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Nenteria lii sp. n. (Acari: Mesostigmata: Nenteriidae) a New Bamboo Leaf Litter Dwelling Uropodina Species (Acari: Mesostigmata) from Xinxiang (Henan, China) with Notes to the Bamboo Associated Mites in Henan (China)

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A new species *Nenteria lii* sp. n. is described on the basis of adults and deutonymphs collected in bamboo (*Phyllostachys* sp.) leaf litters in Xinxiang (Henan Province, China). The new species is very similar to the species *Nenteria japonensis* Hiramatsu, 1979, but the apical process of the female genital shield rounded and smooth in the new taxon, but serrate in the previously described Japanese species. A new key to the Eastern-Palearctic *Nenteria* species is given. A list of the collected bamboo leaf litter associated mites is presented.

Keywords: mites, new species, new records, bamboo, China.

Members of the family Nenteriidae are easy to recognize based on the well-developed paralaciniae on the anterior margin of the gnathosoma which is a unique character among the Uropodina mites (Lindquist et al., 2009). Recently, more than one hundred species have been discovered and named from all the regions of the world (Wiśniewski and Hirschmann, 1993). Some species are associated with insects (Kontschán et al., 2014b), but the majority can be found in soil and leaf litter (Wiśniewski and Hirschmann, 1993). Currently, we do not have any data about the nenteriid species collected in bamboo leaf litters.

From the agronomically very important bamboo genus *Phyllostachys* (gangzhu shu in Chinese) some 49 species are native to China with Zhejiang being the centre of species distribution. According to Zhengping and Stapleton (2006) there are 14 species with 4 varieties which are native to Henan (*P. angusta, P. aureosulcata, P. edulis, P. flexuosa, P. glauca* var. *glauca, P. glauca* var. *variabilis, P. heteroclada, P. mannii, P. meyeri, P. nidularia, P. propinqua, P. reticulata (*syn. *P. bambusoides), P. shuchengensis, P. sulphurea* var. *sulphurea, P. sulphurea* var. *viridis* and *P. vivax*). A further 3 species and 7 forms are listed as cultivated (*P. aurita, P. nidularia* f. *glabrovagina, P. nigra* var. *henonis, P. retic-*

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ulata f. *tanakae, P. reticulata* f. *mixta, P. reticulata* f. *lacrima-deae, P. rubromarginata, P. sulphurea* f. *houzeauana, P. vivax* f. *aureocaulis, P. vivax* f. *huangwenzhu*) in Henan (Ohrnberger, 2002).

During the past year the first two authors collected bamboo leaf and bamboo leaf litter material in the Henan region of China. This material was rich in mites and one of collected species was a new species. Here we offer the description of the adults and the deutonymphs, and we also present the collected mites on bamboo leaves and bamboo leaf litter.

Materials and Methods

Leaves and leaf litter of *Phyllostachys* bamboo species were collected in Henan region of China. Samples were placed into plastic bags and later transported to the Henan Institute of Science and Technology (Xinxiang) where the leaf litter samples were extracted using Berlese funnels. Specimens of the species found were cleared in lactic acid, investigated on half covered deep slides and illustrations were made with the aid of a drawing tube. Scanning electron micrographs were taken in the Hungarian Natural History Museum, Budapest, with a HITACHI SN 2600 scanning electron microscope; the specimens investigated were spatter-coated with gold-palladium. All specimens are stored in ethanol and deposited in the Hungarian Natural History Museum in Budapest, Hungary (HNHM) and the Natural History Museum in Geneva, Switzerland (NHMG). Width of the idiosoma was taken at the level of coxae IV. Measurements in the description and scale bars are in micrometres.

Results

Family Nenteriidae

Nenteria lii **sp. n.** (Figs 1–6).

Material examined: *Holotype:* female (HNHM). Xinxiang, Henan, China, garden of Henan Institute of Science and Technology, bamboo leaf litters, 17.X.2014. leg. J. Kontschán, W. Lii, D. Murányi and G. Q. Wang. *Paratypes:* one female, one male and one deutonymph deposited in NHMG, one male and one deutonymph in HNHM. Locality and date same as in holotype. Non-type material: Two females, one male and one deutonymph covered by gold-palladium and placed on aluminum holder in HNHM, locality and date same as in types.

Diagnosis: Dorsal and ventral idiosoma covered by oval pits, setae on both parts of body with serrated setae. First sternal setae in both gender smooth, others serrate. Apical process on anterior margin of genital shield rounded and smooth.

Description of female: Length of idiosoma 510–530 μm, width 410–420 μm (n = 4). Shape of idiosoma oval.

