughout Europe, along with additional material obtained in recent samplings has made a new description of the species possible, as well as providing data concerning its identity and presumably its real distribution. It seems that this species is present in an arc from Poland to Iran, to the south-east of the Black Sea. It is possible to define a particular feature of colouration present in the specimens throughout this area with some variations and they also maintain a dorsal macrochaetotaxy with a low variation range.

Keywords: Collembola, taxonomy, morphological characters, colour pattern variations

Zusammenfassung

Zur Identität und geographischen Verbreitung von *Entomobrya handschini* Stach, 1922 (Collembola, Entomobryidae) – Das Studium einiger Exemplare von *E. handschini* aus verschiedenen Museen Europas, ergänzt durch zusätzliches Material aus neueren Aufsammlungen, hat die neue Beschreibung dieser Art möglich gemacht und auch Daten, die seine Identität betreffen, geliefert und wahrscheinlich ebenso seine wirkliche Verbreitung. Es scheint, dass diese Art gegenwärtig in einem Bogen von Polen, Iran bis zum Süd-Osten des Schwarzen Meeres vorkommt. Es ist möglich, eine bestimmte Färbung von Exemplaren innerhalb dieser Region mit einigen Variationen abzugrenzen. Gleichzeitig behalten sie auch eine dorsale Makrochaetotaxie mit einer niedrigen Variationsbreite.

1. Introduction

The species *Entomobrya handschini* was described from northern Europe. Colouration has been traditionally used for the identification of the specimens ascribed to this species. Although this colouration presents some characteristic features, some of the references are erroneous, something that can be corroborated using the combination of the colouration, morphological and chaetotaxical characteristics.

2. Materials and methods

2.1. Methods

The combination of the colouration and dorsal macrochaetotaxy of these specimens has been the parameter used for species discrimination and to decide if a given specimen belongs to the species *E. handschini*. The observation of the dorsal macrochaetotaxy in some specimens has been very difficult, due to the previous fixation of mounted specimens, the presence of food in the digestive tract, or the extreme transparency of others.

2.2. Specimens studied

PAN (Polska Akademia Nauk): Two specimens, in two slides, and some specimens in ethyl alcohol, without specification of the locality, but presumably part of the type series from SLOVAKIA, Berekalja (Wanda Weiner, pers. comm.) – Dobó-Berekalja seems to be today's Podluzany, in Slovakia, formerly Hungary –; some specimens in ethyl alcohol labelled as: »*Entomobrya handschini* 1926 Simontornya Pillich« – these could be the same specimens cited and seen by Stach, 1963, p. 50 for HUNGARY –; some specimens in ethyl alcohol labelled as: »*Entomobrya handschini* BULGARIA 1450 m. 12.7.1936 Alibotus-Mts.« – see Stach, 1963, p. 50 –; some specimens in ethyl alcohol labelled as: »*Entomobrya handschini* Polola Kasper 22.5.1934 « – see Stach, 1963, p. 50 –, WEST UKRAINE, leg. Panow.

SMNG (Staatliches Museum für Naturkunde Görlitz): A slide with one specimen – juvenile, chaetotaxy not observable – from Nagy Mana Mountains (about 20 km from the locus typicus, north of the Danube river, Dunger pers. comm.), HUNGARY, Berlese sample from 8 July 1970, humus layer of a meadow at the top of this mountain region, leg./det. W. Dunger (code 5175-84); 11 specimens from western Crete, White Mountains, Kallergi – Cottage, GREECE, 30.05.2004, 1677 m a.s.l., under stones; 1 specimen from western Crete, White Mountains, above Xiloskalo, 30 May 2004, 1300 m a.s.l., collected with aspirator, moss layer under shrubs, 2 specimens from the same place, 25 April 2006, moss layer under *Quercus* shrubs, and 7 specimens from the same place, under stones, leg. J. Schulz.

