

## ORIGINAL ARTICLE

# Two new species and a new record species of genus *Vitronura* (Collembola: Neanuridae) from East China

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**Abstract** Two new species of genus *Vitronura*, *V. zhejiangensis* **sp. nov.** and *V. tianmua* **sp. nov.**, and a new record species for China, *V. acuta* Deharveng & Weiner, 1984, are reported from Zhejiang, China. *V. zhejiangensis* **sp. nov.** is characterized by following: mandible with 5 teeth; maxilla crochet-like; labrum distally not ogival; labium with minute distal sensory organ(x); chaeta O on cephalic tubercle Fr present; tubercle Di on head independent and with 1 chaeta, tubercle De and Oc on head with 3 chaetae, respectively; claw without inner tooth. *V. tianmua* **sp. nov.** is characterized by following: mandible with 4 teeth; maxilla crochet-like; labium without minute distal sensory organ(x); chaeta O on cephalic tubercle Fr absent; tubercle Di on head independent and with 1 chaeta, tubercle De and Oc on head with 3 chaetae respectively; claw without inner tooth.

**Key words** Neanurinae, taxonomy, new species, key.

## 1 Introduction

The *Vitronura* was erected by Yosii (1969) as a subgenus of *Neanura* MacGillivray, 1893, with *Neanura mandarina* Yosii, 1954 as its type species. Later, the subgenus *Vitronura* was raised to generic status (Cassagnau, 1980), and placed in tribe Lobellini by Cassagnau & Deharveng (1981), then, in tribe Blasconurini based on cladistic biogeography (Cassagnau, 1983). Currently, *Vitronura* belongs to Paleonurini base on the phyletic evolution and biogeographic segregation (Cassagnau, 1989). Smolis & Deharveng (2006) summarized the critical definition of the genus as “the presence of separate tubercles Fr and An on dorsal side of the head distinguished it from all genera of Paleonurini”. To date, more than 20 known species were reported worldwide and 11 species were reported from China (Yosii, 1954, 1959, 1976; Rusek, 1967; Lee & Kim, 1990; Jiang & Yin, 2011, 2012; Gao *et al.*, 2012; Wang *et al.*, 2016).

The Tianmu Mountains is located in East China (Lin'an City, Zhejiang Province), covering an area of 4300 hectares, with the highest peak more than 1500 m. It belongs to the subtropical humid monsoon climate zone, where the plant flora belongs to the subtropical evergreen broad-leaved forest. One of the main targets of the foundation of Zhejiang Tianmu Mountains National Nature Reserve is to protect rare and endangered plants, such as *Ginkgo biloba*, *Cercidiphyllum japonicum*, *Liriodendron chinensis*. Up to now, more than 600 species of insects were reported from Tianmu Mountains. However, the collembolan fauna is rarely known, including 2 species of Neanuridae, i.e., *Crossodonthina bidentata* Luo & Chen, 2009, *Paralobella palustris* Jiang, Luan & Yin, 2012. In order to study its Collembola fauna, a field work was done in 2011. In this study, two species of genus *Vitronura* were described as new to science and the species, *V. acuta* Deharveng & Weiner, 1984, was reported in China for the first time.

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## 2 Materials and methods

All specimens were collected with the aid of Tullgren funnels or aspirators, and preserved in 95% ethanol, then cleared in Nesbitt's fluid and mounted on slides in Hoyer's medium. Preparations were dried for 7–10 days in oven at 55°C and then ringed with lacquer. The morphological characters were observed and figures were drawn using a phase contrast microscope Nikon 80i. All specimens are deposited in the Key Laboratory of Zoology, Hunan University of Arts and Science, Changde, Hunan Province, China.

The terminology and layout of the tables used in this paper follow Deharveng (1983), Deharveng & Weiner (1984), Greenslade & Deharveng (1990) and Smolis (2008).

Following abbreviations are used in general morphology:

Abd—abdomen;

Ant—antenna;

Cx—coxa;

Fe—Femur;

Scx2—subcoxa 2;

Ti—tibiotarsus;

Th—thorax;

Tr—trochanter;

VT—ventral tube.

Groups of chaetae:

Ag—antegenital;

Fu—furcal;

Ve—ventroexternal;

VL—ventrolateral.

