Soil Organisms 98 (3) 2026

Online First
DOI 10.25674/506

RESEARCH ARTICLE

Entomobrya terraeincognitae sp. nov.: A new species of springtail described from the Cambridge University Botanic Garden

James I. McCulloch [1,2]

[1] Wellcome Sanger Institute, Wellcome Trust Genome Campus, Hinxton, CB10 1SA, United Kingdom
[2] University of Cambridge, Cambridge CB2 3EJ, United Kingdom
Email: jm72@sanger.ac.uk

Received 3 April 2026 | Accepted 20 August 2026 | Published online 17 September 2026

Abstract

A new species of elongate springtail (Collembola: Entomobryomorpha) is described: *Entomobrya terraeincognitae* sp. nov. This species was collected from inside nurseries at the Cambridge University Botanic Garden in the UK and shares characteristics with some Neotropical and Nearctic congeners, suggesting that it may have been introduced from elsewhere. These characteristics include a relatively short fourth abdominal segment, the short spine-like setae of the trochanteral organ, and highly reduced dorsal chaetotaxy.

Keywords *Entomobrya* | new species | chaetotaxy | taxonomy | springtails

1 Introduction

Greenhouses are an important habitat to search for springtails, as the horticultural industry may be a route of import for non-native species. An example of this is *Sminthurinus domesticus* Gisin, 1963, a globular springtail that was first recorded in the UK at Kew Gardens in 1943 (Bagnall 1949). This species has since been recorded sporadically in other synanthropic situations, such as in flowerpots in the Natural History Museum London (collected by Gisin) and in an orchid nursery in Devon (Paul Ardron). However, in recent years, there have also been records of this species outdoors. If this species is considered non-native and no longer constrained indoors by the climate, it may signal a wider trend among Collembola. Indeed, there are other examples of likely non-native springtails becoming widespread in the country. These include at least two species of *Katianna*, which have only recently started being recorded in the UK and belong to a genus otherwise considered to be nearly exclusively Gondwanan (Bernard 2014). Non-native springtails such as these may have a negative impact on their recipient ecosystems.

The UK's fauna of putatively non-native Collembola is not solely composed of globular springtails (Symphypleona). Alongside them are Entomobryomorpha, also known as slender springtails or elongate springtails. One example is *Entomobrya petri* McCulloch, 2025, a highly distinctive species which was first recorded in the UK in 2015 but has since become widespread and locally common in the

SENCKENBERG
NATURE RESEARCH

ISSN 1864-6417 · eISSN 2509-9523
www.soil-organisms.org

country (McCulloch 2025). Its absence from the records and accounts of highly active 20th century British collembologists, contrasting with its apparent rapid increase in frequency in the decade since its discovery, supports that it is a non-native species.

This publication describes another new species of elongate springtail which is likely to be non-native in the UK, *Entomobrya terraeincognitae* **sp. nov.** This species is described from specimens collected from inside nurseries at the Cambridge University Botanic Garden; its description is crucial for evaluating its possible origins and for tracking possible future expansions in its distribution. It will join over 300 species in the genus *Entomobrya*, moderately-sized elongate springtails which can be found in leaf litter, on rocks, and on herbaceous and woody plants.

2 Methods

Springtail sampling took place in the Cambridge University Botanic Garden, UK, on 1.viii.2025 and 16.ix.2025, both in the public greenhouse as well as the nursery greenhouses. Collembola were collected by visually searching on plants, surfaces, and on and beneath flowerpots, and by sieving woodchips. One specimen of *Entomobrya terraeincognitae* sp. nov. was collected from woodchips in a flowerpot using an aspirator on 1.viii.2025, and 36 specimens were collected on 16.ix.2025 from plants of *Pistia stratiotes* L. floating in a tank. These specimens were preserved in absolute ethanol. Some of these specimens were then mounted in Numount (Brunel Microscopes), and some were used for temporary slide mounts following clearing with 10% sodium hydroxide. Specimens were manipulated using a Brunel LBXZ stereomicroscope and microscopic characters were observed using 400x and 1000x magnification and phase contrast settings on a Brunel SP100 light microscope.

Abbreviations used: Ant = antennal segment; Th = thoracic segment; Abd = abdominal segment.

To compare the dorsal chaetotaxy with that of other *Entomobrya* from the Palaearctic, the sum of the macrosetae in the taxonomically important areas of the thorax and abdomen (specifically Th II, Abd II, Abd III, and Abd IV) according to Jordana & Baquero (2005) was calculated for all *Entomobrya* included in Jordana (2012) which had a complete dorsal chaetotactic formula provided. This was then supplemented with chaeotactic formulae of Palaearctic species (including the Himalayas for consistency with Jordana (2012)) published since 2012, typically accompanying new species descriptions.

3 Results

Entomobryidae Tömösvary, 1882
Entomobrya Rondani, 1861

Entomobrya terraeincognitae sp. nov. McCulloch
urn:lsid:zoobank.org:act:3976D937-90EC-4D38-8C75-60EF44C2D2F8

Type material: Holotype on slide, aspirated from water lettuce in a nursery greenhouse at the Cambridge University Botanic Garden, Cambridge, UK, 16.ix.2025. Coordinates: latitude 52.194686, longitude 0.12679338. Two paratypes on slides and 25 paratypes in absolute ethanol. Types deposited in the Natural History Museum London. 8 further specimens were examined on temporary slides.

Etymology: The specific name means “from an unknown land”. This species was found in a botanical nursery, suggesting that it may not be native to the UK, however we cannot yet be certain of its actual place of origin.

