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New species of *Homidia* from Japan (Collembola, Entomobryidae)

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Abstact

Three species of *Homidia*, (*H. rosannae* n. sp., *H. sotoi* n. sp. and *H. yoshiii* n. sp.) found among misidentified specimens of the Yoshii Collection at MHNG, are described by the use of macrochaetotaxy (Jordana & Baquero, 2005) facilitates the differentiation among members of the Japanese species. This paper describes three new species identified through this method. A comparative chaetotaxy of *Homidia* species and a key are given.

Key words: colour pattern, macrochaetotaxy, descriptions

1. Introduction

While the collection as Riozo Yoshii, deposited in the MHNG, has long been studied, among the material correctly classified as *Entomobrya, Homidia, Sinella* and other genera, some specimens appear to be clearly different from the species indicated on the labelled tubes. These specimens have been studied and some of them are described as new species.

The set of characters used for description takes into account morphological information and dorsal macrochaetotaxy, and follows, in part, the previous papers of Christiansen (1958), Christiansen & Bellinger (1980) and Jordana & Baquero (2005), although Szeptycki (1979) is the basis for the chaetotaxy.

Abbreviations: Abd = abdominal segment; Ant = antennal segment; Fur = manubrium + dens length; Man = manubrium; MHNG = Muséum d'histoire naturelle de la Ville de Genève; Th = thoracic segment

2. Material and Methods

The species described were found among 130 samples from Yoshii's collection. Among them were some type specimens from species described by Yoshii and collected by him and other entomologists (Janetschek, Ashraf, Ueno, Yasuda or Tokunaga). The separation of the specimens not belonging to the species indicated on the labels were made using colour pattern, but the confirmation of the identity requires the study of the dorsal macrochaetotaxy.

The specimens were mounted in Hoyer medium, sometimes cleared with Nesbitt solution. Observation of the slides was done under 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 the 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.

3. Results

***Homidia rosannae* n. sp.** (Figs 1A–B, 2A–D, 5A–D, Tab. 1)

Type locality. Japan, (Gumma): Oze.

Type material. Holotype, specimen on slide labelled as 'Japan (Gumma): Oze leg. R. Yoshii', two paratypes in ethyl-alcohol. They were in the same tube with 2 specimens of 'Sinella (Sinella) umesaoi'. Deposited in MHNG.

Tab. 1 Measurements of the new species (Holotypes), in micrometers.

	***H. rosannae* n. sp.**	***H. sotoi* n. sp.**	***H. yoshiii* n. sp.**
Ant I	180	360	250
Ant II	270	490	350
Ant III	220	460	320
Ant IV	380	690	520
Ant	1050	2000	1440
Head	440	640	500
Ant/head ratio	2,39	3,13	2,88
Th II	320	380	350
Th III	150	170	240
Abd I	70	110	130
Abd II	100	160	150
Abd III	100	170	170
Abd IV	580	960	850
Abd IV/III ratio	5,80	5,65	5,00
Abd V	90	130	150
Abd VI	70	60	90
Body	1920	2780	2630
Manubrium	480	760	650
Dens	540	900	740
Claw	40	68	52
Empodium	30	50	30
Tenent hair	44	64	40

Description

Body length up to 1.9 mm excluding antennae (Tab. 1). Ground colour pale yellow; pattern as Fig. 1A (body) and 1B (head and antennae).

Head.: Eight eyes, GH smaller than EF. Antennae length 1.05 μm, 2.39 times the length of the head; relative length of Ant 1.00/1.50/1.22/2.11. Ant IV apical vesicle bilobed (Fig. 5A). Four conical labral papillae, with a projection chaeta-like on the two central ones (Fig. 5B). Labial base chaetae formula: -MRell, MR ciliated (R half in size than M) and ell smooth.

