

ORIGINAL ARTICLE

Two new species of the genus *Veigaia* from China (Acari: Mesostigmata: Veigaiaidae)

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Abstract Two new species in the genus *Veigaia* Oudemans, 1939 from soil are described from Liaoning Province, China, *Veigaia yinsuigongi* **sp. nov.** and *V. beinaxinae* **sp. nov.** The type specimens are deposited in the Department of Entomology, College of Plant Protection, Shenyang Agricultural University, Liaoning Province, China.

Key words Acari, Veigaiaidae, *Veigaia*, new species, China.

1 Introduction

Veigaia Oudemans, 1939 is one of the three genera belonging to the family Veigaiaidae, which including other two genera *Cyrthyrolaelaps* Berlese, 1905 and *Gamasolaelaps* Berlese, 1905. The genus *Veigaia* contains most of the described species of the family. Species of *Veigaia* are plenty in forest soil, humus or decaying organic materials, particularly logs and soil of coniferous plants. They are essentially playing a predatory role in microarthropods such as mites, eggs of insects, springtails and nematodes (Till, 1988), some studies on systematics and biology (Hurlbutt, 1965, 1984) and geographic distribution (Hurlbutt, 1988) of the genus *Veigaia* have been done in America and East African. So far, about 73 species have been described from different regions (Farrier, 1957; Bregetova, 1961; Pike, 1977; Blaszkak, 2006; Masan, 2011) all over the world, and 21 species of the genus have been described from China (Tseng, 1994; Ma, 1996; Ma & Yin, 1999; Bai & Qin, 2005; Chen *et al.*, 2006; Li *et al.*, 2007). In this paper, 2 species of *Veigaia* from China are described as new to science.

2 Materials and methods

Specimens studied were collected from forest soil in Liaoning Province. Adult specimens were preserved in 70% ethanol in the field as soon as collected. For morphological observation, some of the ethanol preserved specimens were mounted on slides. The chaetotaxy follows Lindquist and Evans (1965). The type specimens are deposited in the Department of Entomology, College of Plant Protection, Shenyang Agricultural University, Liaoning Province, China. All measurements are given in micrometres (µm).

3 Systematics

The species of *Veigaia* usually pale to dark brown, and about 250–1 200 in length, with 2 shields or 1 shield with deep or

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shallow gaps on 2 laterals on the dorsum. Sternal shield with 3 pairs of setae, 2 lateral angles extended between coxae I and II, 1 pair of metasternal plates with 1 pair of setae. Genital shield with 3 pairs of setae. Ventral shield drifting, or coalesced with genital shield or parapodal shield or peritrematal shield. Posterior margin of coxae IV with obvious punctiform organs. Anal shield with 3 perianal setae. Denticles of hypostome prominent, usually 8–11 multidenticulate, transverse rows (rarely 4). Distal extensions of the internal malae of the hypostome are broadly fringed. Tectum with 3 projections, middle projection expanded. Specialized seta on palptarsus with 3 prongs.

***Veigaia yinsuigongi* sp. nov.** (Figs 1–9)

Description. Female (holotype & paratype). Dorsum (Fig. 1). Idiosoma length 729, width 437, oval and pale yellow, with 2 reticulated shields on dorsum. Anterior dorsal shield length 400, width 420, posterior margin flat, provided with 22 pairs of setae and 4 pairs of lyriform pores. Dorsal setae j_1 (60), j_4 (49), z_5 (50) and r_3 (88) long and stout, the other setae short and smooth; the first pair of lyriform pores bigger, arc shaped out of the F_1 and F_2 . Posterior dorsal shield rectangle, length 256, width 376, anterior margin flat, provided with 18 pairs of smooth setae subequal in length and 2 pairs of lyriform pores.

