

## Article

### A new species of *Ramuselloppia* (Acari: Oribatida: Oppiidae) from Vietnam

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#### Abstract

A new oribatid mite species, *Ramuselloppia vietnamica* **sp. nov.** (Oppiidae), is described from soil of Southern Vietnam. The genus is recorded for the first time from Vietnam and the Oriental region. The morphology of the gnathosoma and legs of *Ramuselloppia* is presented in detail for the first time. An annotated checklist of oribatid mite taxa from a dipterocarp forest of Dong Nai Culture and Nature Reserve is presented. It includes 40 species, 29 genera and 19 families.

**Key words:** oribatid mites, new species, *Ramuselloppia*, Dong Nai Culture and Nature Reserve, Vietnam.

#### Introduction

*Ramuselloppia* is a small oribatid mite genus (Acari: Oribatida: Oppiidae) proposed by Subías and Rodríguez (1986) with *Ramuselloppia anomala* Subías and Rodríguez, 1986 as type species. Currently, this genus comprises only one species, which is distributed in the Iberian region (Subías 2004, online version 2012); also, Subías (2004, online version 2012) included *Brachioppia japonica* Aoki, 1983 (see Aoki 1983) from Japan in *Ramuselloppia*. The main diagnostic characters of *Ramuselloppia* (summarized from Subías & Rodríguez 1986; Subías & Balogh 1989; Balogh & Balogh 1992) are: Multioppiinae (summarized from Balogh 1983; Subías & Balogh, 1989; Balogh & Balogh 1992) with ten pairs of short notogastral setae (seta *c* present); five pairs of genital setae; notogastral seta *la* in front of seta *lm*; sensillus with dilated and ciliate head; three pairs of muscle sigilla in interlamellar region; interlamellar seta present; adanal seta *ad*<sub>1</sub> in postanal position; lyrifissure *iad* in paraanal position.

During the identification of oribatid mites from dipterocarp forest of Southern Vietnam, one new species belonging to *Ramuselloppia* was found. The new species is described and illustrated below under the name *Ramuselloppia vietnamica* **sp. nov.** This species is the first member of the genus recorded from Vietnam and the Oriental region. Also, an annotated checklist of registered oribatid mite taxa is provided.

## Materials and methods

Studies were conducted by A.E. Anichkin from a dipterocarp forest of Dong Nai Culture and Nature Reserve (Dong Nai Province, Southern Vietnam, 11°18' N, 107°04' E): 1) 20–30 July 2011 (Dip-3; 30 samples); 2) 22 October 2011 (Dip-4; 42 samples); 3) 21 December 2011 (Dip-5; 30 samples); 4) 30 April 2012 (Dip-6; 30 samples).

Soil samples were collected by taking soil-cores (diameter: 7.8 cm; depth: 10 cm). Samples were left in the metal cores to minimize disturbance during transport from the field to the laboratory. Oribatid mites were extracted into 75% ethanol using Berlese funnels with electric lamps (40 W) for five days.

The holotype and paratypes were mounted in lactic acid on temporary cavity slides for measurement and illustration. All body measurements are presented in micrometers. Body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate to avoid discrepancies caused by different degrees of notogastral distortion. Notogastral width refers to the maximum width in dorsal aspect. Lengths of body setae were measured in lateral aspect. Formulae for leg setation are given in parentheses according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included). Formulae for leg solenidia are given in square brackets according to the sequence genu–tibia–tarsus. General terminology used in this paper follows that of Grandjean (summarized by Norton and Behan-Pelletier 2009), Subías and Balogh (1989).

## Checklist of identified oribatid mite taxa<sup>1</sup>

### Lohmanniidae

- *Javacarus kuehnelti* Balogh. Locality: Dip-5, Dip-6
- *Meristacarus sundensis* Hammer. Locality: Dip-3, Dip-4, Dip-5
- *Papillacarus hirsutus* (Aoki). Locality: Dip-4
- *Papillacarus polygonatus* Ermilov and Anichkin. Locality: Dip-4

### Trhypochthoniidae

- *Archegozetes longisetosus* Aoki. Locality: Dip-4

### Malaconothridae

- *Malaconothrus dorsofoveolatus* Hammer. Locality: Dip-4, Dip-5
- *Malaconothrus geminus* Hammer. Locality: Dip-5

### Nanhermanniidae

- *Cosmohermannia robusta* Aoki. Locality: Dip-4

### Hermanniidae

- *Phyllhermannia gladiata* Aoki. Locality: Dip-3, Dip-4, Dip-5

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<sup>1</sup> Ptyctimous mites not included.