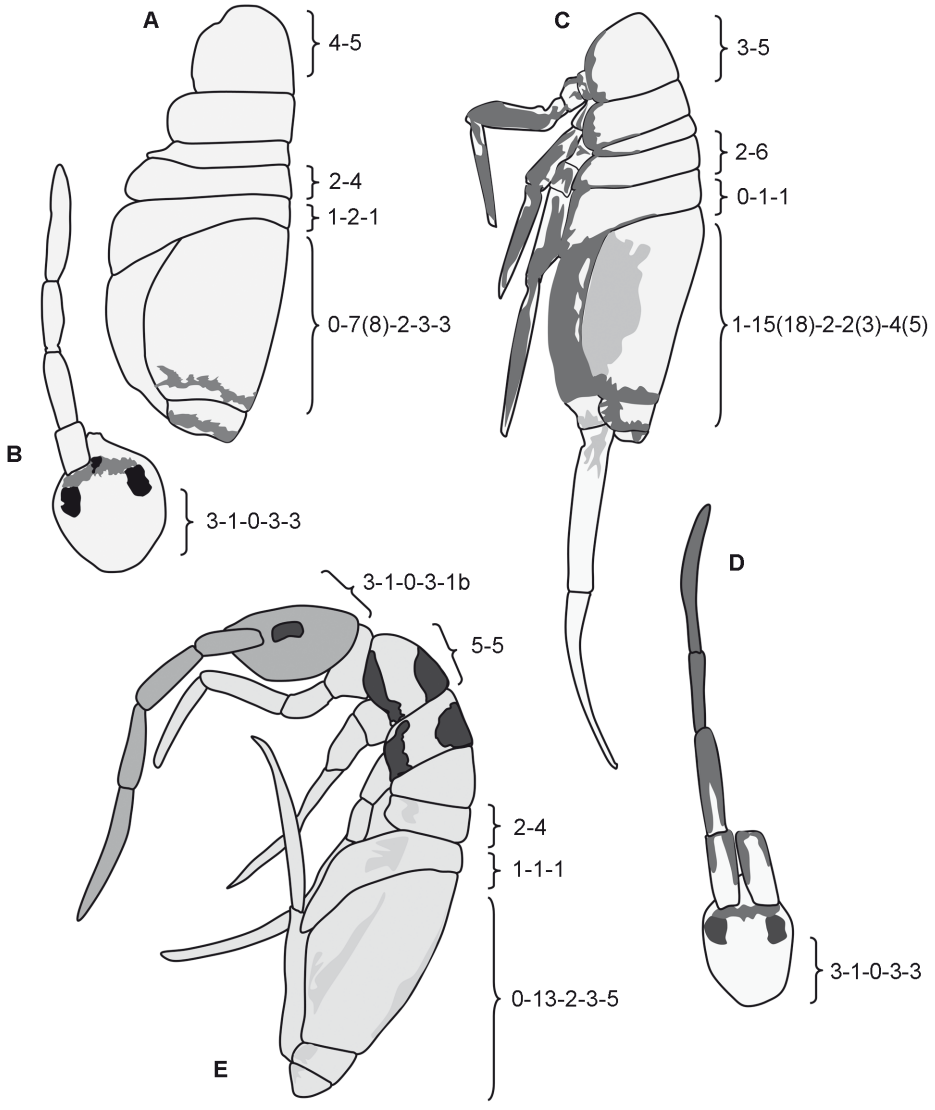


Fig. 1 *Homidia rosannae* n. sp., A: body. B: head and Ant, *Homidia sotoi* n. sp.; C: body and furcula. D: head and Ant, *Homidia yoshiii* n. sp.; E: lateral habitus.

Body: Length ratio Abd IV/ III 5.8. Claw with four internal teeth: first pair at 45% of distance from base of claw, and two odd teeth, first at 70% of distance from base and the most distal one minute; dorsal tooth not basal (before of the level of paired teeth), and lateral ones not visible. Empodium spike-like, with smooth external edge on leg III (Fig. 5C). Length of manubrium and dens 1020 µm. Manubrial plate with 11 chaetae and 3 pseudopores. Manubrium with 22-23 spines, in two rows in the middle. Mucro with basal spine, subapical teeth clearly bigger than terminal one (Fig. 5D).