MZNA (Museum of Zoology of the University of Navarra): 114 specimens from Kerkini, GREECE, 6 May 2004 to 20 June 2005, leg. G. Ramel; 25 specimens from Tehran, IRAN, obtained with Berlese, leg. Abbas Moravvej; 3 specimens on two slides, and several in ethyl alcohol, from AUSTRIA, donated by Pascal Querner; specimens referred to in JORDANA et al. (1990) as *E. handschini*.

NHM (The Natural History Museum, London): 7 specimens on 4 slides of Types of *E. maroccana* Baquero & Jordana, 2008 from Ifrane, MOROCCO, 15 May 1961, leg. P. N. Lawrence; the Holotype of *E. lawrencei* Baquero & Jordana, 2008, in a slide labelled as: »*Entomobrya handschini* Enhanc.1 – Lichen SUFFOLK: I.iii.1964 Laken heath P. N. Lawrence. L2562.«, cited by HOPKIN (2007) as the only referred specimen of *E. handschini* in England.

MNCN (Museo Nacional de Ciencias Naturales, CSIC, Madrid): 1 specimen on a slide labelled as: »Ajo. Vallvidriera. 26-5-58. XX-D1 - *Entomobrya handschini*«.

UNISI (Dipartimento di Biologia Evolutiva, Università degli studi di Siena): 2 specimens on 2 slides labelled as: »*Entomobrya handschini*, Alpi Apuani, Mte. Altissimo, 26.XI.1969«, one adult and one juvenile; 1 specimen on a slide labelled as: »*Entomobrya handschini* det. R. Dallai, Terminillo Sofora Lisciano, 8.VIII.1966«, juvenile.

3. Results

3.1. Original description

Entomobrya handschini Stach, 1922 (44)

Locus typicus: SLOVAKIA, Northern former Hungary, upper Hungarian plain, north of the Danube river, environs of the village Dobó-Berekalja; about 18° eastern longitude; common on grass and herbs, mostly at more humid localities, but also under bark of deciduous trees.

3.2. Distribution

Distribution (Fig. 1): SLOVAKIA (STACH 1922 original description; STACH 1955), AUSTRIA (STACH 1929), BULGARIA (DRENOWSKI 1937) – material seen by Stach –, GREECE (STREBEL 1937) – cited this species as xerophile from 1 specimen –, HUNGARY (STACH 1929), POLAND (STACH 1955), HUNGARY, WEST UKRAINE, GEORGIA, TURKEY, AUSTRIA (STACH 1963), HUNGARY (DUNGER 1975, FARKAS 1995, KOVAČ 1997), AUSTRIA (QUERNER 2003). This paper extends the distribution of the species to IRAN.

The following references should be considered doubtful until the specimens are studied using the chaetotaxy: RUSSIA (GRINDBERGS 1960, MIRONOV 2006), AUSTRALIA (GREENSLADE 1984), PORTUGAL (DA GAMA et al. 1997), South-east UKRAINE (STAROSTENKO & BONDARENKO), AUSTRIA (WINKLER & KAMPICHLER 2000), LITHUANIA (EITMINAVICIUTE 2006).

The following reports are misidentifications: SPAIN: Echauri and Sansoain (JORDANA et al. 1990) are incorrect since 3 of the reported specimens belong to the species *E. nicoleti* (Lubbock, 1868) while others are juveniles; the specimen from Vallvidriera (26 January 1956, leg. D. Selga), cited by SELGA (1971), is a male from a new species not yet described because there are only two specimens, one from Vallvidriera (Spain, MNCN, leg. Selga) and another from Hylte (Sweden, NHM, leg. Bagnall, identified as *E. multifasciata*); KOREA, Mt Phal-Gong, 11 August 1961, 1 male (YOSHII & LEE 1963) the descriptions is not coincident with *E. handschini*; MOROCCO, Ifrane, 15 May 1961, leg. P. N. Lawrence (NHM) seven specimens of *E. maroccana*, that is similar in colour pattern to *E. quinquelineata* but very different in chaetotaxy (Fig. 1F); ENGLAND, Suffolk, 1 March 1964, leg. P. N. Lawrence (NHM) one specimen of *E. lawrencei*, that is similar in colour pattern to *E. quinquelineata* but very different in chaetotaxy (Fig. 1A); ITALY (DALLAI et al. 1995), two juvenile specimens, and one adult specimen; colouration was not observable in any of the specimens because all were cleared. The chaetotaxy observed in the adult is not coincident with that of *E. handschini*.

