

**Fauna of  
New Zealand**  
Ko te Aitanga Pepeke  
o Aotearoa

**EDITORIAL BOARD**

**Dr M. J. Fletcher**, *NSW Agricultural Scientific Collections Unit, Forest Road, Orange, NSW 2800, Australia*

**Prof. G. Giribet**, *Museum of Comparative Zoology, Harvard University, 26 Oxford Street, Cambridge, MA 02138, U.S.A.*

**Dr R. J. B. Hoare**, *Landcare Research, Private Bag 92170, Auckland, New Zealand*

**Dr M.-C. Larivière**, *Landcare Research, Private Bag 92170, Auckland, New Zealand*

**Mr R. L. Palma**, *Museum of New Zealand Te Papa Tongarewa, P.O. Box 467, Wellington, New Zealand*

**Dr C. J. Vink**, *Canterbury Museum, Rolleston Ave, Christchurch, New Zealand*

**CHIEF EDITOR**

**Prof Z.-Q. Zhang**, *Landcare Research, Private Bag 92170, Auckland, New Zealand*

**Associate Editors**

**Dr T. R. Buckley, Dr R. J. B. Hoare, Dr M.-C. Larivière, Dr R. A. B. Leschen, Dr D. F. Ward, Dr Z. Q. Zhao,**  
*Landcare Research, Private Bag 92170, Auckland, New Zealand*

**Honorary Editor**

**Dr T. K. Crosby**, *Landcare Research, Private Bag 92170, Auckland, New Zealand*

---

**Fauna of New Zealand**  
**Ko te Aitanga Pepeke o Aotearoa**

**Number / Nama 77**

***Tenuipalpus***

**(Acari: Trombidiformes: Tetranychoidae: Tenuipalpidae)**

**by**

**Yun Xu**

Postdoctoral Station of Forestry, Forestry College, Fujian Agriculture and Forestry University, Fuzhou 350002, China

**Zhi-Qiang Zhang<sup>1,2</sup>**

<sup>1</sup> Manaaki Whenua - Landcare Research, 231 Morrin Road, Auckland, New Zealand

<sup>2</sup> Centre for Biodiversity & Biosecurity, School of Biological Sciences, University of Auckland, Auckland, New Zealand

For correspondence: zhangz@landcareresearch.co.nz

**Auckland, New Zealand**  
**2018**

---

Copyright © Manaaki Whenua - Landcare Research New Zealand Ltd 2018

No part of this work covered by copyright may be reproduced or copied in any form or by any means (graphic, electronic, or mechanical, including photocopying, recording, taping information retrieval systems, or otherwise) without the written permission of the publisher.

#### Cataloguing in publication

Xu, Yun

*Tenuipalpus* (Acari: Trombidiformes: Tetranychoidae: Tenuipalpidae) / by Yun Xu, Zhi-Qiang Zhang, -- Lincoln, N.Z. : Landcare Research NZ, 2018.

1 online resource

(Fauna of New Zealand, ISSN 1179-7193 (online) ; no. 77 = Ko te Aitanga Pepeke o Aotearoa ; nama 77)

ISBN 978-0-947525-52-1 (online)

ISBN 978-0-947525-53-8 (print)

1.Mites -- New Zealand. I. Title. II. Landcare Research New Zealand Ltd. III. Zhang, Zhi-Qiang, 1963-

UDC 595.425 (931)

#### This work should be cited as:

Xu, Y., Zhang, ZQ. 2018 *Tenuipalpus* (Acari: Trombidiformes: Tetranychoidae: Tenuipalpidae). Lincoln, N.Z.: Landcare Research.

<https://doi.org/10.7931/J2/FNZ.77>

Prepared for publication by Zhi-Qiang Zhang and the authors using computer-based text processing, layout, and printing at Landcare Research, Private Bag 92170, Auckland, New Zealand.

To access on-line extracts from this series visit:

<http://fnz.landcareresearch.co.nz/>

Published by Landcare Research, P.O. Box 40, Lincoln, Canterbury, N.Z.

Website: <http://www.landcareresearch.co.nz/>

Printed by 3A

Cover design: Birgit Rhode

Date of publication 12 November 2018

**Publication of the Fauna of New Zealand series is supported by Core funding for Crown Research Institutes from the Ministry of Business, Innovation and Employment's Science and Innovation Group, for the Defining New Zealand's Land Biota research programme.**

## POPULAR SUMMARY

Class **Arachnida**

Subclass **Acari**

Superorder **Acariformes**

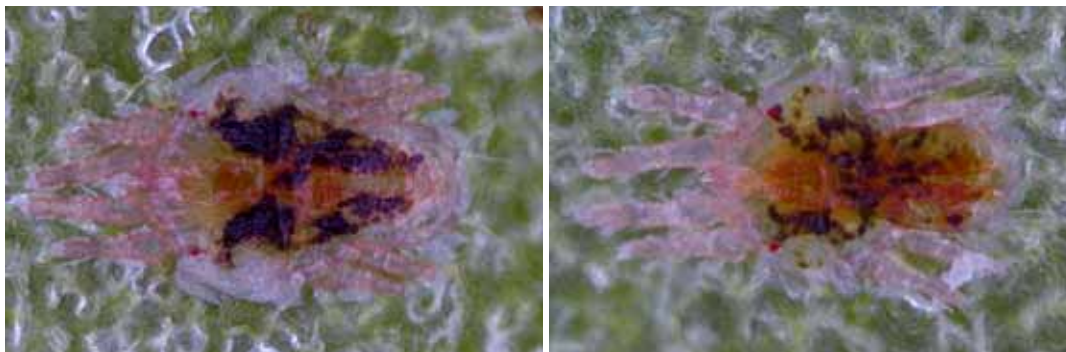
Order **Trombidiformes**

Suborder **Prostigmata**

Superfamily **Tetranychoidae**

Family **Tenuipalpidae**

Members of the family Tenuipalpidae, commonly known as false spider mites, belong to a large group of the obligate plant-feeding mite superfamily Tetranychoidae. These tiny mites, often of a quarter to a third of a millimeter, are also known as flat mites due to their body shape. Some species are of agricultural importance as pests of economic plants or vectors of crop diseases. They are among the common species intercepted on imported fresh produce and are becoming increasingly important in biodiversity. Several species are known as invasive species in recent years. Over 1100 species of the Tenuipalpidae have been described in the world and over 300 species belong to the genus *Tenuipalpus*. In New Zealand, only 9 species of *Tenuipalpus* have been recorded. This book provides both full descriptions of these species from New Zealand and a key to enable their identification.



## WHAKARĀPOPOTOTANGA

Ko te ingoa kārangaranga o te whānau Tenuipalpidae, ko te pūwereriki pūngāwerewere horihori. Nō tētahi wehenga nui rātou o tētahi whānau ruarangi me mātua kai tipu e ora ai, ko ngāi Tetranychoidae te ingoa. He pūwereriki moroiti noa, kei te takiwā o te hauwhā ki te hatoru mirimita te rahi. Ka kīia anō hoki he pūwereriki papatahi, he papatahi nō te tinana. He pānga o ētahi ki ngā mahi ahuwhehua, inā rā he whakararu tā rātou i ētahi tipu tukuhua ki te ōhanga, he kawē tahumaero hoki i waenga i ētahi momo kai o te māra. Ko rātou anō ētahi o ngā momo e kaha haukotia ana i te taenga mai o ngā kai mata kua tonoa i tāwāhi mā Aotearoa. Kei te nui haere hoki te wāhi ki a rātou i te matahuhuatanga koiora. He maha tonu ngā momo kua kīia he whakaariki i ngā tau tata nei. Nui ake i te 1100 ngā momo Tenuipalpidae kua āta whakaahuatia ā-kupu huri i te ao. Ko tētahi 300 o ērā nō te puninga Tenuipalpus. I Aotearoa nei, e 9 noa iho ngā momo Tenuipalpus e mōhiotia ana. Kei tēnei pukapuka nei ngā whakaahuatanga ā-kupu roa o ēnei momo o Aotearoa me tētahi ara tautohu e mōhiotia ai ko tēhea tēhea.

Contributor **Yun Xu** worked as a postdoctoral fellow at Fujian Agriculture and Forestry University, where she majored in horticulture during 2004–2008 for a BSc degree. Since then, she has developed a strong interest in mites. In 2011, she graduated with a master degree of Agriculture at Fujian Agriculture and Forestry University. Between 2011 and 2012, she worked at the Institute of Plant Protection, Fujian Academy of Agricultural Sciences. In 2012, she continued her graduate study at Fujian Agriculture and Forestry University, where she received her PhD in 2015; her thesis was on the systematics of the Tenuipalpidae. In 2012 and 2013, she visited Manaaki

Whenua – Landcare Research, New Zealand for joint research projects on the Tenuipalpidae of New Zealand. She has published or co-published 13 academic papers on mites.



I mahi a **Yun Xu**, tētahi o ngā kaituhi, hei paewai ki tua o kairangi i te Whare Wānanga Ahuwhenua, Ahurākau Fujian, ko tāna kaupapa matua mō tana tohu BSc i a ia i reira mai i te 2004-2008, ko te ahumāra. Mai i taua wā, kua āta hurikiko mai ia ki te tiroiro i ngā pūwereriki. Nō te tau 2011, ka puta ia me tana tohu kauati Ahuwhenua i taua whare wānanga anō. I waenga o te 2011 me te 2012, ka mahi ia i te Pūtahi Tiaki Tipu i te Whare Pūtaiao Ahuwhenua Fujian. I te tau 2012, ka takahi anō ia i te ara ako ki tua o paetahi i te Whare Wānanga Ahuwhenua, Ahurākau Fujian, ka puta me tana tohu kairangi i te tau 2015. Ko te kaupapa o taua tuhinga roa, ko ngā tātai i ngā whakapapa o ngā Tenuipalpidae. I te tau 2012 me te 2013, ka tatū mai ia ki Manaaki Whenua, i Aotearoa, ki te kawae i ētahi rangahau ngātahi i ngā Tenuipalpidae o Aotearoa. Kua oti i a ia, i tōna kotahi, i te taha rānei o ētahi atu, ētahi tuhinga kura wānanga 13 mō ngā pūwereriki.

Contributor **Zhi-Qiang Zhang** was born in Shanghai, China. He was educated at Fudan University, where he majored in zoology and became interested in entomology and acarology. In 1985, he graduated with a BSc in zoology and began his studies on mite systematics and biology at the Graduate School, Fudan University. In 1988, he moved to the USA and continued his graduate studies at Cornell University, Ithaca, New York, where he received his PhD in entomology in January 1993 for research on mite predator-prey ecology. Between 1992 and 1994 he worked as a postdoctoral insect ecologist at Oregon State University, Corvallis, Oregon, on biological weed control. In 1994, he accepted an acarologist position with CAB International Institute of Entomology based in the Natural History Museum in London. While employed at CAB International from 1994 to 1999, he also served as a Technical Officer for the BioNET-INTERNATIONAL from 1998 to 1999. In 1999, he moved to New Zealand and has since been the acarologist for Manaaki Whenua – Landcare Research, working on mite systematics and biology in the New Zealand Arthropod Collection. From 2013, he has been on co-appointment with the University of Auckland as a professor in the School of Biological Sciences. Zhi-Qiang is the author or co-

author of over 300 scientific papers (most of them on mites), including over 20 books. He has a strong passion for biodiversity discovery and is the founder of two of the world's most important journals in this field (*Zootaxa* and *Phytotaxa*).



I whānau mai tērā atu kaituhi, a **Zhi-Qiang Zhang**, i Shanghai, i Haina. I kuraina ki te Whare Wānanga Fudan, ko tana kaupapa matua i reira, ko te mātai kīrehe. Ka tupu ake anō i reira tana manako ki te mātai pepeke me te mātai pūwereriki, pūwere-ngote-toto. Puta ana ia me tana tohu mātai kīrehe i te tau 1985, huri ana ki te wherawhera i ngā tātai whakapapa me te koiora o te pūwereriki i te Kura ki Tua o Paetahi i te Whare Wānanga o Fudan. Ka hūnuku ki Amerika i te tau 1988, ka whai tonu i āna akoranga ki tua o paetahi i te Whare Wānanga o Cornell, i Ithaca, rohe o Niu Ioka. I reira, i te Kohitātea o te 1993, ka riro i a ia tana tohu kairangi mātai pepeke, mō tāna rangahau i ngā hononga konihi-pārurenga o ngā pūwereriki. I waenga i te 1992 me te 1994, ka mahi ia hei kaimātai hauropi pepeke ki tua o kairangi i te Whare Wānanga o Oregon State, i Corvallis, Oregon, ko te pēhi ā-koiora i te otaota te kaupapa. I te 1994, ka piki ki tētahi tūranga mātai pūwereriki, pūwere-ngote-toto i te Pūtahi Mātai Pepeke o te Ao i CAB, i te Whare Taonga o te Ao Tūroa i Rānana. I a ia e mahi ana mā CAB, mai i te 1994 ki te 1999, ka tū anō ia hei Āpiha Taha Hangarau mō te BioNET-INTERNATIONAL, mai i te 1998 ki te 1999. Nō te 1999, ka neke ki Aotearoa, ā, kua tū hei kaimātai pūwereriki, pūwere-ngote-toto mā Manaaki Whenua, ko ngā tātai whakapapa me te koiora o ngā pūwereriki te mahi, i Te Aitanga Pepeke o Aotearoa. Mai i te 2013, kua tū anō hei ahorangi i te Kura Mātauranga Koiora i te Whare Wānanga o Tāmaki Makaurau. Kua oti i a Zhi-Qiang, i tōna kotahi, i te taha rānei o ētahi atu, ētahi tuhinga pūtaiao 300 neke atu (ko te nuinga mō te pūwereriki). Kei roto i tēnei ētahi pukapuka 20 hemihemi. E ngākaunui ana ia ki tēnei mea te hōpara i te matahuhuatanga, nāna hoki i whakaara ake ētahi o ngā hautaka nunui e rua o roto i tēnei kaupapa (te *Zootaxa* me te *Phytotaxa*).

---

**ABSTRACT**

The Tenuipalpidae (Acari: Trombidiformes: Tetranychoidae), commonly known as false spider mites or flat mites, are one of the main groups of obligate phytophagous mites of importance in agriculture and horticulture. They can cause significant damage to host plants, by feeding and vectoring diseases of plants, and are among the common species intercepted on imported fresh produce; several species are known as invasive species in different regions of the world. *Tenuipalpus* is the largest genus in the family and currently comprises over 300 species of worldwide distribution. In New Zealand, nine species have been recognized and are described here in detail and illustrated with line drawings. A key to adult females of *Tenuipalpus* from New Zealand is provided to assist identification. The ontogenetic changes of *T. antipodus* and *T. mahoensis* in idiosomal and leg chaetotaxy on the female, male, deutonymph, protonymph and larva are also presented.

**Keywords:** Acari, Prostigmata, Tenuipalpidae, taxonomy, morphology, key, New Zealand

<http://www.zoobank.org/urn:lsid:zoobank.org:pub:34698677-1190-4B8D-8B68-B827C1F27505>

Accepted by Darren Ward: 24 October 2018; published: 12 November 2018



---

**CHECKLIST OF TAXA**

Genus <i>Tenuipalpus</i> Donnadieu, 1875 .....	15
<i>Tenuipalpus alpinus</i> Collyer, 1973 .....	18
<i>Tenuipalpus antipodus</i> Collyer, 1964 .....	20
<i>Tenuipalpus cyatheae</i> Gerson & Collyer, 1984 .....	24
<i>Tenuipalpus elegans</i> Collyer, 1973 .....	25
<i>Tenuipalpus mahoensis</i> Collyer, 1964 .....	26
<i>Tenuipalpus montanus</i> Collyer, 1973 .....	29
<i>Tenuipalpus rangiorae</i> Collyer, 1964 .....	30
<i>Tenuipalpus senecionis</i> Collyer, 1973 .....	32
<i>Tenuipalpus venustus</i> Collyer, 1973 .....	33

**CONTENTS**

POPULAR SUMMARY .....	5
ABSTRACT .....	8
CHECKLIST OF TAXA .....	9
CONTENTS .....	9
INTRODUCTION .....	10
EXTERNAL MORPHOLOGY .....	10
LIFE HISTORY AND BIOLOGY .....	13
METHODS AND CONVENTIONS .....	14
List of abbreviations .....	14
DESCRIPTIONS.....	15
Key to different life cycle stages of <i>Tenuipalpus</i> .....	17
Key to adult females of New Zealand <i>Tenuipalpus</i> .....	17
Key to adult males of New Zealand <i>Tenuipalpus</i> .....	18
Species present in New Zealand.....	18
ACKNOWLEDGEMENTS .....	35
REFERENCES .....	35
TAXONOMIC INDEX .....	156
HABITAT INDEX .....	157

## INTRODUCTION

The genus *Tenuipalpus* belongs to the family Tenuipalpidae (Trombidiformes: Prostigmata: Tetranychoidae). The Tenuipalpidae, commonly known as false spider mites or flat mites, is a large family of obligate plant-feeding mites and is of worldwide distribution. Over 1100 species of tenuipalpid mites belonging to 40 genera are known (Mesa *et al.* 2009; Beard & Ochoa 2011; Navajas & Ochoa 2013; Beard *et al.* 2013; Bred *et al.* 2014; Hasanvand *et al.* 2018), and many others are yet to be discovered.

*Tenuipalpus* are phytophagous and some species are economically important to agriculture and horticulture. They also have significance in quarantine, and species such as *T. granati*, *T. antipodes* and *T. punicae* are considered as foreign pests of agricultural and environmental significance to the United States (Childers *et al.* 2006). *T. heveae* is believed to have true potential for becoming a serious pest of rubber trees in some areas of Brazil (Feres *et al.* 2010). *T. hornotinus* has been considered as a serious pest of guavas in China (Abudukeyimu *et al.* 2010).

The genus *Tenuipalpus* was erected by Donnadieu (1875), but there have been a lot of controversies since then. It was regarded as a junior synonym of *Brevipalpus* by Sayed (1942) but was later then recognized as a valid genus distinct from *Brevipalpus* (Baker 1945, Sayed 1950). Mitrofanov (1973) erected five genera, namely *Aegyptopalpus*, *Colopalpus*, *Deleonipalpus*, *Gnathopalpus* and *Tuttlepalpus*, which were later treated as synonyms of *Tenuipalpus* (Meyer, 1979). Meyer (1979) reviewed the 162 species of *Tenuipalpus* of the world. Subsequently, more acarologists were committed to the study of the Tenuipalpidae, including Mohanasundaram (1981), Gutierrez and Schicha (1982), Sadana (1980, 1984), Salas and Ochoa (1985, 1986), Ma & Yuan (1980, 1981), Wang (1980, 1983) and so on. Al-Gboory (1987) reviewed the false spider mites in Iraq. Baker and Yin (1988) catalogued 145 species and seven genera of the false spider mites in the United States. Flechtmann (1994) described 1 new species from Brazil. Ehara and his colleagues described two new species from Japan (Ehara 1982, Ehara & Ueckermann 2003). Hasan Wakil and Bashir described five new species from Pakistan (Hasan *et al.* 2004 a & b, 2006). To date, this genus comprises over 320 species in the world (Mesa *et al.* 2009; Castro & Feres 2013; Flechtmann & Noronha 2013; Castro *et al.* 2015; Castro *et al.* 2016a; Castro *et al.* 2016b; Ueckermann & Ripka 2016; Welbourn *et al.* 2017; Hasanvand *et al.* 2018; Khadem Safdarkhani *et al.* 2018; Xu *et al.* 2018).

In New Zealand, taxonomic studies of *Tenuipalpus* started in the mid-1960s. Collyer first described and illustrated two new species (Collyer 1964), and later published a series of studies. In 1973, she described four new species and reviewed the 105 species of the world including seven species from New Zealand (Collyer 1973a, b). Gerson & Collyer (1984) described a new species in New Zealand. Nine species of *Tenuipalpus* have thus far been known to occur in New Zealand: *T. alpinus*, *T. antipodus*, *T. cyatheae*, *T. elegans*, *T. mahoensis*, *T. montanus*, *T. rangiorae*, *T. senecionis*, and *T. venustus*. Here we have redescribed and illustrated the nine species. The ontogenetic development patterns of the two species (*T. antipodus* and *T. mahoensis*) are examined and all the life stages and the variation in the chaetotaxy of the idiosoma and legs are presented. A key to New Zealand species of the genus is also provided.

## EXTERNAL MORPHOLOGY

**Gnathosoma** (Fig. 2). Similar to Tetranychidae that carries the paired chelicerae and palps. Chelicerae consolidated to form stylophore and stylets. Palps simple, 1–4 segmented, the number of palpal segments and the setae form and number on each segment are often used in characterizing different species.

**Idiosoma** (Fig. 1). The idiosoma is divided into propodosoma and hysterosoma by sejugal furrows. Hysterosoma consists of metapodosoma (bearing legs III and IV) and opisthosoma (posterior to legs IV). The prodorsum bears two pairs of simple eyes and 3 pairs of setae. The hysterosoma bears 7–10 pairs of setae (dorsocentral setae  $c_1$ ,  $d_1$  and  $e_1$ , humeral seta  $c_3$  and dorsolateral setae  $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_1$  and  $h_2$ ). Setae  $c_3$ ,  $d_3$ ,  $e_3$ ,  $f_3$ ,  $h_1$  and  $h_2$  are considered to be stable setae, being present in all known species of *Tenuipalpus*; setae  $h_2$  are elongate and whip-like. Most species of *Tenuipalpus* have three pairs of dorsocentral setae, sometimes with two pairs ( $c_1$  and  $e_1$  or  $d_1$  and  $e_1$ ) and rarely with only one pair ( $c_1$ ). Dorsal setae vary in shape/structure: simple, smooth, lanceolate or palm-like. The number of dorsal setae is often used in characterizing the different groups (Baker & Tuttle 1987;

Meyer 1993). The venter of idiosoma has 9 pairs of coxal setae *1a*, *1b*, *1c*, *2b*, *2c*, *3a*, *3b*, *4a* and *4b*. Ventral and genital plates are usually well developed and often fused, with a pair of aggenital setae *ag* and two pairs of genital setae *g*<sub>1</sub> and *g*<sub>2</sub>; anal plate bears 2–3 pairs of setae *ps*<sub>1,3</sub>. The coxal setae *1a*, *3a* and *4a* are situated medially between the bases of coxae. The number of setae *3a* and *4a* vary among groups (e.g. one to two pairs of *3a* and one to four pairs of setae *4a*) and have been used in the subgroup classification of *Tenuipalpus* (Baker & Tuttle 1987; Meyer 1993). Male aedeagus is narrow, sclerotised, finely tapered distally, with membranous duct running from inside, terminating in a trumpet-shaped tip (Fig. 61).

**Legs** (Fig. 3). Leg consists of 6 segments: coxa, trachanter, femur, genu, tibia, and tarsus. Pretarsal claws have tenent hairs on each side; empodium developed, similar to claws, with tenent hairs on each side; tarsi I–II each with a solenidion  $\omega''$ . The number of setae on each segment is often used in characterizing different species.

**Idiosomal setation and ontogeny.** The dorsal idiosomal setae and pseudanal setae are present throughout all stages. Ventral setae *1c*, *2c* and *3b* are added in the protonymph, *2b*, *4a* and *4b* added in deutonymph. Aggenital setae *ag* occur in the protonymph; the first pair of genital setae *g*<sub>1</sub> appear in the deutonymph and the second pair *g*<sub>2</sub> are added in adult.

**Leg setation, ontogeny and phylogeny (Tables 1–4).** Leg chaetotaxy is of potential significance in taxonomy (Seeman & Beard 2011). In our study, the ontogenetic changes of New Zealand *Tenuipalpus* are reviewed for two species: *T. antipodus* and *T. mahoensis* (Table 1).

**Table 1.** Ontogeny of leg chaetotaxy in *T. antipodus* (Ta) and *T. mahoensis* (Tm). Setae are indicated where they are first added. Setae in parentheses represent pairs. Hyphen indicates no additions.

	Coxae	Trochanters	Femora	Genua	Tibiae	Tarsi
<b>Leg I</b>						
Larva—Ta	<i>1b</i>	-	<i>d</i> , <i>v'</i> , <i>bv''</i>	<i>l'</i>	<i>d</i> , ( <i>l</i> ), ( <i>v</i> )	( <i>u</i> ), <i>p'ζ</i> , <i>p''ζ</i> , <i>ft'</i> , <i>ft''</i> , $\omega''$
Larva—Tm	<i>1b</i>	-	<i>d</i> , <i>v'</i> , <i>bv''</i>	<i>l'</i>	<i>d</i> , ( <i>l</i> ), ( <i>v</i> )	( <i>u</i> ), <i>p'ζ</i> , <i>p''ζ</i> , <i>ft'</i> , <i>ft''</i> , $\omega''$
Protonymph—Ta	<i>1c</i>	-	-	-	-	-
Protonymph—Tm	<i>1c</i>	-	-	-	-	-
Deutonymph—Ta	-	<i>v'</i>	<i>l'</i>	<i>l''</i>	-	( <i>tc</i> )
Deutonymph—Tm	-	<i>v'</i>	<i>l'</i>	<i>d</i> , <i>l''</i>	-	( <i>tc</i> )
Female—Ta	-	-	-	<i>d</i>	-	-
Female—Tm	-	-	-	-	-	-
Male—Ta	-	-	-	<i>d</i>	-	$\omega'$
Male—Tm	-	-	-	-	-	$\omega'$
<b>Leg II</b>						
Larva—Ta	-	-	<i>d</i> , <i>v'</i> , <i>bv''</i>	<i>l'</i>	<i>d</i> , ( <i>l</i> ), ( <i>v</i> )	( <i>u</i> ), <i>p'ζ</i> , <i>p''ζ</i> , <i>ft'</i> , <i>ft''</i> , $\omega''$
Larva—Tm	-	-	<i>d</i> , <i>v'</i> , <i>bv''</i>	<i>l'</i>	<i>d</i> , ( <i>l</i> ), ( <i>v</i> )	( <i>u</i> ), <i>p'ζ</i> , <i>p''ζ</i> , <i>ft'</i> , <i>ft''</i> , $\omega''$
Protonymph—Ta	<i>2c</i>	-	-	-	-	-
Protonymph—Tm	<i>2c</i>	-	-	-	-	-
Deutonymph—Ta	<i>2b</i>	<i>v'</i>	<i>l'</i>	<i>l''</i>	-	( <i>tc</i> )
Deutonymph—Tm	<i>2b</i>	<i>v'</i>	<i>l'</i>	<i>d</i> , <i>l''</i>	-	-
Female—Ta	-	-	-	<i>d</i>	-	-
Female—Tm	-	-	-	-	-	-
Male—Ta	-	-	-	<i>d</i>	-	$\omega'$
Female—Tm	-	-	-	-	-	$\omega'$

.....continued

Table 1 (continued).

	Coxae	Trochanters	Femora	Genua	Tibiae	Tarsi
<b>Leg III</b>						
Larva—Ta	-	-	<i>d, ev'</i>	-	<i>d, (v)</i>	<i>(u), ft'</i>
Larva—Tm	-	-	<i>d, ev'</i>	<i>l'</i>	<i>d, (v)</i>	<i>(u), ft'</i>
Protonymph—Ta	<i>3b</i>	<i>l'</i>	-	-	-	-
Protonymph—Tm	<i>3b</i>	<i>l'</i>	-	-	-	-
Deutonymph—Ta	-	<i>v'</i>	-	<i>l'</i>	-	<i>(tc)</i>
Deutonymph—Tm	-	<i>v'</i>	-	-	-	<i>(tc)</i>
Female—Ta	-	-	-	-	-	-
Female—Tm	-	-	-	-	-	-
Male—Ta	-	-	-	-	-	-
Female—Tm	-	-	-	-	-	-
<b>Leg IV</b>						
Protonymph—Ta	-	-	<i>ev'</i>	-	<i>d, (v)</i>	<i>(u), ft'</i>
Protonymph—Tm	-	-	<i>ev'</i>	-	<i>d, (v)</i>	<i>(u), ft'</i>
Deutonymph—Ta	<i>4b</i>	-	-	-	-	-
Deutonymph—Tm	<i>4b</i>	-	-	-	-	-
Female—Ta	-	<i>v'</i>	-	<i>l'</i>	-	<i>(tc)</i>
Female—Tm	-	<i>v'</i>	-	-	-	<i>(tc)</i>
Male—Ta	-	<i>v'</i>	-	<i>l'</i>	-	<i>(tc)</i>
Male—Tm	-	<i>v'</i>	-	-	-	<i>(tc)</i>

\* Leg IV absent in larva.

Table 2. Trochanteral and femoral setae in the adult female of *Tenuipalpus* of New Zealand.

	Tr I–II		Tr III		Tr IV		Fe I–II			Fe III		Fe IV	
	<i>v'</i>	<i>l'</i>	<i>v'</i>	<i>v'</i>	<i>d</i>	<i>v</i>	<i>bv''</i>	<i>l'</i>	<i>d</i>	<i>ev'</i>	<i>d</i>	<i>ev'</i>	
<i>T. alpinus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>T. antipodus</i>	+	+	+	+	+	+	+	+	+	+	-	+	+
<i>T. cyatheae</i>	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>T. elegans</i>	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>T. mahoensis</i>	+	+	+	+	+	+	+	+	+	+	-	+	+
<i>T. montanus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>T. rangiorae</i>	+	+	+	+	+	+	+	+	+	+	-	+	+
<i>T. senecionis</i>	+	-	+	+	+	+	+	+	+	+	-	+	+
<i>T. venustus</i>	+	+	+	+	+	+	+	+	+	+	-	+	+

The basic pattern of trochanteral setae of *Tenuipalpus* is 1-1-2-1. Seta *v'* is present on all trochanters and seta *l'* only appears on trochanter III, which is consistent with the theory of Lindquist (1985). While *T. senecionis* is featured with the trochanters 1-1-1-1, consistent with the general pattern found on Tetranychidae with *v'* present on trochanters I–II and IV, and *l'* on trochanter III. Seta *v'* first appears on trochanters I–III in the deutonymph and is suppressed on trochanter IV until adult; seta *l'* appears on trochanter III in the protonymph. In the genus

*Tenuipalpus*, the basic setae pattern on femora is 3-3-2-1 indicated by Lindquist (1985). Larva bearing setae *d*, *v'* and *bv''* on femora I–II, and setae *d* and *ev'* on femur III. Seta *ev'* or *d*, *ev'* on femur IV appears in the protonymph and *l'* is added on femora I–II in the deutonymph. The pattern on genua I–IV is varied, including 2-2-1-0, 3-3-1-1, 3-3-1-0 and 3-2-0-0. Lateral seta *l'* appears on genua in the larva and setae *d* and *l''* are added to genua I–II in the deutonymph. The basic protonymphal pattern of tibiae is 5-5-3-3, and no ontogenetic additions occur after protonymph. On tarsi, the basic pattern in the deutonymph is 8+ $\omega$ -8+ $\omega$ -5-5, resembling that in the adult. The only additions on tarsi are setae *tc'* and *tc''*, which occur in the deutonymph.

**Table 3.** Genua and tibial setae in the in the adult female of *Tenuipalpus* of New Zealand.

	Ge I			Ge II			Ge III	Ge IV	Ti I–II					Ti III–IV		
	<i>d</i>	<i>l'</i>	<i>l''</i>	<i>d</i>	<i>l'</i>	<i>l''</i>	<i>l'</i>	<i>l'</i>	<i>d</i>	<i>v'</i>	<i>v''</i>	<i>l'</i>	<i>l''</i>	<i>d</i>	<i>v'</i>	<i>v''</i>
<i>T. alpinus</i>	-	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+
<i>T. antipodus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>T. cyatheae</i>	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+
<i>T. elegans</i>	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+
<i>T. mahoensis</i>	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+
<i>T. montanus</i>	-	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+
<i>T. rangiorae</i>	+	+	+	+	+	+	-	-	+	+	+	-	-	+	+	+
<i>T. senecionis</i>	+	+	+	+	+	-	-	-	+	+	+	-	-	+	+	+
<i>T. venustus</i>	-	+	+	-	+	+	-	-	+	+	+	+	+	+	+	+

**Table 4.** Tarsal setae on the adult females of *Tenuipalpus* of New Zealand.

	Ta I–II						Ta III–IV								
	<i>ft'</i>	<i>ft''</i>	<i>u'</i>	<i>u''</i>	<i>p'ζ</i>	<i>p''ζ</i>	<i>tc'</i>	<i>tc''</i>	$\omega''$	<i>ft'</i>	<i>u'</i>	<i>u''</i>	<i>tc'</i>	<i>tc''</i>	
<i>T. alpinus</i>	+	-	+	+	+	+	+	+	+	+	+	+	+	+	
<i>T. antipodus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>T. cyatheae</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>T. elegans</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>T. mahoensis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>T. montanus</i>	+	-	+	+	+	+	+	+	+	+	+	+	+	+	
<i>T. rangiorae</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>T. senecionis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>T. venustus</i>	+	-	+	+	+	+	+	+	+	+	+	+	+	+	

## LIFE HISTORY AND BIOLOGY

The biology of Tenuipalpidae is poorly known and only a few species (considered of high economic importance), such as *Brevipalpus obovatus*, *B. phoenicis*, *B. californicus*, *Raoiella indica*, *Tenuipalpus granati*, *T. heveae*, *T. pacificus*, *T. punicae*, etc., have been studied for their life cycle, including egg, larva, protonymph, deutonymph, and adult stages. They usually live and move slowly on the lower surface of leaves along midribs or veins. They are

dispersed most likely by wind currents and the transport of infested plants or leaves. The eggs are red, ovoid or oblong, with a thin hair at one end. The duration of the life cycle largely depends upon temperature and humidity. The average duration of egg, larva, pronymph, deutonymph, adult stage of *T. pacificus* is about 9.45, 4.58, 4.51, 4.66, 31.92 days at temperature and relative humidity of  $28\pm 2$  °C and  $57\pm 3\%$  respectively (Channabasavanna & Viraktamath 1986). In India, *T. pacificus* is active throughout the year on dendrobium orchid under a polyhouse and has peak activities during the last week of September (Shukla & Radadia 2018). Also in India, *T. pernicious* is a dominant mite species on guava plants, with peak population in June (Ghoshal & Barman 2012). In Brazil, *T. heveae* is a major pest on rubber trees, with infestation peaking between mid-January and late February (Castro *et al.* 2013); developmental time from egg to adult averages about 25 days at fluctuating temperatures of  $28\pm 1$  °C during light phase and  $25\pm 1$  °C during dark phase (Feres *et al.* 2010). The generation time of *T. puniceae* changed from 17.8 days at average temperature 27.3 °C to 44.8 days at average temperature 18.0 °C (Zaher & Yousef 1972). Females may live for 1–2 months. For instance, *T. granati* survived for 29.1 days at 23.6 °C and 55.4% RH, but only 17.6 days at 30 °C and 63.5% RH (Yousef *et al.* 1980). False spider mites overwinter as females for an average of 122.5–149.4 days (Zaher & Yousef 1972, Yousef *et al.* 1980). The oviposition rate was 1–1.8 eggs per female per day (Yousef *et al.* 1980, Pontier *et al.* 2000, Zhang 2003, Feres *et al.* 2010). Males were very rare and females reproduced mainly parthenogenetically. In the mating process, the male moves under the female, bending his posterior up and forwards to mate (see cover image: *T. mahoensis*).

## METHODS AND CONVENTIONS

More than 905 mites, including 432 adult females, 143 adult males, 137 deutonymphs, 68 protonymphs and 95 larvae, mounted on 105 slides from New Zealand Arthropod Collection (NZAC) in Landcare Research, Auckland, New Zealand, were studied and examined at 400 x and 1000 x using DIC Nikon E800 and Leica DM5000B microscope. All measurements were made from slide-mounted specimens using a stage-calibrated ocular ruler and are given in micrometers ( $\mu\text{m}$ ). Measurements of the holotype are presented, followed by a range of paratypes in brackets. Body size was measured by  $v_2-h_1$  and  $sc_2-sc_2$  (Saito *et al.* 1999). Setae were measured from the centre of the setal base to the tip of the seta; distances between setae were measured from the centre of one setal base to that of the other. Legs were measured from the base of the trochanter to the distal end of tarsus (excluding pretarsus). Coxal setae counts exclude *1a*, *3a* and *4a*. Terminology follows Zhang & Fan (2004) and Seeman & Beard (2011), which was adapted from Lindquist (1985).

### List of abbreviations

Gnathosoma

*m* = subcapitular seta

$\omega$  = solenidion

Idiosoma

$v_2$  = vertical seta on prodosum

$sc_1$  = internal scapular seta on prodosum

$sc_2$  = external scapular seta on prodosum

$c_1$  = first dorsocentral seta on prodosum

$c_3$  = humeral seta on hysterosoma

$d_1$  = second dorsocentral seta on hysterosoma

$d_3$  = first dorsolateral seta on hysterosoma

$e_1$  = third dorsocentral seta on hysterosoma

$e_3$  = second dorsolateral seta on hysterosoma

$f_2$  = third dorsolateral seta on hysterosoma

$f_3$  = fourth dorsolateral seta on hysterosoma

$h_1$  = sixth dorsolateral seta on hysterosoma  
 $h_2$  = fifth dorsolateral seta on hysterosoma  
 $1a$  = anterior or first medioventral seta  
 $1b$  = first pair of coxal setae associated with base of legs I  
 $1c$  = second pair of coxal setae associated with base of legs I  
 $2b$  = first pair of coxal setae associated with base of legs II  
 $2c$  = second pair of coxal setae associated with base of legs II  
 $3a$  = middle or second medioventral seta  
 $3b$  = coxal setae associated with bases of legs III  
 $4a_1$  = first pair of posterior or third medioventral setae  
 $4a_2$  = second pair of posterior or third medioventral setae  
 $4b$  = coxal setae associated with bases of legs IV  
 $ag$  = aggenital seta  
 $g_1$  = first genital seta  
 $g_2$  = second genital seta  
 $ps_1$  = first pseudanal seta or anal seta  
 $ps_2$  = second pseudanal seta or anal seta  
 $ps_3$  = third pseudanal seta or anal seta

#### Leg

$d$  = dorsal seta  
 $v$  = ventral seta  
 $l$  = lateral seta  
 $p\zeta$  = proral seta  
 $u$  = unguinal seta  
 $tc$  = tectal seta  
 $ft$  = fastigial seta  
 $\omega$  = solenidion

## DESCRIPTIONS

### Genus *Tenuipalpus* Donnadieu, 1875

*Tenuipalpus* Donnadieu, 1875: 139; **Type species:** *Tenuipalpus palmatus* Donnadieu, 1875: 139; Baker, 1945: 34; Baker & Pritchard, 1953: 317; Baker & Pritchard, 1960: 564; Baker & Tuttle, 1972: 31; Baker, Tuttle & Abbatiello, 1975: 4; Chaudhri, 1971: 203; Collyer, 1973b: 915; De Leon, 1965: 65; Evans et al. 1993: 129; Gonzalez, 1968: 38; Hatzinikolis, 1987: 56; Livschitz & Mitrofanov, 1967: 9; Lo, 1969: 99; Lo, 1986: 276; Ma & Yuan, 1980: 118; Maninder & Ghai, 1978: 243; Meyer, 1979: 3; Meyer, 1993: 1; Meyer & Gerson, 1981: 68; Mitrofanov, 1973: 1318; Nassar & Ghai, 1981: 381; Pritchard & Baker, 1951: 41; Pritchard & Baker, 1958: 235; Rimando, 1962: 41; Smiley & Gerson, 1995: 39; Womersley, 1940: 236.

*Aegyptopalpus* Mitrofanov, 1973: 1318. Type species: *Tenuipalpus granati* Sayed, 1946, synonym according to Meyer 1979: 3.

*Colopalpus* Pritchard & Baker, 1958: 258. Type species: *Tenuipalpus caudatus* Dugés (= *T. palmatus* Donnadieu), synonym according to Meyer 1979: 3.

*Deleonipalpus* Mitrofanov, 1973: 1319. Type species: *Tenuipalpus barticanus* De Leon, 1965, synonym according to Meyer 1979: 4.

*Gnathopalpus* Mitrofanov, 1973: 1318. Type species: *Tenuipalpus rosae* Kadzhaja, 1955, synonym according to Meyer 1979: 4.

*Tuttlepalpus* Mitrofanov, 1973: 1318. Type species: *Tenuipalpus trisetosus* Baker and Tuttle, 1964, synonym according to Meyer 1979: 3.

**Diagnosis.** Adult Female. Palp 1–4 segmented; rostral shield strongly pitted medially and broadly projected; idiosoma widest at posterior margin of prodosum, narrowing abruptly at base of opisthosoma, then expanding posteriorly; prodosum with three pairs of setae ( $v_2$ ,  $sc_1$  and  $sc_2$ ); hysterosoma with 7–10 pairs of setae:  $c_1$ ,  $d_1$ ,  $e_1$  present or absent (but at least one pair of dorsocentral setae present),  $f_2$  present or absent,  $d_3$ ,  $e_3$ ,  $f_3$ ,  $h_2$  and  $h_1$  present;

seta  $h_2$  elongate and whip-like; ventral setae  $3a$  and  $4a$  may be multiplied:  $3a$  (one to two pairs) and  $4a$  (one to four pairs); ventral and genital plates usually developed, often fused; genital setae  $g_1$  and  $g_2$  inserted at posterior margin of genital shield; anal plate bearing 2–3 pairs of setae.

Adult male. Similar to female in most aspects but with a smaller body than female. Hysterosoma divided into metapodosoma and opisthosoma by narrow band of horizontal striations; with an aedeagus and seminal vesicle; pseudanal setae  $ps_2$  or  $ps_3$  often stout and bearing a cone.

**Description. Adult female** (Fig. 53–58). Gnathosoma (Fig. 2). Chelicerae consolidated to form stylophore and stylets. Palps simple, 1–4 segmented, the distal segment generally bearing 1 solenidion  $\omega$  and 1 eupathidium or 2 setae (1 simple seta and 1 eupathidium). Subcapitulum with two pairs of adoral setae ( $or_1$  and  $or_2$ ), simple and minute, and one pair of subcapitular setae  $m$ , smooth or barbed.

**Idiosoma** (Fig. 53–56). Dorsal shield sclerotized with striations or reticulations. Prodorsum bearing two pairs of simple eyes and three pairs of dorsal setae ( $v_2$ ,  $sc_1$  and  $sc_2$ ). Vertical setae  $v_2$  situated at anterior margin of prodorsal shield, and followed by scapular setae  $sc_1$  and  $sc_2$ . Setae  $v_2$ ,  $sc_1$  and  $sc_2$  varied, smooth or barbed or lanceolate,  $sc_2$  obviously enlarged and longer than setae  $v_2$  and  $sc_1$ . The eyes situated between setae  $sc_1$  and  $sc_2$ . Hysterosoma usually bearing three pairs of dorsocentral setae ( $c_1$ ,  $d_1$  and  $e_1$ ), rarely with two pairs (e.g.  $c_1$  absent in *T. alpinus* and *T. montanus*) and sometimes with only one pair (e.g.  $d_1$  and  $e_1$  absent in *T. cyatheae* and *T. elegans*), situated at the dorsocentral area; one pair of humeral setae ( $c_3$ ) and five to six pairs of dorsolateral setae ( $d_3$ ,  $e_3$ ,  $f_3$ ,  $h_2$  and  $h_1$  or  $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_2$  and  $h_1$ ) situated dorsolaterally; all hysterosomal setae varied, smooth or barbed or lanceolate, except setae  $h_2$  elongate and whip-like. Setae  $c_1$ ,  $d_1$ ,  $e_1$  and  $d_3$  often obviously short, setae  $f_2$ ,  $f_3$  and  $h_1$  often in the similar structure. Coxae fused with ventral idiosoma, coxa I with setae  $1a$ ,  $1b$  and  $1c$ , coxa II with setae  $2b$  and  $2c$ , coxa III with setae  $3a$  and  $3b$  and coxa IV with setae  $4a$  and  $4b$ . Ventral and genital plates developed, often slightly sclerotized and fused, with a pair of aggenital setae  $ag$  and two pairs of genital setae  $g_1$  and  $g_2$ ; plicate cuticle of ovipore not exposed; anal plates commonly with two pairs of pseudanal setae ( $ps_1$  and  $ps_2$ ), rarely with three pairs (e.g.  $ps_3$  present in *T. alpinus*, *T. venustus* and *T. mahoensis*).

**Legs** (Figs. 57–58). Pretarsal claws present with tenent hairs on each side; empodium developed, similar to claws, with tenent hairs on each side; tarsi I–II each with a solenidion  $\omega$ . Counts of setae on legs I–IV: coxae 2, 2, 1, 1; trochanters 1, 1, 2, 1, rarely 1, 1, 1, 1 (*T. senecionis*); femora 4, 4, 2, 2 or 4, 4, 2, 1; genua 2–3, 2–3, 0–1, 0–1; tibiae 5, 5, 3, 3, rarely 3, 3, 3, 3 (e.g. *T. rangiorae* and *T. senecionis*); tarsi  $8+\omega$ ,  $8+\omega$ , 5, 5 or  $7+\omega$ ,  $7+\omega$ , 5, 5. Ventral setae on trochanters, femora and tibiae pectinate or setiform, setae  $bv''$  on femur II, dorsal and lateral setae on femora, genua and tibiae generally in similar structure, such as lanceolate, barbed, pine-like or palm-like. Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  lanceolate or barbed; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  barbed or smooth; eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like.

**Adult male** (Figs. 59–64). Similar to adult female, but differing in: hysterosoma divided into metapodosoma and opisthosoma by few light horizontal striations; second or third pseudanal setae often stout and cone-shaped; genital and anal openings fused, having aedeagus; aedeagus narrow, sclerotised, finely tapered distally, membranous duct runs from inside aedeagus, terminating in trumpet-shaped ends; pseudanal setae  $ps_2$  stout and with a cone; tarsi I–II with two pairs of solenidion  $\omega'$  and  $\omega''$ ; solenidion  $\omega'$  on tarsi III–IV absent or present (e.g. *T. alpinus* and *T. venustus*).

**Deutonymph** (Figs. 65–69). Similar to adult but idiosoma smooth, with faint transversal striations anterior to setae  $d_1$ , setae  $v_2$ ,  $sc_1$ ,  $c_1$ ,  $d_1$ ,  $e_1$  and  $d_3$  minute; only with genital setae  $g_1$  but without genital folds; trochanter IV without setae. Setae on legs generally similar to female in structure, setae  $l'$  on trochanter III,  $d$  on femur III,  $bv''$  on femur II and  $l''$  on genua I–II sometimes enlarged (e.g. *T. antipodus*).

**Protonymph** (Figs. 70–74). Similar to deutonymph but without setae  $2b$ ,  $4a$ ,  $4b$  and genital setae; trochanters I–II and IV nude, trochanter III with setae  $l'$ .

**Larva** (Figs. 75–78). Similar to protonymph but without leg IV and aggenital setae  $ag$ ; coxal setae  $1c$ ,  $2c$  and  $3b$  absent; trochanters I–III nude.

**Remarks.** Mesa *et al.* (2009) and Beard *et al.* (2013) generalized the characters of the genus *Tenuipalpus*: palp 1–3 segmented and anal plate carrying two pairs of pseudanal setae. Yet when examining the types of *Tenuipalpus* of New Zealand, we found these characters to be incorrect. The correct characters are revised as follows: palp 1–4 segmented and 2–3 pairs of pseudanal setae.



*Tenuipalpus* is similar to the genera *Brevipalpus*, *Colopalpus*, *Tenuilichus* and *Ultratenuipalpus*, differing from *Brevipalpus* and *Ultratenuipalpus* by having setae  $h_2$  elongate and whip-like (setae  $h_2$  normal, structure similar to other dorsolateral setae in *Brevipalpus* and *Ultratenuipalpus*); and differing from *Tenuilichus* by having at least one pair of dorsocentral setae ( $c_1$ ,  $d_1$  and  $e_1$ ) (dorsocentral setae absent in *Tenuilichus*); and differing from *Colopalpus* by idiosoma widest at posterior margin of prodosum, narrowing abruptly at base of opisthosoma, then expanding posteriorly, setae  $d$  inserted in lateral position on femora, genua and tibiae (*Colopalpus* having elongate-ovate idiosoma, setae  $d$  inserted in the dorsal position on femora, genua and tibiae).

### Key to different life cycle stages of *Tenuipalpus*

1. Idiosoma with three pairs of legs; venter without aggenital setae  $ag$  and genital setae ( $g_1$  and  $g_2$ ); coxae I–III with 1-0-0 setae ..... Larva
- Idiosoma with four pairs of legs; venter with at least aggenital setae  $ag$  or genital setae ( $g_1$  and  $g_2$ ); coxae I–III with 2-1-1 or 2-2-1 setae ..... 2
2. Venter without genital setae; coxae with 2-1-1-0 setae; trochanters with 0-0-1-0 setae ..... Protonymph
- Venter with at least one pair of genital setae  $g_1$ ; coxae with 2-2-1-1 setae; trochanters with 1-1-2-0 or 1-1-2-1 setae ..... 3
3. Venter with one pair of genital setae  $g_1$ ; trochanters with 1-1-2-0 setae ..... Deutonymph
- Venter with two pair of genital setae  $g_1$  and  $g_2$ ; trochanters with 1-1-2-1 setae ..... Adult...4
4. Hysterosoma divided into metapodosoma and opisthosoma by a narrow band of horizontal striations; with an aedeagus and seminal vesicle; pseudanal setae  $ps_2$  or  $ps_3$ , often stout and with a cone ..... Male
- Hysterosoma smooth; without aedeagus and seminal vesicle; pseudanal setae slender and smooth ..... Female

### Key to adult females of New Zealand *Tenuipalpus*

1. Palp 4-segmented; dorsocentral seta  $c_1$  absent; two pairs of posterior medioventral setae  $4a_1$  and  $4a_2$  ..... 2
- Palp 1–3 segmented; seta  $c_1$  present; one pair of posterior medioventral setae  $4a$  ..... 3
2. Seta  $sc_2$  slender, smooth and about twice as long as  $sc_1$ ; prodorsum covered with few broken longitudinal striations posterior to  $sc_1$  ..... *T. alpinus* Collyer
- Seta  $sc_2$  lanceolate and about 3 times as long as  $sc_1$ ; prodorsum covered with curved striations between  $sc_1$ – $sc_2$ , U-shaped ..... *T. montanus* Collyer
3. Palp 1-segmented; tibiae I–IV with 3, 3, 3, 3 setae ..... 4
- Palp 2–3 segmented; tibiae I–IV with 5, 5, 3, 3 setae ..... 5
4. Setae  $v_2$  and  $sc_1$  subequal in length,  $sc_2$  about twice as long as  $v_2$ ; setae  $d_1$  and  $e_1$  subequal in length; trochanters I–IV with 1, 1, 2, 1 setae; genua I–IV with 3, 3, 0, 0 setae ..... *rangiorae* Collyer
- Setae  $v_2$  longest, about 1.3 times as long as  $sc_2$ ; setae  $d_1$  about twice as long as  $e_1$ ; trochanters I–IV with 1, 1, 1, 1 setae; genua I–IV with 3, 2, 0, 0 setae ..... *T. senecionis* Collyer
5. Setae  $d_1$  and  $e_1$  absent; femora I–IV with 4, 4, 2, 2 setae; genua I–IV with 3, 3, 0, 0 setae ..... 6
- Setae  $d_1$  and  $e_1$  present; femora I–IV with 4, 4, 2, 1 setae; genua I–IV with 3, 3, 1, 1 or 3, 3, 1, 0 or 2, 2, 0, 0 setae...7
6. Palp 3-segmented, setal formula: 0, 1, 1; palp tibia with one forked seta; 20–21 pairs of porose patches situated at podosomal venter ..... *T. cyatheae* Gerson & Collyer
- Palp 2-segmented, setal formula: 1, 1; palp tibia with one rod-like seta near distal portion; podosomal venter without porose patches ..... *T. elegans* Collyer
7. Two pairs of pseudanal setae  $ps_1$  and  $ps_2$ ; genua I–IV with 3, 3, 1, 1 setae ..... *T. antipodus* Collyer
- Three pairs of pseudanal setae  $ps_1$ ,  $ps_2$  and  $ps_3$ ; genua I–IV with 3, 3, 1, 0 or 2, 2, 0, 0 setae ..... 8
8. Genua I–IV with 3, 3, 1, 0 setae; tarsus I–IV with  $8+\omega$ ,  $8+\omega$ , 5, 5 setae; prodorsum smooth, divided into 3 regions by longitudinal striations laterad to  $sc_1$ ; hysterosoma with conical projection of body anterior to coxa III ..... *T. mahoensis* Collyer

- Genua I–IV with 2, 2, 0, 0 setae; tarsus I–IV with  $7+\omega$ ,  $7+\omega$ , 5, 5 setae; prodorsum mesally covered with reticulations surrounded by two strong longitudinal wrinkles, and laterally bearing few reticulations and irregular striae; hysterosoma without conical projection..... *T. venustus* Collyer

### Key to adult males of New Zealand *Tenuipalpus*

1. Palp 4-segmented; dorsocentral seta  $c_1$  absent; two pairs of posterior medioventral setae  $4a_1$  and  $4a_2$  ..... *T. alpinus* Collyer
- Palp 1 or 3 segmented; seta  $c_1$  present; one pair of posterior medioventral setae  $4a$  ..... 2
2. Palp 1-segmented; tibiae I–IV with 3, 3, 3, 3 setae ..... 3
- Palp 3-segmented; tibiae I–IV with 5, 5, 3, 3 setae ..... 4
3. Setae  $v_2$  and  $sc_1$  subequal in length,  $sc_2$  about twice as long as  $v_2$ ; trochanters I–IV with 1, 1, 2, 1 setae; genua I–IV with 3, 3, 0, 0 setae ..... *T. rangiorae* Collyer
- Setae  $v_2$  longest, more than 1.5 times as long as  $sc_2$ ; trochanters I–IV with 1, 1, 1, 1 setae; genua I–IV with 3, 2, 0, 0 setae ..... *T. senecionis* Collyer
4. Setae  $d_1$  and  $e_1$  absent; femora I–IV with 4, 4, 2, 2 setae; setae  $v_2$  and  $sc_1$  pectinate,  $sc_2$  lanceolate and about twice as long as  $v_2$  ..... *T. cyatheae* Gerson & Collyer
- Setae  $d_1$  and  $e_1$  present; femora I–IV with 4, 4, 2, 1 setae; setae  $v_2$  and  $sc_1$  slender and smooth,  $sc_2$  lanceolate and more than 7 times as long as  $v_2$  ..... 5
5. Two pairs of pseudanal setae  $ps_1$  and  $ps_2$ ; genua I–IV with 3, 3, 1, 1 setae ..... *T. antipodus* Collyer
- Three pairs of pseudanal setae  $ps_1$ ,  $ps_2$  and  $ps_3$ ; genua I–IV with 3, 3, 1, 0 or 2, 2, 0, 0 setae ..... 6
6. Genua I–IV with 3, 3, 1, 0 setae; tarsus I–IV with  $8+2\omega$ ,  $8+2\omega$ , 5, 5 setae; prodorsum smooth, divided into 3 regions by longitudinal striations laterad to  $sc_1$ ; hysterosoma with conical projection of body anterior to cox III ..... *T. mahoensis* Collyer
- Genua I–IV with 2, 2, 0, 0 setae; tarsus I–IV with  $7+2\omega$ ,  $7+2\omega$ ,  $5+\omega$ ,  $5+\omega$  setae; prodorsum mesally covered with reticulations surrounded by two strong longitudinal wrinkles, and laterally bearing few reticulations and irregular striae; hysterosoma without conical projection ..... *T. venustus* Collyer

\* Males of *T. montanus* and *T. elegans* unknown.

### Species present in New Zealand

#### *Tenuipalpus alpinus* Collyer, 1973

(Figs. 4–13)

*Tenuipalpus alpinus* Collyer, 1973b: 946, figs. 34–35.

*Acaricis alpinus*: Castro et al. 2018: 861, figs. 5–9.

#### FEMALE (Figs. 4–8)

**Gnathosoma.** Rostrum reaching proximal one third of femur I, subcapitular setae  $m$  slender, smooth,  $m=7$  (6–7),  $m-m=13$  (13–14). Palp 4-segmented, setal formula: 0, 0, 2, 2; tibia with two bare setae near distal portion, tarsus with two eupathidia, 4 in length.

**Idiosoma.** 315 (280–315) long, 160 (150–160) wide. Rostral shield pitted, with one median conical projection. PRODORSUM covered with faint broken longitudinal striations posterior to  $sc_1$ , and oblique striations between  $sc_2$  and  $c_3$ ; setae  $v_2$  and  $sc_1$  short, slender and subequal,  $sc_2$  about twice as long as  $v_2$ . Lengths:  $v_2$  5 (3–5),  $sc_1$  5 (3–5),  $sc_2$  10 (6–10); distances:  $v_2-v_2$  37 (33–37),  $v_2-sc_1$  41 (37–41),  $sc_1-sc_1$  82 (82–84),  $sc_1-sc_2$  39 (34–39),  $sc_2-sc_2$  160 (150–160). HYSTEROSOMA covered with transversal striations medially, oblique broken striations laterally, and faint irregular striations posterior to  $e_1$ ; bearing one pair of humeral setae ( $c_3$ ), two pairs of dorsocentral setae ( $d_1$  and  $e_1$ ), and six pairs of dorsolateral setae ( $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_2$  and  $h_1$ ). All setae slender and smooth except  $h_2$  flagelliform. Setae  $d_1$ ,  $e_1$ ,  $c_3$ ,  $d_3$  and  $e_3$  subequal in length, setae  $f_2$ ,  $f_3$  and  $h_1$  subequal. Lengths:  $d_1$  5 (3–5),  $e_1$  5 (3–5),

$c_3$ , 5 (3–5),  $d_3$ , 5 (3–5),  $e_3$ , 5 (3–5),  $f_2$ , 6 (5–6),  $f_3$ , 6 (5–6),  $h_2$ , 80,  $h_1$ , 6 (5–6); distances:  $d_1-d_1$  56 (40–56),  $e_1-e_1$  25 (22–25),  $c_3-c_3$  165 (155–165),  $d_3-d_3$  140 (130–140),  $d_3-e_3$  100 (93–100),  $e_3-e_3$  110,  $e_3-f_2$  18 (18–20),  $f_2-f_2$  105,  $f_2-f_3$  14 (14–17),  $f_3-f_3$  85 (85–88),  $f_3-h_2$  12,  $h_2-h_2$  65 (65–67),  $h_2-h_1$  13,  $h_1-h_1$  40 (40–41).

**Venter.** Venter with broken irregular striae posterior to coxa II and transversal striations anterior to coxa III, and fine transversal striations between setae  $1a-ag$ . All coxal setae slender, smooth and subequal in length. Seta  $1a$ ,  $4a_1$  and  $4a_2$  flagelliform, middle medioventral seta  $3a$  slender and smooth. Setae  $4a_1$  and  $4a_2$  subequal in length and more than 6 times as long as  $3a$ . Lengths:  $1a$  110 (83–110),  $1b$  12 (11–12),  $1c$  11 (11–14),  $2b$  13 (11–13),  $2c$  12,  $3a$  13 (11–13),  $3b$  11 (10–11),  $4a_1$  89 (56–89),  $4a_2$  87 (65–87),  $4b$  12 (8–12). Distances:  $1a-1a$  35 (30–35),  $3a-3a$  28 (28–34),  $4a_1-4a_1$  21,  $4a_1-4a_2$  21,  $4a_2-4a_2$  42 (37–42). Genital and ventral area with longitudinal striations laterally, broken oblique striations and transverse and arched striae, respectively, setae  $ag$ ,  $g_1$  and  $g_2$  slender and smooth,  $g_1$  and  $g_2$  subequal in length. Pseudanal setae  $ps_1$  and  $ps_2$  subequal. Setae lengths:  $ag$  16 (11–16),  $g_1$  19 (15–19),  $g_2$  19 (16–19),  $ps_1$  10 (9–10),  $ps_2$  10 (8–10). Distances:  $ag-ag$  19 (19–23),  $g_1-g_1$  10 (9–10),  $g_1-g_2$  15 (13–15),  $g_2-g_2$  39 (36–39),  $ps_1-ps_2$  27 (26–27).

**Legs.** Lengths of legs I–IV: 115 (100–115), 99 (91–99), 86 (84–86), 91 (82–91). Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-2; genua 2-2-1-0; tibiae 5-5-3-3; tarsus 7+ $\omega$ -7+ $\omega$ -5-5. Most dorsal and lateral setae on trochanters, femora, genua and tibiae simple, spine-like, seta  $d$  on tibia I about 1.2 times length of tibia; ventral setae  $v'$ ,  $ev'$  and  $v''$  on femora and tibiae slender and smooth, and seta  $bv''$  on femur II spine-like. Setae  $ft'$  on tarsi I–IV flagelliform; unguinal setae  $u'$  and  $u''$  pectinate and equal in length except on tarsus II slender and smooth; tectal seta  $tc'$  and  $tc''$  spine-like. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  7 (6–7), II  $\omega''$  7 (6–7). Claws developed with tenent hairs on each side.

#### MALE (Figs. 9–13)

**Gnathosoma.** Rostrum reaching proximal end of femur I, subcapitular setae  $m$  slender and smooth,  $m=4$ ,  $m-m=14$ . Palp 4-segmented, setal formula: 0, 0, 2, 2; tibia with two bare setae near distal portion, tarsus with two eupathidia, 4 and 3 long respectively.

**Idiosoma.** 240–255 long, 135–145 wide. Rostral shield pitted, with one median conical projection. Idiosoma similar to female. PRODORSUM smooth, covered with few faint transversal striations mesally and oblique striae posterior to  $sc_1$ ; setae  $v_2$  and  $sc_1$  short, slender and subequal,  $sc_2$  about twice as long as  $v_2$ . Lengths:  $v_2$  4,  $sc_1$  3–4,  $sc_2$  7–9; distances:  $v_2-v_2$  61–65,  $v_2-sc_1$  31–35,  $sc_1-sc_1$  70–77,  $sc_1-sc_2$  32–34,  $sc_2-sc_2$  135–145. HYSTEROSOMA divided into metapodosoma and opisthosoma by few faint horizontal striations. Metapodosoma covered with few transversal striations between  $c_3-c_3$  and broken oblique striations between  $d_1-d_3$ . Opisthosoma covered with irregular broken striations posterior to  $e_1$  and oblique striae laterally. Dorsal setae similar to female, slender and smooth except  $h_2$  flagelliform. Setae  $d_1$ ,  $e_1$ ,  $c_3$ ,  $d_3$  and  $e_3$  subequal in length, setae  $f_2$ ,  $f_3$  and  $h_1$  subequal. Lengths:  $d_1$  3,  $e_1$  2–3,  $c_3$  3,  $d_3$  3–4,  $e_3$  3,  $f_2$  4–5,  $f_3$  4–5,  $h_2$  61,  $h_1$  5; distances:  $d_1-d_1$  32–35,  $e_1-e_1$  16–18,  $c_3-c_3$  125–135,  $d_3-d_3$  93–98,  $d_3-e_3$  78–83,  $e_3-e_3$  69–72,  $e_3-f_2$  13–16,  $f_2-f_2$  69–73,  $f_2-f_3$  9–10,  $f_3-f_3$  54–57,  $f_3-h_2$  9–10,  $h_2-h_2$  43–44,  $h_2-h_1$  10,  $h_1-h_1$  20–22.

**Venter.** Venter similar to female. All coxal setae slender and smooth and subequal in length. Seta  $1a$ ,  $4a_1$  and  $4a_2$  flagelliform,  $3a$  slender and smooth. Setae  $4a_1$  about 1.8 times as long as  $4a_2$  and more than 5 times as long as  $3a$ . Lengths:  $1a$  87–91,  $1b$  10–12,  $1c$  10–11,  $2b$  11–12,  $2c$  9–10,  $3a$  11,  $3b$  10–12,  $4a_1$  63–69,  $4a_2$  36–40,  $4b$  9–10. Distances:  $1a-1a$  31,  $3a-3a$  15–18,  $4a_1-4a_1$  16–18,  $4a_1-4a_2$  17–18,  $4a_2-4a_2$  31–35. Ventral area with transversal cuticles between  $4a_1$  and  $ag$ , genital area covered with oblique striations between  $ag$  and  $g_2$ , forming inverted U-shaped pattern. Setae  $ag$ ,  $g_1$  and  $g_2$  slender and smooth,  $g_1$  and  $g_2$  subequal. Pseudanal setae  $ps_1$  and  $ps_2$  subequal in length. Setae lengths:  $ag$  10,  $g_1$  13–14,  $g_2$  14–16,  $ps_1$  8,  $ps_2$  8. Distances:  $ag-ag$  16–19,  $g_1-g_1$  16,  $g_1-g_2$  5–7,  $g_2-g_2$  25–27,  $ps_1-ps_2$  13–15.

**Legs.** Lengths of legs I–IV: 100–105, 89–92, 82–85, 84–87. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-2; genua 2-2-1-0; tibiae 5-5-3-3; tarsus 7+2 $\omega$ -7+2 $\omega$ -5+ $\omega$ -5+ $\omega$ . Most dorsal and lateral setae on trochanters, femora, genua and tibiae simple, slender and smooth, seta  $d$  on tibia IV pectinate; ventral setae  $v'$ ,  $v''$ ,  $ev'$  and  $bv''$  on trochanters, femora and tibiae slender and smooth. Setae  $ft'$  on tarsi I–IV flagelliform; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  slender and smooth. Solenidia  $\omega'$  and  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi rod-like. Lengths of solenidia: I  $\omega'$  8–9,  $\omega''$  8–9, II  $\omega'$  9–10,  $\omega''$  8–9. Claws developed with tenent hairs on each side.