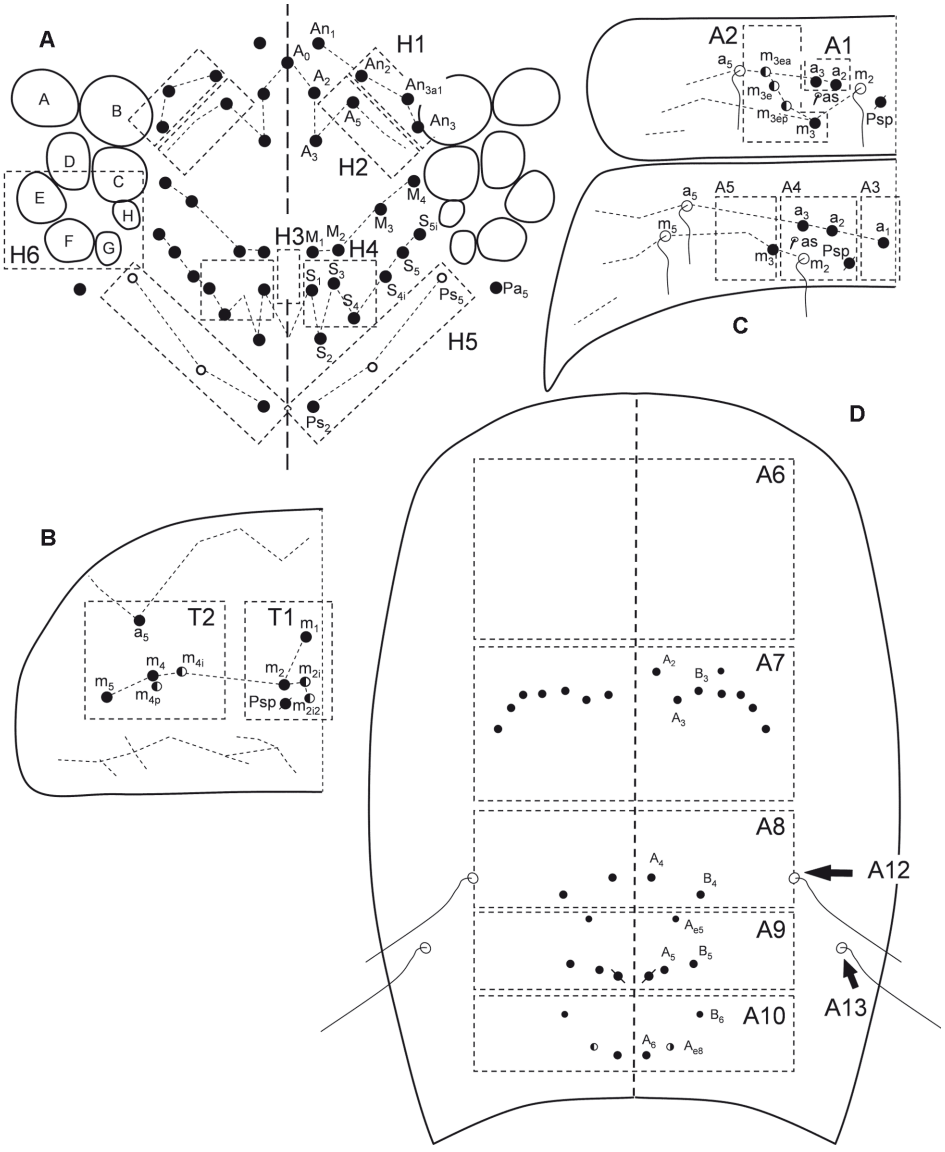


Fig. 2 *Homidia rosannae* n. sp. macrochaetotaxy. A: head; B: Th II; C: Abd II-III; D: Abd IV.

Chaetotaxy: Simplified macrochaetae formula: 3-1-0-3-3/4-5/2-4/1-2-1/0-7(8)-2-3-3.

Head chaetotaxy as Fig. 2A, in H4 area is an asymmetry in chaetae pattern. Thorax chaetotaxy: T1 area on Th II with 4 macrochaetae (m_1, m_2, m_{2i} and m_{2i2} present); T2 area on Th II with five macrochaetae present (a_5, m_4, m_{4i}, m_{4p} and m_5) (Fig. 2B). Abdominal chaetotaxy (Fig. 2C–D): A1 area on Abd II with two macrochaetae and A2 area on Abd II with four macrochaetae. Abd III with one macrochaeta on area A3 and A5, two macrochaetae on A4 area.

Biology: Unknown.

Discussion. The specimens were found among specimens of *Sinella umesaoi* Yoshii, 1940. They were very similar in colour and habitus, but differentiable by eye size (small and triangular in *Sinella* and bigger in *Homidia*), and the carefully observation of colouration.

There are only four Palaearctic *Homidia* with 1-2-1 dorsal macrochaetae on Abd III (*H. munda* Yoshii, 1956, *H. rosannae* n. sp., *H. sauteri* Börner, 1909, and *H. socia* Denis, 1929), only two have 2-4 dorsal macrochaetae on Abd II (*H. munda* and *H. rosannae* n. sp.), but only the new species has 4-5 dorsal macrochaetae on thoracic tergite II. *H. rosannae* n. sp. share with *H. sinensis* Denis, 1929 the dorsal macrochaetaxy of thoracic tergite II and Abd II (Tab. 2), but *H. sinensis* has blue pigment on lateral thoracic tergite II, dorsal thoracic tergite III and abdominal tergites I and II, a transversal stripe on thoracic tergite III and lateral Abd IV.

Etymology. The new species is dedicated to Rosanna Giordano, a prestigious researcher in the molecular biology of insects.

***Homidia sotoi* n. sp.** (Figs 1C–D, 3A–D, 5E–G, Tab. 1)

Type locality. Japan, (Kumamoto): Amakusa, Tororo.

Type material. Holotype, specimen on slide labelled as 'Japan (Kumamoto): Amakusa, Tororo 7.V.1970 leg. R. Yoshii', paratypes: three specimens in ethyl alcohol (two without furcula). Deposited in MHNG.

Description

Body length up to 2.78 mm excluding antennae (Tab. 1). Ground colour pale yellow; pattern as Fig. 1C (body) and 1D (head and antennae).

Head: Eight eyes, GH smaller than EF. Antennae length 2.0 mm, 3.13 times the length of the head; relative length of Ant 1.00/1.36/1.28/1.92. Ant IV with two lobe apical vesicle. Without visible labral papillae. Labial base chaetal formula: ???ell (MMR not visible, ell are smooth).

Body: Length ratio Abd IV/III: 5.65. Claw with four internal teeth: first pair at 40% of distance from base of claw, and two odd teeth, first at 70% of distance from base and the most distal one minute; dorsal tooth basal and lateral ones before paired teeth. Empodium spike-like, with smooth external edge on leg III (Fig. 5E). Length of manubrium and dens 1.66 mm. Manubrial plate with 10 chaetae and 3 pseudopores. 28-30 spines on dens as in Fig. 5F. Mucro with basal spine, subapical teeth clearly bigger than terminal one (Fig. 5G).

Chaetotaxy: Simplified macrochaetae formula: 3-1-0-3-3/3-5/2-6/0-1-1/1-15(18)-2-2(3)-4(5).

Head chaetotaxy as in figure 3A. Thorax chaetotaxy: T1 area on Th II with three macrochaetae (m_1, m_2 and m_{2i} present); T2 area on Th II with five macrochaetae present (a_5, m_4, m_{4p}, m_{4pi} and m_5) (Fig. 3B). Abdomen chaetotaxy (Figs 3C–D): A1 area on Abd II with two macrochaetae and A2 area on Abd II with six macrochaetae. Abd III with one macrochaeta on areas A3-A5.

