A DISJUNCT DISTRIBUTION FOR A NEW SPECIES OF *ORCHESELLIDES* (COLLEMBOLA, ENTOMOBRYIDAE, ORCHESELLINAE)[1]

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ABSTRACT: A new species of *Orchesellides* is described from material collected in the Valsaín forest (Segovia, Spain), and conserved in the collection of the National Museum of Natural Sciences (MNCN), CSIC, Madrid. The genus was known only from the eastern Palaearctic, Oriental, and Indo-Pacific (Hawaii) regions. This is the first reference for the genus from the western Palaearctic region, creating an interesting disjunct distribution. The value of the morphological characteristics for the identification of the species is discussed.

KEY WORDS: *Orchesellides,* disjunct distribution, western Palaearctic region, Iberian Peninsula, Spain

Through the courtesy of Carolina Martín, we had the opportunity to study the collection of the family Entomobryidae at the National Museum of Natural Sciences (MNCN), CSIC (Madrid, Spain). Among the material studied we found five slides with 24 specimens of a species of *Orchesellides* from Valsaín (Segovia, Spain) (sample M40). These specimens had been labeled *Entomobrya* or *Orchesella.* The species previously described for the genus are *O. boraoi Bonet,* 1930 (Pakistan), *O. kabulensis* Yosii, 1966 (Afghanistan), *O. lineatus* Mari Mutt, 1983 (Korea), *O. poli* Yosii, 1966 (Afghanistan), *O. sinensis* (Denis, 1929) Yosii, 1966 (China, Japan and Hawaii), *O. szeptyckii* Mari Mutt, 1983 (Korea), *O. viridis* Mari Mutt, 1983 (Korea) and *O. crassa* (Imms, 1912) (Himalaya). The present paper extends the distribution of the genus to the western Palaearctic region.

KEY TO THE SPECIES OF *ORCHESELLIDES*

1 Antennal segment 5 with bilobed apical papilla 2
- Antennal segment 5 without apical papilla 6
2 Color green ..... *O. viridis*
- Color blue-violet .....
3 Tenaculum with two setae ..... *O. szeptyckii*
- Tenaculum with one seta 4
4 Pin seta on antennal segment 5 pointed 5
- Pin seta on antennal segment 5 bifurcate ..... *O. boraoi*
5 Non annulated dens/mucro ratio = 4. Coxae without pigment ..... *O. kabulensis*

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- Non annulated dens/mucro ratio = 6. Coxae with pigment ..... *O. poli*
6 Head without trichobothrium ..... *O. sinensis*
- Head with trichobothrium 7
7 Pin seta on antennal segment 5 trifurcate, unguiculous outer tooth distal, above the fifty percent from its base..... *O. lineatus*
- Pin seta on antennal segment 5 bifurcate, unguiculous outer tooth at about the forty percent from its base ..... *O. carolinae* n. sp.

Orchesellides carolinae Jordana and Baquero, NEW SPECIES

(Figs. 1-2)

Description. Body length to 1.7 mm (minimum 1.1 mm, mean 1.4 mm, SD 0.16 mm, n = 24). General measurements in Table 1. Background color yellowish, with blue-violet patches principally over abdominal segment I-III, but with pale patches on other areas (Fig. 1A). Antenna with five segments by sub-segmentation of antennal segment I. Apex of antennal segment V without papilla and with bifurcate pin seta (Fig. 1B). Antennal segment IV sensory organ with two small rods in a small groove with the typical accessory sensillae (Fig. 1C). Antennal segment I and II (Fig. 1D) not clearly separated in juveniles. Eyes 8+8, G and H smaller than the others. Prelabral setae smooth and labral papillae with hooked projections (Fig. E). Unguis morphology as in figure 1F: inner margin with paired teeth at about the middle and two distal unpaired teeth; lateral teeth more basal than paired teeth and well developed, dorsal tooth at about basal third of unguis. Trochanteral organ with about 16 small setae. Tenaculum with four teeth in each ramus and one seta on the corpus. Manubrial plate with one internal and four external setae (Fig. 1G). Mucro bidentate with basal seta (Fig. 1H). Body with typical entomobryid type setae: type 1, type 2 and type 5 (Christiansen 1958) (Fig. 1I). Head macrochaetotaxy as in figure 2A. Body macrochaetotaxy and distribution of trichobothria as in figures 2B-C. Head and thoracic segments II and III with macrochaetae type 1 (different sizes) and type 5. Abdominal segments I-V with macrochaetae type 2 (different sizes) and type 5. Posterior half of abdominal segment IV with numerous long sensillae not previously reported for members of the genus.