Tubercles:

An—antennal;

Fr—frontal;

Cl—clypeal;

De—Dorsoexternal;

Di—dorsointernal;

Dl—dorsolateral;

L—lateral;

Oc—ocular;

So—subocular.

Types of chaetae:

ML—long macrochaeta;

Mc—short macrochaeta;

me—mesochaeta;

mi—microchaeta;

ms—sensory microchaeta;

S—sensory chaeta;

or—subapical organ of Ant. IV;

i—small ordinary chaeta on Ant. IV;

mou—ordinary setae arranged in 4 triangles (“soies mousses”) on Ant. IV;

x—labial sensory organ.

## 3 Taxonomy

Family Neanuridae

Subfamily Nenurinae

Tribe Paleonurini Cassagnau, 1989

**Genus *Vitronura* Yosii, 1969****Key to species of genus *Vitronura* Yosii, 1969 (modified base on Jiang & Yin, 2012, Gao *et al.*, 2012).**

1. Cephalic tubercle Oc with 1 or 2 chaetae ..... 2  
Cephalic tubercle Oc with 3 chaetae ..... 13
2. Cephalic tubercle Oc with 1 chaeta ..... 3  
Cephalic tubercle Oc with 2 chaetae ..... 4
3. Cephalic tubercle An with 1 chaeta (Vietnam) ..... *V. mascula* Smolis & Deharveng, 2006  
Cephalic tubercle An with 2 chaetae (China (Shaanxi)) ..... *V. shaanxiensis* Jiang & Yin, 2011
4. Tubercles Di on head fused along midline (China (Taiwan)) ..... *V. tubercula* Lee & Kim, 1990  
Tubercles Di on head separate ..... 5
5. Chaeta O on head present ..... 9  
Chaeta O on head absent ..... 6
6. Tubercles Di on Abd. V fused along midline (China (Hongkong)) ..... *V. sinica* Yosii, 1976  
Tubercles Di on Abd. V separate ..... 7
7. Tubercle De of Th. II with 5 chaetae (Philippines) ..... *V. luzonica* Yosii, 1976  
Tubercle De of Th. II with 4 chaetae ..... 8
8. Tubercle An of head with C and E chaetae (Papua New Guinea, Brunei) ..... *V. gressitti* Cassagnau & Deharveng, 1981  
Tubercle An of head without C and E chaetae (Japan) ..... *V. kunigamiensis* Tanaka & Hasegawa, 2010
9. Tubercles Di on Th. I with 2 chaetae (China (Guangdong)) ..... *V. latior* (Rusek, 1967)  
Tubercles Di on Th. I with 1 chaeta ..... 10
10. Claw with inner tooth ..... 11  
Claw without inner tooth (Japan, Solomon Islands) ..... *V. mandarina* (Yosii, 1954)
11. Tubercle Di on Abd. V with 2 chaetae (Korea) ..... *V. namhaeensis* Lee, 1974  
Tubercle Di on Abd. V with 3 chaetae ..... 12
12. Body length 0.5 mm, mandibular apical tooth not tridentated, macrochaetae not ciliated (China (Taiwan), Japan, Indonesia) ..... *V. pygmaea* (Yosii, 1954)  
Body length 1.9–2.4 mm, mandibular apical tooth tridentated, macrochaetae strongly ciliated (China (Hunan)) ..... *V. ciliata* Wang, Wang & Jiang, 2016
13. Cephalic tubercle De with 2 chaetae (South Africa) ..... *V. joanna* (Coates, 1968)  
Cephalic tubercle De with 3 chaetae ..... 14
14. Cephalic tubercles Di fused or weakly fused along midline ..... 15  
Cephalic tubercles Di distinctly separate ..... 17
15. Cephalic chaeta O on head present ..... 16  
Cephalic chaeta O on head absent (China (Taiwan), Southeast Asia) ..... *V. singaporiensis* (Yosii, 1959)
16. Body macrochaetae not strongly barbulate (Costa Rica) ..... *V. macgillivrayi* (Denis, 1933)  
Body macrochaetae strongly barbulate (China (Shanghai)) ..... *V. setaebarbulata* Gao, Bu & Palacios-Vargas 2012
17. Claw with inner tooth ..... 18  
Claw without inner tooth ..... 20
18. Mandible with 3 denticles, tubercle De+DL of Abd. V with 4 (3+s) chaetae (North Korea) .. *V. dentata* Deharveng & Weiner, 1984  
Mandible with 4 or 5 denticles, tubercle De+DL of Abd. V with 5 (4+s) chaetae ..... 19
19. Mandible with 5 denticles, cephalic tubercle DI fused with tubercle L+So (China (Sichuan)) ..... *V. qingchengensis* Jiang & Yin, 2012  
Mandible with 4 denticles, cephalic tubercle DI separate from tubercle L+So (China (Hunan)) ..... *V. paraacuta* Wang, Wang & Jiang, 2016
20. Cephalic chaeta O on head absent (China (Zhejiang)) ..... *V. tianmua* sp. nov.  
Cephalic chaeta O on head present ..... 21
21. Head with 14 tubercles (China (Shanghai)) ..... *V. quartadecima* Gao, Bu & Palacios-Vargas 2012  
Head with 12 tubercles ..... 22
22. Labrum distally ogival (North Korea) ..... *V. acuta* Deharveng & Weiner, 1984  
Labrum distally not ogival ..... 23
23. Tubercle De+DI on Abd. V with 3 (2+s) chaetae, body macrochaetae and mesochaetae more or less serrate, mandible with 5 teeth (China (Zhejiang)) ..... *V. zhejiangensis* sp. nov.  
Tubercle De+DI on Abd. V with 5 (4+s) chaetae, body macrochaetae and mesochaetae smooth, mandible with 3 teeth (North Korea, Switzerland, Kenya, Mexico) ..... *V. giselae* (Gisin, 1950)