**Distribution.** BASED ON MATERIAL EXAMINED: NEW ZEALAND: NN, CO.

**Material examined.** Holotype and 6 paratypes. **Holotype** female. NEW ZEALAND: NN: Nelson Lakes National Park, Mount Robert Ridge circa 1830 m, Oct., 1969, G. W. Ramssy, mat plants in rocks, NZAC: 1/1 female, 1 (paratype) female. **Paratypes:** on the same slide with holotype: NZAC: 1/1 female. Same collection data as holotype slide: NZAC: 1/1 male, 1 deutonymph; 1/1 male, 1 larva. **CO:** West of Lake Manapouri, Mt Barber, Wilmot Pass, 1100m, 8, Jan., 1970, J. S. Dugdale and J. M. Hoy, mats of *Chionochloa crassiuscula*, *Astelia*, *Clemisia sessiliflora*, *Cyathodes pumila*, *Gaultheria*, *Anisotome*, *Drosera*, NZAC: 1/1 female.

**Habitat.** Mat plants on rocks, mats of *Chionochloa crassiuscula*, *Astelia*, *Clemisia sessiliflora*, *Cyathodes pumila*, *Gaultheria*, *Anisotome*, *Drosera*.

**Remarks.** Collyer (1973) described the characters of *T. alpinus* as follows: palp 3-segmented with a terminal seta on tarsi; genua I–IV with 1, 2, 1, 0 setae; adult male with three pairs of dorsocentral setae; anal plate with only 1 pair of setae. In the examination of the types, we found these characters to be incorrect. The correct characters are as follows: palp 4-segmented with 2 eupathidia on tarsi; genua I–IV with 2, 2, 1, 0 setae; adult male with two pairs of dorsocentral setae; anal plate with two pairs of setae. Here we have revised the concept of this genus accordingly. Pending a phylogenetic analysis of the genera in this family, this species may be removed from this genus.

*T. alpinus* resembles *T. montanus* in hysterosoma having two pairs of dorsocentral setae, venter with one pair of anterior medioventral setae and two pairs of posterior medioventral setae. However, it is readily distinguished by setae  $sc_2$  short, slender and smooth (setae  $sc_2$  enlarged and lanceolate in *T. montanus*); and prodorsum smooth, with few broken longitudinal striations posterior to  $sc_1$  (prodorsum with curved striations between  $sc_1$ – $sc_1$ , U-shaped in *T. montanus*); and caudolateral setae except  $h_2$  minute, slender and smooth (caudolateral setae  $f_2$  and  $f_3$  lanceolate in *T. montanus*).

Castro *et al.* (2018) redescribed *T. alpinus* and *T. montanus* based on paratypes. They moved them to the genus *Acaricis* from *Tenuipalpus* based on some characteristics shared with other *Acaricis* species: dorsocentral setae  $c_1$  is absent; palp 4-segmented; setae  $ft'$  suppressed on tarsus I–II. Based on examining the holotypes of these two species, and studying the genus *Acaricis* by Beard & Gerson (2009) and Xu & Zhang (2013), we disagree with Castro *et al.* (2018) and consider *T. alpinus* and *T. montanus* members of the genus *Tenuipalpus* (expanded concept in this paper) by the following characteristics: the body length less than twice as long as width (prodorsum normal); genital setae  $g_1$  and  $g_2$  are arranged on the same level; trochanters I–IV with 1 ( $v'$ )-1 ( $v'$ )-2 ( $l'$ ,  $v'$ )-1 ( $v'$ ) setae; none of the host of these two species were identified as Cyperaceae (*Acaricis*: body elongate, more than twice as long as wide with elongate prodorsum; genital setae  $g_1$  are inserted anterior to  $g_2$ ; trochanters I–IV with 1-1-1-0 setae, with  $v'$  suppressed on trochanters III–IV; the genus *Acaricis* is currently confined to Cyperaceae).

### ***Tenuipalpus antipodus* Collyer, 1964**

(Figs. 14–37)

*Tenuipalpus antipodus* Collyer, 1964: 436, figs. 3C, D; Lo, 1986: 277, fig. 1; Collyer, 1973b: 919, figs. 7–13.

#### **FEMALE (Figs. 14–18)**

**Gnathosoma.** Rostrum reaching proximal one fourth of femur I, subcapitular setae  $m$  pectinate,  $m=18$ –21,  $m-m=19$ –21. Palp 3-segmented, setal formula: 0, 1, 1; tibia with one pectinate setae near distal portion, tarsus with one eupathidium 5.

**Idiosoma.** 265–290 long, 185–195 wide. Rostral shield pitted, with two median conical projections. PRODORSUM covered with broken transversal wrinkles surrounded by two strong longitudinal wrinkles, and reticulations posterior to  $sc_1$ ; podosomal setae  $v_2$ ,  $sc_1$  and  $sc_2$  lanceolate,  $sc_2$  longest and about 5 times as long as  $sc_1$ . Lengths:  $v_2$  7–10,  $sc_1$  12–14,  $sc_2$  66–76; distances:  $v_2$ – $v_2$  44–48,  $v_2$ – $sc_1$  34–37,  $sc_1$ – $sc_1$  96–100,  $sc_1$ – $sc_2$  44–50,  $sc_2$ – $sc_2$  185–195. HYSTEOSOMA covered with reticulations between  $c_1$ – $e_1$  and strong longitudinal wrinkles laterad to  $c_1$ – $e_1$ , and with irregular wrinkles posterior to  $e_1$ ; bearing one pair of humeral setae ( $c_3$ ), three pairs of dorsocentral setae ( $c_1$ ,  $d_1$  and  $e_1$ ), six pairs of dorsolateral setae ( $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_2$  and  $h_1$ ), and 1 pair of pores anterior to  $e_3$ . All setae lanceolate except  $h_2$  elongate. Setae  $c_1$ ,  $d_1$  and  $d_3$  subequal in length,  $f_2$  and  $f_3$  subequal and about 4 times as long as  $d_1$ , setae  $e_3$  and  $h_1$  subequal and about twice as long as  $c_3$ . Lengths:  $c_1$  9–10,  $d_1$  11–13,  $e_1$  7–10,  $c_3$  15–19,  $d_3$  11–13,  $e_3$  29–36,  $f_2$  42–48,  $f_3$  43–46,  $h_2$  255–270,  $h_1$  27–32; distances:  $c_1$ – $c_1$  59–67,  $d_1$ – $d_1$  38–43,  $e_1$ – $e_1$  8–12,  $c_3$ – $c_3$  200–215,  $d_3$ –

$d_3$  170–185,  $d_3-e_3$  69–80,  $e_3-e_3$  140–150,  $e_3-f_2$  16–20,  $f_2-f_2$  125–140,  $f_2-f_3$  19–23,  $f_3-f_3$  105–123,  $f_3-h_2$  18–23,  $h_2-h_2$  77–90,  $h_2-h_1$  17–21,  $h_1-h_1$  42–48.

**Venter.** Venter with fine longitudinal striae between coxae II–III and irregular oblique striations between setae  $1a-3a$ , and with transversal striations between  $3a-g_1$  and oblique striae exterior to  $3a-g_2$ . All coxal setae pectinate. Seta  $1a$  and  $4a$  flagelliform,  $3a$  slender and smooth. Seta  $4a$  twice as long as  $3a$ , and seta  $1a$  longest and about 4 times as long as  $4a$ . Lengths:  $1a$  150–170,  $1b$  12–15,  $1c$  17–20,  $2b$  13–21,  $2c$  25–31,  $3a$  18–23,  $3b$  26–29,  $4a$  37–42,  $4b$  25–27. Distances:  $1a-1a$  36–39,  $3a-3a$  55–57,  $4a-4a$  43–48. Genital and ventral area covered with broken striae and anal area with fine oblique striae. Setae  $ag$ ,  $g_1$  and  $g_2$  pectinate and subequal. Pseudanal setae  $ps_1$  and  $ps_2$  slender and smooth,  $ps_1$  about twice as long as  $ps_2$ . Setae lengths:  $ag$  31–37,  $g_1$  30–35,  $g_2$  30–34,  $ps_1$  27–33,  $ps_2$  13–16. Distances:  $ag-ag$  26–32,  $g_1-g_1$  23–25,  $g_1-g_2$  12–16,  $g_2-g_2$  50–52,  $ps_1-ps_2$  4–5.

**Legs.** Lengths of legs I–IV: 130–145, 115–125, 110–120, 110–120. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-1; genua 3-3-1-1; tibiae 5-5-3-3; tarsus  $8+\omega-8+\omega-5-5$ . Most dorsal and lateral setae on trochanters, femora, genua and tibiae lanceolate, lateral seta  $l'$  on genu I elongate about 3 times as long as  $l''$  on genu I; ventral setae  $v'$ ,  $ev'$ ,  $v''$  and  $bv''$  on trochanters, femora and tibiae pectinate, and  $bv''$  on femur II lanceolate; setae  $v'$  and  $v''$  subequal in length. Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  barbed; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  barbed and subequal. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  8–9, II  $\omega''$  8–9. Claws developed with tenent hairs on each side.

#### MALE (Figs. 19–24)

**Gnathosoma.** Rostrum reaching proximal one fourth of femur I, subcapitular setae  $m$  pectinate,  $m=$  12–13,  $m-m=$  16–18. Palp 3-segmented, setal formula: 0, 1, 1; tibia with one pectinate setae near distal portion, tarsus with one eupathidium, 6.

**Idiosoma.** 240–255 long, 160 wide. Rostral shield pitted, with two median conical. PRODORSUM covered with few reticulations and irregular striations mesally, and oblique striations laterally; setae  $v_2$  and  $sc_1$  slender, smooth and subequal,  $sc_2$  lanceolate and about 6 times as long as  $sc_1$ . Lengths:  $v_2$  6–7,  $sc_1$  7–8,  $sc_2$  45–52; distances:  $v_2-v_2$  35–37,  $v_2-sc_1$  27–30,  $sc_1-sc_1$  77–81,  $sc_1-sc_2$  41–42,  $sc_2-sc_2$  160. HYSTEROSOMA divided into metapodosoma and opisthosoma by narrow band of horizontal striations. Metapodosoma covered with irregular broken striations between  $c_1-d_1$  and broken oblique striations laterally. Opisthosoma covered with oblique striations anterior to  $e_1$  and few reticulations around  $e_1$ . All dorsolateral setae lanceolate except  $h_2$  elongate. Setae  $d_1$  and  $e_1$  subequal in length,  $f_2$  and  $f_3$  subequal and about twice as long as  $e_3$ . Lengths:  $c_1$  6–7,  $d_1$  4–6,  $e_1$  4–6,  $c_3$  10–13,  $d_3$  8–10,  $e_3$  15–17,  $f_2$  31–33,  $f_3$  29–33,  $h_2$  205–235,  $h_1$  22–23; distances:  $c_1-c_1$  43–46,  $d_1-d_1$  24–32,  $e_1-e_1$  3–7,  $c_3-c_3$  150,  $d_3-d_3$  110–120,  $d_3-e_3$  83–85,  $e_3-e_3$  84–86,  $e_3-f_2$  9–14,  $f_2-f_2$  82–87,  $f_2-f_3$  13–14,  $f_3-f_3$  73–79,  $f_3-h_2$  18–19,  $h_2-h_2$  51–57,  $h_2-h_1$  12–13,  $h_1-h_1$  25–32.

**Venter.** Venter with fine longitudinal oblique striations between coxae II–IV and broken longitudinal striations between  $1a-3a$ , and with curved striations between  $3a-4a$ . All coxal setae pectinate except  $2b$  and  $3b$  slender and smooth. Seta  $1a$  and  $4a$  flagelliform,  $3a$  slender and smooth. Seta  $4a$  about 5 times as long as  $3a$ . Lengths:  $1a$  130–135,  $1b$  12–16,  $1c$  15–18,  $2b$  20–21,  $2c$  21–24,  $3a$  14–16,  $3b$  21–24,  $4a$  36–59,  $4b$  24. Distances:  $1a-1a$  28–29,  $3a-3a$  41–44,  $4a-4a$  24–28. Setae  $ag$ ,  $g_1$  and  $g_2$  pectinate. Aedeagus narrow, sclerotised, finely tapered distally, membranous duct runs from inside aedeagus, terminating in trumpet-shaped end. Pseudanal setae  $ps_1$  slender and smooth,  $ps_2$  stout and with a cone. Genital and ventral area covered with broken transversal striations. Setae lengths:  $ag$  18–21,  $g_1$  28–30,  $g_2$  23–24,  $ps_1$  14–15,  $ps_2$  12–13. Distances:  $ag-ag$  19–21,  $g_1-g_1$  20–21,  $g_1-g_2$  6–7,  $g_2-g_2$  28–30,  $ps_1-ps_2$  15–18.

**Legs.** Lengths of legs I–IV: 125–130, 110–115, 100–105, 110. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-1; genua 3-3-1-1; tibiae 5-5-3-3; tarsus  $8+2\omega-8+2\omega-5-5$ . Most dorsal and lateral setae on trochanters, femora, genua and tibiae lanceolate, lateral seta  $l'$  on femur I elongate about 3 times as long as  $l''$  on femur I, and setae  $l'$  on tibiae I–II barbed; ventral setae  $v'$ ,  $ev'$ ,  $v''$  and  $bv''$  on trochanters, femora and tibiae pectinate, and  $bv''$  on femur II lanceolate; setae  $v'$  and  $v''$  subequal in length. Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  barbed; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  barbed and subequal. Solenidia  $\omega'$  and  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega'$  10–11,  $\omega''$  9–10, II  $\omega'$  10,  $\omega''$  10–12. Claws developed with tenent hairs on each side.

**DEUTONYMPH (Figs. 25–29)**

**Gnathosoma.** Rostrum reaching proximal end of femur I, subcapitular setae  $m$  pectinate,  $m=8-9$ ,  $m-m=14-16$ . Palp 3-segmented, setal formula: 0, 1, 1; tibia with one pectinate setae near distal portion, tarsus with one eupathidium, 5.

**Idiosoma.** 260–300 long, 150–175 wide. Rostral shield pitted, with two median conical projection. PRODORSUM smooth, with faint transversal striations anterior to setae  $d_1$  and oblique striations between  $d_1$  and  $d_3$ ; setae  $v_2$  and  $sc_1$  slender, smooth and subequal,  $sc_2$  lanceolate. Lengths:  $v_2$  2–3,  $sc_1$  2–3,  $sc_2$  51–58; distances:  $v_2-v_2$  28–37,  $v_2-sc_1$  28–32,  $sc_1-sc_1$  77–87,  $sc_1-sc_2$  38–44,  $sc_2-sc_2$  150–175. Setae  $c_1$ ,  $d_1$ ,  $e_1$  and  $d_3$  slender and smooth and subequal in length, setae  $c_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$  and  $h_1$  lanceolate,  $h_2$  elongate. Setae  $c_3$  and  $h_1$  subequal,  $e_3$  and  $f_2$  subequal in length and about 1.5 times as long as  $h_1$ . Lengths:  $c_1$  2,  $d_1$  2,  $e_1$  2–3,  $c_3$  20–28,  $d_3$  2–4,  $e_3$  32–43,  $f_2$  33–37,  $f_3$  29–32,  $h_2$  100–140,  $h_1$  21–29; distances:  $c_1-c_1$  41–46,  $d_1-d_1$  25–31,  $e_1-e_1$  5–8,  $c_3-c_3$  170–220,  $d_3-d_3$  125–160,  $d_3-e_3$  45–49,  $e_3-e_3$  88–115,  $e_3-f_2$  13–14,  $f_2-f_2$  78–97,  $f_2-f_3$  13–14,  $f_3-f_3$  62–75,  $f_3-h_2$  16–18,  $h_2-h_2$  38–46,  $h_2-h_1$  11–12,  $h_1-h_1$  18–21.

**Venter.** Venter with fine transversal striations. All coxal setae slender and smooth. Setae  $1a$  and  $4a$  flagelliform,  $3a$  slender and smooth, length of  $1a$  more than twice as long as seta  $4a$  and more than 10 times as long as  $3a$ . Lengths:  $1a$  91–125,  $1b$  7–8,  $1c$  6–9,  $2b$  7–9,  $2c$  11–12,  $3a$  9–10,  $3b$  10–13,  $4a$  46–53,  $4b$  9–12. Distances:  $1a-1a$  21–25,  $3a-3a$  47–55,  $4a-4a$  30–40. Genital and ventral area bearing one pair of aggenital setae ( $ag$ ) and one pairs of genital setae ( $g_1$ ). Pseudanal setae  $ps_1$  and  $ps_2$  slender and smooth. Setae lengths:  $ag$  20–30,  $g_1$  5–7,  $ps_1$  7,  $ps_2$  3–6. Distances:  $ag-ag$  20–30,  $g_1-g_1$  14–23,  $ps_1-ps_2$  9–10.

**Legs.** Lengths of legs I–IV: 83–92, 69–78, 64–71, 55–63. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-0; femora 4-4-2-1; genua 2-2-1-0; tibiae 5-5-3-3; tarsus 8+ $\omega$ 8+ $\omega$ 5-5. Most dorsal and lateral setae on trochanters, femora, genua and tibiae lanceolate; dorsal seta  $d$  on femur III, lateral seta  $l'$  on trochanter III and  $l''$  on genu I elongate; ventral setae  $v'$ ,  $ev'$  and  $bv''$  on trochanters, femora slender and smooth except  $bv''$  on femur II lanceolate and elongate; setae  $v'$  and  $v''$  on tibiae pectinate and subequal in length except on tibia IV slender and smooth. Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  barbed; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  barbed and subequal. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  5, II  $\omega''$  5. Claws developed with tenent hairs on each side.

**PROTONYMPH (Figs. 30–34)**

**Gnathosoma.** Rostrum reaching proximal end of femur I, subcapitular setae  $m$  pectinate,  $m=6-7$ ,  $m-m=14-16$ . Palp 3-segmented, setal formula: 0, 1, 1; tibia with one pectinate setae near distal portion, tarsus with one eupathidium, 4.

**Idiosoma.** 195–220 long, 125–135 wide. Rostral shield pitted, with two median conical projection. PRODORSUM similar to deutonymph, with faint transversal striations anterior to setae  $d_1$  and oblique striations between  $d_1$  and  $d_3$ ; setae  $v_2$  and  $sc_1$  slender, smooth and subequal,  $sc_2$  lanceolate. Lengths:  $v_2$  2–3,  $sc_1$  2–3,  $sc_2$  42–47; distances:  $v_2-v_2$  24,  $v_2-sc_1$  26–27,  $sc_1-sc_1$  68–71,  $sc_1-sc_2$  29–34,  $sc_2-sc_2$  125–135. Setae  $c_1$ ,  $d_1$ ,  $e_1$  and  $d_3$  slender and smooth and subequal in length, setae  $c_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$  and  $h_1$  lanceolate,  $h_2$  elongate. Setae  $f_2$  and  $f_3$  subequal in length and about 1.5 times as long as  $h_1$ . Lengths:  $c_1$  3,  $d_1$  2–3,  $e_1$  2–3,  $c_3$  13–18,  $d_3$  2,  $e_3$  27–29,  $f_2$  24–25,  $f_3$  22,  $h_2$  94–96,  $h_1$  16; distances:  $c_1-c_1$  33–38,  $d_1-d_1$  20–22,  $e_1-e_1$  8–10,  $c_3-c_3$  140–155,  $d_3-d_3$  99–115,  $d_3-e_3$  35,  $e_3-e_3$  75–91,  $e_3-f_2$  8,  $f_2-f_2$  69–80,  $f_2-f_3$  10–11,  $f_3-f_3$  54–62,  $f_3-h_2$  12–15,  $h_2-h_2$  35–37,  $h_2-h_1$  10,  $h_1-h_1$  14–16.

**Venter.** Venter similar to deutonymph. Seta  $1a$  flagelliform and more than 5 times as long as  $3a$ . Lengths:  $1a$  43–68,  $1b$  8–9,  $1c$  8–9,  $2c$  10–11,  $3a$  9,  $3b$  10–11. Distances:  $1a-1a$  16–17,  $3a-3a$  45. Genital and ventral plates bearing one pair of aggenital setae ( $ag$ ). Anal area with two pairs of pseudanal setae ( $ps_1$  and  $ps_2$ ). Setae lengths:  $ag$  6–7,  $ps_1$  2–4,  $ps_2$  3–5. Distances:  $ag-ag$  21,  $ps_1-ps_2$  6.

**Legs.** Lengths of legs I–IV: 56–64, 50–58, 46–52, 37–42. Chaetotaxy: coxae 2-1-1-0; trochanters 0-0-1-0; femora 3-3-2-1; genua 1-1-0-0; tibiae 5-5-3-3; tarsus 6+ $\omega$ 6+ $\omega$ 3-3. Most dorsal and lateral setae on trochanters, femora, genua and tibiae lanceolate; dorsal seta  $d$  on femur III and lateral seta  $l'$  on trochanter III elongate; ventral setae  $v'$ ,  $ev'$ ,  $v''$  and  $bv''$  on femora and tibiae slender and smooth except  $bv''$  on femur II lanceolate and elongate. Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  lanceolate; unguinal setae  $u'$  and  $u''$  pectinate and equal in length. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  4, II  $\omega''$  4. Claws developed with tenent hairs on each side.

**LARVA (Figs. 35–37)**

**Gnathosoma.** Rostrum reaching proximal end of femur I. Palp 3-segmented, setal formula: 0, 1, 1; tibia with one pectinate setae near distal portion, tarsus with one eupathidium, 4–5.

**Idiosoma.** 175–195 long, 100–110 wide. Rostral shield round. PRODORSUM covered with dense round knots anteriorly and mesally, and a broad band of transversal striations between setae  $sc_2$  and  $c_3$ ; setae  $v_2$  and  $sc_1$  slender, smooth and subequal,  $sc_2$  lanceolate. Lengths:  $v_2$  2,  $sc_1$  2,  $sc_2$  33–34; distances:  $v_2-v_2$  17–19,  $v_2-sc_1$  25–26,  $sc_1-sc_1$  59–60,  $sc_1-sc_2$  22–25,  $sc_2-sc_2$  100–110. HYSTEROSOMA similar to deutonymph. Opisthosoma covered with dense round knobs posterior to  $d_1$ . Lengths:  $c_1$  2–10,  $d_1$  2–10,  $e_1$  2,  $c_3$  9–13,  $d_3$  2,  $e_3$  28–30,  $f_2$  27–28,  $f_3$  23–25,  $h_2$  74–94,  $h_1$  17–18; distances:  $c_1-c_1$  33–36,  $d_1-d_1$  14–19,  $e_1-e_1$  9–10,  $c_3-c_3$  105–125,  $d_3-d_3$  81–90,  $d_3-e_3$  14–19,  $e_3-e_3$  67–81,  $e_3-f_2$  9–10,  $f_2-f_2$  59–70,  $f_2-f_3$  9–12,  $f_3-f_3$  48–52,  $f_3-h_2$  10–13,  $h_2-h_2$  30–32,  $h_2-h_1$  8–9,  $h_1-h_1$  13–14.

**Venter.** Venter similar to deutonymph. Setae *1a* flagelliform and more than 6 times as long as *3a*. Lengths: *1a* 47–59, *1b* 7–9, *3a* 5–9. Distances: *1a-1a* 16–20, *3a-3a* 36–45. Anal area with two pairs of pseudanal setae ( $ps_1$  and  $ps_2$ ). Setae lengths:  $ps_1$  3–6,  $ps_2$  3–5. Distances:  $ps_1-ps_2$  6.

**Legs.** Lengths of legs I–III: 43–46, 39–42, 40–41. Chaetotaxy: coxae 1-0-0; trochanters 0-0-0; femora 3-3-2; genua 1-1-0; tibiae 5-5-3; tarsus 6+ $\omega$ + $\omega$ -3. Most dorsal and lateral setae on femora, genua and tibiae lanceolate except seta *l'* on tibiae I–II slender and smooth; ventral setae  $v'$ ,  $ev'$ ,  $v''$  and  $bv''$  on femora and tibiae slender and smooth except  $bv''$  on femur II lanceolate and elongate. Setae *ft'* on tarsi I–III flagelliform, *ft''* barbed; unguinal setae  $u'$  and  $u''$  pectinate and equal in length. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  3–4, II  $\omega''$  3–4. Claws developed with tenent hairs on each side.

**Distribution.** BASED ON MATERIAL EXAMINED: NEW ZEALAND: AK, WN, NN, MB.

Other countries: China (Lo 1986).

**Material examined.** 294 non-type specimens. **Non-types:** **AK:** Auckland, Cosseys Creel Bush, 21, May, 1960, E. Collyer, *Coprosma* sp., 1/17 females, 1 deutonymph, 1 larva. Waitakere Ranges, 31, Oct., 1960, E. Collyer, *Coprosma* sp., 1/2 females. Te Morehu Orere, 11, Nov., 1960, E. Collyer, *Melicytus ramiflorus*, 1/1 female, 1 male, 1 protonymph. Te Morehu Orere, 25, Feb., 1961, E. Collyer, *Melicytus ramiflorus*, 1/1 female. Te Morehu Orere, 27, Feb., 1961, E. Collyer, long smooth leaves, 1/2 females. Te Morehu Orere, 27, Feb., 1961, E. Collyer, *Coprosma* sp., 1/1 female; Te Morehu Orere, 14, May, 1961, E. Collyer, *Nothoparax* sp., 1/29 females, 2 males. Waitakere Range, Anawhata Rd, 18, Jun., 1961, E. Collyer, *Coprosma*, 1/20 females [+*Ultraltenuipalpus coprosmae* 11 females, 5 males]. Ponui Island, Jun., 1967, E. Collyer, *Dysoxylum spectabile*, 1/1 female. Anawhata McElwain Loop Track, 1 Aug., 2004, N. A. Martin, *Cordyline banksii*, 1/2 deutonymphs. Waitakere, Ra Upper Nihotupu Dam Waik, 21, Jan., 2006, N. A. Martin, *Gahnia lacera*, 1/1 female. Waitakere, Ra Old Coach Road, 14, Mar., 2006, N. A. Martin, *Alseuosmia macrophylla*, 1/1 male, 3 deutonymphs. Waitakere, Ra Upper Nihotupu Dam Waik, 25, Aug., 2006, N. A. Martin, *Elaeocarpus dentatus*, 1/6 females, 1 protonymph. Whangaporoa Peninsula, Shakespeare Regional Park, water fall gully, 24, Nov., 2013, N. A. Martin, *Beilschmiedia tomaroa*, 1/8 females, 8 males, 7 deutonymphs. **WN:** Wellington, Akatarawa, 30, Mar., 1964, D. C. M. Manson, tawa, 1/5 females, 4 males, 1 deutonymph, 1 protonymph, 5 larvae. Wellington, 18, Apr., 1966, D. C. M. Manson, tawa, 1/3 females. **NN:** Nelson, Ruby Bay, 11, Dec., 1964, E. Collyer, *Ctenitus velutuma*, 1/1 female. Head of Waiiti R., May, 1965, E. Collyer, *Melicytus ramiflorus*, 1/19 females, 3 males. Marahau, 21, Jul., 1965, E. Collyer, *Rhipogonum scanclens*, 1/10 females, 11 males, 3 deutonymphs, 2 protonymphs, 1 larva. Ruby Bay, 21, Jul., 1965, E. Collyer, *Heclycarga aborea*, 1/6 females, 1 male. Kaihoka Lake, 3, Oct., 1965, E. Collyer, *Rhipogonum scanclens*, 1/4 females, 1 male, 1 deutonymph, 1 protonymph, 1 larva. Kaihoka Lake, 3, Oct., 1965, E. Collyer, *Heclycarga aborea*, 1/17 females, 3 males. Totaranui, Goat Bay, 25, Oct., 1965, E. Collyer, *Pseudowintrea axillars*, 1/2 females. Totaranui, Goat Bay, 25, Oct., 1965, E. Collyer, *Heclycarga aborea*, 1/1 female. Totaranui, Goat Bay, 25, Oct., 1965, E. Collyer, *Rhipogonum scanclens*, 1/31 females. Ruby Bay, 8, Nov., 1965, E. Collyer, *Rhipogonum scanclens*, 1/7 females, 3 males, 2 deutonymphs. Totaranui, Mutton Cove, 27, Oct., 1969, E. Collyer, *Heclycarga aborea*, 1/4 females, 4 deutonymphs, 3 protonymphs, 2 larvae. Ruby Bay, 7, Jun., 1966, E. Collyer, *Melicytus ramiflorus*, 1/3 females, 3 males, 1 protonymph, 1 larva. **MB:** Marlborough, Pelorus Sound, Waitata Bay, 22, Jun., 1963, E. Collyer, *Dysoxylum spectabile*, 1/7 females. Queen Charlottle Sound, Davis Bay, 30, Jan., 1966, E. Collyer, *Beilschmiedia tawa*, 1/1 male, 1 deutonymph, 3 protonymphs. Marahau, 29, Mar., 1970, E. Collyer, *Rhipogonum scanclens*, 1/2 females, 2 males, 1 deutonymph.

**Habitat.** *Coprosma* sp., *Meliccytus ramiflorus*, long smooth leaves, *Nothoparax* sp., *Dysoxylum spectabile*, *Cordyline banksii*, *Gahnia lacera*, *Alseuosmia macrophylla*, *Elaeocarpus dentatus*, *Beilschmiedia tomaroa*, tawa, *Ctenitis velutuma*, *Rhipogonum scancellens*, *Heclycarga aborea*, *Pseudowintrea axillars*, *Beilschmiedia tawa*.

**Remarks.** Collyer (1964, 1973) and Lo (1969) remarked that this species has genua 2, 2, 1, 1 setae. This is incorrect and the true count is 3, 3, 1, 1.

*T. antipodus* can be separated from *T. punicae* by setae  $sc_2$  lanceolate and enlarged; dorsocentral setae lanceolate and subequal; genua I–IV with 3, 3, 1, 1 setae (setae  $sc_2$  lanceolate, small and with slightly serrations; dorsocentral setae setiform, and slightly serrate; genua I–IV with 3, 3, 0, 0 setae in *T. punicae*).

#### ***Tenuipalpus cyatheae* Gerson & Collyer, 1984**

(Figs. 38–48)

*Tenuipalpus cyatheae* Gerson & Collyer, 1984: 143, figs. 2–4.

##### **FEMALE (Figs. 38–43)**

**Gnathosoma.** Rostrum reaching middle of femur I, subcapitular setae  $m$  pectinate,  $m=13$  (11–14),  $m-m=15$  (15–18). Palp 3-segmented, setal formula: 0, 1, 1; tibia with one forked seta near distal portion, tarsus with one eupathidium, 4–5.

**Idiosoma.** 260 (255–280) long, 170 (170–185) wide. Rostral shield pitted, with two median conical projection. Idiosoma oval shaped. PRODORSUM covered with dense reticulations mesally and laterally; setae  $v_2$ ,  $sc_1$  and  $sc_2$  barbed,  $v_2$  and  $sc_1$  subequal,  $sc_2$  about twice as long as  $v_2$ ; lengths:  $v_2$  12 (11–12),  $sc_1$  13 (11–13),  $sc_2$  25 (22–26); distances:  $v_2-v_2$  40 (39–43),  $v_2-sc_1$  43 (35–44),  $sc_1-sc_1$  115 (105–120),  $sc_1-sc_2$  30 (30–33),  $sc_2-sc_2$  170 (170–185). HYSTEROSOMA covered with dense reticulations mesally and laterally; bearing one pair of pores, one pair of humeral setae ( $c_3$ ), one pair of dorsocentral setae ( $c_1$ ), and six pairs of dorsolateral setae ( $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_2$  and  $h_1$ ). All setae barbed except  $h_2$  flagelliform. Setae  $e_3$ ,  $f_2$  and  $f_3$  subequal in length. Lengths:  $c_1$  17 (10–17),  $c_3$  17 (14–18),  $d_3$  14 (10–15),  $e_3$  9 (9–13),  $f_2$  10 (9–11),  $f_3$  9 (8–10),  $h_2$  275 (215–275),  $h_1$  8 (7–8); distances:  $c_1-c_1$  51 (44–54),  $c_3-c_3$  180 (180–195),  $d_3-d_3$  155 (100–170),  $d_3-e_3$  68 (68–80),  $e_3-e_3$  100 (100–110),  $e_3-f_2$  22 (21–28),  $f_2-f_2$  88 (85–90),  $f_2-f_3$  24 (24–29),  $f_3-f_3$  65 (56–65),  $f_3-h_2$  12 (12–14),  $h_2-h_2$  47 (38–48),  $h_2-h_1$  10 (8–14),  $h_1-h_1$  27 (21–28).

**Venter.** Venter covered with oblique striae between coxae II–III, dense longitudinal striations between setae  $1a-3a$  and transversal striae anterior to  $3a$ , and with oblique striations between  $3a-4a$ . Three pairs of porose patches transversally situated in the middle area; 7 pairs of porose patches located on coxae III and IV and another one pair situated anterior to  $4a$ . All coxal setae slender and smooth. Seta  $1a$  and  $4a$  flagelliform,  $3a$  slender and smooth. Seta  $4a$  about 7 times as long as  $3a$ , and seta  $1a$  longest and about 11 times as long as  $3a$ . Lengths:  $1a$  120 (105–140),  $1b$  23 (16–23),  $1c$  20 (18–22),  $2b$  24 (18–25),  $2c$  24 (21–26),  $3a$  11 (9–13),  $3b$  16 (14–20),  $4a$  81 (70–91),  $4b$  17 (15–20). Distances:  $1a-1a$  32 (30–46),  $3a-3a$  39 (39–40),  $4a-4a$  26 (26–30). Genital and ventral area with transversal striae mesally and broken longitudinal striations laterally; eight pairs of porose patches situated in submarginal area and one pair anterior to  $ag$ . Anal area with two pairs of pseudanal setae ( $ps_1$  and  $ps_2$ ). All setae slender and smooth,  $g_1$  and  $g_2$  subequal,  $ps_1$  and  $ps_2$  subequal in length. Setae lengths:  $ag$  14 (12–15),  $g_1$  17 (16–18),  $g_2$  17 (16–17),  $ps_1$  15 (12–15),  $ps_2$  15 (13–15). Distances:  $ag-ag$  15 (15–24),  $g_1-g_1$  18 (18–21),  $g_1-g_2$  9 (9–13),  $g_2-g_2$  35 (35–45),  $ps_1-ps_2$  10 (10–16).

**Legs.** Lengths of legs I–IV: 140 (140–155), 125 (120–135), 115 (115–125), 125 (125–135). Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-2; genua 3-3-0-0; tibiae 5-5-3-3; tarsus 8+ $\omega$ -8+ $\omega$ -5-5. All dorsal and lateral setae on trochanters, femora, genua and tibiae barbed; ventral setae  $v'$  and  $v''$  on trochanters I–III and tibiae I–IV pectinate; seta  $v'$  on femora I–II and  $ev'$  on femora III–IV slender and smooth; seta  $bv''$  on femur I–II barbed. Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  barbed; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  barbed and subequal. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  9 (9–10), II  $\omega''$  7 (7–8). Claws developed with tenent hairs on each side.

##### **MALE (Figs. 44–48)**

**Gnathosoma.** Rostrum reaching middle of femur I, subcapitular setae  $m$  slender and smooth,  $m=11$ ,  $m-m=19$ . Palp 3-segmented, setal formula: 0, 1, 1; tibia with one slender and smooth setae near distal portion, tarsus with one eupathidium, 4.



**Idiosoma.** 245 long, 150 wide. Rostral shield pitted, with one median conical projection. PRODORSUM covered with broken and oblique striations mesally and laterally; setae  $v_2$ ,  $sc_1$  and  $sc_2$  barbed,  $v_2$  and  $sc_1$  subequal,  $sc_2$  about twice as long as  $v_2$ ; lengths:  $v_2$  12,  $sc_1$  12,  $sc_2$  22; distances:  $v_2-v_2$  35,  $v_2-sc_1$  38,  $sc_1-sc_1$  100,  $sc_1-sc_2$  27,  $sc_2-sc_2$  150. HYSTEROSOMA divided into metapodosoma and opisthosoma by few faint horizontal striations. Metapodosoma covered with few oblique striations laterally. Opisthosoma covered with broken longitudinal and oblique striations mesally and laterally. All setae barbed except  $h_2$  flagelliform. Setae  $d_3$ ,  $e_3$ ,  $f_2$  and  $f_3$  subequal in length. Lengths:  $c_1$  16,  $c_3$  20,  $d_3$  13,  $e_3$  12,  $f_2$  10,  $f_3$  11,  $h_2$  205,  $h_1$  7; distances:  $c_1-c_1$  28,  $c_3-c_3$  150,  $d_3-d_3$  105,  $d_3-e_3$  55,  $e_3-e_3$  78,  $e_3-f_2$  30,  $f_2-f_2$  67,  $f_2-f_3$  21,  $f_3-f_3$  52,  $f_3-h_2$  14,  $h_2-h_2$  39,  $h_2-h_1$  11,  $h_1-h_1$  19.

**Venter.** Venter with oblique striae between coxae II–III. All coxal setae slender and smooth. Seta  $1a$  and  $4a$  flagelliform,  $3a$  slender and smooth. Seta  $4a$  about 5 times as long as  $3a$ , and seta  $1a$  longest about 8 times as long as  $3a$ . Lengths:  $1a$  94,  $1b$  17,  $1c$  16,  $2b$  20,  $2c$  18,  $3a$  12,  $3b$  18,  $4a$  59,  $4b$  17. Distances:  $1a-1a$  32,  $3a-3a$  33,  $4a-4a$  17. Genital and ventral area with broken oblique striations. All setae slender and smooth,  $g_1$  and  $g_2$  subequal in length,  $ps_1$  about 2.5 times as long as  $ps_2$ . Setae lengths:  $ag$  14,  $g_1$  17,  $g_2$  17,  $ps_1$  15,  $ps_2$  6. Distances:  $ag-ag$  19,  $g_1-g_1$  24,  $g_1-g_2$  5,  $g_2-g_2$  32,  $ps_1-ps_2$  11.

**Legs.** Lengths of legs I–IV: 125, 115, 105, 105. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-2; genua 3-3-0-0; tibiae 5-5-3-3; tarsus 8+2 $\omega$ -8+2 $\omega$ -5-5. All dorsal and lateral setae on trochanters, femora, genua and tibiae barbed; ventral setae  $v'$  and  $v''$  on trochanters I–III and tibiae I–IV pectinate; seta  $v'$  on femora I–II and  $ev'$  on femora III–IV slender and smooth; seta  $bv''$  on femur I–II barbed. Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  barbed; unguinal setae  $u'$  and  $u''$  barbed and equal in length; tectal seta  $tc'$  and  $tc''$  barbed and subequal. Solenidia  $\omega'$  and  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega'$  9,  $\omega''$  9, II  $\omega'$  9,  $\omega''$  10. Claws developed with tenent hairs on each side.

**Distribution.** BASED ON MATERIAL EXAMINED: NEW ZEALAND: ND, WO, AK, SD, NN, BP.

**Material examined.** Holotype, 9 paratypes and 12 non-type specimens. **Holotype** female. NEW ZEALAND: **ND:** Northland, Mount Bledisloe, near Waitangi, 5, Sep., 1982, U. G. Gerson, *Cyathea medullaris*, NZAC: 1/1 female. **Paratypes:** Same collection data as holotype slide: NZAC: 1/1 male; 1/1 deutonymph. **WO:** Herangi Range, 19, Sep., 1982, U. G. Gerson, *Cyathea medullaris*, NZAC: 5/5 females, 1/1 deutonymph. **AK:** Auckland, Waitakere, 21, Sep., 1982, U. G. Gerson, *Cyathea dealbata*, NZAC: 1/1 male. **Non-types:** **SD:** Marlborough Sounds, Queen Charlotte Drive, 31, Jan., 1983, U. G. Gerson, *Cyathea medullaris*, NZAC: 2/2 females. **NN:** Sharlands Creek, 14, Aug., 1983, E. Collyer, *Cyathea dealbata*, 4/4 females, 1/1 male. **BP:** Bay of Plenty, near Waihi Beach, 11, Nov., 1989, D. C. M. Manson, fern, MPI: 1/2 females. **AK:** Epsom, Marhef Rd, 7, Feb., 1990, D. C. M. Manson, fern, MPI: 1/3 females.

**Habitat.** *Cyathea medullaris*, *Cyathea dealbata*, fern.

**Remarks.** *T. cyathea* can be separated from *T. elegans* by palp 3-segmented, setal formula: 0, 1, 1; palp tibia with a forked seta; 20–21 pairs of porose patches situated in podosomal venter.

### ***Tenuipalpus elegans* Collyer, 1973**

(Figs. 49–52)

*Colopalpus elegans* Collyer, 1973a: 529, fig. 1.

#### **FEMALE (Figs. 49–52)**

**Gnathosoma.** Rostrum reaching middle of femur I, subcapitular setae  $m$  slender and smooth,  $m=11$ ,  $m-m=17$ . Palp 2-segmented, setal formula: 1, 1; tibia with one rod-like setae near distal portion, tarsus with one eupathidium, 6.

**Idiosoma.** 265 long, 175 wide. Rostral shield pitted, with two median conical projection. Idiosoma oval shaped. PRODORSUM covered with dense reticulations mesally and laterally, setae  $v_2$ ,  $sc_1$  and  $sc_2$  pectinate,  $v_2$  and  $sc_1$  subequal,  $sc_2$  about twice as long as  $v_2$ . Lengths:  $v_2$  15,  $sc_1$  14,  $sc_2$  29; distances:  $v_2-v_2$  45,  $v_2-sc_1$  49,  $sc_1-sc_1$  115,  $sc_1-sc_2$  30,  $sc_2-sc_2$  175. HYSTEROSOMA covered with dense reticulations mesally and laterally and dense minute recticulations anterior to  $c_1$ ; bearing one pair of pores, one pair of humeral setae ( $c_3$ ), one pair of dorsocentral setae ( $c_1$ ), and six pairs of dorsolateral setae ( $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_2$  and  $h_1$ ). All setae pectinate except  $h_2$  flagelliform. Setae  $e_3$ ,  $f_2$ ,

$f_3$  and  $h_1$  subequal in length. Lengths:  $c_1$  15,  $c_3$  17,  $d_3$  15,  $e_3$  11,  $f_2$  12,  $f_3$  11,  $h_2$  240,  $h_1$  11; distances:  $c_1-c_1$  46,  $c_3-c_3$  185,  $d_3-d_3$  165,  $d_3-e_3$  80,  $e_3-e_3$  105,  $e_3-f_2$  23,  $f_2-f_2$  90,  $f_2-f_3$  18,  $f_3-f_3$  76,  $f_3-h_2$  16,  $h_2-h_2$  52,  $h_2-h_1$  11,  $h_1-h_1$  27.

**Venter.** Venter covered with oblique striae between coxae II–III, transversal striae posterior to  $3a$ , and with oblique striations between coxae III and IV. All coxal setae slender and smooth. Seta  $1a$  and  $4a$  flagelliform,  $3a$  slender and smooth. Seta  $4a$  more than 6 times as long as  $3a$ , and seta  $1a$  longest about 8 times as long as  $3a$ . Lengths:  $1a$  91,  $1b$  23,  $1c$  16,  $2b$  25,  $2c$  23,  $3a$  11,  $3b$  22,  $4a$  70,  $4b$  20. Distances:  $1a-1a$  32,  $3a-3a$  36,  $4a-4a$  29. Genital and ventral area covered with transversal striae mesally, broken longitudinal striations in submarginal area and dense reticulations laterally, bearing one pair of aggenital setae ( $ag$ ) and two pairs of genital setae ( $g_1$  and  $g_2$ ). Anal area with two pairs of pseudanal setae ( $ps_1$  and  $ps_2$ ). All setae slender and smooth,  $g_1$  and  $g_2$  subequal,  $ps_1$  and  $ps_2$  subequal in length. Setae lengths:  $ag$  11,  $g_1$  16,  $g_2$  17,  $ps_1$  14,  $ps_2$  14. Distances:  $ag-ag$  21,  $g_1-g_1$  21,  $g_1-g_2$  10,  $g_2-g_2$  41,  $ps_1-ps_2$  13.

**Legs.** Lengths of legs I–IV: 150, 130, 120, 130. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-2; genua 3-3-0-0; tibiae 5-5-3-3; tarsus 8+ $\omega$ -8+ $\omega$ -5-5. All dorsal and lateral setae on trochanters, femora, genua and tibiae barbed; ventral setae  $v'$  and  $v''$  on trochanters III–IV and tibiae I–IV pectinate; seta  $v'$  on trochanters I–II and femora I–II and seta  $ev'$  on femora III–IV slender and smooth; seta  $bv''$  on femur I slender and smooth and on femur II barbed. Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  barbed; unguinal setae  $u'$  and  $u''$  barbed and equal in length; tectal seta  $tc'$  and  $tc''$  barbed and subequal. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  9, II  $\omega''$  9. Claws developed with tenent hairs on each side.

**MALE.** Unknown.

**Distribution.** BASED ON MATERIAL EXAMINED: NEW ZEALAND: NN.

**Material examined.** Holotype only. **Holotype** female. NEW ZEALAND: NN: Nelson, Westhaven Inlet, Mangarakau, 14, Nov., 1970, E. Collyer, foliage of *Senecio hectori*, NZAC: 1/1female.

**Habitat.** *Senecio hectori*.

**Remarks.** This species was described as follows by Collyer (1973): palp 1-segmented with a terminal seta on tarsi; prodorsum bearing two pairs of setae, seta  $v_2$  absent. These are incorrect based on the holotype examined. The correct characters are as follows: palp 2-segmented, tibia palp with one rod-like seta, tarsi palp with a eupathidia; prodorsum bearing three pairs of setae, seta  $v_2$  present.

*T. elegans* can be separated from *T. cyatheae* by palp 2-segmented, setal formula: 1, 1; palp tibia with one rod-like setae near distal portion; podosomal venter without porose patches.

### ***Tenuipalpus mahoensis* Collyer, 1964**

(Figs. 53–78)

*Tenuipalpus mahoensis* Collyer, 1964: 438. fig. 4.

#### **FEMALE (Figs. 53–58)**

**Gnathosoma.** Rostrum reaching middle of femur I, subcapitular setae  $m$  slender and smooth,  $m=$  10–11,  $m-m=$  19–20. Palp 3-segmented, setal formula: 0, 1, 1; tibia with one pectinate seta near distal portion, tarsus with one eupathidium, 4–6.

**Idiosoma.** 340–360 long, 205–220 wide. Rostral shield pitted, with a median slender, conical projections. PRODORSUM smooth, divided into 3 regions by longitudinal striations laterad to  $sc_1$ , and 8 pairs of porose patches longitudinally situated in the middle area, another three pairs situated laterally; setae  $v_2$  and  $sc_1$  slender and smooth,  $sc_2$  broadly lanceolate; lengths:  $v_2$  3–5,  $sc_1$  4–6,  $sc_2$  64–68; distances:  $v_2-v_2$  35–37,  $v_2-sc_1$  41–49,  $sc_1-sc_1$  95–105,  $sc_1-sc_2$  52–57,  $sc_2-sc_2$  205–220. HYSTEROSOMA covered with oblique striations laterad to  $c_1$ , and few broken transversal striations between  $d_1-e_1$ ; 13 porose patches longitudinally situated laterally, and 2–3 pairs of porose patches posterior to  $e_1$ ; conical projection of body anterior to coxa III; bearing one pair of pores, one pair of humeral setae ( $e_3$ ), three pairs of dorsocentral setae ( $c_1$ ,  $d_1$  and  $e_1$ ), and six pairs of dorsolateral setae ( $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_2$  and  $h_1$ ). Setae  $c_1$ ,  $d_1$ ,  $e_1$  and  $d_3$  slender and smooth and subequal in length,  $c_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$  and  $h_1$  broadly lanceolate except for  $c_3$  which is rotund and  $e_3$  which is narrower,  $h_2$  elongate. Lengths:  $c_1$  3–4,  $d_1$  4–5,  $e_1$  4–6,  $c_3$  33–37,  $d_3$  3–5,  $e_3$  26–40,  $f_2$  45–51,  $f_3$  38–46,  $h_2$  166–200,  $h_1$  37–42; distances:  $c_1-c_1$  42–47,  $d_1-d_1$  35–42,  $e_1-e_1$  15–20,  $c_3-c_3$  230–

250,  $d_3-d_3$  180–190,  $d_3-e_3$  83–97,  $e_3-e_3$  140–155,  $e_3-f_2$  22–29,  $f_2-f_2$  135–150,  $f_2-f_3$  17–22,  $f_3-f_3$  120–125,  $f_3-h_2$  30–36,  $h_2-h_2$  75–84,  $h_2-h_1$  12–15,  $h_1-h_1$  53–59.

**Venter.** Venter smooth. All coxal setae slender and smooth. Seta *1a* and posterior medioventral seta *4a* flagelliform, middle medioventral seta *3a* much shorter, slender and smooth. Seta *4a* about 3 times as long as *3a*. Lengths: *1a* 97–105, *1b* 12–14, *1c* 17–25, *2b* 20–24, *2c* 28–35, *3a* 15–19, *3b* 29–36, *4a* 93–110, *4b* 23–27. Distances: *1a-1a* 45–50, *3a-3a* 46–54, *4a-4a* 46–51. Genital and ventral area covered with striated flaps and dense knobs laterally; setae *ag*,  $g_1$  and  $g_2$  slender and smooth,  $g_1$  and  $g_2$  subequal. Anal area with three pairs of pseudanal setae ( $ps_1$ ,  $ps_2$  and  $ps_3$ ),  $ps_1$  and  $ps_2$  subequal and more than twice as long as  $ps_3$ . Setae lengths: *ag* 17–19,  $g_1$  19–22,  $g_2$  19–21,  $ps_1$  32–35,  $ps_2$  31–33,  $ps_3$  12–14. Distances: *ag-ag* 21–26,  $g_1-g_1$  18–23,  $g_1-g_2$  9–12,  $g_2-g_2$  40–44,  $ps_1-ps_2$  7–10,  $ps_2-ps_3$  5–9.

**Legs.** Lengths of legs I–IV: 145–160, 135–145, 120–125, 120–125. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-1; genua 3-3-1-0; tibiae 5-5-3-3; tarsus 8+ $\omega$ -8+ $\omega$ -5-5. Most dorsal and lateral setae on trochanters, femora, genua and tibiae lanceolate, lateral seta *l'* on tibiae I–II pectinate; most ventral setae *v'*, *ev'*, *v''* and *bv''* on trochanters, femora and tibiae pectinate, seta *v'* on trochanters III–IV slender and smooth and *bv''* on femur II lanceolate; Setae *ft'* on tarsi I–IV flagelliform, *ft''* lanceolate; unguinal setae *u'* and *u''* pectinate and equal in length; tectal seta *tc'* and *tc''* on tarsus I–II slender and smooth and on tarsus III–IV forked. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  10–12, II  $\omega''$  10–12. Claws developed with tenent hairs on each side.

#### MALE (Figs. 59–64)

**Gnathosoma.** Rostrum reaching middle of femur I, subcapitular setae *m* pectinate, *m*= 8–10, *m-m*= 18–21. Palp 3-segmented, setal formula: 0, 1, 1; tibia with one pectinate setae near distal portion, tarsus with one eupathidium, 5.

**Idiosoma.** 230–270 long, 175–185 wide. Rostral shield pitted, with slender median conical projections. PRODORSUM similar to female, divided into 3 regions by longitudinal striations laterad to  $sc_1$ , and four pairs of porose patches longitudinally situated in the middle area, another three pairs situated laterally; setae  $v_2$  and  $sc_1$  slender and smooth,  $sc_2$  broadly lanceolate; lengths:  $v_2$  3–5,  $sc_1$  4–5,  $sc_2$  51–63; distances:  $v_2-v_2$  29–34,  $v_2-sc_1$  39–45,  $sc_1-sc_1$  82–89,  $sc_1-sc_2$  45–49,  $sc_2-sc_2$  175–185. HYSTEROSOMA divided into metapodosoma and opisthosoma by few faint horizontal striations. Metapodosoma covered with two faint striations between  $c_1-c_3$  and 5 porose patches situated between  $d_1$  and  $d_3$ . Opisthosoma covered with few oblique striations and two pairs of porose patches anterior to  $e_1$ , forming inverted V-shaped pattern, and broken transversal striae between  $e_1-e_1$  and three pairs of porose patches posterior to  $e_1$ . Setae  $c_1$ ,  $d_1$ ,  $e_1$  and  $d_3$  slender, smooth and subequal,  $c_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$  and  $h_1$  broadly lanceolate except for  $e_3$  is narrower,  $h_2$  elongate. Lengths:  $c_1$  2–3,  $d_1$  2–4,  $e_1$  3–4,  $c_3$  25–28,  $d_3$  3–4,  $e_3$  18–26,  $f_2$  36–40,  $f_3$  33–37,  $h_2$  145–170,  $h_1$  27–31; distances:  $c_1-c_1$  27–32,  $d_1-d_1$  31–38,  $e_1-e_1$  13–15,  $c_3-c_3$  175–190,  $d_3-d_3$  130–140,  $d_3-e_3$  80–95,  $e_3-e_3$  95–105,  $e_3-f_2$  14–17,  $f_2-f_2$  93–105,  $f_2-f_3$  13–19,  $f_3-f_3$  83–95,  $f_3-h_2$  22–29,  $h_2-h_2$  54–68,  $h_2-h_1$  9–10,  $h_1-h_1$  40–47.

**Venter.** Venter similar to female. All coxal setae slender and smooth. Seta *1a* and *4a* flagelliform, *3a* much shorter, slender and smooth. Setae *4a* about 8 times as long as *3a*. Lengths: *1a* 88–100, *1b* 9–13, *1c* 17–20, *2b* 16–19, *2c* 27–34, *3a* 14–16, *3b* 26–29, *4a* 105–125, *4b* 21–26. Distances: *1a-1a* 36–41, *3a-3a* 33–38, *4a-4a* 34–37. Genital and ventral area covered with one pair of porose patches posterior to *ag*, and oblique striations laterally as shown in Figs. 60–61, bearing one pair of aggenital setae (*ag*) and two pairs of genital setae ( $g_1$  and  $g_2$ ), slender and smooth,  $g_1$  and  $g_2$  subequal. Anal area with three pairs of pseudanal setae ( $ps_1$ ,  $ps_2$  and  $ps_3$ ),  $ps_1$  and  $ps_2$  subequal and more than twice as long as  $ps_3$ ,  $ps_3$  stout and with a cone. Setae lengths: *ag* 13–21,  $g_1$  14–19,  $g_2$  13–15,  $ps_1$  17–19,  $ps_2$  16–17,  $ps_3$  8. Distances: *ag-ag* 10–20,  $g_1-g_1$  17–22,  $g_1-g_2$  4–8,  $g_2-g_2$  23–30,  $ps_1-ps_2$  5–7.

**Legs.** Lengths of legs I–IV: 140–155, 130–140, 110–120, 110–125. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-1; genua 3-3-1-0; tibiae 5-5-3-3; tarsus 8+2 $\omega$ -8+2 $\omega$ -5-5. Most dorsal and lateral setae on trochanters, femora, genua and tibiae broadly lanceolate, lateral seta *l'* on tibiae I–II pectinate; most ventral setae *v'*, *ev'*, *v''* and *bv''* on trochanters, femora and tibiae pectinate, *v'* on trochanters III–IV slender and smooth and *bv''* on femur II lanceolate; Setae *ft'* on tarsi I–IV flagelliform, *ft''* lanceolate; unguinal setae *u'* and *u''* pectinate and equal in length; tectal seta *tc'* and *tc''* on tarsus I–II slender and smooth and on tarsus III–IV forked. Solenidia  $\omega'$  and  $\omega''$

and  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega'$  13–16,  $\omega''$  12–14, II  $\omega'$  11–16,  $\omega''$  10–13. Claws developed with tenent hairs on each side.

#### DEUTONYMPH (Figs. 65–69)

**Gnathosoma.** Rostrum reaching proximal end of femur I, subcapitular setae  $m$  slender and smooth,  $m=8-10$ ,  $m-m=18-21$ . Palp 3-segmented, setal formula: 0, 1, 1; tibia with one slender and smooth setae near distal portion, tarsus with one eupathidium, 4–5.

**Idiosoma.** 285–310 long, 160–185 wide. Rostral shield pitted, with median conical projections. PRODORSUM smooth, with faint transversal striations anterior to setae  $d_1$  and oblique striations between  $d_1$  and  $d_3$ . Setae  $v_2$  and  $sc_1$  slender, smooth and subequal,  $sc_2$  lanceolate; lengths:  $v_2$  2,  $sc_1$  2–3,  $sc_2$  50–65; distances:  $v_2-v_2$  27–29,  $v_2-sc_1$  31–35,  $sc_1-sc_1$  79–91,  $sc_1-sc_2$  41–46,  $sc_2-sc_2$  160–185. Setae  $c_1$ ,  $d_1$ ,  $e_1$  and  $d_3$  slender, smooth and subequal in length, setae  $c_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$  and  $h_1$  broadly lanceolate except  $c_3$  which is more rotund,  $h_2$  elongate. Setae  $c_3$  and  $h_1$  subequal,  $e_3$  and  $f_2$  subequal in length and about 1.2 times as long as  $h_1$ . Lengths:  $c_1$  2–3,  $d_1$  2–3,  $e_1$  2–3,  $c_3$  22–28,  $d_3$  2–3,  $e_3$  33–37,  $f_2$  33–37,  $f_3$  26–34,  $h_2$  105–115,  $h_1$  23–30; distances:  $c_1-c_1$  30–36,  $d_1-d_1$  23–30,  $e_1-e_1$  15–17,  $c_3-c_3$  205–240,  $d_3-d_3$  145–170,  $d_3-e_3$  49–55,  $e_3-e_3$  105–125,  $e_3-f_2$  14–18,  $f_2-f_2$  96–110,  $f_2-f_3$  16–18,  $f_3-f_3$  79–91,  $f_3-h_2$  20–24,  $h_2-h_2$  49–57,  $h_2-h_1$  11–14,  $h_1-h_1$  27–30.

**Venter.** Venter covered with fine transversal striations. All coxal setae slender and smooth. Setae  $1a$  and  $4a$  flagelliform,  $3a$  very short, slender and smooth,  $1a$  about twice as long as seta  $4a$  and more than 6 times as long as  $3a$ . Lengths:  $1a$  65–82,  $1b$  7–9,  $1c$  10–12,  $2b$  9–11,  $2c$  13–16,  $3a$  11–12,  $3b$  12–16,  $4a$  33–51,  $4b$  8–12. Distances:  $1a-1a$  24–31,  $3a-3a$  47–57,  $4a-4a$  42–45. Genital and ventral area bearing one pair of aggenital setae ( $ag$ ) and one pairs of genital setae ( $g_1$ ). Anal area with three pairs of pseudanal setae ( $ps_1$ ,  $ps_2$  and  $ps_3$ ). Setae lengths:  $ag$  6–10,  $g_1$  6–9,  $ps_1$  8–13,  $ps_2$  7–11,  $ps_3$  5–6. Distances:  $ag-ag$  19–25,  $g_1-g_1$  19–23,  $ps_1-ps_2$  6–8,  $ps_2-ps_3$  7–8.

**Legs.** Lengths of legs I–IV: 94–100, 85–89, 63–69, 58–60. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-0; femora 4-4-2-1; genua 3-3-1-0; tibiae 5-5-3-3; tarsus 8+ $\omega$ -8+ $\omega$ -5-3. Most dorsal and lateral setae on trochanters, femora, genua and tibiae broadly lanceolate, lateral seta  $l'$  on tibiae I–II pectinate; seta  $d$  on genua I–II slender and smooth; most ventral setae  $v'$ ,  $ev'$ ,  $v''$  and  $bv''$  on trochanters, femora and tibiae slender and smooth, setae  $v'$  and  $bv''$  on femur I pectinate and  $bv''$  on femur II lanceolate; Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  lanceolate; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  on tarsus slender and smooth. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  6–7, II  $\omega''$  6. Claws developed with tenent hairs on each side.

#### PROTONYMPH (Figs. 70–74)

**Gnathosoma.** Rostrum reaching proximal end of femur I, subcapitular setae  $m$  slender and smooth,  $m=4-6$ ,  $m-m=11-13$ . Palp 3-segmented, setal formula: 0, 1, 1; tibia with one pectinate setae near distal portion, tarsus with one eupathidium, 3–4.

**Idiosoma.** 220–265 long, 125–145 wide. Rostral shield pitted, with a median conical projection. PRODORSUM similar to deutonymph; lengths:  $v_2$  2,  $sc_1$  2–3,  $sc_2$  41–50; distances:  $v_2-v_2$  19–23,  $v_2-sc_1$  25–30,  $sc_1-sc_1$  64–72,  $sc_1-sc_2$  29–38,  $sc_2-sc_2$  125–145. HYSTEROSOMA similar to deutonymph. Lengths:  $c_1$  2–3,  $d_1$  2–3,  $e_1$  2,  $c_3$  18–24,  $d_3$  2–3,  $e_3$  22–33,  $f_2$  22–30,  $f_3$  19–23,  $h_2$  67–90,  $h_1$  16–21; distances:  $c_1-c_1$  29–33,  $d_1-d_1$  22–25,  $e_1-e_1$  12–13,  $c_3-c_3$  145–180,  $d_3-d_3$  105–125,  $d_3-e_3$  32–37,  $e_3-e_3$  80–95,  $e_3-f_2$  10–12,  $f_2-f_2$  70–86,  $f_2-f_3$  10–12,  $f_3-f_3$  60–69,  $f_3-h_2$  15–18,  $h_2-h_2$  37–41,  $h_2-h_1$  9–10,  $h_1-h_1$  18–21.

**Venter.** Venter similar to deutonymph. Setae  $1a$  flagelliform and more than 8 times as long as  $3a$ . Lengths:  $1a$  61–89,  $1b$  6–8,  $1c$  9–12,  $2c$  9–11,  $3a$  8–10,  $3b$  8–10. Distances:  $1a-1a$  17–23,  $3a-3a$  41–47. Genital and ventral area bearing one pair of aggenital setae ( $ag$ ). Anal area with three pairs of pseudanal setae ( $ps_1$ ,  $ps_2$  and  $ps_3$ ). Setae  $ps_1$  and  $ps_2$  subequal in length. Setae lengths:  $ag$  6–7,  $ps_1$  5–7,  $ps_2$  5–7,  $ps_3$  4–5. Distances:  $ag-ag$  16–19,  $ps_1-ps_2$  5,  $ps_2-ps_3$  5–6.

**Legs.** Lengths of legs I–IV: 63–68, 57–63, 44–50, 37–40. Chaetotaxy: coxae 2-1-1-0; trochanters 0-0-1-0; femora 3-3-2-1; genua 1-1-1-0; tibiae 5-5-3-3; tarsus 6+ $\omega$ -6+ $\omega$ -3-3. Most dorsal and lateral setae on trochanters, femora, genua and tibiae lanceolate, lateral seta  $l'$  on tibiae I–II slender and smooth; most ventral setae on trochanters, femora and tibiae slender and smooth, seta  $bv''$  on femur II lanceolate. Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  lanceolate; unguinal setae  $u'$  and  $u''$  pectinate and equal in length. Solenidion  $\omega''$  and eupathidia

$p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  4–5, II  $\omega''$  4–5. Claws developed with tenent hairs on each side.

#### LARVA (Figs. 75–78)

**Gnathosoma.** Rostrum reaching proximal end of femur I. Palp 3-segmented, setal formula: 0, 1, 1; tibia with one slender and smooth setae near distal portion, tarsus with one eupathidium, 1–2.

**Idiosoma.** 165–190 long, 100–110 wide. Rostral round. PRODORSUM covered with dense round tubercles anteriorly and mesally, a broad band of transversal striations between setae  $sc_2$  and  $c_3$ . Bearing three pairs of prodorsal setae ( $v_2$ ,  $sc_1$  and  $sc_2$ ), setae  $v_2$  and  $sc_1$  slender, smooth and subequal,  $sc_2$  lanceolate; lengths:  $v_2$  2,  $sc_1$  2–3,  $sc_2$  27–35; distances:  $v_2$ – $v_2$  16–18,  $v_2$ – $sc_1$  25–28,  $sc_1$ – $sc_1$  57–61,  $sc_1$ – $sc_2$  23–25,  $sc_2$ – $sc_2$  100–110. HYSTEROSOMA similar to deutonymph, covered with irregular striae posterior to  $e_1$ . Lengths:  $c_1$  2–3,  $d_1$  2–3,  $e_1$  2,  $c_3$  12–15,  $d_3$  2–3,  $e_3$  15–18,  $f_2$  17–19,  $f_3$  13–15,  $h_2$  60–66,  $h_1$  12–13; distances:  $c_1$ – $c_1$  28–31,  $d_1$ – $d_1$  21–22,  $e_1$ – $e_1$  9–13,  $c_3$ – $c_3$  100–125,  $d_3$ – $d_3$  77–84,  $d_3$ – $e_3$  17–18,  $e_3$ – $e_3$  64–78,  $e_3$ – $f_2$  10–13,  $f_2$ – $f_2$  54–66,  $f_2$ – $f_3$  9–11,  $f_3$ – $f_3$  46–50,  $f_3$ – $h_2$  10–11,  $h_2$ – $h_2$  28–30,  $h_2$ – $h_1$  8–10,  $h_1$ – $h_1$  12–13.

**Venter.** Venter similar to deutonymph. Seta  $1a$  flagelliform and more than 7 times as long as  $3a$ . Lengths:  $1a$  55–67,  $1b$  7–9,  $3a$  8. Distances:  $1a$ – $1a$  14–15,  $3a$ – $3a$  32–40. Anal area with three pairs of pseudanal setae ( $ps_1$ ,  $ps_2$  and  $ps_3$ ). Setae lengths:  $ps_1$  4,  $ps_2$  4–5,  $ps_3$  4. Distances:  $ps_1$ – $ps_2$  3–5,  $ps_2$ – $ps_3$  4–5.

**Legs.** Lengths of legs I–III: 42–47, 38–43, 36–40. Chaetotaxy: coxae 1-0-0; trochanters 0-0-0; femora 3-3-2; genua 1-1-1; tibiae 5-5-3; tarsus 6+ $\omega$ -6+ $\omega$ -3. Most dorsal and lateral setae on trochanters, femora, genua and tibiae lanceolate, dorsal seta  $d$  on femora and genua I–II slender and smooth, lateral seta  $l'$  on tibiae I–II slender and smooth; most ventral setae  $v'$ ,  $ev'$ ,  $v''$  and  $bv''$  on femora and tibiae slender and smooth, seta  $bv''$  on femur II lanceolate. Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  slender and smooth; unguinal setae  $u'$  and  $u''$  pectinate and equal in length. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  4–5, II  $\omega''$  4–5. Claws developed with tenent hairs on each side.