Type Material. Holotype. Female, SPAIN, Valsaín Forest, Segovia, *Pinus sylvestris,* code MNCN-Valsaín-M40, 30.X.1971, Margarita Acón and José Carlos Simón leg. Paratypes, 23 specimens with same data. Type material deposited in National Museum of Natural Sciences (MNCN), CSIC, Madrid.

Etymology. The species is dedicated to Carolina Martín (MNCN), who kindly provided the studied material.

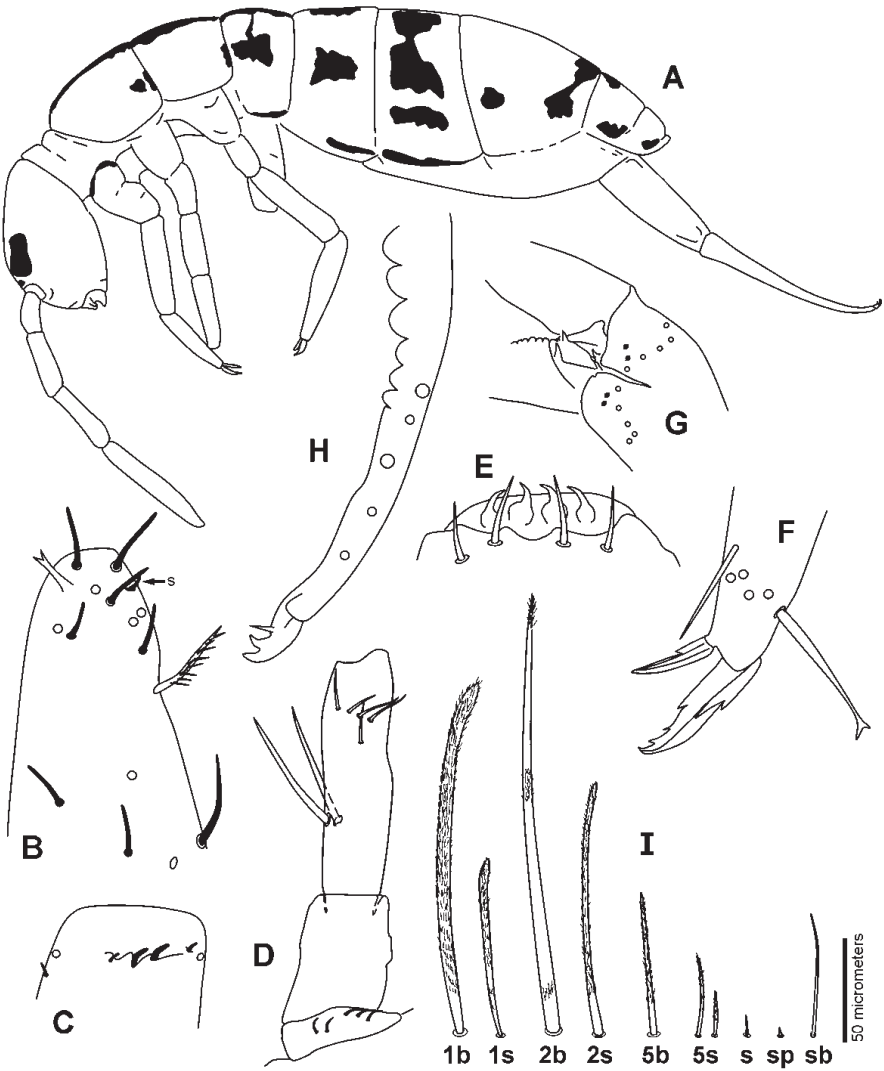

Fig. 1. *Orchesellides carolinae* n. sp. A. Pattern color, lateral habitus. B. Tip of antennal segment five. C. Sensory organ of antennal segment four. D. Antennal segments 1-3. E. Labral papillae and first row of labral setae. F. Unguis and unguiculus. G. Manubrial plate. H. Distal part of dens. I. Types of setae (following to Christiansen, 1958): 1b, type 1 big, drawing from thoracic segment II; 1s, type 2 small, drawing from thoracic segment II; 2b, type 2 big, from abdominal segment IV; 2s, type 2 small; 5b, type 5 big; 5s, type 5 small; s, sensilla; sp, spine; sb, sensilla big -only on abdominal segment IV-. Bar scale only for sensillae.