***Vitronura acuta* Deharveng & Weiner, 1984**

Diagnosis. *V. acuta* is characterized by mandible 4 toothed, maxilla hook-like, claw toothless, labium ogival, without x

papilla. Its body tubercles and chaetotaxy are similar to *V. zhejiangensis* **sp. nov.** *V. acuta* is also similar to *V. qingchengensis* in body chaetotaxy and antennal structure. However, *V. acuta* is different from the latter by not having inner tooth on claw and having four-dentated mandible, while *V. qingchengensis* has an inner tooth on claw and five-dentated mandible. The differences among *V. zhejiangensis* **sp. nov.**, *V. acuta* and *V. giselae* see the remarks of *V. tianmua* **sp. nov.**

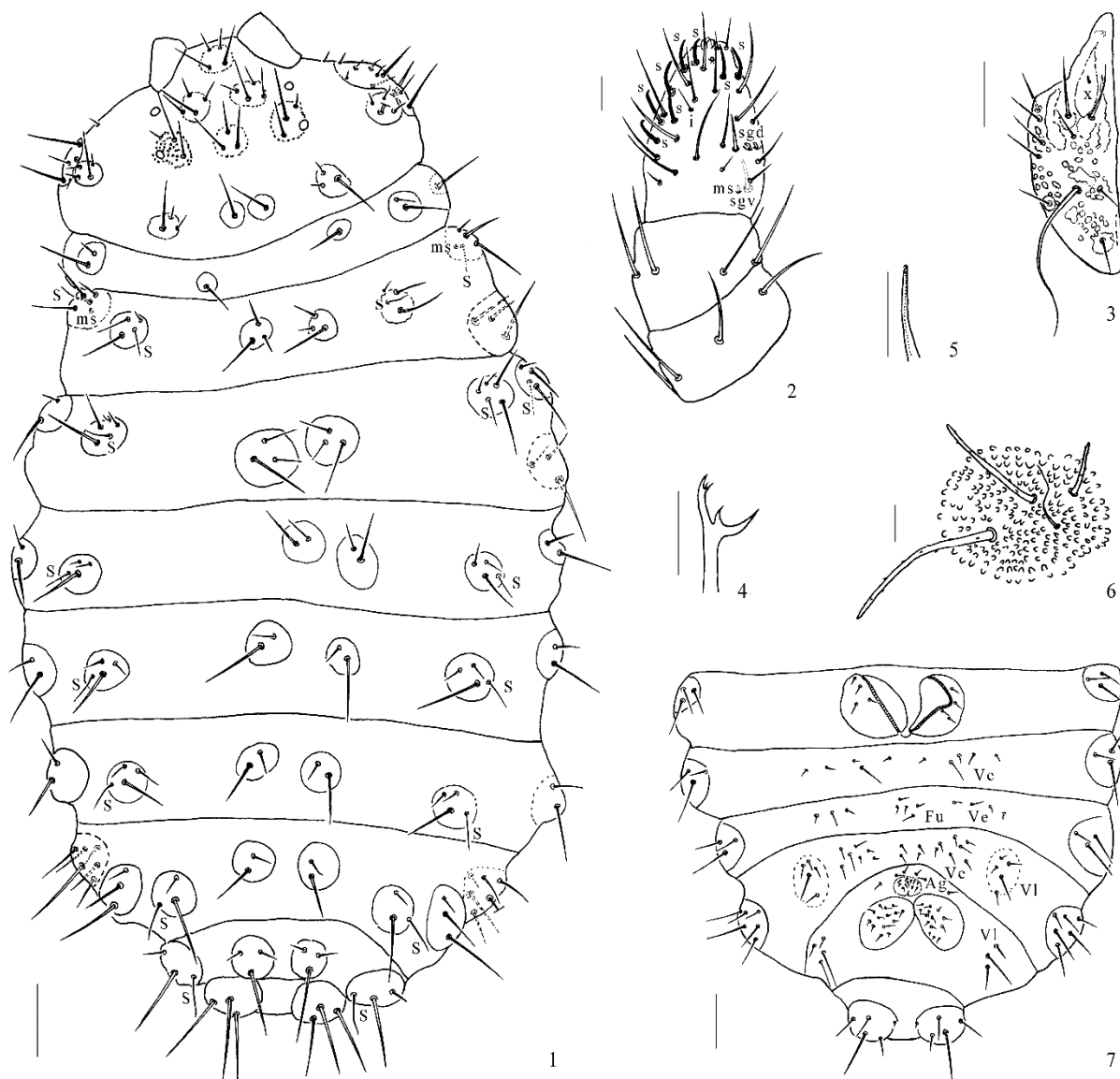
Material examined. 2♀, on the Path of Longfengjian to Fairy Peak, Tianmu Mountains, Zhejiang, China (30°23'09"N, 119°26'07"E; elev. 1100–1500m), 25 July 2011, coll. Jigang Jiang (no. J2011072502).

