CONTRIBUTION TO THE KNOWLEDGE OF CHIGGER MITES (ACARI: TROMBICULIDAE) PARASITIZING *APODEMUS SYLVATICUS* (L.) (RODENTIA, MURIDAE) ON THE IBERIAN PENINSULA

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TAXONOMÍA
FAUNA
TROMBICÚLIDOS
ACARI
PARÁSITOS
RATONES
ESPAÑA

RESUMEN : Se describen dos nuevas especies, *Neotrombicula jordana* n. sp., e *Hirsutiella billabeta* n. sp. sobre *Apodemus sylvaticus* (L.) muestreados en la provincia de Navarra. Se citan por primera vez para la Península Ibérica tres especies de ácaros trombicúlidos. Se presentan también los datos de distribución y morfología de otras cinco especies.

TAXONOMY
FAUNA
CHIGGERS
ACARI
PARASITES
MICE
SPAIN

SUMMARY: Two new species, *Neotrombicula jordana* n. sp., and *Hirsutiella billabeta* n. sp. are described from mice *Apodemus sylvaticus* (L.) collected in Navarra Province. Three species of chigger mites are recorded for the first time on the Iberic Peninsula. Data on distribution and morphology of other 5 species are presented.

TAXINOMIE
FAUNE
TROMBICULIDÉS
ACARI
PARASITES
MULOTS
ESPAGNE

RÉSUMÉ : Deux espèces nouvelles, *Neotrombicula jordana* n. sp. et *Hirsutiella billabeta* n. sp. sont décrites de mulots *Apodemus sylvaticus* (L) provenant de Navarre. Trois espèces de Trombiculides sont signalées pour la première fois de la péninsule ibérique. La distribution et la morphologie de 5 autres espèces sont précisées.

Trombiculids of the Iberian Peninsula are still insufficiently studied. To the time only three works devoted to the chiggers fauna of this territory had been published (not considering old or closely parasitological publications which reported about finds of *Neotrombicula autumnalis* (Shaw, 1790), the usual agent of trombidiosis in Europe). Papers by KEPKA (1960a, 1960b) cover results of chiggers collection in several localities from different regions of Spain. This author recorded 5 species of Trombiculidae parasitizing rodents and reptiles in the country. PEREIRA-LORENZO (1993) found 9 species in Galicia,

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including 7 for the first time recorded in Spain. Thus, till now 12 species of chiggers were known on the Iberian Peninsula. In the present paper two species new to science are described and 3 species are for the first time recorded in Spain. Besides that, data on distribution and morphology of 5 other species are presented.

Material and methods

Hosts had been collected by D. Galicia and M.C. Escala in the Erro Valley, north of Navarra Province, Spain, since February 2001 till July 2002. The localities are designated as follows: "Ardaitz" — Ardaitz Village, marge of a pine forest, 600 m above sea level (UTM coordinates 30TXN2551); "Larraingoa" — Larraingoa Village, marge of a pine forest, 620 m (30TXN2552); "Oscáriz" — Oscáriz Village, field of grain crops, edge, 500 m (30TXN2642); "Lizoain" — Lizoain Village, field of grain crops, edge, 500 m (30TXN2539); "Villaveta-Billabeta" — Villaveta-Billabeta Village, field of grain crops, edge, 470 m (30TXN3036); "Señorío de Liberri" — Señorío de Liberri Village, field of grain crops, edge, 470 m (30TXN2836); "Urricelqui" — Urricelqui Village, marge of a pine forest, 570 m (30TXN2447); "Ureta" — Ureta Village, marge of a beech forest, 740 m (30TXN3058); "Casa Sorogain" — Sorogain Area near Mezkiritz Village, marge of a beech forest, 800 m (30TXN2963); "Estación Aforo Sorogain" — same data, 760 m (30TXN3059).

Mites were cleared in Nesbitt's fluid and mounted in Faure-Berlese's medium. All measurements are given in micrometres (μm). Terminology follows Goff et al. (1982), with some adaptation: "ventral setae" (V) — setae on the ventral surface of idiosoma excluding coxal and sternal setae; VS — number of ventral setae; D — dorsal idiosomal setae; DS — number of dorsal idiosomal and humeral setae (Kudryashova, 1998); TaIII — length of leg III tarsus; TaW — width of leg III tarsus; m-t — ratio between distance from mastitarsala to the base of leg III tarsus and length of leg III tarsus (Stekol'nikov, 2001a). We also use the ratio between TaIII and TaW being significant taxonomic character in the genus *Neotrombicula* Hirst, 1925. Type specimens are deposited in the Museum of Zoology, University of Navarra (MZNA).

Results

Neotrombicula jordana n.sp.
(Figs. 1-10, Table 1)

Diagnosis: SIF = 7BS-N-3-3111.1000; fPp = B/B/NBB; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; Ip = 921; fD = 2H-8-6-6-4-2-2; DS = 32; VS = 33; NDV = 65.