**Distribution.** BASED ON MATERIAL EXAMINED: NEW ZEALAND: AK.

**Material examined.** 68 non-types specimens. **Non-types:** NEW ZEALAND: **AK:** Auckland, Waitakere, Ra Old Coach Road, 14, Mar., 2006, N. A. Martin, *Hebe macrocarpa*, NZAC: 1/3 females, 1/1 female, 1/2 males. Piha, Laird Thonson Track, 6, Oct., 2013, N. A. Martin, *Veronica macrocarpa*, NZAC: 14 females, 10 males, 13 deutonymphs, 9 protonymphs, 16 larvae.

**Habitat.** *Hebe macrocarpa*, *Veronica macrocarpa*.

**Remarks.** This species was depicted as follows by Collyer (1964): palp 2-segmented, genua I–IV with 2, 2, 1, 0 setae; tibia I–IV 4, 4, 3, 3 setae. The depiction is found incorrect after the types are examined. The correct characters should be: palp 3-segmented, genua I–IV with 3, 3, 1, 0 setae; tibia I–IV 5, 5, 3, 3 setae.

#### *Tenuipalpus montanus* Collyer, 1973

(Figs. 79–83)

*Tenuipalpus montanus* Collyer, 1973b: 949, fig. 26.

*Acaricis montanus*: Castro et al. 2018: 857, figs. 1–4.

#### FEMALE (Figs. 79–83)

**Gnathosoma.** Rostrum reaching proximal end of femur I, subcapitular setae  $m$  slender and smooth,  $m=6$  (5–6),  $m$ – $m=12$  (12–13). Palp 4-segmented, setal formula: 0, 0, 2, 2; tibia with two slender and smooth setae, tarsus with two eupathidia, 4 (4–5), 5 (4–5).

**Idiosoma.** 325 (285–340) long, 180 (180–210) wide. Rostral shield pitted, with two median conical projection. PRODORSUM covered with curved striations between  $sc_1$ – $sc_1$ , U-shaped, and transversal striations between  $sc_2$  and  $c_3$ ; setae  $v_2$  and  $sc_1$  slender and smooth,  $sc_2$  lanceolate and about 3 times as long as  $sc_1$ ; lengths:  $v_2$  5 (5–6),  $sc_1$  8 (6–8),  $sc_2$  24 (19–24); distances:  $v_2$ – $v_2$  41 (36–43),  $v_2$ – $sc_1$  42 (42–48),  $sc_1$ – $sc_1$  100 (94–105),  $sc_1$ – $sc_2$  40 (40–52),  $sc_2$ – $sc_2$  180 (180–210). HYSTEROSOMA covered with transversal wrinkles mesally and oblique striations laterally; with curved striations posterior to  $e_1$ ; bearing one pair of humeral setae ( $c_3$ ), two pairs of dorsocentral setae ( $d_1$  and  $e_1$ ), and six pairs of dorsolateral setae ( $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_2$  and  $h_1$ ). Setae  $c_3$ ,  $d_1$ ,  $e_1$ ,  $d_3$  and  $e_3$  slender and smooth,  $d_1$ ,  $e_1$  and  $c_3$  subequal in length,  $d_3$  and  $e_3$  subequal in length; setae  $f_2$ ,  $f_3$  and  $h_1$  lanceolate,

subequal in length and about 5 times as long as  $e_3$ ; setae  $h_2$  flagelliform. Lengths:  $d_1$  5,  $e_1$  5 (4–5),  $c_3$  5 (4–6),  $d_3$  3 (3–4),  $e_3$  4 (3–5),  $f_2$  21 (18–22),  $f_3$  20 (19–22),  $h_2$  110 (86–110),  $h_1$  19 (18–21); distances:  $d_1-d_1$  55 (41–55),  $e_1-e_1$  26 (21–30),  $c_3-c_3$  190 (190–210),  $d_3-d_3$  165 (165–190),  $d_3-e_3$  115 (105–135),  $e_3-e_3$  140 (140–160),  $e_3-f_2$  22 (18–24),  $f_2-f_2$  145 (145–150),  $f_2-f_3$  19 (18–22),  $f_3-f_3$  120 (120–130),  $f_3-h_2$  17 (17–21),  $h_2-h_2$  95 (68–100),  $h_2-h_1$  15 (15–23),  $h_1-h_1$  65 (55–67).

**Venter.** Venter covered with oblique striae posterior to coxa II, transversal striae anterior to coxa III, and longitudinal striations between coxae III and IV, and with transversal striations between  $1a-4a$ . All coxal setae slender and smooth. Seta  $1a$ ,  $4a_1$  and  $4a_2$  flagelliform,  $3a$  much shorter, slender and smooth. Setae  $4a_1$  and  $4a_2$  subequal in length, about 9 times as long as  $3a$ . Lengths:  $1a$  135 (125–140),  $1b$  13 (12–16),  $1c$  14 (11–16),  $2b$  14 (12–15),  $2c$  14 (12–14),  $3a$  10 (8–11),  $3b$  10 (10–13),  $4a_1$  92 (92–110),  $4a_2$  94 (91–105),  $4b$  12 (11–12). Distances:  $1a-1a$  46 (46–51),  $3a-3a$  30 (29–41),  $4a_1-4a_1$  28 (28–36),  $4a_1-4a_2$  28 (28–36),  $4a_2-4a_2$  48 (48–59). Genital and ventral area with transverse and arched striae, respectively as shown in Fig. 80, bearing one pair of aggenital setae ( $ag$ ) and two pairs of genital setae ( $g_1$  and  $g_2$ ), slender and smooth,  $g_1$  and  $g_2$  subequal. Anal area with two pairs of pseudanal setae ( $ps_1$  and  $ps_2$ ),  $ps_1$  and  $ps_2$  subequal. Setae lengths:  $ag$  11 (10–12),  $g_1$  18,  $g_2$  19 (18–20),  $ps_1$  11 (8–12),  $ps_2$  11 (10–12). Distances:  $ag-ag$  18 (17–28),  $g_1-g_1$  12 (12–13),  $g_1-g_2$  17 (16–19),  $g_2-g_2$  45 (43–53),  $ps_1-ps_2$  29 (27–40).

**Legs.** Lengths of legs I–IV: 100 (100–130), 93 (93–110), 86 (86–100), 83 (83–105). Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-2; genua 2-2-1-0; tibiae 5-5-3-3; tarsus 7+ $\omega$ -7+ $\omega$ -5-5. Most dorsal and lateral setae on trochanters, femora, genua and tibiae lanceolate, lateral seta  $l'$  on tibiae I–II slender and smooth; ventral setae  $v'$ ,  $ev'$ ,  $v''$  and  $bv''$  on trochanters, femora and tibiae mostly slender and smooth, seta  $bv''$  on femur II lanceolate; Setae  $ft'$  on tarsi I–IV flagelliform; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  on tarsus I–IV slender and smooth. Solenidia  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  7 (7–8), II  $\omega''$  7 (6–8). Claws developed with tenent hairs on each side.

**MALE.** Unknown.

**Distribution.** BASED ON MATERIAL EXAMINED: NEW ZEALAND: CO.

**Material examined.** Holotype and 8 paratype. **Holotype** female. NEW ZEALAND: **CO:** Central Otago, Queenstown, Lake Manapouri area, Turret Range, Mt Grey 1250m, 9, Jan., 1970, A. C. Eyles, *Pimelea sericeo-villosa* with litter and soil from beneath this shrub, NZAC: 1/1 female. **Paratypes:** Same collection data as holotype slide: NZAC: 1/4 females, 1/3 females. **CO:** West of Lake Manapouri, Wilmot Pass, Mt Barber, 1100m, 8, Jan., 1970, A. C. Eyles, mixed mats taken near tarns, NZAC: 1/1 female.

**Habitat.** *Pimelea sericeo-villosa* with litter and soil from beneath this shrub, mixed mats taken near tarns.

**Remarks.** *T. montanus* can be separated from *T. alpinus* by seta  $sc_2$  lanceolate and about 3 times as long as  $sc_1$ ; prodorsum covered with curved striations between  $sc_1-sc_1$ , U-shaped. For discussion on its placement in *Tenuipalpus* (not *Arcaricis*), see comments on page 19.

### ***Tenuipalpus rangiorae* Collyer, 1964**

(Figs. 84–93)

*Tenuipalpus rangiorae* Collyer, 1964: 436, figs. 3A, B.

#### **FEMALE (Figs. 84–88)**

**Gnathosoma.** Rostrum reaching middle of femur I, subcapitular setae  $m$  slender and smooth,  $m=27-30$ ,  $m-m=16-18$ . Palp 1-segmented, tarsus with one slender and smooth setae, 23–33.

**Idiosoma.** 230–285 long, 160–190 wide. Rostral shield pitted, with two median conical projection. PRODORSUM covered with irregular wrinkles mesally and laterally, setae  $v_2$ ,  $sc_1$  and  $sc_2$  lanceolate and barbed,  $v_2$  and  $sc_1$  subequal, and  $sc_2$  about twice as long as  $sc_1$ ; lengths:  $v_2$  22–33,  $sc_1$  20–30,  $sc_2$  48–62; distances:  $v_2-v_2$  69–85,  $v_2-sc_1$  22–30,  $sc_1-sc_1$  97–125,  $sc_1-sc_2$  29–40,  $sc_2-sc_2$  160–190. HYSTEROSOMA covered irregular wrinkles mesally and laterally; bearing one pair of pores anterior to  $e_3$ , one pair of humeral setae ( $c_3$ ), three pairs of dorsocentral setae ( $c_1$ ,  $d_1$  and  $e_1$ ), and six pairs of dorsolateral setae ( $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_2$  and  $h_1$ ). All setae lanceolate and barbed except  $h_2$  elongate. Setae  $d_1$  and  $e_1$  subequal in length. Setae  $c_3$  and  $f_3$  subequal and more than twice as long as seta  $f_2$ . Lengths:  $c_1$  36–48,  $d_1$  31–34,  $e_1$  29–31,  $c_3$  31–35,  $d_3$  11–21,  $e_3$  8–11,  $f_2$  12–16,  $f_3$  32–38,  $h_2$  150–205,  $h_1$  22–

33; distances:  $c_1-c_1$  48–61,  $d_1-d_1$  38–43,  $e_1-e_1$  13–24,  $c_3-c_3$  180–210,  $d_3-d_3$  145–175,  $d_3-e_3$  48–67,  $e_3-e_3$  115–125,  $e_3-f_2$  17–27,  $f_2-f_2$  105–125,  $f_2-f_3$  19–23,  $f_3-f_3$  88–110,  $f_3-h_2$  24–32,  $h_2-h_2$  59–71,  $h_2-h_1$  14–19,  $h_1-h_1$  33–35.

**Venter.** Venter covered with irregular striae between coxae II–IV and transversal striations between  $1a-3a$ , fine transversal striations between  $3a-3a$ , and irregular striations between  $3a-4a$ . All coxal setae slender and smooth. Seta  $1a$  flagelliform,  $3a$  and  $4a$  slender and smooth and subequal in length,  $1a$  longest and more than 4 times as long as  $3a$ . Lengths:  $1a$  105–135,  $1b$  24–29,  $1c$  21–25,  $2b$  29–35,  $2c$  26–32,  $3a$  28–32,  $3b$  31–35,  $4a$  27–34,  $4b$  35–40. Distances:  $1a-1a$  29–33,  $3a-3a$  33–42,  $4a-4a$  23–50. Genital and ventral area with irregular striae mesally and oblique striae laterally as shown in Fig. 82, bearing one pair of aggenital setae ( $ag$ ) and two pairs of genital setae ( $g_1$  and  $g_2$ ), slender and smooth and subequal. Anal area with two pairs of pseudanal setae ( $ps_1$  and  $ps_2$ ),  $ps_1$  more than twice as long as  $ps_2$ . Setae lengths:  $ag$  23–31,  $g_1$  26–36,  $g_2$  23–31,  $ps_1$  25–33,  $ps_2$  10–12. Distances:  $ag-ag$  23–34,  $g_1-g_1$  14–27,  $g_1-g_2$  6–10,  $g_2-g_2$  28–43,  $ps_1-ps_2$  5–6.

**Legs.** Lengths of legs I–IV: 100–130, 89–115, 80–105, 83–105. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-1; genua 3-3-0-0; tibiae 3-3-3-3; tarsus 8+ $\omega$ -8+ $\omega$ -5-5. Most dorsal and lateral setae on trochanters, femora, genua and tibiae slender and smooth, dorsal seta  $d$  on femur I lanceolate and on femora II–III barbed, lateral seta  $l'$  on trochanter III slender and smooth and on tibiae I barbed; most ventral setae  $v'$ ,  $ev'$ ,  $v''$  and  $bv''$  on trochanters, femora and tibiae slender and smooth, seta  $v'$  on tibia III pectinate and  $bv''$  on femur II slender and smooth; Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  slender and smooth; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal setae  $tc'$  and  $tc''$  on tarsus I–IV slender and smooth. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  11–12, II  $\omega''$  11–12. Claws developed with tenent hairs on each side.

#### MALE (Figs. 89–93)

**Gnathosoma.** Rostrum reaching middle of femur I, subcapitular setae  $m$  slender and smooth,  $m=$  26–29,  $m-m=$  15–17. Palp 1-segmented, tarsus with a slender and smooth seta, 25–26.

**Idiosoma.** 235–245 long, 145–155 wide. Rostral shield pitted, with two median conical projections. PRODORSUM similar to female, covered with oblique wrinkles mesally and laterally; propodosomal setae lanceolate,  $sc_2$  about twice as long as  $sc_1$ ; lengths:  $v_2$  23–27,  $sc_1$  21–24,  $sc_2$  41–49; distances:  $v_2-v_2$  60–63,  $v_2-sc_1$  23–26,  $sc_1-sc_1$  90–96,  $sc_1-sc_2$  30–32,  $sc_2-sc_2$  145–155. HYSTEROSOMA covered with irregular wrinkles as shown in Fig. 86; bearing one pair of pores anterior to  $e_3$ . All setae lanceolate except  $h_2$  elongate. Lengths:  $c_1$  22–26,  $d_1$  17–19,  $e_1$  16–19,  $c_3$  30–33,  $d_3$  17–19,  $e_3$  14–18,  $f_2$  16–19,  $f_3$  33–36,  $h_2$  175–210,  $h_1$  17–23; distances:  $c_1-c_1$  41–44,  $d_1-d_1$  30–34,  $e_1-e_1$  4–8,  $c_3-c_3$  145–155,  $d_3-d_3$  110–115,  $d_3-e_3$  57–63,  $e_3-e_3$  77–85,  $e_3-f_2$  17–21,  $f_2-f_2$  71–78,  $f_2-f_3$  20–28,  $f_3-f_3$  74–84,  $f_3-h_2$  21–23,  $h_2-h_2$  52–61,  $h_2-h_1$  12–16,  $h_1-h_1$  28–35.

**Venter.** Venter covered with few oblique striae between coxae II–IV and irregular striations between setae  $3a-4a$ . All coxal setae slender and smooth. Seta  $1a$  and  $4a$  flagelliform,  $3a$  slender and smooth. Seta  $4a$  about 3 times as long as  $3a$ . Lengths:  $1a$  84–125,  $1b$  23–26,  $1c$  22–25,  $2b$  37–43,  $2c$  27–30,  $3a$  23–24,  $3b$  30–31,  $4a$  65–86,  $4b$  29–34. Distances:  $1a-1a$  28,  $3a-3a$  31–39,  $4a-4a$  24–30. Genital and ventral area with oblique striae laterally and broken transversal striations anterior to  $g_1$  as shown in Fig. 87, setae  $ag$ ,  $g_1$  and  $g_2$ , slender and smooth and subequal. Anal area with two pairs of pseudanal setae ( $ps_1$  and  $ps_2$ ),  $ps_1$  slender and smooth and about twice as long as  $ps_2$ ,  $ps_2$  stout and with cone. Setae lengths:  $ag$  18–27,  $g_1$  28–31,  $g_2$  28–32,  $ps_1$  20–24,  $ps_2$  8–10. Distances:  $ag-ag$  14–16,  $g_1-g_1$  15–20,  $g_1-g_2$  6–7,  $g_2-g_2$  24–27,  $ps_1-ps_2$  18–21.

**Legs.** Lengths of legs I–IV: 130–135, 110–115, 90–100, 100–105. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-1; genua 3-3-0-0; tibiae 3-3-3-3; tarsus 8+2 $\omega$ -8+2 $\omega$ -5-5. Most dorsal and lateral setae on trochanters, femora, genua and tibiae barbed, dorsal seta  $d$  on femur I–III lanceolate and on tibiae III–IV slender and smooth; most ventral setae on trochanters, femora and tibiae slender and smooth, seta  $v'$  on tibia IV slender, with spinules and  $bv''$  on femur II lanceolate; Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  lanceolate; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  on tarsus I–IV slender and smooth. Solenidia  $\omega'$  and  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega'$  14–16,  $\omega''$  13–14, II  $\omega'$  12–15,  $\omega''$  11–15. Claws developed with tenent hairs on each side.

**Distribution:** BASED ON MATERIAL EXAMINED: NEW ZEALAND: NN, WO.

**Material examined.** 372 non-type specimens. **Non-types:** Te Morehu Orere, 11, Sep., 1960, E. Collyer, *Brachyglottis repanda*, NZAC: 1/4 females, 4 males. **NN:** Nelson, New Zealand, Nelson, Eves Valley, Palmers

Bush, 5, Sep., 1969, E. Collyer, *Rubus* sp., NZAC: 1/2 females, 3 males, 6 deutonymphs; 1/1 male, 10 deutonymphs, 3 protonymphs; 1/10 deutonymphs, 12 protonymphs, 4 larvae; 1/14 deutonymphs, 1 protonymph, 2 larvae. Ruby Bay, 20, Oct., 1969, E. Collyer, *Brachyglottis repanda*, NZAC: 1/2 females, 6 males, 17 deutonymphs, 8 protonymphs, 2 larvae; 1/2 females, 5 males, 16 deutonymphs, 7 protonymphs, 6 larvae; 1/16 males; 1/20 females, 9 males, 3 deutonymphs; 1/19 females, 8 males, 3 deutonymphs; 1/1 deutonymph, 13 protonymphs, 3 larvae; 1/33 females, 6 males, 4 deutonymphs; 1/56 larvae; 1/2 females, 3 deutonymphs; 1/20 females, 1 male, 1 protonymph, 1 larva. Abel Tasman Nation Park, Waiharakeke, 27, Oct., 1969, E. Collyer, *Metrosideros* sp., NZAC: 1/2 females. **WO**: Waikato, Waitomo Cave, 20, Oct., 1969, E. Collyer, *Brachyglottis repanda*, NZAC: 1/2 females, 3 deutonymphs.

**Habitat:** *Brachyglottis repanda*, *Rubus* sp., *Metrosideros* sp.

**Remarks.** *T. rangiorae* can be separated from *T. senecionis* by having setae  $v_2$  and  $sc_1$  subequal in length,  $sc_2$  about twice as long as  $v_2$ ; setae  $d_1$  and  $e_1$  subequal in length; genua I–IV carrying 3, 3, 0, 0 setae.

### ***Tenuipalpus senecionis* Collyer, 1973**

(Figs. 94–103)

*Tenuipalpus senecionis* Collyer, 1973b: 945, figs. 32–33.

#### **FEMALE (Figs. 94–98)**

**Gnathosoma.** Rostrum reaching middle of femur I, subcapitular setae  $m$  slender and smooth,  $m = 33$  (28–34),  $m-m = 16$  (16–18). Palp 1-segmented, tarsus with one slender and smooth seta, 28 (25–28).

**Idiosoma.** 260 (245–280) long, 155 (150–165) wide. Rostral shield pitted, with two median conical projection. Idiosoma widest at posterior margin of prodosum, narrowing abruptly at base of opisthosoma, then gradually narrows posteriorly. PRODORSUM covered with irregular wrinkles mesally and oblique striations laterally; setae  $v_2$ ,  $sc_1$  and  $sc_2$  lanceolate,  $v_2$  longest and about 1.3 times as long as  $sc_2$ ; lengths:  $v_2$  34 (30–34),  $sc_1$  28 (26–28),  $sc_2$  22 (22–26); distances:  $v_2-v_2$  57 (54–62),  $v_2-sc_1$  23 (22–25),  $sc_1-sc_1$  89 (88–100),  $sc_1-sc_2$  34 (28–35),  $sc_2-sc_2$  155 (150–165). HYSTEROSOMA covered irregular wrinkles mesally and laterally; bearing 1 pair of pores anterior to  $e_3$ , one pair of humeral setae ( $c_3$ ), three pairs of dorsocentral setae ( $c_1$ ,  $d_1$  and  $e_1$ ), and six pairs of dorsolateral setae ( $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_2$  and  $h_1$ ). All setae lanceolate except  $h_2$  elongate. Setae  $c_1$  and  $d_1$  subequal in length and about twice as long as  $e_1$ . Setae  $c_3$  and  $e_3$  subequal,  $f_3$  and  $h_1$  subequal and about 3 times as long as  $c_3$ . Lengths:  $c_1$  34 (34–39),  $d_1$  30 (30–35),  $e_1$  14 (14–20),  $c_3$  12 (10–16),  $d_3$  9 (9–11),  $e_3$  9 (9–15),  $f_2$  19 (17–25),  $f_3$  38 (35–41),  $h_2$  175 (150–180),  $h_1$  35 (34–40); distances:  $c_1-c_1$  55 (51–55),  $d_1-d_1$  36 (5–42),  $e_1-e_1$  19 (14–19),  $c_3-c_3$  165 (165–170),  $d_3-d_3$  150 (145–155),  $d_3-e_3$  62 (60–63),  $e_3-e_3$  115 (115–125),  $e_3-f_2$  22 (20–22),  $f_2-f_2$  110 (110–125),  $f_2-f_3$  21 (19–24),  $f_3-f_3$  95 (95–100),  $f_3-h_2$  28 (26–29),  $h_2-h_2$  59 (59–62),  $h_2-h_1$  14 (14–15),  $h_1-h_1$  30 (30–33).

**Venter.** Venter smooth. All coxal setae slender and smooth. Seta  $1a$  flagelliform,  $3a$  and  $4a$  slender, smooth and subequal in length,  $1a$  longest and more than 4 times as long as  $3a$ . Lengths:  $1a$  120 (110–120),  $1b$  25 (25–29),  $1c$  22 (20–22),  $2b$  31 (31–37),  $2c$  24 (24–31),  $3a$  23 (22–28),  $3b$  25 (22–27),  $4a$  31 (25–31),  $4b$  32 (27–32). Distances:  $1a-1a$  29 (28–29),  $3a-3a$  44 (40–44),  $4a-4a$  33 (33–38). Genital and ventral area with few striae, bearing one pair of aggenital setae ( $ag$ ) and two pairs of genital setae ( $g_1$  and  $g_2$ ), slender and smooth,  $g_1$  and  $g_2$  subequal. Anal area with two pairs of pseudanal setae ( $ps_1$  and  $ps_2$ ),  $ps_1$  more than 1.5 times as long as  $ps_2$ . Setae lengths:  $ag$  19 (19–23),  $g_1$  28 (26–30),  $g_2$  27 (25–28),  $ps_1$  26 (22–26),  $ps_2$  18 (12–18). Distances:  $ag-ag$  21 (21–24),  $g_1-g_1$  12 (12–15),  $g_1-g_2$  11 (7–11),  $g_2-g_2$  34 (28–35),  $ps_1-ps_2$  4 (4–5).

**Legs.** Lengths of legs I–IV: 135 (130–140), 115 (110–120), 100 (92–105), 110 (100–110). Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-1-1; femora 4-4-2-1; genua 3-2-0-0; tibiae 3-3-3-3; tarsus 8+ $\omega$ -8+ $\omega$ -5-5. Most dorsal and lateral setae on femora, genua and tibiae lanceolate, lateral seta  $l'$  on tibiae I–II pectinate; most ventral setae on trochanters and femora slender and smooth,  $bv''$  on femur II lanceolate; setae  $v'$  and  $v''$  on tibiae I–IV pectinate; Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  barbed; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  on tarsus I–IV slender and smooth. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  11 (10–11), II  $\omega''$  10. Claws developed with tenent hairs on each side.



**MALE (Figs. 99–103)**

**Gnathosoma.** Rostrum reaching middle of femur I, subcapitular setae  $m$  slender and smooth,  $m=22-25$ ,  $m-m=15$ . Palp 1-segmented, tarsus with a slender and smooth seta, 19–24.

**Idiosoma.** 210–230 long, 125–130 wide. Rostral shield pitted, with two median conical projections. PRODORSUM mesally covered with irregular wrinkles forming an O-shaped pattern and laterally bearing oblique striations, propodosomal setae lanceolate,  $v_2$  longest and about 1.6 times as long as  $sc_2$ ; lengths:  $v_2$  24–29,  $sc_1$  19–25,  $sc_2$  12–18; distances:  $v_2-v_2$  48–52,  $v_2-sc_1$  17–18,  $sc_1-sc_1$  74–78,  $sc_1-sc_2$  27–29,  $sc_2-sc_2$  125–130. HYSTEROSOMA divided into metapodosoma and opisthosoma by few faint horizontal striations. Metapodosoma covered with irregular wrinkles mesally and laterally. Opisthosoma covered with 2 longitudinal striations anterior to  $e_1$  and oblique striae laterally. All setae lanceolate except  $h_2$  elongate. Setae  $c_1$  about twice as long as  $e_1$ ; setae  $c_3$ ,  $e_3$  and  $f_2$ , subequal,  $f_3$  and  $h_1$  subequal and about twice as long as  $f_2$ . Lengths:  $c_1$  21–22,  $d_1$  15–16,  $e_1$  8–12,  $c_3$  9–10,  $d_3$  7–9,  $e_3$  10–11,  $f_2$  12,  $f_3$  25–28,  $h_2$  145–170,  $h_1$  20–23; distances:  $c_1-c_1$  41–43,  $d_1-d_1$  29–32,  $e_1-e_1$  8–10,  $c_3-c_3$  120–135,  $d_3-d_3$  95–105,  $d_3-e_3$  46–55,  $e_3-e_3$  65–75,  $e_3-f_2$  16–19,  $f_2-f_2$  66–72,  $f_2-f_3$  17,  $f_3-f_3$  70–72,  $f_3-h_2$  20–23,  $h_2-h_2$  54–55,  $h_2-h_1$  14–15,  $h_1-h_1$  25–27.

**Venter.** Venter smooth, similar to female. All coxal setae slender and smooth. Seta  $1a$  and posterior medioventral seta  $4a$  flagelliform, middle medioventral seta  $3a$  slender and smooth. Setae  $1a$  longest more than 6 times as long as  $3a$ . Lengths:  $1a$  71–105,  $1b$  23–24,  $1c$  15–18,  $2b$  26–28,  $2c$  17–18,  $3a$  12–16,  $3b$  20–23,  $4a$  80–82,  $4b$  25–26. Distances:  $1a-1a$  25,  $3a-3a$  35–39,  $4a-4a$  24–25. Genital and ventral area bearing one pair of aggenital setae ( $ag$ ) and two pairs of genital setae ( $g_1$  and  $g_2$ ), slender and smooth,  $g_1$  and  $g_2$  subequal. Anal area with two pairs of pseudanal setae ( $ps_1$  and  $ps_2$ ),  $ps_1$  more than twice as long as  $ps_2$ . Setae lengths:  $ag$  17–20,  $g_1$  23–27,  $g_2$  22–25,  $ps_1$  13–14,  $ps_2$  7–8. Distances:  $ag-ag$  13–15,  $g_1-g_1$  17,  $g_1-g_2$  6,  $g_2-g_2$  25–26,  $ps_1-ps_2$  17–18.

**Legs.** Lengths of legs I–IV: 125–130, 100–110, 85–90, 94–97. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-1-1; femora 4-4-2-1; genua 3-2-0-0; tibiae 3-3-3-3; tarsus 8+2 $\omega$ -8+2 $\omega$ -5-5. All dorsal and lateral setae on trochanters, femora, genua and tibiae barbed, most ventral setae  $v'$ ,  $ev'$  and  $bv''$  on trochanters and femora slender and smooth, seta  $v'$  on femur I pectinate and  $bv''$  on femur II barbed; setae  $v'$  and  $v''$  on tibiae I–IV pectinate; Setae  $ft'$  on tarsi I–IV flagelliform,  $ft''$  barbed; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  on tarsus I–IV slender and smooth. Solenidia  $\omega'$  and  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega'$  8–11,  $\omega''$  8–13, II  $\omega''$  7–10,  $\omega''$  8–11. Claws developed with tenent hairs on each side.

**Distribution.** BASED ON MATERIAL EXAMINED: NEW ZEALAND: AK.

**Material examined.** Holotype and 9 paratypes. **Holotype** female. NEW ZEALAND: AK: Auckland, Waitakere Ranges, 7, Nov., 1966, E. Collyer, *Senecio kirkii*, NZAC: 1/1 female, 9 paratypes (3 females, 2 males, 2 deutonymphs, 2 larvae). **Paratypes**: on the same slide with holotype: NZAC: 1/3 females, 2 males, 2 deutonymphs, 2 larvae.

**Habitat.** *Senecio kirkii*.

**Remarks.** *T. senecionis* can be separated from *T. rangiorae* by having setae  $v_2$  longest, about 1.3 times as long as  $sc_2$ ; setae  $d_1$  about twice as long as  $e_1$ ; genua I–IV carrying 3, 2, 0, 0 setae.

***Tenuipalpus venustus* Collyer, 1973**

(Figs. 104–113)

*Tenuipalpus venustus* Collyer, 1973b: 951, figs. 36–37.

**FEMALE (Figs. 104–108)**

**Gnathosoma.** Rostrum reaching proximal one third of femur I, subcapitular setae  $m$  slender and smooth,  $m=10-12$ ,  $m-m=17$  (11–17). Palp 3-segmented, setal formula: 0, 1, 1; tibia with one pectinate setae near distal portion, tarsus with one eupathidium, 6 (5–6).

**Idiosoma.** 285 (275–285) long, 200 (165–200) wide. Rostral shield pitted, with two median conical projection. PRODORSUM mesally covered with reticulations surrounded by two strong longitudinal wrinkles, and laterally bearing few reticulations and irregular striae; setae  $v_2$  and  $sc_1$  short, slender and subequal in length,  $sc_2$  lanceolate and about 9 times as long as  $sc_1$ ; lengths:  $v_2$  4 (4–5),  $sc_1$  4,  $sc_2$  36–37; distances:  $v_2-v_2$  37 (36–37),  $v_2-sc_1$  33 (33–40),  $sc_1-sc_1$  105 (98–110),  $sc_1-sc_2$  48 (33–45),  $sc_2-sc_2$  200 (165–200). HYSTEROSOMA covered with

transversal striations between  $c_1-e_1$  and reticulations laterally, and with irregular wrinkles posterior to  $e_1$  as shown in Fig. 104; bearing one pair of humeral setae ( $c_3$ ), three pairs of dorsocentral setae ( $c_1$ ,  $d_1$  and  $e_1$ ), and six pairs of dorsolateral setae ( $d_3$ ,  $e_3$ ,  $f_2$ ,  $f_3$ ,  $h_2$  and  $h_1$ ). Setae  $c_1$ ,  $d_1$ ,  $e_1$ ,  $c_3$  and  $d_3$  slender, smooth and subequal in length. Setae  $e_3$ ,  $f_2$  and  $f_3$  longer, lanceolate, subequal,  $h_2$  longest and about 3 times as long as  $e_3$ . Lengths:  $c_1$  3 (3–6),  $d_1$  3–4,  $e_1$  3–5,  $c_3$  4,  $d_3$  3 (3–5),  $e_3$  26 (20–26),  $f_2$  24 (21–24),  $f_3$  26 (23–26),  $h_2$  78,  $h_1$  18 (17–22); distances:  $c_1-c_1$  38 (32–47),  $d_1-d_1$  28–30,  $e_1-e_1$  18–20,  $c_3-c_3$  250 (210–250),  $d_3-d_3$  205 (165–205),  $d_3-e_3$  100 (70–100),  $e_3-e_3$  165 (135–165),  $e_3-f_2$  19 (18–22),  $f_2-f_2$  150 (125–150),  $f_2-f_3$  20 (14–20),  $f_3-f_3$  125 (100–125),  $f_3-h_2$  23 (16–23),  $h_2-h_2$  95 (75–95),  $h_2-h_1$  17 (9–17),  $h_1-h_1$  66 (55–66).

**Venter.** Venter smooth. All coxal setae slender and smooth. Seta  $1a$  and  $4a$  flagelliform,  $3a$  slender and smooth. Seta  $4a$  about 4 times as long as  $3a$ . Lengths:  $1a$  92 (92–100),  $1b$  12 (10–14),  $1c$  18 (14–18),  $2b$  17 (15–17),  $2c$  17 (16–18),  $3a$  19 (16–19),  $3b$  20 (20–22),  $4a$  67 (62–88),  $4b$  20 (17–21). Distances:  $1a-1a$  42 (30–42),  $3a-3a$  48 (43–48),  $4a-4a$  48 (40–48). Genital and ventral area covered with transversal striations and oblique striae as shown in Fig. 105, bearing one pair of aggenital setae ( $ag$ ) and two pairs of genital setae ( $g_1$  and  $g_2$ ), slender and smooth,  $g_1$  and  $g_2$  subequal. Anal area with three pairs of pseudanal setae ( $ps_1$ ,  $ps_2$  and  $ps_3$ ),  $ps_1$  and  $ps_2$  subequal in length. Setae lengths:  $ag$  21 (18–21),  $g_1$  26 (22–26),  $g_2$  22 (18–23),  $ps_1$  16 (14–20),  $ps_2$  15 (15–20),  $ps_3$  14 (12–15). Distances:  $ag-ag$  40 (24–40),  $g_1-g_1$  18 (13–19),  $g_1-g_2$  12 (9–12),  $g_2-g_2$  41 (30–41),  $ps_1-ps_2$  4 (4–7),  $ps_2-ps_3$  11 (8–12).

**Legs.** Lengths of legs I–IV: 120 (82–120), 105 (70–105), 90 (68–90), 99 (65–99). Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-1; genua 2-2-0-0; tibiae 5-5-3-3; tarsus 7+ $\omega$ -7+ $\omega$ -5-5. Most dorsal and lateral setae on trochanters, femora, genua and tibiae spatulate, lateral seta  $l'$  on tibiae I–II pectinate; most ventral setae on trochanters, femora and tibiae pectinate, seta  $bv''$  on femur II spatulate; Setae  $ft'$  on tarsi I–II lanceolate with flagelliform and tarsi III–IV flagelliform; unguinal setae  $u'$  and  $u''$  pectinate and equal in length; tectal seta  $tc'$  and  $tc''$  on tarsus I–IV slender and smooth. Solenidion  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega''$  7 (7–9), II  $\omega''$  7 (7–9). Claws developed with tenent hairs on each side.

#### MALE (Figs. 109–113)

**Gnathosoma.** Rostrum reaching proximal end of femur I, subcapitular setae  $m$  slender and smooth,  $m=9-13$ ,  $m-m=14-16$ . Palp 3-segmented, setal formula: 0, 1, 1; tibia with one pectinate setae near distal portion, tarsus with one eupathidium, 5–6.

**Idiosoma.** 245–265 long, 160–170 wide. Rostral shield pitted, with two median conical projection. PRODORSUM covered with strong longitudinal wrinkles mesally, U-shaped, and oblique striations laterally, setae  $v_2$  and  $sc_1$  slender, smooth and subequal,  $sc_2$  lanceolate and about 8 times as long as  $v_2$ ; lengths:  $v_2$  4,  $sc_1$  4,  $sc_2$  30–36; distances:  $v_2-v_2$  39–42,  $v_2-sc_1$  36–37,  $sc_1-sc_1$  89–97,  $sc_1-sc_2$  33–35,  $sc_2-sc_2$  160–170. HYSTEROSOMA divided into metapodosoma and opisthosoma by few faint horizontal striations. Metapodosoma covered with irregular wrinkles mesally and laterally. Opisthosoma covered with inverted V-shaped oblique striations anterior to  $e_1$ , and faint broken striae posterior to  $e_1$  as shown in Fig. 109; bearing one pair of pores anterior to  $e_3$ . Setae  $c_1$ ,  $d_1$ ,  $e_1$ ,  $c_3$  and  $d_3$  slender, smooth and subequal in length. Setae  $e_3$ ,  $f_2$ ,  $f_3$  and  $h_1$  subequal. Lengths:  $c_1$  4–5,  $d_1$  3–4,  $e_1$  3,  $c_3$  4–5,  $d_3$  3,  $e_3$  15–18,  $f_2$  19–21,  $f_3$  17–19,  $h_2$  75–84,  $h_1$  17–18; distances:  $c_1-c_1$  33–36,  $d_1-d_1$  23–24,  $e_1-e_1$  17–19,  $c_3-c_3$  165–175,  $d_3-d_3$  125,  $d_3-e_3$  72–83,  $e_3-e_3$  92–95,  $e_3-f_2$  11–13,  $f_2-f_2$  90–93,  $f_2-f_3$  10–14,  $f_3-f_3$  79–83,  $f_3-h_2$  13–15,  $h_2-h_2$  61–66,  $h_2-h_1$  10–11,  $h_1-h_1$  41–45.

**Venter.** Venter smooth. All coxal setae slender and smooth. Seta  $1a$  and  $4a$  flagelliform,  $3a$  slender and smooth. Seta  $4a$  about 6 times as long as  $3a$ . Lengths:  $1a$  66–81,  $1b$  10–15,  $1c$  10–15,  $2b$  13–17,  $2c$  18–19,  $3a$  12–14,  $3b$  17–23,  $4a$  78–81,  $4b$  14–18. Distances:  $1a-1a$  29–32,  $3a-3a$  30–32,  $4a-4a$  21–23. Genital and ventral area bearing one pair of aggenital setae ( $ag$ ) and two pairs of genital setae ( $g_1$  and  $g_2$ ), slender, smooth and subequal. Pseudanal setae  $ps_1$ ,  $ps_2$  and  $ps_3$  subequal. Setae lengths:  $ag$  13–17,  $g_1$  14–16,  $g_2$  15,  $ps_1$  13–14,  $ps_2$  10–11,  $ps_3$  10–12. Distances:  $ag-ag$  13–19,  $g_1-g_1$  24–25,  $g_1-g_2$  6,  $g_2-g_2$  34–35,  $ps_1-ps_2$  4–6,  $ps_2-ps_3$  12–14.

**Legs.** Lengths of legs I–IV: 99–105, 98–100, 85–88, 88–93. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-1; genua 2-2-0-0; tibiae 5-5-3-3; tarsus 7+2 $\omega$ -7+2 $\omega$ -5+ $\omega$ -5+ $\omega$ . Most dorsal and lateral setae on trochanters, femora, genua and tibiae lanceolate, seta  $d$  on tibia I rod-like and lateral seta  $l'$  on tibiae I–II pectinate; ventral setae  $v'$ ,  $ev'$ ,  $v''$  and  $bv''$  on trochanters, femora and tibiae mostly pectinate, seta  $bv''$  on femur II lanceolate; Setae  $ft'$  on tarsi I–II lanceolate with flagelliform and tarsi III–IV flagelliform; unguinal setae  $u'$  and  $u''$  pectinate

and equal in length; tectal seta  $tc'$  and  $tc''$  on tarsus I–II slender, smooth and on tarsus III–IV barbed except  $tc'$  on tarsi III forked. Solenidia  $\omega'$  and  $\omega''$  and eupathidia  $p'\zeta$  and  $p''\zeta$  on tarsi I–II rod-like. Lengths of solenidia: I  $\omega'$  14–16,  $\omega''$  12–14, II  $\omega'$  13–16,  $\omega''$  10–14. Claws developed with tenent hairs on each side.

**Distribution.** BASED ON MATERIAL EXAMINED: NEW ZEALAND: NN, CO, BR, AK.

**Material examined.** Holotype, 25 paratypes and 133 non-type specimens. **Holotype** female. NEW ZEALAND: **NN:** Nelson, Takaka Hill, Canaan Area, Mount Evans Track, 16, Dec., 1965, E. Collyer, *Libocedrus bidwillii*, NZAC: 1/1 female. **Paratypes:** **NN:** Nelson, Takaka Hill, Canaan Area, 26, Feb., 1966, E. Collyer, *Libocedrus plumose*, NZAC: 1/3 females, 2 deutonymphs, 2 protonymphs. Nelson lakes National Park, St Arnaud, 12, Feb., 1966, E. Collyer, *Dacrydium bidwilli*, NZAC: 1/16 females, 2 males. **Non-types:** **NN:** Nelson lakes National Park, St Arnaud, 12, Feb., 1966, E. Collyer, *Dacrydium bidwilli*, NZAC: 1/17 females, 2 males, 2 deutonymphs. Takaka Hill, Canaan Area, 15, May, 1965, E. Collyer, *Dacrydium intermedium*, NZAC: 1/5 females, 1 deutonymph. Takaka Hill, Canaan Area, 5, Jun., 1965, E. Collyer, *Dacrydium intermedium*, NZAC: 1/1 female, 1 male; 1/2 females, 5 males; 1/2 females, 1 male; 1/2 females, 1 male, 4 deutonymphs, 1 protonymph [+*Ultratenuipalpus arboreus* 4 deutonymphs]. Takaka Hill, Canaan Area, 5, Jun., 1965, E. Collyer, *Libocedrus bidwilli*, NZAC: 1/9 females, 3 males, 1 protonymph; 1/6 females. Takaka Hill, Canaan Area, 5, Nov., 1965, E. Collyer, *Libocedrus bidwilli*, NZAC: 1/2 females, 1 male, 2 deutonymphs, 3 protonymphs [+*Ultratenuipalpus arboreus* 2 females, 2 males]. Lake Sylvester Gobb, 2, Jan., 1966, E. Collyer, *Dacrydium bidwilli*, NZAC: 1/2 females. Takaka Hill, Canaan Area, 8, Jun., 1969, E. Collyer, *Dacrydium intermedium*, NZAC: 1/9 males; 1/2 males, 8 deutonymphs, 2 protonymphs, 1 larva. **CO:** Otago, Te Anou Reserve, 17, Mar., 1966, E. Collyer, *Dacrydium bidwilli*, NZAC: 1/18 females, 1 male; 1/1 female. **BR:** Buller, Greymouth, Arthurs Ross National Park, 12, Nov., 1968, E. Collyer, *Dacrydium laxifolium*, NZAC: 1/2 females, 6 males, 1 larva. **AK:** Auckland, Waitakere Ranges, Fairy Falls Track, 10, Aug., 2003, R.C. Henderson, *Libocedrus plumose*, NZAC: 4/4 females; 3/3 males.

**Habitat.** *Libocedrus bidwillii*, *Libocedrus plumose*, *Dacrydium bidwilli*, *Dacrydium intermedium*, *Dacrydium laxifolium*.

**Remarks.** *T. venustus* can be separated from *T. austrocedri* by humeral setae  $c_3$  minute and smooth; genua with 2-2-0-0 setae (setae  $c_3$  enlarged lanceolate; genua with 3-3-1-0 setae in *T. austrocedri*).

## ACKNOWLEDGEMENT

We are very grateful to the Ministry for Primary Industries (MPI), Auckland, New Zealand for the loan of specimens for study; to Dr Nicholas A. Martin (Landcare Research, Auckland, New Zealand) for collecting the specimens; To Anne Asutin (also Landcare Research) for reviewing the manuscript; to Dr Qing-Hai Fan (Ministry for Primary Industries, Auckland, New Zealand) for help with references; to Prof Jia Luo and Mei-Xiang Wu (Fujian Agriculture and Forestry University, China) for their continuous support in providing lab facility to Yun Xu. While this paper was prepared, Zhi-Qiang Zhang was supported by Core funding for Crown Research Institutes from the Ministry of Business, Innovation and Employment's Science and Innovation Group.

## REFERENCES

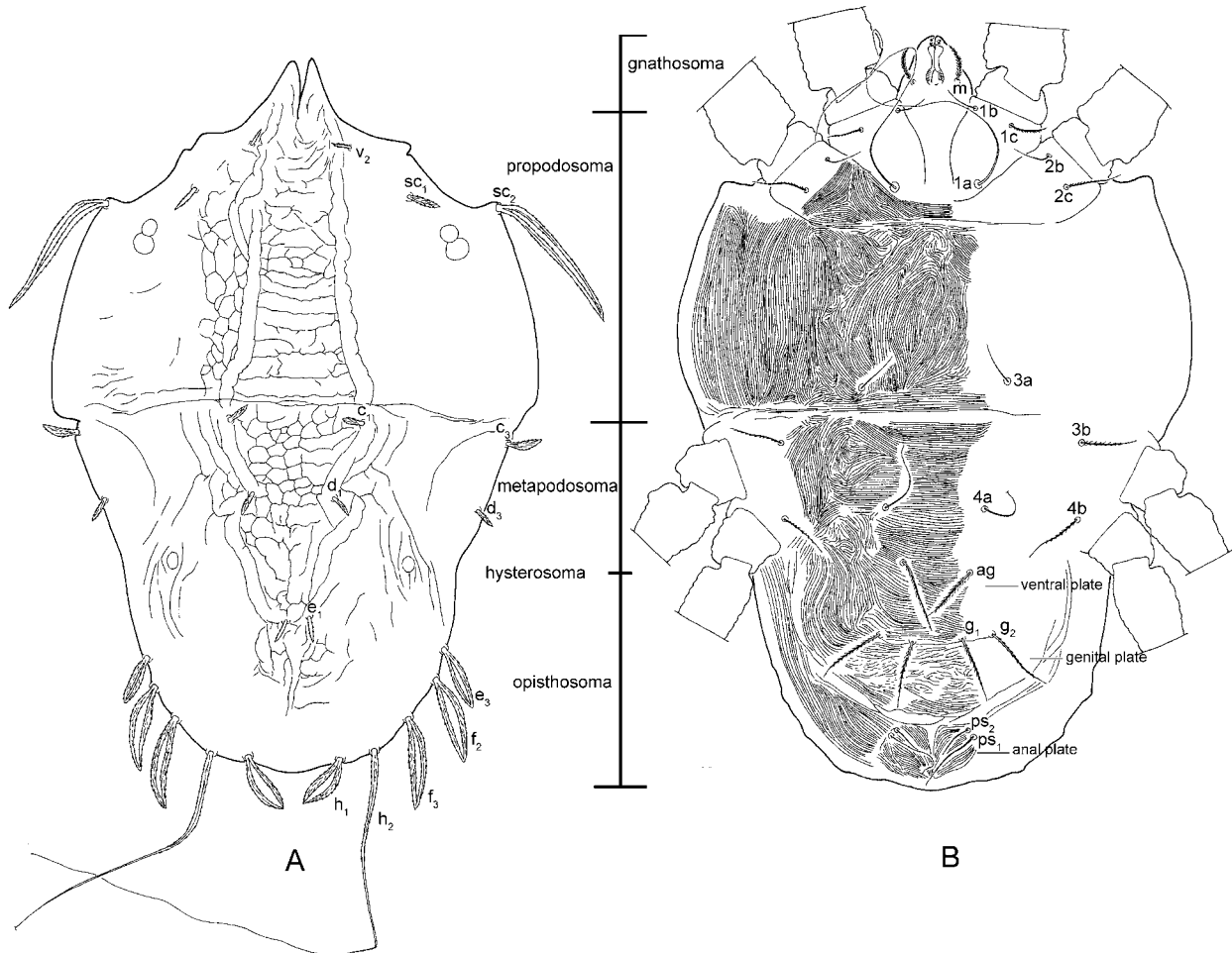
- Abudukeyimu, K.; Zhu, X.-Fe.; Xu, B.-Q.; Tuerxunayi, T.; Yang, S. 2010: Study on the occurrence and damage of now spidermites in Xinjiang. *Xinjiang Agricultural Sciences* 47 (7): 1376–1380.
- Al-Gboory, I. 1987: Taxonomic studies of false spider mites (Acari: Tenuipalpidae) in central Iraq. 1987. 205 p. Tese (Doctor in Agronomy)—Institut für angewandte Zoologie der Rheinischen Friedrich-Wilhelms—Universität Bonn, Bonn, 1987.
- Baker, E.W. 1945: Mites of the genus *Tenuipalpus* (Acarina: Trichadenidae). *Proceedings of the Entomological Society of Washington* 47 (2): 33–38.

- Baker, E.W.; Pritchard, A.E. 1953: A review of the false spider mite genus *Tenuipalpus* Donnadieu (Acarina: Phytotipalpidae). *Annals of the Entomological Society of America* 46 (3): 317–336.
- Baker, E.W.; Pritchard, A. 1960: The tetranychoid mites of Africa. *Hilgardia* 29 (11): 455–574.
- Baker, E.W.; Tuttle, D.M. 1972: New species and further notes on the Tetranychoidae mostly from Southwestern United States (Acarina: Tetranychidae and Tenuipalpidae). *Smithsonian Contributions to Zoology* 116: 1–36.
- Baker, E.W.; Tuttle, D.M. 1987.: The false spider mites of Mexico (Tenuipalpidae: Acari). *United States Department of Agriculture, Agricultural Research Service, Technical Bulletin* 1706: 1–236.
- Baker, E.W.; Tuttle, D.M.; Abbatiello, M. 1975.: The false spider mites of northwestern and north central Mexico (Acarina, Tenuipalpidae). *Smithsonian Contributions to Zoology* 194: 1–22.
- Baker, E.W.; Yin, S.-G. 1988: A catalog of the false spider mites (Tenuipalpidae: Acari) of the United States. *International Journal of Acarology* 14 (3): 143–155.  
<https://doi.org/10.1080/01647958808683507>
- Beard, J.J.; Gerson, U. 2009: A new flat mite genus, *Acaricis* (Prostigmata: Tenuipalpidae), from Australian sedges (Cyperaceae). *Zootaxa* 2073: 31–44.
- Beard, J.J.; Seeman O.D.; Bauchan, G. 2014: Tenuipalpidae (Acari: Trombidiformes) from Casuarinaceae (Fagales). *Zootaxa* 3778 (1): 1–157.  
<http://dx.doi.org/10.11646/zootaxa.3778.1.1>
- Beard, J.J.; Seeman O.D.; Bauchan, G.; Ochoa, R. 2011: New flat mite genera (Acari: Trombidiformes: Tenuipalpidae) associated with Australian sedges (Cyperaceae). *Zootaxa* 2941: 1–37.
- Beard, J.J.; Ochoa, R.; Bauchan, G.R.; Trice, M.; Redford, A.J.; Walters, T.W.; Mitter, C. 2013: Flat Mites of the World. Edition 2. Identification Technology Program, CPHST, PPQ, APHIS, USDA; Fort Collins, CO. Available from: <http://idtools.org/id/mites/flatmites/> (18 June 2014).
- Castro, E.B.; Beard, J.J.; Ochoa, R.; Feres R.J.F. 2018: Two species of *Acaricis* (Acari: Tenuipalpidae) from New Zealand, moved from the genus *Tenuipalpus*, with a key to the known species. *Acarologia* 58(4): 855–867.  
<http://doi.org/10.24349/acarologia/20184290>
- Castro, E.B.; Feres R.J.F. 2013: New species of *Tenuipalpus* (Acari: Tenuipalpidae) from Semideciduous Forest remnants in the State of São Paulo, Brazil. *Zootaxa* 3716 (3): 475–493.  
<http://dx.doi.org/10.11646/zootaxa.3716.3.9>
- Castro, E.B.; Feres, R.J.F.; Ochoa, R.; Bauchan, G.R. 2016a: A new species of *Tenuipalpus* sensu stricto (Acari: Tenuipalpidae) from Brazil, with ontogeny and a key to the known species. *Zootaxa* 4088 (3): 355–378.  
<http://dx.doi.org/10.11646/zootaxa.4088.3.3>
- Castro, E.B.; Kane, E.C.; Feres, R.J.F.; Ochoa, R.; Bauchan, G.R. 2016b: Definition of *Tenuipalpus* sensu stricto (Acari, Tenuipalpidae), with redescription of *Tenuipalpus caudatus* (Dugès) and description of a new species from Costa Rica. *International Journal of Acarology* 42 (2): 106–126.  
<http://dx.doi.org/10.1080/01647954.2015.1130941>
- Castro, E.B.; Nuvoloni, F.M.; Mattos, C. .R.; Feres, R.J.F. 2013: Population fluctuation and damage caused by phytophagous mites on three rubber tree clones. *Neotropical Entomology* 42 (1): 95–101.  
<https://doi.org/10.1007/s13744-012-0088-y>
- Castro, E.B.; Ochoa, R.; Feres, R.J.F.; Beard, J.J.; Bauchan, G.R. 2015: Reinstatement of the genus *Colopalpus* Pritchard and Baker (1958) and re-description of *Colopalpus matthyssei* Pritchard and Baker (1958), the type species of the genus (Acari, Tenuipalpidae). *International Journal of Acarology* 41 (4): 310–328.  
<http://dx.doi.org/10.1080/01647954.2015.1031276>
- Charanasri, V.; Saringkapaibul, C.; Kongchuensin, M. 1986: Mites injurious to orchids in Thailand. In: Channabasavanna, G.P.; Viraktamath, C.A. (Eds.) *Progress in Acarology*. Published VII International Congress of Acarology, Bangalore, India, 201–206.
- Chaudhri, W.M. 1971: The genus *Tenuipalpus* in Pakistan-I. Descriptions of five new species (Acarina: Tenuipalpidae). *Pakistan Journal of Zoology* 3 (2): 203–212.
- Childers, C.C.; Welbourn, W.C.; Fashing, N.J.; McDonald, E.; Ochoa, R. 2006: A ranking model and list to identify foreign tetranychoidae pests of agricultural and environmental significance to the United States. USDA-APHIS. Available from: [http://keys.lucidcentral.org/keys/v3/mites/Invasive\\_Mite\\_Identification/key/Whole\\_site/Tet\\_files/Tetranychoidae\\_report.htm](http://keys.lucidcentral.org/keys/v3/mites/Invasive_Mite_Identification/key/Whole_site/Tet_files/Tetranychoidae_report.htm) (18 June 2014).
- Collyer, E. 1964: New species of *Tenuipalpus* (Acarina: Tenuipalpidae) from New Zealand. *Acarologia* 6 (3): 432–440.
- Collyer, E. 1973a: Two new species of the genus *Colopalpus* (Acarina: Tenuipalpidae). *New Zealand Journal of Science* 16: 529–532.

- Collyer, E. 1973b: New species of the genus *Tenuipalpus* (Acari: Tenuipalpidae) from New Zealand, with a key to the world fauna. *New Zealand Journal of Science* 16: 915–955.
- Crosby, T.K.; Dugdale, J.S.; Watt, J.C. 1976: Recording specimen localities in New Zealand: an arbitrary system of areas and codes defined. *New Zealand Journal of Zoology* 3: 69 (with separate map overleaf).  
<https://doi.org/10.1080/03014223.1976.9517903>
- Crosby, T.K.; Dugdale, J.S.; Watt, J.C. 1998: Area codes for recording specimen localities in the New Zealand subregion. *New Zealand Journal of Zoology* 25: 175–183.  
<https://doi.org/10.1080/03014223.1998.9518148>
- De Leon, D. 1965: New Tenuipalpidae (false spider mites) from British Guiana with notes on four described species. *Florida Entomologist* 48 (1): 65–75.
- Donnadieu, A.L. 1875: *Recherches pour servir à l'histoire des Tétranyques*. Imprimerie Pitrat Ainé, 163 pp.
- Ehara, S. 1982: Two new species of false spider mites (Acarina: Tenuipalpidae) from Japan. *Annotationes Zoologicae Japonenses (published by Zoological Society of Japan), Zoological Institute, Tokyo University* 55 (3): 175–179.
- Ehara, S.; Ueckermann, E.A. 2003. A new species of the genus *Tenuipalpus* (Acarina: Tenuipalpidae) from South Africa. *Journal of the Acarology Society Japan* 12 (1): 21–24.  
<https://doi.org/10.2300/acari.12.21>
- Evans, G.; Cromroy, H.L.; Ochoa, R. 1993: The Tenuipalpidae of Honduras (Tenuipalpidae: Acari). *Florida Entomologist* 76 (1): 126–155.  
<http://dx.doi.org/10.2307/3496021>
- Feres, R.J.F.; Del'Arco, M.; Daud, R.D. 2010: Biological cycle of *Tenuipalpus heveae* Baker (Acari, Tenuipalpidae) on leaflets of three rubber tree clones. *Revista Brasileira de Entomologia* 54 (2): 298–303.  
<http://dx.doi.org/10.1590/S0085-56262010000200013>
- Flechtmann, C.H.W. 1994: *Tenuipalpus oliveirai*, a new species (Acari, Prostigmata, Tenuipalpidae) from Brazil. *Scientia Agricola* 51(1): 184–187.  
<http://dx.doi.org/10.1590/S0103-90161994000100026>
- Flechtmann, C.H.W.; Noronha, A.C.S. 2013: A new species of the genus *Tenuipalpus* Donnadieu (Prostigmata: Tenuipalpidae) with remarks on a conceivable ovipositor in flat mites. *Zootaxa* 3681 (4): 493–499.  
<http://dx.doi.org/10.11646/zootaxa.3681.4.10>
- Gerson, U.; Collyer, E. 1984: Two false spider mites (Acari: Tenuipalpidae) from Cook Islands and New Zealand ferns. *New Zealand Journal of Zoology* 11: 141–144.  
<https://doi.org/10.1080/03014223.1984.10423753>
- Ghoshal, S.; Barman, S. 2012: Population dynamics and feeding potentiality of *Tenuipalpus pernicious* (Chaudhri, Akbar and Rasool) on guava (*Psidium guajava*). *International Journal of Life Sciences Biotechnology and Pharma Research* 1 (2): 220–226.
- González, R.H. 1968: Acaros plantícolas del género *Tenuipalpus* en Chile (Acarina: Tenuipalpidae). *Revista Chilena de Entomología* 6: 37–46.
- Gutierrez, J.; Schicha, E. 1982: Two new species of *Tenuipalpus* Donnadieu from New South Wales (Acari: Tenuipalpidae). *Journal of the Australian Entomological Society* 21: 137–141.  
<https://doi.org/10.1111/j.1440-6055.1982.tb01781.x>
- Hasan, M.; Wakil, W.; Bashir, F. 2004a.: Two new species of the genus *Tenuipalpus* (Acari: Tenuipalpidae) from Punjab, Pakistan. *Journal Acarology Society of Japan* 13 (1): 41–45.  
<https://doi.org/10.2300/acari.13.41>
- Hasan, M.; Wakil, W.; Bashir, F. 2004b: Genus *Tenuipalpus* (Acari: Tenuipalpidae) from central Punjab, Pakistan. *Systematic & Applied Acarology* 9: 97–101.  
<https://doi.org/10.11158/saa.9.1.14>
- Hasan, M.; Wakil, W.; Bashir, F. 2006: False spider mites (Acari: Tenuipalpidae) from northern Punjab, Pakistan. *International Journal of Acarology* 32 (4): 383–386.  
<https://doi.org/10.1080/01647950608684486>
- Hasanvand, I.; Jafari, S.; Khanjani, Ma.; Khanjani, Mo. 2018: *Tenuipalpus pariae* sp. nov., a new species of the genus *Tenuipalpus* Donnadieu (Acari: Tenuipalpidae) from Iran. *Systematic & Applied Acarology* 23(7): 1352–1365.  
<http://doi.org/10.11158/saa.23.7.12>
- Hatzinikolis, E.N. 1987: A revision of tenuipalpid mites of Greece (Acarina: Tenuipalpidae). *Entomologia Hellenica* 5 (2): 47–60.
- Lindquist, E.E. 1985: External anatomy. In: Helle, W.; Sabelis, M. W. (Eds.) *Spider Mites: Their Biology, Natural Enemies and Control*. Vol. 1a. Elsevier, Amsterdam, pp. 3–28.

- Livshitz, I.Z.; Mitrofanov, V.I. 1967: Materials to the cognition of the Acariformes: Tenuipalpidae fauna. *Proceedings Nikitsky Botanic Garden* 39: 1–72.
- Lo, P.K.C. 1969: Tetranychoid mites infesting fruit plants in Taiwan. *Bulletin Sun Yat-Sem Cultural Foundation* 4: 97–99.
- Lo, P.K.C. 1986. Tetranychoid mites infesting tea in Taiwan. *Chung-San Academic Cultural Affairs Serie 1*: 275–286.
- Ma, E.-P.; Yuan, Y.-L. 1980: Four new species of the genus *Tenuipalpus* from China (Acari: Tenuipalpidae). *Florida Entomologist* 63 (1): 118–122.  
<http://dx.doi.org/10.2307/3494662>
- Ma, E.-P.; Yuan, Y.-L. 1981: Three new species of the false spider mites from China (Acari: Tenuipalpidae). *Zoological Research* 2 (2): 191–194.
- Maninder, S.; Ghai, S. 1978: Indian species of *Tenuipalpus* (Acarina: Tenuipalpidae). *Oriental Insects* 12 (2): 243–258.  
<https://doi.org/10.1080/00305316.1978.10434572>
- Mesa, N.C.; Ochoa, R.; Welbourn, W.C.; Evans, G.A.; Moraes, G.J. de 2009: A catalog of the Tenuipalpidae (Acari) of the World with a key to genera. *Zootaxa* 2098: 1–185.
- Meyer, M.K.P. 1979: The Tenuipalpidae (Acari) of Africa with keys to the world fauna. *Entomology Memoir, Department of Agriculture Republic South Africa, Pretoria* 50: 1–133.
- Meyer, M.K.P. 1993: A revision of the genus *Tenuipalpus* Donnadieu (Acari: Tenuipalpidae) in the Afrotropical region. *Entomology Memoir, Department of Agriculture Republic South Africa* 88: 1–84.
- Meyer, M.K.P.; Gerson, U. 1981: Some false spider mites (Prostigmata: Tenuipalpidae) from Israel. *Israel Journal of Entomology* 15: 67–81.
- Mitrofanov, V.I. 1973: Revision of the system of phytophagous mites of the subfamily Tenuiplapinae s. str. (Trombidiformes, Tenuipalpidae). *Zoologicheskii Zhurnal* 52: 1315–1320.
- Mohanasundaram, M. 1981: Five new species of *Tenuipalpus* (Acarina: Tenuipalpidae) from south India. *Oriental Insects* 15 (4): 397–406.  
<https://doi.org/10.1080/00305316.1981.10434338>
- Nassar, O.A.; Ghai, S. 1981: Taxonomy studies on tetranychoid mites infesting vegetable and fruit crops in Delhi and surrounding areas. *Oriental Insects* 15 (4): 333–396.  
<https://doi.org/10.1080/00305316.1981.10434337>
- Navajas, M.; Ochoa, R. 2013: Integrating ecology and genetics to address Acari invasions. *Experimental and Applied Acarology* 59: 1–10.  
<https://doi.org/10.1007/s10493-012-9636-8>
- Pontier, K.J.B.; Moraes, G.J. de.; Kreiter, S. 2000: Biology of *Tenuipalpus heveae* (Acari, Tenuipalpidae) on rubber tree leaves. *Acarologia* 41(4): 423–427.
- Pritchard, A.E.; Baker, E.W. 1951: The false spider mites of California (Acarina: Phytotipalpidae). *University of California Publications in Entomology* 9 (1): 1–94.
- Pritchard, A.E.; Baker, E.W. 1958: The false spider mites (Acarina: Tenuipalpidae). *University of California Publications in Entomology* 14 (3): 175–274.
- Rimando, L.C. 1962.: *The tetranychoid mites of the Philippines*. University of Philippines, College Agricultural. Laguna, Technical Bulletin II: 1–52.
- Sadana, G.L.; Chhabra, S.C. 1980: Two new species of *Tenuipalpus* Donnadieu (Tenuipalpidae: Acarina) and distributional records of other mites from India. *Entomon* 5 (2): 151–155.
- Sadana, G.L.; Chhabra, S.C.; Gupta, B.K. 1984: New species of the genus *Tenuipalpus* Donnadieu (Tenuipalpidae: Acarina) from India. *Entomon* 9 (2): 141–147.
- Safdarkhani, H.K.; Asadi, M.; Seeman, O.D. 2018: Two new species of *Tenuipalpus* Donnadieu, 1875 (Acari: Trombidiformes: Tenuipalpidae) from Iran. *Zootaxa* 4410 (3): 511–524.  
<https://doi.org/10.11646/zootaxa.4410.3.5>
- Saito, Y.; Kotaro, M.; Chittenden, A.R. 1999: Body characters reflecting the body size of spider mites in flattened specimens (Acari: Tetranychidae). *Applied Entomology and Zoology* 34: 383–386.  
<https://doi.org/10.1303/aez.34.383>
- Salas, L.A.; Ochoa, R. 1985: *Tenuipalpus chamaedorea*, una nueva especie de falsa araña roja (Acari: Tenuipalpidae) en pacaya (*Chamaedorea* spp.). *Agronomia Costarricense* 9 (2): 171–174.
- Salas, L.A.; Ochoa, R. 1986: Una especie nueva de ácaro plano *Tenuipalpus costarricensis* (Acari: Tenuipalpidae), en Costa Rica. *Agronomía Costarricense* 10 (1/2): 203–205.
- Sayed, M.T. 1942: Contribution to the knowledge of the Acarina of Egypt: II The genus *Tenuipalpus* Donnadieu (Tetranychidae). *Bulletin of the Society Fouad Ier. Entomology* 26: 93–113.