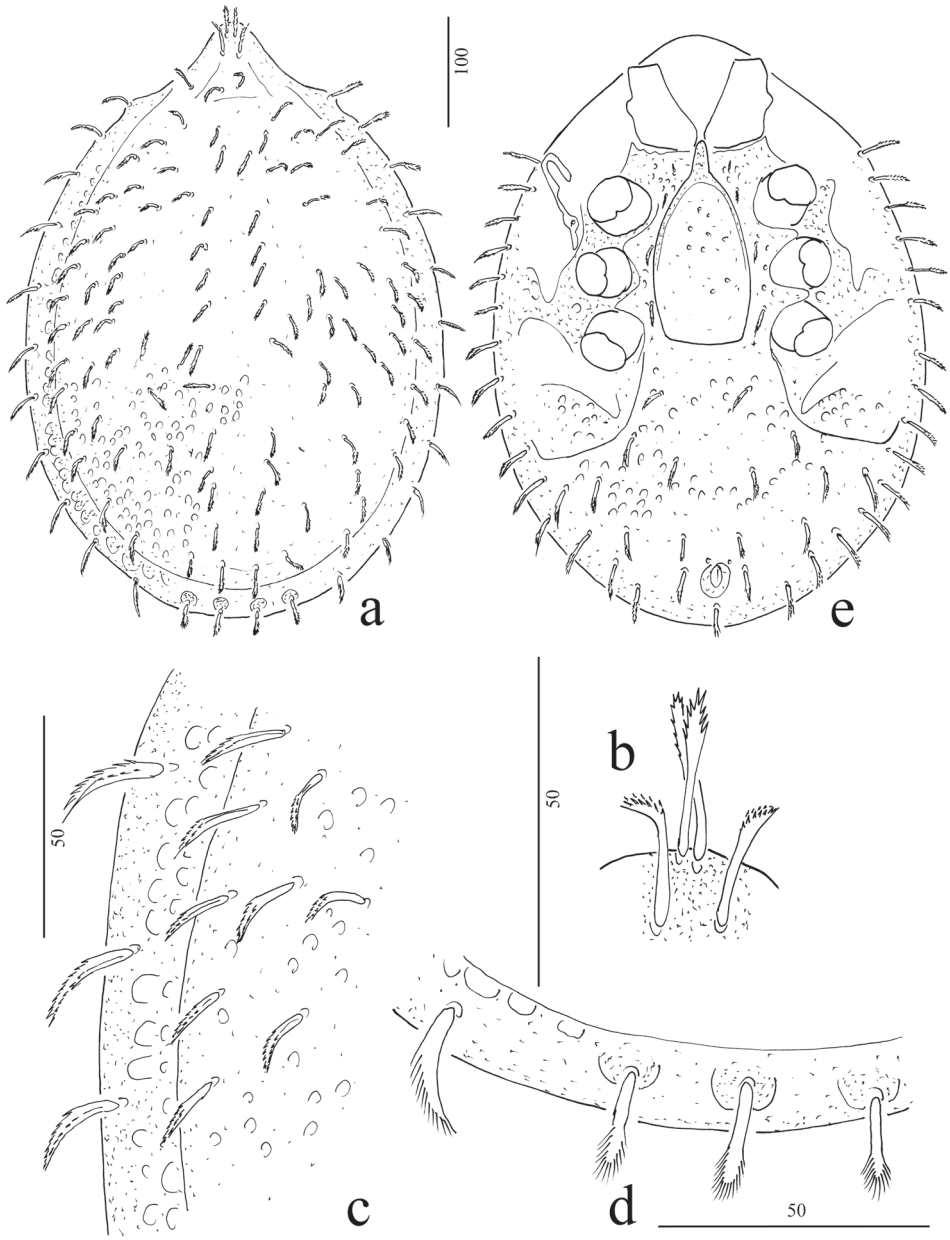

Fig. 1. *Nenteria lii* sp. n., female, holotype. a: Body in dorsal view; b: Setae on apical part of body; c: Setae and ornamentation on marginal and dorsal shields; d: Setae on caudal part of marginal shield; e: Body in ventral view