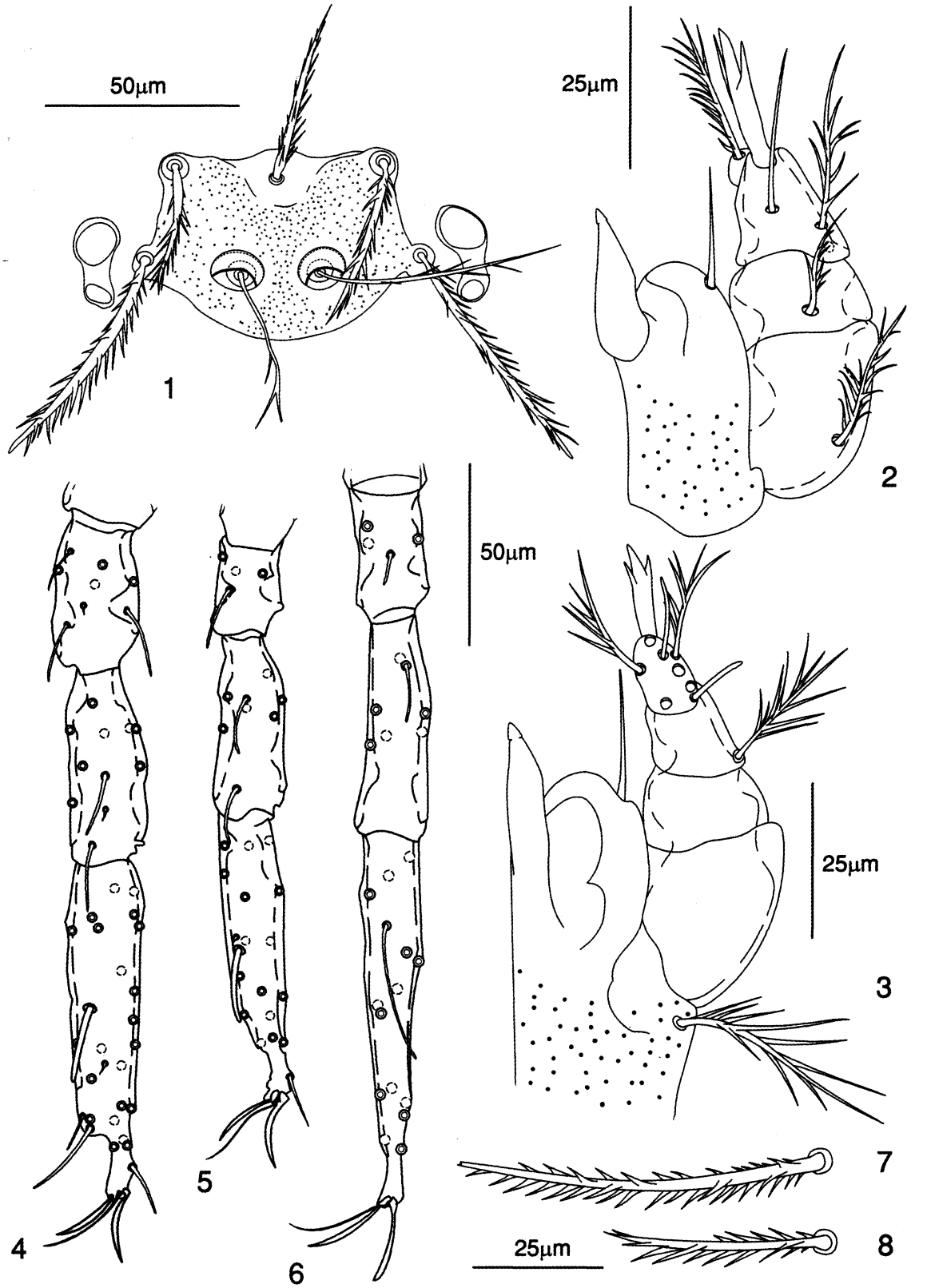
Description. *Larva.* Idiosoma. Eyes 2 + 2, on ocular plate, anterior larger. One pair of humeral setae; 30-34 dorsal idiosomal setae, densely covering with rather thick and short barbs, arranged 8-6-6-4-2-2-2; 2 pairs of sternal setae and 33-42 ventral setae; total idiosomal setae 66-74.

Gnathosoma. Cheliceral blade with tricuspid cap; gnathobase moderately punctate, bearing a pair of branched setae; galeala nude; palpal claw 3-pronged; setae on palpal femur and genu branched; ventral and lateral palpal tibial setae branched, dorsal palpal tibial seta nude; palpal tarsus with 7 branched setae, nude subterminala and tarsala.

Scutum. Moderately punctate, subpentagonal, with broadly rounded posterior margin; AM base posterior to level of ALs; SB on level of PLs or slightly posterior; PL>AM>AL; sensilla flagelliform with branches in distal 2/3, nude basally.

Legs. All 7-segmented, with a pair of claws and clawlike empodium. Leg I: coxa with 1 non-specialized branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 3 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala, microtarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala, microtarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibiala; tarsus 14B, mastitarsala.

Differential diagnosis: The new species is similar to *Neotrombicula solida* Schluger & Davidov, 1967 and *N. texana* Schluger, 1962, and differs from the both species in having 3 genualae I versus 2, nude



FIGS. 1-8: *Neotrombicula jordana* n. sp., larva. 1. — Scutum and eyes. 2. — Dorsal aspect of gnathosoma. 3. — Ventral aspect of gnathosoma. 4. — Leg I. 5. — Leg II. 6. — Leg III. 7. — Humeral seta. 8. — Ventral idiosomal seta.

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	S	H	D	V
Holotype	55	73	23	33	18	50	25	48	43	63	-	70	55-65	38-58
Minimum	55	70	20	29	15	45	25	40	40	58	85	63	48-58	38-50
Maximum	63	80	25	33	20	50	29	49	55	65	85	70	55-70	43-60
Mean	58	73	23	31	17	48	27	45	44	61	85	66	52-65	39-55

	pa	pm	pp	Ip	DS	VS	NDV	TaIII	TaW	m-t	TaIII/TaW
Holotype	307	277	337	921	32	34	66	103	16	0.293	6.31
Minimum	287	267	307	861	30	34	66	100	15	0.207	6.14
Maximum	327	307	356	990	34	42	74	113	18	0.293	7.50
Mean	312	290	341	943	32	39	71	105	15	0.251	6.79

TABLE 1: *Neotrombicula jordana* n.sp., standard measurements (n = 13).

galeala and dorsal palpal tibial seta versus branched, smaller scutum (AW=55-63, PW=70-80, SB=20-25, and SD=45–50 versus AW=74-89, PW=95-109, SB=31-44, and SD=58-69), and shorter legs (Ip=861-990 versus 1033-1294). *N. jordana* also differs from *N. texana* in having 8 setae in the first row of D versus 6 and presence of mastitarsala III (Materials on N. solida and *N. texana* from the Zoological Museum of Moscow State University, Russia, including possible syntypes had been studied. 7 specimens of *N. solida* from Tajikistan, Uzbekistan and Kazakhstan and 4 specimens of *N. texana* from Uzbekistan and Kazakhstan were measured).

HOST: *Apodemus sylvaticus* (L.)