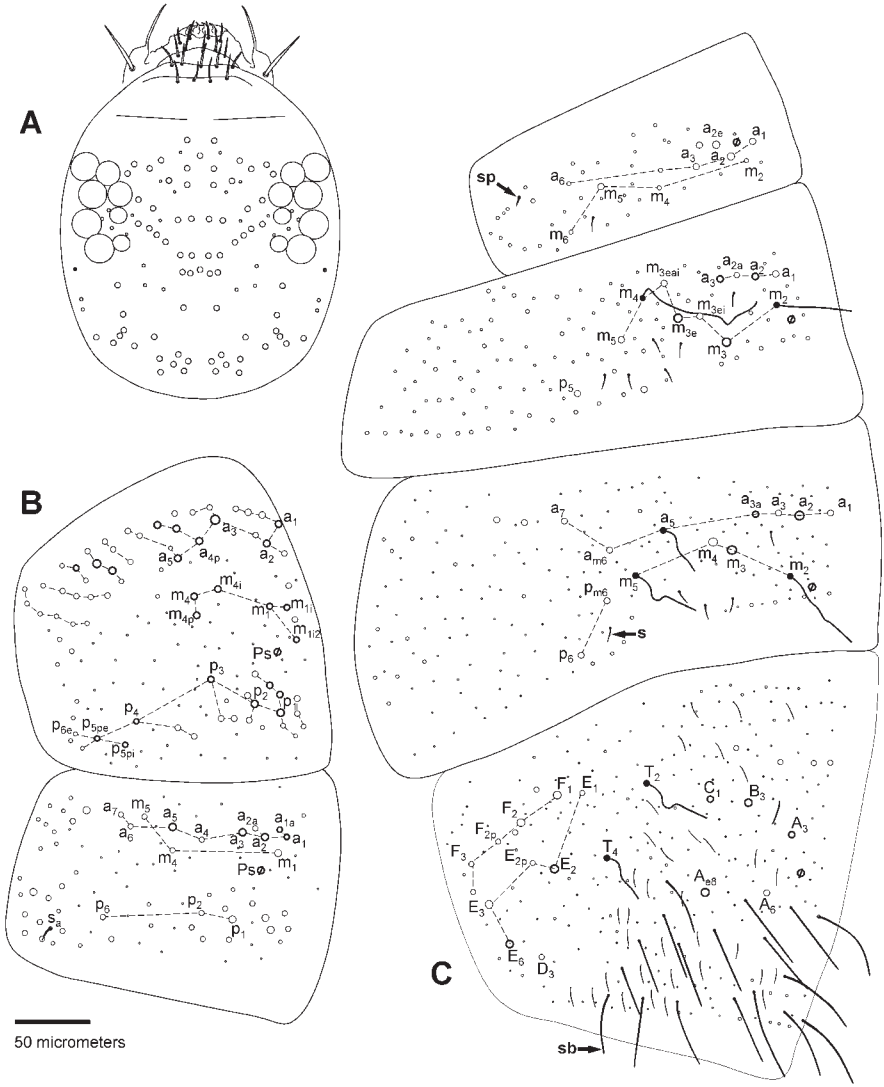

Fig. 2. *Orchesellides carolinae* n. sp. chaetotaxy. A. Head. B. Thoracic segments II and III. C. Abdominal segments I-IV. The circles with heavy outline are macrochaetae.

Table 1. *Orchesellides. carolinae* n. sp. Measurements in micrometers of all studied specimens.