Venter (Fig. 2). Presternal shield composed of 2 pairs of platelets, irregularity and without reticulation. Sternal shield length 136, width 120, ornamented reticulation obviously between St_2 and St_3 . Anterior margin of sternal shield concaved, 2 lateral angles extended transversely between coxae I and II, faintly concaved on center of posterior margin, 3 pairs of sternal setae and 2 pairs of lyriform pores. St_1 length 49, St_2 and St_3 length 40. 1 pair of metasternal shields sliver-like with 1 pair of setae (32). Genital shield reticulated, bearing 3 pairs of setae, middle pair tiny, genital region with ring-like structure, ornamented with radiant ray on anterior margin. Posterior margin of genital shield not coalesced with ventral shield but connected with punctiform organ area, 12–13 pairs of pores arranged in 1 row in punctiform organ area. Posterior margin of ventral shield slightly concaved, inverted trapezium in shape. Ventral shield with 1 pair of lyriform pores and 5 pairs of setae, the anterior 3 pairs short and the posterior 2 pairs longer. Posterior margin of peritrematal shield coalesced with antero-lateral corner of ventral shield, bearing 1 pair of parastigma setae; 1 pair of lyriform pores situated in front of the stigma of peritrematal groove. 1 pair of matapodal shields, slender with 2 forks on inner part of anterior tip. Ventral membrane with 9 pairs of setae and 2 pairs of lyriform pores, setae between ventral shield and anal shield about 1/4 time as long as the last pair of setae. Anal shield sector, reticulated, length 88, width 96, with 3 perianal setae; postanal seta length 14, adanal setae length 28, anal opening length 32. Tritosternal base length 80, width 16. Lacinae bifid, with a few branches.

Gnathosoma (Figs 3–5). Seta f_1 on palpfemur tiny and thin with sparsely microseta on anterior margin; seta g_1 on palpgenu with 6 prongs on tip of anterior margin, seta g_2 club-like, bared tip. Tectum with 3 projections, middle projection expanded terminally torch-like, 2 laterals slightly convex in the middle each with 2 denticles on tip. Base of tectum broad, with 1 pair of slender sutures. Fixed digit of chelicera slightly longer than movable digit, fixed digit with 3 teeth, middle tooth slightly big, 2 tip teeth close together, movable digit with 2 teeth on tip.

Legs. Leg IV with club-like setae except coxae, blunted round tip with microseta, chaetotaxy as follows: 1-5-10-10-7 (trochanter- femur- genu- tibia- tarsus).