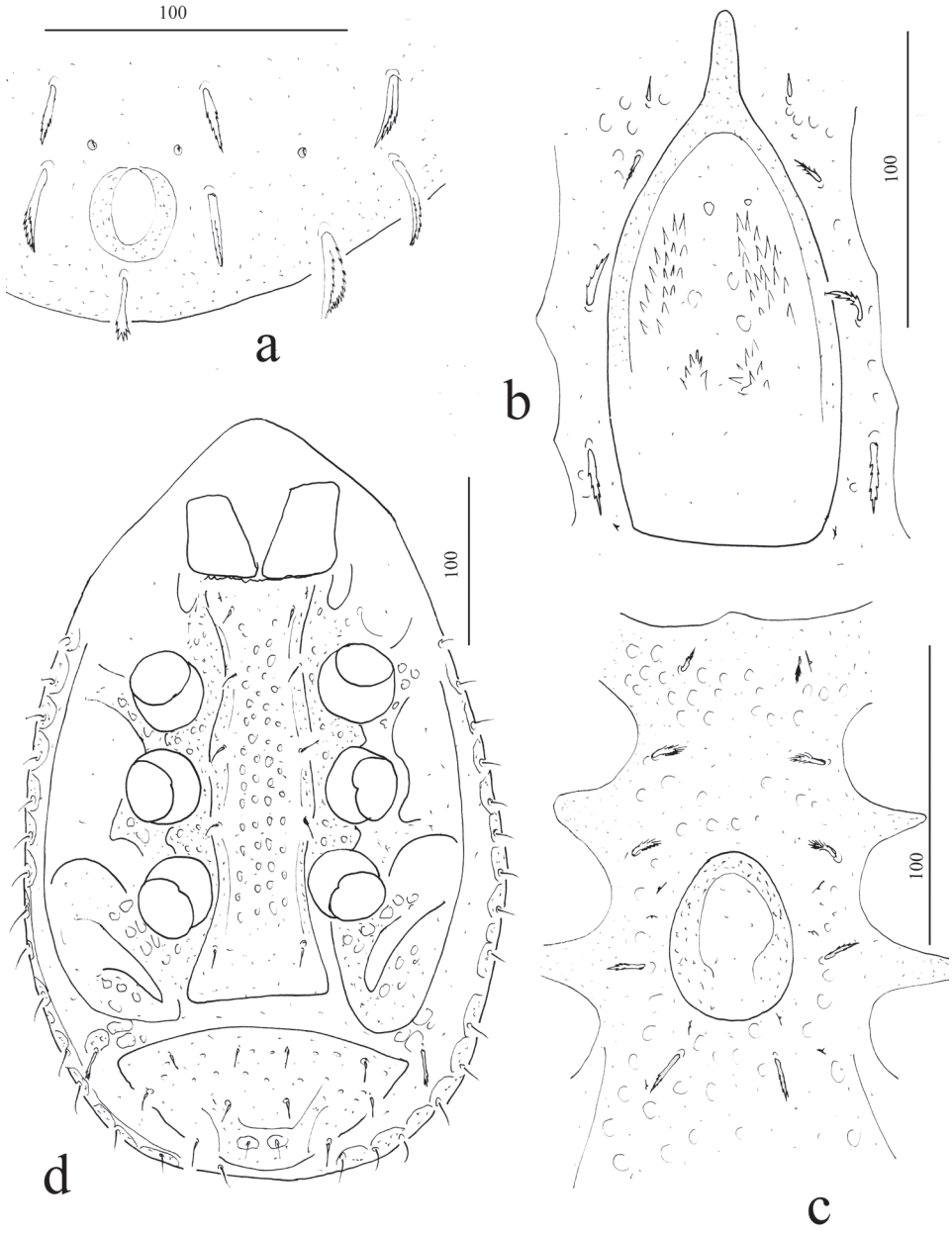

Fig. 2. *Nenteria lii* sp. n., female, holotype. a: Anal area; b: Intercoxal area of female; c: Intercoxal area of male paratype; d: Ventral view of deutonymph paratype