TYPE DATA AND ADDITIONAL MATERIAL: Holotype (No. 011106-07-04-03) and 6 paratypes larvae, Ureta, 6 Nov. 2001; 76 larvae, Ureta, 6-7 Nov. 2001; 2 larvae, Ureta, 27 Feb. 2002; 12 larvae, Estación Aforo Sorogain, 6 Feb. 2002; 6 larvae, Oscáriz, 2 Nov. 2001; 1 larva, Ardaitz, 13 Feb. 2002; 1 larva, Villaveta-Billabeta, 15 Feb. 2001.

The holotype and paratypes are deposited in MZNA.

ETYMOLOGY: The species is named in honor of Prof. R. Jordana, long-time soil zoologist who was a mentor and teacher for some of us.

Neotrombicula autumnalis (Shaw, 1790)

DISTRIBUTION: Throughout Continental Europe (excepting Northern Scandinavia and Northwest Russia), and on British Isles. The only reliable finding in Asia took place in Turkmenistan, the Western Kopet Dagh (STEKOL'NIKOV, 1997b). On Iberian Peninsula the species previously was recorded on *A. sylvaticus* and other species of mammal hosts by KEPKA (1960b), PEREIRA-LORENZO (1993) and other authors.

MATERIAL EXAMINED: 179 larvae, Larraingoa, 6-7 Sep. 2001; 122 larvae, Casa Sorogain, 5 Sep. 2001;1 larva, Casa Sorogain, 13 Mar. 2002; 19 larvae, Oscáriz, 1-2 Nov. 2001; 1 larva, Señorío de Liberri, 18 Apr. 2001; 15 larvae, Ureta, 25 Apr. 2001; 43 larvae, Ureta, 2-3 Aug. 2001; 7 larvae, Ureta, 6-7 Nov. 2001; 24 larvae, Urricelqui, 29 Aug. 2001; 1 larva, Urricelqui, 23 Jan. 2002; 2 larvae, Villaveta-Billabeta, 15-16 Feb. 2001; 3 larvae, Villaveta-Billabeta, 13 Nov. 2001.

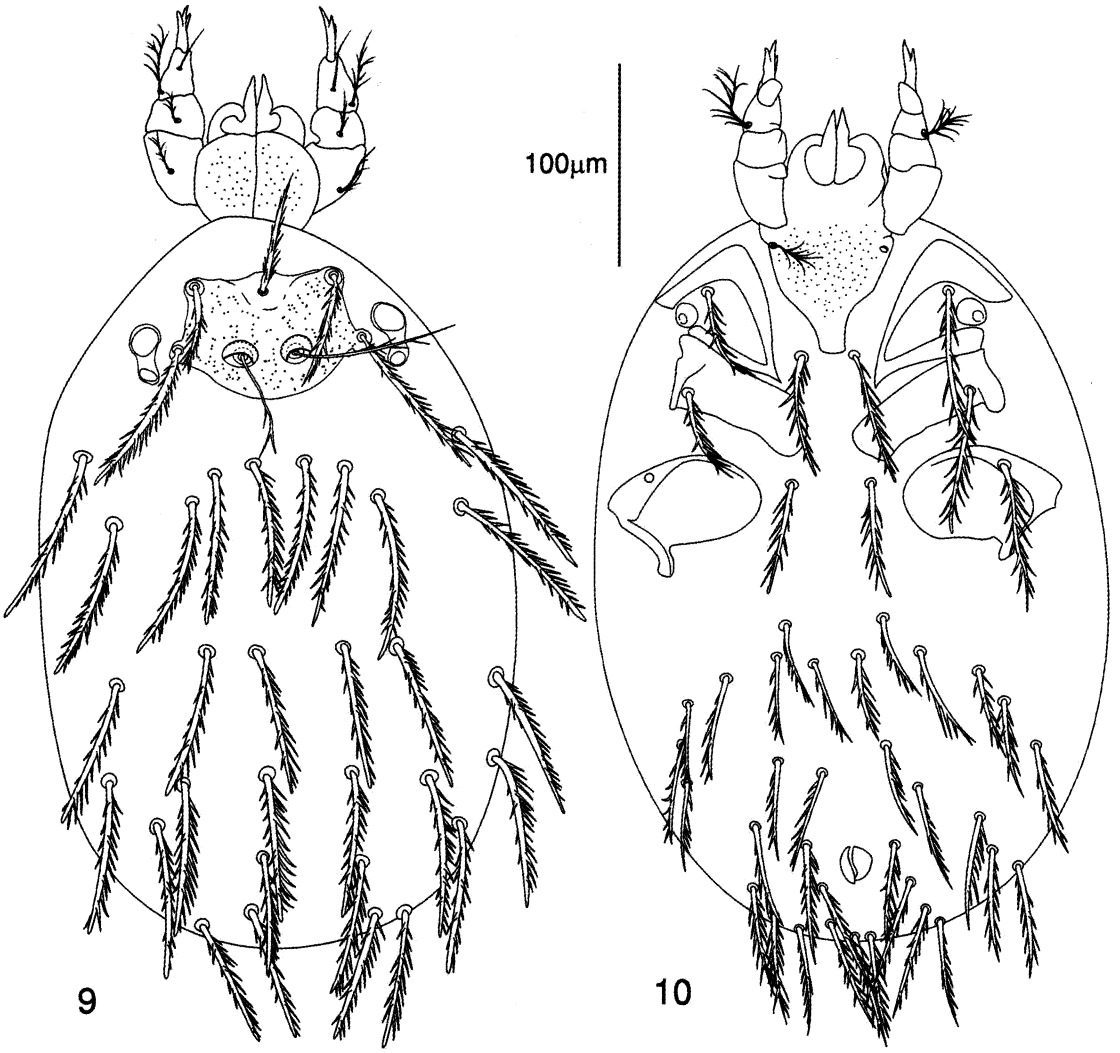
REMARKS: Usually *N. autumnalis* have fPp=B/B/NNB, but variation of lateral palpal tibial seta were observed in this species. Thus, several specimens from Western Caucasus had this seta branched on one or both palps (STEKOL'NIKOV, 1997a). Specimens from our material expose also variation of dorsal palpal tibial seta (TABLE 2).

fPp	Spec.	%
BBB	2	0.6
BBB / NBB	2	0.6
BBB / NNB	2	0.6
NBB	20	6.5
NBB / NNB	24	7.8
NNB	258	83.8
Total	308	100

TABLE 2: *Neotrombicula autumnalis*, variation of palpal tibial chaetotaxy.