Diagnosis: The following series of characters identifies this species as belonging to *Entomobrya*: 8+8 ocelli, two teeth and a basal spine on the mucro, bare intersegmental membranes, neither flattened chaetae nor dental spines, and an apical bulb on Ant IV. This species can be distinguished from other *Entomobrya* by a combination of its distinctive, sexually monomorphic colour pattern – particularly the rectangular dark band on Abd III which does not reach the lateral or hind edges of the segment, as well as the transverse band on Abd IV also not reaching the hind edge centrally – and its dorsal chaetotaxy. The chaetotaxy is highly reduced on the thorax and abdomen (paucichaetosis) and can be represented by the simplified formula 3-1-0-2-3/0-1/0-1/0-0-1/0-0-0-1-1.

Description: Body: small, length up to 1.8mm, not including antennae. Adult specimens of both sexes have broad dark bands on a paler background colour, with the dark pigment bordered with a burnt orange hue (Fig. 1). The basal antennal segments are the paler background colour, becoming greyer towards the apex. The head has smudges of dark pigment laterally, and occasionally an isolated dark spot behind the eye. Th II has dark pigment along the fore and lateral margins. Th III predominantly dark, often with a narrow pale mid-dorsal stripe. Abd I has smaller, ill-defined patches of dark pigment towards the centre, separated by a more distinct pale mid-dorsal stripe. Abd II mostly unpigmented, but bordered with dark pigment along the lateral and hind edges. Abd III mostly darkly pigmented, but the rectangular patch of pigment is squared off before reaching the lateral margins and also does not reach the hind margin. When viewed laterally, Abd IV has a longitudinal stripe of pigment on each side, arching towards the mid-dorsum; these stripes are connected in the middle by a much broader, irregular transverse band of pigment which does not contact the hind edge of the segment. This band may also be broken in the middle by a faint pale mid-dorsal stripe. Abd V has lateral and hind margins broadly darkly pigmented. Anterior half of Abd VI darkly pigmented. The underside of the femur of leg 3 is darkly pigmented in the apical two thirds. Length ratio of Abd IV/III ~ 3 at midline. An example of the vestiture of the collophore is illustrated in Fig. 4B and pictured in Fig. S9.

Head: 8 ocelli, GH smaller and harder to discern than EF (Fig. 3A). Ratio of the length of antennae to the head: 3. Length ratio of Ant I/II/III/IV: 1.0/2.5/2.5/3. Apical vesicle of Ant IV simple. Labial and post-labial chaetotaxy illustrated in Fig. 5B, all ventral cephalic chaetotaxy imaged in Fig. S10. Setae a1-a3, a5, e, and l smooth, seta M ciliate. Ventral groove with 5 marginal setae. Labral papillae simple, smooth (Fig. 5D). Maxillary lobe with the basal and apical chaetae subequal in length and an indent in the lobe apically, lateral to the apical chaeta (Fig. 5C). Labial papilla E with three guard setae plus the lateral projection (Fig. 5A).

Leg: Single smooth tenent hair on the tibiotarsus by the claw expanded at the tip (Fig. 2C). Claw (Fig. 2C) with four internal teeth: the most basal two are paired, about 40% from the base of the claw, with the other two unpaired, positioned at 70% and 90% of the way from the

Figure 1. Two adult specimens of *Entomobrya terraeincognitae* sp. nov. from the Cambridge University Botanic Garden showing the dorsal and lateral pattern.

base to the tip. The most basal internal tooth can be very small or invisible. One small basal dorsal tooth. Lateral teeth present, positioned at ~40% of the way between the base of the claw and

The basal pair of internal teeth. Both the internal edge of the claw and the external edge of the empodium are smooth. The empodium is acuminate (Figs 2C, S7). Trochanteral organ comprising a dozen short spine-like chaetae in a triangular formation, including four close together comprising the apical side of the triangle (Fig. 4A).

Furca: Manubrial plate with three chaetae arranged in an obtuse angle, proximal and basal to usually two pseudopores (Fig. 2B). Sometimes only one pseudopore can be discerned. Mucro with two teeth, the apical tooth smaller (Figs 2D, S8). Single basal spine on the mucro reaching the tip of the subapical tooth.

Dorsal chaetotaxy: simplified chaetotaxy formula 3-1-0-2-3/0-1/0-1/0-0-1/0-0-0-1-1 (Fig. 2A). Head chaetotaxy as shown in Fig. 3A and Fig. S2. Thorax chaetotaxy as in Figs 3B, 3C, and S3: area T1 on Th II has no macrosetae, area T2 has only a_5. Abdominal chaetotaxy as in Figs 3D, 3E, 3F, S4, S5, and S6: area A1 on Abd II without macrosetae, A2 with only m_3. Areas A3 and A4 on Abd III without macrosetae, A5 with only m_3. Areas A6, A7, and A8 on Abd IV also lack macrosetae, with A9 and A10 with B_5 and B_6 respectively; two trichobothria present, T_2 and T_4.

Ecology: The type specimens were collected from four small individual plants of water lettuce, *Pistia stratiotes*, floating in a tank in a nursery greenhouse (Fig. 6). The tank also contained several plants of mosaic flower, *Ludwigia sedioides* (Bonpl.) H.Hara, but was otherwise empty. The rim of the metal tank is a few feet off the