### **Zetorchestidae**

- *Zetorchestes saltator* Oudemans. Locality: Dip-4

### **Astegistidae**

- *Furcoppia cattienica* Ermilov and Anichkin. Locality: Dip-3, Dip-5

### **Amerobelbidae**

- *Roynortonia vietnamica* Ermilov. Locality: Dip-5

### **Basilobelbidae**

- *Basilobelba parmata* Okayama. Locality: Dip-5

### **Eremulidae**

- *Eremulus avenifer* Berlese. Locality: Dip-5

### **Eremobelbidae**

- *Eremobelba breviseta* Balogh. Locality: Dip-3, Dip-5

### **Arceremaeidae**

- *Tecteremaeus hauseri* Mahunka. Locality: Dip-5

### **Oppiidae**

- *Arcoppia hammerae* Rodríguez and Subías. Locality: Dip-3, Dip-5, Dip-6
- *Karenella acuta* (Csiszár). Locality: Dip-5
- *Multioppia tamdao* Mahunka. Locality: Dip-4, Dip-5
- *Ramuselloppia vietnamica* **sp. nov.** Locality: Dip-5
- *Pulchroppia elegans* Hammer. Locality: Dip-5
- *Pulchroppia roynortoni* Ermilov and Anichkin. Locality: Dip-3, Dip-5

### **Tetracondylidae**

- *Dolicheremaeus aokii* Balogh and Mahunka. Locality: Dip-4

### **Tectocephidae**

- *Tectocephus velatus* (Michael). Locality: Dip-4, Dip-5

### **Microzetidae**

- *Berlesezetes ornatissimus* (Berlese). Locality: Dip-3, Dip-4, Dip-5

### **Scheloribatidae**

- *Scheloribates fimbriatus* Thor. Locality: Dip-3
- *Scheloribates kraepelini* (Berlese). Locality: Dip-4, Dip-5
- *Scheloribates praeincisus* (Berlese). Locality: Dip-5

## Haplozetidae

- *Peloribates rangiroaensis* Hammer. Locality: Dip-5
- *Protoribates heterodactylus* Ermilov and Anichkin. Locality: Dip-3, Dip-4, Dip-5, Dip-6
- *Protoribates maximus* (Mahunka). Locality: Dip-4, Dip-5
- *Protoribates paracapucinus* (Mahunka). Locality: Dip-3
- *Trachyoribates ovulum* Berlese. Locality: Dip-3, Dip-4, Dip-5, Dip-6

## Galumnidae

- *Galumna khoii* Mahunka. Locality: Dip-6
- *Galumna levisensilla* Ermilov and Anichkin. Locality: Dip-3, Dip-4, Dip-5
- *Neogalumna seniczaki* Ermilov and Anichkin. Locality: Dip-5
- *Pergalumna cattienica* Ermilov and Anichkin. Locality: Dip-4
- *Pergalumna indistincta* Ermilov and Anichkin. Locality: Dip-4
- *Pergalumna margaritata* Mahunka. Locality: Dip-5
- *Pergalumna pseudosejugalis* Ermilov and Anichkin. Locality: Dip-4, Dip-5

Hence, in the course of this taxonomic study we registered 40 species, 29 genera and 19 families. All listed taxa (except the new species and the genus *Ramuselloppia*) have been found earlier in Vietnam (for example, Ermilov & Anichkin 2012a, b, c; Ermilov *et al.* 2012).

## Description of new species

### *Ramuselloppia vietnamica* sp. nov. (Figs. 1–16)

#### *Diagnosis*

Body size 299–323 × 131–139. Lamellar lines short, thin. Translamellar line absent. Rostral and exobothridial setae barbed, lamellar and interlamellar setae smooth. Sensillus with unilaterally well dilated pointed head, with long and short cilia. Notogastral setae short, smooth. Epimeres III+IV oblong, distance between legs III and IV considerably longer than between legs I and III. Ventral setae short, smooth (except ciliate epimeral setae *3c*, *4c* and adanal setae).