- Sayed, M.T. 1950: On the taxonomy of Tetranychidae and allied genera. A new family and two new sub-families in Acarina. *Proceedings of the 8th International Congress of Entomology, Stockholm, Sweden*: 1012–1017.
- Seeman, O.D.; Beard, J.J. 2011: A new species of *Aegyptobia* (Acari: Tenuipalpidae) from Myrtaceae in Australia. *Systematic & Applied Acarology* 16: 73–89.  
<https://doi.org/10.11158/saa.16.1.10>
- Smiley, R.L.; Gerson, U. 1995: A review of the Tenuipalpidae (Acari: Prostigmata) of Australia with descriptions of two new genera and four new species. *International Journal of Acarology* 21 (1): 33–45.  
<https://doi.org/10.1080/01647959508684041>
- Shukla, S; Radadia, G.G. 2018: Seasonal incidence of tenuipalpid mite, *Tenuipalpus pacificus* Baker on dendrobium orchid under polyhouse condition. *Annals of Plant Protection Sciences* 26 (1): 6–9.  
<http://dx.doi.org/10.5958/0974-0163.2018.00002.2>
- Wang, H.-F. 1980: A new species of the genus *Tenuipalpus* (Acarina: Tenuipalpidae). *Acta Zootaxonomica Sinica* 5 (4): 386–387.
- Wang, H.-F. 1983: New species of the genus *Tenuipalpus* from China (Acarina: Tenuipalpidae). *Acta Zootaxonomica Sinica* 8 (1): 51–62.
- Welbourn, W.C., Beard, J.J., Bauchan, G.R. & Ochoa, R. 2017: Description of a new species of *Tenuipalpus* (Acari: Trombidiformes) from succulent plants in Florida, USA, and a redescription of *T. crassulus* Baker and Tuttle. *International Journal of Acarology* 43 (2): 112–136.  
<http://dx.doi.org/10.1080/01647954.2016.1255253>
- Womersley, H. 1940: Studies in Australian Acarina Tetranychidae and Trichadenidae. *Transactions of the Royal Society of South Australia* 64 (2): 233–265.
- Ueckermann, E. A; Ripka, G. 2016: Three new species and a new record of tenuipalpid mites (Acari: Tenuipalpidae) from Hungary. *Journal of Natural History* 50 (15–16): 989–1015.  
<http://dx.doi.org/10.1080/00222933.2015.1091104>
- Xu, Y., Fan, Q.H., Huang, J.; Zhang, F.P. 2018: Two new species of *Tenuipalpus* and re-description of *Tenuipalpus lineosetus* Wang, 1983 (Acari: Tenuipalpidae) from China. *Systematic and Applied Acarology* 23(3): 539–580.  
<https://doi.org/10.11158/saa.23.3.12>
- Xu, Y.; Zhang, Z.Q. 2013: New Zealand Tenuipalpidae (Acari: Trombidiformes): A new species of *Acaricis* from Cyperaceae and its ontogenetic patterns in chaetotaxy. *Systematic and Applied Acarology* 18(4): 357–388.  
<http://dx.doi.org/10.11158/saa.18.4.6>
- Yousef, A.A.; Zaher, M.A.; Abd-el-Hafiez, A.M. 1980: Effect of season and grapevine variety on the biology of *Tenuipalpus granati* Sayed, with description of its immature stages. (Acari: Prostigmata: Tenuipalpidae). *Acarologia* 21(3): 384–388.
- Zaher, M.A.; Yousef, A.A. 1972: Biology of the False Spider Mite *Tenuipalpus punicae* P. & B. in U. A. R. (Acarina—Tenuipalpidae). *Zeitschrift für Angewandte Entomologie* 70 (1): 23–29.  
<https://doi.org/10.1111/j.1439-0418.1972.tb02146.x>
- Zhang, Z.-Q. 2003: False spider mites. In: Zhang, Z.-Q. (Ed.) *Mites of greenhouses: identification, biology and control*. CAB International, Wallingford, UK. pp. 87–98.
- Zhang, Z.-Q.; Fan, Q.-H. 2004: Redescription of *Dolichotetranychus ancistrus* Baker & Pritchard (Acari: Tenuipalpidae) from New Zealand. *Systematic & Applied Acarology* 9: 111–131.



**FIGURE 1.** *Tenuipalpus antipodus* female dorsum and venter.



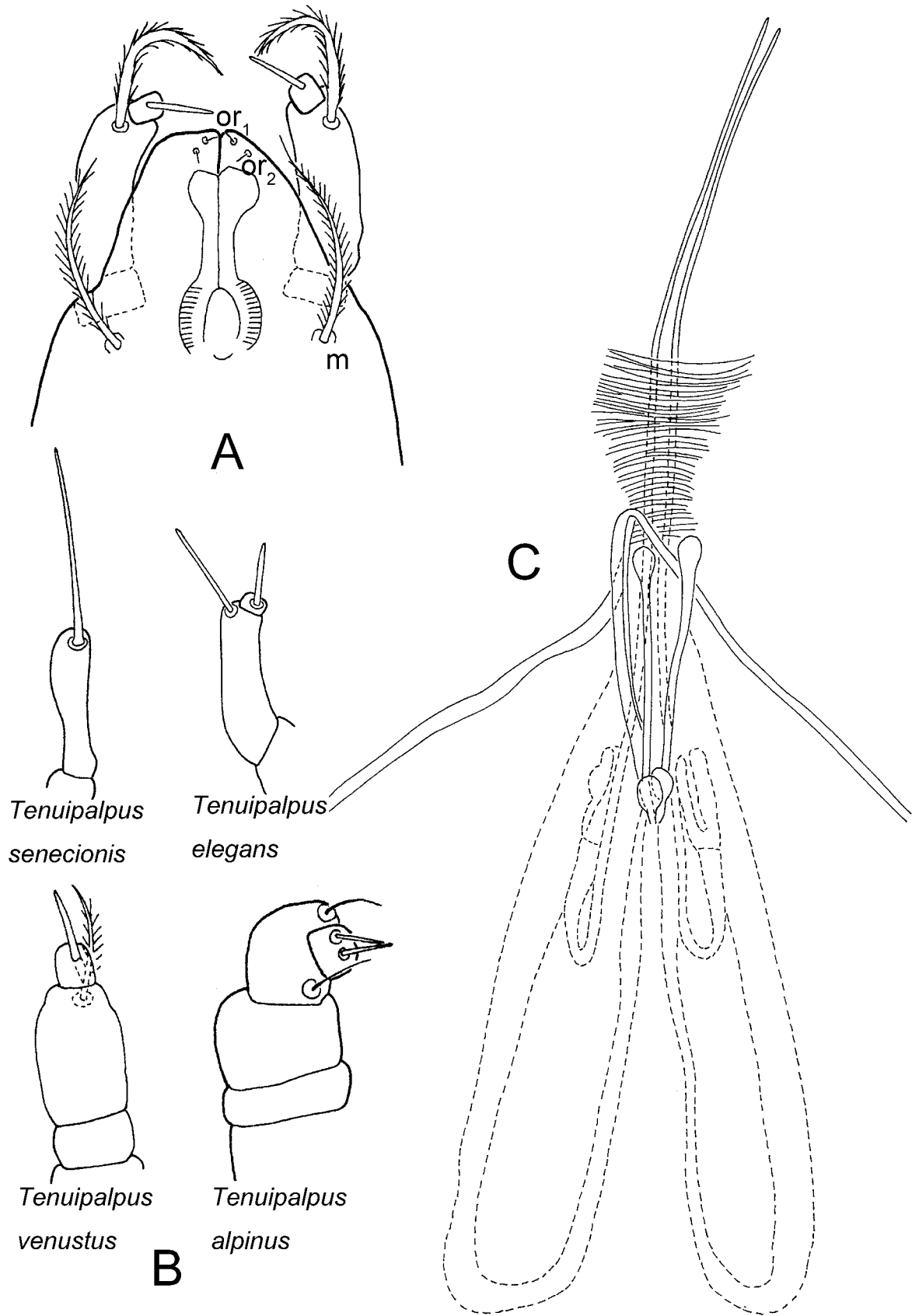
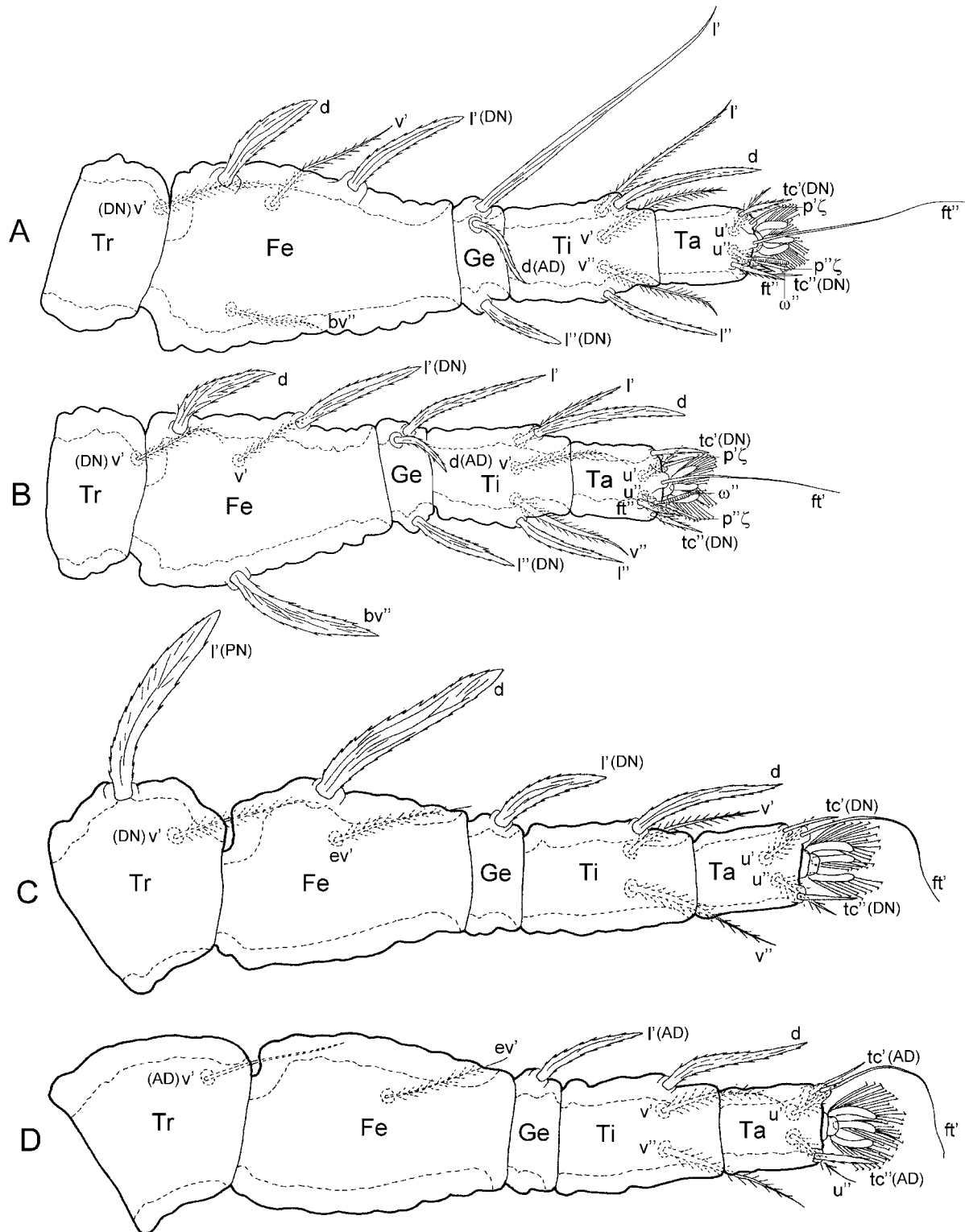


FIGURE 2. Gnathosoma. A. subcapitulum of *Tenuipalpus antipodus*; B. types of palpi found in *Tenuipalpus*; C. chelicerae and collar.



**FIGURE 3.** Legs I–IV of *Tenuipalpus antipodus*. A. leg I; B. leg II; C. leg III; D. leg IV. Setae are larval on legs I–III unless denoted by PN, DN and AD in parentheses, indicating protonymph, deutonymph and adult respectively; setae are protonymphal on leg IV.

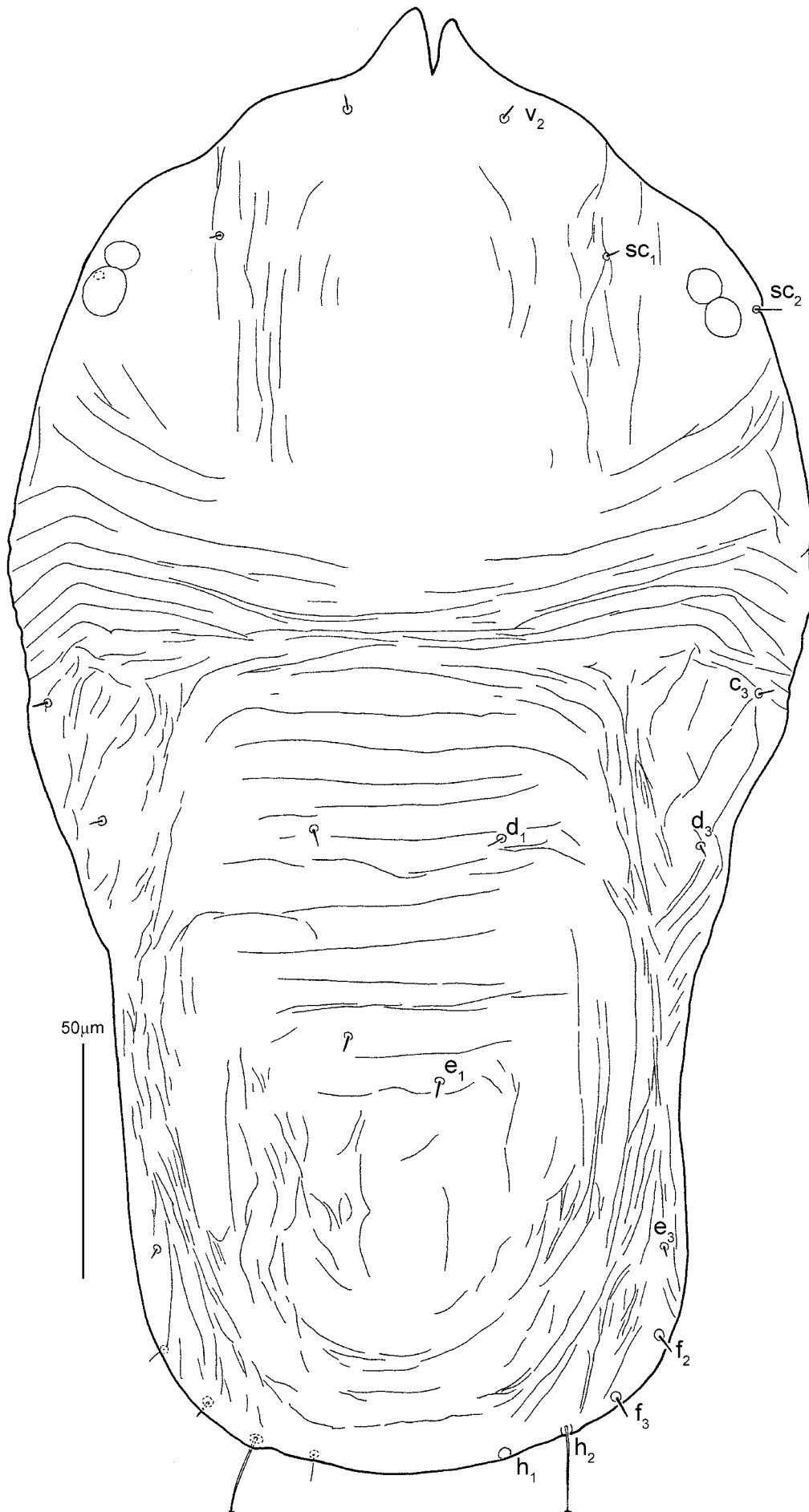


FIGURE 4. *Tenuipalpus alpinus* Collyer (female). Dorsal view of idiosoma.

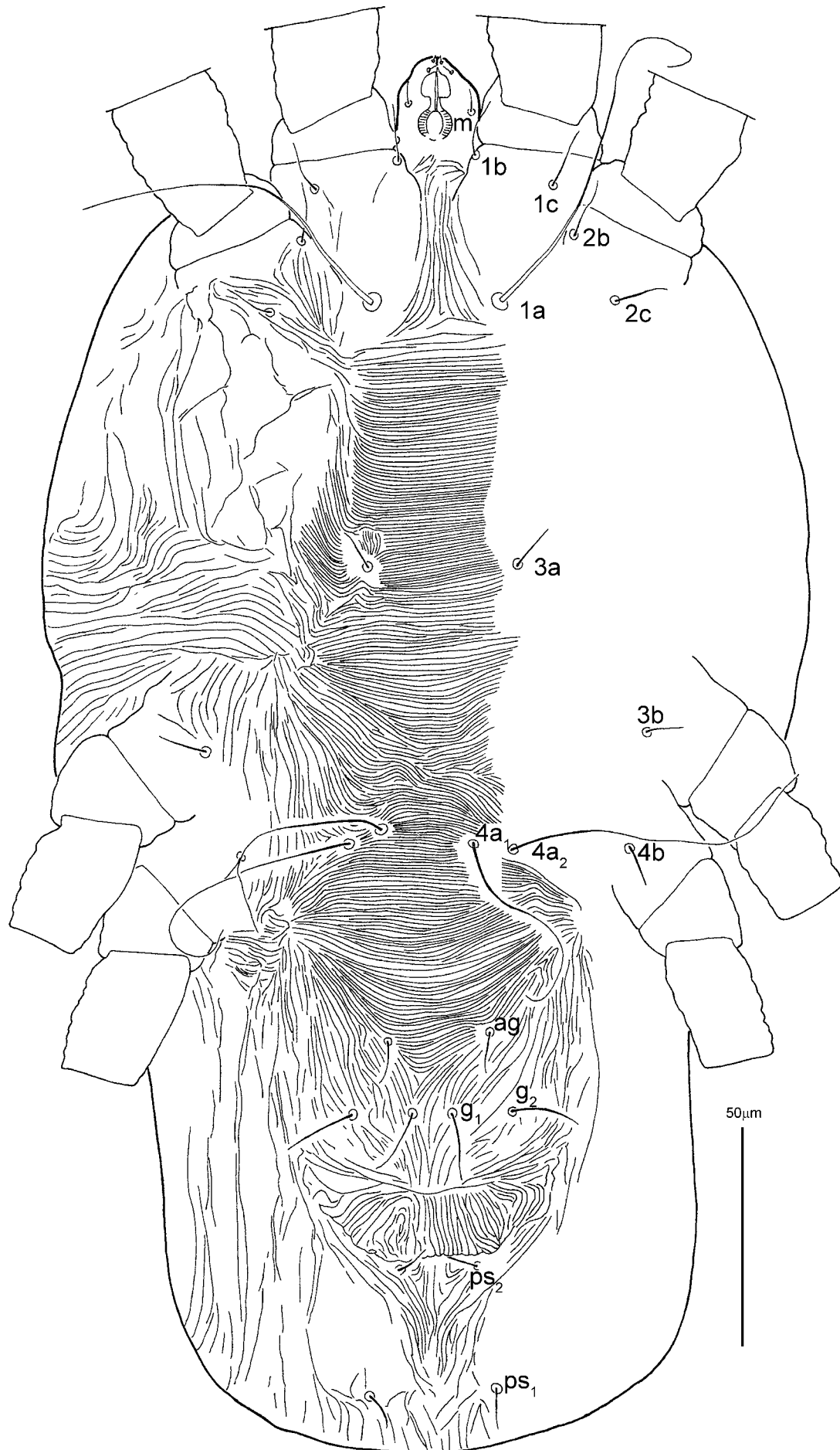


FIGURE 5. *Tenuipalpus alpinus* Collyer (female). Ventral view of idiosoma.

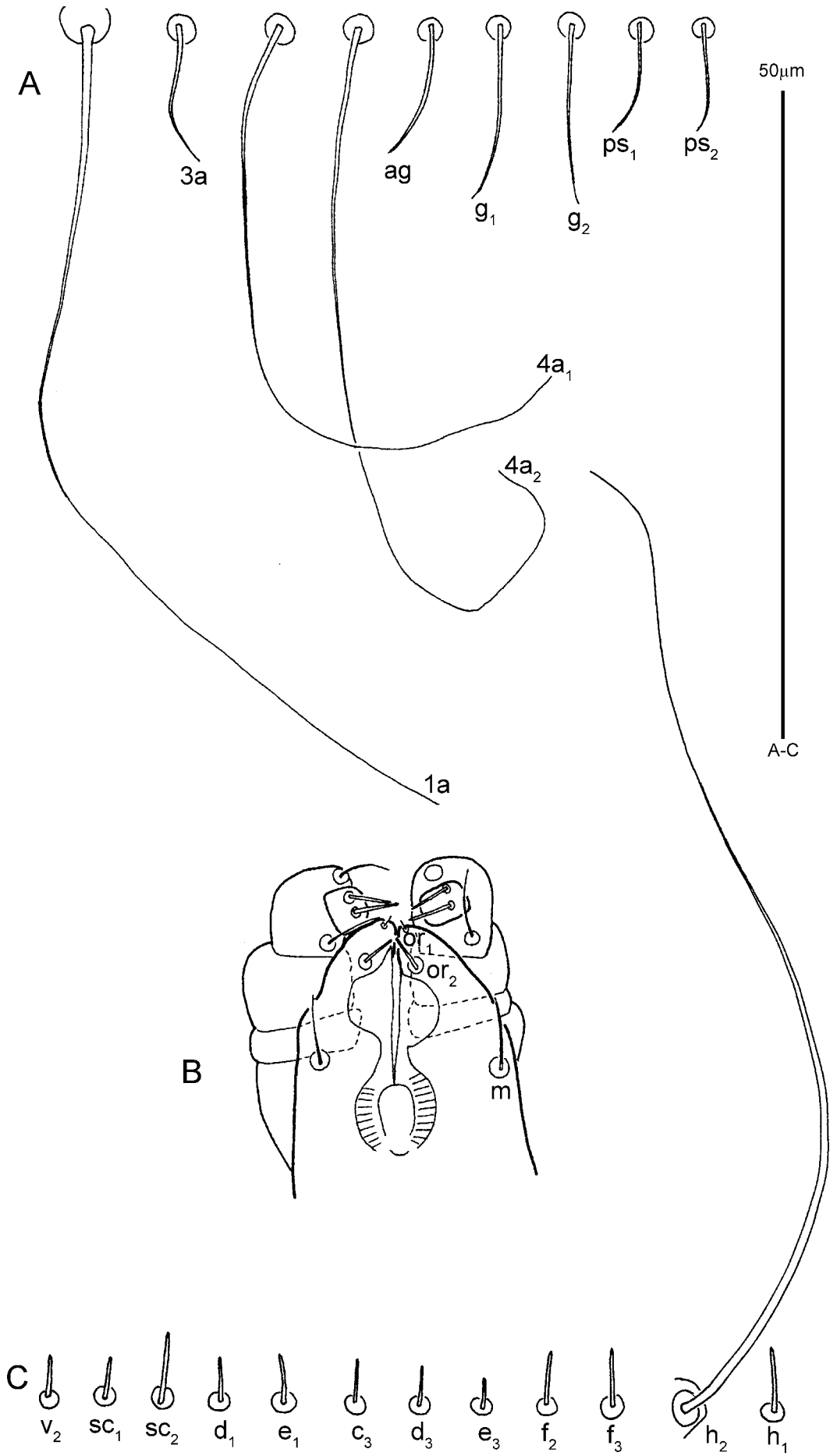


FIGURE 6. *Temipalpus alpinus* Collyer (female). A, ventral setae; B, subcapitulum; C, dorsal setae.

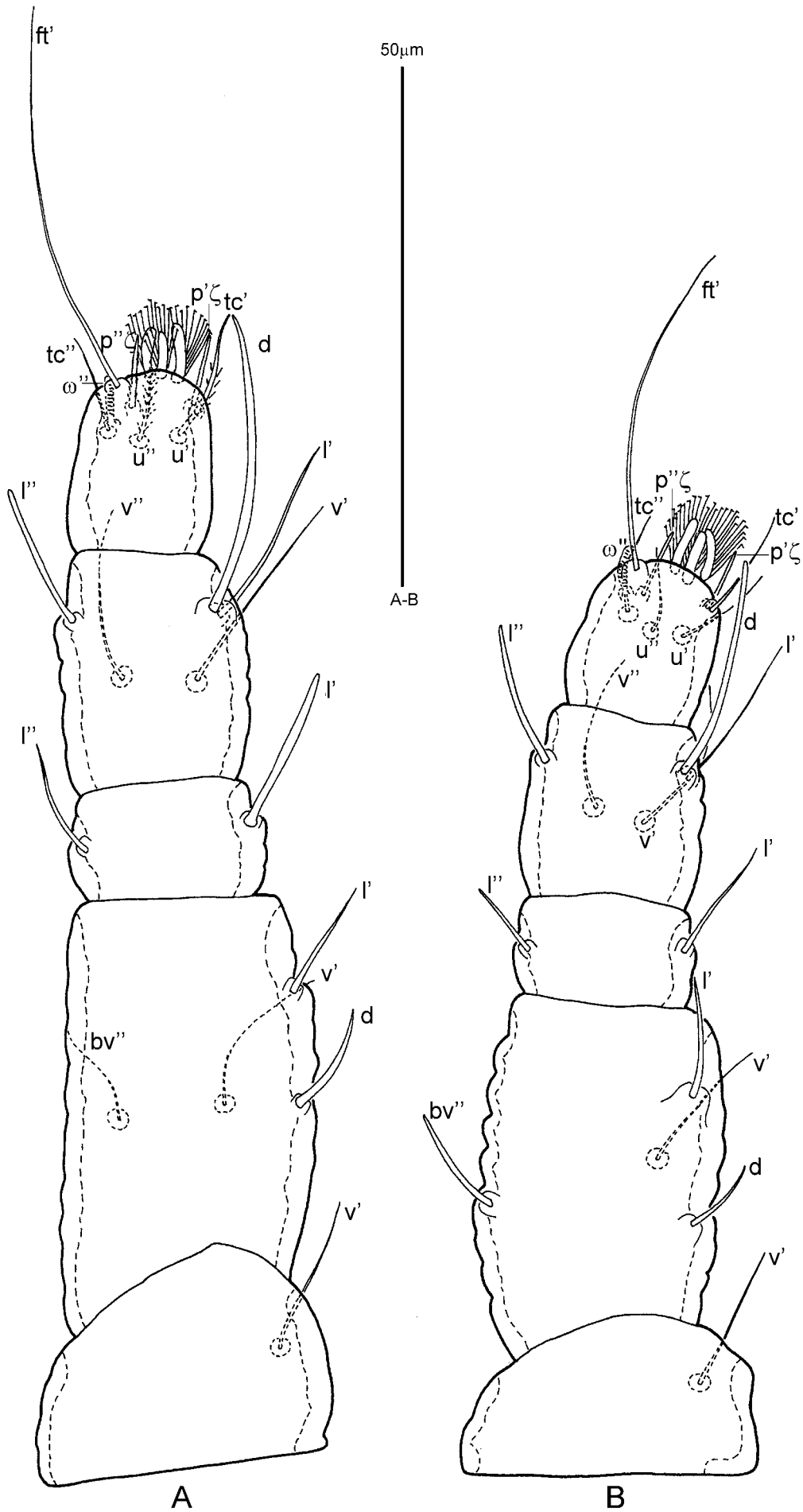


FIGURE 7. *Tenuipalpus alpinus* Collyer (female). A, leg I; B, leg II.

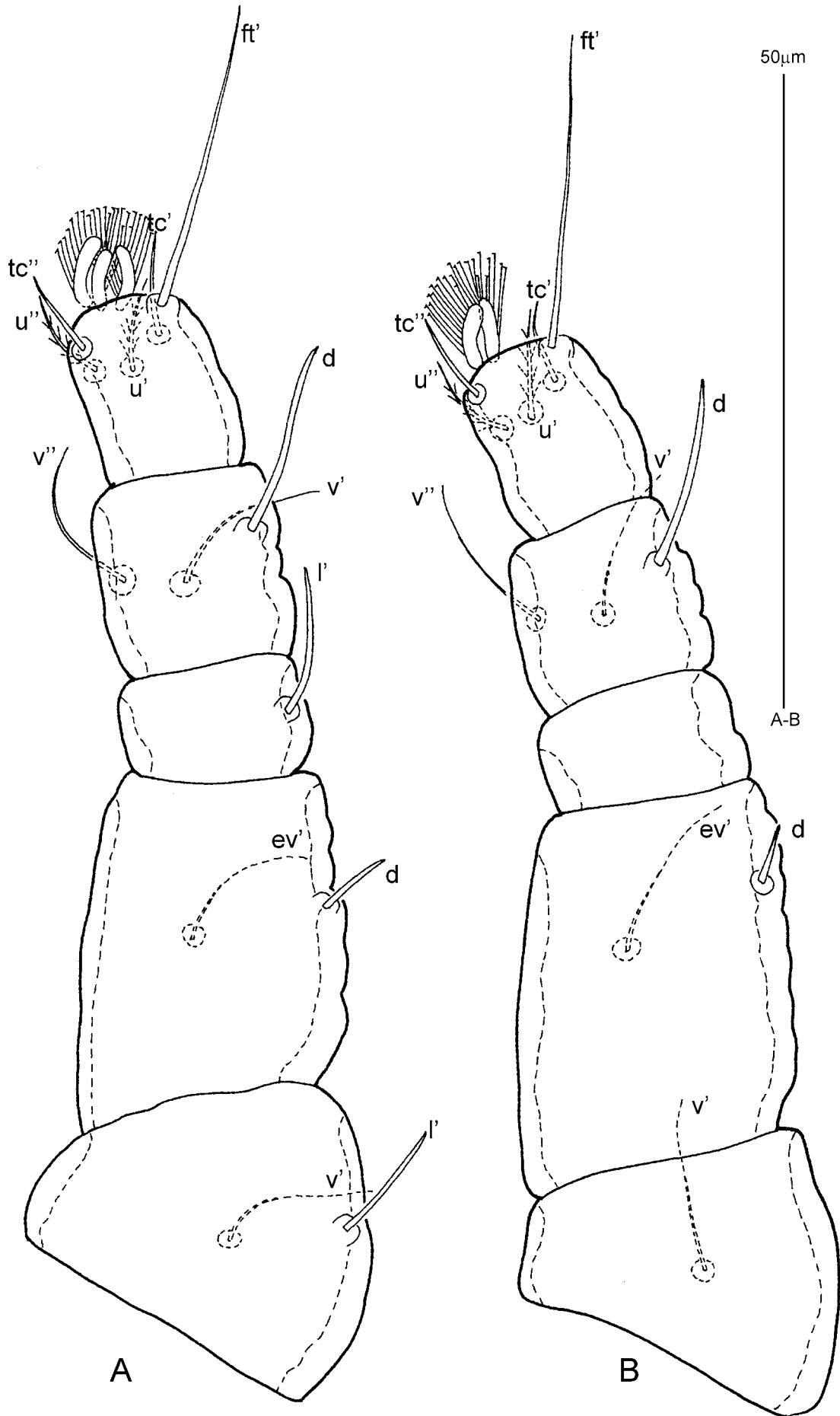


FIGURE 8. *Tenuipalpus alpinus* Collyer (female). A, leg III; B, leg IV.

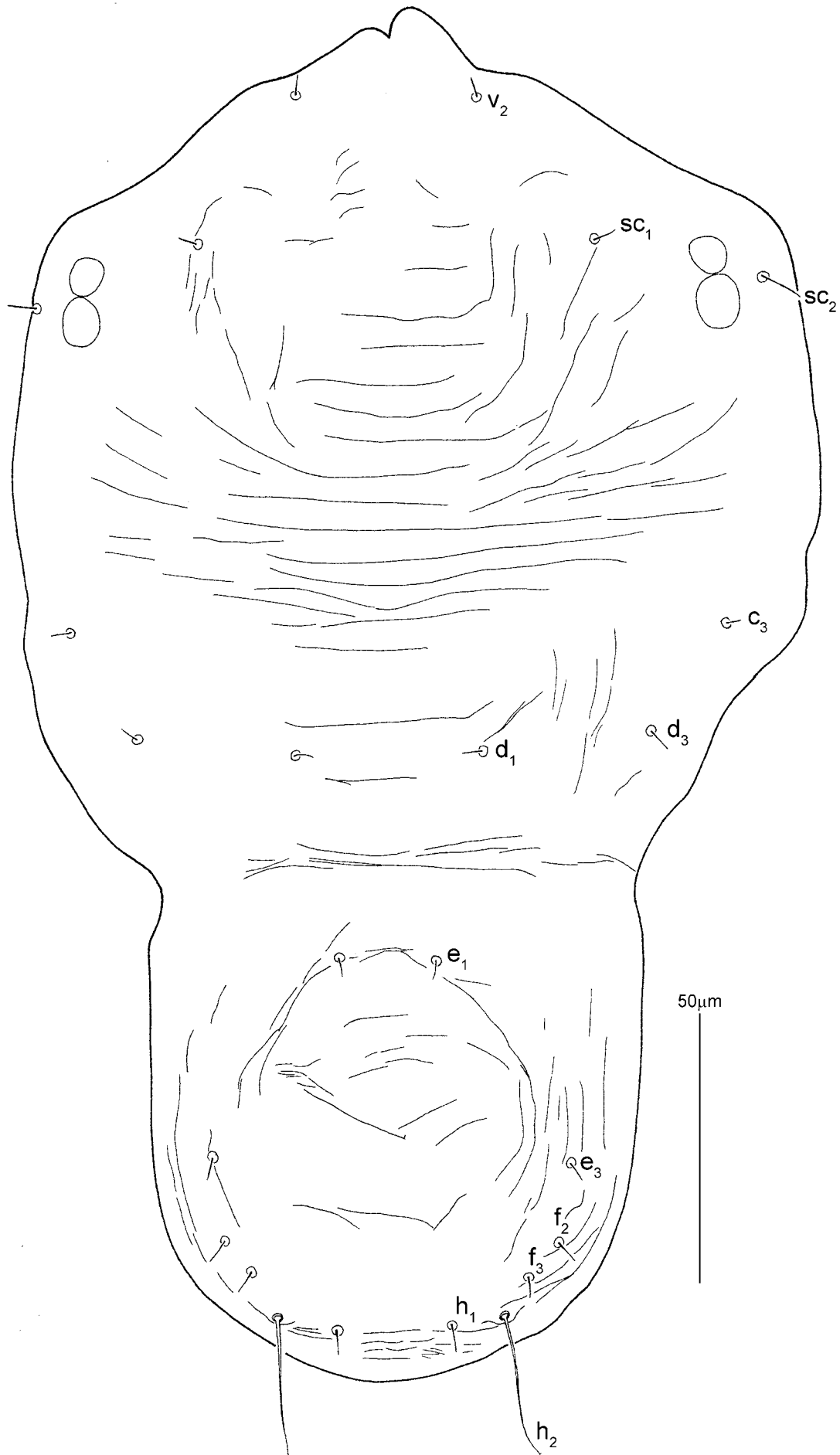


FIGURE 9. *Tenuipalpus alpinus* Collyer (male). Dorsal view of idiosoma.



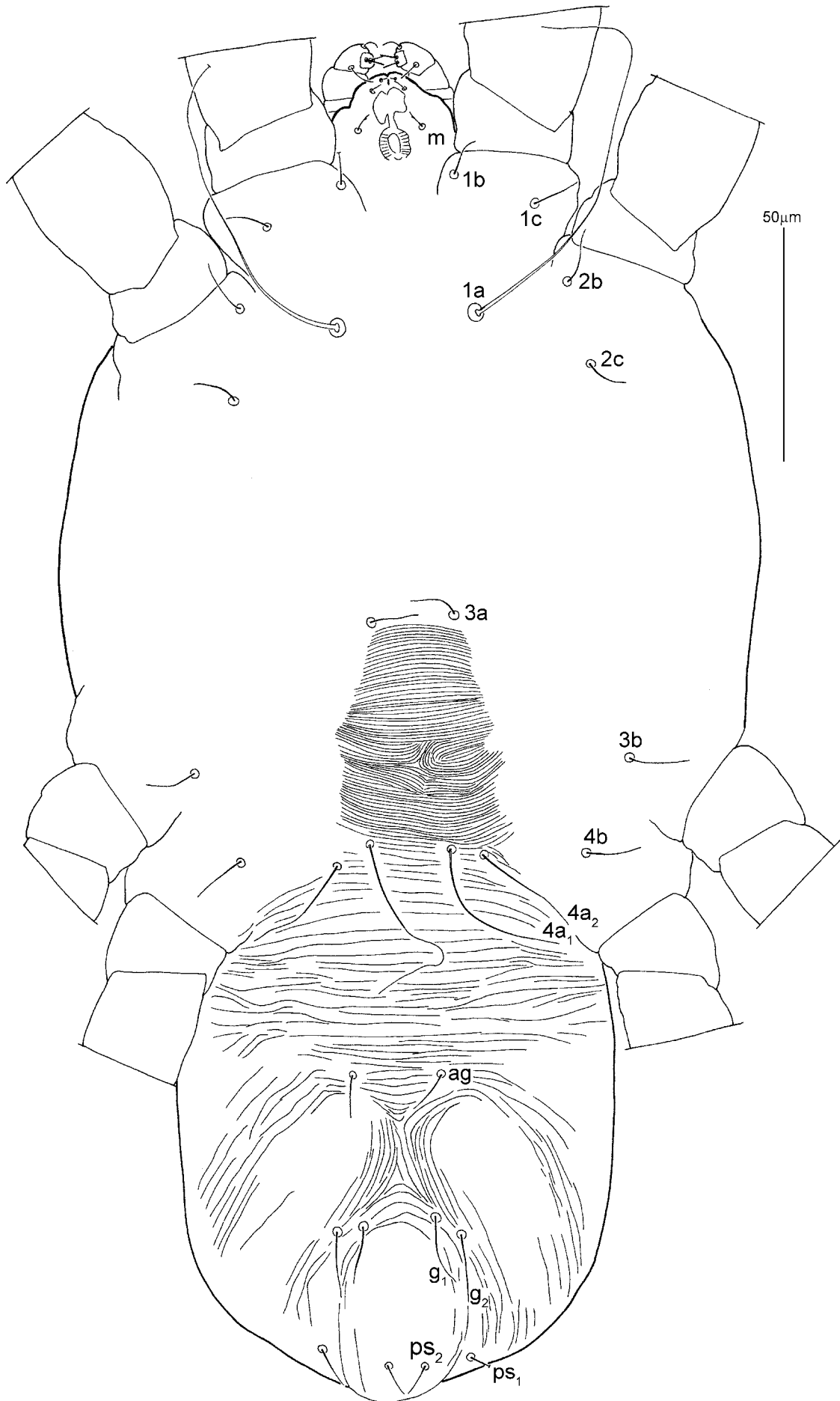
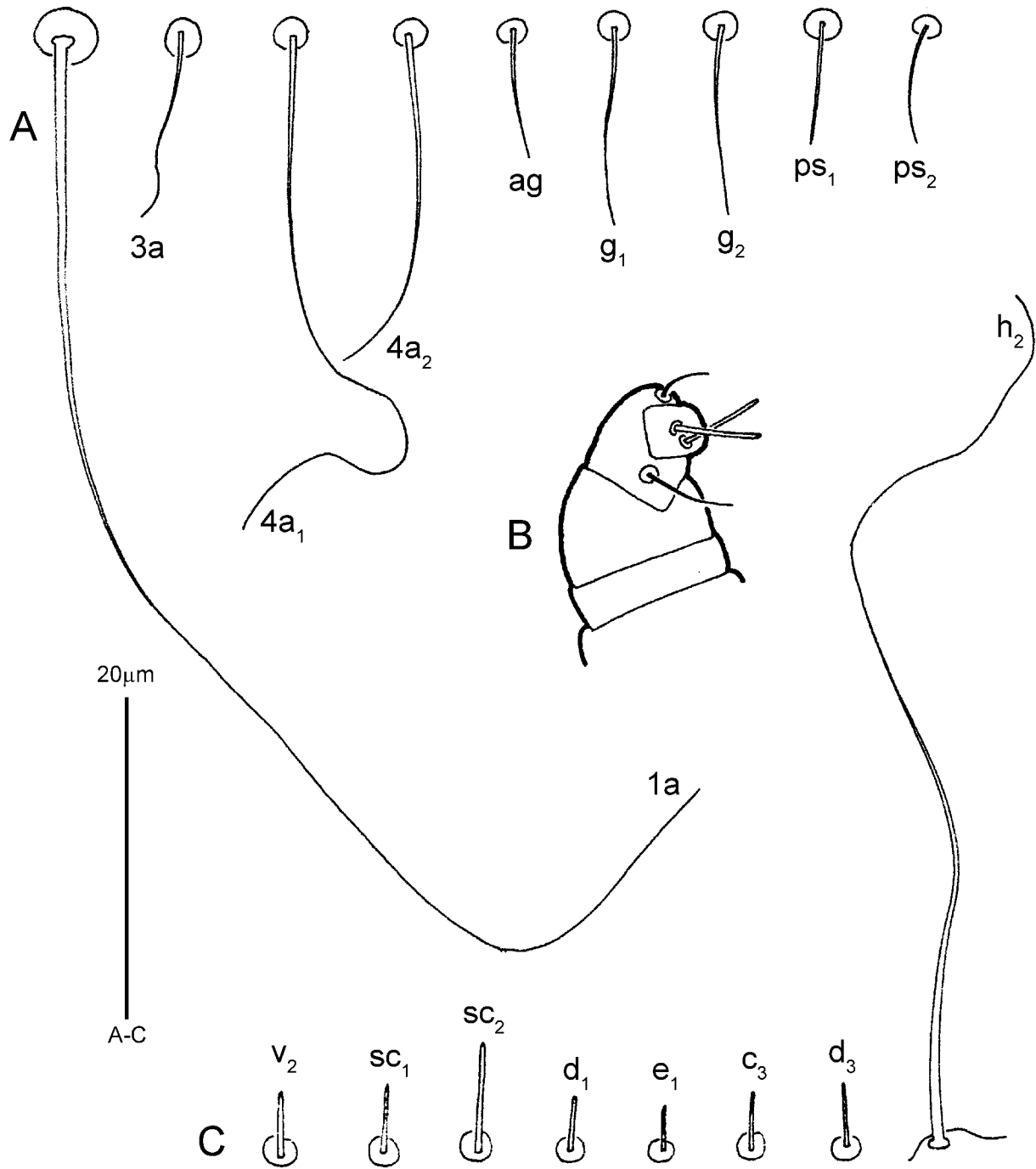


FIGURE 10. *Temipalpus alpinus* Collyer (male). Ventral view of idiosoma.



**FIGURE 11.** *Tenuipalpus alpinus* Collyer (male). A, ventral setae; B, palp; C, dorsal setae.

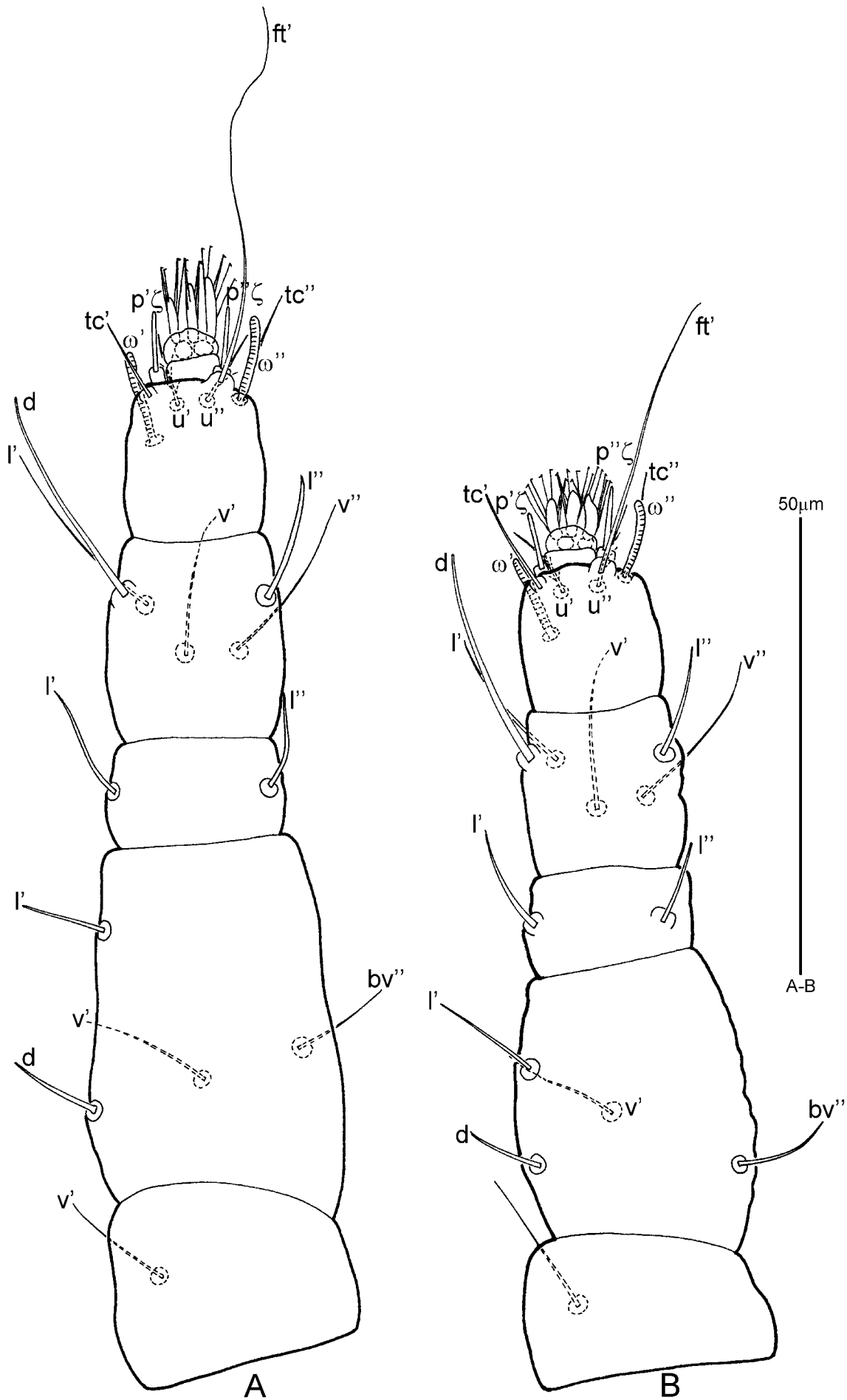


FIGURE 12. *Temipalpus alpinus* Collyer (male). A, leg I; B, leg II.

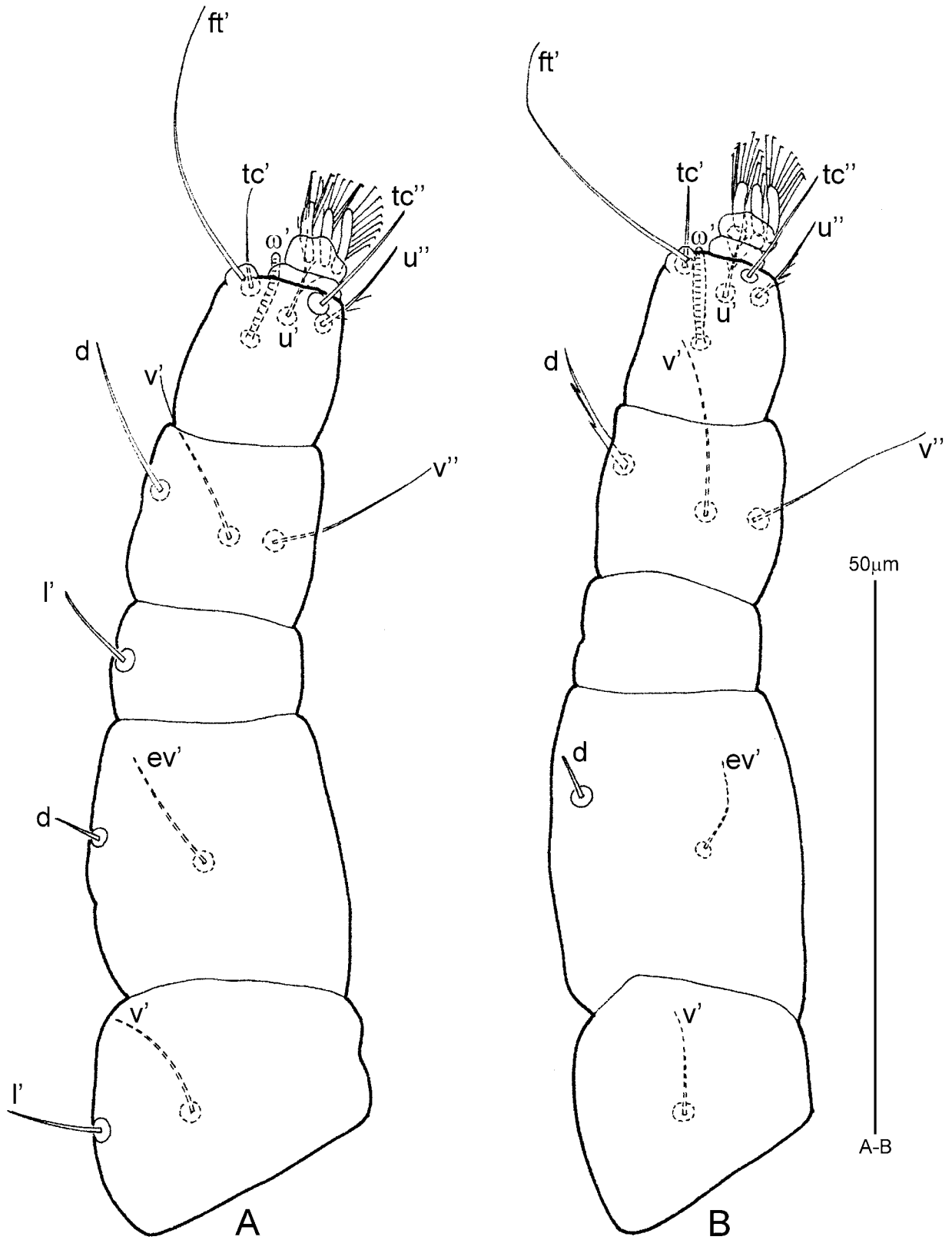


FIGURE 13. *Tenuipalpus alpinus* Collyer (male). A, leg III; B, leg IV.

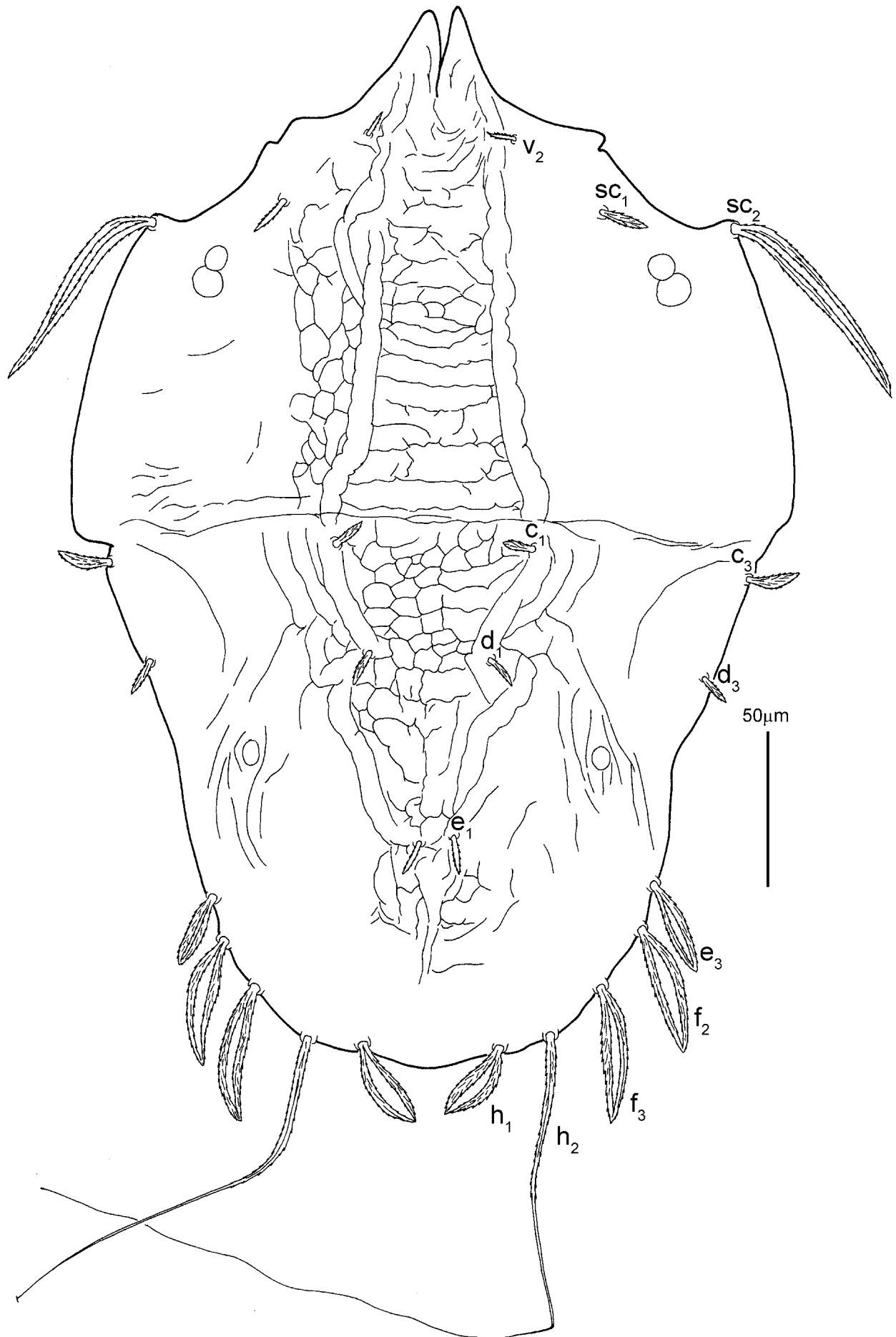


FIGURE 14. *Tenuipalpus antipodus* Collyer (female). Dorsal view of idiosoma.

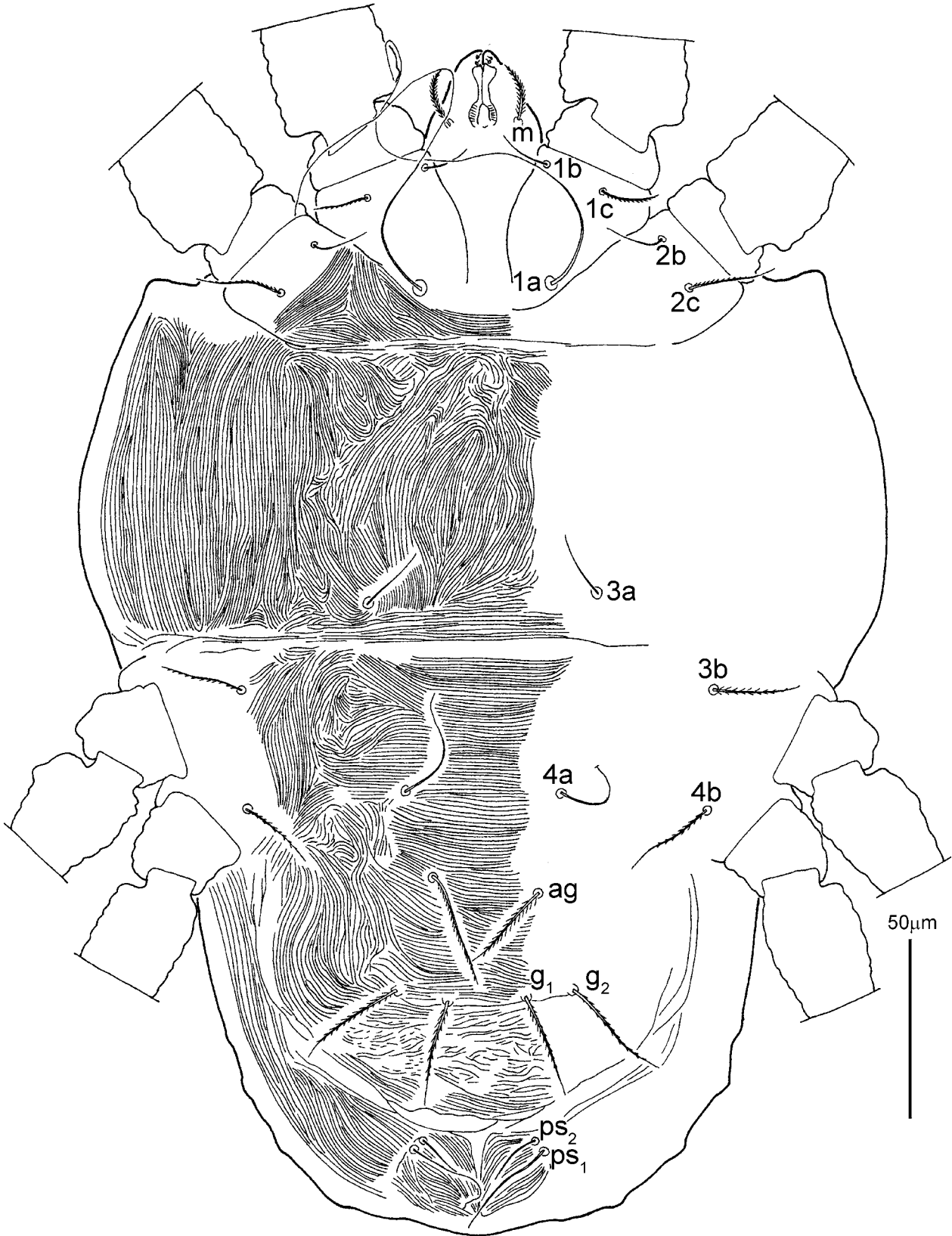


FIGURE 15. *Tenuipalpus antipodus* Collyer (female). Ventral view of idiosoma.

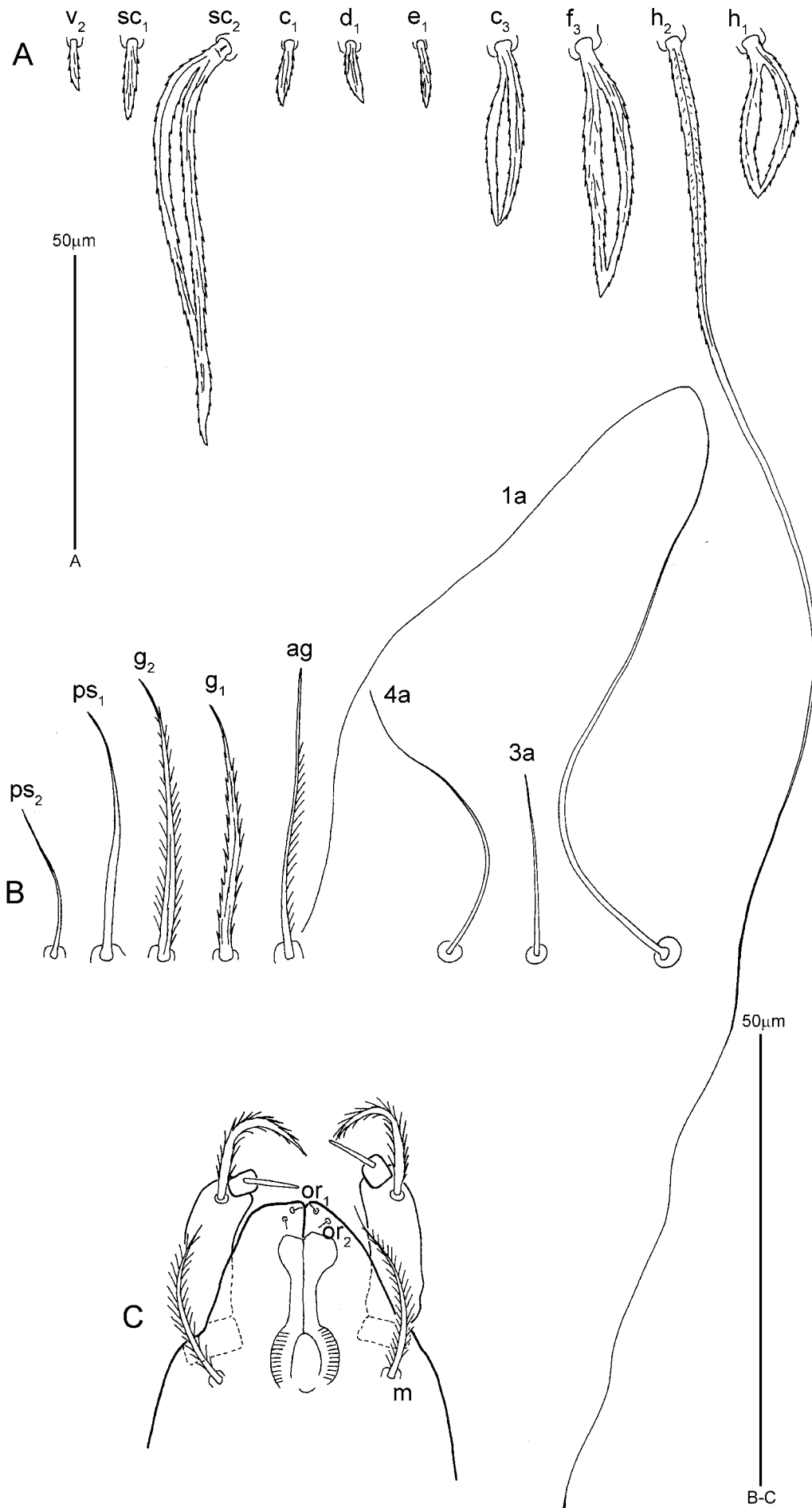


FIGURE 16. *Temipalpus antipodus* Collyer (female). A, dorsal setae; B, ventral setae; C, subcapitulum.

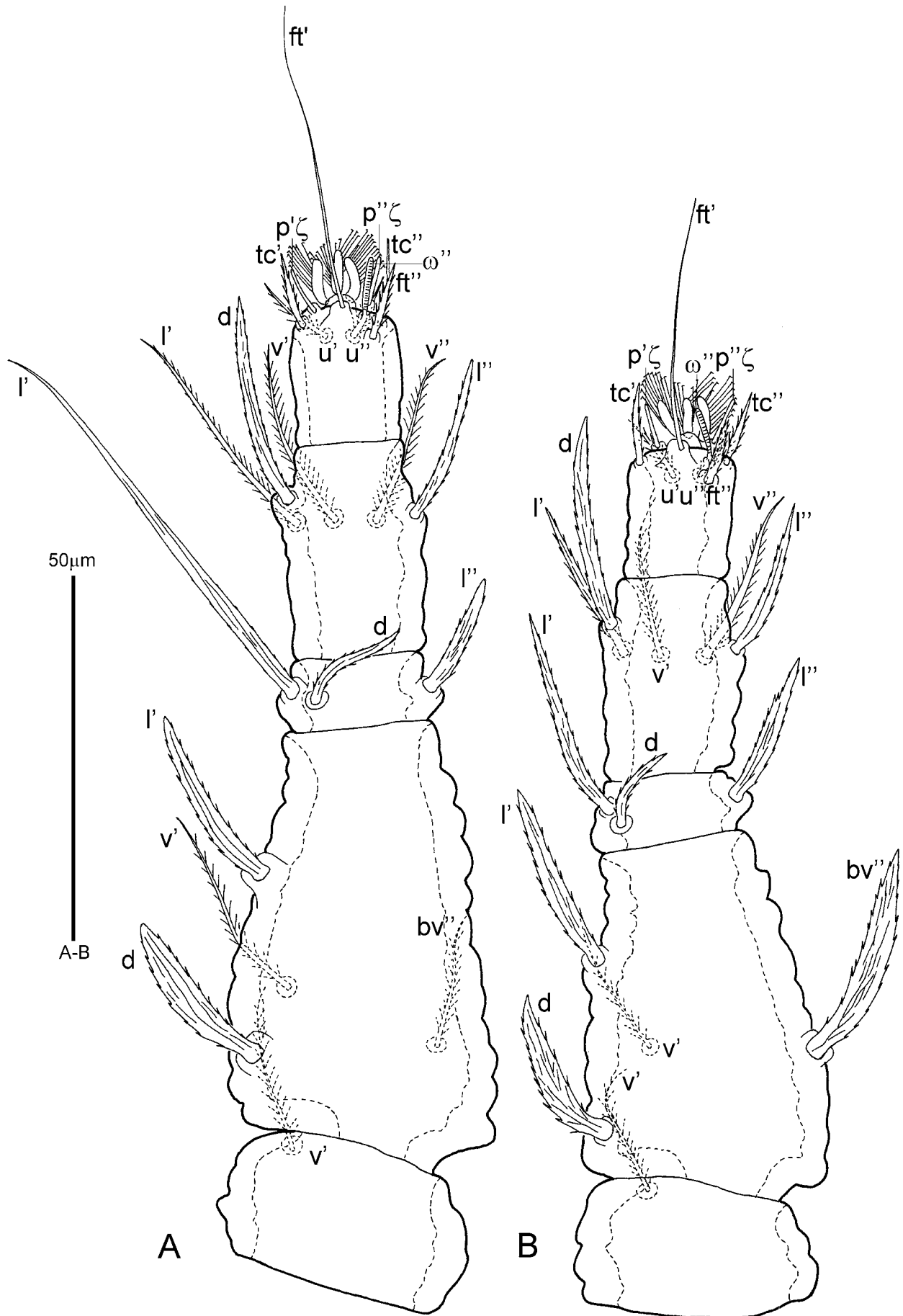


FIGURE 17. *Tenuipalpus antipodus* Collyer (female). A, leg I; B, leg II.