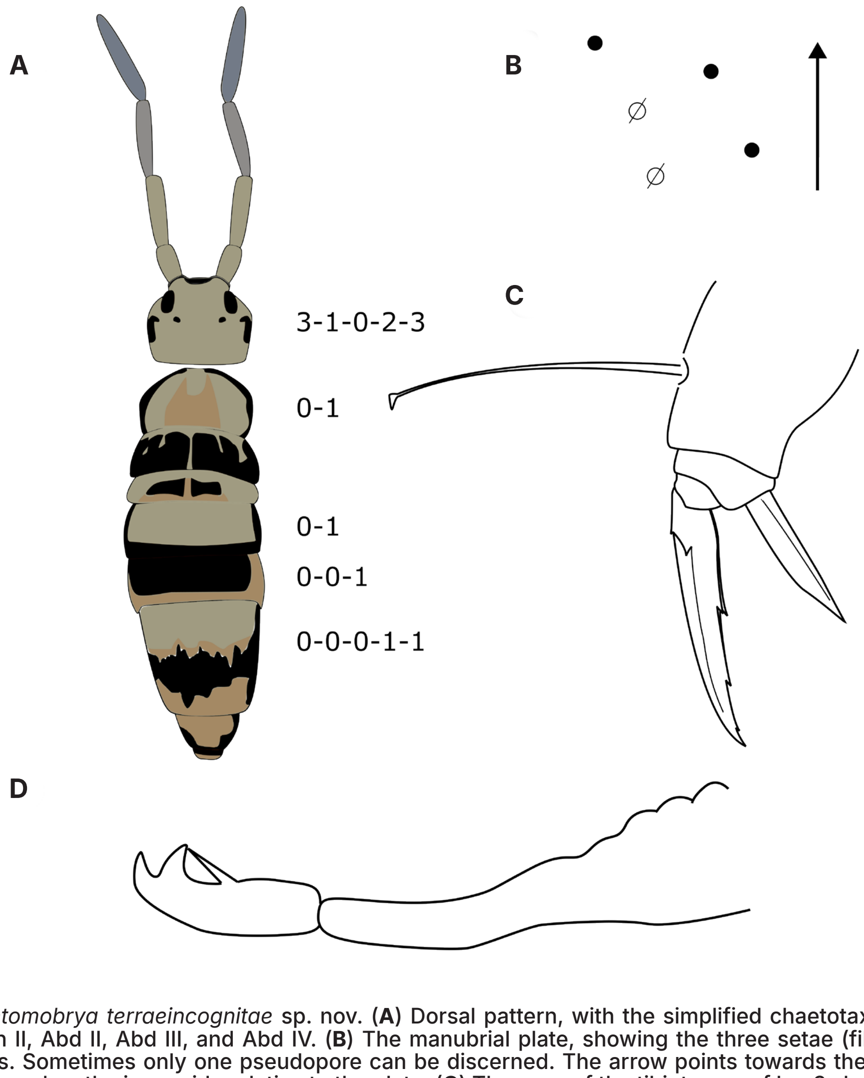

Figure 2. *Entomobrya terraeincognitae* sp. nov. (**A**) Dorsal pattern, with the simplified chaetotaxy formula incorporating the head, Th II, Abd II, Abd III, and Abd IV. (**B**) The manubrial plate, showing the three setae (filled circles) and the two pseudopores. Sometimes only one pseudopore can be discerned. The arrow points towards the base of the manubrium and is positioned on the inner side relative to the plate. (**C**) The apex of the tibiotarsus of leg 3 showing the tenent hair, the claw (unguis) with four internal teeth including two paired, lateral tooth, and small basal dorsal tooth, and the acuminate empodium (unguiculus). (**D**) Mucro and the apex of the dens. The subapical tooth is larger than the apical tooth, and the basal spine approximately reaches the tip of the subapical tooth.