Biology: Collected together with *Entomobrya thalassicola* Yosii, 1965 in a marine environment.

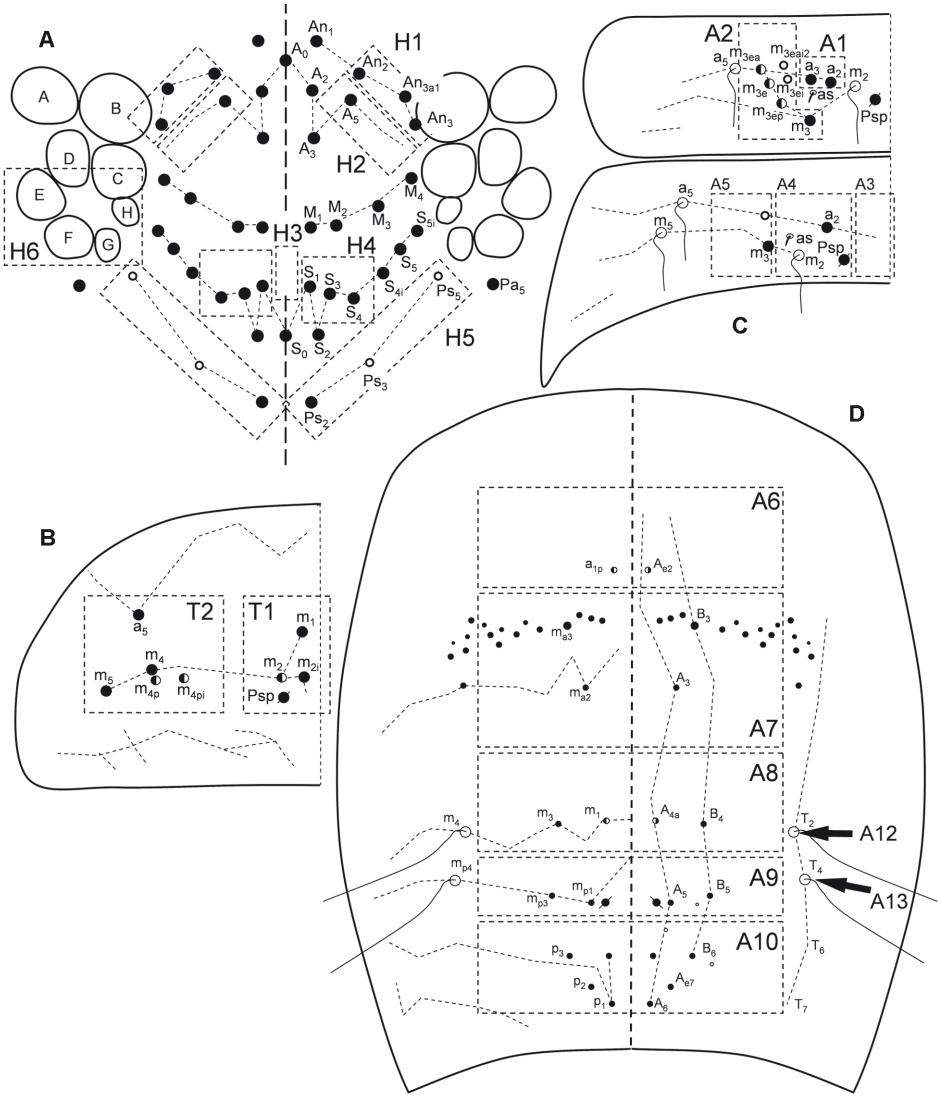


Fig. 3 *Homidia sotoi* n. sp. macrochaetotaxy. A: head; B: Th II; C: Abd II-III; D: Abd IV.

Discussion. The colour pattern of the new species is not characteristic. Dorsal macrochaetotaxy is necessary for its identification. *H. sotoi* n. sp. is the only Palaearctic species with 6 chaetae on A2 area in Abd II (there are only two species with five: *H. sauteri* from USA, and *H. socia*). The formula 0-1-1 is frequent on Abd III (26 palaearctic species), but only two species –apart from the new species– (*H. tiantaiensis* Chen & Lin, 1998 and *H. ziguiensis* Jia et al., 2003) have 1 chaeta on the A6 area on Abd IV. *H. sotoi* n. sp. and *H. rosannae* n. sp. are the only species with three macrochaetae (or mesochaetae with a reasonable size) on the H5 area (head) (Tab. 2).

Tab. 2 Comparative set of characteristics for the new and related species.
Differences among compared species in bold with grey background.