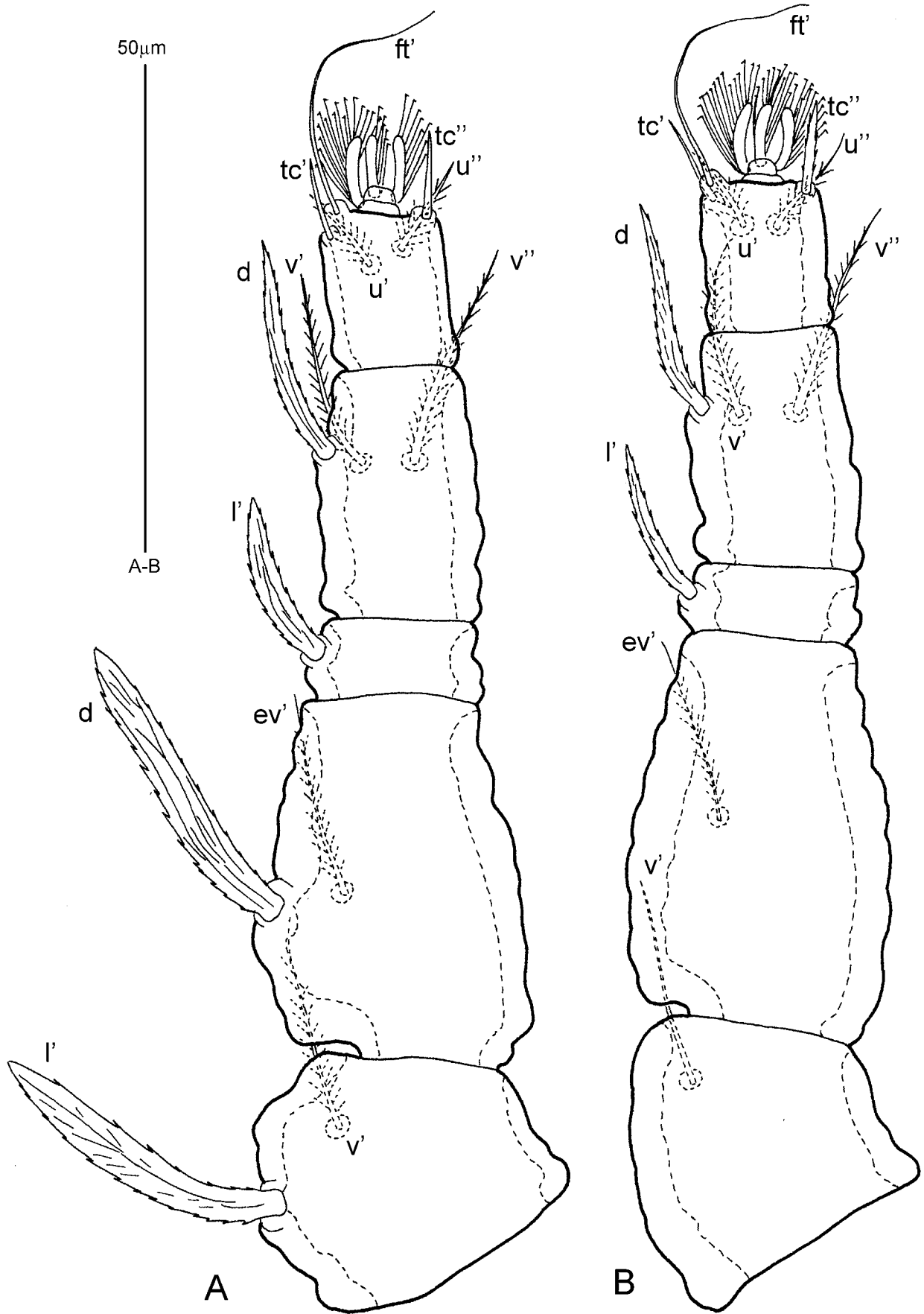


FIGURE 18. *Tenuipalpus antipodus* Collyer (female). A, leg III; B, leg IV.

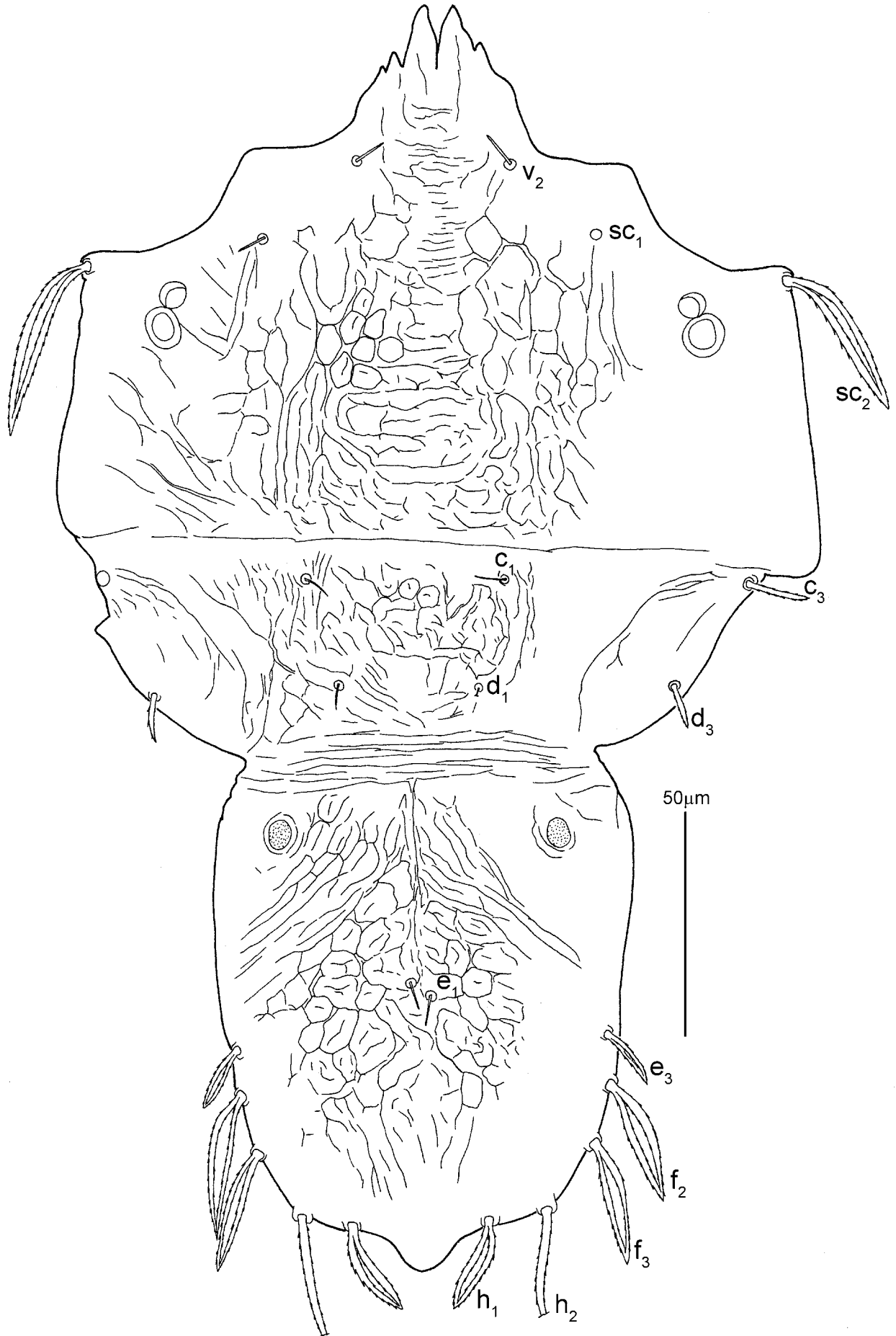


FIGURE 19. *Tenuipalpus antipodus* Collyer (male). Dorsal view of idiosoma.

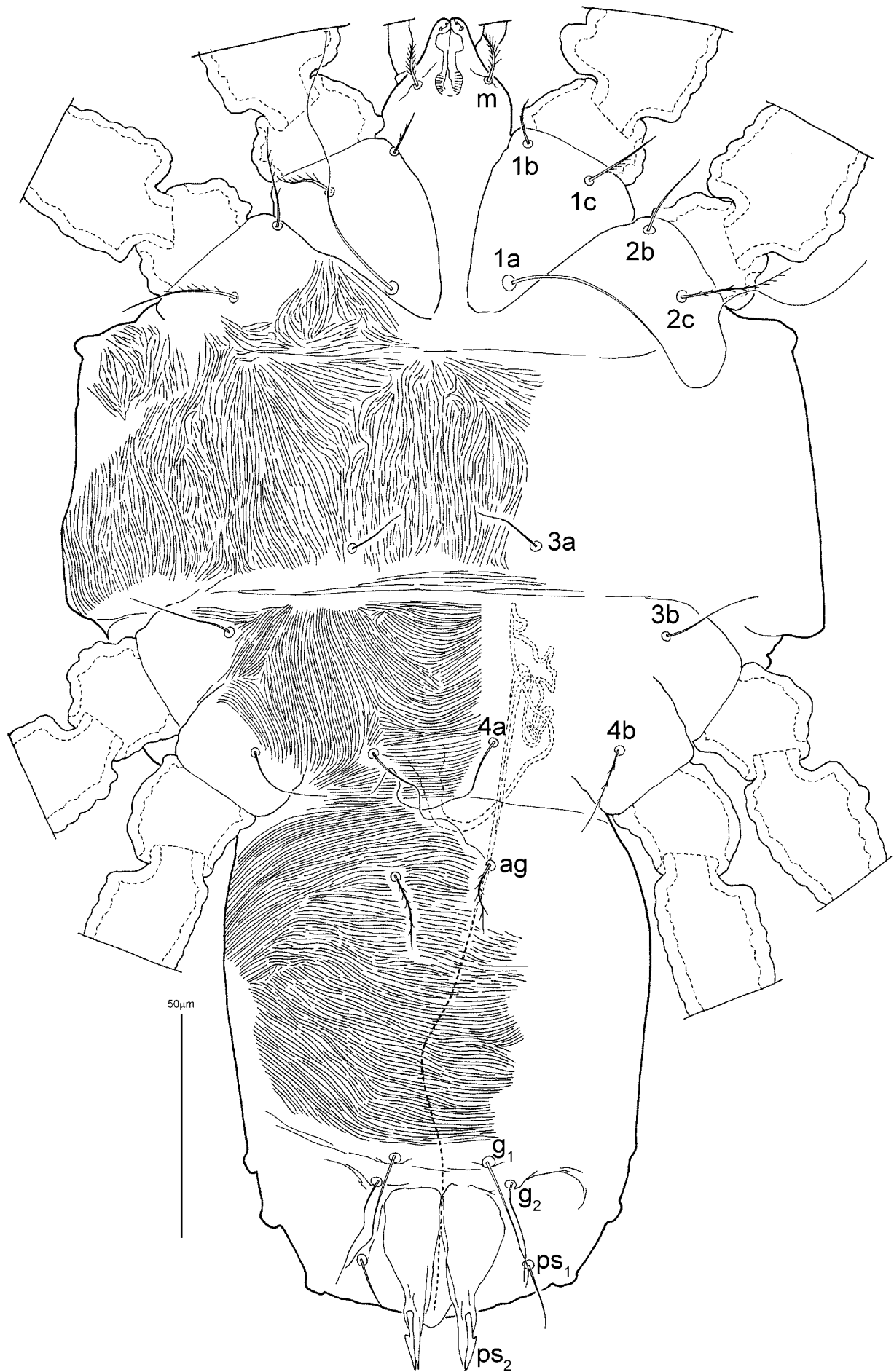
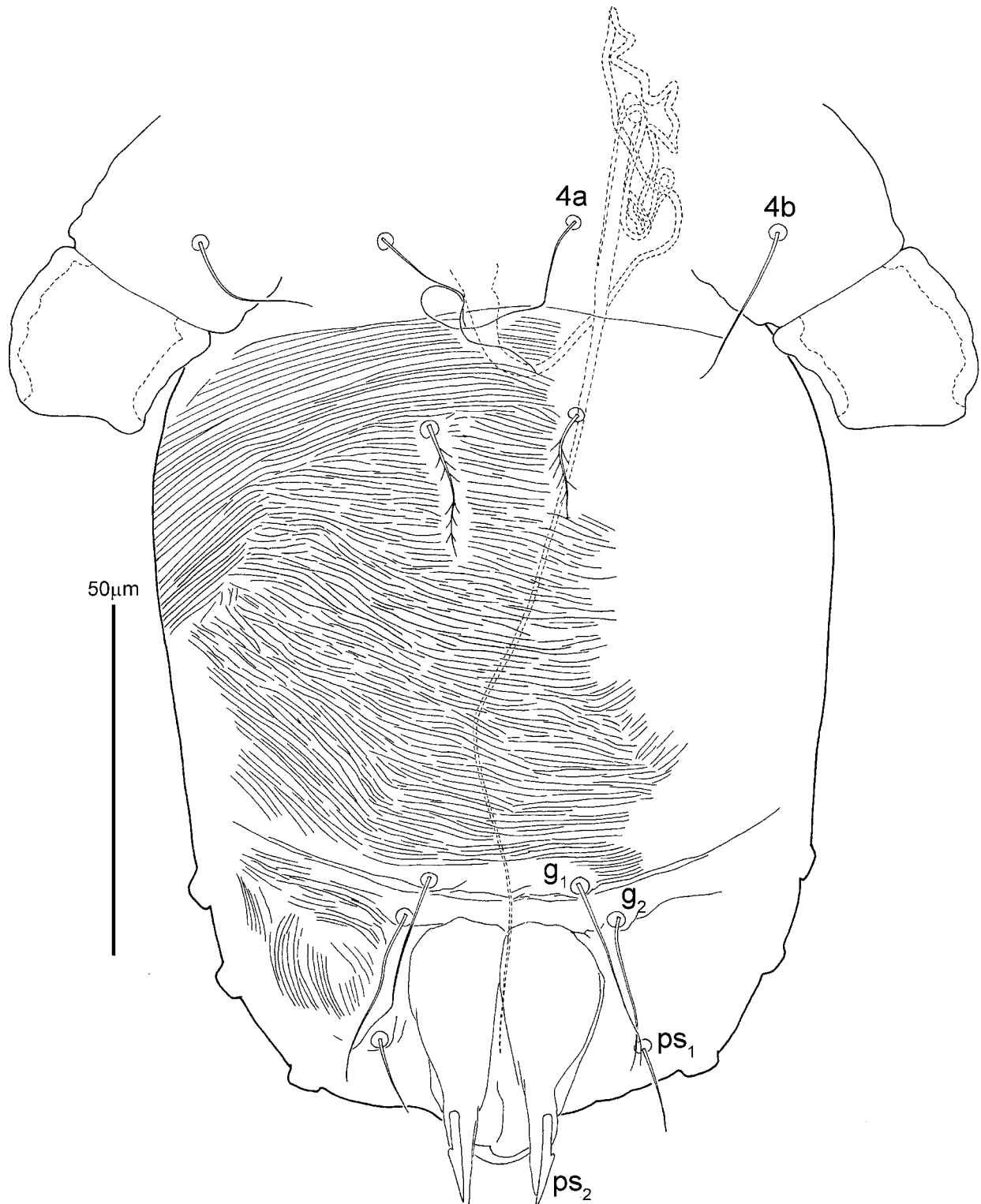


FIGURE 20. *Temipalpus antipodus* Collyer (male). Ventral view of idiosoma.



**FIGURE 21.** *Tenuipalpus antipodus* Collyer (male). Genitoanal area.

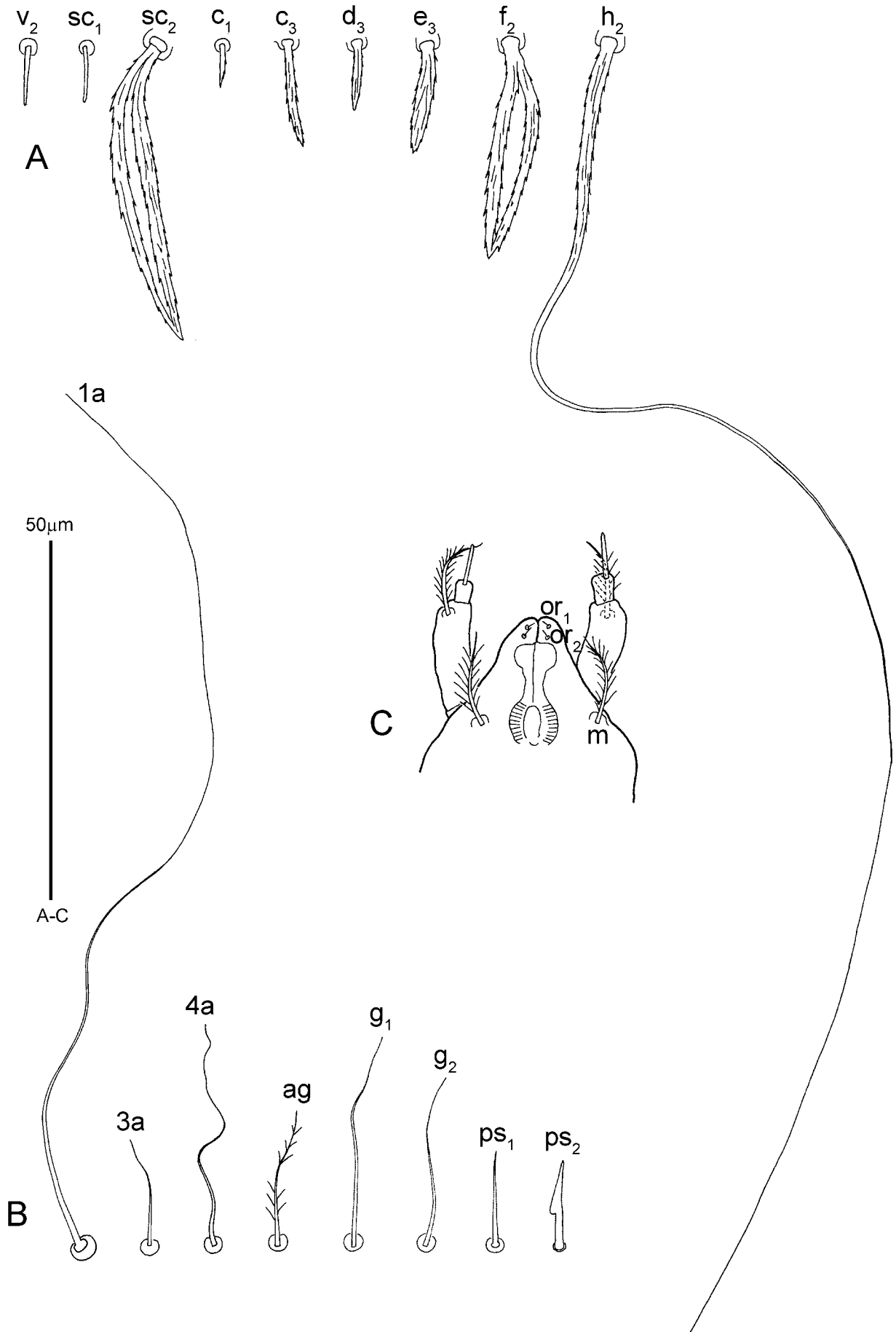


FIGURE 22. *Tenuipalpus antipodus* Collyer (male). A, dorsal setae; B, ventral setae; C, subcapitulum.

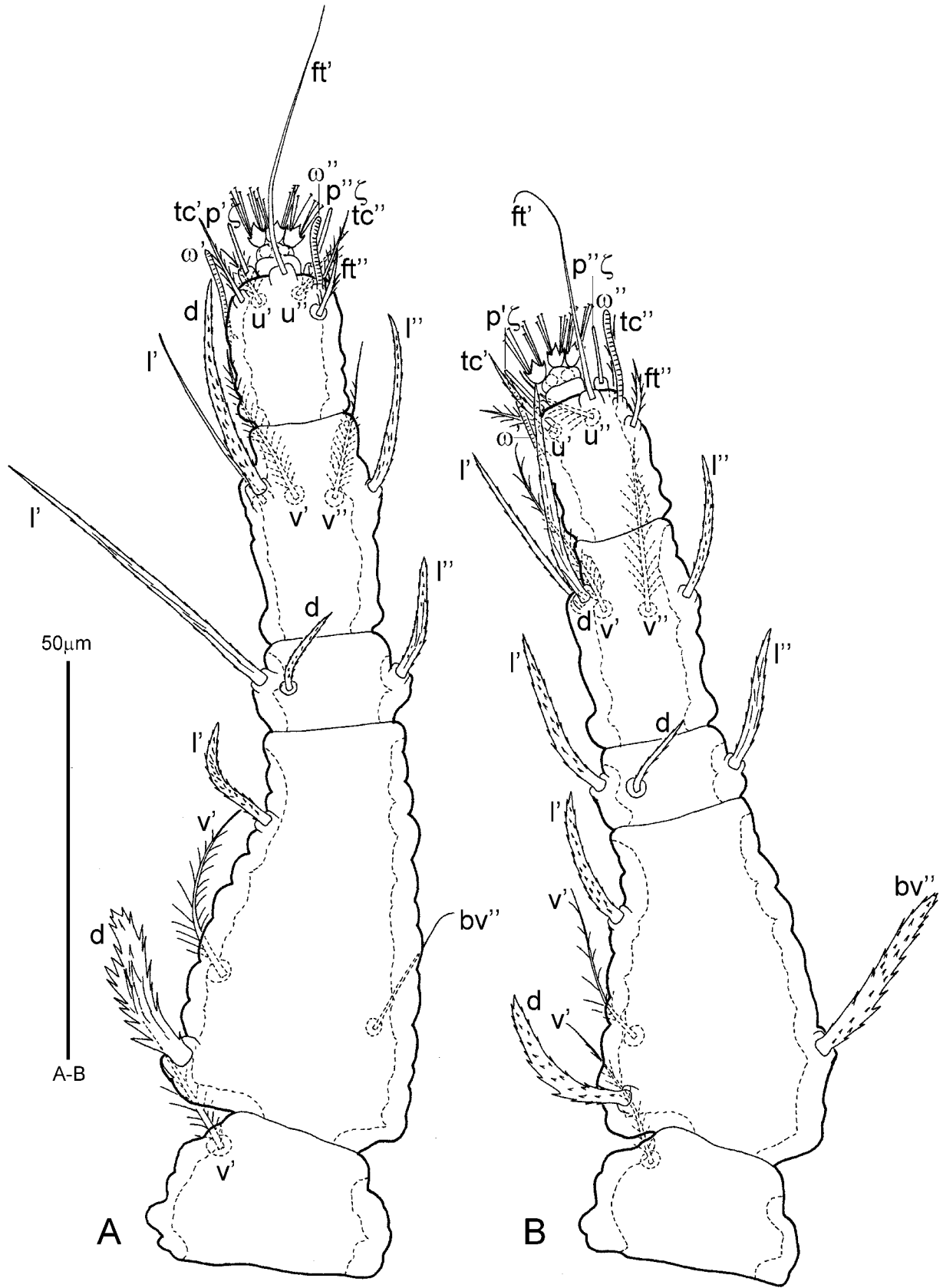


FIGURE 23. *Tenuipalpus antipodus* Collyer (male). A, leg I; B, leg II.

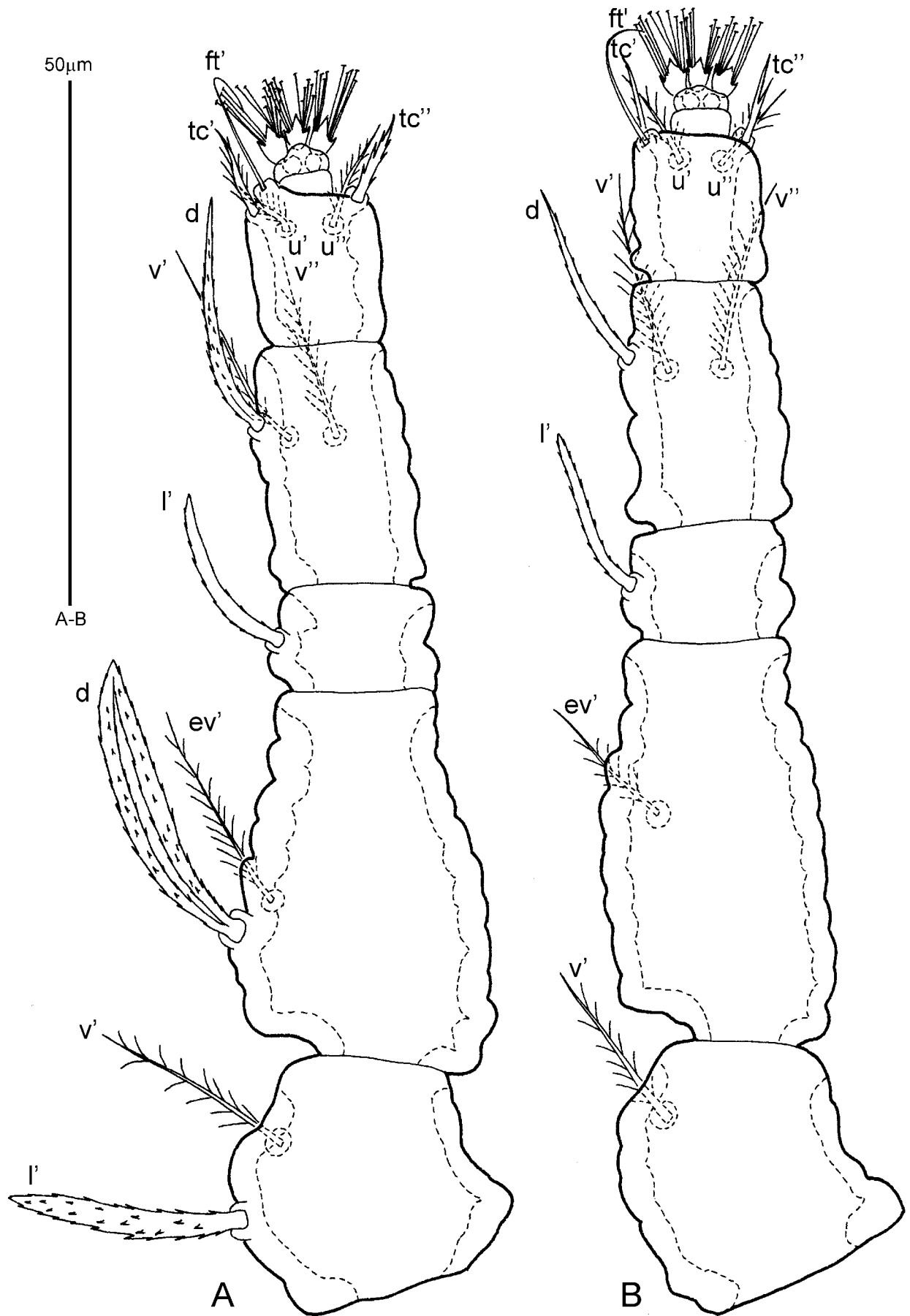


FIGURE 24. *Temnipalpus antipodus* Collyer (male). A, leg III; B, leg IV.

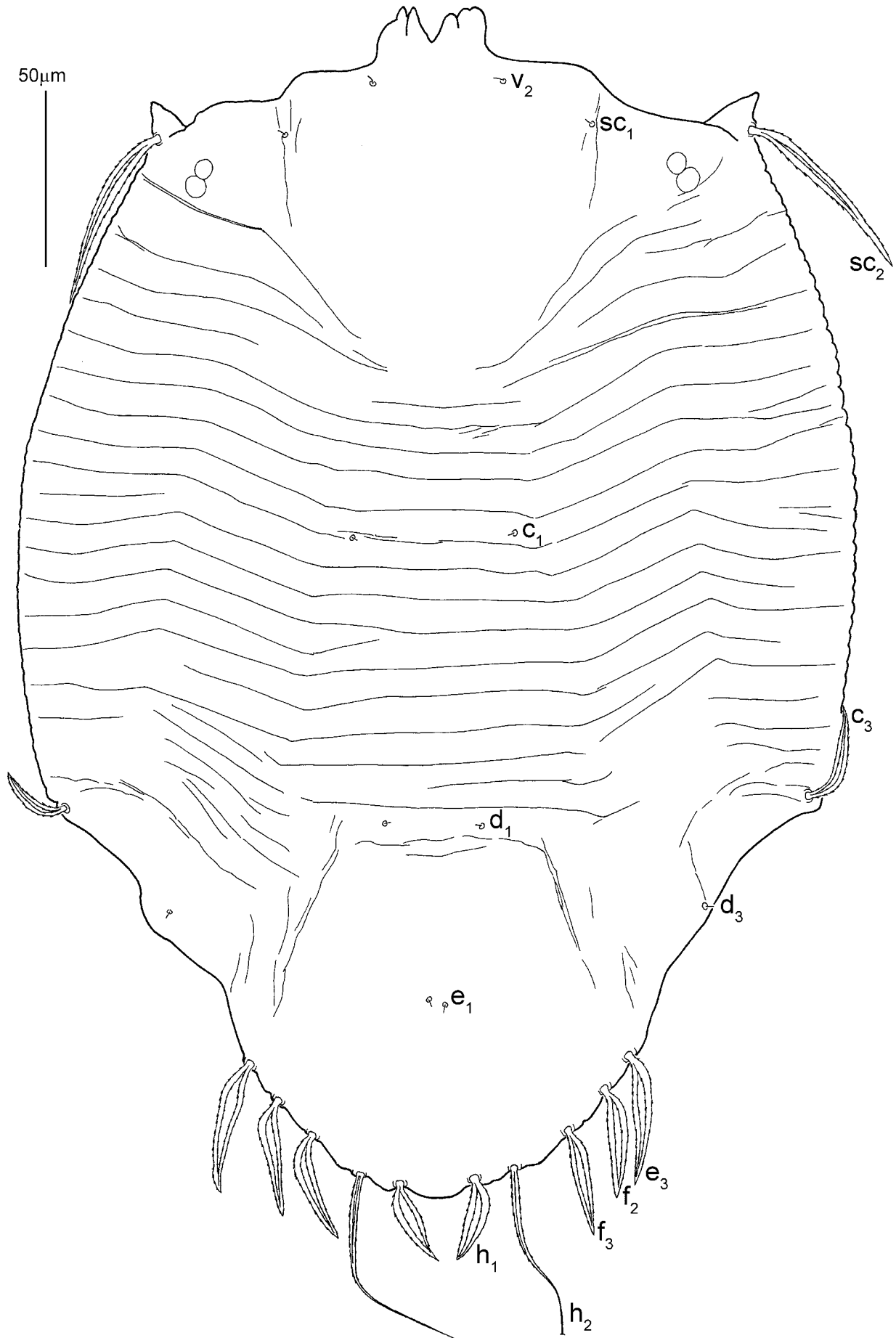


FIGURE 25. *Tenuipalpus antipodus* Collyer (Deutonymph). Dorsal view of idiosoma.



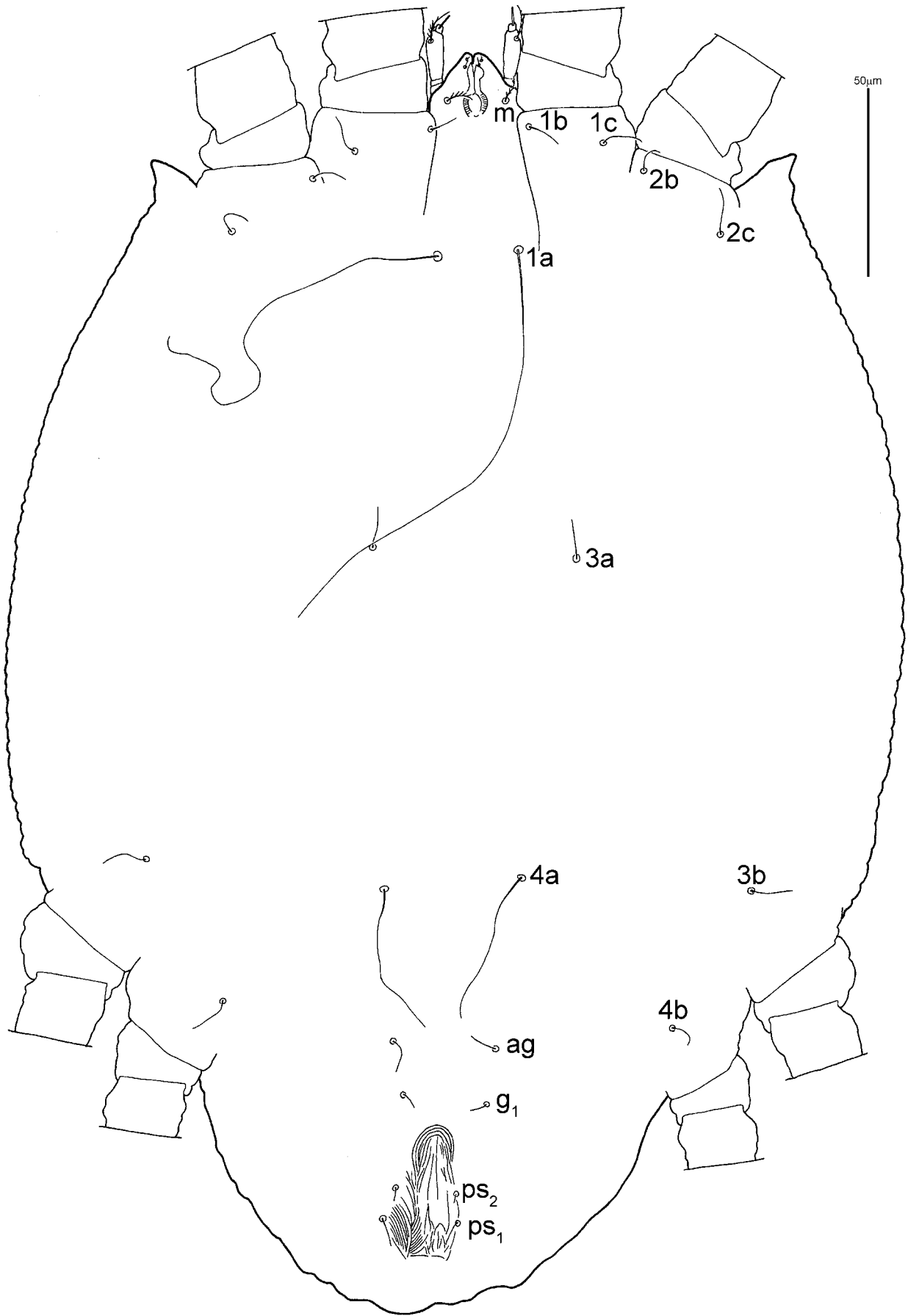


FIGURE 26. *Tenuipalpus antipodus* Collyer (Deutonymph). Ventral view of idiosoma.

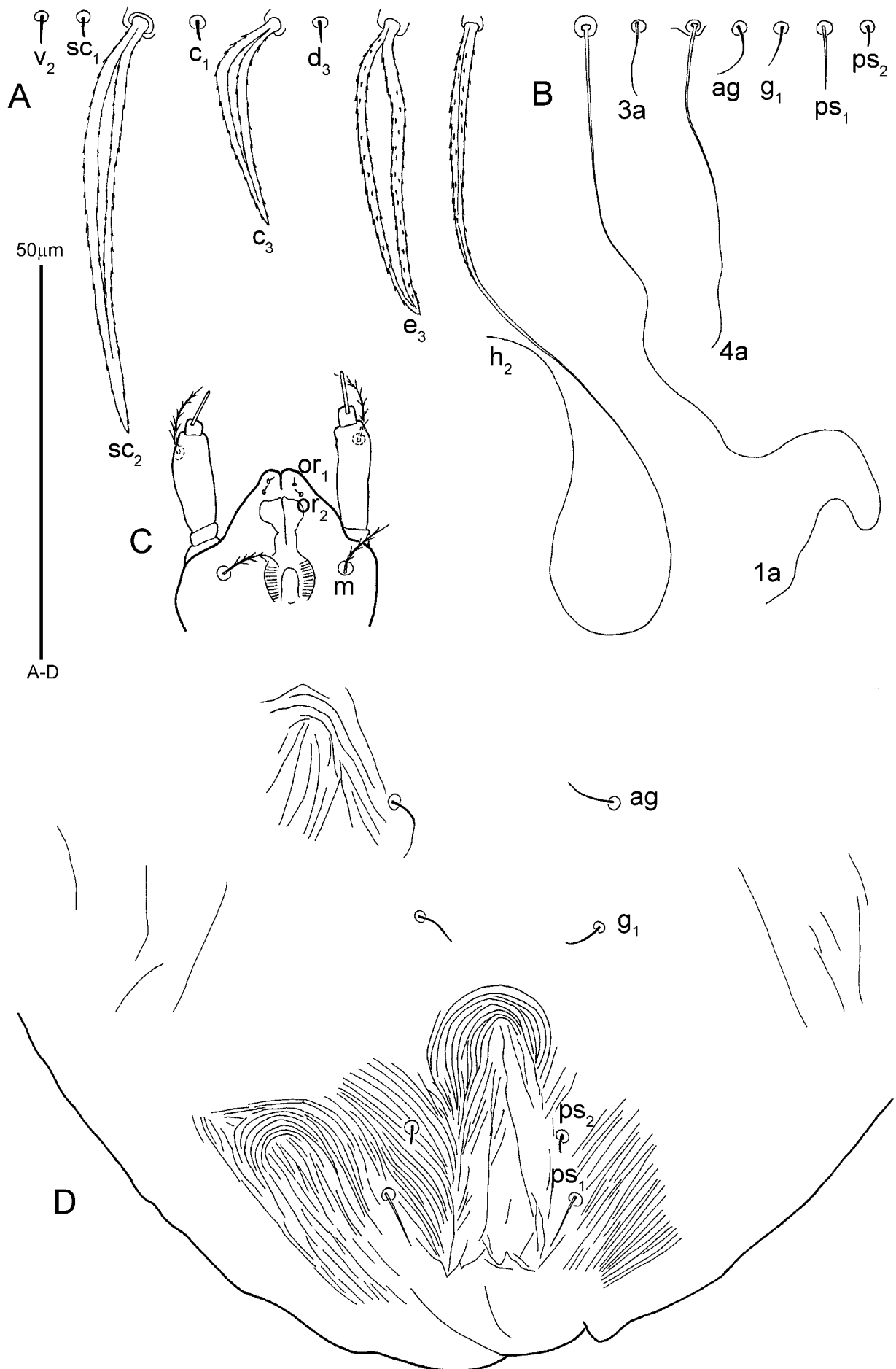


FIGURE 27. *Tenuipalpus antipodus* Collyer (Deutonymph). A, dorsal setae; B, ventral setae; C, subcapitulum; D, genitoanal area.

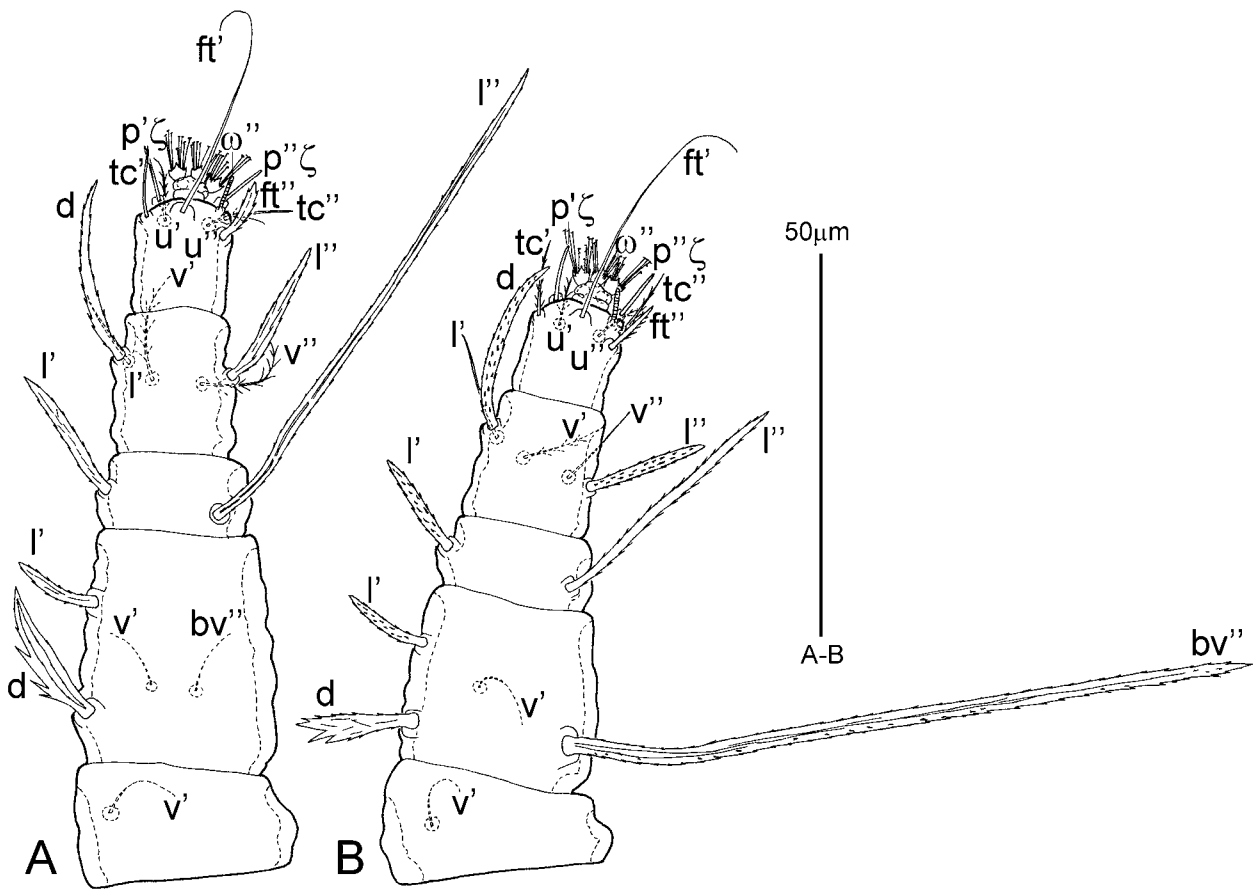
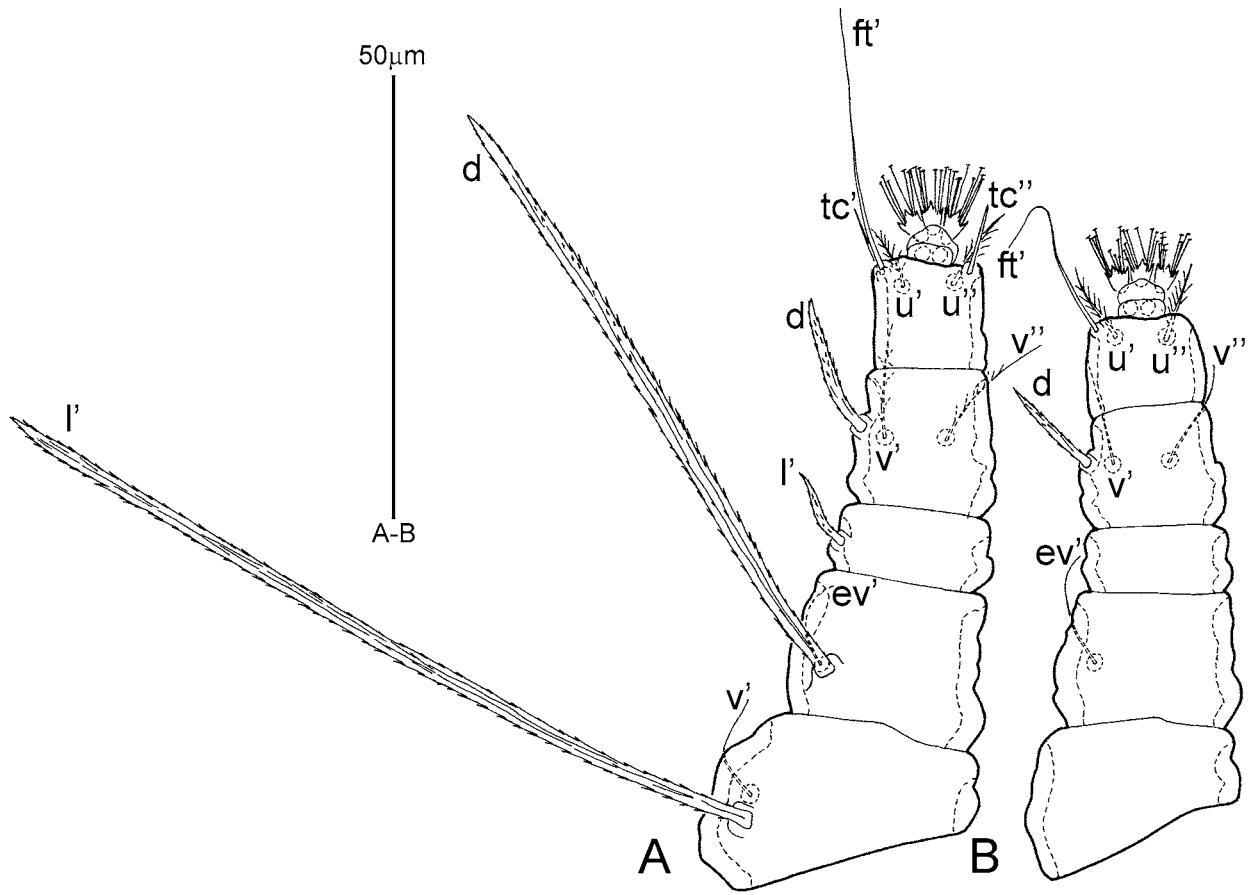


FIGURE 28. *Tenuipalpus antipodus* Collyer (Deutonymph). A, leg I; B, leg II.



**FIGURE 29.** *Tenuipalpus antipodus* Collyer (Deutonymph). A, leg III; B, leg IV.

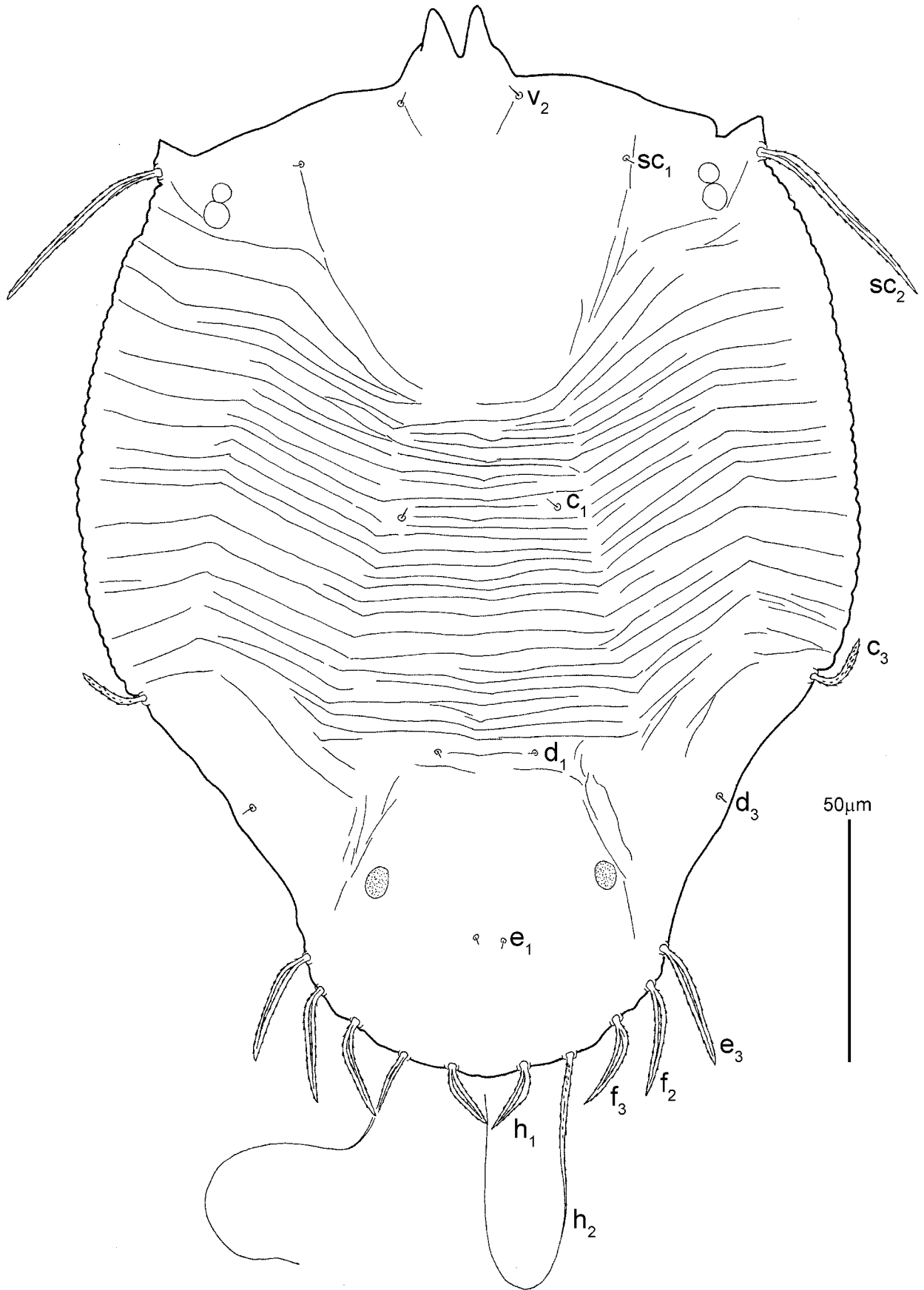
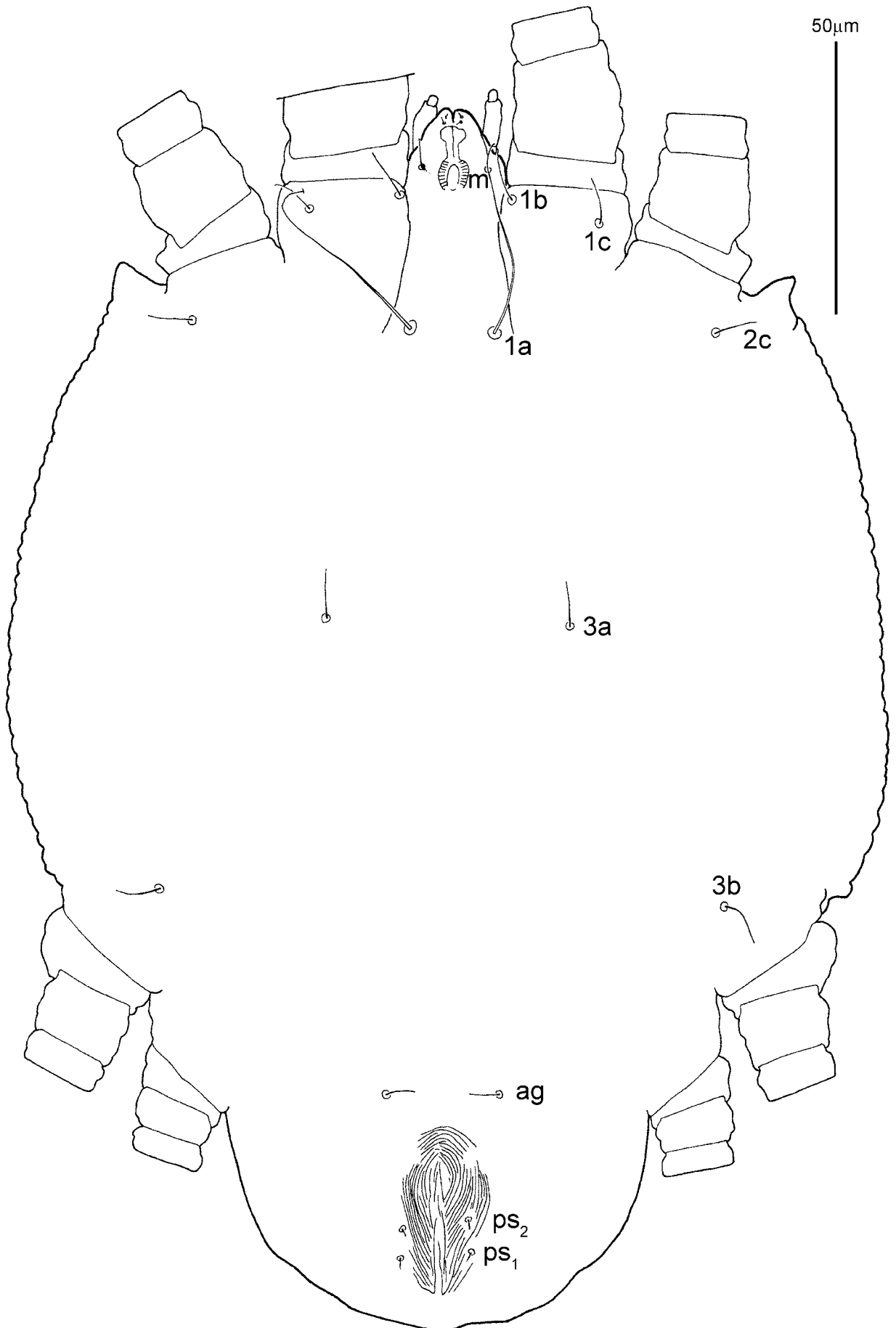


FIGURE 30. *Tenuipalpus antipodus* Collyer (Protonymph). Dorsal view of idiosoma.



**FIGURE 31.** *Tenuipalpus antipodus* Collyer (Protonymph). Ventral view of idiosoma.

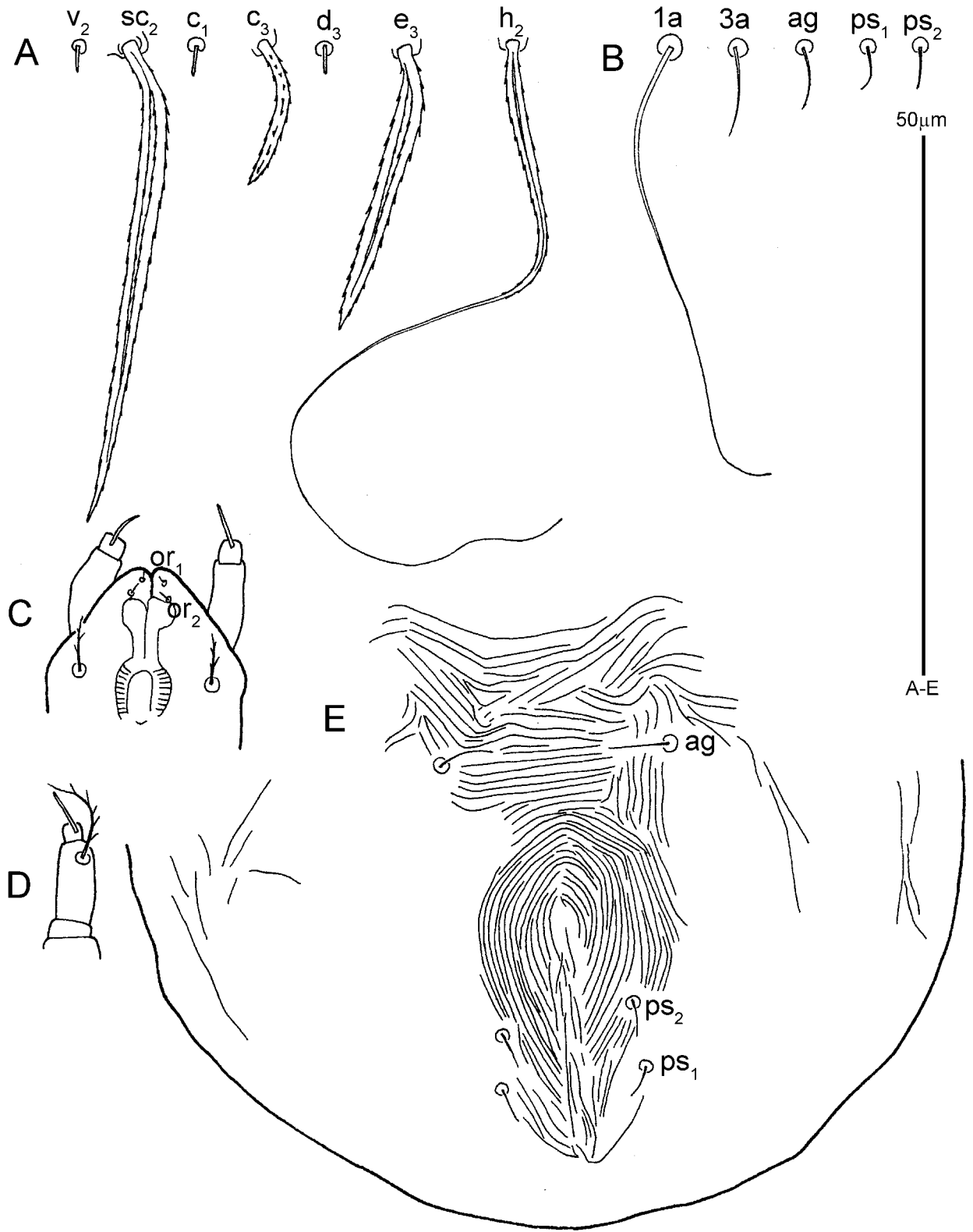


FIGURE 32. *Temipalpus antipodus* Collyer (Protonymph). A, dorsal setae; B, ventral setae; C, subcapitulum; D, palp; E, genitoanal area.

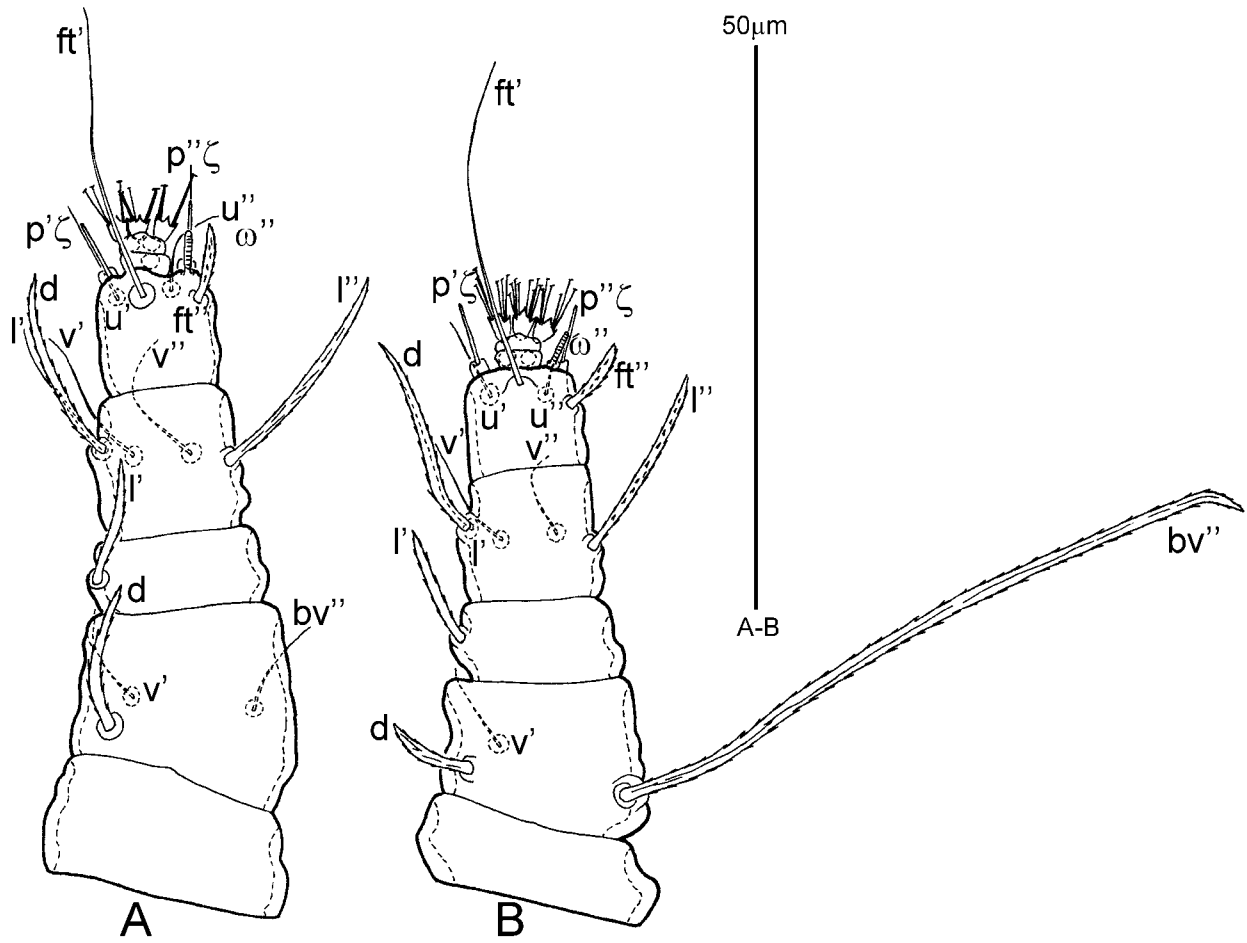


FIGURE 33. *Tenuipalpus antipodus* Collyer (Protonymph). A, leg I; B, leg II.



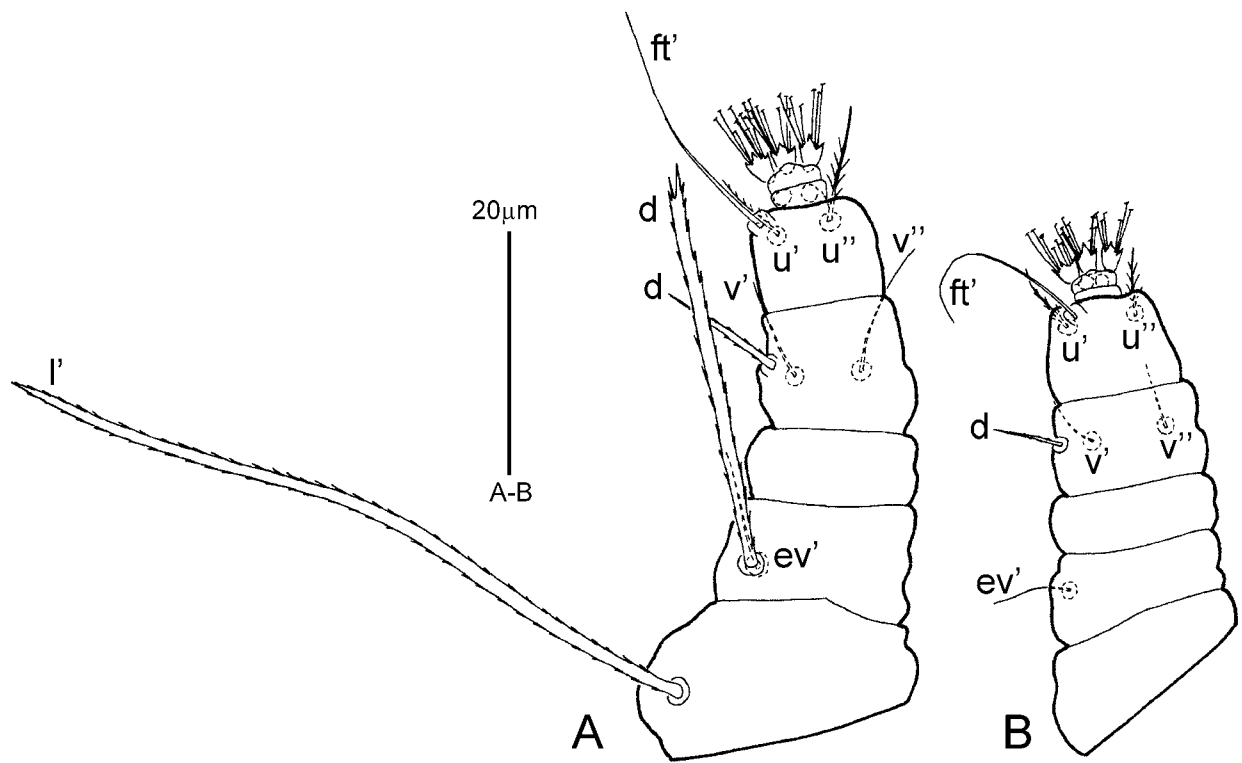


FIGURE 34. *Tenuipalpus antipodus* Collyer (Protonymph). A, leg III; B, leg IV.

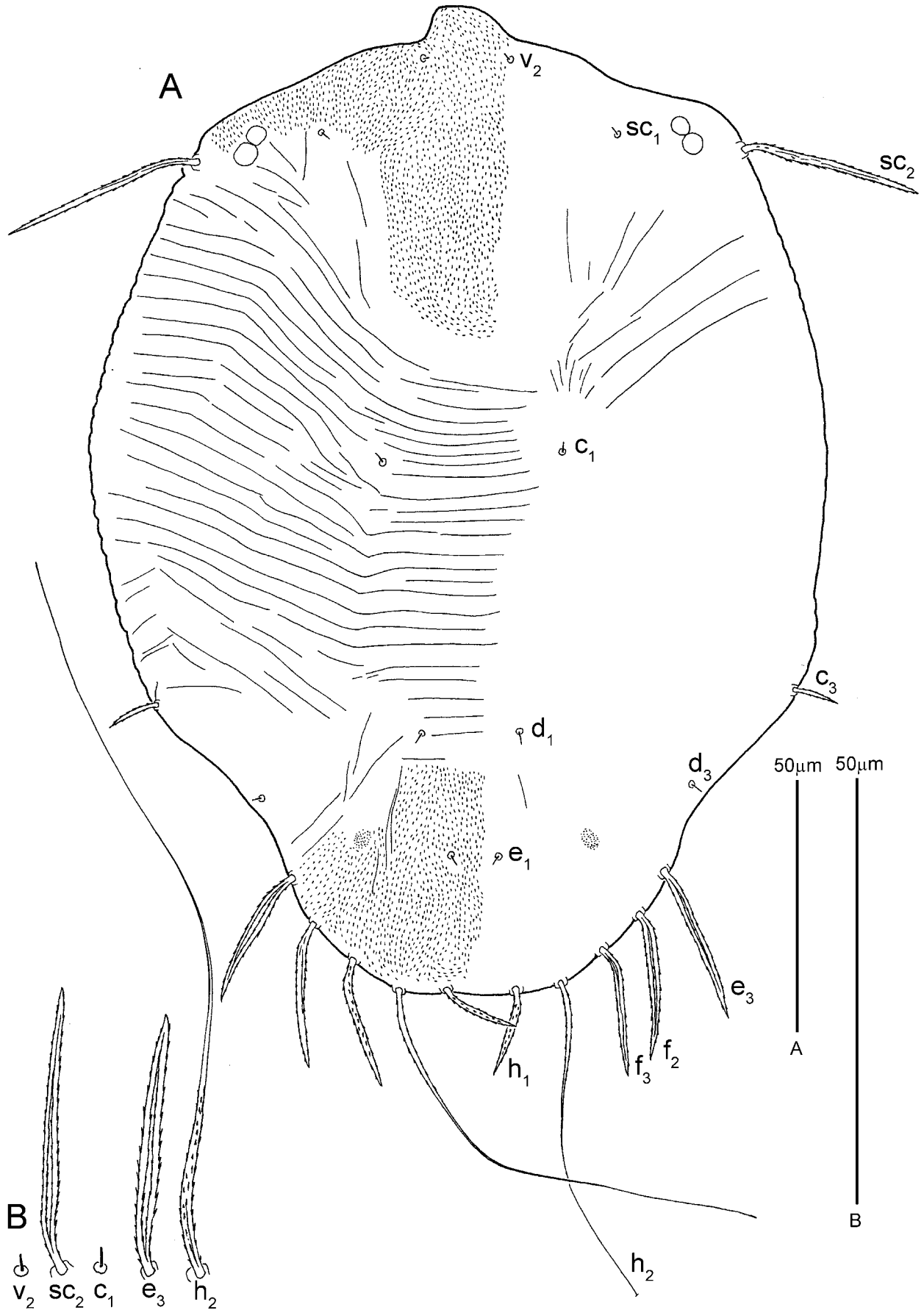


FIGURE 35. *Tenuipalpus antipodus* Collyer (Larva). A, dorsal view of idiosoma; B, dorsal setae.