Ecology. Under leaf in the forest.

Remarks. The species is recorded in China for the first time.

***Vitronura zhejiangensis* sp. nov.** (Figs 1–7, Tables 1–2, 5)

Diagnosis. The new species is similar to *V. acuta* Deharveng & Weiner, 1984 from North Korea by both species have similar arrangement of body tubercles, presence of chaeta O and no inner tooth on claw, and different in the structures of labrum and mandible. In *V. zhejiangensis* **sp. nov.**, labrum distally is not ogival and mandible has 5 teeth; while in *acuta*, labrum distally is ogival and mandible has 3 teeth. The new species is also close to *V. qingchengensis* Jiang & Yin, 2012 from Sichuan, China by having similar arrangements of body tubercles and 5-toothed mandible, but can be separated by having serrated macrochaetae and mesochaeta on body, inner tooth on claw and medium middle tooth on mandible (body



Figures 1–7. *Vitronura zhejiangensis* **sp. nov.** 1. Dorsum of body. 2. Antenna. 3. Labium. 4. Mandible. 5. Maxilla. 6. Tubercle De on Th. II. 7. Ventral side of abdomen. Scale bars: 1, 7 = 100 µm; 2–6 = 20 µm.

macrochaetae and mesochaeta smooth, claw without inner tooth and mandible with a minute middle tooth in latter). The new species has 5 teeth on mandible (2 basal and 3 apical teeth), 3 chaetae (2+s) on tubercle De of Abd. V, separated from *V. paraacuta* Wang, Wang & Jiang, 2016, which has 4 teeth on mandible (2 basal and 2 apical teeth), 5 chaetae (4+s) on tubercle De of Abd. V. It has 3 chaetae on tubercle Oc of head, separated from *V. mascula* Smolis & Deharveng, 2006, *V. shaanxiensis* Jiang & Yin, 2011, *V. tubercula* Lee & Kim, 1990, *V. sinica* Yosii, 1976, *V. luzonica* Yosii, 1976, *V. gressitti* Cassagnau & Deharveng, 1981, *V. latior* (Rusek, 1967), *V. mandarina* (Yosii, 1954), *V. namhaeensis* Lee, 1974, *V. pygmaea* (Yosii, 1954), which have less than 3 chaetae on tubercle Oc. The new species can also be separated from *V. joanna* (Coates, 1968) by having 3 chaetae on tubercle De of head (2 in the latter), from *V. macgillivrayi* (Denis, 1933) and *V. singaporiensis* (Yosii, 1959) by having separate tubercles Di on head (having fused Di tubercles in the latters), from *V. dentata* Deharveng & Weiner, 1984 by having no inner tooth on claw (has an inner tooth in the latter). Additionally, the new species is similar to *V. giselae* Cassagnau & Deharveng, 1981 by chaeta O on tubercle Fr present, claw without tooth. However, it can be differentiated from the latter by having 5 toothed mandibles and 8 chaetae on each tubercle of Abd. VI, while the latter has 3 teeth on mandible, 7 chaetae on each tubercle of Abd. VI. The differences between the new species and its allied species see Table 5.