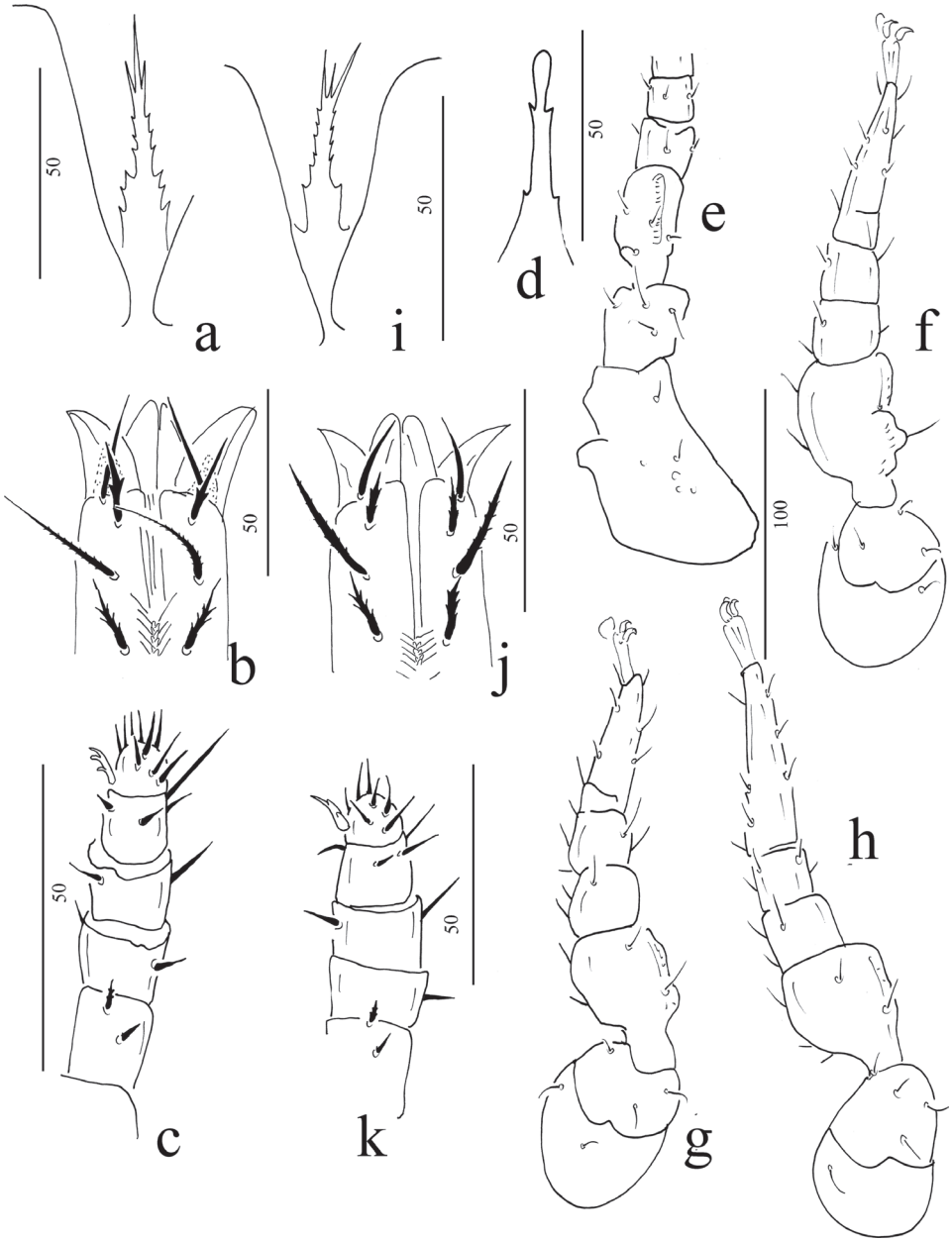

Fig. 3. *Nenteria lii* sp. n., female, holotype. a: Tritosternum; b: Ventral view of gnathosoma; c: Ventral view of palp; d: Epistome; e: Ventral view of leg I (apical part not illustrated); f: Ventral view of leg II; g: Ventral view of leg III; h: Ventral view of leg IV; i: Tritosternum of deutonymph paratype; j: Ventral view of gnathosoma of deutonymph paratype; k: Ventral view of palp of deutonymph paratype

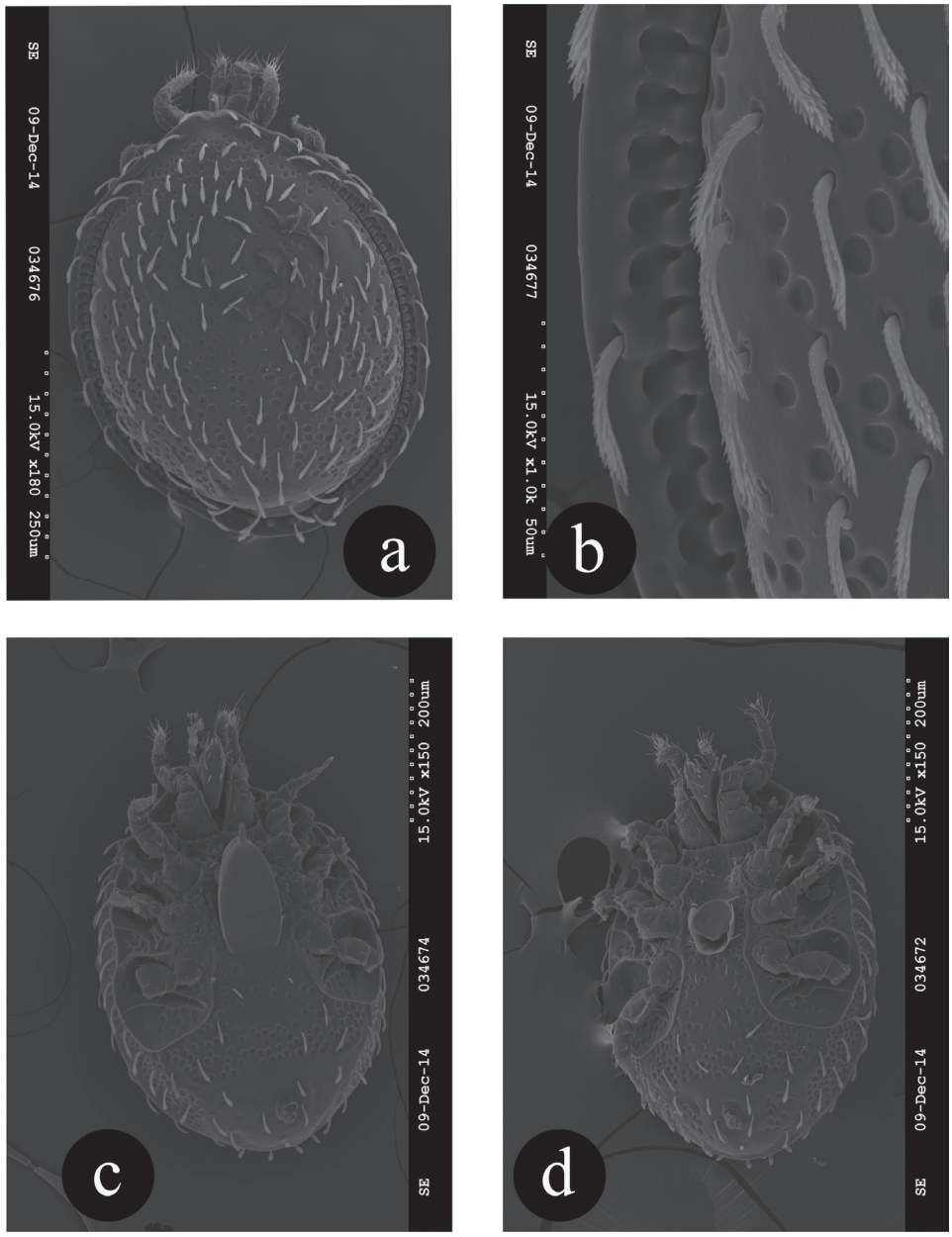

Fig. 4. Scanning micrographs about *Nenteria lii* sp. n., paratypes. a: Body in dorsal view; b: Setae and ornamentation on marginal and dorsal shields; c: Female body in ventral view; d: Male body in ventral view

Dorsal idiosoma (Fig. 1a and Fig. 4a): Marginal and dorsal shields fused anteriorly. Dorsal shield neotrichous. All setae on dorsal shield marginally serrate (ca 36–44 μm) (Fig. 1a, b, c and Fig. 4b). Surface of dorsal shield covered by oval pits (8 × 9 μm) (Fig. 1c and Fig. 4b). Setae on marginal shield similar in shape and length to dorsal setae, marginal shield ornamented by oval pits (Fig. 1c and Fig. 4b). Four setae on caudal part of marginal shield situated on small platelets (Fig. 1d).