Specimen Code	52-4	50-2	50-5	50-3	50-6	38-2	49-1	52-5	51-3	52-3	52-6	49-2	51-2	52-1	51-4	50-1	52-2	50-4	38-1	51-1	49-3	49-5	49-4	49-6	Mean	Min.	Max.	SD
ant 1	30	25	25	20	25	20	15	20	15	30	20	20	20	20	20	20	15	15	20	30	22	15	18	15	20.6	15	30	4.77
ant 2	75	80	90	60	70	90	45	70	60	60	60	50	60	60	70	55	55	40	50	50	60	55	40	45	60.4	40	90	13.75
ant 3	160	130	180	120	140	150	115	130	130	130	150	120	135	120	140	120	120	100	110	130	130	110	90	90	127.1	90	180	20.69
ant 4	210	170	220	140	180	180	160	150	160	140	180	135	110	160	160	130	130	130	130	150	130	120	100	100	149.0	100	220	30.86
ant 5	310	280	-	250	-	310	265	260	-	240	-	240	-	260	260	250	220	230	-	250	260	210	200	180	248.6	180	310	33.60
antenna total	785	685	515	590	415	750	600	630	365	600	410	565	325	620	650	575	540	515	310	610	602	510	448	430	543.5	310	785	124.54
ant. 5/ant. 4	1.48	1.65	-	1.79	-	1.72	1.66	1.73	-	1.71	-	1.78	-	1.63	1.63	1.92	1.69	1.77	-	1.67	2.00	1.75	2.00	1.80	1.7	1.48	2	0.13
head	375	390	380	330	380	370	340	310	380	360	350	350	350	360	320	230	330	270	300	280	330	250	270	260	327.7	230	390	46.67
head/antenna	0.48	0.57	0.74	0.56	0.92	0.49	0.57	0.49	1.04	0.6	0.85	0.62	1.08	0.58	0.49	0.4	0.61	0.52	0.97	0.46	0.55	0.49	0.6	0.6	0.6	0.4	1.08	0.19
th. II	210	190	200	250	200	230	200	200	160	230	200	210	160	170	150	210	190	170	180	160	165	180	185	150	189.6	150	250	26.41
th. III	165	160	190	180	150	150	125	160	160	150	150	150	140	150	150	150	150	130	160	120	120	130	130	130	147.9	120	190	17.63
abd. I	140	120	110	100	90	85	110	100	100	100	110	90	100	70	60	100	90	100	100	75	70	80	75	90	94.4	60	140	17.71
abd. II	150	150	130	150	90	100	150	150	130	100	130	100	135	100	140	140	120	120	80	110	70	110	75	110	118.3	70	150	25.27
abd. III	165	160	140	140	120	150	150	150	140	160	120	135	140	130	160	140	130	130	120	110	100	110	75	100	132.3	75	165	22.31
abd. IV	330	270	300	260	300	290	270	290	270	250	270	245	250	260	250	260	200	240	210	240	230	200	200	170	252.3	170	330	37.59
abd. IV/III	2.00	1.69	2.14	1.86	2.50	1.93	1.80	1.93	1.93	1.56	2.25	1.81	1.79	2.00	1.56	1.86	1.54	1.85	1.75	2.18	2.30	1.82	2.67	1.70	1.9	1.54	2.67	0.29
abd. V	120	150	100	100	100	90	110	100	100	100	90	100	90	100	90	90	90	90	70	85	70	80	75	60	93.8	60	150	17.95
abd. VI	60	80	80	50	80	40	50	40	60	45	60	50	60	40	50	30	50	50	40	40	40	40	50	30	50.6	30	80	14.17
body total	1715	1670	1630	1560	1510	1505	1505	1500	1500	1495	1480	1430	1425	1380	1370	1350	1350	1300	1260	1220	1195	1180	1135	1100	1406.9	1100	1715	166.75
manubrium	300	260	340	240	280	280	250	260	240	250	300	240	240	270	260	230	200	220	250	250	250	220	200	190	250.8	190	340	34.12
dens	380	370	440	320	400	400	350	350	330	320	400	320	330	350	330	330	280	290	320	340	360	220	250	250	334.6	220	440	51.92

Table 2. Characteristic data for the identification of the species of *Orchesellides.*

	***carolinae* n. sp**	***boraoi***	***kabulensis***	***lineatus***	***poli***	***sinensis*** China, Japan, and Hawaii	***szeptyckii***	***viridis***
Distribution	Spain	Pakistan	Afghanistan	Korea	Afghanistan		Korea	Korea
Non annulated /mucro ratio	5.25	5.5	4	-	6	-	-	-
Unguis paired teeth position [1]	50	55	-	20	70	40	50	60
Unguis dorsal teeth position [1]	30	no	-	15	50	20	50	50
Unguiculous teeth position [1]	40	66	-	60	60	60	70	65
Apical vesicle ant. 5	no	bilobed	bilobed	no	bilobed	no	bilobed [2]	bilobed
Pin seta ant. 5	bifurcated	bifurcated	pointed	trifurcate	pointed	bifurcated	bifurcated	trifurcate
Ant. 5/4 ratio	1.7	1.57	1.33	1.12	1.84	1.54	1.37	1.6
Head trichobothrium	yes	no	-	yes	-	no	yes	yes
Tenaculum setae number	1	1	1	2-3	1	1	2	1[3]
Labral papillae	hooked	hooked	hooked	conelike	hooked	conelike	conelike	hooked
Trocanteral organ setae number	16	10-12	18	up to 27	12	10	15	22

[1] Percentage in relation to its basis. [2] Slight developed. [3] Broadened apically. The symbol "-" means "no information available."