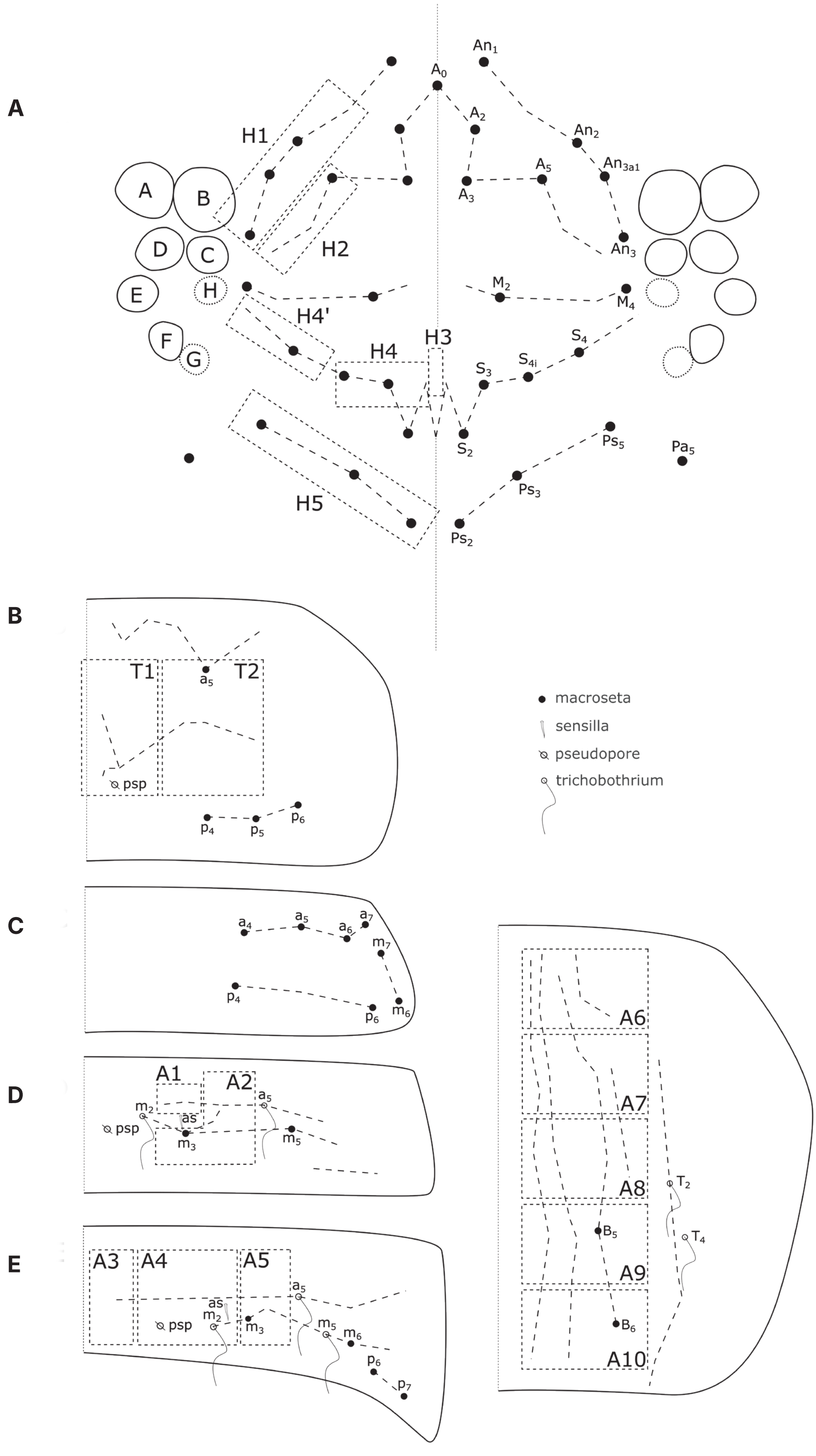

Figure 3. Chaetotaxy of the head, thorax, and abdomen of *Entomobrya terraeincognitae* sp. nov. (**A**) Head. Only interocular mesosetae are shown. (**B**) Second thoracic segment. (**C**) Third thoracic segment. (**D**) Second abdominal segment. (**E**) Third abdominal segment. (**F**) Fourth abdominal segment.

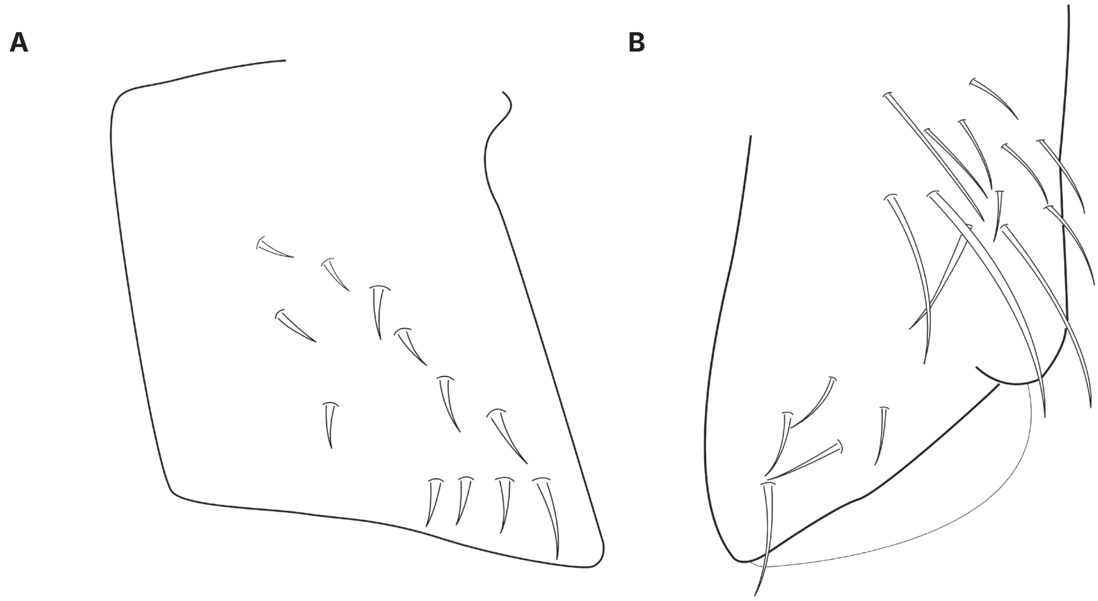

Figure 4. *Entomobrya terraeincognitae* sp. nov. (**A**) Trochanteral organ. (**B**) Chaetotaxy of the collophore from a lateral view, anterior face on the right.

ground and there were no overhanging plants. The water lettuce was not near the edge of the tank, but there may have been a clear route to the plants previously, especially given that water lettuce floats freely. One other juvenile specimen of *Entomobrya terraeincognitae* sp. nov. was found in a terracotta plant pot containing a young plant of *Rhododendron aurigeranum* Sleumer from Papua New Guinea.

Other records of *E. terraeincognitae* sp. nov. as a morphospecies

Specimens with identical pattern to *E. terraeincognitae* sp. nov. were collected from the tropical house of the Inverness Botanic Gardens, UK, on 14.xii.2024, 18.i.2025, and 16.v.2025 by Finley Hutchinson. Additionally, photographs of specimens with the same pattern were posted to the online forum BugGuide by Eric Ryvicker in September 2022 with this caption: "I have been culturing these springtails from a small group of wild caught specimens in Rhode Island for around 4 months … they thrive on a diet of nutritional yeast" (https://bugguide.net/node/view/2174144, accessed 30.ix.2025). The precise collection location is given as Barrington, Bristol County, Rhode Island, USA. The species name provided is *Entomobrya trifasciata*, however it appears this name was unintentionally misapplied without knowledge of the pre-existing *Entomobrya trifasciata* Handschin, 1927, and was intended as a new name (which would have been a *nomen nudum*). *Entomobrya terraeincognitae* sp. nov. is compared to *Entomobrya trifasciata* Handschin, 1927 in the Discussion. Neither the specimens from Inverness nor those from Rhode Island have been examined microscopically and therefore they cannot be unequivocably ascribed to *Entomobrya terraeincognitae* sp. nov. *sensu stricto*. However, they are indistinguishable macroscopically and are important records for understanding the distribution of the morphospecies.