Description. Body length 1.3–2.0 mm. Body red in alive and white in alcohol.

Etymology. The species is named after the Zhejiang Province, the typical locality of the new species.

**Table 1. Cephalic tubercles and chaetotaxy of *Vitronura zhejiangensis* sp. nov.**

Tubercle	Number and type of chaetae	Names of chaetae
Cl	2 MI	F
	2 Mcc (or me)	G
An	1 MI	B
	2 me (or Mcc)	C, D
	1 Mc	E
Fr	2 MI	A
	1 Mc	O
Oc	1 MI	Ocm
	1 Mc	Ocp
	1 me	Oca
Di	1 MI	Di1
De	1 MI	De1
	2 me (or Mcc)	Di2, De2
DI+ L+So	14 (4 MI + 10 Mcc or me)	Chaetal homology uncertain

**Table 2. Body tubercles and chaetotaxy of *Vitronura zhejiangensis* sp. nov.**

Terga					Legs				
	Di	De	DI	L	Scx2	Cx	Tr	Fe	T
Th I	1	2	1	–	0	3	6	13	19
Th II	3	3+s	3+s+ms	3	2	7	6	12	19
Th III	3	4+s	3+s	3	2	8	6	11	18
Terga					Sterna				
Abd I	2	3+ s	2	3	VT	4			
Abd II	2	3+ s	2	3	Ve	5		VI	–
Abd III	2	3+ s	2	3	Ve	3(4)		Fu	5(4)
Abd IV	2	2+ s	3	6	Ve	9		VI	5
Abd V	3	2+s		4(3)	Ag	3		VI	–
Abd VI	8				Ve	15		VI	3(4)

Head. Eyes 2+2, black (Fig. 1). Antenna equal to diagonal of the head and 4-segmented. Ant. I and II with 7 and 12 chaetae, respectively. Ant. III dorsally fused to Ant. IV. Ant. III organ consists of 2 short rods (exposed in separate pits), and 2 long sensory chaetae: sgd (dorsal guard chaeta) and sgv (ventral guard chaeta), chaeta sgd on the same level of sensory rod, sgv on the same level of ventral ms. Ant. IV with trilobed apical bulb, dorsally with 8 sensilla, slender *i* chaeta, 12 slender chaetae (mou) and minute capitate organ (or) (Fig. 2). Labrum chaetotaxy as 0/2, 2, distally not ogival. Labium with minute distal x and 11 chaetae (Fig. 3). Mandible with 5 teeth (Fig. 4). Maxilla crochet-like (Fig. 5). Dorsal cephalic

macrochaetae and mesochaetae similar to those on thorax and abdomen, more or less serrated and apically blunt (Fig. 6), microchaetae smooth and pointed. All dorsal cephalic tubercles (except DI+L+So) independent, tubercle CI with 2 MI and 2 Mc (or me), tubercle An with 1 MI, 1 Mc and 2 Mcc (or me), tubercle Fr with 2 MI and 1 Mc, O-chaeta present. Tubercle Di on head with 1 MI, and De with 1 MI and 2 me (or Mcc). Tubercle DI+L+So with 4 MI and 10 me (or Mcc) (Fig. 1, Table 1).

Thoracic and abdominal tubercles and chaetotaxy shown in Figs 1, 7 and Table 2. Chaetae formula of tubercle Di on Th. I–Abd. V as 1, 3, 3/2, 2, 2, 2, 3. Sensory chaetae and s-microchaeta formula on Th. I–Abd. V as 0, 2+ms, 2/1, 1, 1, 1, 1. Each tubercle on Abd. VI with 8 chaetae (3 MI, 4 Mc and 1 me). Tubercle De on Th. II shown in Fig. 6.