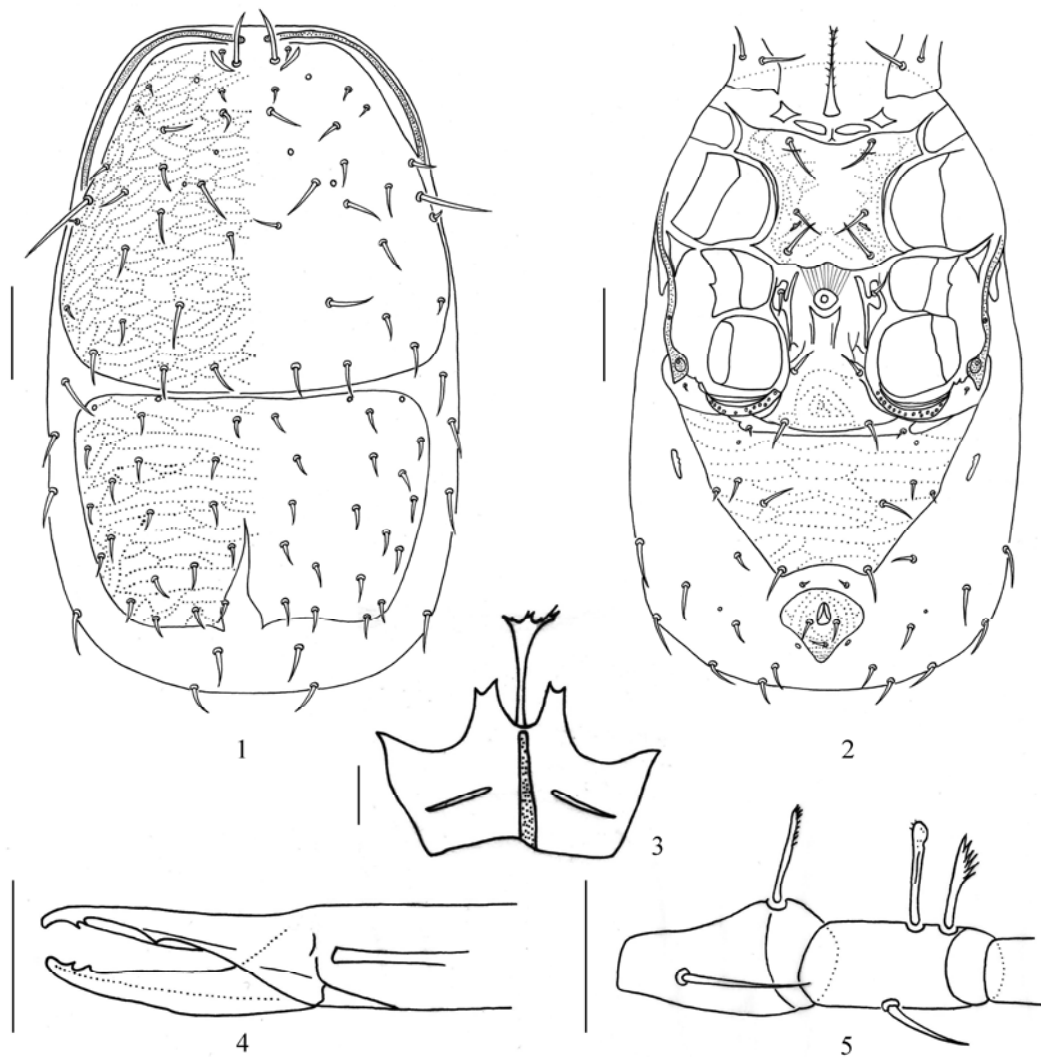
Male (paratype). Dorsum (Fig. 6). Oval and pale yellow, length 648, width 405. Dorsal shield with 40 pairs of setae, reticulated, divided into 2 parts by wrinkles behind dorsal seta j_6 . Dorsal chaetotaxy similar to those of female. Dorsal setae j_1 , j_4 , z_5 , r_3 longer and stouter than other setae, lateral part of dorsal shield coalesced with peritrematal shield and ventral-anal shield.

Venter (Fig. 7). One pair of big presternal shield, without reticulation. Sternal shield reticulated, length 244, width 116, bearing 4 pairs of simple setae and 2 pairs of lyriform pores. Genital pore situated on anterior margin of sternal shield. Ventral shield coalesced with genital shield and anal shield, reticulated, bearing 12 pairs of setae, anterior margin coalesced with peritrematal shield, postero-lateral margin coalesced with dorsal shield. Punctiform organ area with 12 pairs of pores arranged in 1 row. Tritosternal base broad and short, length 10, width 14. Lacinae bifid, slightly branched.

Gnathosoma (Figs 8–9). Palp similar to female. Tectum with 3 projections, crown-like, tip of middle with 3 teeth, laterals with 2 teeth. Fixed digit of chelicera with 1 tooth, while movable digit 1 tooth, spermatophoral process belt-like, longer than movable digit.

Material examined. Holotype female, from soil, Anshan City (41°05'N, 123°00'E), September 2002, coll. Li-Qiang Gu and Cheng-Min Shi. Paratypes 1 female, 8 males, same data as holotype.

Etymology. The new species is named in honor of Dr. Sui-Gong Yin, a famous acarologist in China.