Ventral idiosoma (Fig. 1e and Fig. 4c): Base of tritosternum narrow, tritosternal laciniae marginally serrate, apically divided into two lateral short and one central long branches (Fig. 3a). Four pairs of sternal setae short (ca 6–15 μm), first pair (St1) smooth and needle-like, St2, St3 and St4 marginally serrate (Fig. 2b). St1 situated near anterior margin of genital shield, St2 at level of anterior margin of coxae II, St3 at level of anterior margin of coxae III and St4 at level of anterior margin of coxae IV, St5 absent. Surface of sternal shield covered by some oval pits. Ventral shield ornamented by oval pits. Six pairs of ventral setae marginally serrate (ca 32–38 μm). Adanal (*ad1* and *ad2*) and postanal *(pa)* setae similar in shape and length to ventral setae (Fig. 2a). Similar setae situated on ventral margins of body. One pair of lyriform fissures placed close to setae St1, second pair close to basal edges of genital shield and two pairs of poroid glands presented anterior to anal opening (Fig. 2a). Genital shield linguliform (ca 160–170 μm long), with long anterior process and with some shallow pits on its surface (Fig. 2b). Genital shield placed between coxae III and IV. Prestigmatid part of peritremes long and apically hook-shaped, poststigmatid part short and straight. Pedofossae deep and smooth with separate furrows

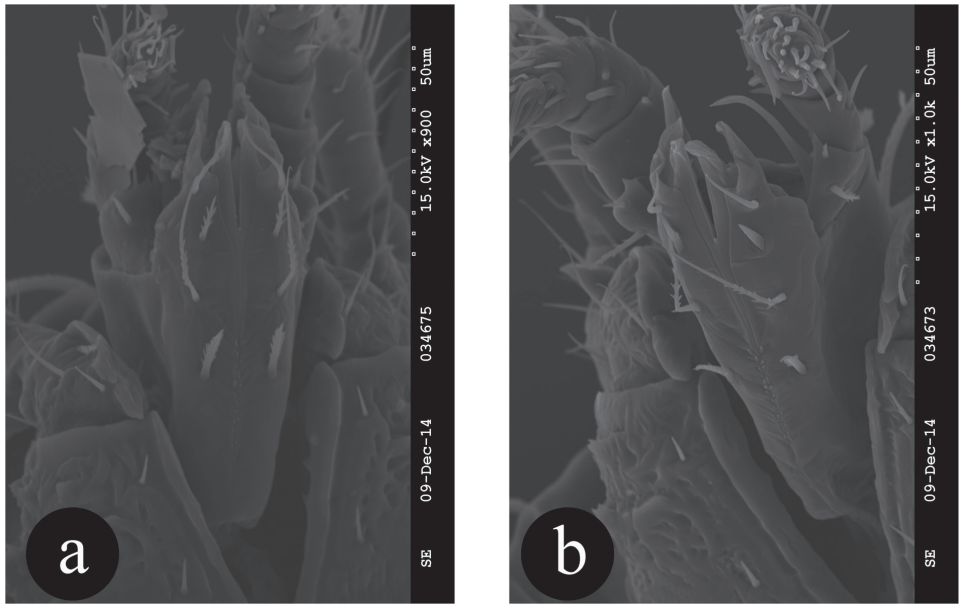

Fig. 5. Scanning micrographs of *Nenteria lii* sp. n., paratypes. a: Female gnathosoma in dorsal view; b: Male gnathosoma in dorsal view