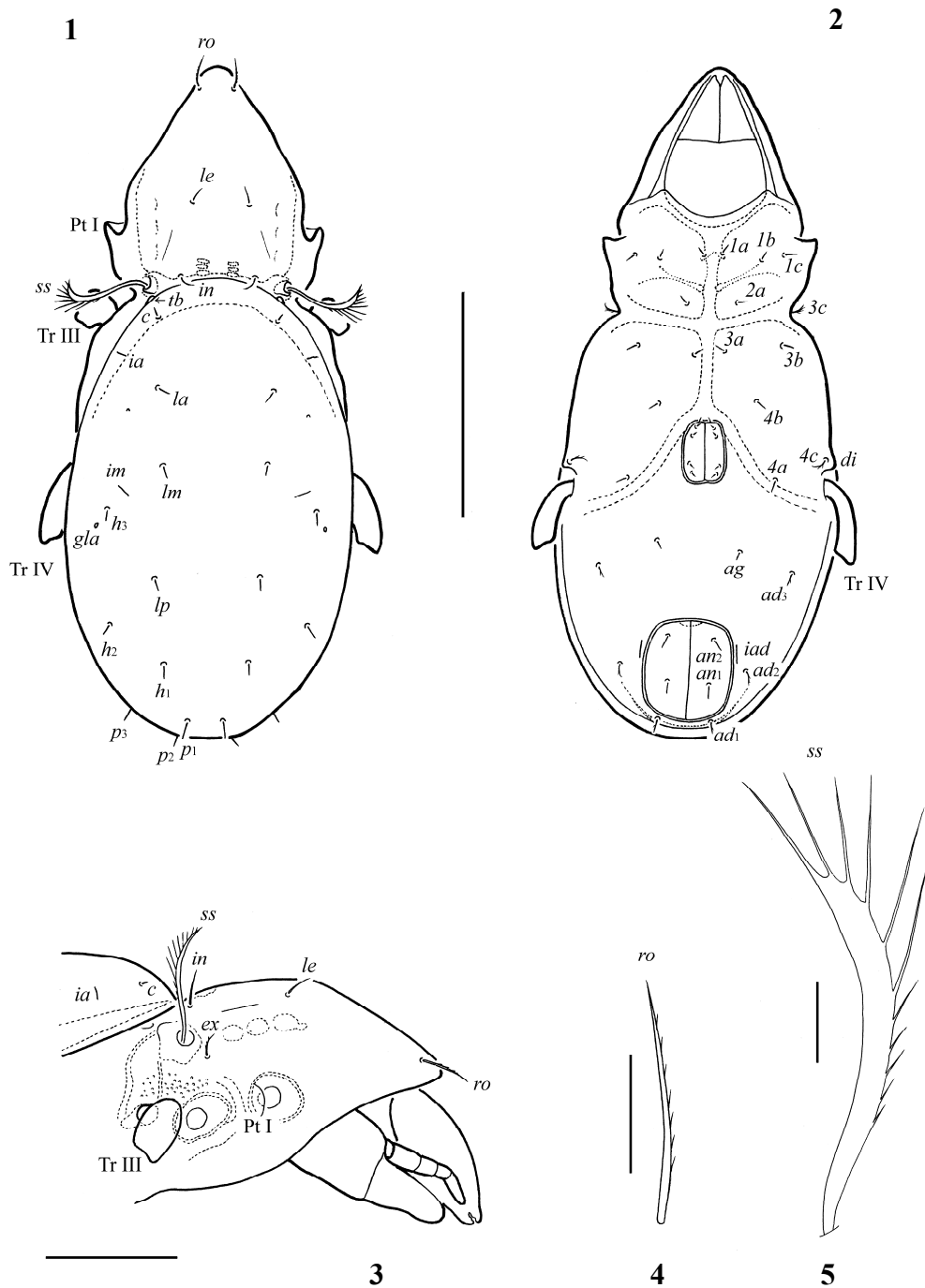
#### *Measurements*

Body length 303 (holotype), 299–323 (mean 310; five paratypes); notogaster width 139 (holotype), 131–139 (mean 135; five paratypes).