Appendages. Ventral tube with 4+4 chaetae (Fig. 7), furcular vestige with 5 (rarely 4) chaetae (Fig. 7). Unguis without inner and lateral tooth. Unguiculus absent. Chaetotaxy of legs, ventral tube and furcular remnant see Table 2.

Material examined. Holotype ♂, on the path from Longfengjian to Fairy Peak, Tianmu Mountains, Zhejiang, China (30°23'11"N, 119°26'07"E; elev. 1100–1500m), 25 July 2011, coll. Jigang Jiang (no. J2011072501). Paratypes. 1♂5♀ and 2 subadult females, same data as holotype.

Ecology. Under leaves in forest.

***Vitronura tianmua* sp. nov.** (Figs 8–12, Tables 3–5)

**Table 3. Cephalic tubercles and chaetotaxy of *Vitronura tianmua* sp. nov.**

Tubercle	Number and type of chaetae	Names of chaetae
CI	2 Mc	F
	2 Mcc (or me)	G
An	1 MI	B
	2 Mcc (or me)	C, D
	1 Mc	E
Fr	2 MI	A
Oc	1 MI	Ocm
	1 Mc	Ocp
	1 me (or Mcc)	Oca
Di	1 MI	Di1
De	1 MI	De1
	2 Mcc (or me)	De2, Di2
DI+ L+So	14 (4 MI +10 me)	Chaetal homology uncertain

**Table 4. Body tubercles and chaetotaxy of *Vitronura tianmua* sp. nov.**

Terga					Legs				
	Di	De	DI	L	Scx2	Cx	Tr	Fe	Ti
Th I	1	2	1	–	0	3	6	12	19
Th II	3	3+s	3+s+ms	3	2	6	7	9	19
Th III	3	4+s	3+s	3	2	8	6	10	18
Terga					Sterna				
Abd I	2	3+ s	2	3	VT	4			
Abd II	2	3+ s	2	3	Ve	2(4)		VI	0(1)
Abd III	2	3+ s	2	3	Ve	2–4		Fu	4
Abd IV	2	2+ s	3	6	Ve	8–10		VI	4–5
Abd V	3	4+s		4	Ag	3		VI	–
Abd VI	7				Ve	14		VI	3