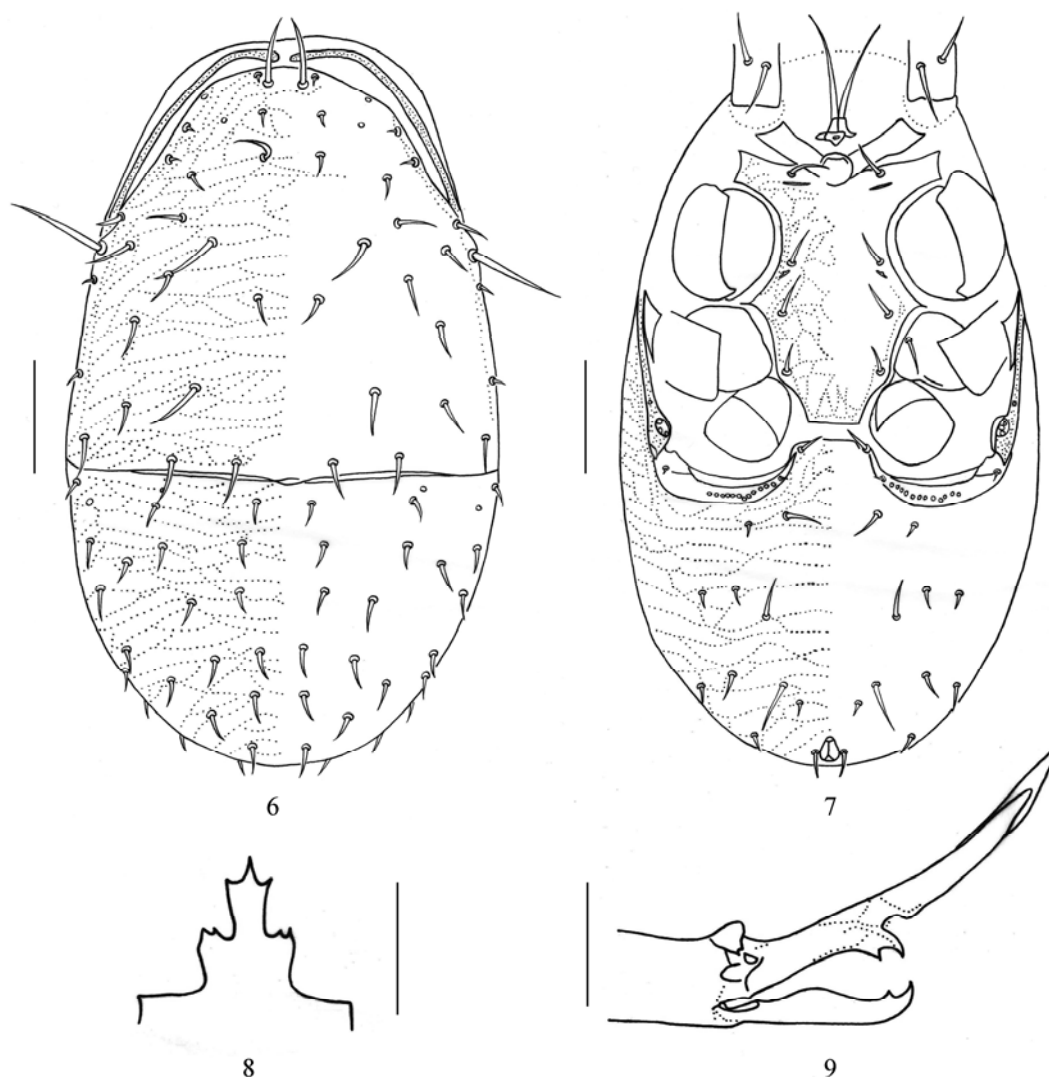


Figs 1–5. *Veigaia yinsuigongi* sp. nov., female. 1. Dorsum. 2. Venter. 3. Tectum. 4. Chelicera. 5. Palp femur and genu. Scale bars: 1–2 = 100 μ m, 3–5 = 50 μ m.

Remarks. The new species is similar to *V. mirabilis* Bregetova, 1961, but differs in latter by following. In the new species, posterior margin of ventral shield concaved, while the latter posterior margin of ventral shield flat. Seta g_1 of palpgenu has 6 branches on tip of anterior margin, rather than bared in *V. mirabilis*. The new species has female tectum middle one torch-like, laterals with 2 big teeth and male tectum crown-like, tip of middle rather broad, while in *V. mirabilis*, female has 3 tines on the tip of middle one, laterals with 3–4 small teeth and male has tiny middle tines. Additionally, the new species has 12–13 pairs of pores arranged in 1 row, while 22–24 pairs pores arranged in 2 rows in *V. mirabilis*.