Highly reduced dorsal chaetotaxy

Fig. 7 illustrates the distribution of the number of taxonomically-important macrosetae on the thorax and abdomen (defined as those included in the simplified chaetotaxy formula of Jordana & Baquero (2005)) of 139 species of *Entomobrya* known from the Palaearctic. The mean number of macrosetae in the taxonomically-important regions is 25 (2 s.f.) with a standard deviation of eight. There are several species that greatly exceed 25, such as *E. parazistei* Denis, 1933 which typically has 54, and some plurichaetotic species can have over 60, such as *E. cheni* Baquero, Arbea & Jordana, 2010 and *E. margaretae* Gruia, 1967 . However, only two species have fewer than 10: *E. montana* Stebaeva, 1971 with nine and *E. terraeincognitae* sp. nov. with five. Table S1 provides a full list of Palaearctic species for which the number of taxonomically-important body macrosetae could be calculated.

Figure 5. The mouthparts of *Entomobrya terraeincognitae* sp. nov. (**A**) Labial papilla E with the lateral process coloured in black. (**B**) Labial and postlabial chaetotaxy. Upper-case setae are serrated. (**C**) Maxillary lobe with three setae on the sublobal plate. **(D)** The smooth and rounded labral papillae.

Figure 6. The plants of *Pistia stratiotes* (water lettuce, the four light plants on the left) from which the type specimens of *Entomobrya terraeincognitae* sp. nov. were collected. The other plants are *Ludwigia sedioides*.

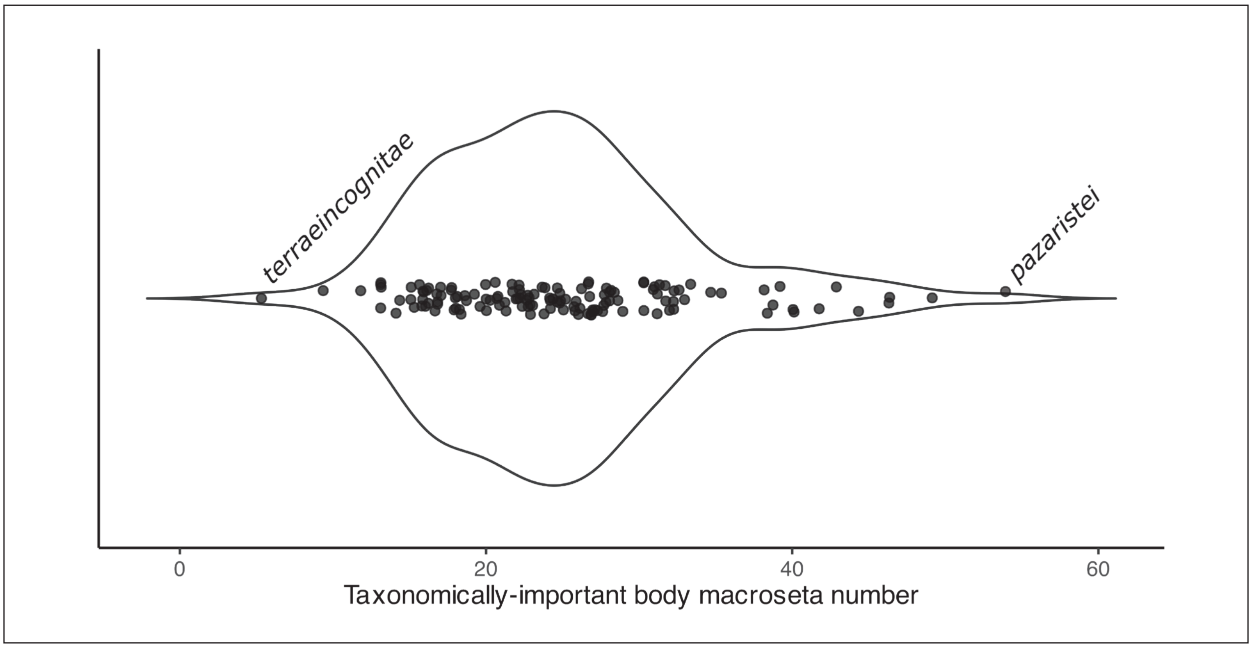

Figure 7. A violin plot illustrating the distribution of the number of taxonomically-important body macroseta number, as in the simplified chaetotaxy formula by Jordana & Baquero (2005), for 139 Palaearctic and Himalayan *Entomobrya*. The species with the most (*pazaristei*, 54 mac) and fewest (*terraeincognitae* sp. nov., 5 mac) are labelled.

4 Discussion and conclusion

Table 1 provides a comparison between *Entomobrya terraeincognitae* sp. nov. and other species with similar colour patterns and/or reduced chaetotaxy. The majority of these are Nearctic or Neotropical, with *E. corticalis* (Nicolet, 1842) considered to be the only Palaearctic species with a similar colour pattern. Nevertheless, *E. corticalis* rarely has pigment dorsally on Th III and Abd I, and its chaetotaxy formula differs in all five key regions (head, Th II, Abd II, Abd III, Abd IV) (Jordana 2012). Beyond pattern, *E. terraeincognitae* sp. nov. has many fewer macrosetae in the taxonomically important regions (Jordana & Baquero 2005) of the thorax and abdomen than any other Palaearctic species for which the simplified chaetotaxy formula can be inferred or is provided by Jordana (2012) or other sources cited in Table S1. There is need for a molecular phylogeny of *Entomobrya* to allow any ecological or environmental correlates of features such as this reduced chaetotaxy to be identified through phylogenetically-controlled comparative analyses.