3.3 General description

Entomobrya handschini (Figs 1C – E, G – K – 2A – E – 3A – D)

Body length up to 2.3 mm without antennae.

Basic colour pale yellow. Eye patches and antennal basis dark blue, with an unpaired longitudinal patch on dorsal head. Usually another small patch of diffuse blue pigment appears in the middle of the head. The eye patches always extend their pigment at the end of the lateral part of the head (Fig. 1). Antennae with homogeneous uniformly bluish pale aspect, with the apical area of the first three segments darker. Among the studied material some variation in colour has been found. The more typical pattern is shown in Figs 1C, 1D and 1G, with five longitudinal stripes running from thoracic tergite II to abdominal tergite II (three dorsal and two lateral). The central stripe reaches to the middle of the abdominal tergite IV; the two dorsal end on the second abdominal tergite, oblique to the centre. On the same second abdominal segment there is another oblique patch that reaches to the third segment. Fourth abdominal tergite with four or five patches around the middle one. Some variations of colour pattern observed are: head without middle stripe or only on the forehead (Figs 1E, 1I, 1J and 1K); body without middle longitudinal stripe (Figs 1I and 1K); the interruption of the dorsal stripes solving in separate patches (Figs 1I and 1J).

Eight eyes, $GH < EF$, very small. Antennae as long as the half of the body (Tab. 1). Apical vesicle trilobed (Fig. 3B).

Head chaetotaxy as in Fig. 2A, constant among the studied specimens. Head trichobothrium present. As in the rest of *Entomobrya* species, the labral setae have the formula 5 5 4, and are smooth. Labral papillae with long projections (Fig. 3A). Labial setae formula: – MRELL – (R is two thirds as long as M, but is ciliated). Thoracic tergite II with mane of macrochaetae. Metatrochanteral organ with 12 – 15 setae similar as described and drawn by STACH (1963). There are no differentiating setae on the tibiotarsus, with the exception of the presence of the smooth setae characteristic for the genus. Claw with four internal teeth: a first pair at 55 % from the claw base, and two impair teeth; dorsal tooth at paired internal level (Fig. 3D). Empodium spike like, with smooth inner edge at the leg III. Macrochaetotaxy as in Figs 2A – 2E. In Tab. 3 the chaetotactic variations in specimens of each studied site is shown. The more frequent simplified formula: 3-1-0-3-2/4-5/2-5/0-2-2/0-3-4-3-2 (head areas: H1-H5/thoracic tergite II: T1-T2/abdominal tergite II: A1-A2/abdominal tergite III: A3-A5/abdominal tergite IV: A6-A10).

Manubrial plate with four setae and two pseudopores (Fig. 3C). Mucro with the anteapical teeth smaller than the apical, and mucronal spine present.

The rest of the descriptive characters are shown in Tab. 2 (following JORDANA & BAQUERO 2005).