***Veigaia beinaxinae* sp. nov.** (Figs 10–13)

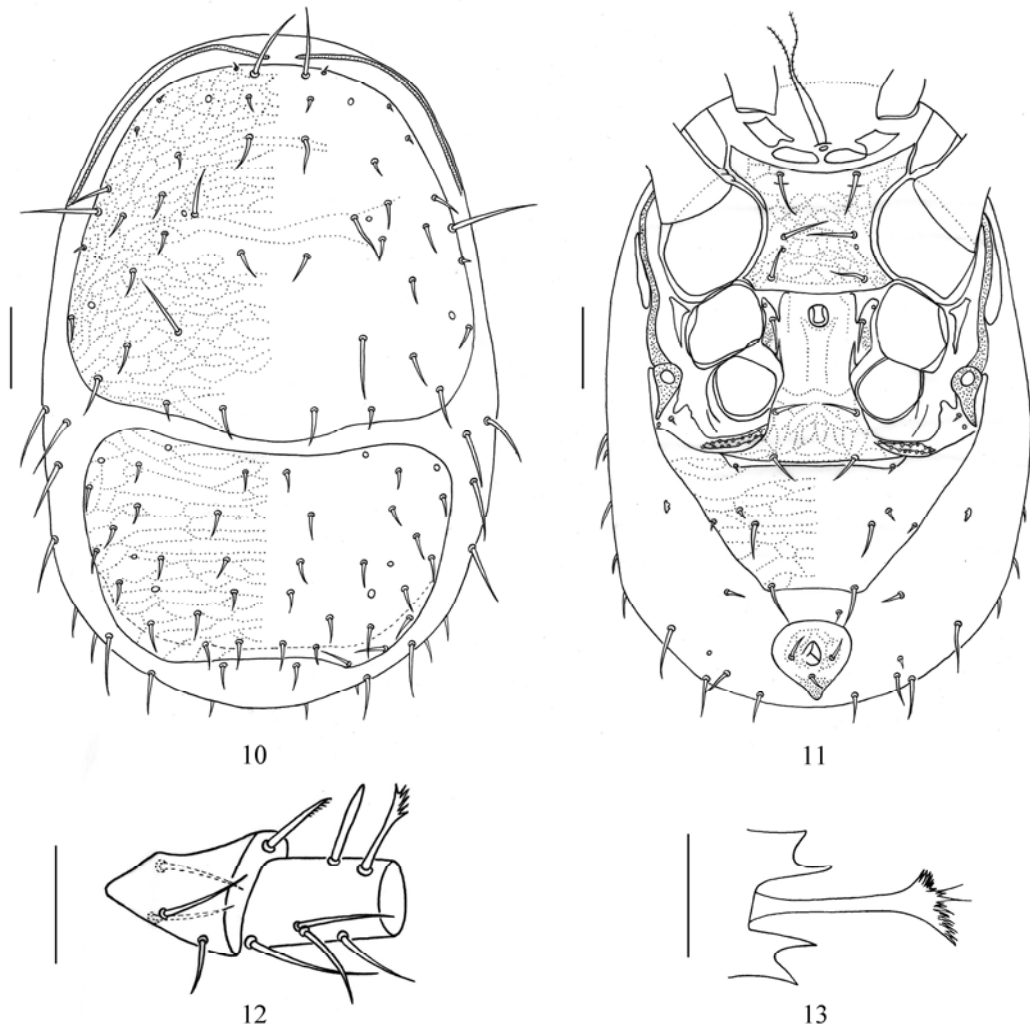
Description. Female (holotype & paratype). Dorsum (Fig. 10). Idiosoma length 834, width 599, oval and pale yellow. Dorsal shield composed of 2 shields, reticulated. Anterior dorsal shield length 478, width 527, middle of posterior margin slightly convex, bearing 22 pairs of setae and 3 pairs of lyriform pores. Dorsal setae j_1 (72), j_4 (68), z_5 (68), r_3 (108) all with microsetae, longer and stouter than other setae. Seta j_3 length (48), s_6 (48) longer than j_6 (40) and z_6 (36). Posterior dorsal shield length 275, width 470, bearing 18 pairs of smooth setae and 4 pairs of lyriform pores, anterior margin slightly concaved, posterior margin flat, 8 pairs of setae on membrane between dorsal shield and ventral shield.