#### *Integument*

Body color light brown. Body surface smooth. Lateral part of body (between acetabula II, III and bothridium) granulate (diameter of granules less than 1).

*Prodorsum* (Figs. 1, 3–5): Rostrum rounded in dorsal view. Thin, short lamellar lines present, but poorly visible. Translamellar line absent. Interbothridial region with three pairs of small muscle sigilla. Dorso-lateral part (anteriorly to bothridium) with three to four large muscle sigilla. Rostral seta (*ro*, 20–24) setiform, barbed, inserted dorso-laterally. Lamellar (*le*, 12–14) and interlamellar (*in*, 14–16) setae setiform, smooth. Sensillus (*ss*, 45–53) with well developed stalk and unilaterally dilated pointed head, with 10 to 13 long and short cilia. Postbothridial tubercles present, but poorly visible.



**Figures 1–5.** *Ramuselloppia vietnamica* **sp. nov.** 1. Dorsal view, legs (except trochanters III and IV) not shown; 2. Ventral view, legs (except trochanters IV), palp and subcapitular setae not shown; 3. Lateral view of prodorsum and anterior part of notogaster, legs (except trochanter III), gnathosomal setae not shown; 4. Rostral seta; 5. Sensillus. Scale bar 100  $\mu\text{m}$  (Figs. 1, 2), 50  $\mu\text{m}$  (Fig. 3), 10  $\mu\text{m}$  (Figs. 4, 5).

*Notogaster* (Figs. 1–3): Anterior margin medially convex, with two small tubercles (*tb*), directed towards postbothridial tubercles. Notogastral setae short (8–12, only *c* shorter 4–6), setiform, smooth. Setae *c*, *la*, *lm*, *lp*, *h*<sub>1</sub> inserted in two longitudinal rows.

Very small tubercle located latero-posteriorly to each seta *la*. Lyrifissures *ia*, *im*, *ip* and opisthonotal gland opening (*gla*) clearly visible.

*Lateral part of body* (Fig. 3): Pedotectum I (Pt I) convex. Exobothridial seta (*ex*, 12–14) setiform, barbed. Lyrifissures *ih*, *ips* visible. Discidium (*di*) triangular, blunt-ended. Distance between legs III and IV considerably longer than between legs I and III.

*Gnathosoma* (Figs. 6–8). Subcapitulum longer than wide (65–69 × 49). Subcapitular setae setiform; *h* (8) smooth; *m* with cilia (14–16); *a* (12) barbed. Adoral setae absent. Palp (41) with setation 0–2–1–3–8(+1 $\omega$ ). Solenidion not attached to eupathidium, pressed to the palptarsus surface. Chelicera (69) with two setiform setae: *cha* (24) thickened, with cilia; *chb* (10) thinner, barbed. One small tooth is present posteriorly to *cha*. Trägårdh's organ not evident.

*Epimeral region* (Figs. 2, 9–11). Epimeres III+IV oblong. Epimeral setal formula: 3–1–3–3. Epimeral setae short (8–12; *3c* longer, 16), setiform, thin, smooth (except ciliate *3c* and *4c*).

*Anogenital region* (Figs. 2, 12, 13). Five pairs of genital (*g*<sub>1–5</sub>, 4–6), one pair of aggenital (*ag*, 4–6) and two pairs of anal (*an*<sub>1</sub>, *an*<sub>2</sub>, 8–12) setae setiform, smooth. Three pairs of adanal (*ad*<sub>1–3</sub>, 8–12) setae setiform, with one to two cilia. Seta *ad*<sub>2</sub> inserted latero-posteriorly to lyrifissure *iad*.

*Legs* (Figs. 14–16). Tarsus with one smooth claw. Formulae of leg setation and solenidia: I (1–5–2–4–20) [1–2–2], II (1–5–2–4–15) [1–1–2], III (2–3–1–3–15) [1–1–0], IV (1–2–2–3–12) [0–1–0]; homology of setae and solenidia indicated in Table 1. Seta *p* setiform on tarsi I, and small, thorn-like on tarsi II–IV. Famulus short, thin, blunt-ended. All solenidia simple.