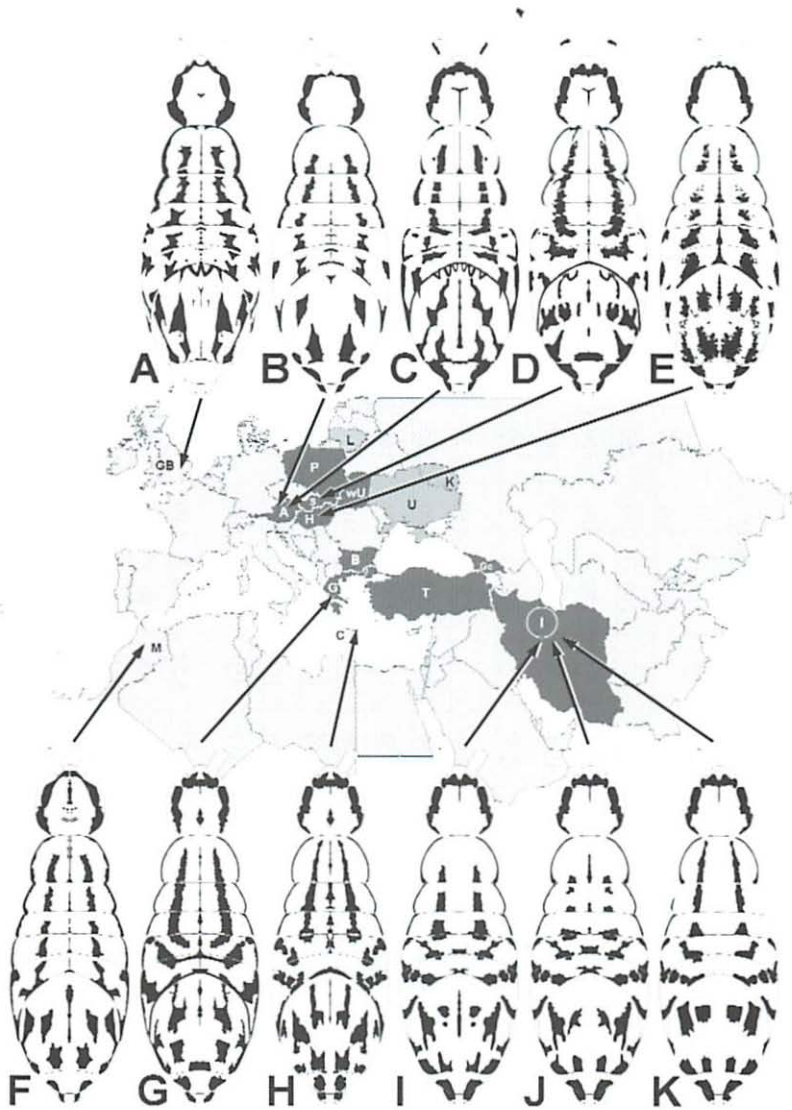


Fig. 1 Colour pattern of *E. handschini* and other species with similar colouration, with association between specimens and localities: A, *E. lawrencei* from England misidentified as *E. handschini* (NHM); B, *E. quinquelineata* from Austria and identified previously as *E. handschini* (MZNA); C, *E. handschini* from Austria found in the same locality with the anterior (MZNA); D, Slovakia – probably specimen from the type series – (PAN); E, specimen identified as *E. handschini* from Hungary (SMNG); F, *E. maroccana* from Morocco (NHM); G, *E. handschini* from North Greece (MZNA); H, *E. handschini* from Crete (SMNG); I – K, *E. handschini* from Iran (MZNA). Abbreviations for the countries: L, Lithuania; P, Poland; A, Austria, S, Slovakia; H, Hungary; wU, Western Ukraine; U, Ukraine; K, locality of Kursk; B, Bulgaria; M, Morocco; G, Greece; C, Crete; T, Turkey; Ge, Georgia; I, Iran.

Tab. 1 *Entomobrya handschichi*. Measurements of some specimens from different localities, in micrometres. »-«: no data