Figs 6–9. *Veigaia yinsuigongi* **sp. nov.**, male. 6. Dorsum. 7. Venter. 8. Tectum. 9. Chelicera. Scale bars: 6–7 = 100 μ m, 8–9 = 50 μ m.

Venter (Fig. 11). Presternal shield composed 2 pairs of platelets, irregularity and without reticulation. Sternal shield length 160, width 120, ornamented reticulation obviously between St_2 and St_3 ; anterior margin of sternal shield concaved, 2 lateral angles extended between coxae I and II, posterior margin flat with faintly sclerotized. Sternal shield with 3 pairs of setae and 2 pairs of lyriform pores, St_1 length 64, St_2 length 64, St_3 length 52, distance between St_2 and St_3 60 in length. 1 pair of metasternal shields sliver-like with 1 pair of setae and 1 pair of lyriform pores. Small part of metasternal shield coalesced with genital shield. Genital shield reticulated, bearing 3 pairs of setae, middle pair tiny, genital region with ring-like structure, forked structure behind it, posterior margin of genital shield coalesced with ventral shield. Punctiform organ area with 14 pairs of pores arranged in 2 rows. Ventral shield inverted trapezium in shape, with 5 pairs of setae, the anterior 3 pairs short and the posterior 2 pairs longer; anterior margin of ventral shield with V-shaped gap on inner side of peritrematal shield. Posterior margin of peritrematal shield coalesced with antero-lateral angle of ventral shield, 1 pair of parastigma setae, 1 pair of lyriform pores behind stigmata. 1 pair of metapodal shields, sliver-like and 2 times on inner part of anterior tip. Length of setae between ventral shield and anal shield 1/5 of the length of the last pair of setae on ventral shield, anal shield triangle, angles round and blunt, with slight reticulation, length 98, width 112, with 3 perianal setae, postanal seta length 16, adanal setae length 32, anal pore length 28. Tritosternal base length 108, width 16. Laciniae bifid, with a few branches.

Gnathosoma (Figs 12–13). Seta f_1 of palpfemur tiny and thin on tip with a few microsetae. Seta g_1 on palpgenu with many prongs on anterior margin, seta g_2 bared tip. Tectum with 3 projections, middle projection long expanded terminally torch-like, with clump branches, 2 lateral projections with 2 large teeth on tip.



Figs 10–13. *Veigaia beinaxinae* sp. nov., female. 10. Dorsum. 11. Venter. 12. Palp femur and genu. 13. Tectum. Scale bars: 10–11 = 100 μ m, 12–13 = 50 μ m.

Legs. Leg IV with club-like setae except coxae, blunted round tip with microsetae, chaetotaxy as follows: 2-4-9-9-3 (trochanter- femur- genu- tibia- tarsus).

Male. Unknown.

Material examined. Holotype female, from soil, Shenyang City (41°08'N, 123°38'E), May 1984, coll. Sui-Gong Yin. Paratype 1 female, same data as holotype.

Etymology. The new species is named in honor of Dr. Na-Xin Bei, a famous acarologist in China.

Remarks. The new species is similar to *V. cuneata* Ma, 1996, but differs in the latter by following. The new species has 2 pairs of presternal shields, but without slender platelets between presternal shields and coxae I, while the latter has 1 pair of presternal shields, and 2 slender platelets between presternal shields and coxae I. In the new species, all the sternal shield has reticulation especially central part, rather than only lateral margin of sternal shield with reticulation in *V. cuneata*. In new species, parastigma seta bears behind stigma, while parastigma seta bears on inner margin of plate in *V. cuneata*. Additionally, the new species has posterolateral margin of genital shield sharp, while *V. cuneata* has posterolateral margin of genital shield round.

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