Neotrombicula vulgaris (Schluger, 1955)

DISTRIBUTION: Hungary, Bulgaria, Moldova, Ukraine, Russia (the Western and Northern Cauca-



FIGS. 9-10: *Neotrombicula jordana* n. sp., larva. 9. — Dorsal view. 10. — Ventral view.

sus), Georgia, Azerbaijan, Turkmenistan (the Western Kopet Dagh) (STEKOL'NIKOV, 1999). Recorded on Iberian Peninsula for the first time.

MATERIAL EXAMINED: 30 larvae, Ardaitz, 13 Feb. 2002; 31 larvae, Larraingoa, 6-7 Sep. 2001; 169 larvae, Larraingoa, 30-31 Oct. 2001; 6 larvae, Casa Sorogain, 27 Mar. 2001; 1 larva, Casa Sorogain, 5 Sep. 2001; 25 larvae, Casa Sorogain, 13-14 Mar. 2002; 8 larvae, Estación Aforo Sorogain, 10 Apr. 2001; 12 larvae, Oscáriz, 1-2 Nov. 2001; 1 larva, Ureta, 25 Apr. 2001; 71 larvae, Ureta, 6-7 Nov. 2001.

Neotrombicula japonica
(Tanaka, Kaiwa, Teramura & Kagaya, 1930)
(= *Trombicula dubinini* Schluger, 1950)

DISTRIBUTION: Spain, France, Austria, Czechia, Slovakia, Albania, Bulgaria, Yugoslavia, Belarus,

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	S	H	D	V
Minimum	59	78	30	25	25	50	28	33	30	40	58	35	35	20-25
Maximum	69	85	34	28	28	55	30	38	34	50	63	48	43	26-33
Mean	64	81	32	27	25	52	29	35	32	45	60	44	38–39	23-29

	pa	pm	pp	Ip	DS	VS	NVD	TaIII	TaW	m-t	TaIII/TaW
Minimum	228	198	228	653	40	25	66	58	15	0.115	3,29
Maximum	257	267	257	762	46	32	72	69	18	0.154	4,33
Mean	239	223	247	709	42	27	69	63	16	0.133	3,99

TABLE 3: *Neotrombicula hispanica*, standard measurements (n = 7).

Ukraine, Moldova, Russia (from the Arkhangelsk and Moscow Regions up to the Far East), Azerbaijan, Japan, Northern Korea (KUDRYASHOVA, 1998). The species was recorded for the first time on the Iberian Peninsula by PEREIRA-LORENZO (1993), under the name *Neotrombicula dubinini*.

MATERIAL EXAMINED: 4 larvae, Larraingoa, 6-7 Sep. 2001; 2 larvae, Larraingoa, 30-31 Oct. 2001; 2 larvae, Lizoain, 27 Nov. 2001.

Neotrombicula hispanica Kepka, 1960
(TABLE 3)

DIAGNOSIS: SIF = 7BS-N-3-3111.1000; fPp = B/B/NNB; fCx = 1-1-1; fSt = 2.2; fSc: PL > AM > AL; Ip = 709; fD= 2H-8-8-8-...; DS = 40-46; VS = 25-32; NDV = 66–72.

DISTRIBUTION: Spain ("Zarzua", in Bizkaia Province or neighboring territories) (KEPKA, 1960b), France (Ardèche Department) (KOLEBINOVA, 1970).

MATERIAL EXAMINED: 14 larvae, Larraingoa, 6-7 Sep. 2001; 3 larvae, Ureta, 2-3 Aug. 2001; 2 larvae, Ureta, 24 Jul. 2002.

Hirsutiella billabeta n.sp.
(Figs. 11-20, TABLE 4)

DIAGNOSIS: SIF = 7BS-B-3-2111.1000; fPp = B/B/BBB; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; Ip = 1015; fD = 4H-[16-8]-[17-15]-[15-8]-14-9-7-9-2; DS = 122; VS = 116; NDV = 238.