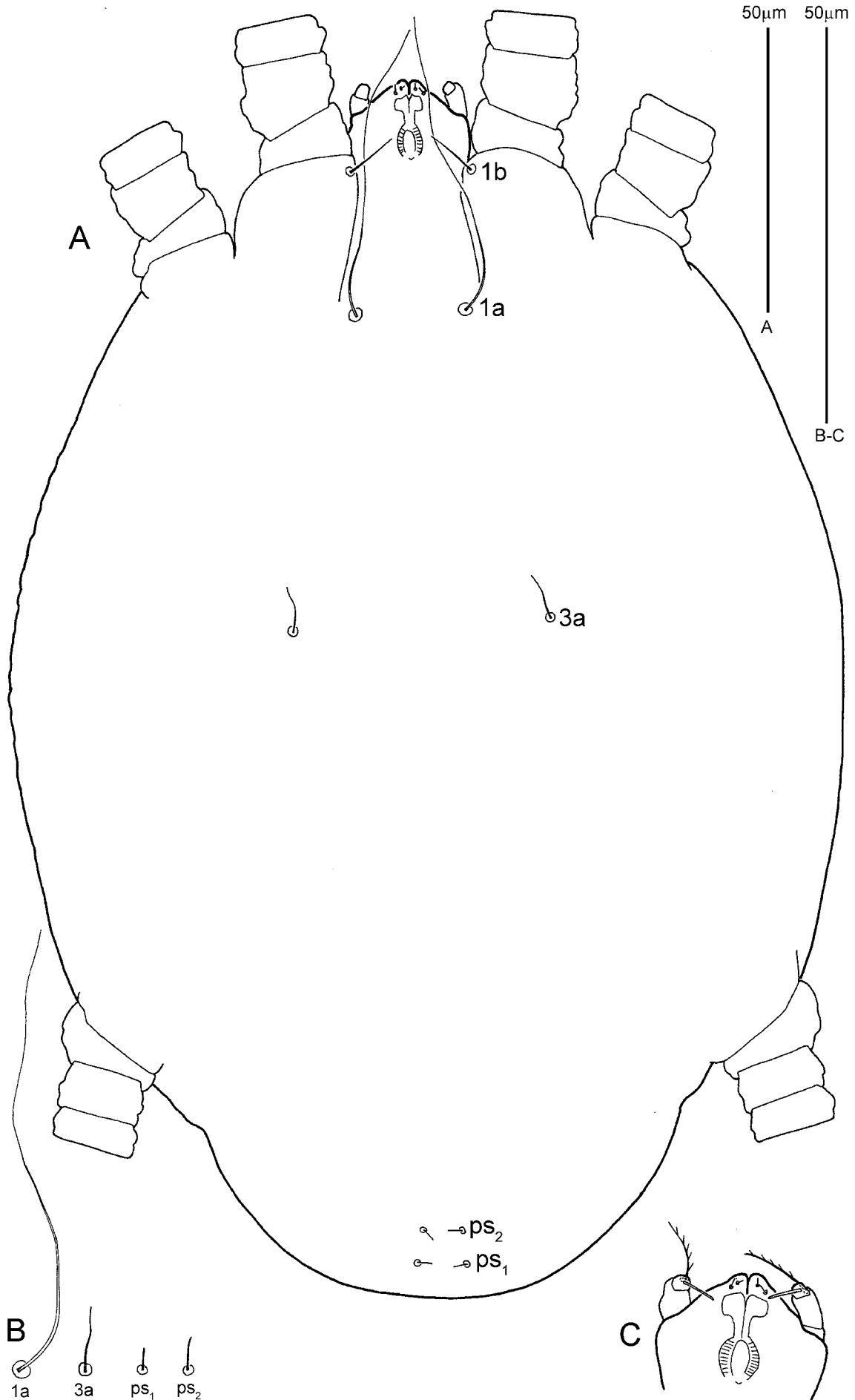


FIGURE 36. *Temuipalpus antipodus* Collyer (Larva). A, ventral view of idiosoma; B, ventral setae; C, subcapitulum.

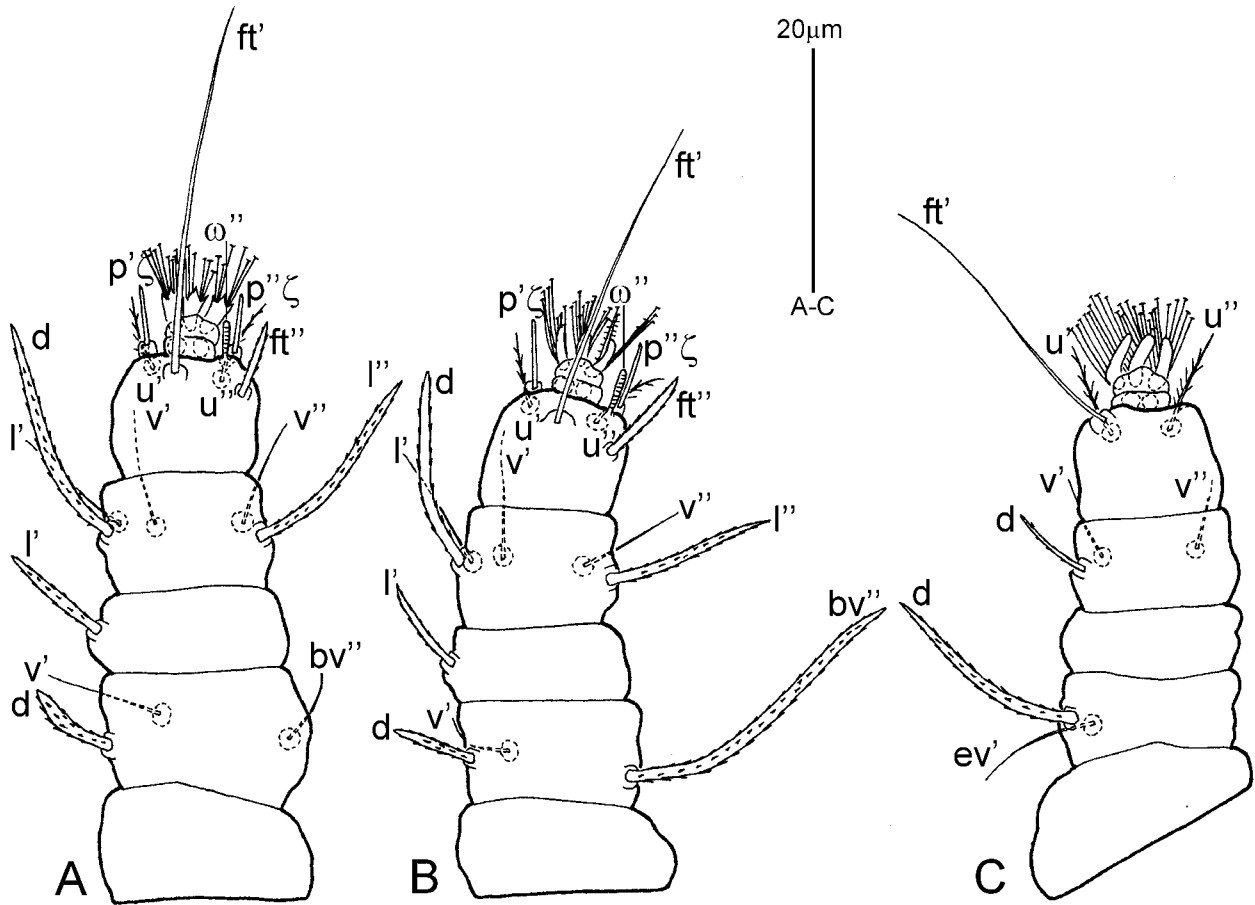


FIGURE 37. *Tenuipalpus antipodus* Collyer (Larva). A, leg I; B, leg II; C, leg III.

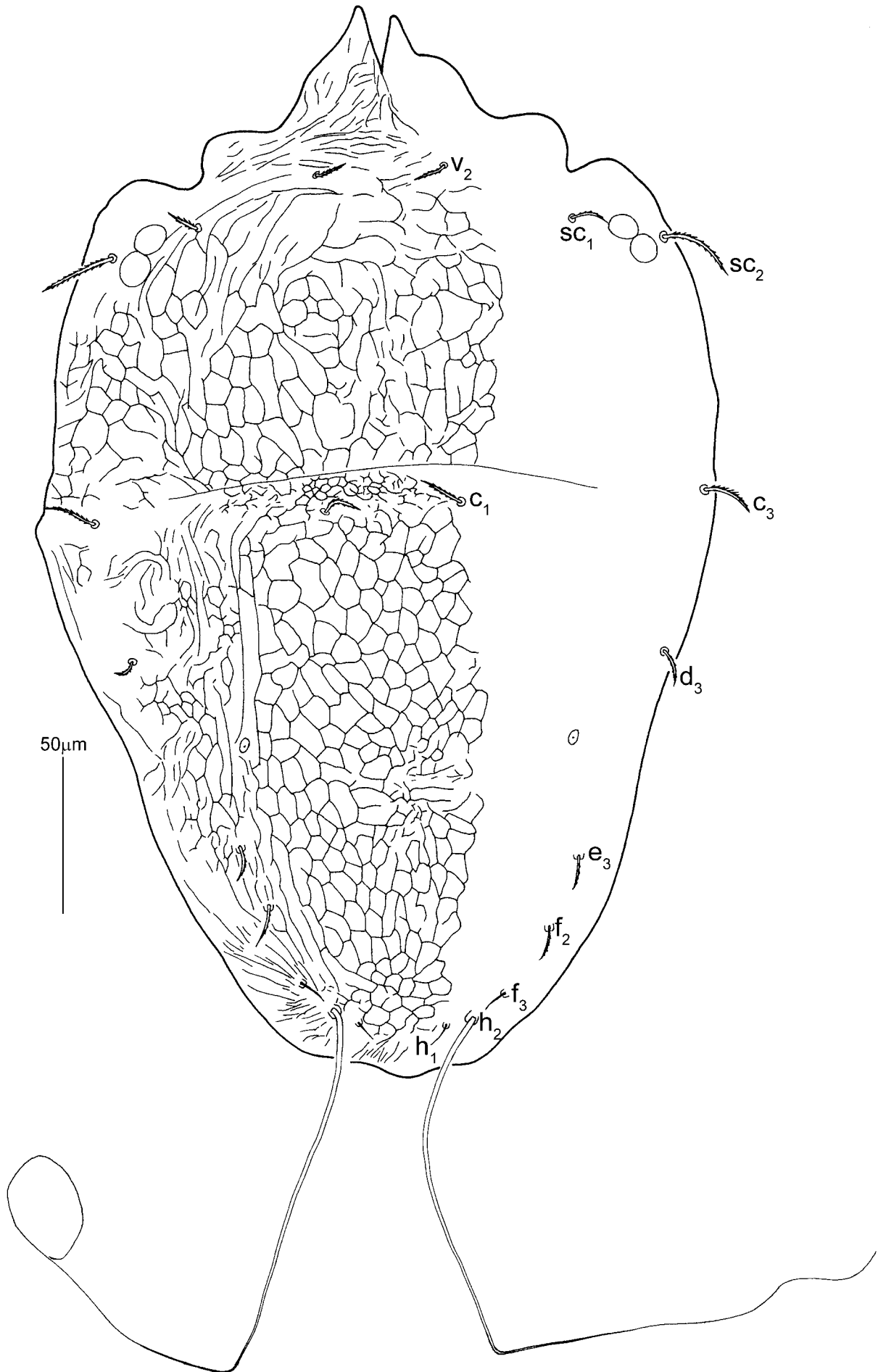


FIGURE 38. *Tenuipalpus cyatheae* Gerson & Collyer (female). Dorsal view of idiosoma.



FIGURE 39. *Tenuipalpus cyatheae* Gerson & Collyer (female). Ventral view of idiosoma.

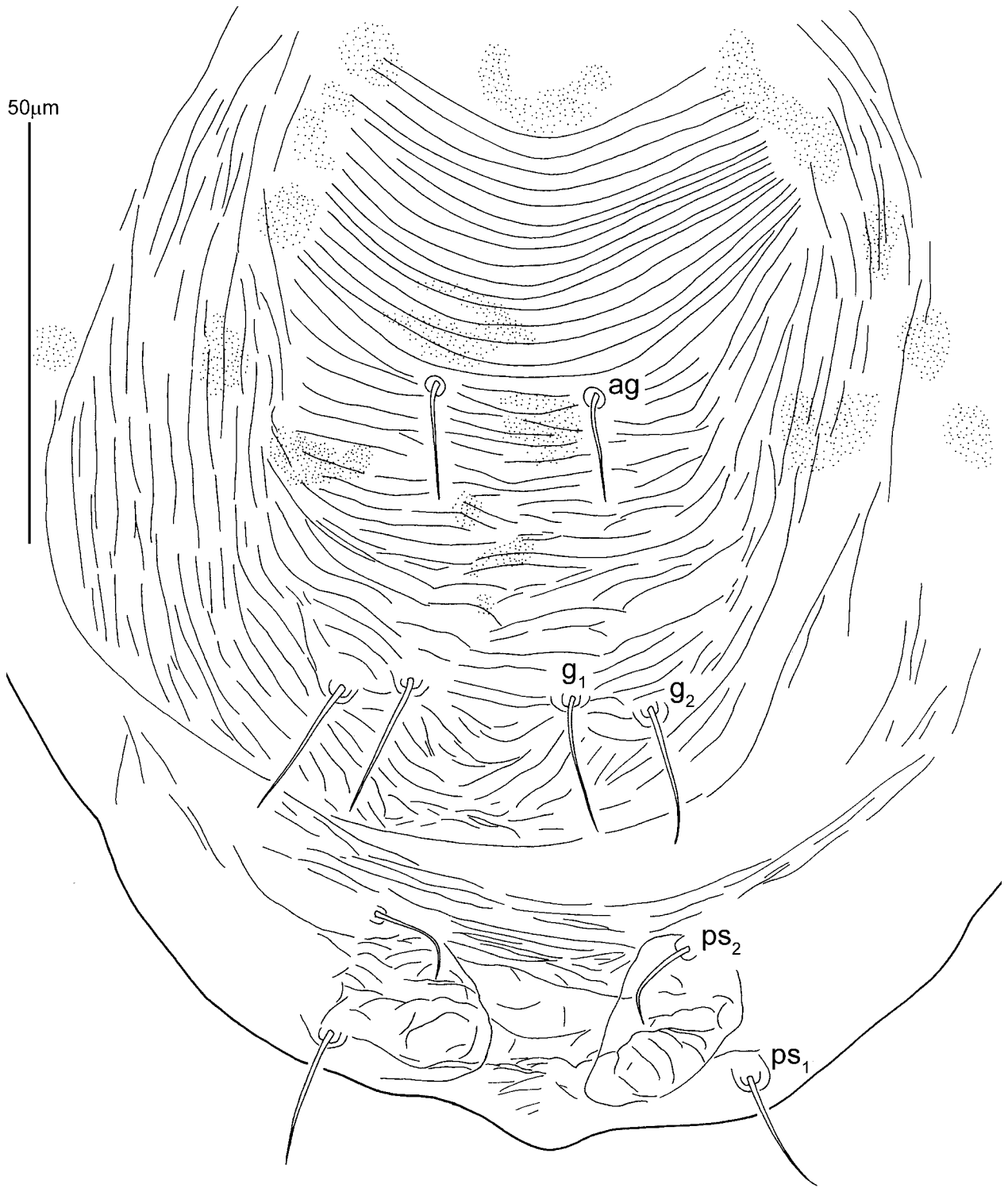


FIGURE 40. *Temuipalpus cyatheae* Gerson & Collyer (female). Genitoanal area.

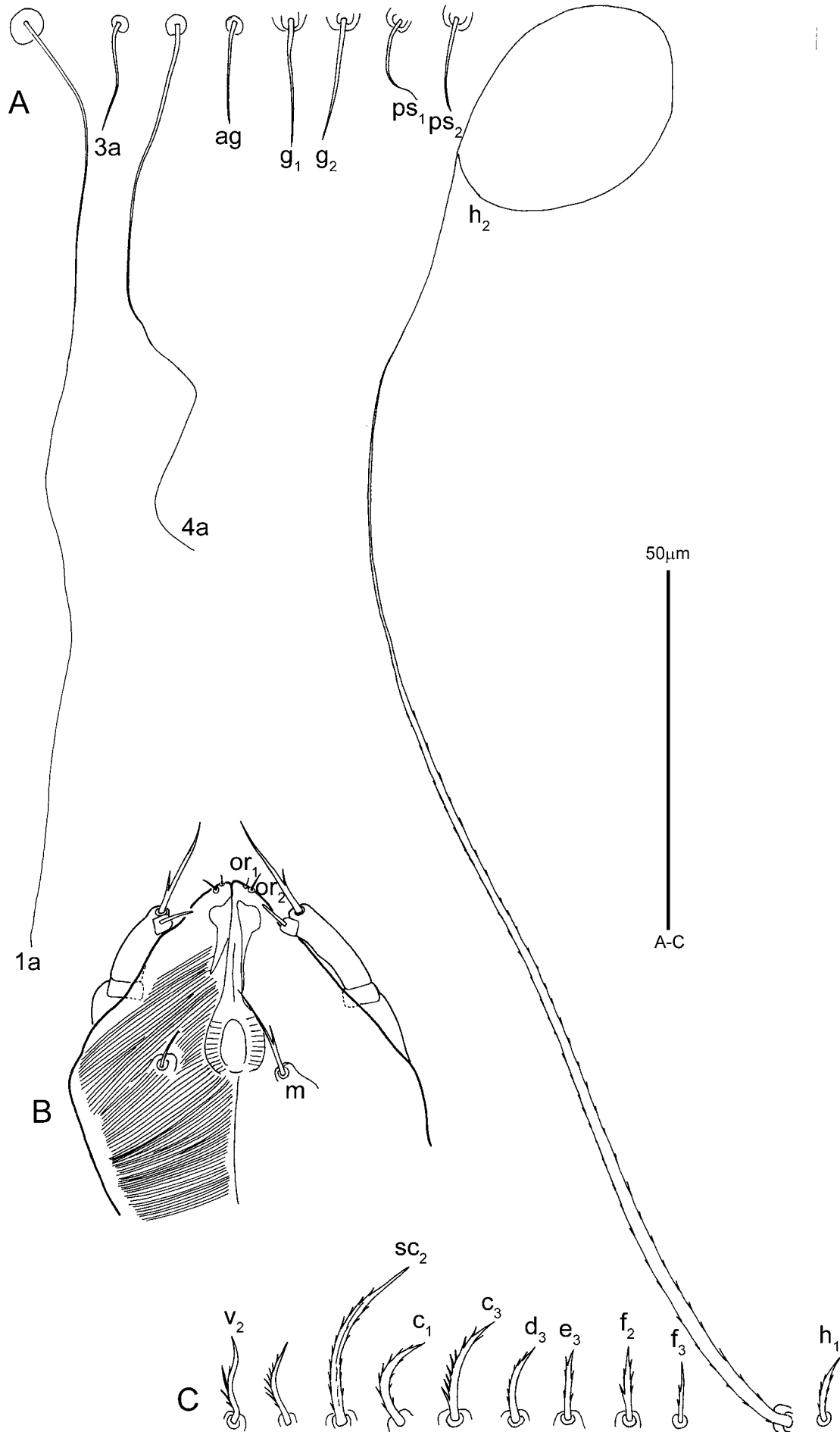


FIGURE 41. *Tenuipalpus cyatheae* Gerson & Collyer (female). A, ventral setae; B, subcapitulum; C, dorsal setae.



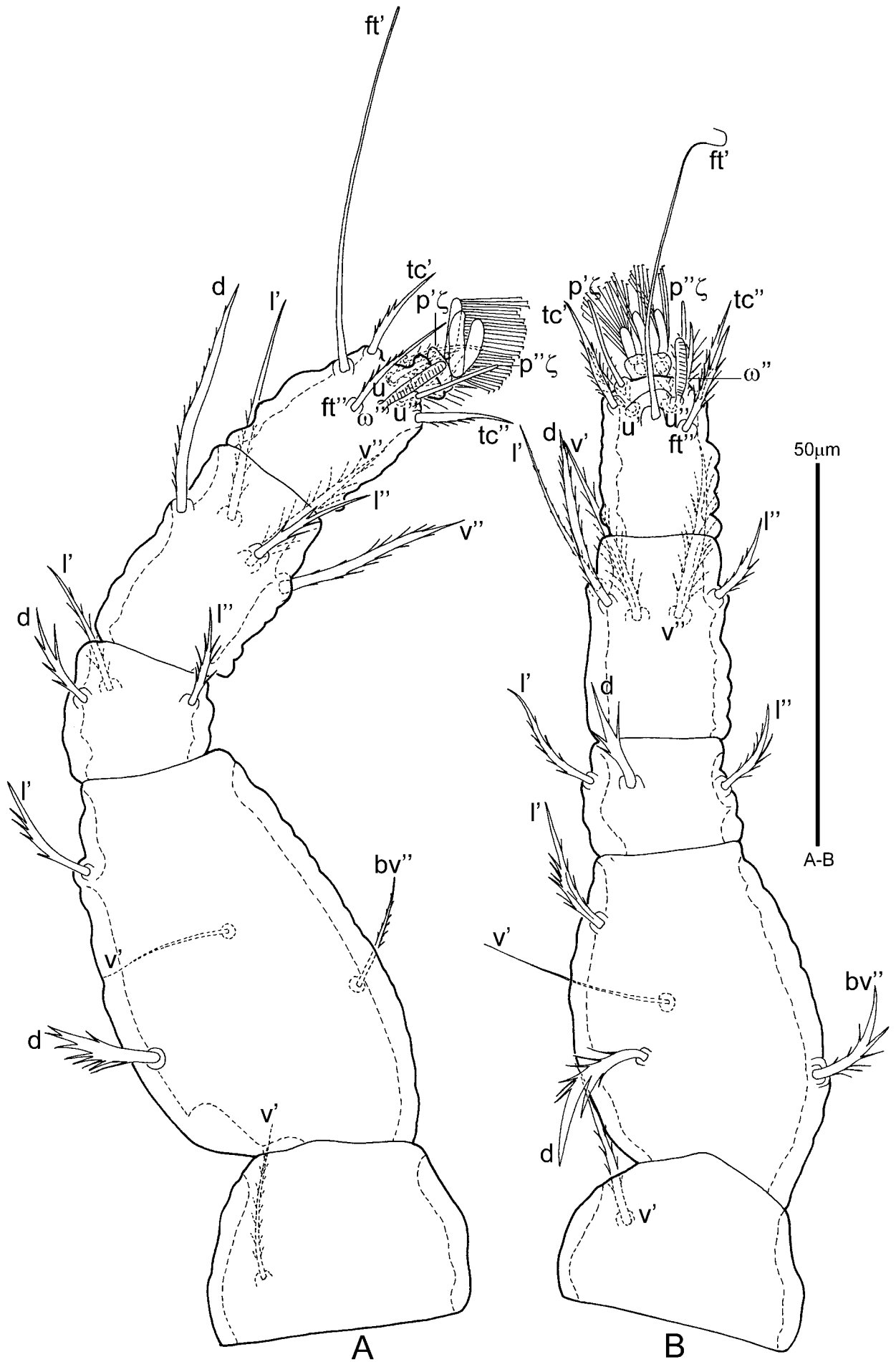


FIGURE 42. *Tenuipalpus cyatheae* Gerson & Collyer (female). A, leg I; B, leg II.

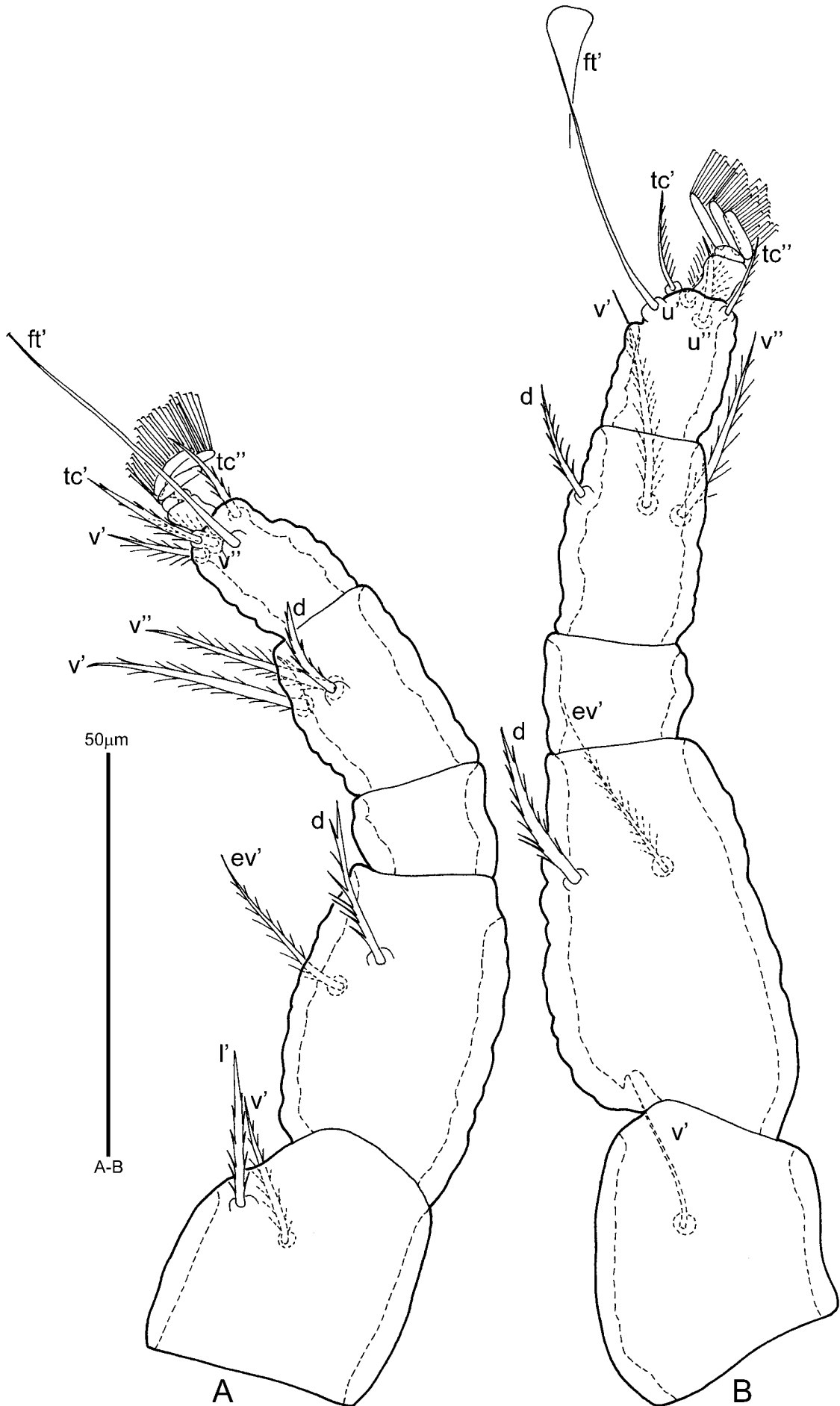


FIGURE 43. *Tenuipalpus cyatheae* Gerson & Collyer (female). A, leg III; B, leg IV.

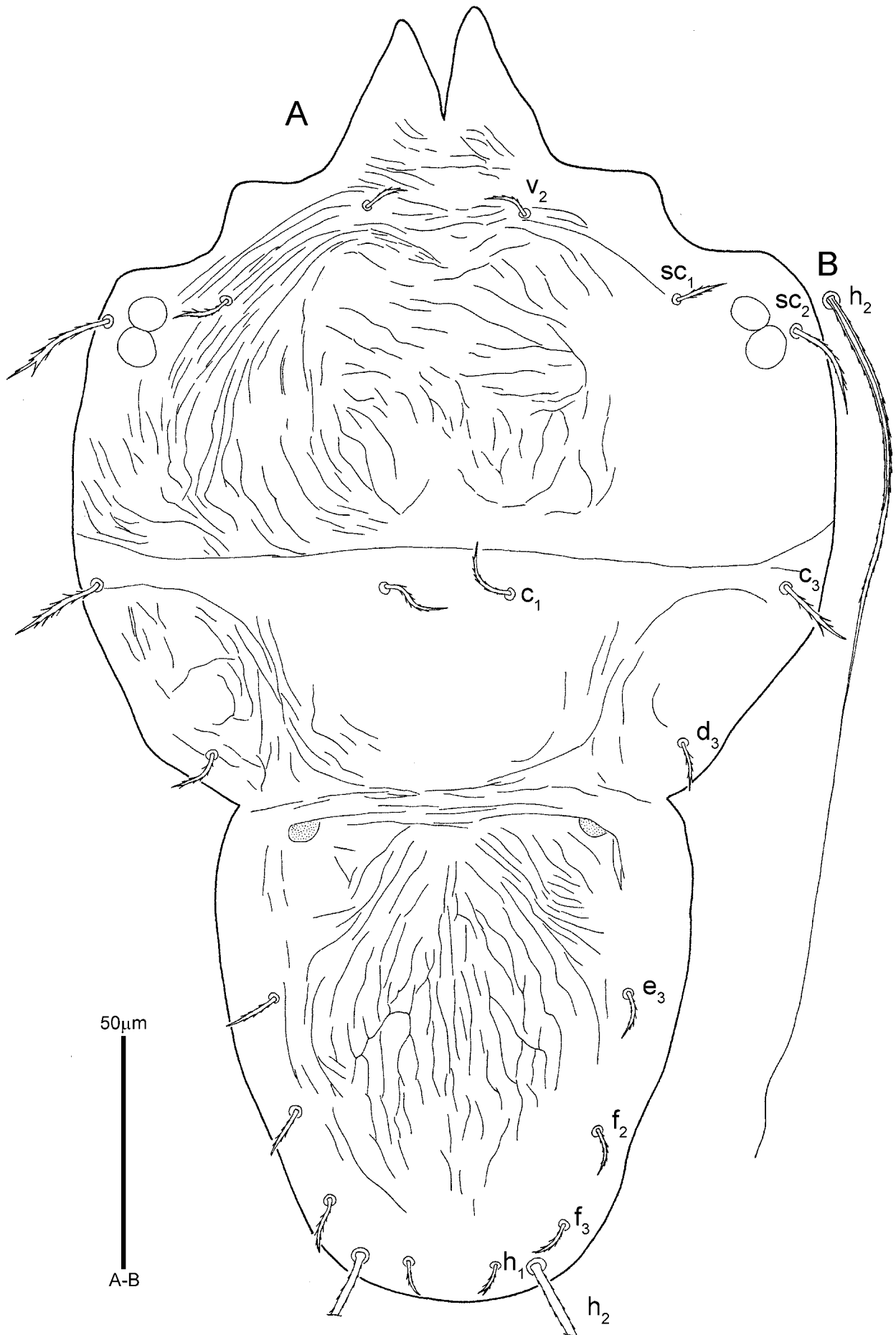


FIGURE 44. *Tenuipalpus cyatheae* Gerson & Collyer (male). A, dorsal view of idiosoma; B, seta  $h_2$ .

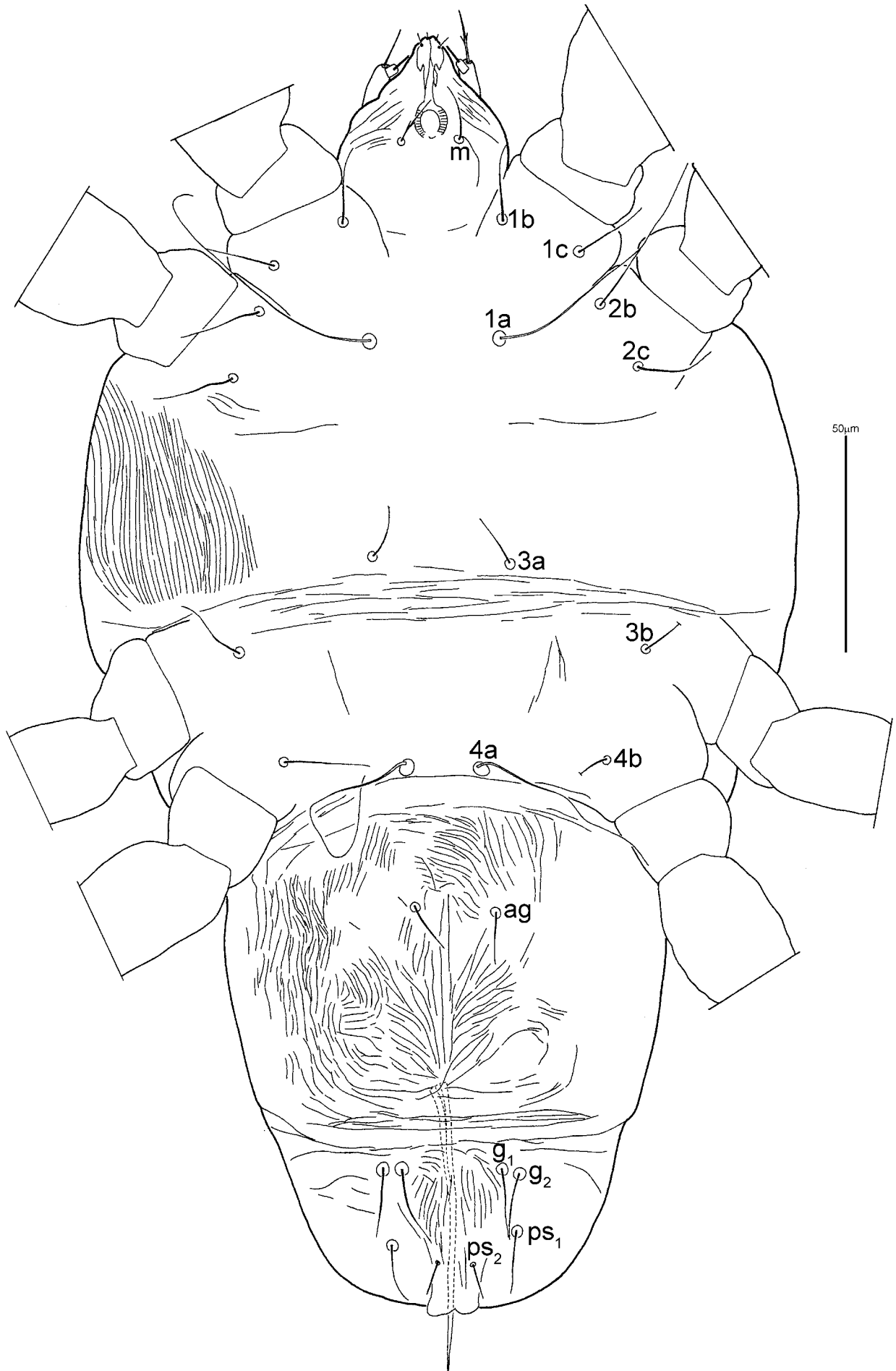


FIGURE 45. *Tenuipalpus cyatheae* Gerson & Collyer (male). Ventral view of idiosoma.

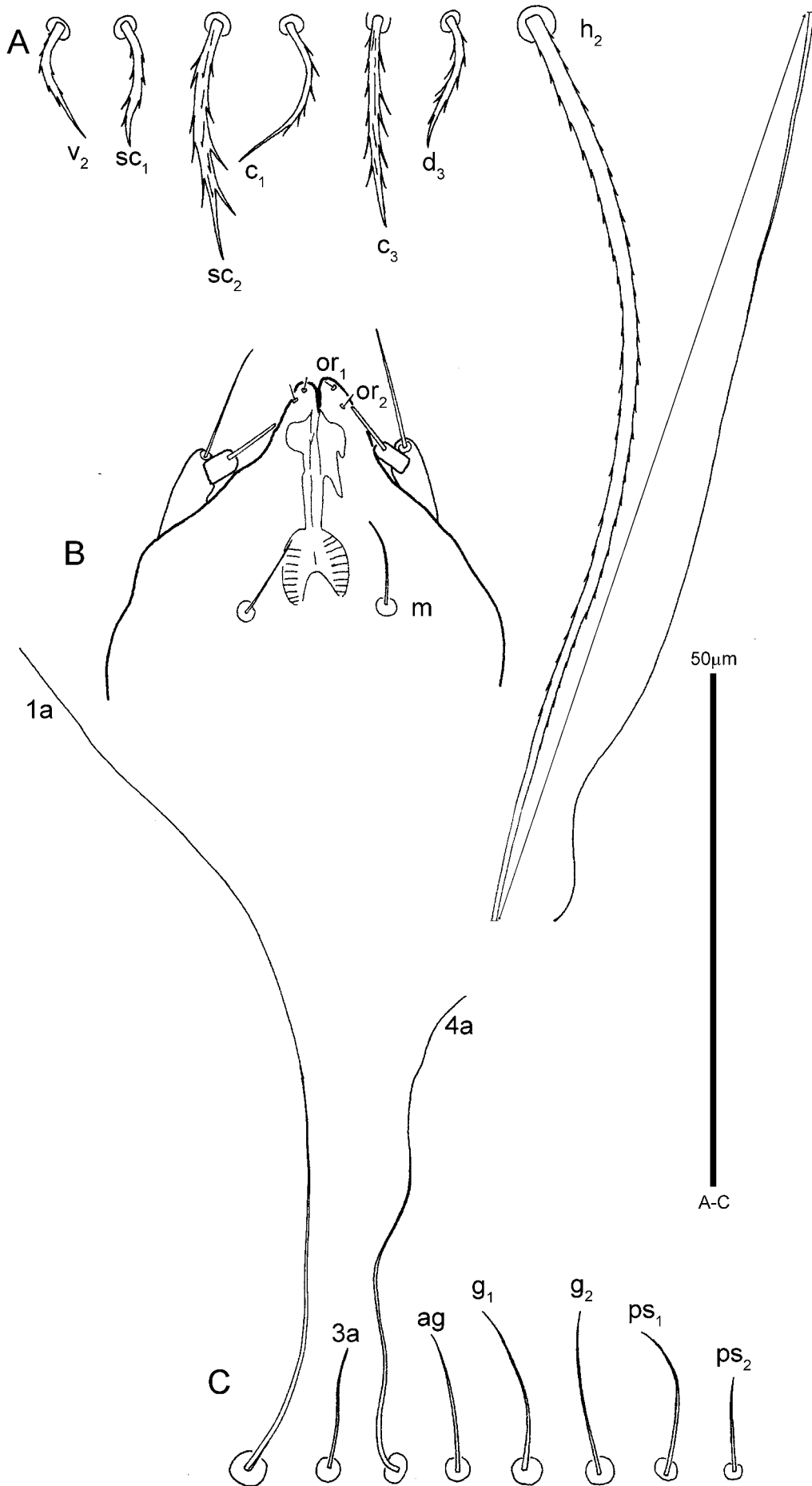
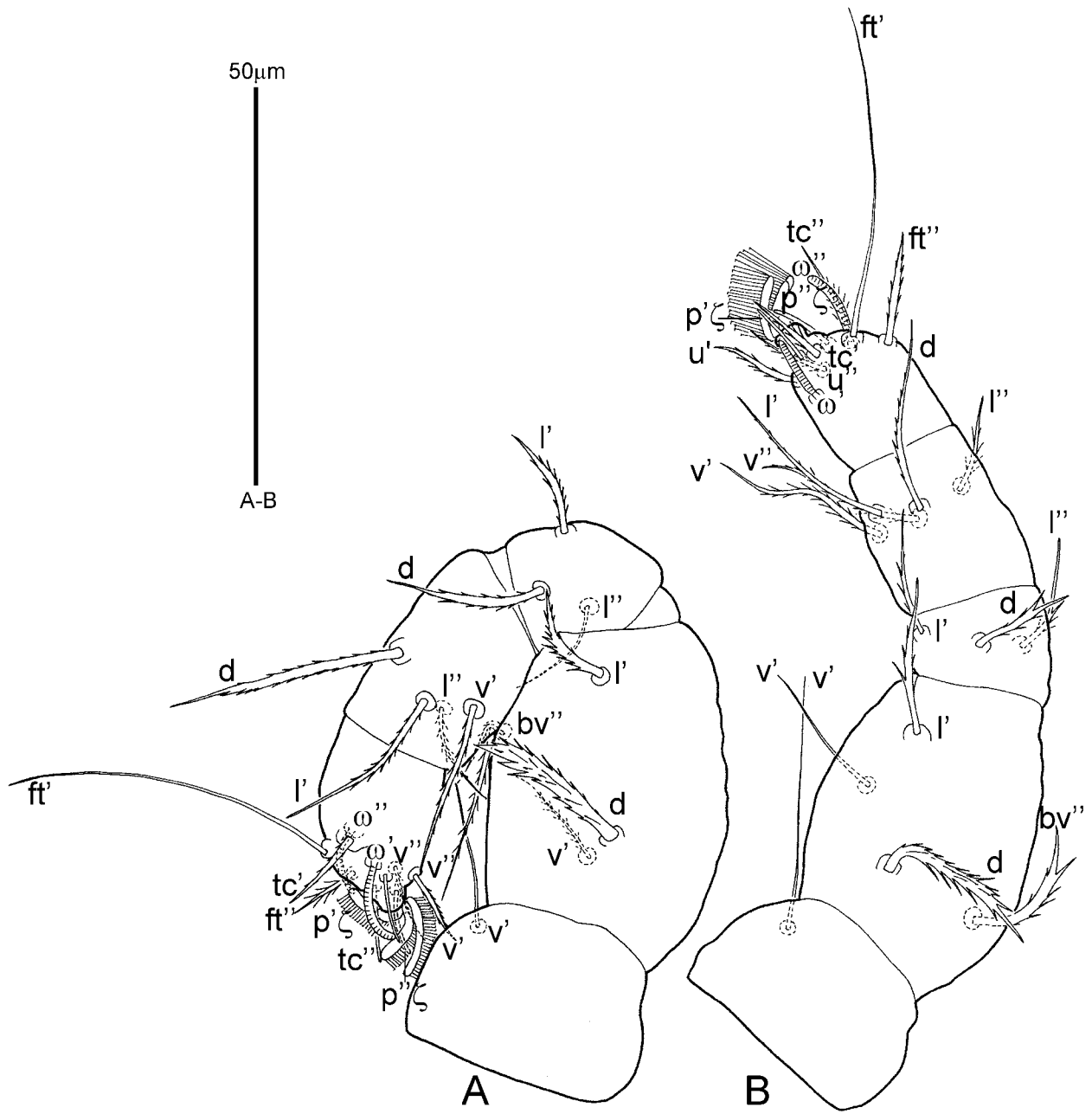


FIGURE 46. *Temuipalpus cyatheae* Gerson & Collyer (male). A, dorsal setae; B, subcapitulum; C, ventral setae.



**FIGURE 47.** *Tenuipalpus cyatheae* Gerson & Collyer (male). A, leg I; B, leg II.

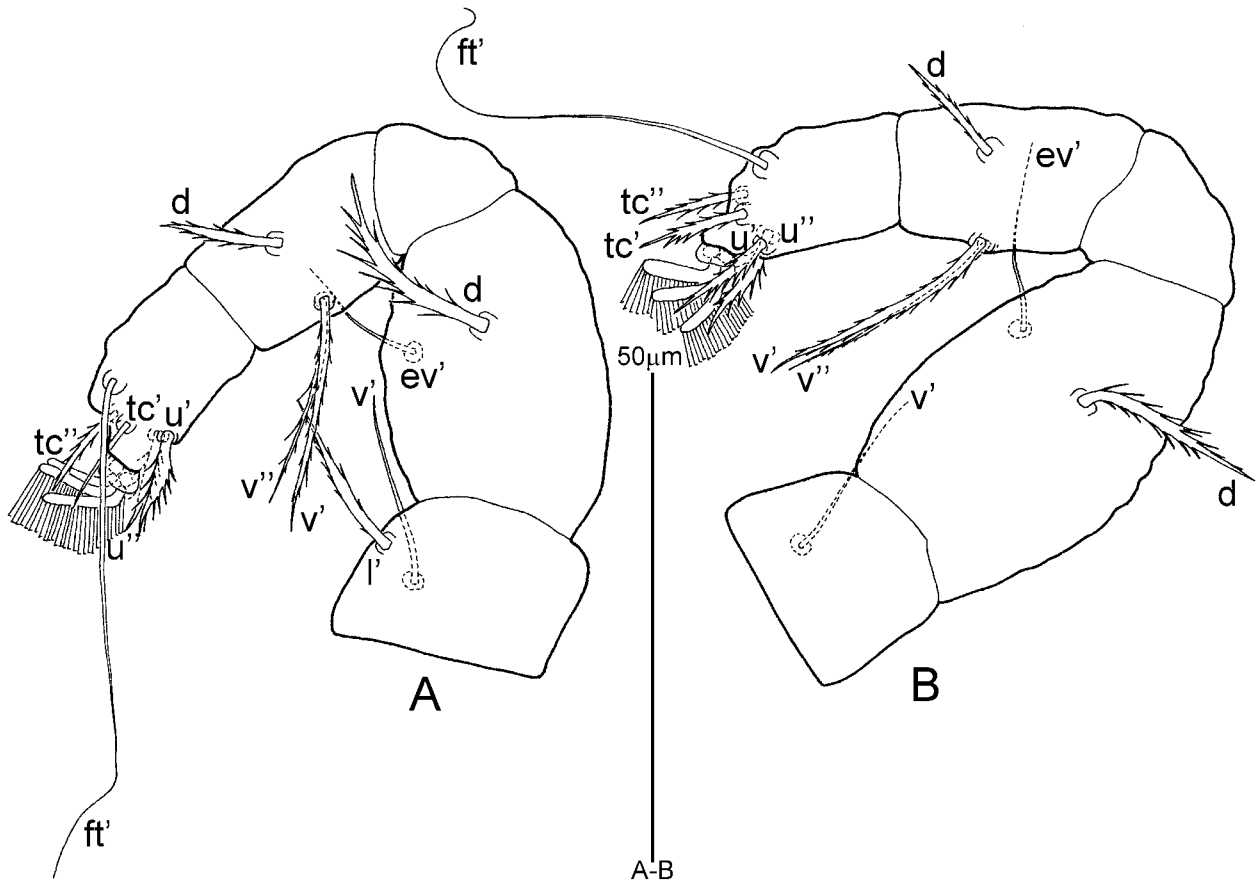


FIGURE 48. *Tenuipalpus cyatheae* Gerson & Collyer (male). A, leg III; B, leg IV.

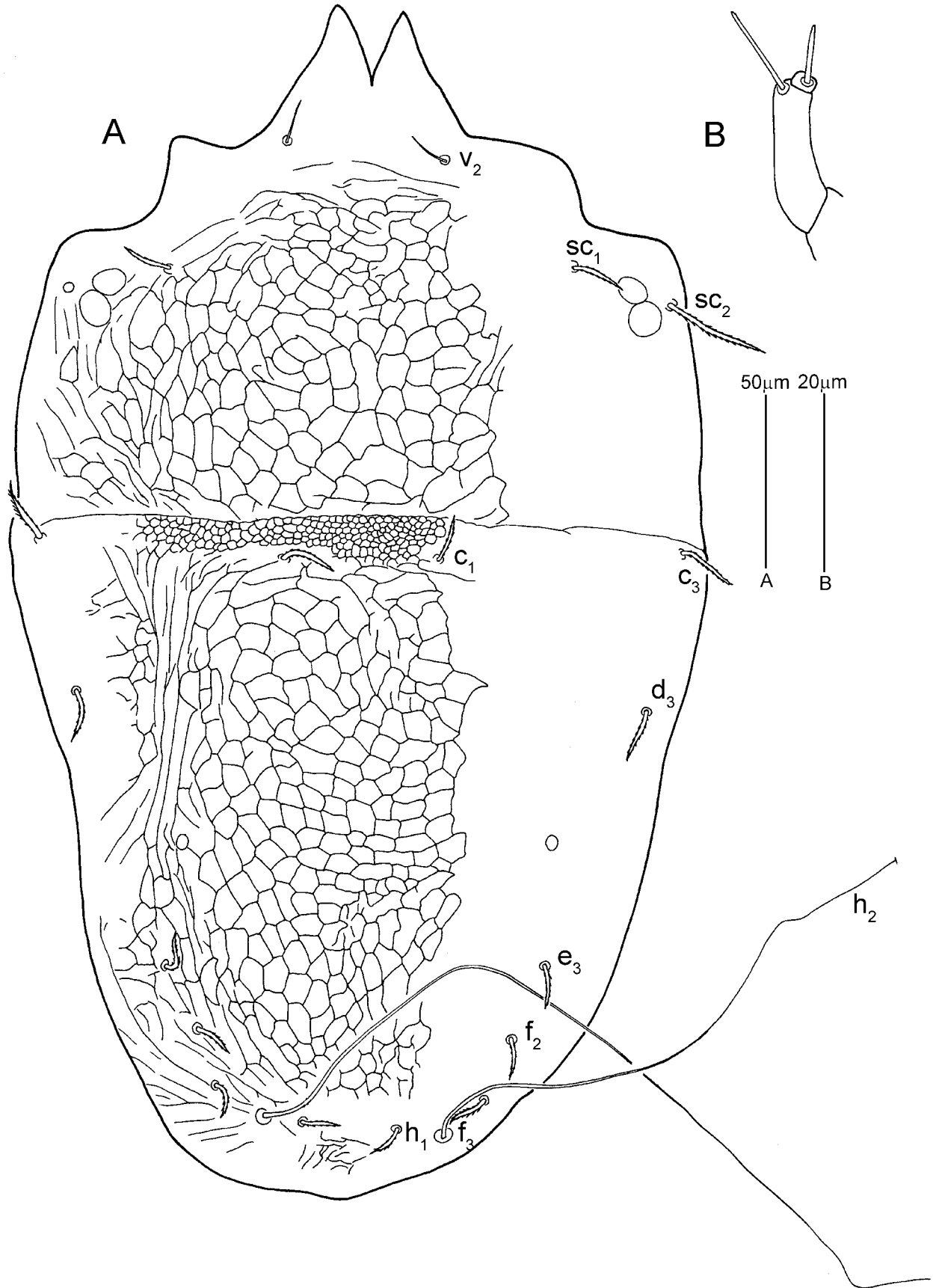


FIGURE 49. *Tenuipalpus elegans* Collyer (female). A, dorsal view of idiosoma; B, palp.



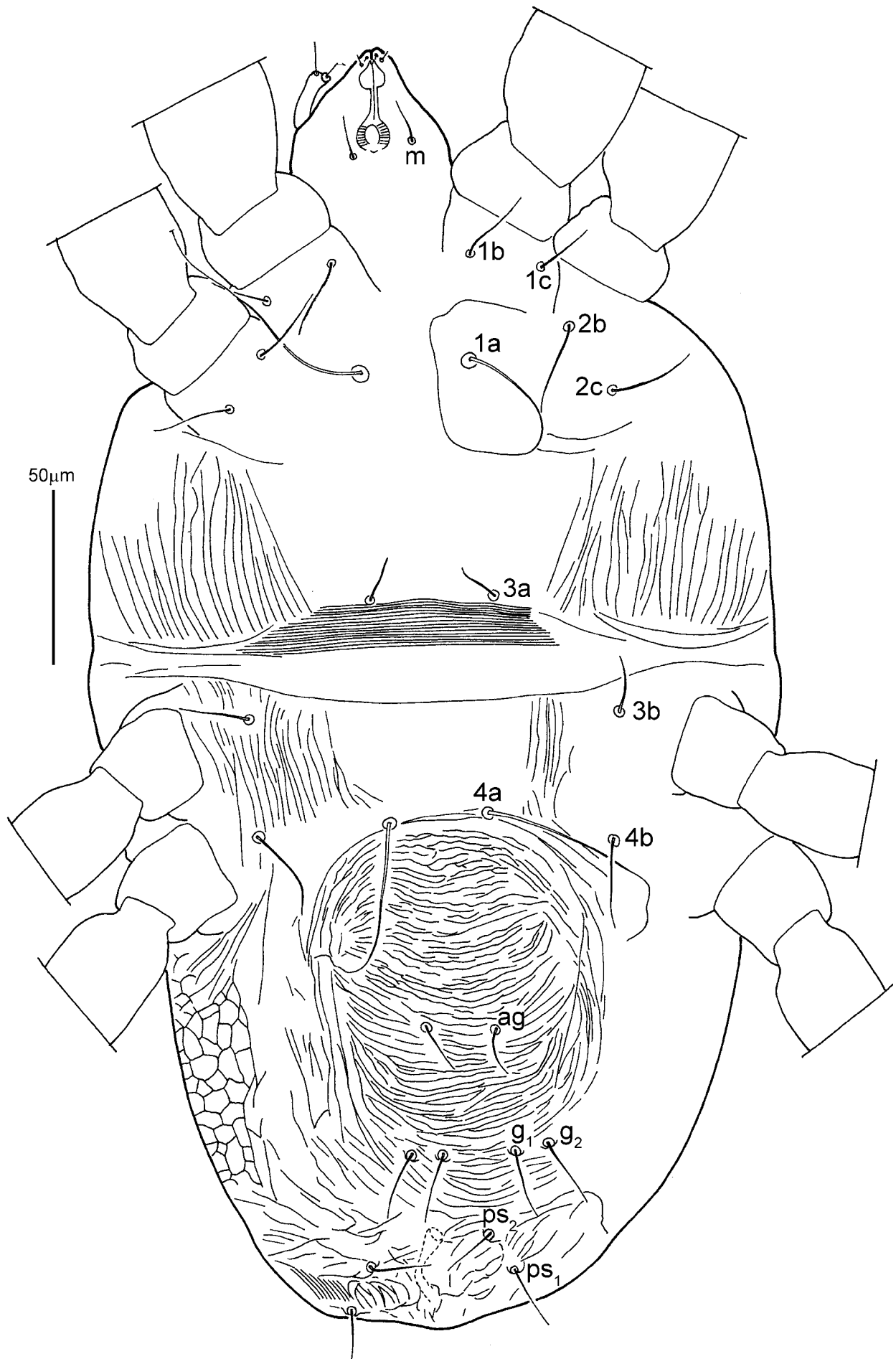


FIGURE 50. *Tenuipalpus elegans* Collyer (female). Ventral view of idiosoma.

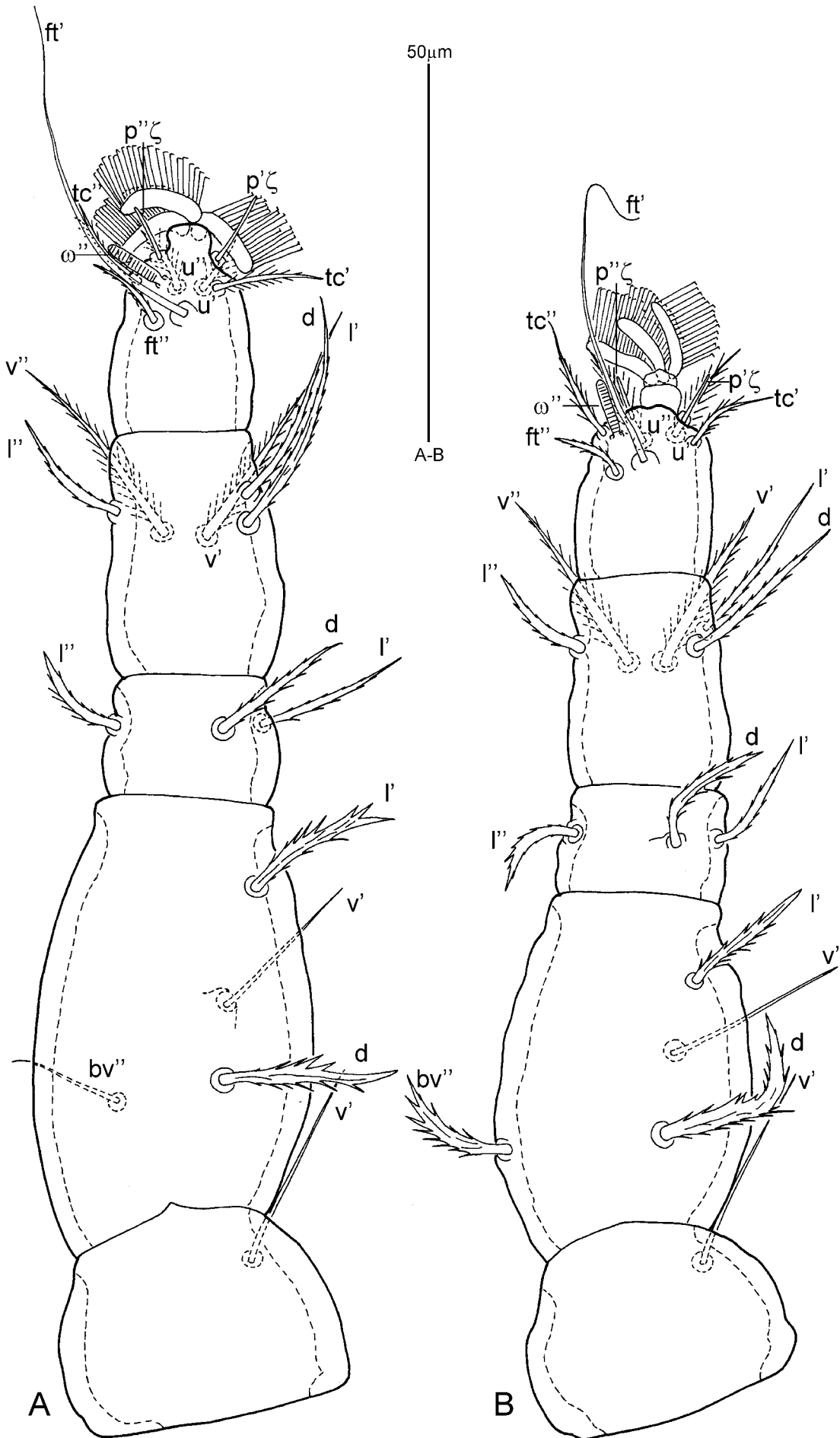


FIGURE 51. *Tenuipalpus elegans* Collyer (female). A, leg I; B, leg II.

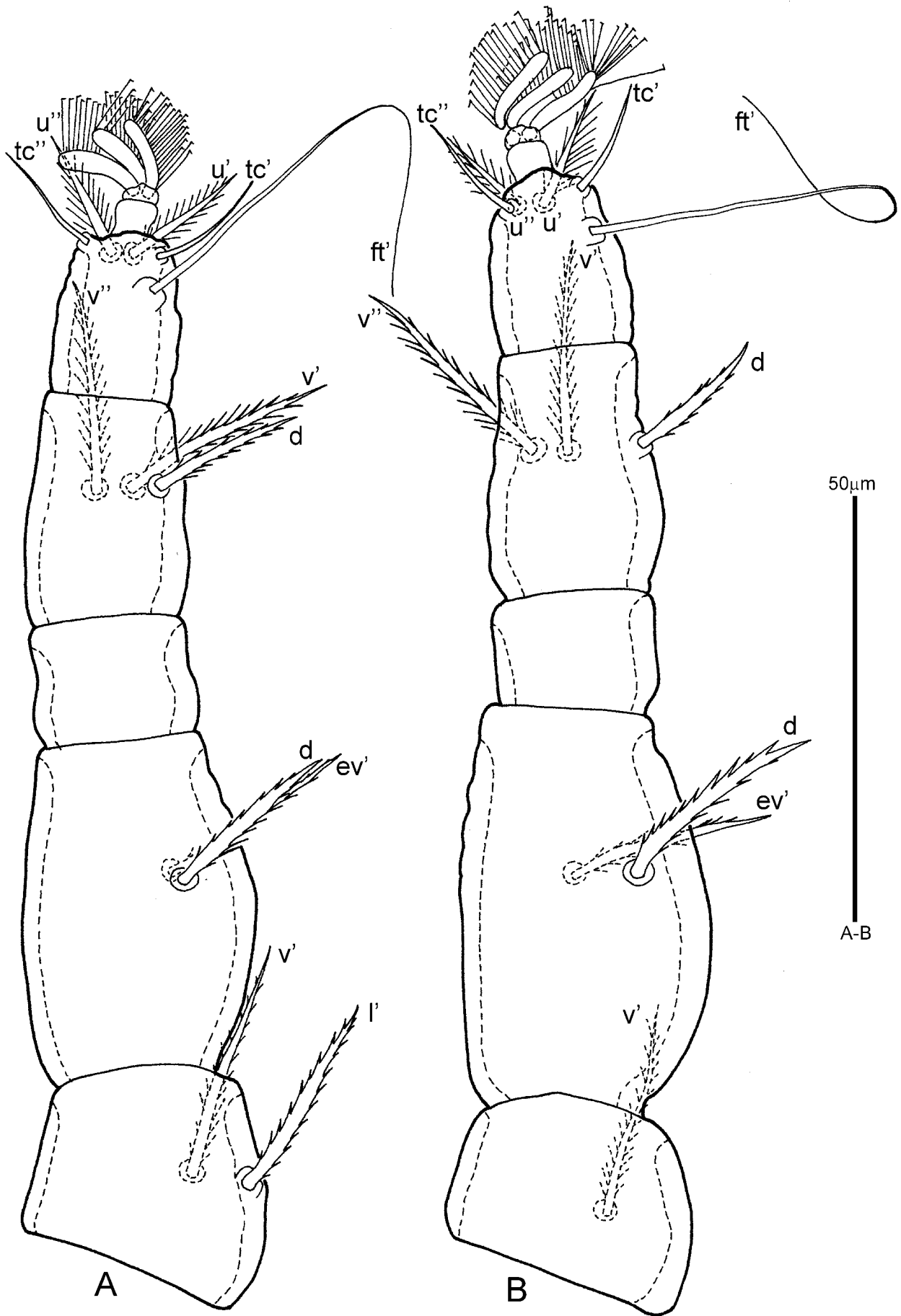


FIGURE 52. *Tenuipalpus elegans* Collyer (female). A, leg III; B, leg I

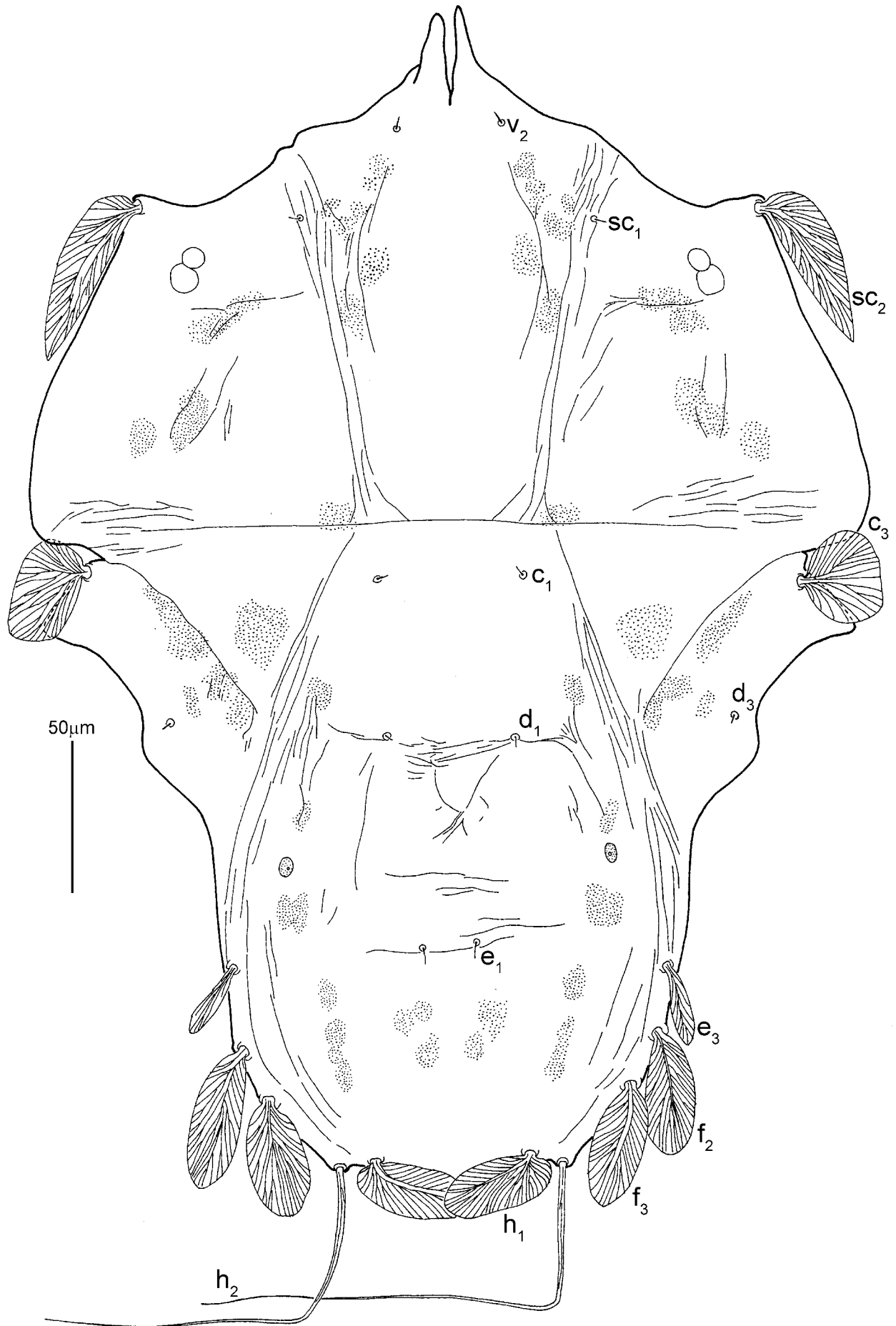


FIGURE 53. *Tenuipalpus mahoensis* Collyer (female). Dorsal view of idiosoma.