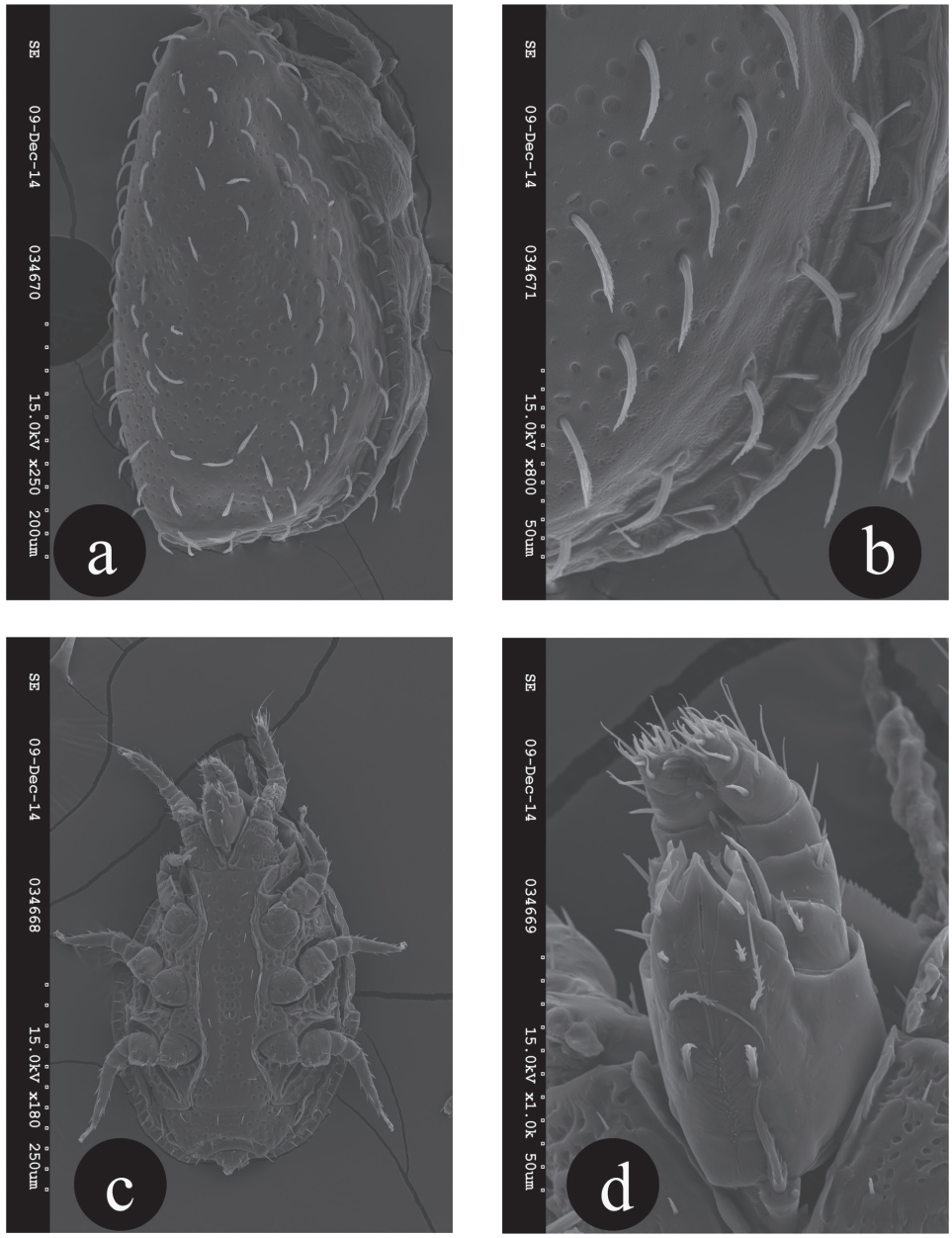

Fig. 6. Scanning micrographs of *Nenteria lii* sp. n., deutonymph, paratypes. a: Body in dorsal view; b: Setae and ornamentation on dorsal body; c: Body in ventral view; d: Ventral view of gnathosoma

for tarsi IV. Metapodal line present. Oval pits can be seen between metapodal line and pedofossae IV.

Gnathosoma (Fig. 3b and Fig. 5a): Corniculi horn-like and covered by paralaciniae, internal malae triangular, longer than corniculi. Paralaciniae well developed and triangular. Hypostomal setae: h1, h2 and h4 short (ca 11–16 μm), h3 very long (ca 32–35 μm), h1 smooth, h2, h3 and h4 marginally serrate. Fixed digit of chelicerae longer than movable digit and both bearing three teeth. Cheliceral internal sclerotised node present. One of setae on palp trochanter serrate, other setae smooth. Palp apothele with three claws (Fig. 3c). Apical part of epistome spatuliform with two spine-like lateral branches (Fig. 3d).

Legs (Fig. 3e–h): Bearing smooth and simple setae, all legs bearing claws, but claws on leg I smaller than on others. All femora with flap-like ventral process.

Description of male: Length of idiosoma 540–550 μm, width 370–390 μm (n = 3). Shape of idiosoma, ornamentation, and chaetotaxy of dorsal part as in female. Five sternal setae short and serrate (ca 8–16 μm) their position illustrated in Fig. 2d. Surface of sternal shield covered by some oval pits. Position and shape of ventral setae same as in female (Fig. 4d). Genital shield oval (ca 54 μm long and 50 μm wide) and placed between coxae III and IV. Four pairs of lyriform fissures situated on sternal shield, first pair close to St1, second pair close to St3, third pair to posterior margin of genital shield, fourth close to St5 (Fig. 2c). All parts of gnathosoma (Fig. 5b): same as in females, except setae h2 which is short (ca 6–7 μm), robust and spine like.

Description of deutonymph: Length of idiosoma 460–470 μm, width 300–310 μm (n = 3). Shape of idiosoma, ornamentation, and chaetotaxy of dorsal part as in female (Fig. 6a, b).

Ventral aspect of idiosoma (Fig. 2d and Fig. 6c): Base of tritosternum narrow, tritosternal laciniae marginally serrate, apically divided into two lateral long and one central short branches (Fig. 3i). Sternal shield covered by oval pits situated in four longitudinal rows. Caudal margin of sternal shield as wide as apical margin. Sternal setae smooth and needle-like (ca 11–13 μm), St1 placed at level of anterior margin of sternal shield, St2 at level of anterior margin of coxae II, St3 at level of anterior margin of coxae III, St4 at level of posterior margin of coxae III, St5 at level of posterior margin of coxae IV. Ventrianal shield covered by some oval pits. Five pairs of smooth and needle-like setae (ca 12–14 μm) situated on ventrianal shield. One pair of lyriform fissures situated close to St1. Adanal setae similar in shape and length to other setae on ventrianal shield. Needle-like and smooth setae placed on platelets situated on ventral margins of body. Metapodal shield with oval pits. One pair of apically serrate setae situated on small platelets between metapodal and ventrianal shields. Pedofossae deep and smooth with separate furrows for tarsi IV.