Character	Location	Description	*H. rosannae* n. sp.	*H. sinensis*	*H. sotoi* n. sp.	*H. yoshiii* n. sp.	*H. munda*	*H. nigra*	*H. chosonica*
Ch 1	H1	sd'4-sd'4' (An_2-An_3)	3	3	3	3	3	3	3
Ch 2	H2	sd4-sd'3a (A_5-A_7)	1	1	1	1	1	1	1
Ch 3	H3	d'0 (S'_0)	0	0	0	0	0	0	0
Ch 4	H4	d1-sd1-sd'1 (S_1-S_3-S_4)	3	3	3	3	3	3	3
Ch 5	H5	v1-v3-v4 (Ps_2-Ps_3-Ps_5)	3	**2**	3	1b	**2**	**2**	**2**
Ch 6	Labral papilla	without (0), simple and smooth papilla (1), wrinkled or with some projections (2), a projection chaetae like (3)	3	**1**	0	1	**0**	**0**	**0**
Ch 7	Eyes G&H size	= E&F (1), <E&F (2)	2	2	2	2	2	2	2
Ch 8	Antennal vesicle	no bulb (0), lobule simple (1), bilobed (2), trilobed (3)	2		2	2	2	2	2
Ch 9		> or = 3 (1), > or = 2 < 3 (2), < 2 (3)	2	2	1	2	2	2	1
Ant	Antennae length		1050	**1950**	2000	1440	1698	**838**	1244
Ch10	Thoracic tergite II mane MS	with Ms type 1 (1), without Ms or type 2 (2)	1	1	1	1	1	1	1
Ch11	T1	m_1-m_{2i2}; >4 (5)	4	4	3	5	**4**	3	5
Ch12	T2	a_5-m_5; >8 (9)	5	5	5	5	**7**	5	5
Ch13	Smooth chaetae on tibiotarsi	not or 1 on Tt III (0), double file (1)	0	0	0	1	**0**	0	**0**
Ch14	Claw internal teeth	1(1), 2(2), 3(3), 4(4)	4	**3**	4	3	**4**	4	**4**
Firstpair	First pair at % of Claw		46	**37**	42	56	50	50	**45**

Tab. 2 (Continued previous page.) Comparative set of characteristics for the new and related species. Differences among species comparison, in bold and grey ground.

Character	Location	Description	*H. rosannae* n. sp.	*H. sinensis*	*H. sotoi* n. sp.	*H. yoshiii* n. sp.	*H. munda*	*H. nigra*	*H. chosonica*
Firstodd	First unpaired at % of Claw		71	69	71	72	**85**	76	70
Ch15	Claw dorsal tooth	absent=0, basal =1, internal teeth level = 2, intermediate = 3	3	**1**	3	1	1	1	1
Ch16	Claw internal edge	without ciliation (0), with ciliation (1)	0	0	0	0	0	0	0
Ch17	External empodium	smooth (0), serrate (1)	0	0	0	0	0	0	1
Ch18	A1 Abd II	a_2–a_3	2	2	2	2	2	2	2
Ch19	A2 Abd II	m_3 series	4	4	6	4	4	4	4
Ch20	A3 Abd III	a_1	1	**0**	0	1	1	1	**0**
Ch21	A4 Abd III	above m_2	2	2	1	1	**2**	1	1
Ch22	A5 Abd III	m_3-m_4 series	1	1	1	1	1	1	1
Ch23	A6 Abd IV	a_1-a_5 (A_1-E_{1a}); >8 (9)	0	0	1	0	0	0	0
Ch24	A7 unpaired chaeta	ma_0 (A_{03})	0	0	0	0	0	0	0
Ch25	A7 Abd IV	ma_1-ma_4 (A_2-E_1); >9 (10)	7(8)	8	15(18)	13	**16-20**	9	11-12
Ch26	A8 unpaired chaeta	m_0 (A_{04})	0	0	0	0	0	0	0
Ch27	A8 Abd IV	m_1-m_3 (A_{4p}-C_4); >5 (6)	2	**0**	2	0	**0**	**0**	**0**
Ch28	A9 unpaired chaeta	mp_0 (A_{05})	0	0	0	0	0	0	0
Ch29	A9 Abd IV	mp_1-mp_3 (A_5-B_5); >5 (6)	3	**2**	2(3)	3	**2**	3	0

Ch30	A10 Abd IV	p_{1a}-p_3 (A_{6i}-B_6); >5 (6)	3	**4**	4(5)	5	**7**	**2**	4
Ch31	A11 Abd IV	$T_1(ma_{4e})$ as thrichobothrium	0	0	0	0	0	0	0
Ch32	A12 Abd IV	$T_2(m_4)$ as thrichobothrium	1	**0**	1	1	**0**	**0**	**0**
Ch33	A13 Abd IV	$T_4(mp_4)$ as thrichobothrium	1	1	1	1	1	1	1
Ch34	A14 Abd IV	T_6 (p_4) as thrichobothrium	0	**1**	0	0	**1**	**1**	**1**
Ch35	Ratio Abd IV/Abd III	2 < R < 4 (1), R > 4 (2)	2	2	2	2	2	2	2
Fur	Manubrium and dens length		1020	**1500**	1660	1390	**1696**	**920**	1460
Ch36	Manubrial plate	chaetae number; >10 (11)	11	**7**	10	11	-	-	8
Ch37	Manubrial plate	pseudopores 1-3	3	3	3	3	-	-	3
Ch38	Mucro	sub-apical tooth without (0), normal (1), big (2), small (3)	2	2	2	2	2	2	2
Ch39	Mucro	basal spine absent (0), present normal (1), present big (2)	1	1	1	1	1	1	1
Ch40	Eyes	number	8	8	8	8	8	8	8
Ch41	Eyes	lower-case if smaller	EF>gh	EF>gh	EF>gh	EF>gh	EF>gh	EF>gh	EF>gh
Ch42	Empodium	tooth: present (1), absent (0)	0	0	0	0	0	0	0
Ch43	Tenent hair	clavate (1), acuminate (2)	1	1	1	1	1	1	1
Ch44	Manubrium smooth chaetae	absent (0), present (1)	0	0	0	0	0	0	0
Ch45	Labial chaetae	absent (0), smooth micro (1), smooth macro (2), ciliated micro (3), ciliated Macro (4)	-44333	**044444**	-	044333	-	**44434**	**044344**
Ch45	Labial chaetae (letter)		-MRell	-MRELL	-	-MRell	-	-MMReLL	-MReLL
Ch46	Scale-like chaetae	absent (0), present (1)	0	0	0	0	0	0	0
Ch47	Dens with spines	absent (0), present (1)	1	1	1	1	1	1	1
Ch48	Dens with spines	Number	20-23	**42**	28	27-40	36-38	**20**	33-44
		Differential characters		**16**			**14**	**14**	**12**
		B to A and E, F G to D	**A**	**B**	**C**	**D**	**E**	**F**	**G**