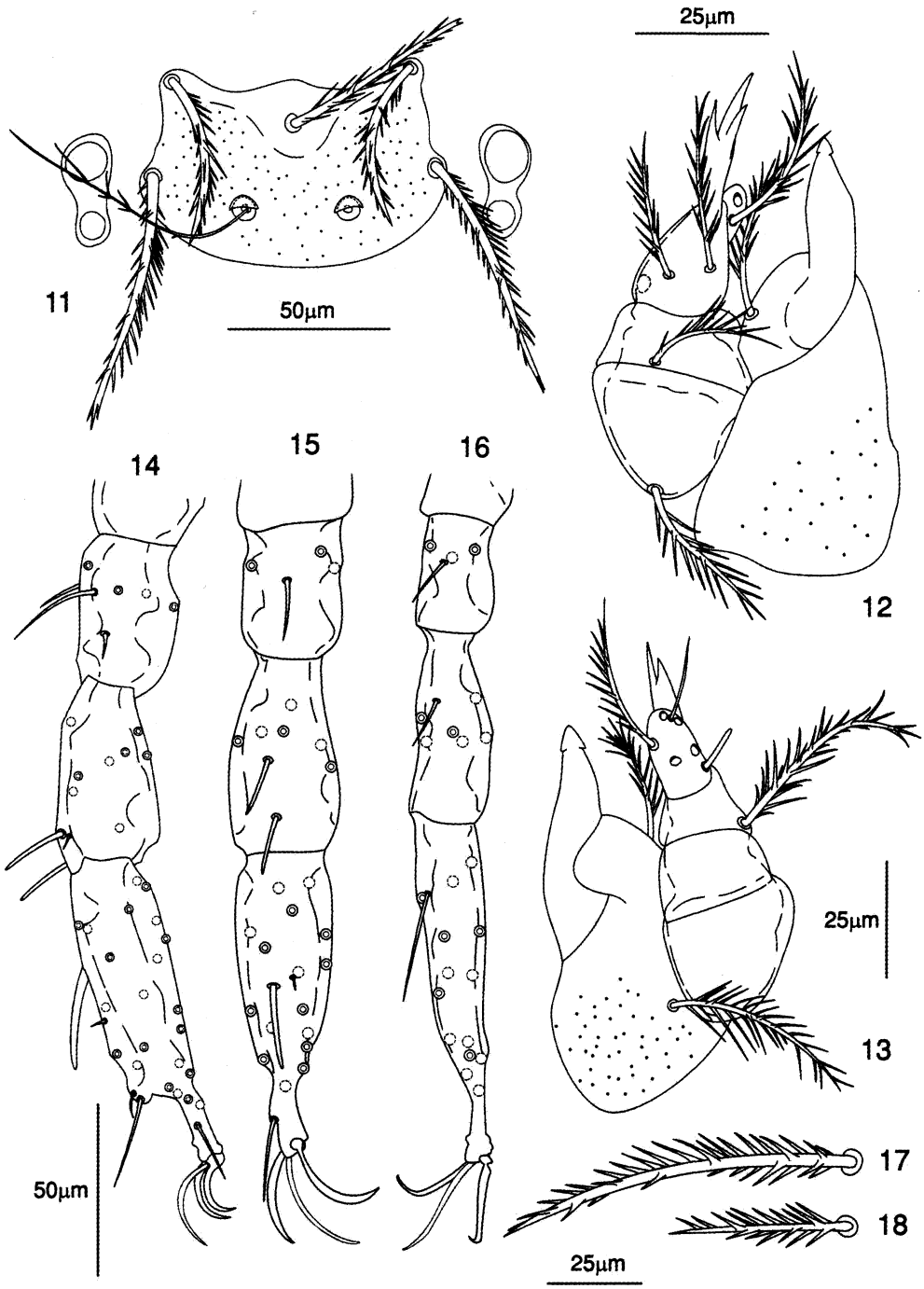
DESCRIPTION. *Larva*. Idiosoma. Eyes 2 + 2, on ocular plate, anterior larger. Two pairs of humeral setae; 109–126 dorsal idiosomal setae, densely covering with rather thick and long barbs, arranged [16-8]-[17-15]-[15-8]-14-9-7-9-2 (first 3 rows double); 2 pairs of sternal setae and 112-138 ventral setae; total idiosomal setae 226–259.

Gnathosoma. Cheliceral blade with tricuspid cap; gnathobase densely punctate, bearing a pair of branched setae; galeala branched; palpal claw 3-pronged; setae on palpal femur, genu, and tibia branched; palpal tarsus with 7 branched setae, nude subterminala and tarsala.

Scutum. Densely punctate, trapezoidal, with convex rounded posterior margin; AM base posterior to level of ALs; SB posterior to level of PLs; PL>AM>AL; sensilla flagelliform with few branches in distal 2/3, nude basally.

Legs. All 7-segmented, with a pair of claws and clawlike empodium. Leg I: coxa with 1 non-specialized branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 2 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala, microtarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala, microtarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibiala; tarsus 14B, mastitarsala.

DIFFERENTIAL DIAGNOSIS: The new species is similar to *Hirsutiella zachvatkini* (Schluger, 1948), and differs from this species in having much more numerous idiosomal setae (NDV = 226-259 versus 145–180), somewhat smaller scutum (PW = 84 versus 88, ASB = 38-41 versus 41-48, SD = 53-59 versus 57-66), longer AM (53-83 versus 47-60), and lesser m-t (0.236 versus 0.271). *H. billabeta* resembles



FIGS. 11-18: *Hirsutiella billabeta* n. sp., larva. 11. — Scutum and eyes. 12. — Dorsal aspect of gnathosoma. 13. — Ventral aspect of gnathosoma. 14. — Leg I. 15. — Leg II. 16. — Leg III. 17. — Humeral seta. 18. — Ventral idiosomal seta.

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	S	H	D	V
Holotype	73	85	31	41	18	59	30	63	55	74	-	78	53-75	33-55
Minimum	70	81	30	38	15	53	25	53	50	73	88	73	44-69	29-50
Maximum	78	88	34	41	18	59	30	83	55	80	103	80	60-83	33-58
Mean	73	84	31	39	16	56	28	60	53	75	95	76	52-75	30-53

	pa	pm	pp	Ip	DS	VS	NVD	TaIII	TaW	m-t
Holotype	337	322	356	1015	122	116	238	103	20	0.220
Minimum	287	292	347	926	109	112	226	98	19	0.214
Maximum	337	322	366	1015	126	138	259	105	21	0.250
Mean	317	304	354	976	118	124	241	102	20	0.236

TABLE 4: *Hirsutiella billabeta* n.sp., standard measurements (n = 19).

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	S	H	D	V
Minimum	73	93	31	39	15	54	30	50	60	88	88	93	65-75	33-60
Maximum	83	103	38	45	18	60	38	63	68	106	100	100	80-90	45-78
Mean	78	96	34	41	16	58	33	57	63	99	92	96	70–84	39-67

	pa	pm	pp	Ip	DS	VS	NVD	TaIII	TaW	m-t
Minimum	337	327	356	1020	68	64	150	101	20	0,244
Maximum	386	356	396	1119	95	112	185	115	23	0,289
Mean	363	342	382	1087	76	92	168	110	21	0,267

TABLE 5: *Hirsutiella zachvatkini*, standard measurements (n = 11).

H. alpina Stekolnikov, 2000 by large NDV, but differs in having smaller scutum (PW = 81-88 versus 95-108, SD = 53-59 versus 64-69), shorter legs (Ip = 926-1015 versus 1183-1341, TaIII = 98-105 versus 113-133), and lesser m-t (0.236 versus 0.271).