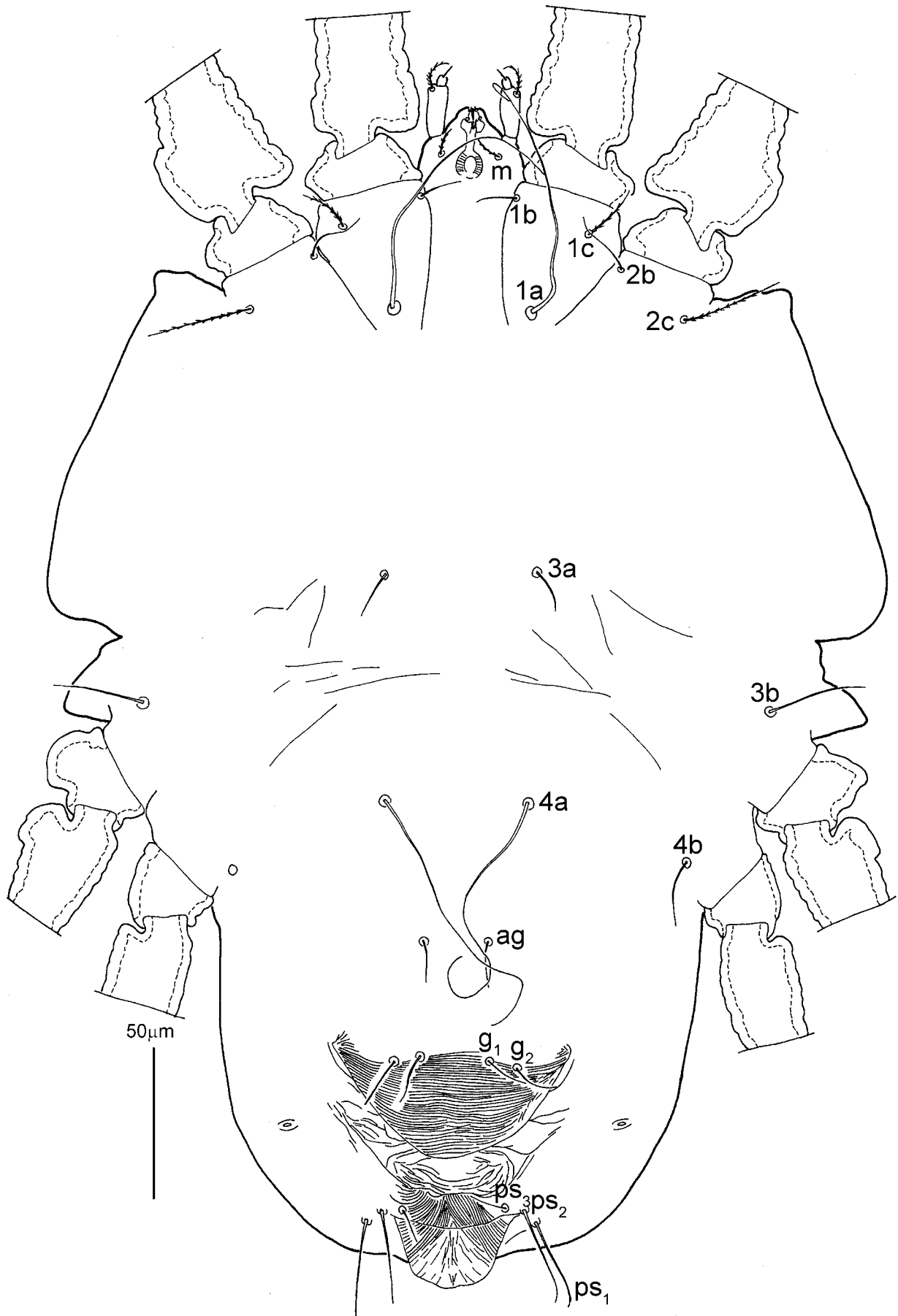


FIGURE 54. *Tenuipalpus mahoensis* Collyer (female). Ventral view of idiosoma.

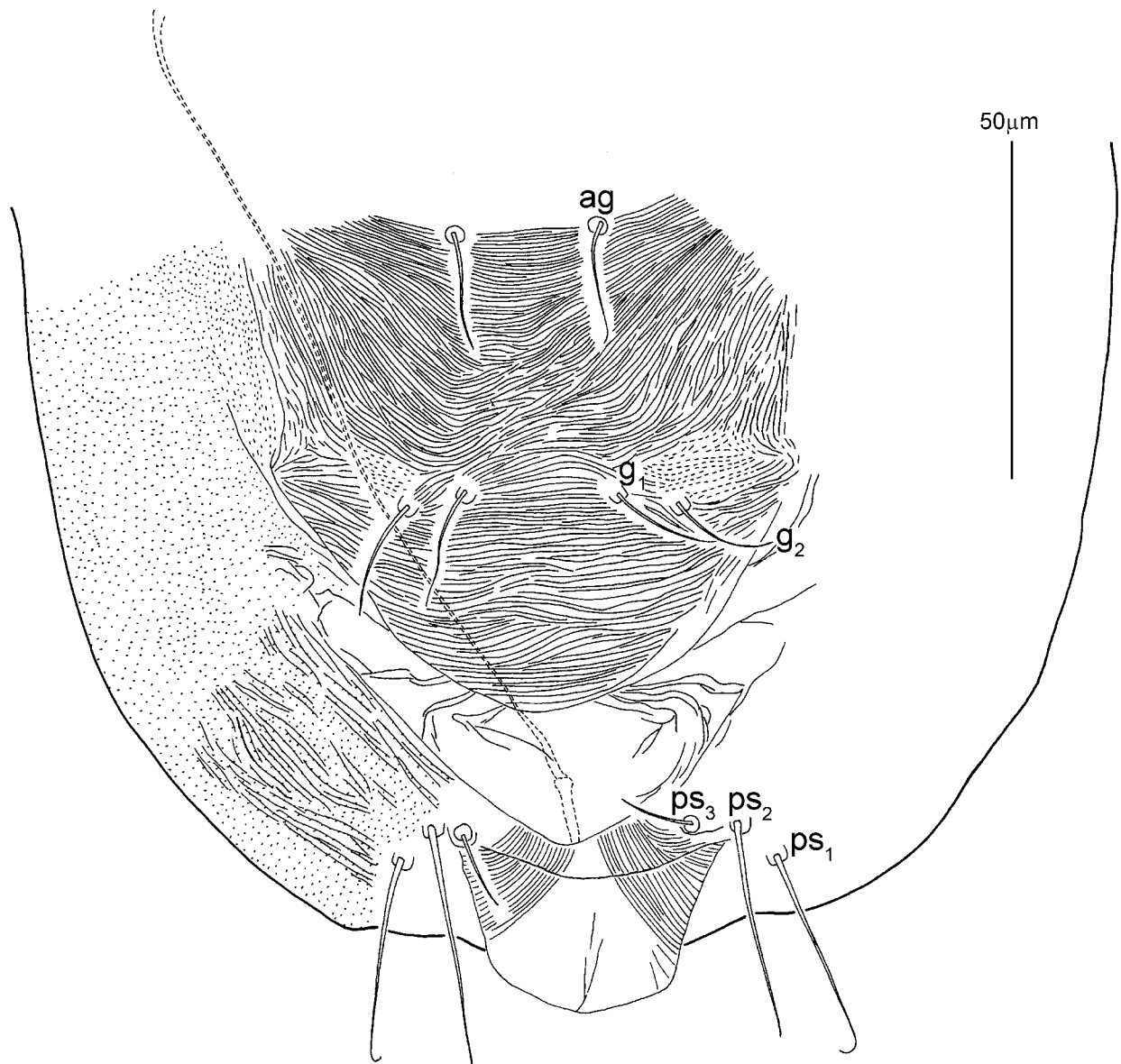


FIGURE 55. *Tenuipalpus mahoensis* Collyer (female). Genitoanal area.

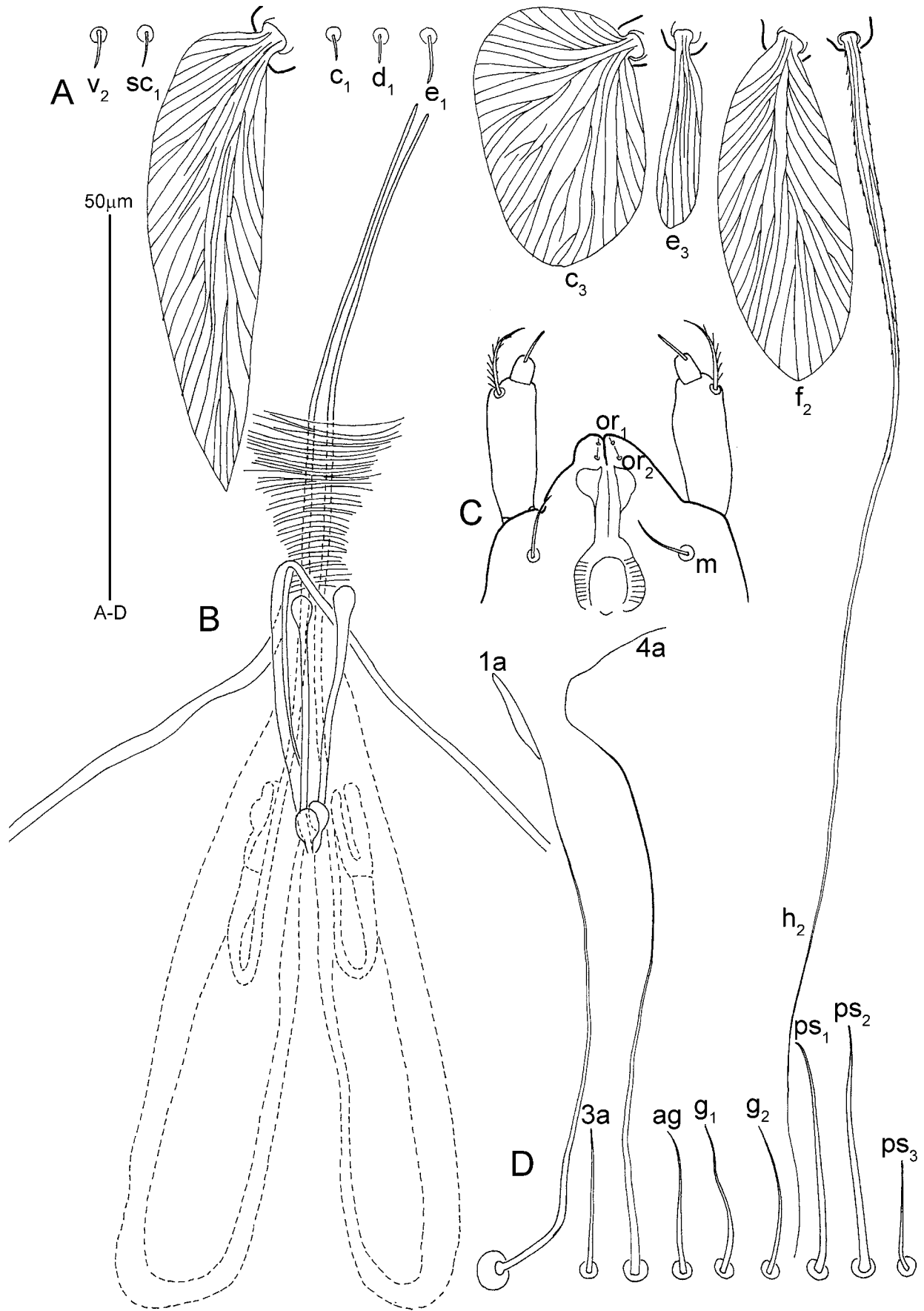


FIGURE 56. *Temipalpus mahoensis* Collyer (female). A, dorsal setae; B, chelicerae and collar; C, subcapitulum; D, ventral setae.

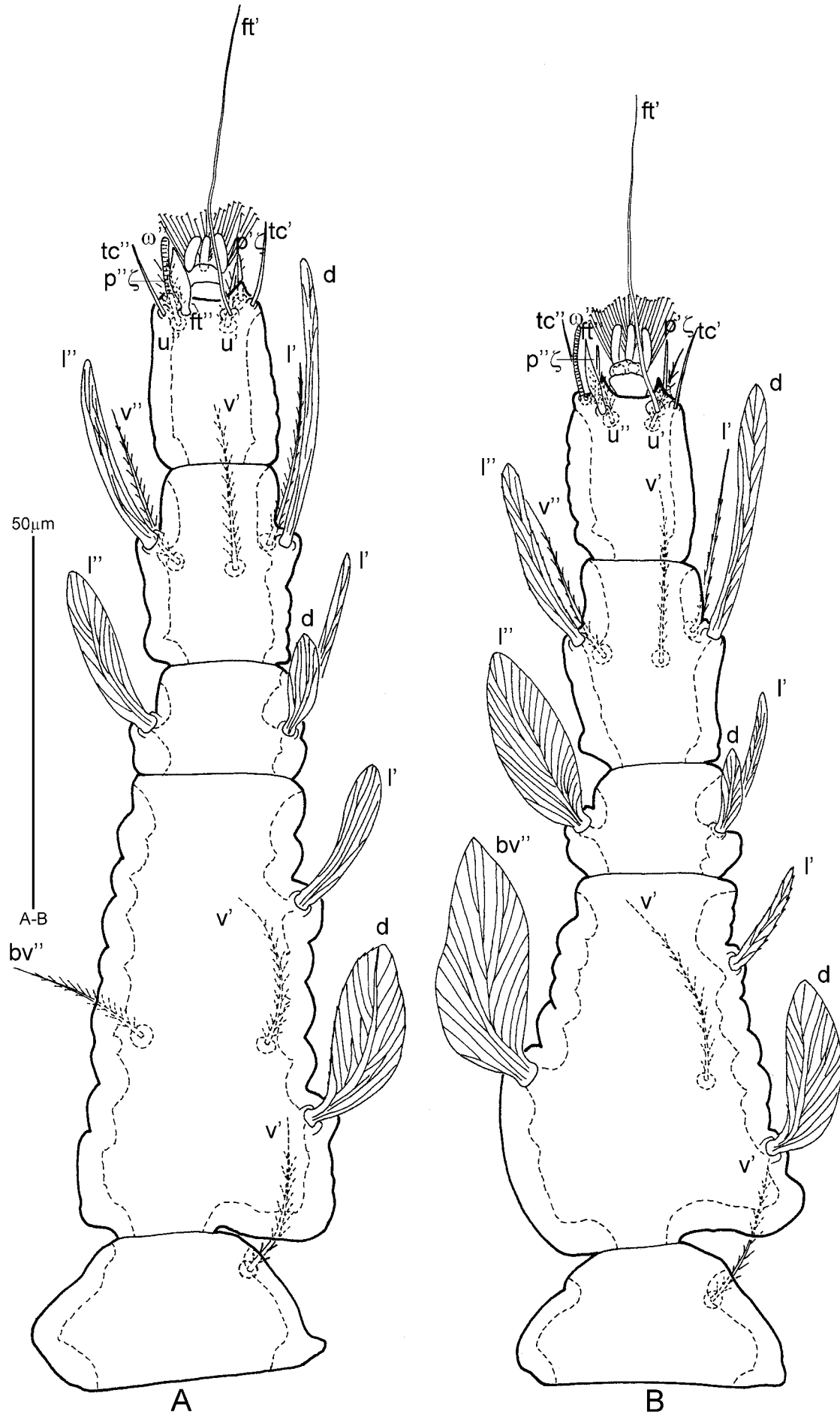


FIGURE 57. *Tenuipalpus mahoensis* Collyer (female). A, leg I; B, leg II.



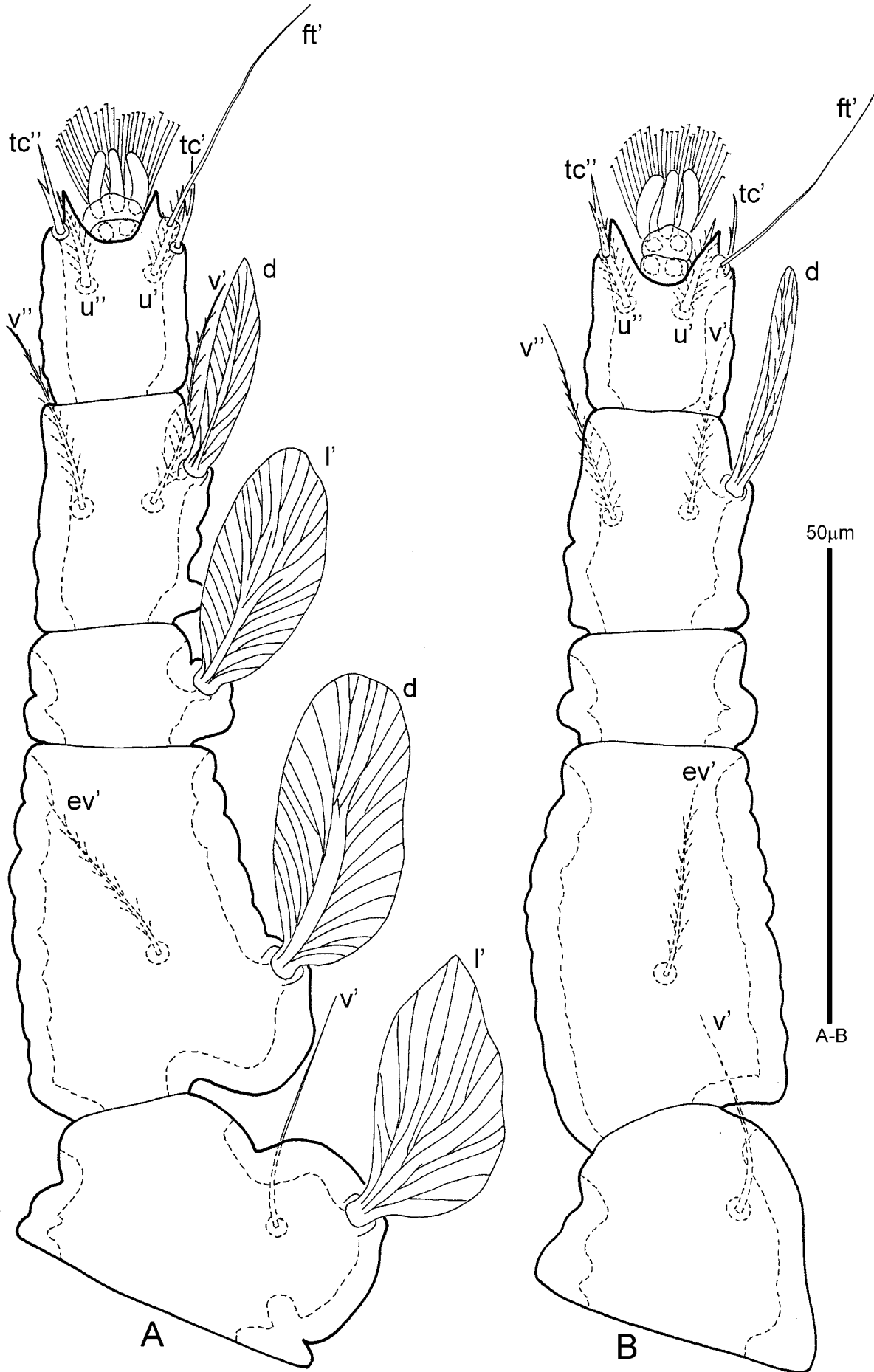


FIGURE 58. *Tenuipalpus mahoensis* Collyer (female). A, leg III; B, leg IV.

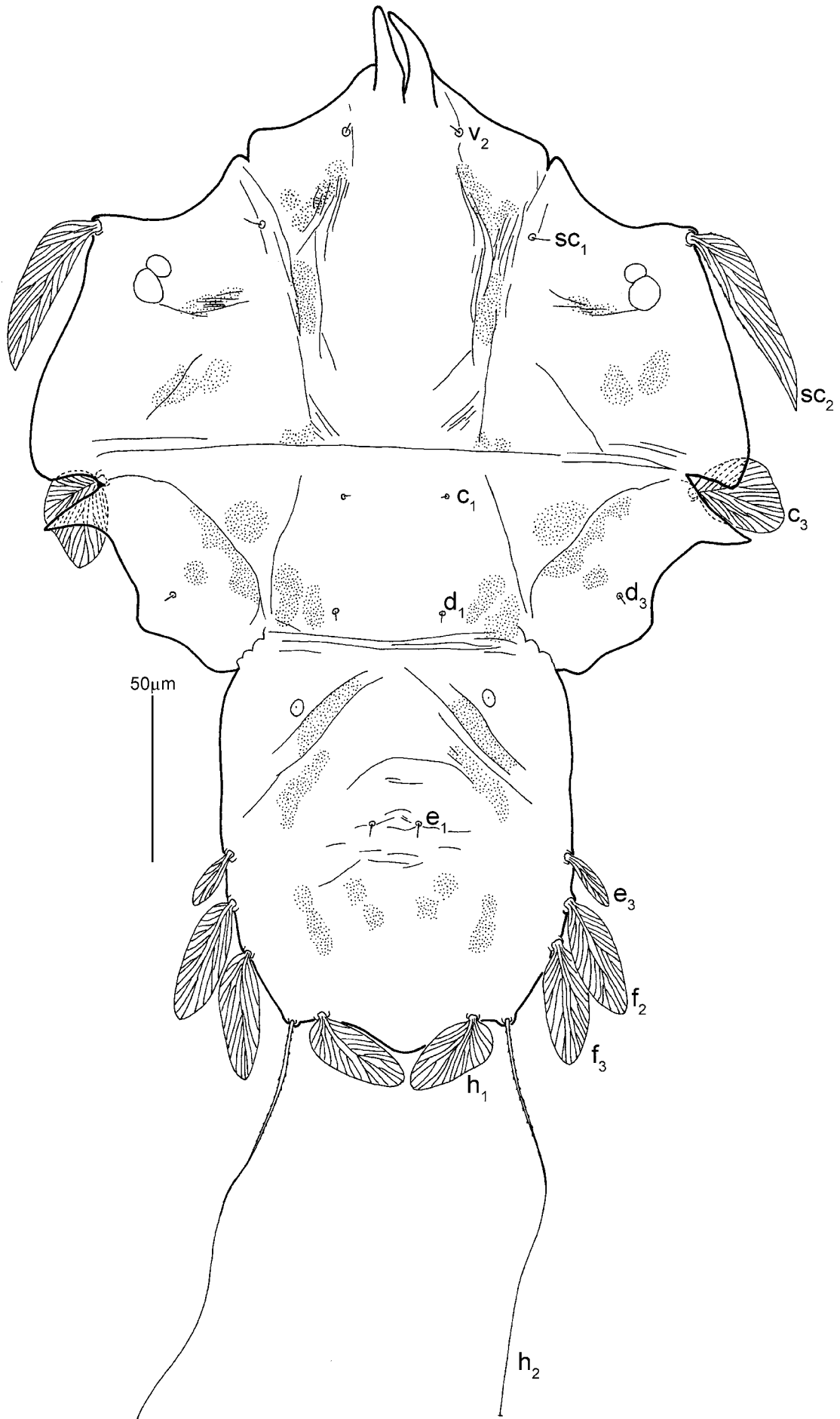


FIGURE 59. *Tenuipalpus mahoensis* Collyer (male). Dorsal view of idiosoma.

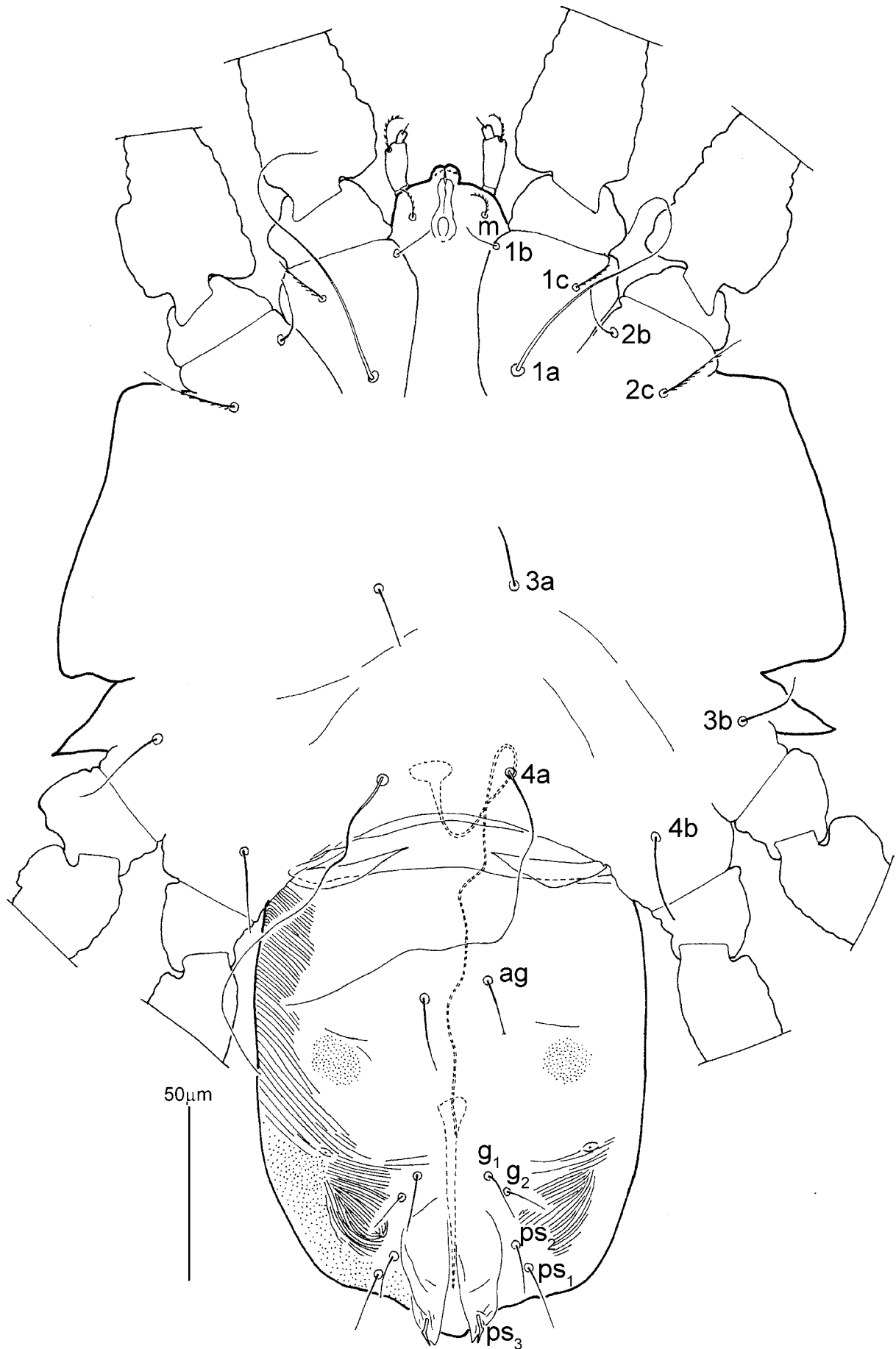


FIGURE 60. *Tenuipalpus mahoensis* Collyer (male). Ventral view of idiosoma.

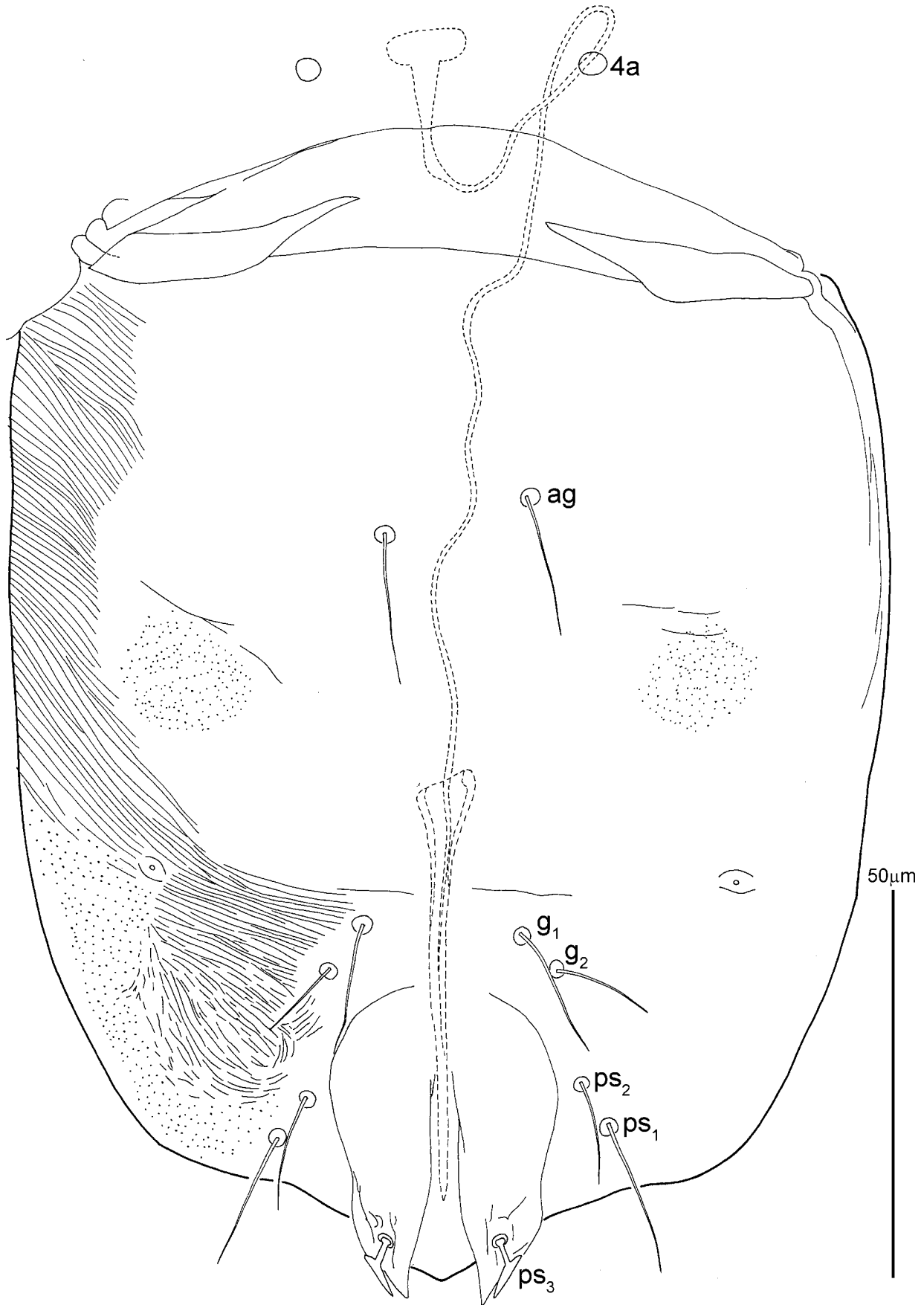


FIGURE 61. *Tenuipalpus mahoensis* Collyer (male). Genitoanal area.

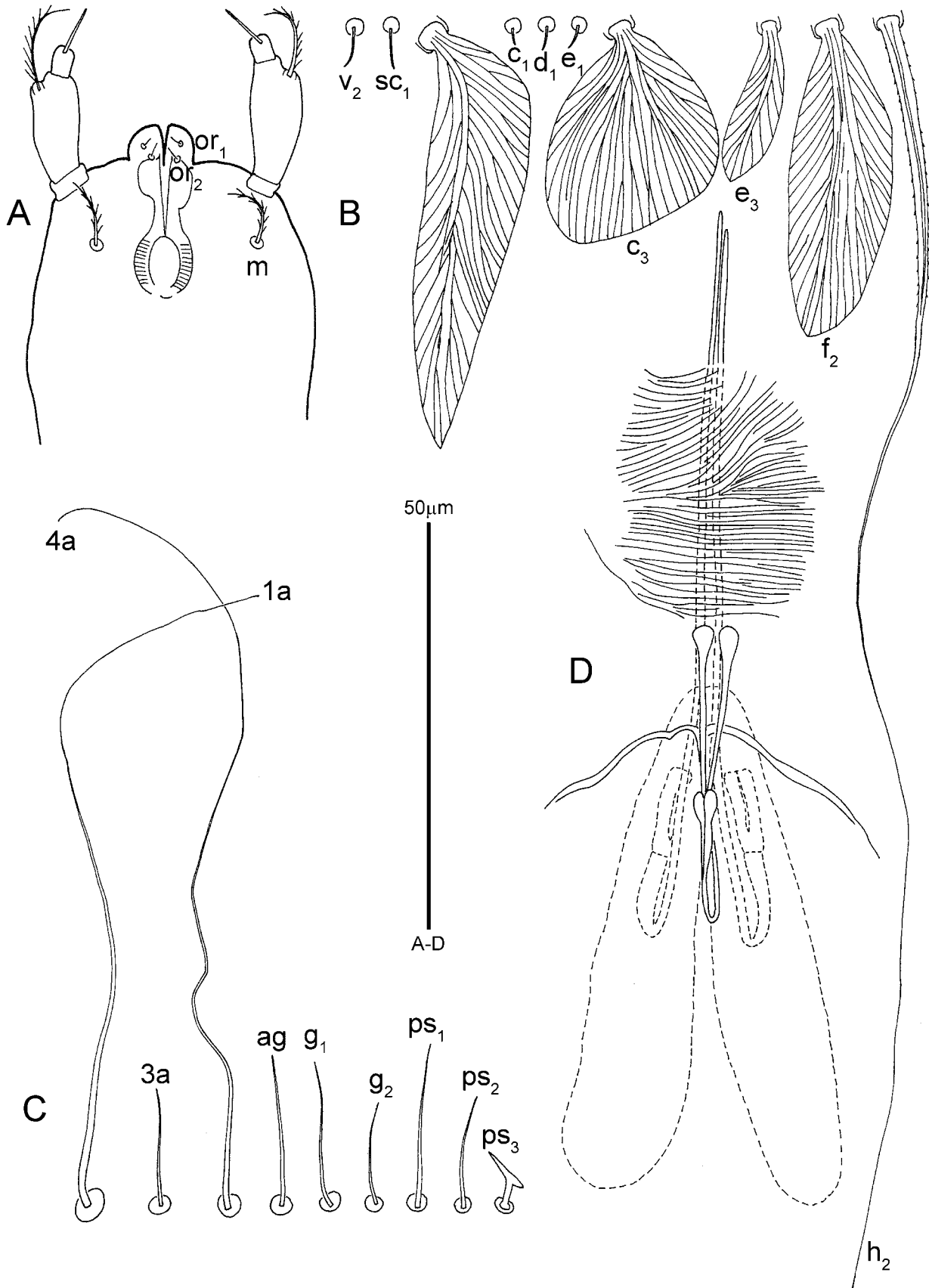


FIGURE 62. *Tenuipalpus mahoensis* Collyer (male). A, subcapitulum; B, dorsal setae; C, ventral setae; D, chelicerae and collar.

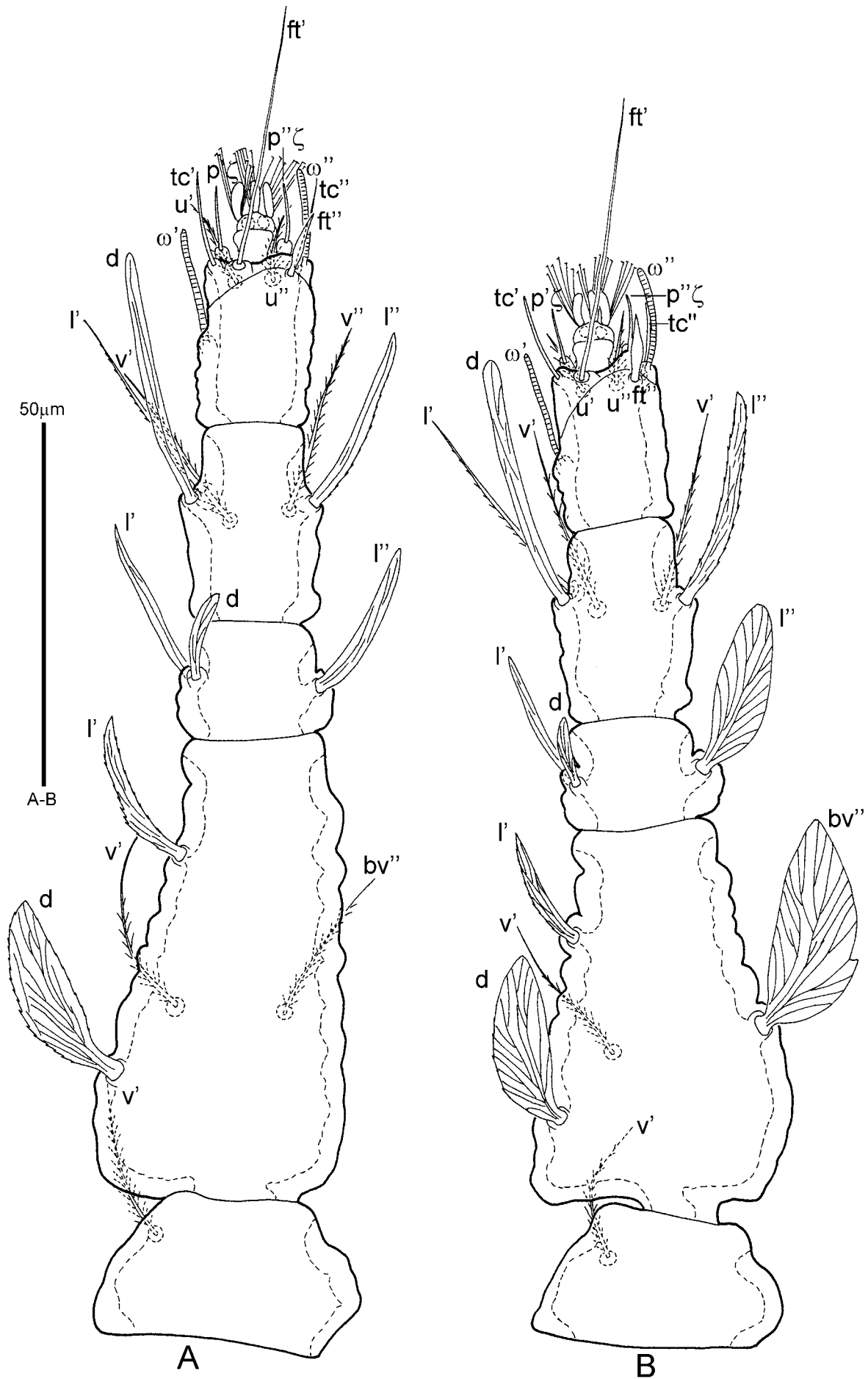


FIGURE 63. *Tenuipalpus mahoensis* Collyer (male). A, leg I; B, leg II.

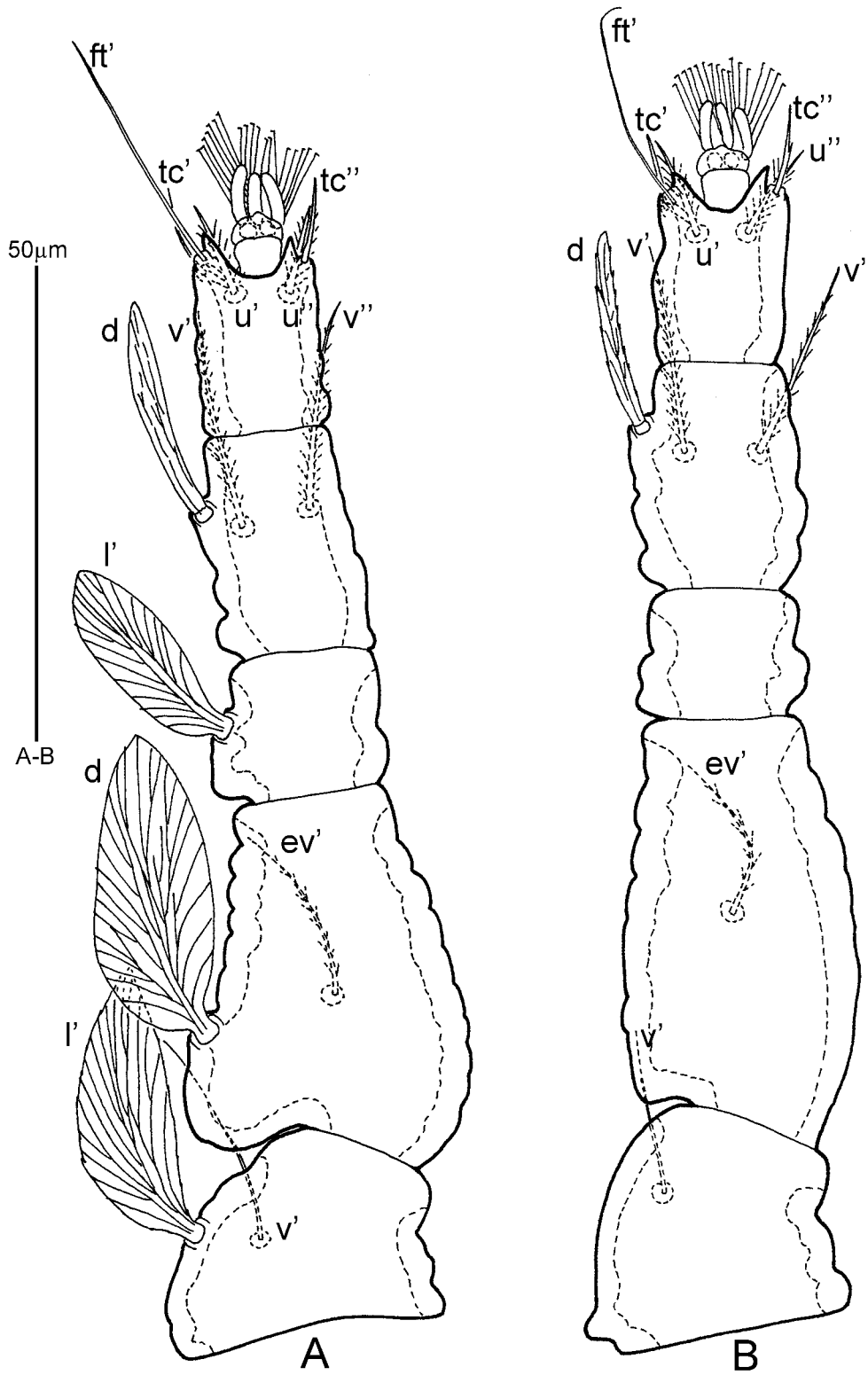


FIGURE 64. *Temipalpus mahoensis* Collyer (male). A, leg III; B, leg IV.

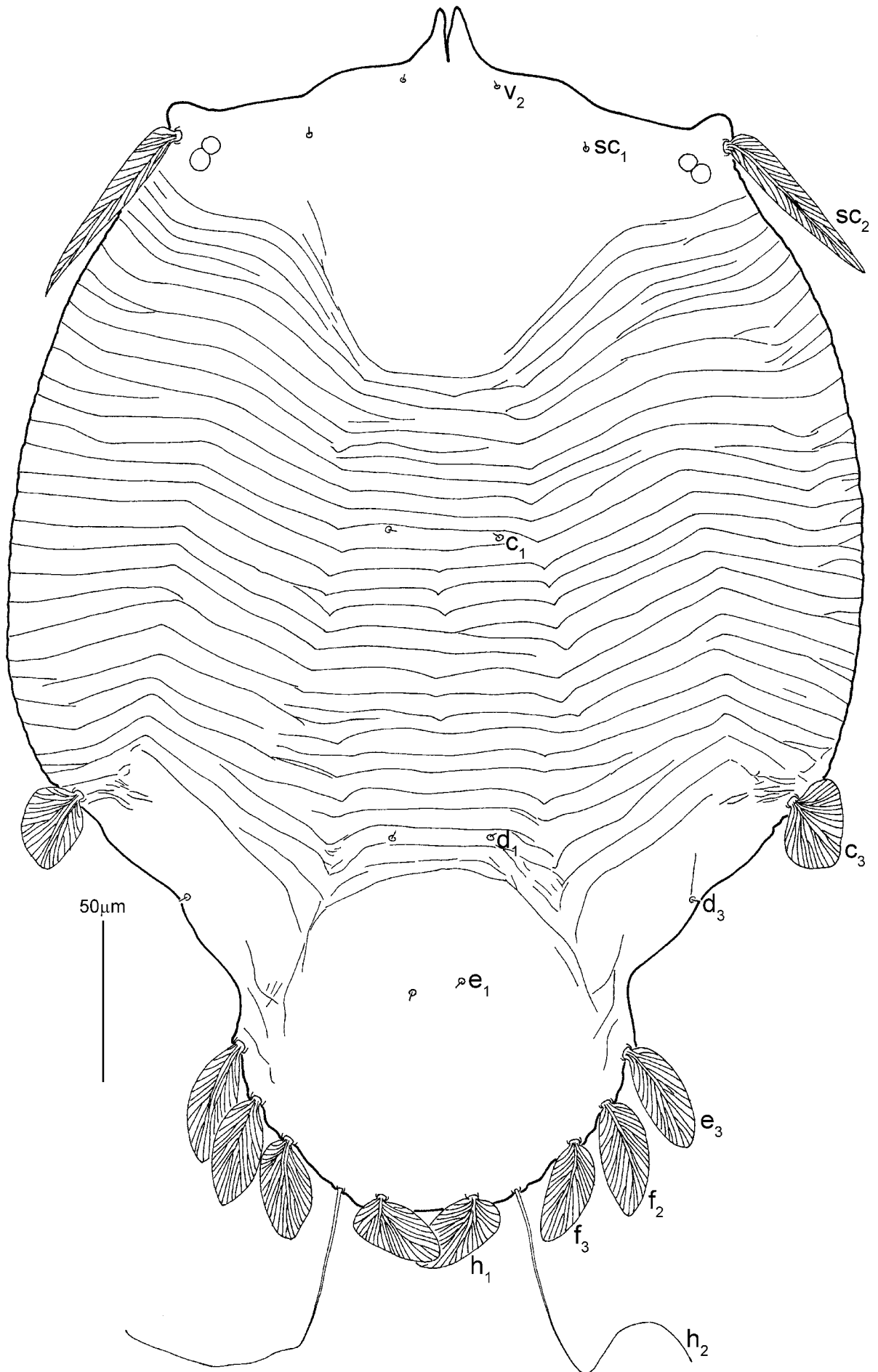


FIGURE 65. *Tenuipalpus mahoensis* Collyer (Deutonymph). Dorsal view of idiosoma.



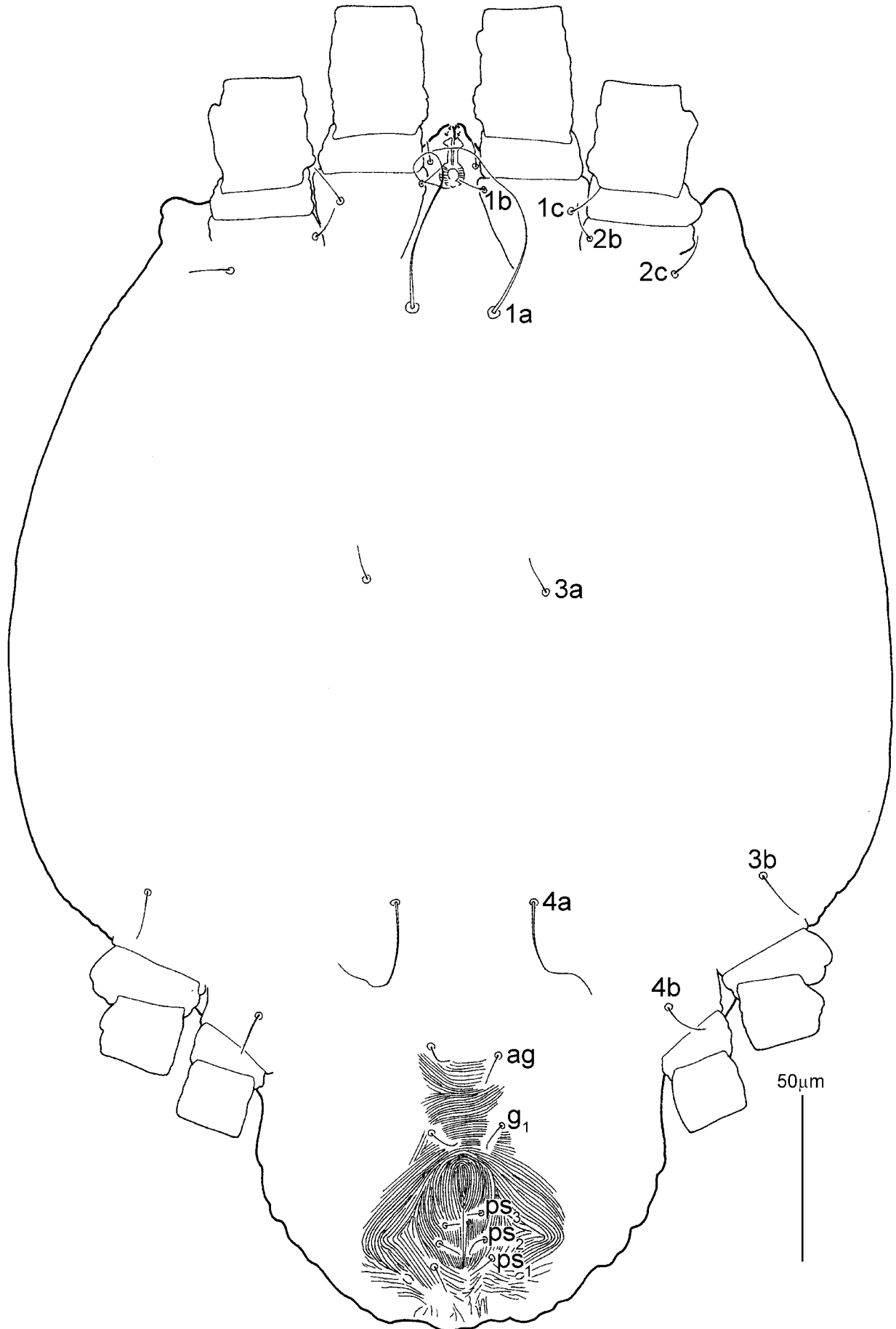
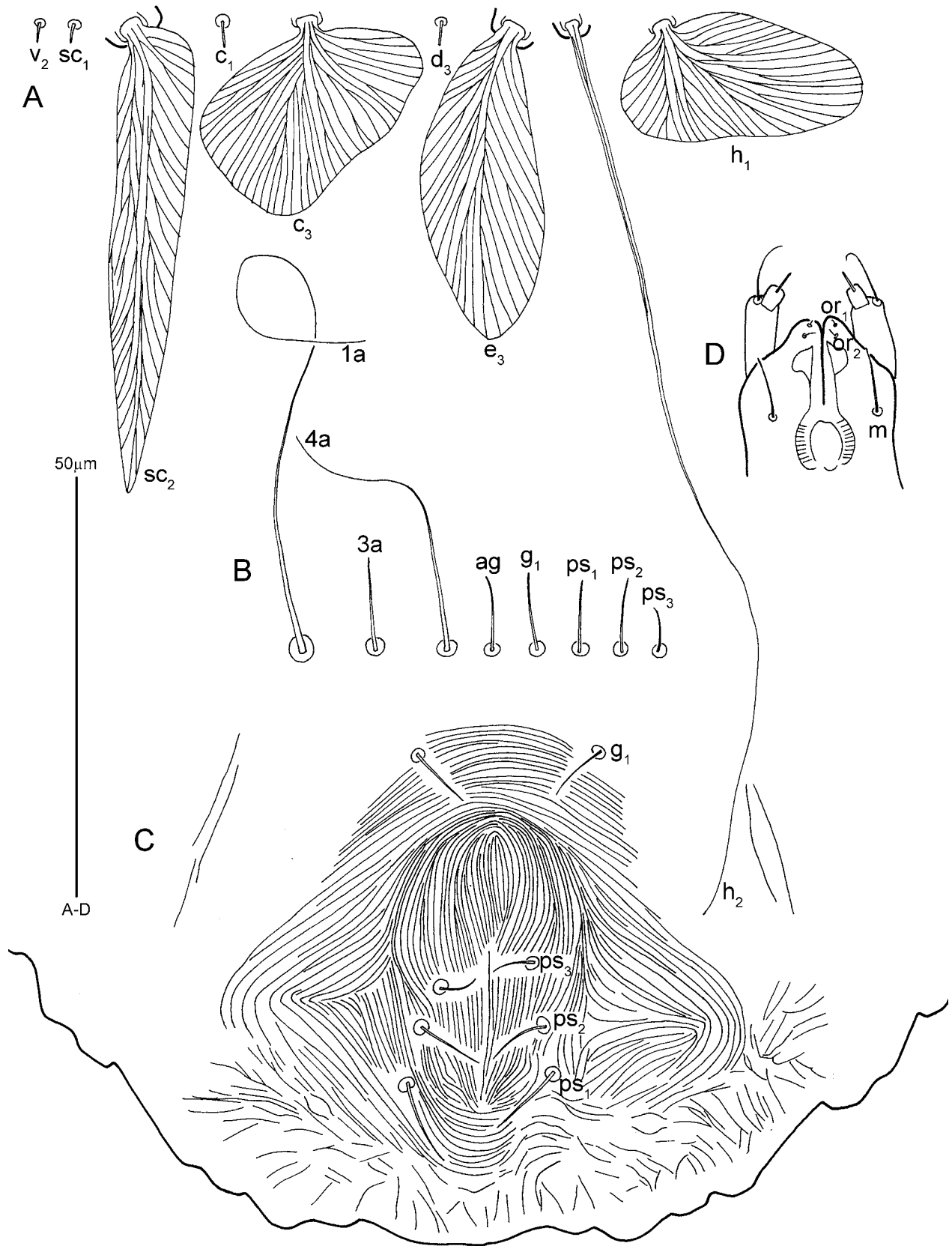


FIGURE 66. *Temipalpus mahoensis* Collyer (Deutonymph). Ventral view of idiosoma.



**FIGURE 67.** *Tenuipalpus mahoensis* Collyer (Deutonymph). A, dorsal setae; B, ventral setae; C, genitoanal area; D, subcapitulum.

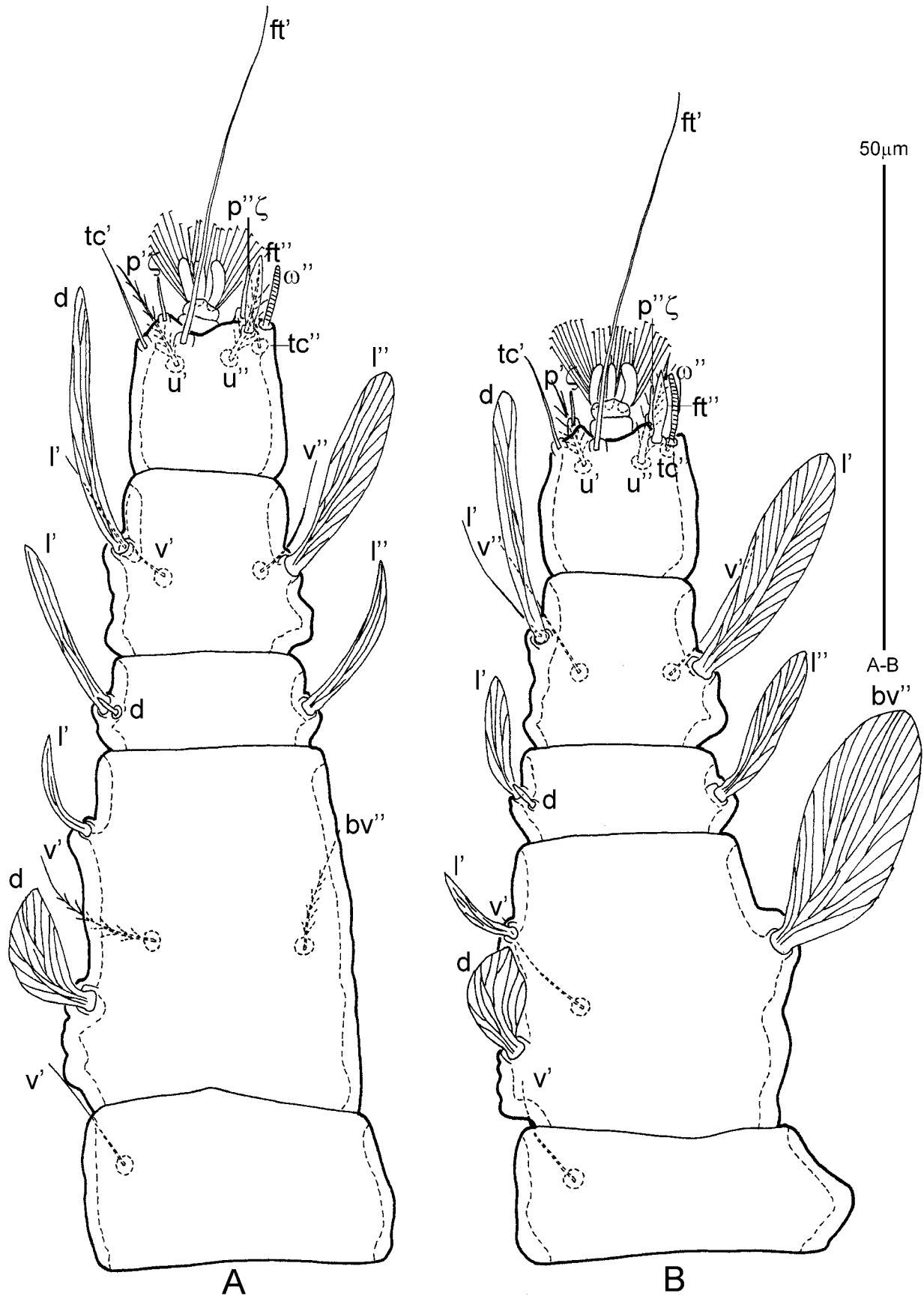


FIGURE 68. *Tenuipalpus mahoensis* Collyer (Deutonymph). A, leg I; B, leg II.

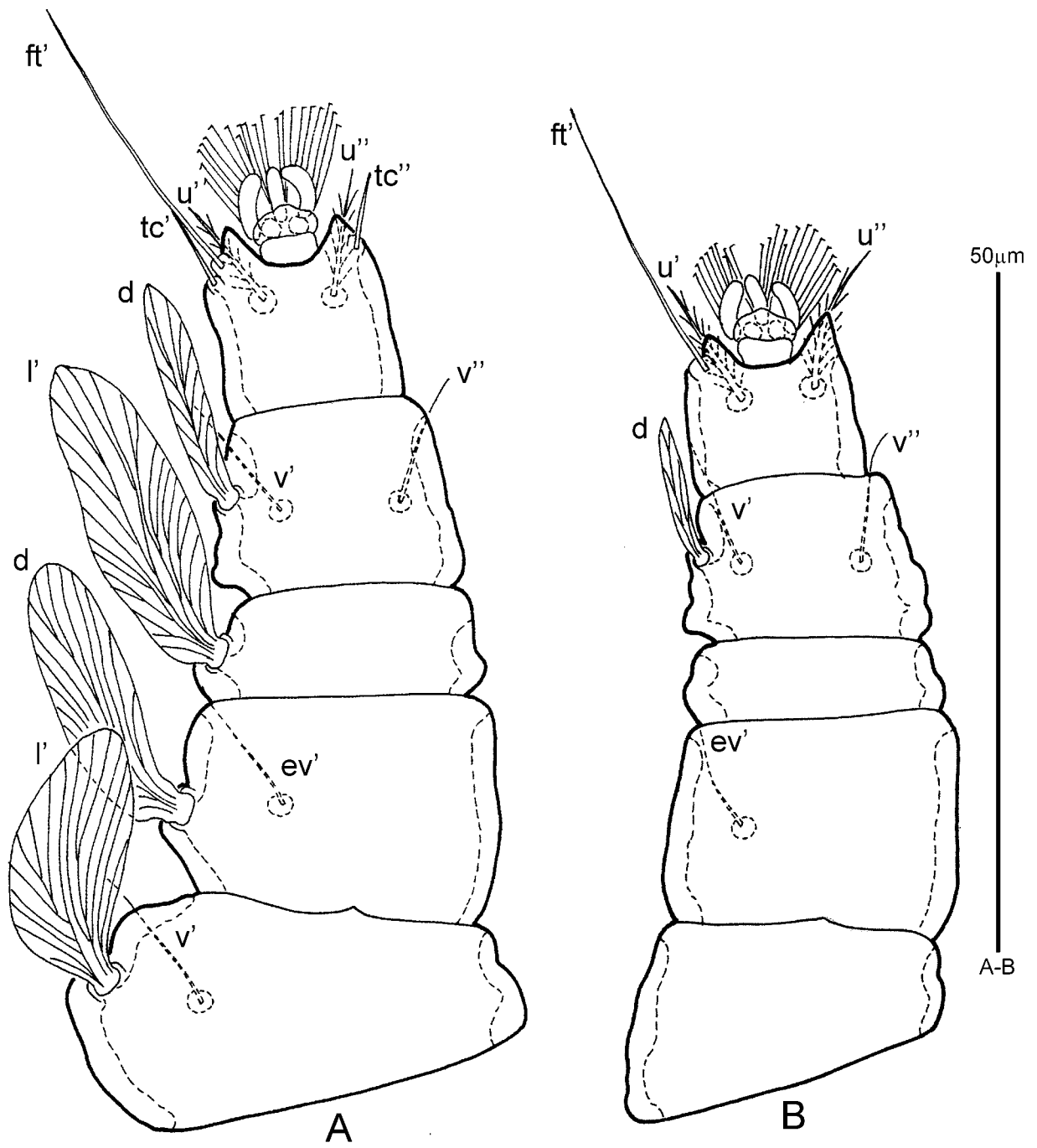


FIGURE 69. *Tenuipalpus mahoensis* Collyer (Deutonymph). A, leg III; B, leg IV.

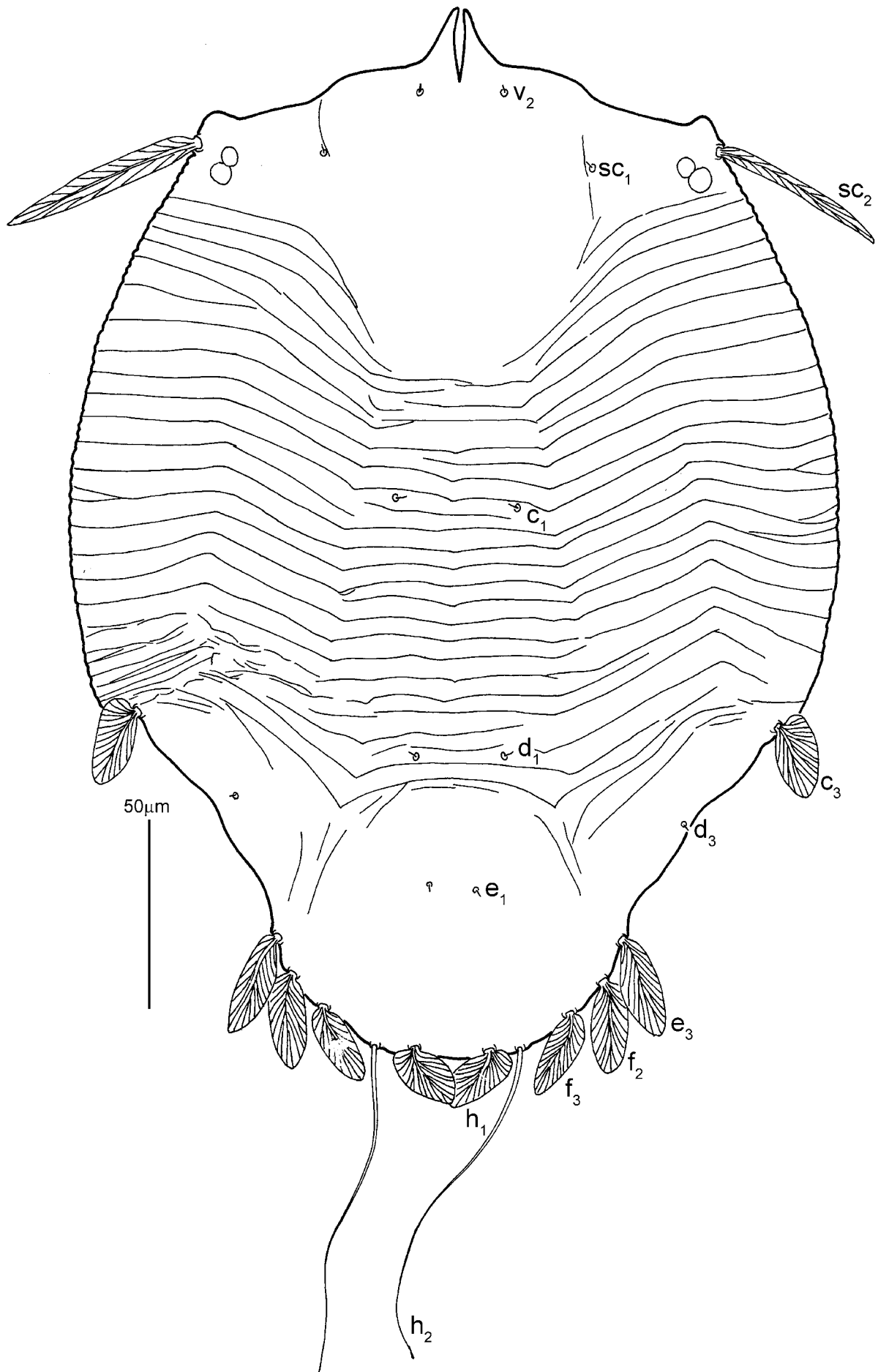


FIGURE 70. *Tenuipalpus mahoensis* Collyer (Protonymph). Dorsal view of idiosoma.