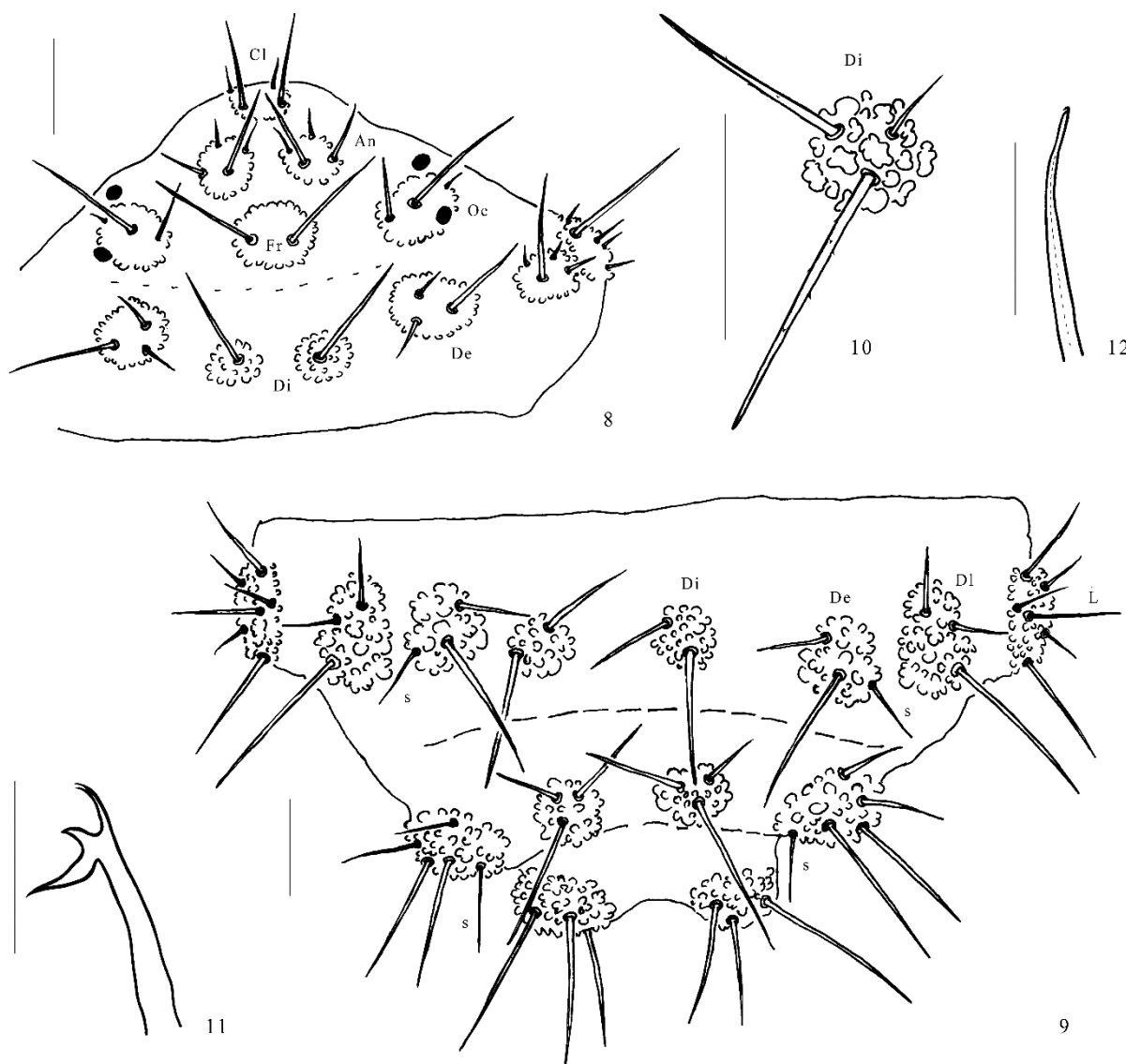
Diagnosis. The new species is different from *V. mascula*, *V. shaanxiensis*, *V. tubercula*, *V. sinica*, *V. luzonica*, *V. gressitti*, *V. latior*, *V. mandarina*, *V. namhaeiensis* and *V. pygmaea*, by having 3 chaetae on tubercle Oc of head, while less than 3 chaetae in the latters. It also differs from *V. Joanna* by having 3 chaetae on tubercle De of head (having 2 in the latter), from *V. macgillivrayi* and *V. singaporiensis* by having separated tubercles Di on head (having fused tubercles Di in the latters). In addition, the new species has no tooth on claw which is different from *V. dentata* and *V. qingchengensis* by having an inner tooth on claw, has no chaeta O on tubercle Fr of head which is different from *V. zhejiangensis* **sp. nov.**, *V. paraacuta*, *V. acuta*

and *V. giselae* having chaeta O presence on tubercle Fr. Differentiated characters between the new species and their allied species see Table 5.

Description. Body length 1.7–1.8 mm. Body red in alive and white in alcohol.

Head. Eyes black, 2+2 (Fig. 8). Antenna 4-segmented. Ant. I and II with 7 and 12 chaetae respectively. Ant. III dorsally fused with Ant. IV. Ant. III organ consists of 2 short rods (exposed in separate pits), and 2 long sensory chaetae: sgd (dorsal guard chaeta) and sgv (ventral guard chaetae), chaeta sgd on the same level of sensory rod, chaeta sgv on the same level of ventral ms. Ant. IV with trilobed apical bulb, dorsally with 8 sensilla, slender *i* chaeta, 12 slender cylindrical chaetae (mou) and minute capitate organ (or). Labrum distally not ogival, chaetotaxy as 0/2, 2. Labium with 11 chaetae, without minute distal x. Mandible with 4 teeth (Fig. 11). Maxilla crochet-like (Fig. 12). Cephalic tubercles and chaetotaxy as in Fig. 8 and Table 3, macrochaetae and mesochaetae on body more or less serrated and apically blunt, microchaetae smooth and pointed (Fig. 10). All dorsal cephalic tubercles (except DL+L+So) independent. Tubercle Cl with 2 MI and 2 me (or Mcc). Tubercle An with 1 MI+3 me (or 1 MI+1 Mc+2 me). Tubercle Fr with 2MI, chaeta O absent. Tubercle Di on head with 1 MI. Tubercle De with 1 MI and 2 me (or Mcc). Tubercle Dl with 1 MI and 3 me. Tubercle L+So with 3 MI and 7 me, tubercle Dl fuse to tubercle L+So (Fig. 8).