We used data on *H. zachvatkini* from Germany, Czech Republic, Slovakia, Moldova, and Russia (STEKOL'NIKOV, 2001b) for the above comparison. But *H. billabeta* differs even more from our Spanish material on *H. zachvatkini*. Thus, the difference in the size of scutum is more clear in this case (PW = 81-88 versus 93-103, AP = 25-30 versus 30-38), and additional differences are also observed, namely shorter scutal and idiosomal setae (AL = 50-55 versus 60-68, PL = 73-80 versus 88-106, H = 73-80 versus 93-100, D_{min} = 44-60 versus 65-80), and somewhat shorter legs (Ip = 926-1015 versus 1020-1119, TaIII = 98-105 versus 101-115) in *H. billabeta*.

HOST: *Apodemus sylvaticus* (L.)

TYPE DATA AND ADDITIONAL MATERIAL: Holotype (No. 010215-03-01) and 12 paratypes larvae, Villaveta-Billabeta, 15-16 Feb. 2001; 56 larvae, Villaveta-Billabeta, 15-16 Feb. 2001; 4 larvae, Villaveta-Billabeta, 13 Nov. 2001; 1 larva, Villaveta-Billabeta, 15 Mar. 2002.

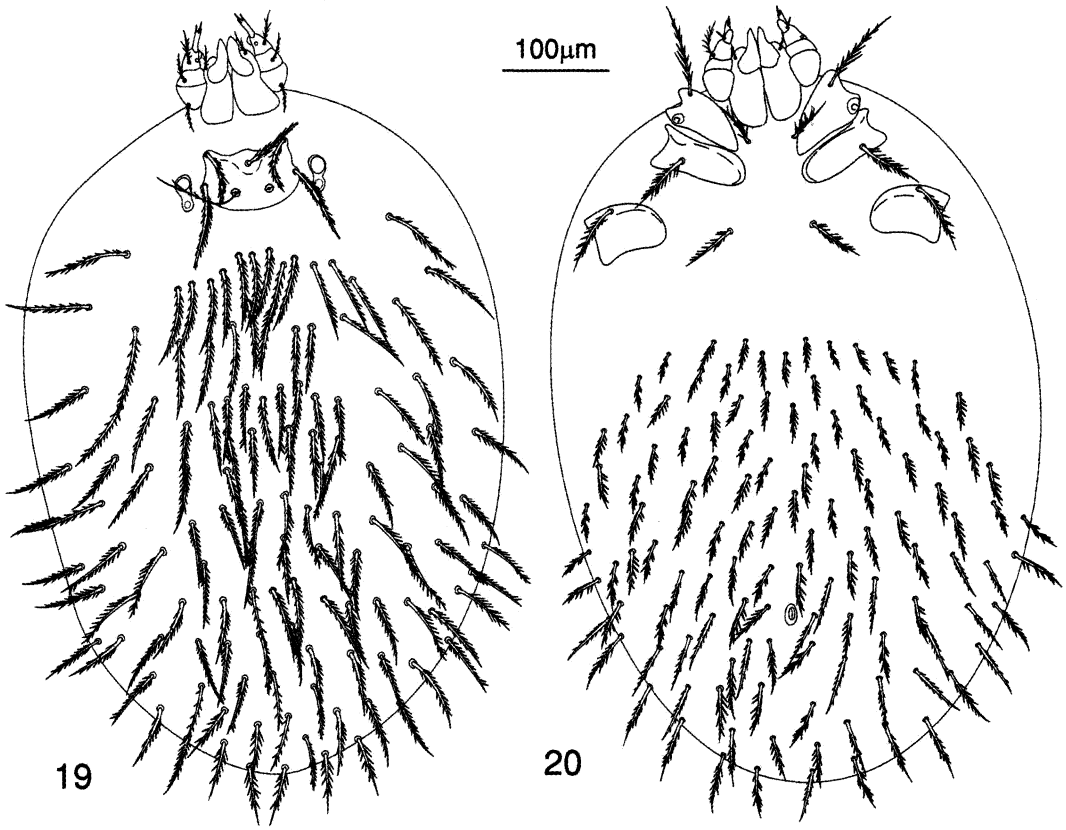
The holotype and paratypes are deposited in MZNA.

ETYMOLOGY: The species name refers to the type locality.

Hirsutiella zachvatkini (Schluger, 1948) (TABLE 5)

DISTRIBUTION: Spain, France, Switzerland, Austria, Sweden, Czechia, Slovakia, Germany, Poland, Romania, Slovenia, Macedonia, Albania, Bulgaria, Latvia, Belarus, Ukraine, Moldova, European Russia (STEKOL'NIKOV, 2001b). On Iberian Peninsula the species previously was recorded on *A. sylvaticus* and other species of mammal hosts by PEREIRA-LORENZO (1993).

MATERIAL EXAMINED: 1 larva, Ardaitz, 4 Apr. 2001; 1 larva, Larraingoa, 15 Jun. 2001; 4 larvae, Casa Sorogain, 27 Mar. 2001; 3 larvae, Casa Sorogain, 4 Sep. 2001; 1 larva, Estación Aforo Sorogain, 10 Apr.



FIGS. 19-20: *Hirsutiella billabeta* n. sp., larva. 19. — Dorsal view. 20. — Ventral view.

2001; 1 larva, Ureta, 6 Nov. 2002; 1 larva, Ureta, 27 Feb. 2002.

REMARKS: Our specimens differ from *H. zachvatkini* materials which was collected in Germany, Czech Republic, Slovakia, Moldova, and Russia (STEKOL'NIKOV, 2001b) in having broader scutum (PW = 93-103 versus 78-95), longer scutal and idiosomal setae (AL = 60-68 versus 45-63, PL = 88-106 versus 67-87, H = 93-100 versus 59-85, D_{min} = 65-80 versus 41-58, D_{max} = 75-90 versus 63-77), and slightly longer legs (TaIII = 101-115 versus 86-103).

Leptotrombidium europaeum
(Daniel & Brelich, 1959)

DISTRIBUTION: Spain, France, Austria, Czechia, Slovakia, Romania, Yugoslavia, Albania, Bulgaria, Ukraine, Moldova, Russia (Northern Caucasus), Azerbaijan, Turkey. On Iberian Peninsula the species previously was recorded on *A. sylvaticus* and other species of mammal hosts by KEPKA (1960b) and PEREIRA-LORENZO (1993).