Gnathosoma (Fig. 3j and Fig. 6d): Corniculi, internal malae, paralaciniae, epistome and chelicerae same as in females. Setae h1 (ca 17–18 μm) smooth, h2 (ca 7–9 μm), h3 (ca 30–33 μm) and h4 (ca 9–10 μm) marginally serrate. One of setae on palp trochanter serrate, other setae smooth. Palp apothele with three claws (Fig. 3k).

Etymology: We dedicate the new species to our dear friend Dr. Weihai Li (Henan Institute of Science and Technology, Xingxiang, China), a noted Plecoptera specialist.

Habitat: The new species were found in *Phyllostachys* sp. bamboo leaf litters which were collected in two separate bamboo clumps in the area of the Henan Institute of Science and Technology, Xinxiang, China. The new species was not found in other, non-bamboo leaf litters in this area.

Remarks: The new species belongs to the *Nenteria rühmi*–species group (Hirschmann and Wiśniewski, 1985) on the basis of the presence of an anterior process of the female genital shield and the oval pits on both sides of the body. Long anterior process on the genital shield, oval pits on the surface of the genital shield and the serrate dorsal and ventral setae can be observed only in the species *Nenteria japonensis* Hiramatsu, 1979. The most important characters differentiating these two species are presented in Table 1.

Table 1

Distinguishing characters between *N. japonensis* Hiramatsu, 1979 and *N. lii* sp. n.

	N. japonensis	N. lii
Anterior surface of sternal shield in both gender	with irregular pits	without pits
Anterior part of process situated on apical margin of female genital shield	serrate	rounded
Paralaciniae	longer than internal malae	as long as internal malae

Key to the East Palearctic *Nenteria* species

Up to now nine *Nenteria* species have been recorded from the Eastern part of the Palearctic region, one species [*Nenteria eulaelaptis* (Vitzthum, 1930)] was found in China, six species (*N. japonensis* Hiramatsu, 1979, *N. kashimensis* Hiramatsu, 1979, *N. kurosai* Hiramatsu, 1979, *N. okumurai* Hiramatsu, 1979, *N. riztemaisimilis* Hirschmann and Hiramatsu, 1978 and *N. yonaguiensis* Hiramatsu, 1980) were recorded from Japan and three species (*N. japonensis* Hiramatsu, 1979, *N. koreae* Hirschmann, 1981 and *N. koreana* Kontschán et al., 2012) were listed from the Korean Peninsula (Wiśniewski, 1993, Kontschán et al., 2012).

1. Female genital shield with anterior process 3
   – Female genital shield without anterior process 2
2. Apical part of peritremes hook-like ..... *N. yonaguiensis*
   – Apical part of peritremes straight ..... *N. eulaelaptis*
3. Anterior process on female genital shield long 6
   – Anterior process on female genital shield short 4
4. Surface of ventral shield smooth ..... *N. kashimensis*
   – Surface of ventral shield with sculptural pattern 5
5. Ventral shield covered by oval pits ..... *N. koreae*
   – Surface of ventral shield with reticulate sculptural pattern ..... *N. koreana*
6. Apical part of anterior process on female genital shield rounded ..... *N. lii*
   – Apical part of anterior process on female genital shield not rounded 7

7. Apical part of anterior process on female genital shield serrate
.....*N. japonensis*
– Apical part of anterior process on female genital shield peaked, needle-like
.....*N. ritzemaisimilis*

Notes for the key: This key is based on females; therefore two species (*N. okumurai* and *N. kurosai*) are not represented in the key because they were described on the basis of nymphs.

Mites collected on bamboo leaves and in bamboo leaf litters

Order Trombidiformes

Family Tetranychidae

Schizotetranychus bambusae Reck, 1941

New locality: Deng Feng Da Dao, Dengfeng, Zhengzhou, Henan, China, near the Shaolin Temple, from leaves of *Phyllostachys* sp. bamboo, 11.X.2014. leg. J. Kontschán, W. Lii, D. Murányi and G. Q. Wang. Henan, China, garden of Henan Institute of Science and Technology, *Phyllostachys* sp. bamboo leaf litter, 9.X.2014. leg. J. Kontschán, W. Lii, D. Murányi and G. Q. Wang.

Notes: This species is recorded by Ma et al. (1979); Wang (1981); Zhang et al. (2000, 2001) from China, but this is the first record from Henan Province.

Order Mesostigmata

Family Ologamasidae Ryke, 1962

Gamasiphis novipulchellus Ma and Yin, 1998

New locality: Xinxiang, Henan, China, garden of Hotel Hei Sindi, bamboo leaf litter, 17.X.2014. leg. J. Kontschán, W. Lii, D. Murányi and G. Q. Wang.

Notes: This species is known only from China.

Family Ascidae Voigts and Oudemans, 1905

Lasioseius sugawarae (Ehara, 1964)

New locality: Xinxiang, Henan, China, garden of Hotel Hei Sindi, bamboo leaf litter, 17.X.2014. leg. J. Kontschán, W. Lii, D. Murányi and G. Q. Wang.

Notes: This species occurs in Japan and Taiwan; this is the first record from China.