	Slovakia		Hungary		Austria			Kerkini (Greece)				Crete (Greece)			Iran			Mean
Antennal I	125		50		120	150	100	150	120	100	150	110	120	150	140	110	121	
Antennal II	300		90		220	250	200	200	250	-	200	220	240	350	290	-	243	
Antennal III	260		90		240	-	200	200	280	-	200	250	250	350	280	-	238	
Antennal V	330		145		290	-	280	280	350	-	250	300	300	375	310	-	293	
Antenna	1015		375		870	-	880	780	1030	-	750	880	910	1225	1020	-	895	
Head	475		190		430	400	380	380	500	350	300	350	330	475	350	400	379	
Antenna/head ratio	2.1		1.97		2.02	0.93	2.20	2.05	2.06	-	2.50	2.51	2.75	2.6	2.91	-	2.27	
Thorax II	325		100		220	220	190	190	250	200	200	210	230	275	200	150	213	
Thorax III	200		55		140	180	170	140	150	150	100	180	150	150	120	110	140	
Abdominal I	175		30		100	150	150	100	200	150	100	130	80	150	100	100	122	
Abdominal II	150		35		150	150	180	150	150	100	100	150	110	180	150	110	131	
Abdominal III	125		40		100	150	140	150	150	100	80	150	120	120	100	110	116	
Abdominal IV	650		210		580	520	530	500	550	450	430	450	420	550	460	450	483	
Abdominal IV/III ratio	5.2		5.25		5.80	3.47	3.79	3.33	3.67	4.50	5.38	3.00	3.5	4.9	4.60	4.09	4.36	
Abdominal V	125		60		80	100	100	80	100	100	80	100	100	130	70	110	94	
Abdominal VI	100		40		80	100	100	60	100	100	80	100	70	75	120	100	88	
Body	2325		720		1880	1970	1990	1750	2150	1700	1470	1820	1610	2135	1670	1640	1765	
Manubrium	400		160		400	350	350	350	420	-	300	350	260	425	300	350	340	
Dens	550		180		450	450	450	400	450	-	350	400	340	480	450	400	418	

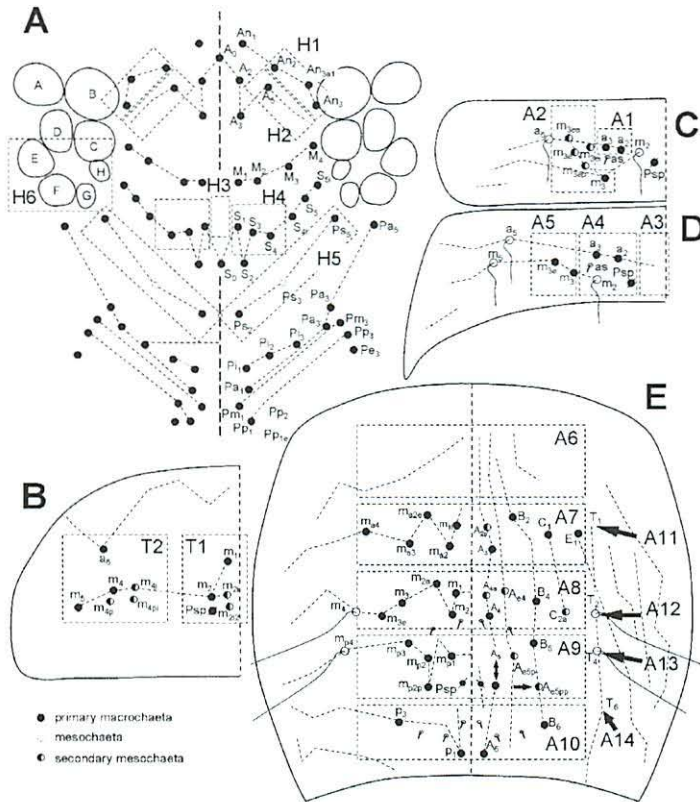


Fig. 2. *E. handschini* macrochaetotaxy. General localisation of each macrochaeta in the areas considered for taxonomy. Not all of represented macrochaetae are present on every specimen (see Tab. 3 for details): A, head; B, disc of thoracic tergite II; C, abdominal tergite II; D, abdominal tergite III; E, abdominal tergite IV (the arrows point to the trichobothrium insertions).

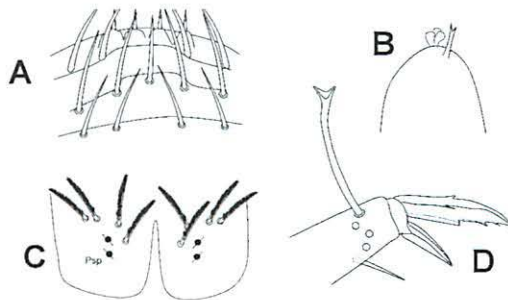


Fig. 3. *E. handschini*. A, labral papillae; B, antenna of segment IV; C, manubrial plate; D, claw and empodium.