Etymology: The new species is dedicated to Felipe N. Soto-Adames, a known specialist on Collembola.

***Homidia yoshiii* n. sp.** (Figs 1E, 4A–D, 5H)

Type locality. Japan, Miyako Is.

Type material. Holotype, specimen in tube. 'Japan: Miyako Is. 24.V.1959 leg. Nishihita, 39 specimens'. Deposited in the MHNG.

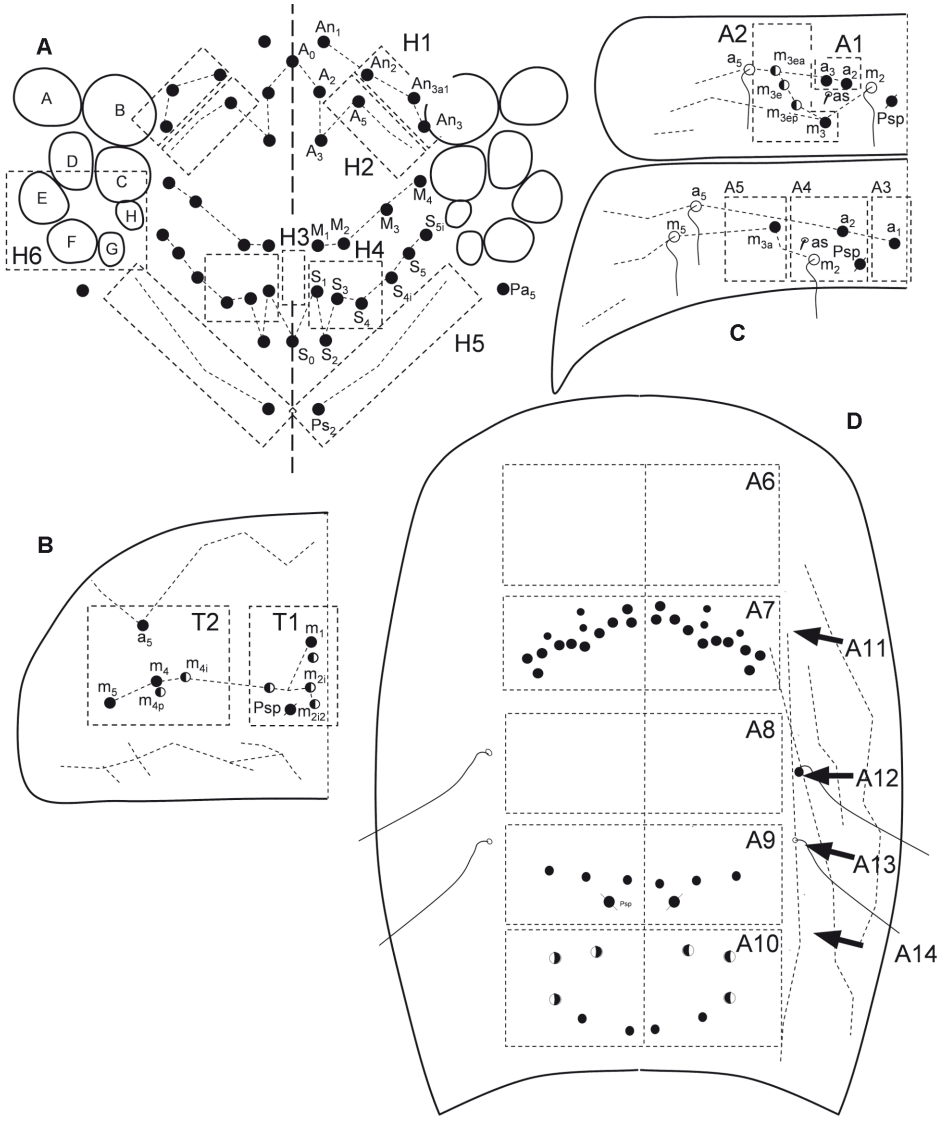


Fig. 4 *Homidia yoshiii* n. sp. macrochaetotaxy. A: head; B: Th II; C: Abd II-III; D: Abd IV.