**Table 1.** Leg setation and solenidia of *Ramuselloppia vietnamica* sp. nov.

Leg	Trochanter	Femur	Genu	Tibia	Tarsus
I	<i>v'</i>	<i>d</i> , ( <i>l</i> ), <i>bv''</i> , <i>v''</i>	( <i>l</i> ), $\sigma$	( <i>l</i> ), ( <i>v</i> ), $\phi_1$ , $\phi_2$	( <i>ft</i> ), ( <i>tc</i> ), ( <i>it</i> ), ( <i>p</i> ), ( <i>u</i> ), ( <i>a</i> ), <i>s</i> , ( <i>pv</i> ), ( <i>v</i> ), ( <i>pl</i> ), <i>e</i> , $\omega_1$ , $\omega_2$
II	<i>v'</i>	<i>d</i> , ( <i>l</i> ), <i>bv''</i> , <i>v''</i>	( <i>l</i> ), $\sigma$	( <i>l</i> ), ( <i>v</i> ), $\phi$	( <i>ft</i> ), ( <i>tc</i> ), ( <i>it</i> ), ( <i>p</i> ), ( <i>u</i> ), ( <i>a</i> ), <i>s</i> , ( <i>pv</i> ), $\omega_1$ , $\omega_2$
III	<i>l'</i> , <i>v'</i>	<i>d</i> , <i>l'</i> , <i>ev'</i>	<i>l'</i> , $\sigma$	<i>l'</i> , ( <i>v</i> ), $\phi$	( <i>ft</i> ), ( <i>tc</i> ), ( <i>it</i> ), ( <i>p</i> ), ( <i>u</i> ), ( <i>a</i> ), <i>s</i> , ( <i>pv</i> )
IV	<i>v'</i>	<i>d</i> , <i>ev'</i>	<i>d</i> , <i>l'</i>	<i>l'</i> , ( <i>v</i> ), $\phi$	<i>ft''</i> , ( <i>tc</i> ), ( <i>p</i> ), ( <i>u</i> ), ( <i>a</i> ), <i>s</i> , ( <i>pv</i> )

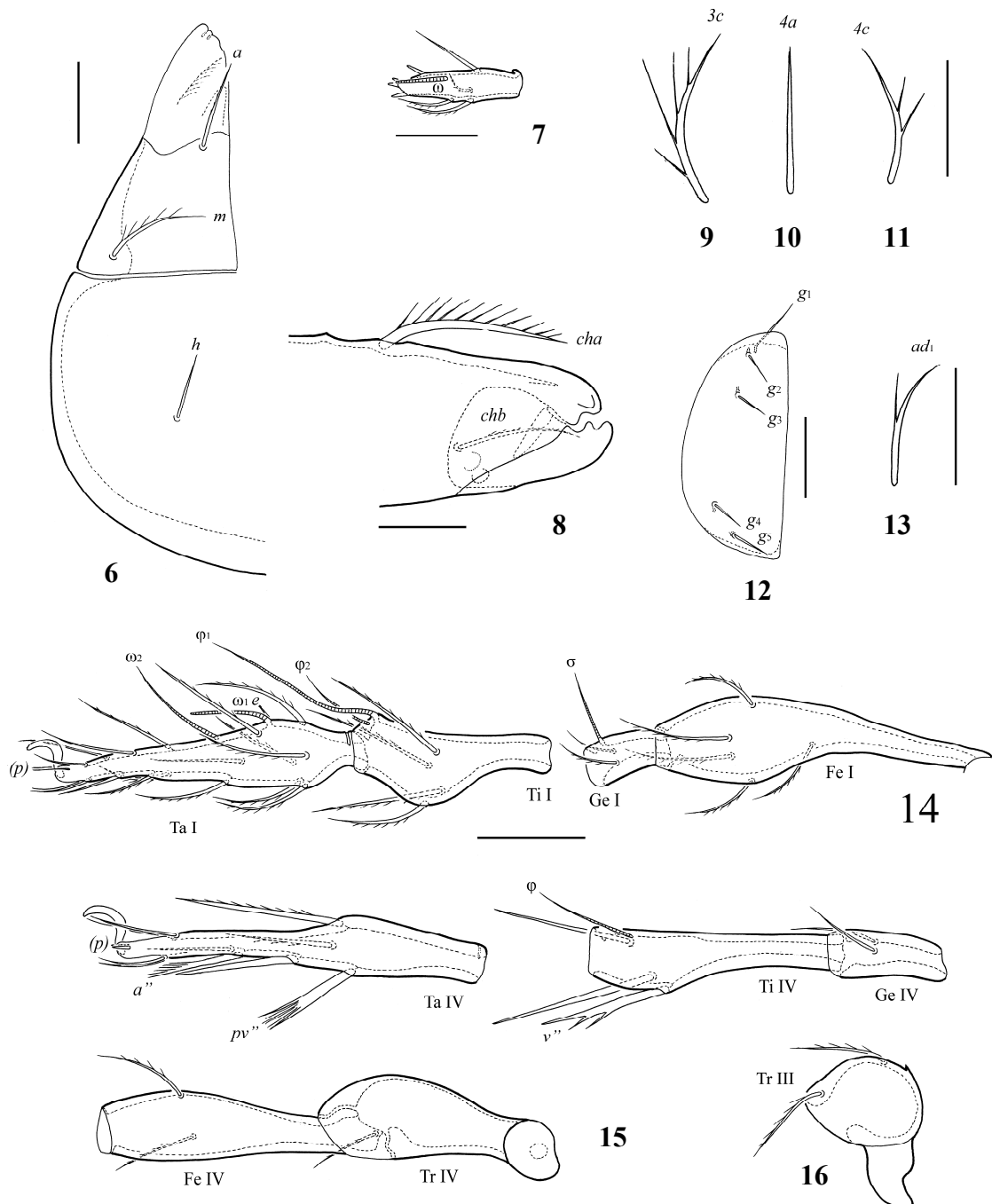
Roman letters refer to normal setae (*e* to famulus), Greek letters to solenidia. Single prime (') marks setae on anterior and double prime (") setae on posterior side of the given leg segment. Parentheses refer to a pair of setae.