Tab. 2 Comparative set of characteristics between specimens from different sites of *E. handschini*. Studied specimens number: Austria (3), Crete (2), Greece (4), Iran (2), Slovakia (3); (material deposited in brackets)

Character	Place	Description	Value	Austria (MZNA)	Crete (SMNG)	north Greece (MZNA)	Iran (MZNA)	Slovakia (PAN)
Ch.1	H1 (Head)	An2-An3	1-6	3	3	3	3	3
Ch.2	H2	A5-A7	1-3	1	1	1	1	1
Ch.3	H3	S'0	0-1	0	0	0	0	0
Ch.4	H4	S1-S3-S4	0-3	2	3	3	3	3
Ch.5	H5	Ps2-Ps3-Ps5	0-3	2	2	2	2	2
Ch.6	Labral papillae	simple and smooth papillae (1) wrinkled or with some projections (2) a projection setae like (3)	1-3	3	3	3	3	3
Ch.7	eyes G&H size	= E&F (1), <E&F (2)	1-2	2	2	2	2	2
Ch.8	apical antennal retractile bulb	no bulb (0), lobe simple (1), bilobate (2), trilobate (3)	0-3	3	3	2-3	3	3
Ch.9	Ratio Ant./Head	> or = 3 (1), > or = 2 < 3 (2), < 2 (3)	1-3	2	2	2	2	2
Ch.10	anterior dorsal mane Th II Ms	with Ms type 1 (1), without Ms or type 2 (2)	1-2	1	1	1	1	1
Ch.11	T1	setae number m1-m2i2 or >4 (5)	0-5	4	3(4)	3	4	4
Ch.12	T2	setae number a5, m4-m5 or >8 (9)	0-9	5	4	5	5	4
Ch.13	Smooth setae on tibiotarsi	not or 1 in tibiotarsi III = 0, double file = 1	0-1	0	0	0	0	0
Ch.14	Unguis internal teeth	1(1), 2(2), 3(3), 4(4)	1-4	4	4	4	4	4
Ch.15	Unguis dorsal tooth	basal = 1, internal teeth level = 2	1-2	2	2	2	2	2
Ch.16	Unguis internal edge	without ciliation (0), with ciliation (1)	0-1	0	0	0	0	0
Ch.17	External unguiculous	smooth (0), serrate (1)	0-1	0	0	0	0	0
Ch.18	A1 Abd. II	a2-a3	0-2	2	2	2	2	2
Ch.19	A2 Abd. II	m3 series setae number	0-7	5	5	5	5	4
Ch.20	A3 Abd. III	a1	0-1	0	0	0	0	0
Ch.21	A4 Abd. III	above m2 setae number	0-3	2	2	2	2	2
Ch.22	A5 Abd. III	m3-m4 series setae number	0-4	2	1	2	2	2
Ch.23	A6 Abd. IV	a1-a5 (A1-D1) setae number; >8 (9)	0-9	0	0	0	0	0

Tab. 2 cont.