Other material. 'Japan: Miyako Is. 24.V.1960 leg. Nishihita, 56 specimens'

Description

Body length up to 2.63 mm excluding antennae (Tab. 1). Ground colour pale yellow; pattern as Fig. 1E.

Head: Eight eyes, GH smaller than EF. Antennae length 1.44 μm, 2.88 times the length of the head; relative length of Ant 1.00/1.40/1.28/2.08. Ant IV with 2 lobe apical vesicle. 4 smooth labral papillae. Labial base chaetal formula: -MRell, ell smooth.

Body: Length ratio Abd IV/III: 5.0. Claw with 3 internal teeth: first pair at 55% of distance from base of claw, and one odd tooth at 70% of distance from base; dorsal tooth basal, and lateral ones before level of paired teeth. Empodium spike-like, with smooth external edge on leg III (Fig. 5H). Length of manubrium and dens 1.39 μm. Manubrial plate with 11 chaetae and 3 pseudopores. Mucro with basal spine, subapical teeth clearly larger than terminal one.

Chaetotaxy: Simplified macrochaetae formula: 3-1-0-3-1b/5-5/2-4/1-1-1/0-13-0-3-5.

Head chaetotaxy as Fig. 4A. Thorax chaetotaxy: T1 area on Th II with 5 macrochaetae (m_1, m_{2i}, m_{2i2} and two additional chaetae present), T2 area on Th II with 5 macrochaetae present (a_5, m_4, m_{4i}, m_{4p} and m_5) (Fig. 4B). Abdomen chaetotaxy (Figs 4C–D): A1 area on Abd II with 2 macrochaetae and A2 area on Abd II with 4 macrochaetae. Abd III with 1 macrochaeta on areas A3-A5.

Biology: Unknown.

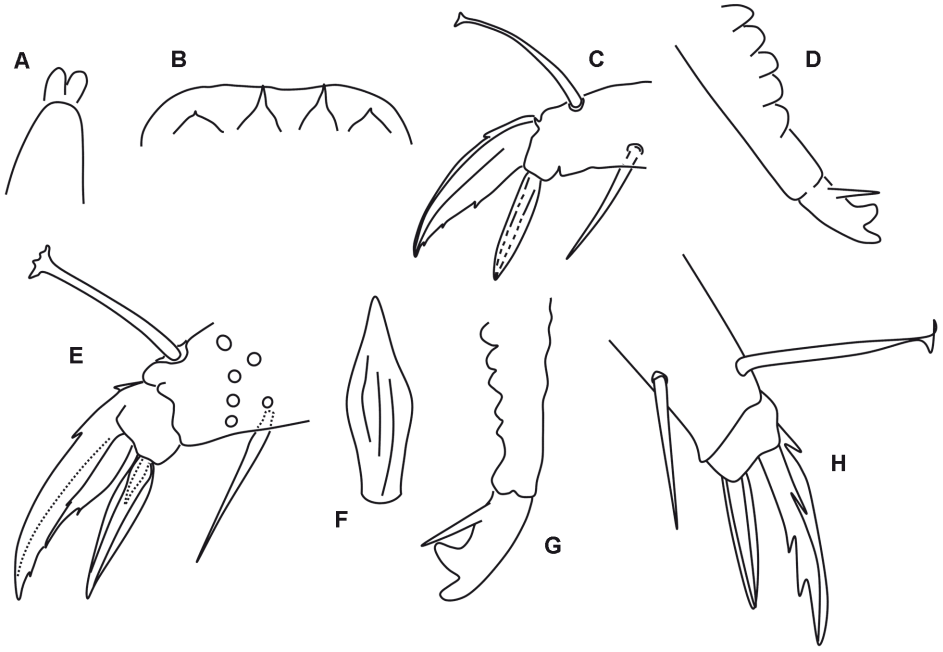


Fig. 5 *Homidia rosannae* n. sp.; A: antennal vesicle; B: labral papillae; C: claw and empodium; D: end of dens and mucro.
Homidia sotoi n. sp.; E: claw and empodium; F; one of the dental spines; G: end of dens and mucro.
Homidia yoshiii n. sp.; H: claw and empodium.

Discussion. The specimens were identified by Yoshii as *H. munda*, but some differences in colour pattern can be seen: the head is completely dark in *H. yoshiii* n. sp.; the dorsal dark patch on thoracic tergite II reaches the anterior side in *H. munda*, while it is only posterior in *H. yoshiii* n. sp.; the dark patch is anterior in *H. yoshiii* n. sp. and posterior in *H. munda*, which also has a transversal stripe on its posterior side in Abd I and III; *H. munda* also have some patches on posterior side in abdominal tergites IV and V. *H. yoshiii* n. sp. is close to *H. chosonica* Szeptycki, 1973 due to its 5 chaetae on T1 area (thoracic tergite II), but differs in the Abd II and IV chaetotaxy. It shares the formula 1-1-1 on Abd III only with *H. sauteri* from USA and *H. nigra* Lee & Lee, 1981, but is distinguished by multiple differences in its reduced dorsal macrochaetotaxy formula (Tab. 2). The identity of the specimens studied as new species is consistent with the fact of having been found on an island far south of where the species *H. munda* was found and described.

Etymology. The new species is dedicated to the memory of Riozo Yoshii, the eminent Japanese specialist in Collembola.