MATERIAL EXAMINED: 42 larvae, Ardaitz, 4 Apr. 2001; 7 larvae, Ardaitz, 13 Feb. 2002; 6 larvae, Larraingoa, 15 Jun. 2001; 83 larvae, Larraingoa, 6-7 Sep. 2001; 21 larvae, Larraingoa, 30 Oct. 2001; 6 larvae, Lizoain, 30 Jan. 2002; 5 larvae, Casa Sorogain, 5 Sep. 2001; 1 larva, Estación Aforo Sorogain, 10 Apr. 2001; 220 larvae, Oscáriz, 1-2 Nov. 2001; 8 larvae, Oscáriz, 20 Aug. 2002; 10 larvae, Señorío de Liberri, 18-19 Apr. 2001; 4 larvae, Señorío de Liberri, 3-4 Jul. 2001; 7 larvae, Ureta, 7 Nov. 2001; 1 larva, Urricelqui, 29 Aug. 2001; 1 larva, Urricelqui, 20 Nov. 2001; 1 larva, Urricelqui, 23 Jan. 2002; 1 larva, Villaveta-Billabeta, 15 Feb. 2001.

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	S	H	D	V
Minimum	58	75	33	25	20	45	38	35	35	48	38	48	30-38	23-30
Maximum	63	90	40	30	23	53	43	43	43	53	38	53	45	25-38
Mean	60	83	37	27	22	48	41	38	41	50	38	51	38-42	24-34

	pa	pm	pp	Ip	DS	VS	NVD	TaIII	TaW
Minimum	208	208	238	663	41	54	103	65	18
Maximum	248	228	267	743	52	67	113	73	18
Mean	232	216	255	703	48	60	109	69	18

TABLE 6: *Schoutedenichia krampitzi*, standard measurements (n = 10).

Schoutedenichia krampitzi (Willmann, 1955)
(TABLE 6)

DISTRIBUTION: Spain, France, Switzerland, Italia, Yugoslavia, Albania, Bulgaria, Ukraine, Moldova, Azerbaijan, Turkey (KUDRYASHOVA, 1998). On Iberian Peninsula the species previously was recorded on *A. sylvaticus* and *A. flavicollis* (Melchior, 1834) by KEPKA (1960b).

MATERIAL EXAMINED: 8 larvae, Ardaitz, 4 Apr. 2001; 27 larvae, Larraingoa, 15 Jun. 2001; 213 larvae, Larraingoa, 7 Sep. 2001; 17 larvae, Larraingoa, 30-31 Oct. 2001; 2 larvae, Lizoain, 27 Nov. 2001; 1 larva, Lizoain, 30 Jan. 2002; 152 larvae, Oscáriz, 1-2 Nov. 2001; 9 larvae, Oscáriz, 20 Aug. 2002; 122 larvae, Señorío de Liberri, 18-19 Apr. 2001; 173 larvae, Señorío de Liberri, 3-4 Jul. 2001; 22 larvae, Ureta, 6-7 Nov. 2001; 36 larvae, Urricelqui, 29 Aug. 2001; 20 larvae, Villaveta-Billabeta, 15 Mar. 2002.

REMARKS: A variation of fCx (1.1.1 or 1.1.2) is observed in this species, as stated by KEPKA (1960b), KUDRYASHOVA (1998) and other authors. The form having fCx=1.1.2 was described as a separate species, *Schoutedenichia donaldi* (Kepka, 1958) being recognized by some authors. In our material fCx=1.1.2 was a predominant variant (TABLE 7).

fCx	Spec.	%
1.1.1	2	0.3
1.1.1 / 1.1.2	32	4.1
1.1.2	700	90.3
1.1.2 / 1.1.3	41	5.3
Total	775	100

TABLE 7: *Schoutedenichia krampitzi*, variation of coxal chaetotaxy.

Two specimens in our material have tibiala in one of the legs III. This case should be considered as a rare anomaly.

Brunehaldia bulgarica
(Vercammen-Grandjean & Kolebinova, 1966)
(TABLE 8)

DISTRIBUTION: Bulgaria, Yugoslavia, and Corsica Island (KOLEBINOVA, 1992). Recorded on Iberian Peninsula for the first time.

MATERIAL EXAMINED: 56 larvae, Oscáriz, 1 Nov. 2001; 6 larvae, Señorío de Liberri, 18 Apr. 2001; 5 larvae, Villaveta-Billabeta, 15 Feb. 2001; 45 larvae, Villaveta-Billabeta, 13 Nov. 2001; 19 larvae, Villaveta-Billabeta, 15 Mar. 2002.

	AW	PW	SB	ASB	PSB	SD	P-PL	AP	AM	AL	PL	S	H	D	V
Minimum	55	68	23	28	9	38	20	15	23	30	43	28	43	30-45	20-33
Maximum	60	73	28	33	13	43	25	18	28	38	50	28	48	45-50	25-38
Mean	58	68	25	30	10	40	22	17	25	34	47	28	45	37-49	23-36

	pa	pm	pp	Ip	DS	VS	NVD	TaIII	TaW
Minimum	210	200	243	665	55	60	115	58	13
Maximum	233	208	250	685	61	64	125	63	18
Mean	220	205	247	672	57	63	120	59	16

TABLE 8: *Brunehaldia bulgarica*, standard measurements (n = 9).

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	S	H	D	V
Minimum	55	75	28	23	14	20	25	25	25	35	30	40	25-33	18-25
Maximum	60	100	35	25	20	43	30	28	40	45	33	53	38-45	23-38
Mean	57	81	28	23	18	32	27	26	30	39	32	43	29-35	19-30

	pa	pm	pp	Ip	DS	VS	NVD	TaIII	TaW
Minimum	200	175	193	573	41	31	74	45	15
Maximum	225	200	223	648	45	38	83	55	18
Mean	208	189	203	600	42	35	78	49	16

TABLE 9: *Cheladonta pannonica*, standard measurements (n = 8).

Cheladonta pannonica (Kepka, 1956)
(TABLE 9)

KEPKA, 1956: 9, Abb. 1, 2 (*Euschoengastia*; Austria, Burgenland, Parndorfer); 1958: 12 [transferred to the genus *Cheladonta* Lipovsky, Crossley & Loomis, 1955, and rejected as subjective synonym of *Cheladonta ikaoensis* (Sasa et al., 1951)]; KUDRYASHOVA, 1998: 264.