Not many of the character states are known for *Entomobrya trifasciata* Handschin, 1927, a species described from Costa Rica which has a similar colour pattern. However, the dentation on the claw differs, with *E. trifasciata* described to have only two internal teeth and there are no dorsal teeth featuring in the illustration accompanying the original description (Handschin 1927). Furthermore, the dark transverse band on Abd IV extends posteriorly to the hind margin of the segment. Soto-Adames (2002) noted that three other Neotropical species have a colour pattern similar to *E. trifasciata* (and, by extension, to *E. terraeincognitae* sp. nov.): *E. protrifasciata* Denis, 1931, *E. similis* Denis, 1931, and *E. linda* Soto-Adames, 2002. Like *E. trifasciata*, *E. protrifasciata* has the transverse band on Abd IV extending posteriorly to the hind margin, while *E. similis* and *E. linda* are unpigmented dorsally on Abd I, and *E. similis* is also described as having a long mucro (Soto-Adames 2002).

Entomobrya linda and *E. terraeincognitae* sp. nov. are quite similar, as can be seen in Table 1, however the most striking difference is the relative lengths of the third and fourth abdominal segments. In *E. terraeincognitae* sp. nov., the fourth abdominal segment is approximately three times the length of the third, while in *E. linda* this ratio is greater than four (Fig. S11). Another difference between *E. terraeincognitae* sp. nov. and *E. linda* is the new species having a greater number of spine-like chaetae comprising the trochanteral organ. Furthermore, *E. linda* does not have seta M_4 on the head as a macrochaeta, unlike in *E. terraeincognitae* sp. nov. With regard to pattern, alongside the lack of pigment on Abd I of *E. linda*, *E. linda* also has the dark pigment extend to the hind *and* lateral margins of Abd III, which it does not in *E. terraeincognitae* sp. nov. The lack of pigment laterally on Abd III is particularly distinctive in *E. terraeincognitae* sp. nov. as it results in a relatively neat dark rectangle, the limits of which can be discerned from a top-down view. The lateral process of labial papilla E does not reach the apex of the papilla in *E. terraeincognitae* sp. nov., whereas it does in *E. linda* (Figs 5A, S1). Additionally, the empodium lacks any teeth (up to three in *E. linda*) and is acuminate (Figs 2C, S7). All specimens of *E. terraeincognitae* sp. nov. examined have the subapical mucronal tooth larger than the apical tooth (Fig. S8), whereas most specimens of *E. linda* have the teeth subequal. *E. darwini* Katz, Soto-Adames & Taylor 2016 and *E. longiseta* Soto-Adames 2002 also have similar chaetotaxy to *E. terraeincognitae* sp. nov., but the new species lacks m_4 on Th II and has 3 macrosetae in the head Ps series (Katz *et al.* 2016, Soto-Adames 2002).

E. barbata Siqueira & Bellini 2020 is also similar in pattern to *E. terraeincognitae* sp. nov. *E. barbata* differs from *E. terraeincognitae* sp. nov. by having 5 macrosetae in the A_n series of the head (4 in *E. terraeincognitae* sp. nov.), 1-2 central p macrosetae on Th II (rather than none), and 3-4 central macrosetae on Abd IV (rather than two) (da Cunha Santos *et al.* 2020). Furthermore, the labral papillae of *E. barbata* have 4-7 projections (not smooth) and the empodium has small teeth, whereas that of *E. terraeincognitae* sp. nov. does not (da Cunha Santos *et al.* 2020). *E. barbata* also has a relatively shorter third abdominal segment, similar to *E. linda*. The labial chaetotaxy of *E. terraeincognitae* sp. nov. is reduced relative to *E. barbata*, lacking a_4 and possessing only one L seta rather than two. The dorsal tooth on the claw of *E. barbata* is positioned between the base and the internal pair of teeth, rather than basally, and the mucronal spine surpasses the tip of the proximal tooth.

As included in Table 1, *E. linda* and *E. barbata* have reduced dorsal chaetotaxy compared to most *Entomobrya*, albeit not quite as reduced as *E. terraeincognitae* sp. nov. Two Nearctic taxa are notable for having a similarly reduced dorsal chaetotaxy and a similar pattern to *E. terraeincognitae* sp. nov.: *E. assuta* Folsom, 1924 and *E. citrensis* Katz & Soto-Adames, 2015. *E. assuta* is highly variable in pattern, but there are other morphological differences; *E. assuta* also has a highly reduced dorsal chaetotaxy, but always has An_{3a2} on the head, m_{3e} on Abd II, and C_1 and A_6 on Abd IV, all of which are missing in *E. terraeincognitae* sp. nov. Further, *E. terraeincognitae* sp. nov. does not have any of the taxonomically important setae *E. assuta* is missing. Beyond chaetotaxy, *E. assuta* has projections on the labral papillae (which are smooth in *E. terraeincognitae* sp. nov.) and many more setae

Table 1. Set of characters for identifying *Entomobrya*, as proposed by Jordana & Baquero (2005), with the corresponding observed values for *E. terraeincognitae* sp. nov. and selected *Entomobrya* with a similar colour pattern and/or chaetotaxy: *E. linda* (from Soto-Adames 2002), *E. assuta* (from Katz *et al.* 2015 and Folsom 1924), *E. ligata* (from Christiansen & Bellinger 1998 and Folsom 1924), *E. barbata* (from da Cunha Santos *et al.* 2020), *E. longiseta* (from Soto-Adames 2002), and *E. darwini* (from Katz *et al.* 2016). Values in brackets represent less common alternative phenotypes. Hyphens represent the character not being described or illustrated in the cited sources. † the illustration of *E. ligata* in Christiansen & Bellinger (1998) seems to show 4 internal teeth (2 paired, 2 unpaired), while Folsom (1924) describes the unguis having 3.