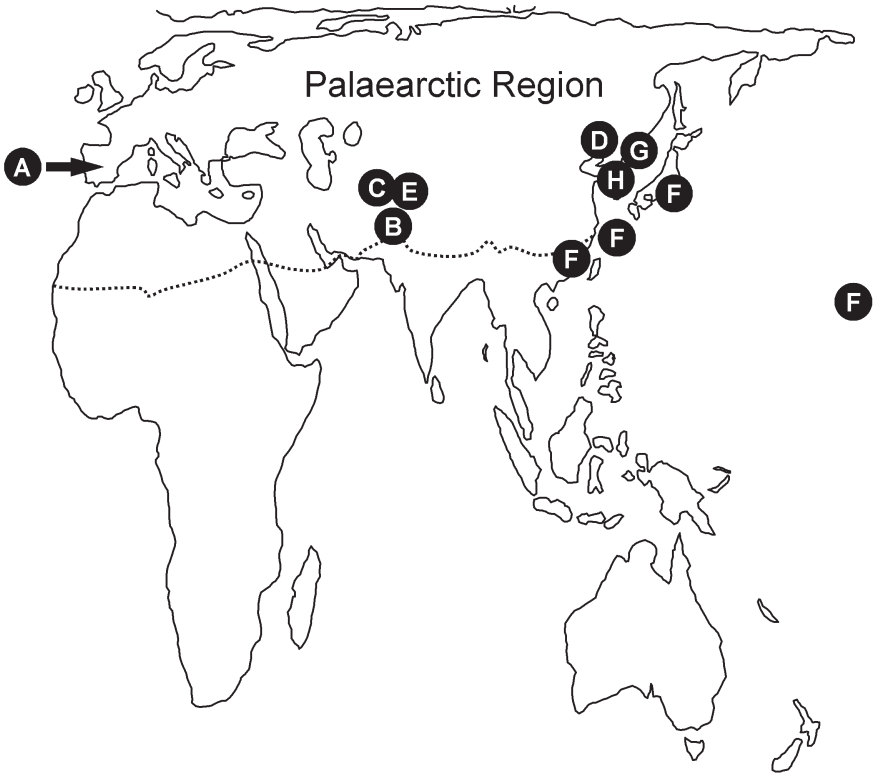

Fig. 3. Distribution of the described species of *Orchesellides*. A. *O. carolinae* n. sp. Valsaín, Segovia, Spain. B. *O. boraoi* Miram-Shah, Pakistan. C. *O. kabulensis* Kabul, Afghanistan. D. *O. lineatus* Hanghe-namdo, N Korea. E. *O. poli* Mt. Noshaq, Afghanistan. F. *O. sinensis* Fukien, China; Kioto and Okinawa, Japan; Hawaii. G. *O. szeptyckii* Kangvôn-do, N Korea. H. *O. viridis* Janggang-do, N Korea.

DISCUSSION

There are few characteristics to distinguish the species of *Orchesellides.* Most useful characters, with exception of coloration, are included in the key and in Table 2, and have been obtained from the original descriptions by Bonet (1930), Mari Mutt (1983, 1986) and Yosii (1966). In our opinion morphologic characters (e.g., chaetotaxy, foot complex, etc.) are more reliable than color pattern in reflecting species specific differences because it is often difficult to find and study fresh material in which the color has not been altered by the preserving agent. The position of the outer tooth of the unguiculus is a very useful and easily observable characteristic of *O. carolinae* n. sp., and only *O. lineatus*, *O. sinensis* and the new species lack the apical vesicle on antennal segment 5. The setae

number on the tenaculum was used in the key although Mari Mutt (1983) reports to vary from 1-3 setae between conspecific individuals of *O. lineatus* and *O. szeptyckii.* The chaetotaxy of the new species is very similar to the one described by Szeptycki (1979) for *Orchesellides* sp., really *O. viridis* (by personal communication from Szeptycki to Mari Mutt, 1983). The presence of long sensillae on the abdominal tergite IV is very characteristic of *O. carolinae* n. sp.

Orchesellides crassa (Imms, 1912) was described as *Entomobrya crassa* probably by an inaccurate observation of the antennal segments (Bonet, 1930). This species has not been considered in the present study because the original description is insufficient for diagnosis and we were unable to examine the holotype.

The genus *Orchesellides* is recognized by the absence of scales and the presence of a subdivided first antennal segment. The subdivision of the first antennal segment is hard to see or may be absent in juvenile specimens, resulting in misidentifications as unrecognizable species of *Entomobrya* or juvenile *Orchesella.* It is remarkable to discover a species of *Orchesellides* in the western Palaearctic since the other species of the genus are found far away, east of the Caspian Sea (Fig. 3).

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