A general discussion about Japanese Homidia

The genus *Homidia* was established by Börner (1906) as a subgenus of the genus *Entomobrya* Rondani, 1861. Denis (1929) promoted it to the generic level. This genus is the only among Entomobryini with dental spines on its inner edge in adults. Its chaetotaxy shows a peculiar distribution of macrochaetae on Abd IV with a transversal anterior row (Area A7). 11 species of the genus have been found in Japan and are listed below.

H. amethystinoides n. nom. = *Homidia amethystina* Yosii, 1942 nec Börner, 1909.
H. chrysothrix Yosii, 1942
H. fujiyamai Uchida, 1954
H. munda Yosii, 1956
H. nigrocephala Uchida, 1943
H. rossannae n. sp.
H. sauteri (Börner, 1909)
H. socia Denis, 1929
H. sotoi n. sp.
H. subcingula Denis, 1948
H. yoshiii n. sp.

H. amethystinoides was described by Yosii in 1942 as *H. amethystina* Börner, 1909, but as this species is an *Entomobrya* without dental spines, we have changed the name by homonymy. The description is very poor and only refers to its characteristic colour and some morphological characters. *H. fujiyamai* and *H. nigrocephala* are species described by Uchida and were never found again, although its characteristic colour permits its identification. Specimens of these three species have not been found in the revised collection of Yoshii and only the original descriptions remain. We studied the types or some material of the rest of listed species and we can give its chaetotaxy (Tab. 3). A comparison among the species with known chaetotaxy is given in Table 4. The comparison shows many chaetotaxic differences among the species.

Tab. 3 Chaetotaxy of 8 Japanese species of *Homidia*. In bold text, exclusive and differential characters among the species

	H1	H2	H3	H4	H5	T1	T2	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	dens spines number
H. chrysothrix	3	**2**	0	3	0	**2**	5	2	3	0	2	**2**	0	**5**	0	2	2	30
H. munda	3	1	0	3	2(1m)	4	**7**	2	4	1	2	1	0	16(20)	0	2	**7**	36-38
***H. rossannae* n. sp.**	3	1	0	3	3	4	5	2	4	1	2	1	0	7(8)	2	3	3	20-25
H. sauteri	3	1	0	3	1b	4	**4**	2	3	1	2	1	0	8	0	3	3	20-30
H. socia	**5**	1	0	3	1b	4	5	2	4	0	**3**	0	1	7	0	3	2	14-30
***H. sotoi* n. sp.**	3	1	0	3	3(2m)	**3**	5	2	**6**	0	1	1	1	15(18)	2	2(3)	4(5)	28
H. subcingula	3	1	0	3	0	4	5	2	4	0	1	1	0	**6**	0	3	2	14-19
***H. yoshiii* n. sp**	3	1	0	3	1b	**5**	5	2	4	1	1	1	0	**13**	0	3	5	27-40

Tab. 4 Chaetotaxic differences among the species with known.

	H. chrysothrix	*H. munda*	*H. rossannae*	*H. sauteri*	*H. socia*	*H. sotoi*	*H. subcingula*	*H. yoshiii*
H. chrysothrix	**0**							
H. munda	**9**	**0**						
***H. rossannae* n. sp.**	**8**	**7**	**0**					
H. sauteri	**8**	**7**	**4**	**0**				
H. socia	**10**	**11**	**7**	**8**	**0**			
***H. sotoi* n. sp.**	**10**	**10**	**8**	**10**	**9**	**0**		
H. subcingula	**8**	**8**	**7**	**8**	**6**	**8**	**0**	
***H. yoshiii* n. sp.**	**11**	**8**	**5**	**6**	**9**	**6**	**7**	**0**

Key of Japanese species of Homidia

1 Entirely white o yellowish from Th II to Abd III entirely white T2 area on Th II with 5 macrochaetae ..... ***H. rosannae* n. sp.**
– with some colour patches or dark pigment on these body segments 2
2 Th III to Abd IV totally dark, with or without posterior darker band 3
– Th III to Abd IV not totally dark, but with some coloured pattern or without pigment in some segment 4
3 Th II entirely pigmented ..... ***H. amethystinoides* n. name**
– Th II with an anterior-lateral band and a posterior transversal stripe, head dark coloured ..... *H. nigrocephala*
4 Abd I without dark pigment, only ground colour 5
– Abd I with dark pigment 8
5 T1 and T2 on Th 2 with 4-4 macrochaetae respectively ..... *H. sauteri*
– T1 and T2 on Th 2 without such formula 6
6 T1 and T2 on Th 2 with 5-5 macrochaetae respectively ..... ***H. yoshiii* n. sp.**
– T1 and T2 on Th 2 without such formula 7
7 Abd III with 0-2-2 macrochaetae on A2-A3 areas ..... *H. chrysothrix*
– Abd III with 0-1-1 macrochaetae on A2-A3 areas ..... *H. subcingula*
8 Abd I with lateral bands 9
– Abd I with posterior transversal stripe ..... *H. munda*
9 Abd III completely dark and lateral darker bands ..... *H. fujiyamai*
– Abd III only with lateral bands 10
10 A4 in Abd III with 3 macrochaetae ..... *H. socia*
– A4 in Abd III with macrochaetae ..... ***H. sotoi* n. sp.**

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5. References

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