Character	Place	Description	Value	Austria (MZNA)	Crete (SMING)	north Greece (MZNA)	Iran (MZNA)	Slovakia (PAN)
Ch.24	A7 unpaired seta	ma0 (A03)	0-1	0	0	0	0	0
Ch.25	A7 Abd. IV	ma1-ma4 (A2-E1) setae number; >9 (10)	0-10	4	3	4	3	3
Ch.26	A8 unpaired seta	m0 (A04)	0-1	0	0	0	0	0
Ch.27	A8 Abd. IV	m1-m3 (A4a-C2a) setae number; >5 (6)	0-6	3	3	4	4	4
Ch.28	A9 unpaired seta	mp0 (A05)	0-1	0	0	0	0	0
Ch.29	A9 Abd. IV	mp1-mp3 (A5-B5) setae number; >6 (7)	0-7	3	3	4	3	3
Ch.30	A10 Abd. IV	p1a-p3 (A6-B6) setae number; >5 (6)	0-6	2	2	2	2	2
Ch.31	A11 Abd. IV	T1 (ma4c) as trichobotrium	0-1	0	0	0	0	0
Ch.32	A12 Abd. IV	T2 (m4) as trichobotrium	0-1	1	1	1	1	1
Ch.33	A13 Abd. IV	T4 (mp4) as trichobotrium	0-1	1	1	1	1	1
Ch.34	A14 Abd. IV	T6 (p4) as trichobotrium	0-1	0	0	0	0	0
Ch.35	Ratio Abd.IV/Abd.III	2 < R < 4 (1), R > 4 (2)	1-2	2	2	2	2	2
Ch.36	Manubrial plate	setae number; >10 (11)	0-11	4	4	6-7	4	4
Ch.37	Manubrial plate	pseudopores 1-2	1-2	2	2	2	2	2
Ch.38	Mucro	sub-apical tooth	0-1	1	1	1	1	1

4. Discussion

This species was described by STACH (1922) from central Europe. STACH (1963) extended its distribution to Hungary, Slovakia, West Ukraine, Georgia, Turkey, Bulgaria and Austria, using material obtained by different persons and examined by him. We consider these references as valid. During a revision of the genus *Entomobrya* for publication in the Palaearctic Fauna, some new material from different localities has been studied: northern Greece, Crete and Iran, and some specimens from various museums identified as *E. handschini*. In the specimens of *E. handschini* observed for this paper, there is some variation in the colour pattern. Fig. 1 shows the colour pattern variation among the specimens from different populations, and among each population. As a very clear example, some specimens from Iran lack the longitudinal stripe on the thoracic tergite II or on the abdominal tergite IV. There are slight variations in the macrochaetotaxy (see Tab. 3), that do not justify the consideration of different species. The macrochaetotaxy of abdominal tergites II-III and thoracic tergite II is very particular, and facilitates the separation of *E. handschini* from other species with similar colouration, as in the case of the specimens from Iran.

Tab. 3 Macrochaetae present on the areas considered for taxonomy of *E. handschini*, observed in specimens from different sites (see Fig. 2 for detailed position of the macrochaetae). Studied specimens' number: Austria (3), Crete (2) Greece (4), Iran (2), Slovakia (2) *, It is difficult to decide what are exactly the macrochaetae in each specimen

Character (area)	Austria	Crete	Greece	Iran	Slovakia	range
Ch. 1 (H1)	An ₂	An ₂	An ₂	An ₂	An ₂	3
	An _{3a1}	An _{3a1}	An _{3a1}	An _{3a1}	An _{3a1}	
	An _{3a1}	An _{3a1}	An _{3a1}	An _{3a1}	An _{3a1}	
Ch. 2 (H2)	A ₅	A ₅	A ₅	A ₅	A ₅	1
Ch. 3 (H3)						0
Ch. 4 (H4)	S ₁	S ₁	S ₁	S ₁	S ₁	2-3
	S ₃	S ₃	S ₃	S ₃	S ₃	
		S ₄	S ₄	S ₄	S ₄	
Ch. 5 (H5)	Ps ₂	Ps ₂	Ps ₂	Ps ₂	Ps ₂	2
	Ps ₅	Ps ₅	Ps ₅	Ps ₅	Ps ₅	
Ch. 11 (T1)	m ₁	m ₁	m ₁	m ₁	m ₁	3-4
	m ₂	m ₂	m ₂	m ₂	m ₂	
	m _{2j}	m _{2j}	m _{2j}	m _{2j}	m _{2j}	
	m _{2j2}	m _{2j2}		m _{2j2}	m _{2j2}	
Ch. 12 (T2)	a ₅	a ₅	a ₅	a ₅	a ₅	4-5
	m _{4j}	m _{4j}	m _{4j}	m _{4j}	m _{4j}	
	m _{4pi}		m _{4pi}	m _{4pi}		
	m ₄	m ₄	m ₄	m ₄	m ₄	
	m _{4p}	m _{4p}	m _{4p}	m _{4p}	m _{4p} -m ₅ *	
Ch. 18 (A1)	a ₂	a ₂	a ₂	a ₂	a ₂	2
	a ₃	a ₃	a ₃	a ₃	a ₃	
Ch. 19 (A2)	m _{3ea}	m _{3ea}	m _{3ea}	m _{3ea}		4-5
	m _{3eai}	m _{3eai}	m _{3eai}	m _{3eai}	m _{3eai}	
	m _{3e}	m _{3e}	m _{3e}	m _{3e}	m _{3e}	
	m _{3ep}	m _{3ep}	m _{3ep}	m _{3ep}	m _{3ep}	
	m ₃	m ₃	m ₃	m ₃	m ₃	
Ch. 20 (A3)						0
Ch. 21 (A4)	a ₂	a ₂	a ₂	a ₂	a ₂	2
	a ₃	a ₃	a ₃	a ₃	a ₃	
Ch. 22 (A5)	m _{3e}		m _{3e}	m _{3e}	m _{3e}	1-2
	m ₃	m ₃	m ₃	m ₃	m ₃	
Ch. 23 (A6)						0
Ch. 25 (A7)			A _{2p}	A _{2p}		3-4
	A ₃	A ₃				
	B ₂	B ₂	B ₂		B ₂	
	C ₁		C ₁	C ₁	C ₁	
	E ₁	E ₁	E ₁	E ₁	E ₁	