Thoracic and abdominal tubercles and chaetotaxy shown in Table 4, tubercles and chaetotaxy of Abd. IV–VI as in Fig. 9. Chaetae formula of tubercle Di on Th. I–Abd. V as 1, 3, 3/2, 2, 2, 2, 3. Sensory chaetae and s-microchaeta formula on Th. I–Abd. V as 0, 2+ms, 2/1, 1, 1, 1, 1. Each tubercle on abd. VI with 7 chaetae (3 MI and 4 Mc or me).



Figures 8–12. *Vitronura tianmua* sp. nov. 8. Dorsum of head. 9. Dorsum of Abd. IV–VI. 10. Left tubercle Di of Th. III. 11. Mandible. 12. Maxilla. Scale bars: 8–10 = 50  $\mu$ m; 11–12 = 20  $\mu$ m.

Thoracic and abdominal tubercles and chaetotaxy shown in Table 4, tubercles and chaetotaxy of Abd. IV–VI as in Fig. 9. Chaetae formula of tubercle Di on Th. I–Abd. V as 1, 3, 3/2, 2, 2, 2, 3. Sensory chaetae and s-microchaeta formula on Th. I–Abd. V as 0, 2+ms, 2/1, 1, 1, 1, 1. Each tubercle on abd. VI with 7 chaetae (3 MI and 4 Mc or me).

Appendages. Ventral tube with 4+4 chaetae, furcular vestige with 4 chaetae. Unguis without inner and lateral tooth. Unguiculus absent. Chaetotaxy of legs, ventral tube and furcular remnant see Table 4.

Ecology. Under leaves in forest.

Material examined. Holotype ♂, on the path from Longfengjian to fairy Peak, Tianmu Mountains, Zhejiang, China (30°23'11"N, 119°26'07"E; elev. 1100–1500m), 25 July 2011, coll. Jigang Jiang (no. J2011072501). Paratype. 1♂, same data as holotype.

Etymology. The species is named after the locality of the Mountains Tianmu, where the new species was collected.

**Table 5. Diagnosis among *Vitronura zhejiangensis* sp. nov., *V. tianmua* sp. nov. and their allied species.\***

Species	MT	LA	SM	COC	OC	CTD	VA IV	ITC
<i>V. zhejiangensis</i> sp. nov.	5	not ogival	slightly serrate	+ (Mc)	3	3	8–10	–
<i>V. acuta</i> Deharveng & Weiner, 1984	3	ogival	serrate	+ (Mc)	3	3	10	–
<i>V. tianmua</i> sp. nov.	4	not ogival	slightly serrate	–	3	3	8–10	–
<i>V. giselae</i> (Gisin, 1950)	3	not ogival	serrate	+ (Mc)	3	3	7–9	–
<i>V. qingchengensis</i> Jiang & Yin, 2012	5	not ogival	smooth	+ (Mc)	3	3	10 (9)	+
<i>V. dentata</i> Deharveng & Weiner, 1984	3	not ogival	weakly serrate	+ (Mc)	3	3	8	+
<i>V. ciliata</i> Wang, Wang & Jiang, 2016	5	ogival	ciliate	+ (me)	2	2	9	–
<i>V. setaebarbulata</i> Gao et al, 2012	6–7	not ogival	barbulate	+(Mc)	3	3	9 (8)	–
<i>V. joanna</i> (Coates, 1968)	6	?	serrate	+(Mc)	3	2	?	–
<i>V. shaanxiensis</i> Jiang & Yin, 2011	7	not ogival	barbulate	–	1	1	9 (8)	–
<i>V. mandarina</i> (Yosii, 1954)	3	not ogival	smooth	+(Mc)	3	3	?	–

\*Abbreviations: MT—Mandible teeth; LA—Labrum; SM—Shape of macrochaetae; COC—Cephalic O-chaeta; OC—Ocular chaetae; CTD—Cephalic tubercle De chaetae; VA IV—Ve on Abd. IV; ITC—Inner tooth on claw.

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