Character	Location	Description	Range of values	*E. terraeincognitae* sp. nov.	*E. linda*	*E. assuta*	*E. ligata*	*E. barbata*	*E. longiseta*	*E. darwini*
Ch.1	H1 (Head)	An_2-An_3	1-6	3	3	4(5)	-	3	3	3
Ch.2	H2	A_5-A_7	1-3	1	1	1	-	1	1	1
Ch.3	H3	S'_0	0-1	0	0	1(0)	-	0	0	0
Ch.4	H4	S_1-S_3-S_{4i}	0-3	2	2	2	-	1	2	2
Ch.5	H5	Ps_2-Ps_3-Ps_5	0-3	3	3	3	-	3	3	1
Ch.6	labral papillae	simple and smooth (1), wrinkled or with some projections (2), a chaeta-like projection (3)	1-3	1	1	2	3	2	-	1
Ch.7	ocelli G and H size	=E and F (1), < E and F (2)	1-2	2	2	2	-	2	2	2
Ch.8	apical antennal retractile bulb	no bulb (0), bulb simple (1), bilobate (2), trilobate (3)	0-3	1	1	2(1,3)	-	2(1)	1	1
Ch.9	ratio Ant/Head	> or = 3 (1), > or = 2 < 3 (2), < 2 (3)	1-3	1(2)	2	2	-	2	-	-
Ch.10	anterior dorsal mane Th II Mc	with Mc type 1 (1), without Mc or type 2 (2)	1-2	1	1	1	1	1	1	1
Ch.11	T1	chaetae number m_1-m_{2i2} or > 4 (5)	0-5	0	0	0	-	0	0	0
Ch.12	T2	chaetae number a_5, m_4-m_5 or > 8 (9)	0-9	1	2	1	-	1-2	2	2
Ch.13	smooth chaetae on tibiotarsi	not or 1 on tibiotarsus III = 0, double file = 1	0-1	0	0	0	0	0	0	0
Ch.14	claw internal teeth	1(1), 2(2), 3(3), 4(4), 5(5)	1-5	4	4	4	3(4)†	4	4	4
Ch.15	claw dorsal tooth	absent (0), basal (1), internal teeth level (2), between pair teeth and base (3)	0-3	1	1	1	1	3	3	1
Ch.16	claw internal edge	without (0) or with ciliation (1)	0-1	0	0	-	-	-	-	-
Ch.17	external empodium	smooth (0), serrate (1)	0-1	0	0	-	-	-	-	1

Table 1 continued.

Character	Location	Description	Range of values	*E. terraeincognitae* sp. nov.	*E. linda*	*E. assuta*	*E. ligata*	*E. barbata*	*E. longiseta*	*E. darwini*
Ch.18	A1 Abd II	a_2-a_3	0-2	0	0	0	-	0	0	0
Ch.19	A2 Abd II	m_3 series chaetae number	0-7	1	1	2	-	1	1	1
Ch.20	A3 Abd III	a_1	0-1	0	0	0	-	0	0	0
Ch.21	A4 Abd III	above m_2 chaetae number	0-3	0	0	1	-	0	0	0
Ch.22	A5 Abd III	m_3-m_4 series chaetae number	0-4	1	1	1	-	1	1	1
Ch.23	A6 Abd IV	A_1-D_1 chaetae number; > 8 (9)	0-9	0	0	0	-	0	0	0
Ch.24	A7 unpaired chaeta	A_{03}	0-1	0	0	-	-	0	0	0
Ch.25	A7 Abd IV	A_2-E_1 chaetae number; > 9 (10)	0-10	0	0	1	-	0	0	0
Ch.26	A8 unpaired chaeta	A_{04}	0-1	0	0	-	-	0	0	0
Ch.27	A8 Abd IV	A_{4a}-C_{2a} chaetae number; > 5 (6)	0-6	0	0	-	-	0	0	0
Ch.28	A9 unpaired chaeta	A_{05}	0-1	0	0	-	-	0	0	0
Ch.29	A9 Abd IV	A_5-B_5 chaetae number; > 6 (7)	0-7	1	1	1	-	1	1	1
Ch.30	A10 Abd IV	A_6-B_6 chaetae number; > 5 (6)	0-6	1	1	2	-	1	1	1
Ch.31	A11 Abd IV	T_1 as trichobothrium	0-1	0	0	0	-	0	0	0
Ch.32	A12 Abd IV	T_2 as trichobothrium	0-1	1	1	1	-	1	1	1
Ch.33	A13 Abd IV	T_4 as trichobothrium	0-1	1	1	1	-	1	1	1
Ch.34	A14 Abd IV	T_6 as trichobothrium	0-1	0	0	0	-	0	0	0
Ch.35	ratio Abd IV/III	2 < R < 4 (1), R > 4 (2)	1-2	1	2	1	2	-	-	-
Ch.36	manubrial plate	chaetae number; > 10 (11)	0-11	3	3	-	-	3(4)	2	-
Ch.37	manubrial plate	pseudopores 1-2	1-2	2(1)	1	-	-	2	1	-
Ch.38	mucro	sub-apical tooth, without (0), normal (1), big (2), smaller (3)	0-3	2	1(2)	1	1	1	1	2
Ch.39	mucro	basal spine, absent (0), present (1)	0-1	1	1	1	1	1	1	1

on the trochanteral organ (up to 23 vs 12) (Katz *et al.* 2015). The pattern of *E. citrensis*, originally considered a form of *E. assuta*, is more similar to *E. terraeincognitae* sp. nov. than *E. assuta* in some respects (it has a dark transverse band on Abd IV) but more different in others (it lacks pigmentation on Th III). *E. citrensis* also differs in dorsal chaetotaxy, additionally possessing a_3 on Abd II, which is missing in *E. assuta* and *E. terraeincognitae* sp. nov., and has entirely purple-pigmented antennae.