Tab. 3 cont.

Character (area)	Austria	Crete	Greece	Iran	Slovakia	range
Ch. 27 (A8)		A _{4a}	A _{4a}	A _{4a}		3-4
					A ₄	
	A _{e4}	A _{e4}	A _{e4}	A _{e4}	A _{e4}	
	B ₄	B ₄	B ₄	B ₄	B ₄	
	C _{2a}		C _{2a}	C _{2a}	C _{2a}	
Ch. 29 (A9)	A ₅	A ₅	A ₅	A ₅	A ₅	3-4
			A _{e5p}		A _{e5p}	
	A _{e5pp}	A _{e5pp}	A _{e5pp}	A _{e5pp}		
	B ₅	B ₅	B ₅	B ₅	B ₅	
Ch. 30 (A10)	A ₆	A ₆	A ₆	A ₆	A ₆	2
	B ₆	B ₆	B ₆	B ₆	B ₆	

When a colour pattern is associated with *E. handschini* by its longitudinal stripes as in the case of Austria, Morocco and England, chaetotaxy enables the decision as to whether these specimens belong to *E. handschini* or not. In the case of the specimens of Italy, totally cleared, the chaetotaxy has indicated that they are not *E. handschini*. The reference for Kursk (GRINDBERGS 1960) is based on »unpublished data of Bizova«, therefore the specimens were not seen by Grindbergs. This last site has been cited by MIRONOV (2006) using material identified by Chernova. We tried to see the specimens from RUSSIA (MIRONOV 2006) and LITHUANIA (EITMINAVICIUTE 2006), but no reply was received from the authors. The material referred to by Kampichler (WINKLER & KAMPICHLER 2000) could not be located. In Fig. 1 the countries where the material could not be studied and is still doubtful has been coloured grey.

In Fig. 1, next to the drawings of *E. handschini* from different countries, some specimens misidentified as *E. handschini* are represented. All have in common the five longitudinal stripes that relate it with *E. handschini*, but, a) in Austria some specimens belong to *E. quinquelineata*, mixed in the same sample with *E. handschini*. The separation between these two species was possible using the colour pattern and the macrochaetotaxy; b) in the specimen from England (*E. lawrencei*) it is similar to *E. quinquelineata* by the stripes, but its macrochaetotaxy is quite different; c) the material from Spain has been identified as *E. nicoleti*; d) the material from Morocco (*E. maroccana*), similar to an *E. quinquelineata* by its colour pattern has a quite different macrochaetotaxy.

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