#### *Material examined*

Holotype (female) and five paratypes (four males and one female) were collected: Dip-5.

#### *Type deposition*

The holotype is deposited in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; two paratypes are in the collection of the Siberian Zoological Museum, Novosibirsk, Russia; three paratypes are in the private collection of the senior author.



**Figures 6–16.** *Ramusellopedia vietnamica* sp. nov. 6. Subcapitulum, right half; 7. Palptarsus; 8. Anterior part of chelicera; 9. Epimeral seta 3c; 10. Epimeral seta 4a; 11. Epimeral seta 4c; 12. Genital plate, right; 13. Epimeral seta  $ad_1$ ; 14. Leg I, without trochanter, right, paraxial view; 15. Leg IV, left, paraxial view; 15. Trochanter of leg III, right, antiaxial view. Scale bar 10  $\mu$ m (Figs. 6–13), 20  $\mu$ m (Figs. 14–16).

### Etymology

The new species is named after the country of origin, Vietnam, where the material was collected.

### Remarks

*Ramuselloppia vietnamica* **sp. nov.** can be distinguished from the type species *Ramuselloppia anomala* Subías and Rodríguez by the long epimeres III+IV (versus short in *R. anomala*), unilaterally dilated and ciliate sensillar head (versus fusiform and radiate ciliate in *R. anomala*), absence of translamellar line (versus present in *R. anomala*).

Subías (2004, online version 2012) included *Brachioppia japonica* Aoki, 1983 in *Ramuselloppia*. He may probably be right, but this species has a different arrangement of notogastral setae, as well as the absence of seta *c*. Further research is needed to establish the taxonomical position of *B. japonica*.

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### گونه جدیدی از *Ramuselloppia* (Acari: Oribatida: Oppiidae) از ویتنام

#### چکیده

*Ramuselloppia vietnamica* sp. nov. گونه جدیدی از کنه‌های اریباتید خانواده Oppiidae با نام *Ramuselloppia vietnamica* sp. nov. از خاک‌های جنوب ویتنام توصیف می‌شود. این جنس برای نخستین بار از ویتنام و ناحیه اوریتال گزارش می‌شود. ریخت‌شناسی گناتوزوما و پاهای جنس *Ramuselloppia* برای نخستین بار به طور مفصل ارائه می‌شود. فهرست گونه‌های اریباتید جنگل دیپتروکارپ Dong Nai Culture and Nature Reserve ارایه شده است. این فهرست شامل ۴۰ گونه، ۲۹ جنس و ۱۹ خانواده است.

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