DIAGNOSIS: SIF = 4B-N-7-2110.0000; fPp = B/B/BBB; fCx = 1.1.1; fSt: 2.2; fSc: PL > AL > AM; Ip = 611; fD = 4H-10(10-12)-8-4-...; DS = 41-45; VS = 31-38; NDV = 74-83.

DISTRIBUTION AND HOSTS: Described from susliks *Spermophilus citellus* (L.) collected in Austria. Recorded on Iberian Peninsula and on *A. sylvaticus* for the first time.

MATERIAL EXAMINED: 14 larvae, Larraingoa, 6–7 Sep. 2001; 2 larvae, Larraingoa, 31 Oct. 2001; 1 larva, Lizoain, 27 Nov. 2001; 2 larvae, Casa Sorogain, 15 Sep. 2001; 6 larvae, Casa Sorogain, 13 Mar. 2002; 1 larva, Estación Aforo Sorogain, 10 Apr. 2001; 3 larvae, Señorío de Liberri, 18 Apr. 2001, 34 larvae, Señorío de Liberri, 3-4 Jul. 2001; 13 larvae, Ureta, 6-7 Nov. 2001; 1 larva, Urricelqui, 23 Jan. 2002.

REMARKS: The holotype and paratypes of the species were preserved in the Zoological Institute of Gratz University, Austria. But a thorough revision of the chiggers collection undertaken in this Institute by Prof. R. Schuster in 2005 have not revealed these specimens (R. Schuster, personal communication). Thus, they should be considered as lost. According to the original description, some paratypes were also kept in the Museum of Burgenland (Burgenländischen Landesmuseum), Eisenstadt, Austria. But our efforts to find an information about this material in the Museum were unsuccessful.

The original description of *Ch. pannonica* is incomplete. So, only separate variations for fD, VS, and legs lengths there are presented instead of NDV and Ip. But measurements of scutum and setae in this description are very close to those given in the above table of standard measurements. Some differences in non-metric characters between our material and the original description (branched dorsal palpal tibial seta versus nude, absence of palpal subterminala) most probably are a result of an inaccuracy of the latter. The difference in the number of palpal claw prongs (4 in our material, 5 in the original description) may be accounted for an individual variation.

KEPKA (1958) did not adduced sufficient proofs of that *Ch. pannonica* should be considered a synonym of *Ch. ikaoensis*. KUDRYASHOVA (1998) supposes that *Ch. pannonica* may be a synonym of *Ch. flava* (Schluger, 1955) (a steppe species which parasitizes susliks too) rather than of *Ch. ikaoensis*, and that presence of *Ch. ikaoensis* in Europe is doubtful. A complete revision of European *Cheladonta* is need for the final solution of this problem.

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REFERENCES

GOFF (M.L.), LOOMIS (R.B.), WELBOURN (W.C.) & WRENN (W.J.), 1982. — A glossary of chigger terminology (Acari: Trombiculidae). — J. Med. Entomol., 19 (3): 221-238.

KEPKA (O.), 1956. — Ein Beitrag zur Verbreitung und Biologie der Trombiculinae (Acari: Fam. Trombiculidae) im Burgenland. — Wiss. Arb. Burgenland, 16: 1-29.

KEPKA (O.), 1958. — Eine neue Art des Genus Cheladonta aus Österreich. — Zool. Anz., 160 (7-8): 151-158.

KEPKA (O.), 1960a. — Die Trombiculidae (Acari) der Iberischen Halbinsel. I. Mitteilung. — Z. Parasitenk., 19: 548-552.

KEPKA (O.), 1960b. — Die Trombiculidae (Acari) der Iberischen Halbinsel. II. Mitteilung. — Z. Parasitenk., 20: 191-206.

KOLEBINOVA (M.G.), 1970. — Larves des Trombiculidae (Acarina) de la Corse, des Pyrénées et de la Crète. — Bull. Inst. Zool. Mus. Acad. Bulgare Sci., 32: 93-105.

KOLEBINOVA (M.G.), 1992. — Fauna Bulgarica, Vol. 21. Acariformes, Trombidioidea, Trombiculidae, Leeuwenhoekiidae. — In Aedibus Academie Scientiarium Bulgaricae, Sofia. 172 pp. (in Bulgarian).

KUDRYASHOVA (N.I.), 1998. — Chigger mites (Acariformes, Trombiculidae) of East Paleartics. — KMK Scientific Press, Moscow. 342 pp. (in Russian).

PEREIRA-LORENZO (A.), 1993. — Chiggers (Acarina: Trombiculidae) parasitizing small mammals in Galicia (NW Spain). — Acarologia, 34 (4): 323-329.

STEKOL'NIKOV (A.A), 1997a. — Geographical variability of the chigger species *Neotrombicula autumnalis* and its interrelationships with *N. caucasica* stat. nov. (Trombiculidae). — Parazitologiya (Saint-Petersburg), 31 (5): 397-413 (in Russian).

STEKOL'NIKOV (A.A.), 1997b. — New data on fauna and systematics of chiggers of the *autumnalis* group (Trombiculidae: *Neotrombicula*). — Parazitologiya (Saint-Petersburg), 31 (6): 527-542 (in Russian).

STEKOL'NIKOV (A.A.), 1999. — A revision of the chigger mites species group *vulgaris* (Trombiculidae: *Neotrombicula*). — Parazitologiya (Saint-Petersburg), 33 (5): 387-403 (in Russian).

STEKOL'NIKOV (A.A), 2001a. — On the systematics of the genus *Eutonella* Kudryashova, 1988 (Acari: Trombiculidae). — Acarina. Rus. J. Acarology, 9 (1): 97-104.

STEKOL'NIKOV (A.A.) 2001b. — Systematics of chigger mites of the genus *Hirsutiella* Schluger et Vysotzkaya, 1970 (Acari, Trombiculidae). — Entomologicheskoe obozrenie, 80 (1): 219-242 (in Russian).