Three further species are important to compare with *E. terraeincognitae* sp. nov. on account of their similar pattern: *E. triangularis* Schott, 1896, *E. ligata* Folsom, 1924, and *E. corticalis*. In these species there is similarity in terms of which body segments are pigmented or not and the shape of this pigmentation, however these species tend to have a more curved posterior edge to Abd III, and the pigment is more distinct: the patches are a darker black, and there is not orange colouration fringing the dark pigment. Furthermore, although neither the original descriptions of *E. triangularis* and *E. ligata* nor their accounts in Christiansen & Bellinger (1998) contain illustrations in which the specific macrosetae possessed can be easily identified on all important segments, they do not appear to share the same reduced dorsal chaetotaxy as *E. terraeincognitae* sp. nov. For example, *E. triangularis* possesses six macrosetae between trichobothria m_2 and a_5 on Abd II (Christiansen & Bellinger 1998), while *E. terraeincognitae* sp. nov. has just one. The same can be said more categorically for *E. corticalis*, which has the simplified chaetotaxy formula 3-2-0-2-3/1-3/0-2/1-1-1/0-0-1-1-2. Some authors consider *E. corticalis* and *E. ligata* to be conspecific (Jordana 2012). *E. spectabilis* Reuter, 1890 is also somewhat similar in colour pattern, though the pigment on Th III and Abd III is not a solid block as it is in *E. terraeincognitae* sp. nov., and its claw only has three teeth on the inner edge, rather than four (Jordana 2012).

The species is dissimilar in pattern to any native *Entomobrya* recorded from Australia (Jordana & Greenslade 2020). However, there has been recorded a uniformly-blue colour form of *E. assuta* on Barrow Island, Western Australia; Jordana & Greenslade (2020) propose that it was introduced during the construction of a gas processing plant. While there are some small differences in the dorsal chaetotaxy and the trochanteral organ, suggesting it may be a closely-related species as opposed to *E. assuta* itself, it represents a possible further example of a species in the *assuta* clade (an informal grouping based on pattern, relative Abd IV length, and reduced dorsal chaetotaxy) expanding beyond its native range.

This description adds a further species to an already speciose and complex genus. Though *Entomobrya* species are linked by shared morphological traits, phylogenetic and phylogenomic studies indicate that the genus may be polyphyletic (Godeiro & Bellini 2026, Cucini *et al.* 2026, S. Ebdon pers. comm.). Therefore, there is an urgent need for a review of the subfamily, preferably using molecular methods, in order to ensure the monophyly of its constituent genera, as well as to clarify the relationships between morphologically similar species.

Research is also required to gauge the extent of the negative impacts of non-native springtails on the native ecosystem, alongside comprehensive monitoring of potential sources – such as greenhouses – to track which species are being introduced and at what rate. This is not the first springtail species to be described from a greenhouse in the UK: the poduromorph *Ceratophysella robustiseta* Skarżyński & Smolis, 2006 was described from Kew Gardens greenhouses (Skarżyński & Smolis 2006). Further undescribed species are highly likely to be found in greenhouses, and it is probable that many of the recognised undescribed species of springtail in the UK were imported via the horticultural trade. These recognised undescribed species are already prospering outdoors, but with a changing climate it is possible that further species currently confined to indoor situations will be able to expand outdoors. Non-native species may have a competitive advantage; a study of the Collembola on the subantarctic Macquarie Island found that non-native species had greater desiccation tolerance, higher critical thermal maximum, and lower critical thermal minimum than the native species (Phillips *et al.* 2020). However, further studies are required to examine whether we would see the same result in a more temperate ecosystem.

Even without physiological tests, we could predict the spread and potential impact of non-native species by studying their ecology and environmental preferences in their native distribution. However, for many likely non-native species such as *Entomobrya terraeincognitae* sp. nov., their native distribution is unknown. The same is true for the recognised undescribed species which are considered to be non-native given that they were not noted or collected by 20th century collembologists but are now common and widespread. These include species currently referred to as Katiannidae genus nov. sp. nov. and *Katianna* sp. 3. The first step in identifying the native distributions is taxonomic description and comparison to related members of the global fauna. In the case of *Entomobrya terraeincognitae* sp. nov., characteristics such as highly reduced dorsal chaetotaxy, short Abd IV relative to Abd III, and the pattern suggest similarity to Nearctic and Neotropical species such as *E. assuta* and *E. citrensis*. However, even narrowing the options down to these realms still leaves a large range of possible environments and climates *E. terraeincognitae* sp. nov. could favour. This emphasises the need for more comprehensive taxonomic study of regions with a poorly-known Collembolan fauna in order to find non-native species in their native environments.

Online Supplementary Material

Figures S1–11
Table S1

Acknowledgements

I am very grateful to the Cambridge University Botanic Garden for allowing me to sample springtails in the gardens on two occasions in August and September 2025. I would also like to thank Finley Hutchinson for providing images of the *E. terraeincognitae* morphospecies from Inverness, and Aron Katz for providing comments on images of the habitus. I am also grateful to the anonymous reviewers for their helpful suggestions.

This research was funded in part by the Wellcome Trust Grant 108413/A/15/D and by the LinnéSys: Systematics Research Fund awarded by The Linnean Society of London and The Systematics Association.

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