Order Oribatida

Family Nothridae Berlese, 1885

***Nothrus anauniensis* Canestrini and Fanzago, 1876**

New locality: Deng Feng Da Dao, Dengfeng, Zhengzhou, Henan, China, near the Shaolin Temple, from leaves of *Phyllostachys* sp. bamboo, 11.X.2014. leg. J. Kontschán, W. Lii, D. Murányi and G. Q. Wang. Xinxiang, Henan, China, garden of Henan Institute of Science and Technology, *Phyllostachys* sp. bamboo leaf litter, 17.X.2014. leg. J. Kontschán, W. Lii, D. Murányi and G. Q. Wang.

Notes: This is a very common species which occurs in the Palearctic region.

Family Lohmanniidae Berlese, 1916

***Papillacarus aciculatus* (Berlese, 1905)**

New locality: Xinxiang, Henan, China, garden of Henan Institute of Science and Technology, *Phyllostachys* sp. bamboo leaf litter, 17.X.2014. leg. J. Kontschán, W. Lii, D. Murányi and G. Q. Wang.

Notes: Palearctic species.

Discussion

The investigated bamboo clumps belong to the genus *Phyllostachys* sp. (Fig. 7). Only one of the species found has a strict association with bamboos, *Schizotetranychus bambusae* can be found only on the leaves of different species of bamboo from Asia to Europe (Kontschán et al., 2014a). The other species found can use bamboo leaf litter as a biotope where they can find convenient habitats for their lifecycle. On the basis of our other investigations, the new species was not found in different habitats nearby; therefore we have to suppose bamboo leaf litter could be the preferred habitat for this species.

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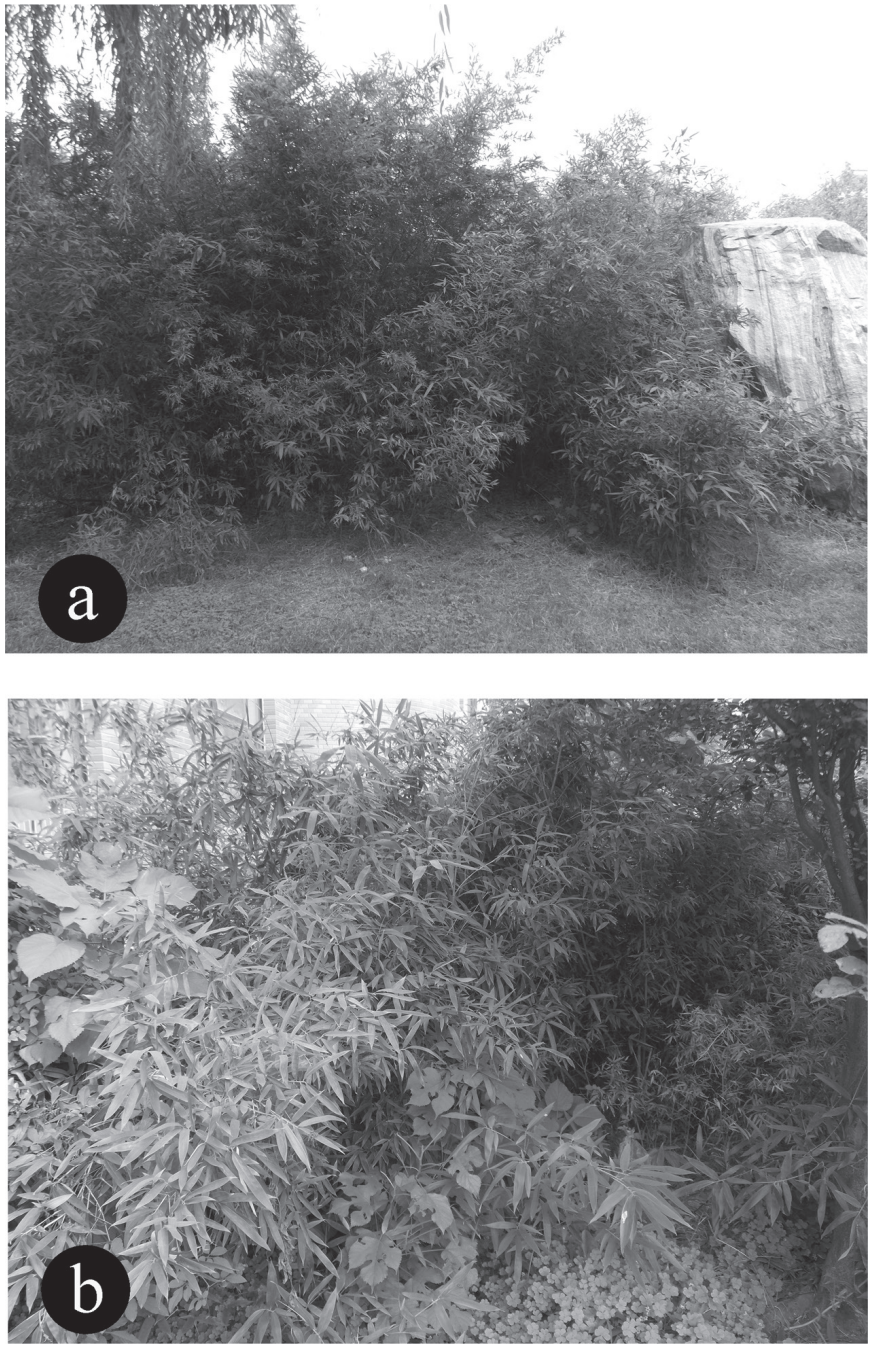

Fig. 7. Investigated bamboo clumps in Xinxiang (China).
a: Locality of holotype and several paratypes; b: Locality of other paratypes

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