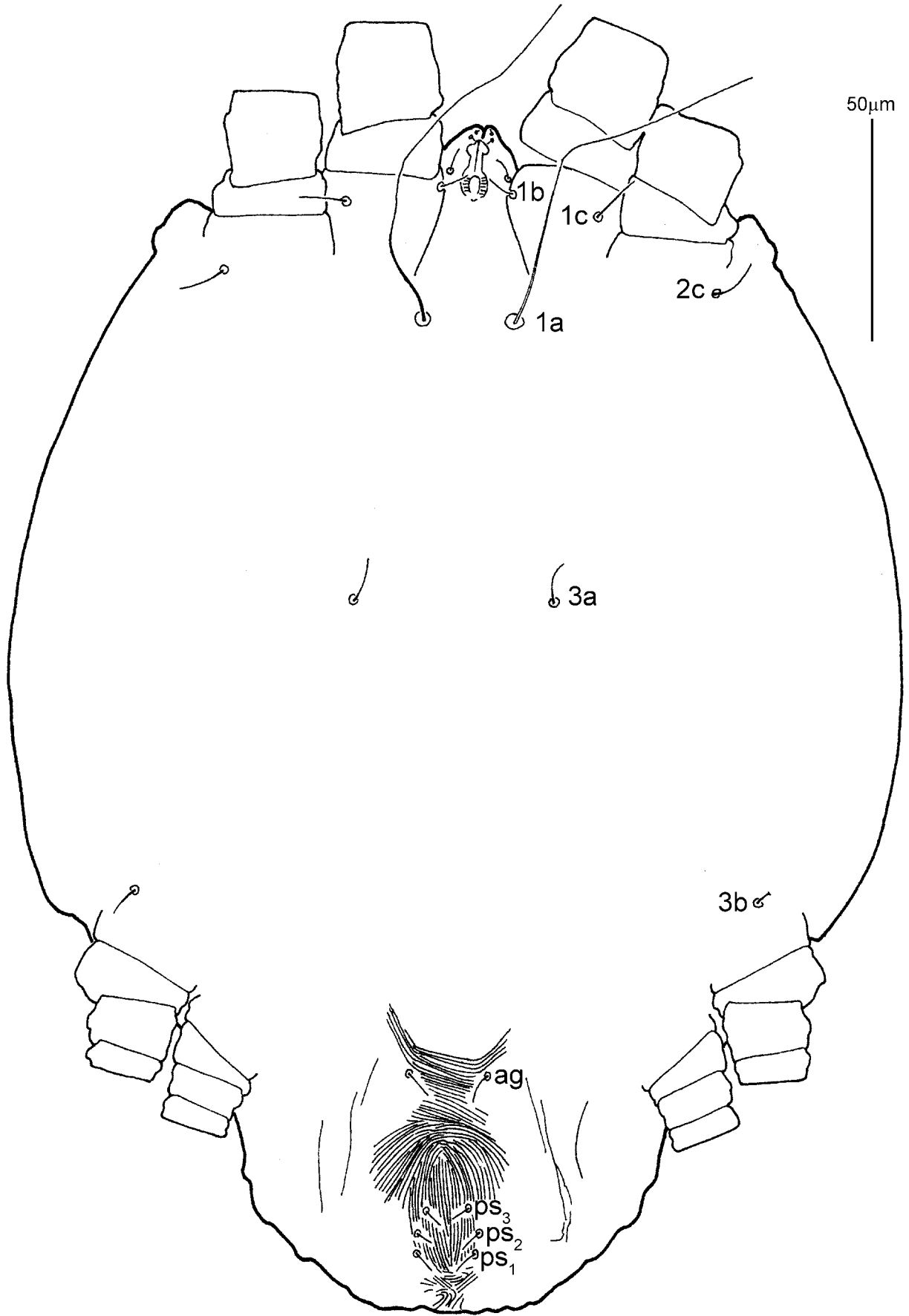


FIGURE 71. *Tenuipalpus mahoensis* Collyer (Protonymph). Ventral view of idiosoma.

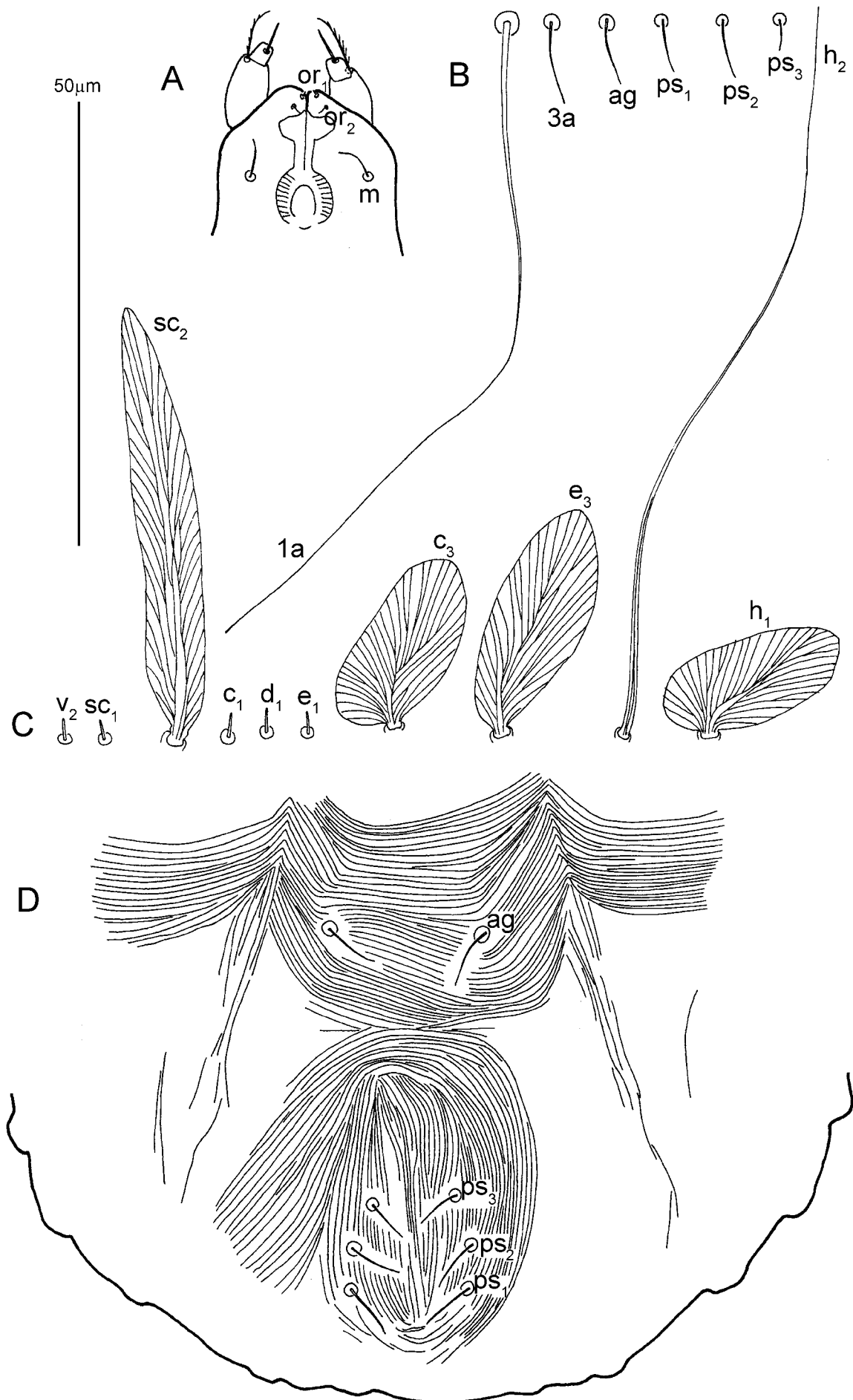


FIGURE 72. *Tenuipalpus mahoensis* Collyer (Protonymph). A, subcapitulum; B, ventral setae; C, dorsal setae; D, genitoanal area.

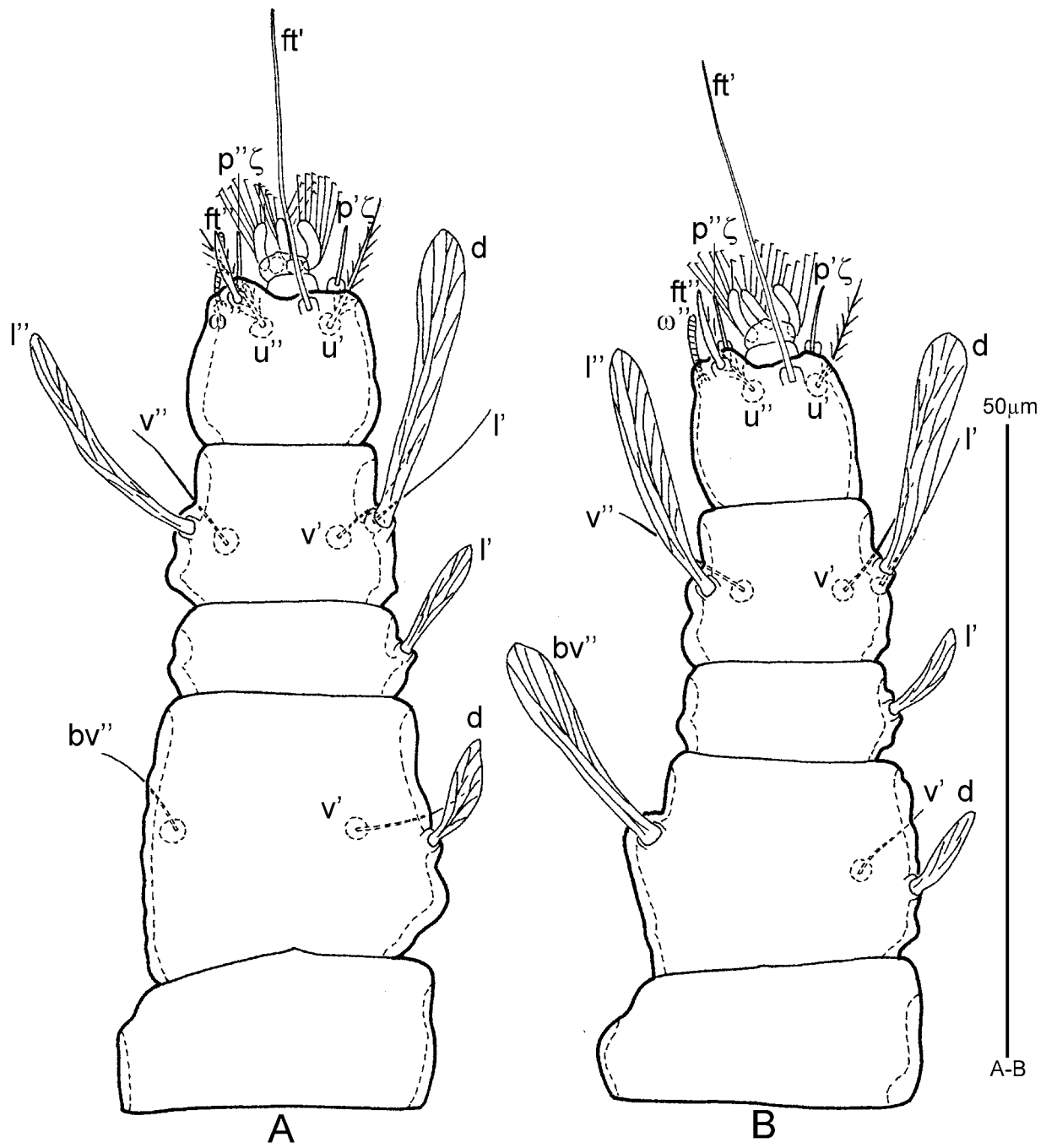


FIGURE 73. *Tenuipalpus mahoensis* Collyer (Protonymph). A, leg I; B, leg II.



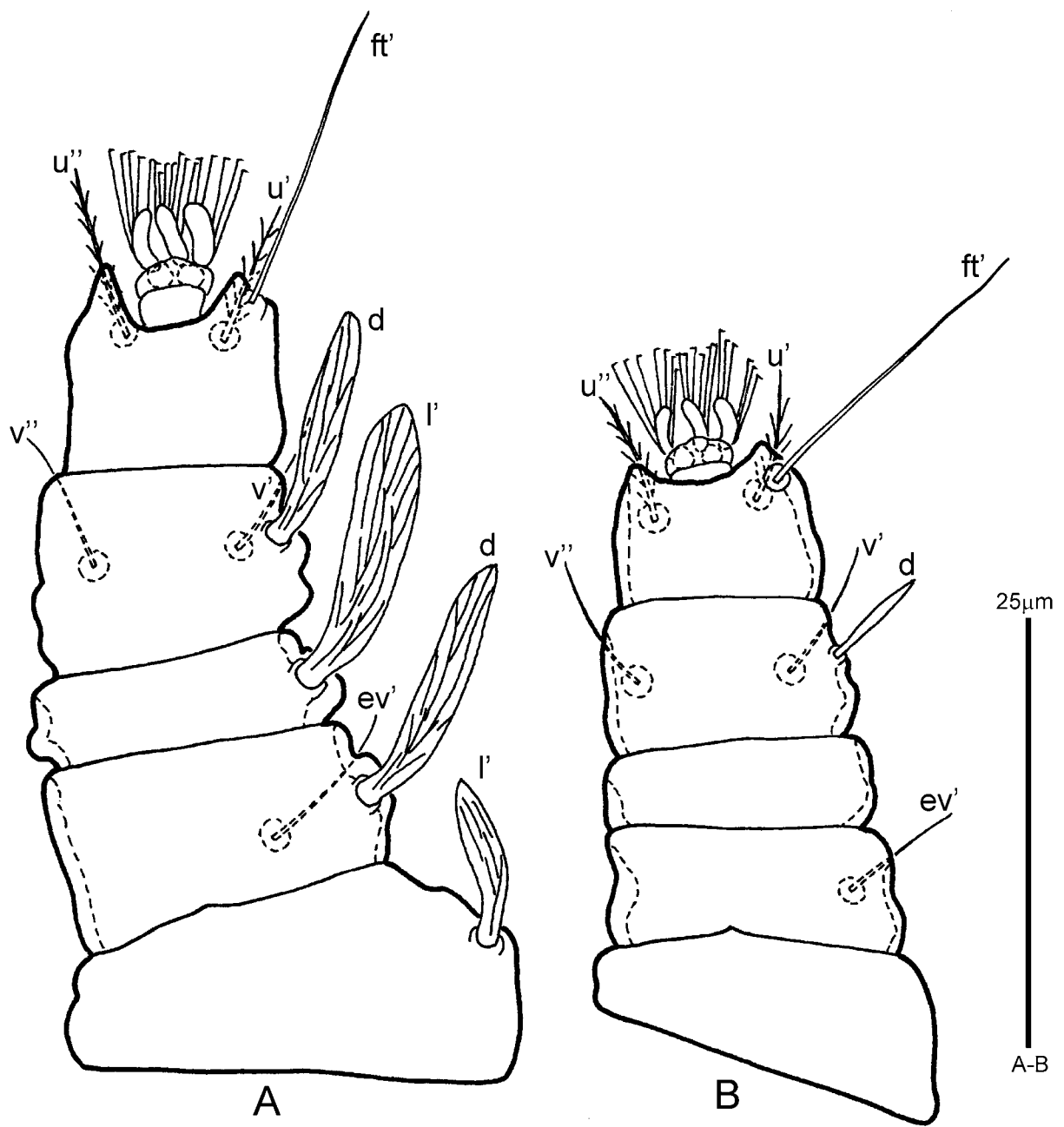


FIGURE 74. *Temuipalpus mahoensis* Collyer (Protonymph). A, leg III; B, leg IV.

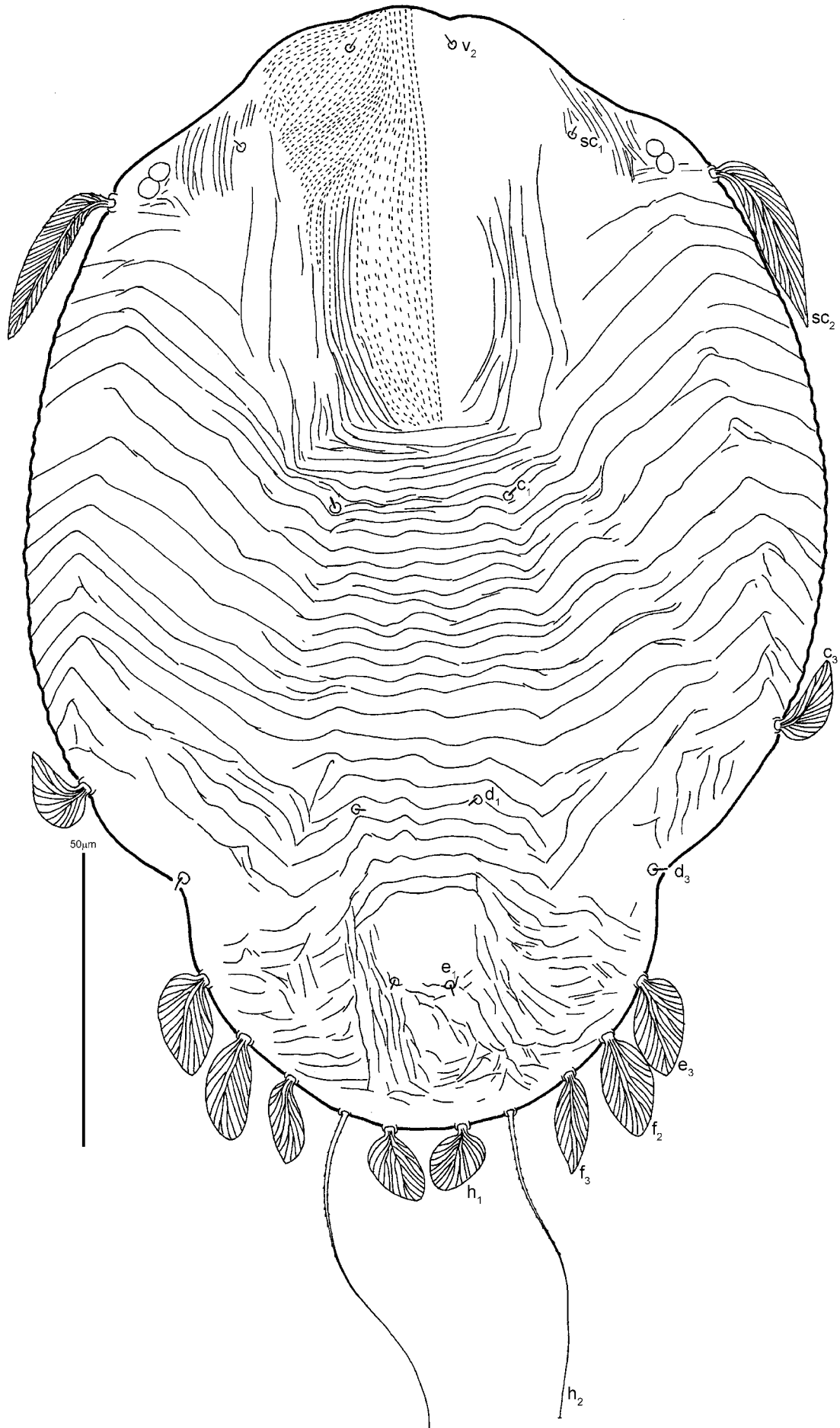


FIGURE 75. *Tenuipalpus mahoensis* Collyer (Larva). Dorsal view of idiosoma.

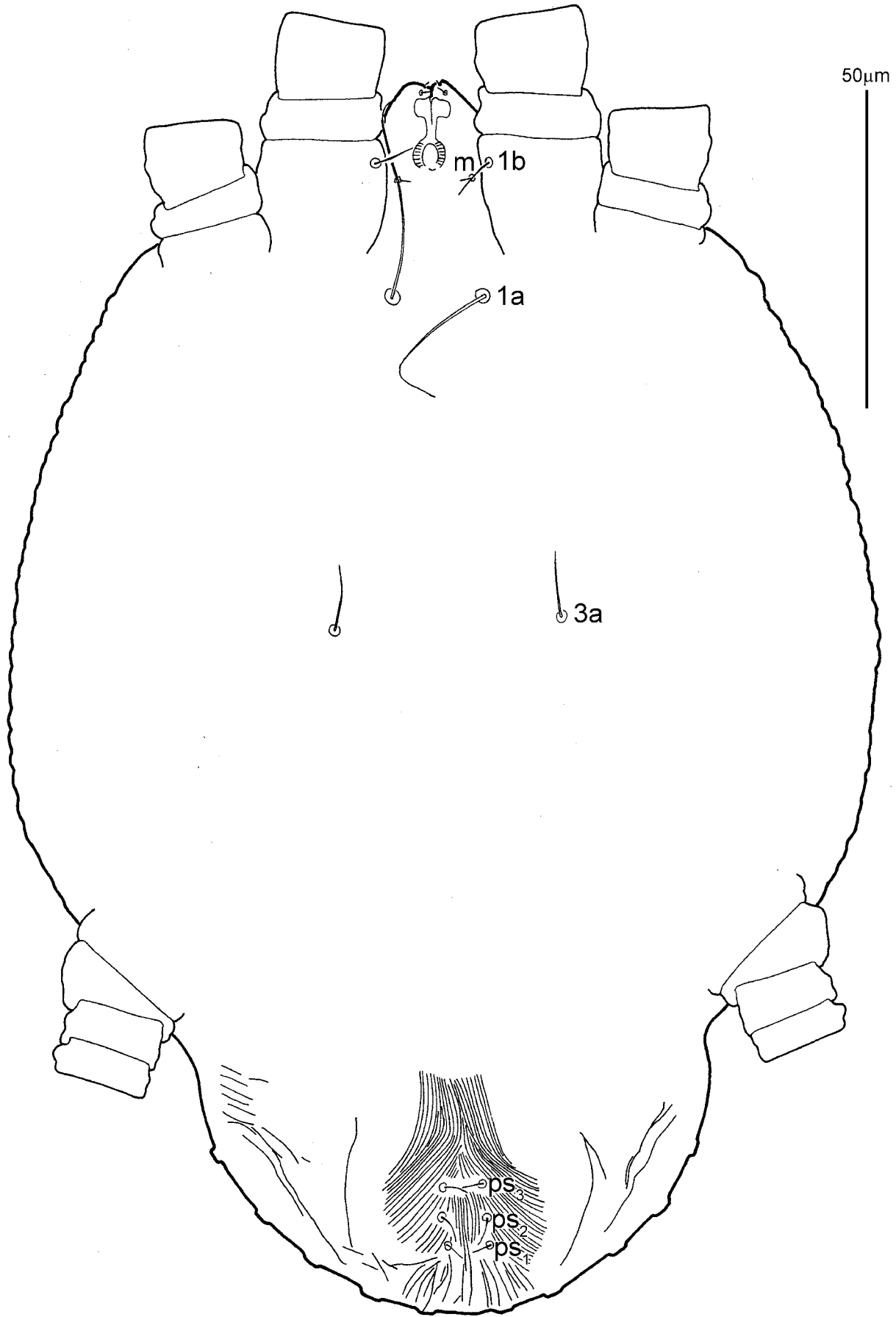


FIGURE 76. *Tenuipalpus mahoensis* Collyer (Larva). Ventral view of idiosoma.

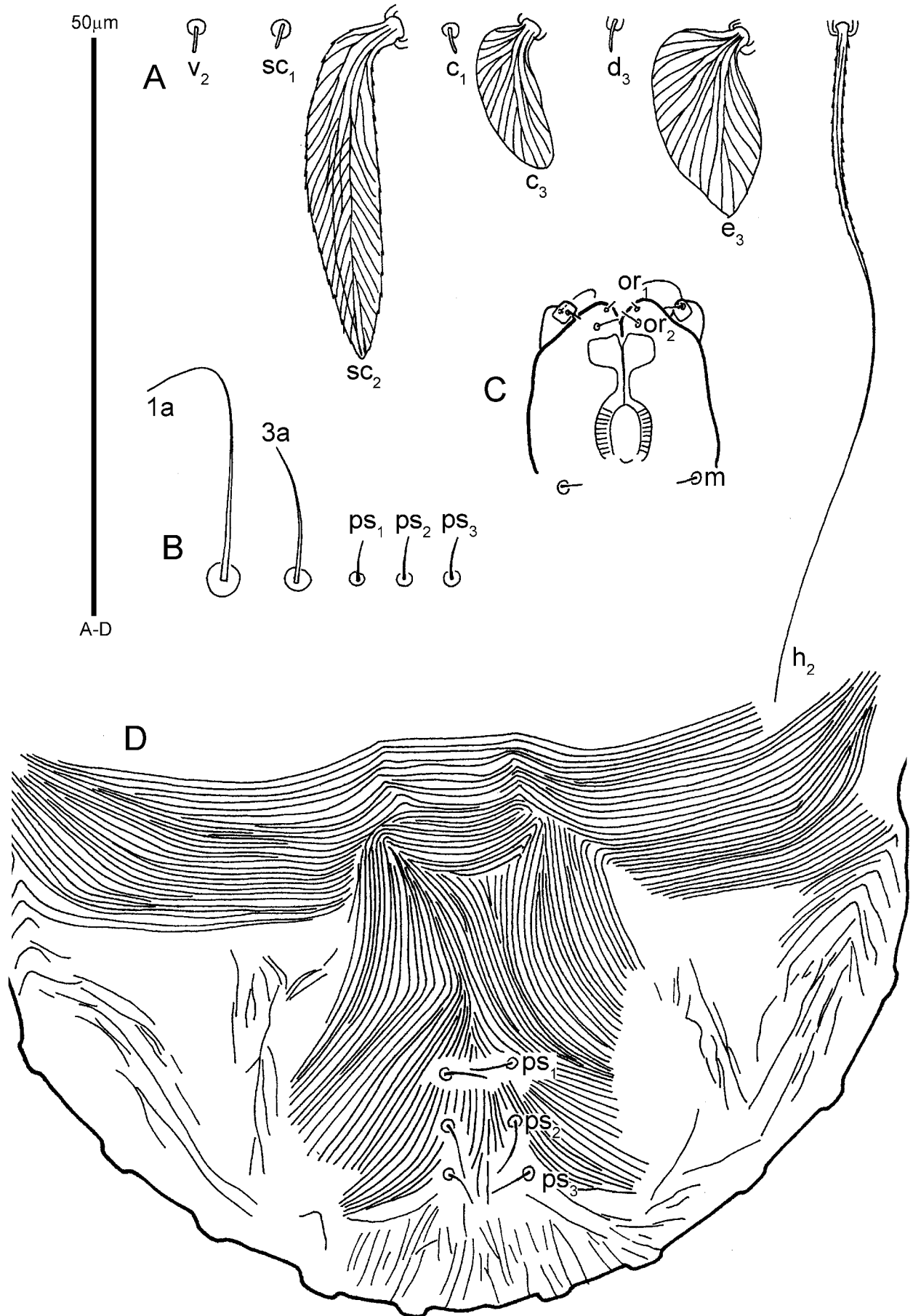


FIGURE 77. *Tenuipalpus mahoensis* Collyer (Larva). A, dorsal setae; B, ventral setae; C, subcapitulum; D, anal area.

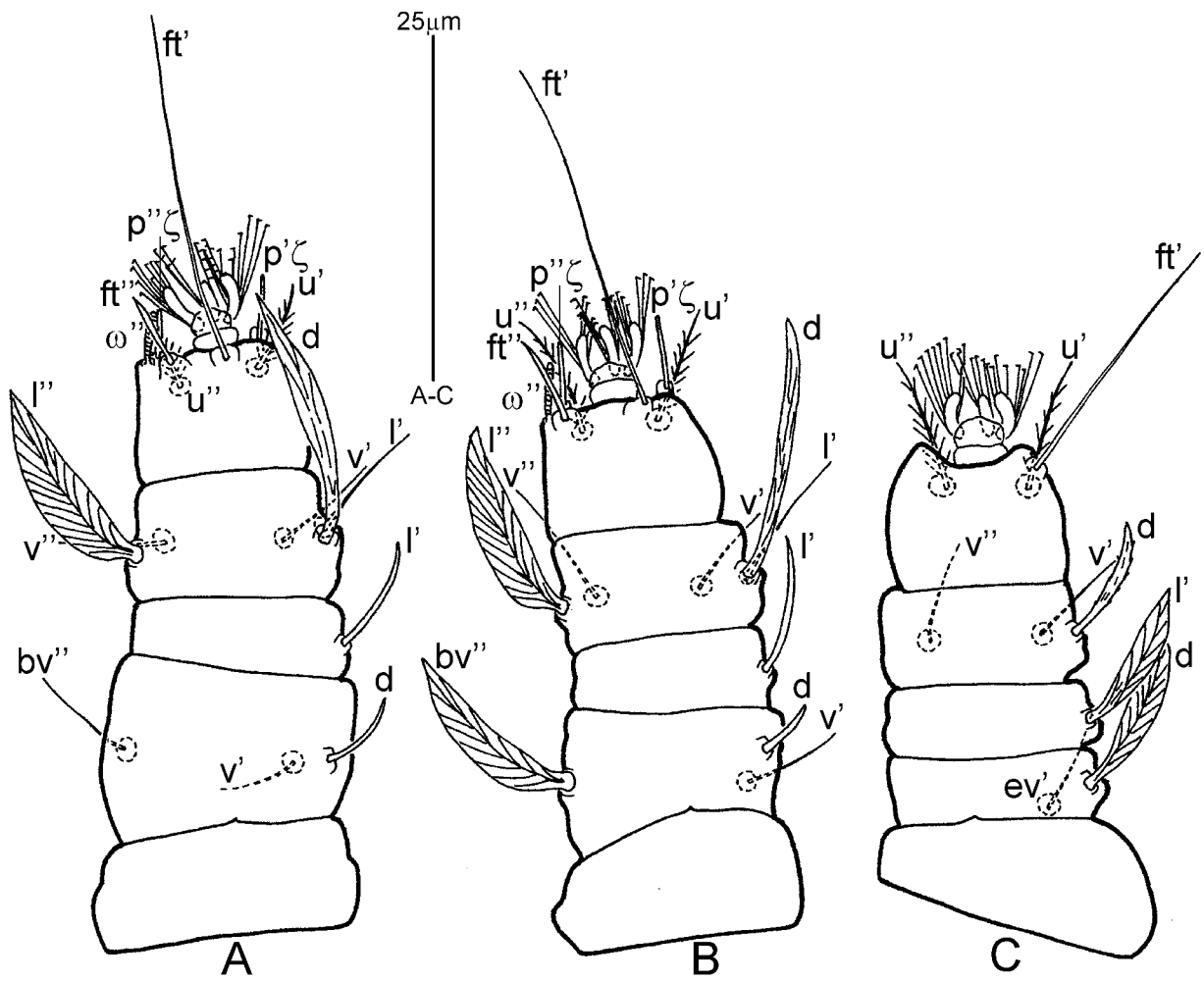


FIGURE 78. *Tenuipalpus mahoensis* Collyer (Larva). A, leg I; B, leg II; C, leg III.

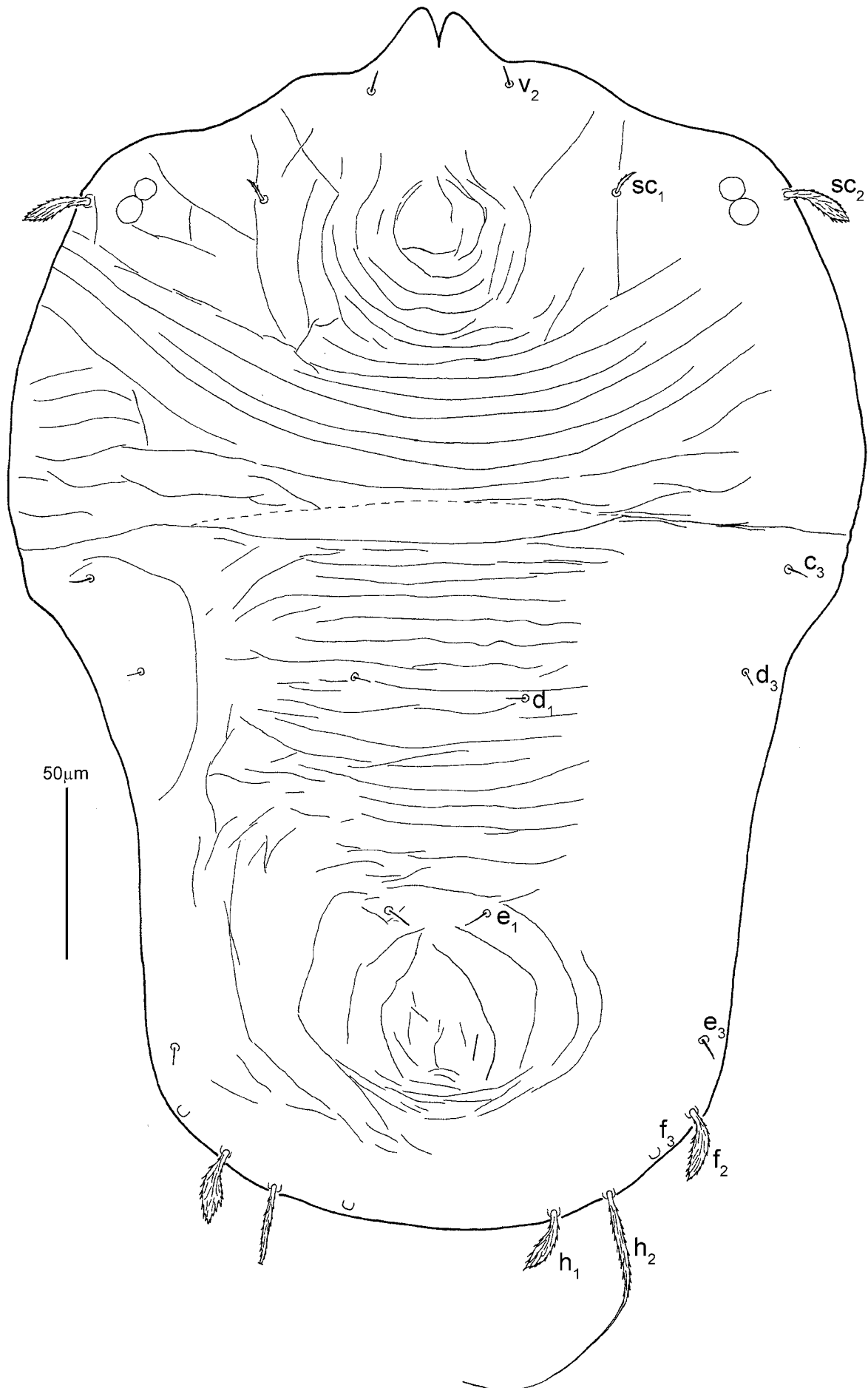


FIGURE 79. *Tenuipalpus montanus* Collyer (female). Dorsal view of idiosoma.

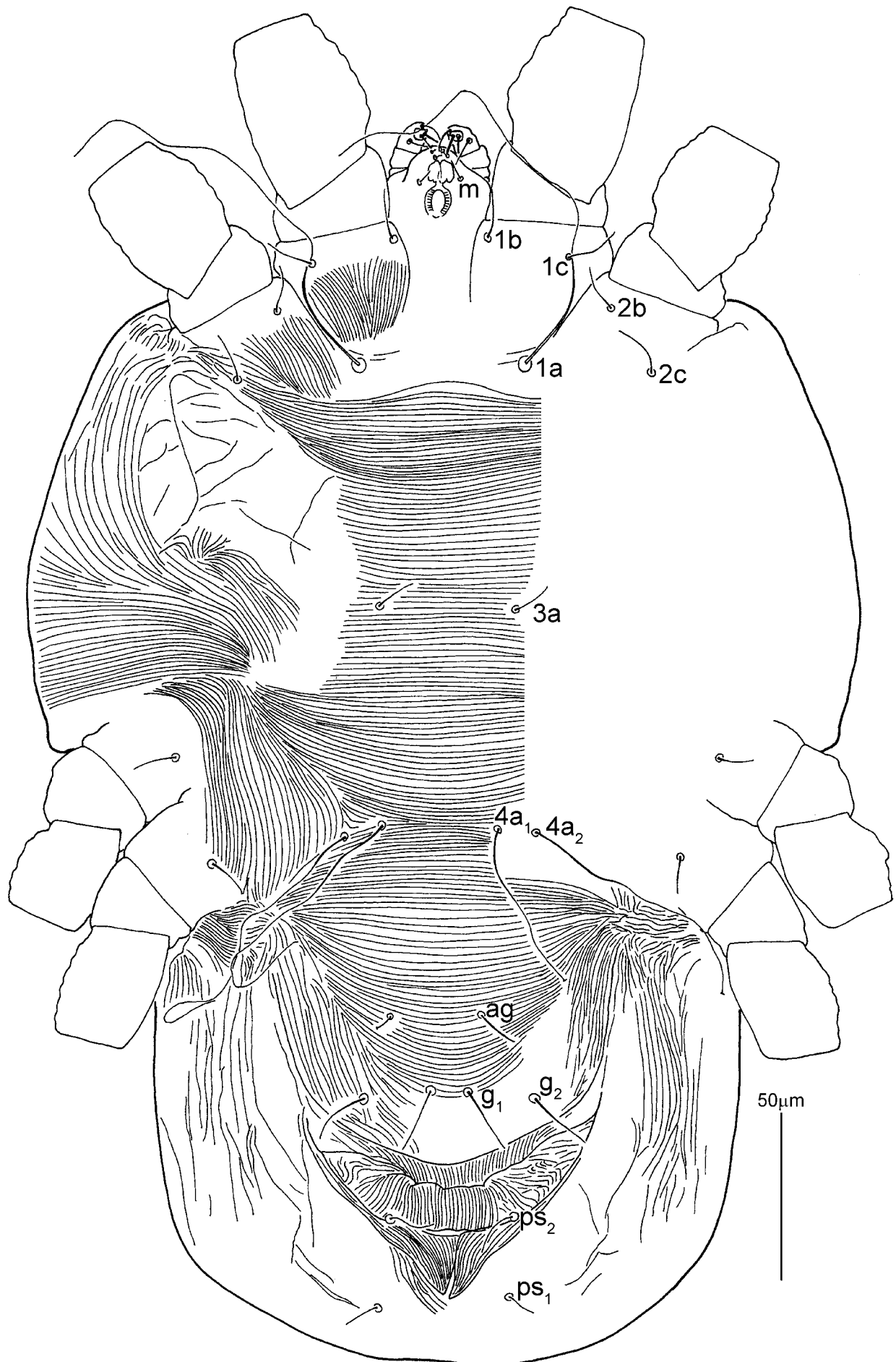


FIGURE 80. *Tenuipalpus montanus* Collyer (female). Ventral view of idiosoma.

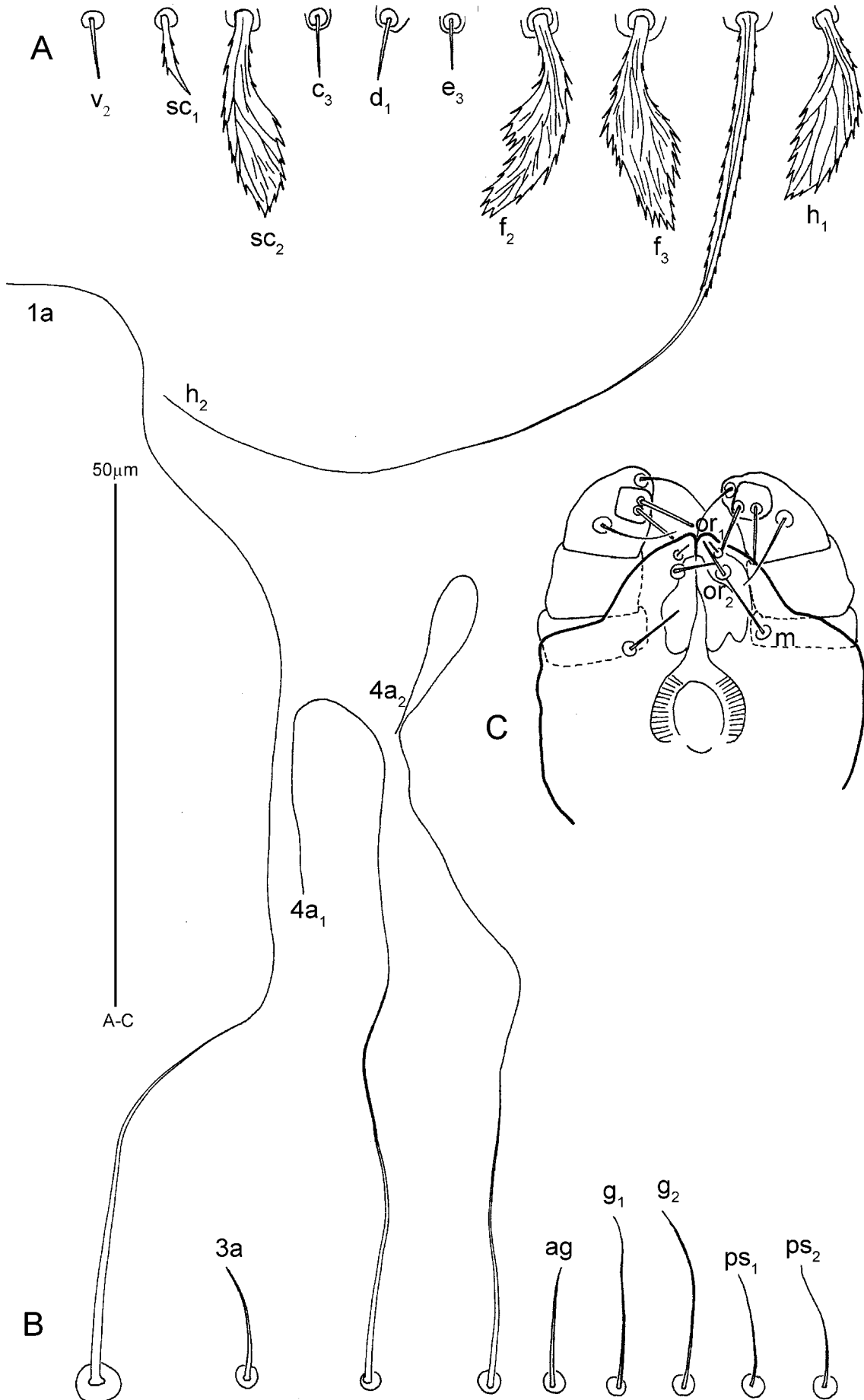


FIGURE 81. *Tenuipalpus montanus* Collyer (female). A, dorsal setae; B, ventral setae; C, subcapitulum.



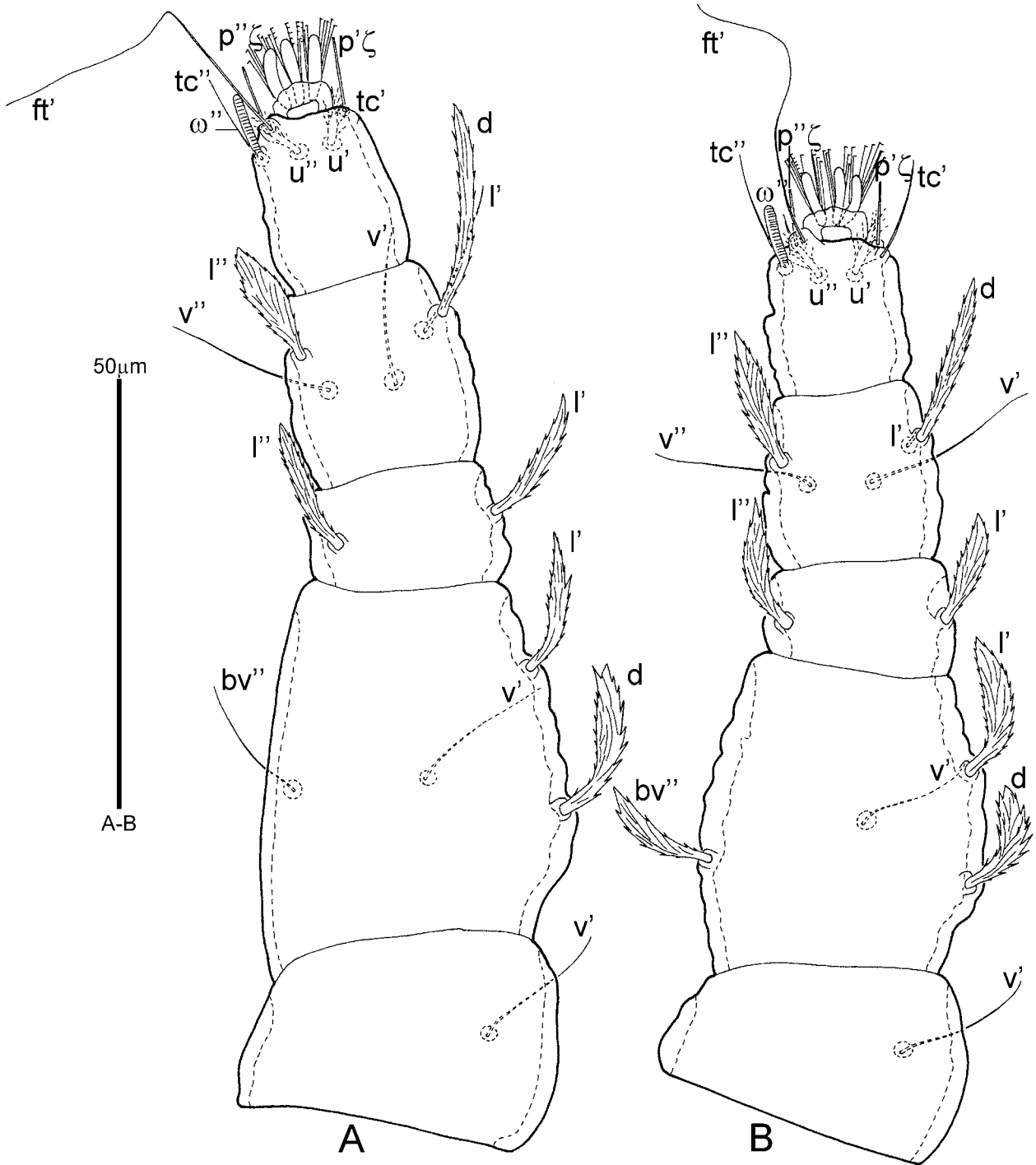


FIGURE 82. *Tenuipalpus montanus* Collyer (female). A, leg I; B, leg II.

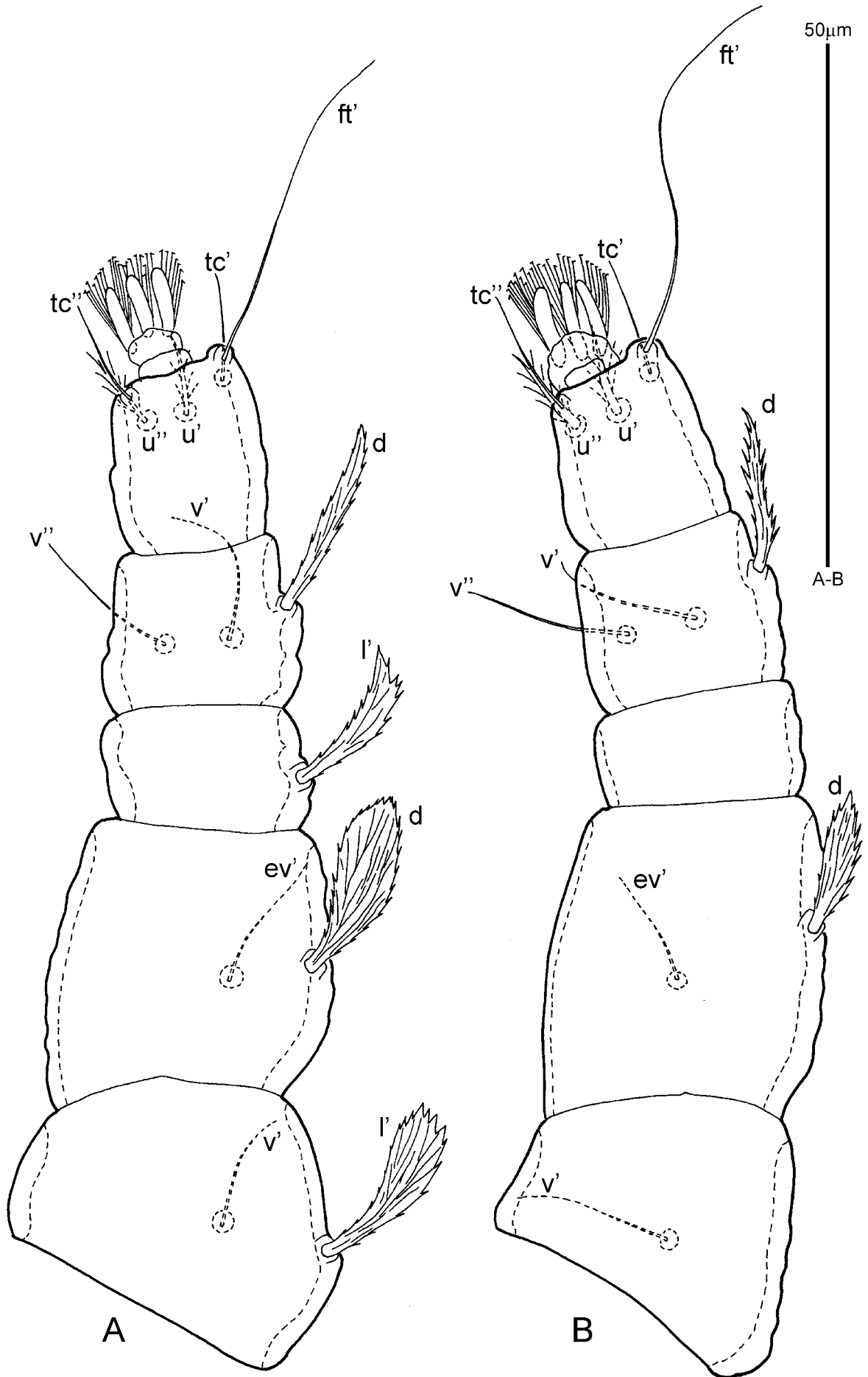


FIGURE 83. *Tenuipalpus montanus* Collyer (female). A, leg III; B, leg IV.



FIGURE 84. *Tenuipalpus rangiorae* Collyer (female). Dorsal view of idiosoma.

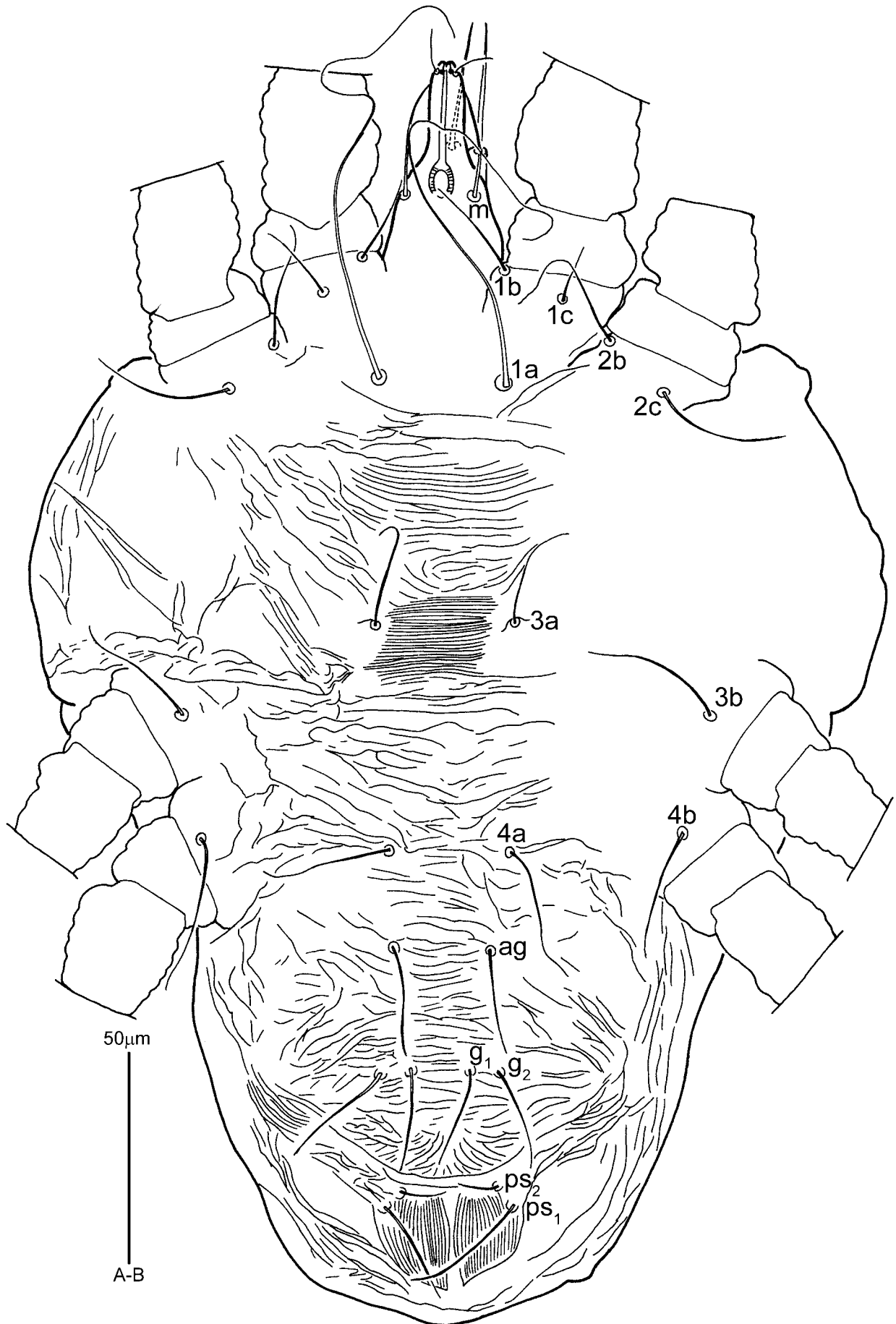


FIGURE 85. *Tenuipalpus rangiorae* Collyer (female). Ventral view of idiosoma.

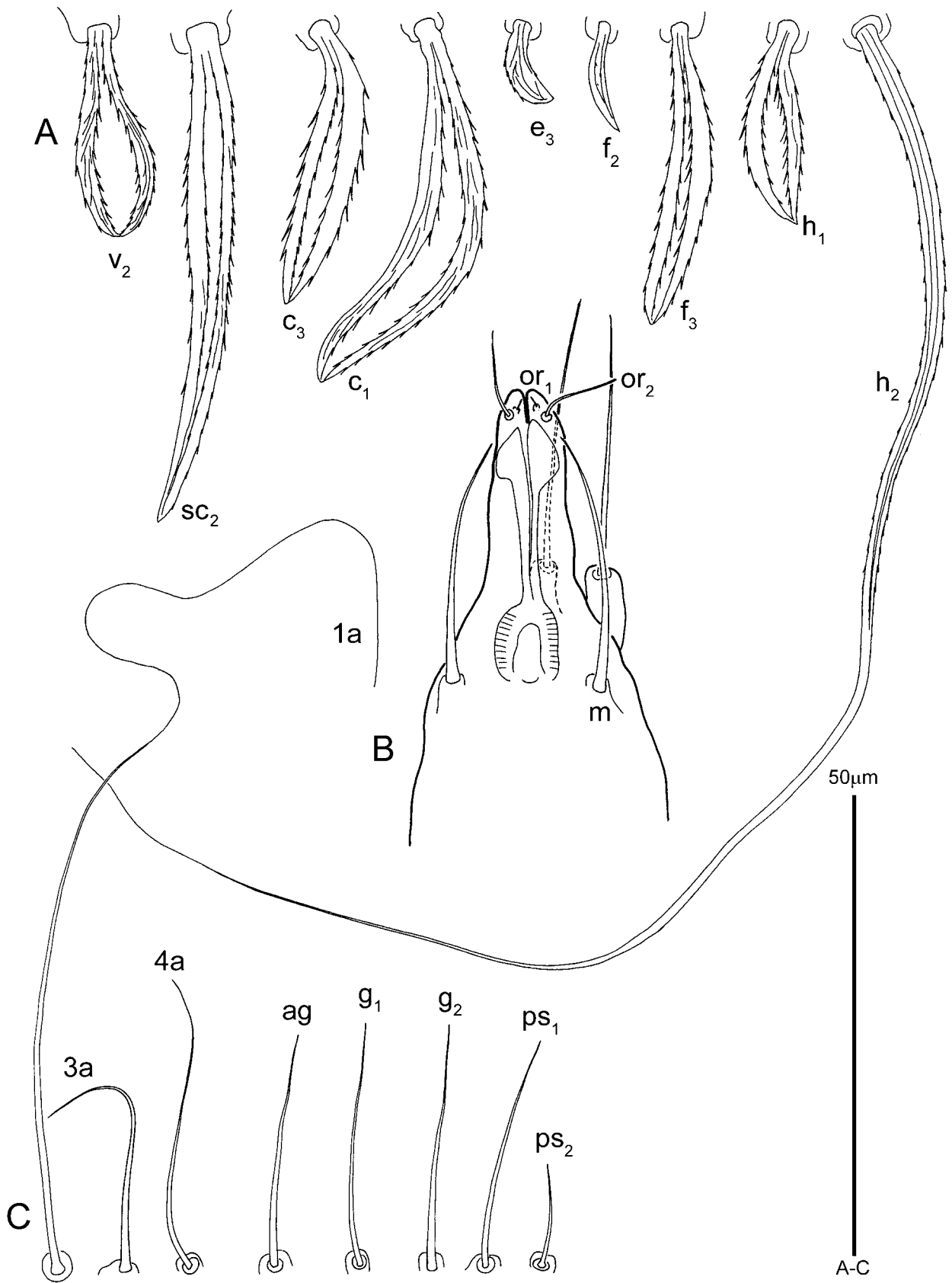


FIGURE 86. *Tenuipalpus rangiorae* Collyer (female). A, dorsal setae; B, subcapitulum; C, ventral setae.

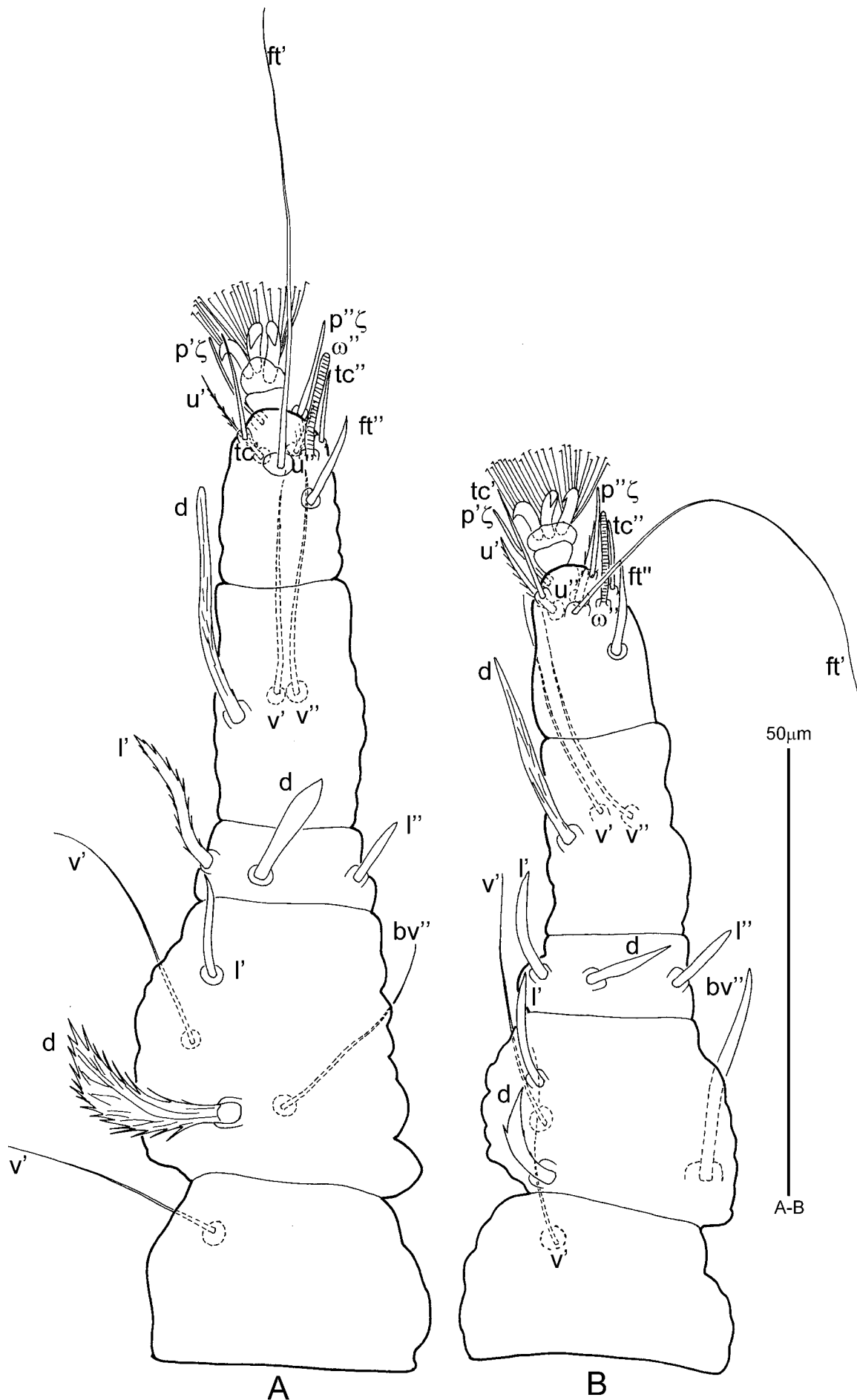


FIGURE 87. *Tenuipalpus rangiorae* Collyer (female). A, leg I; B, leg II.

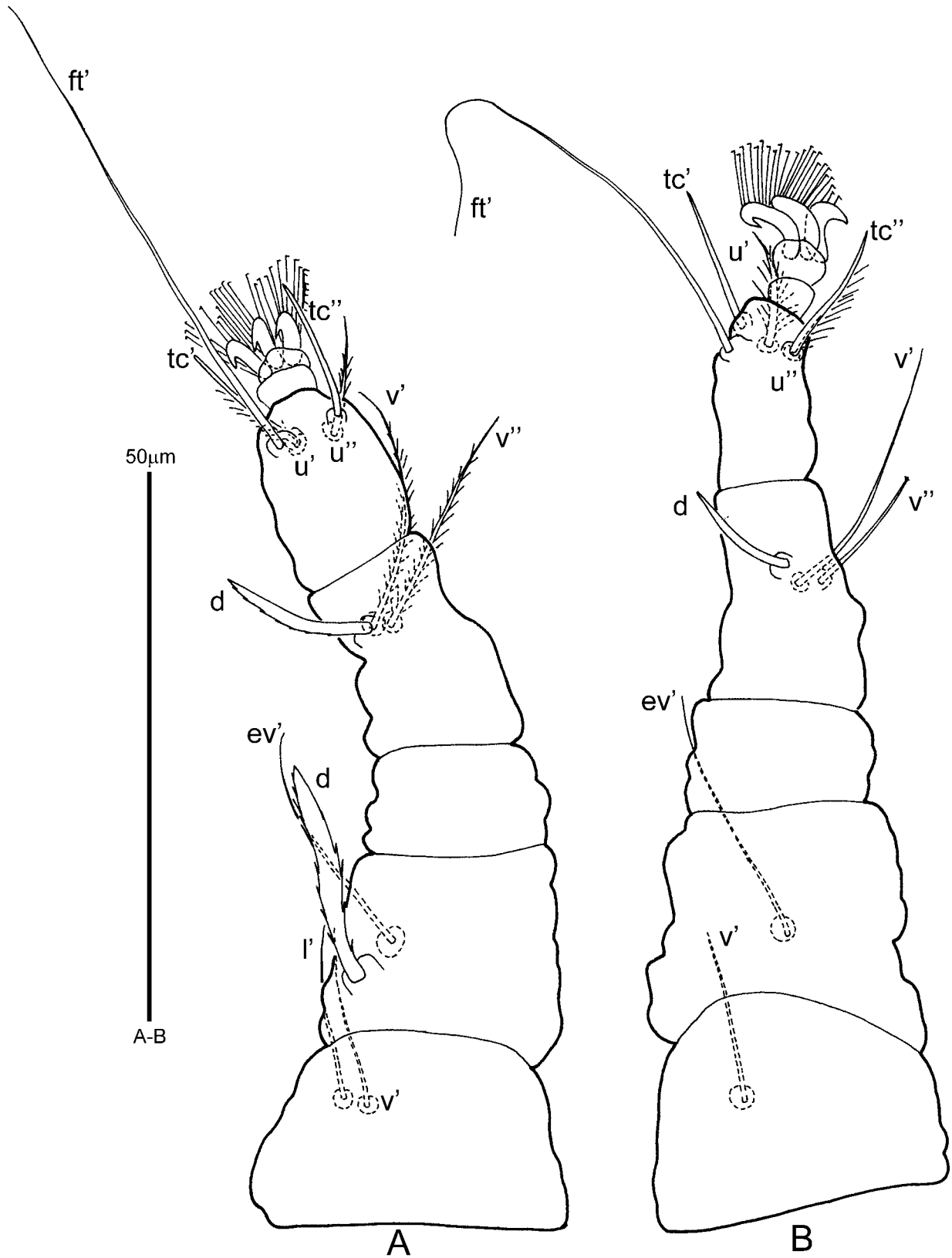


FIGURE 88. *Tenuipalpus rangiorae* Collyer (female). A, leg III; B, leg IV.

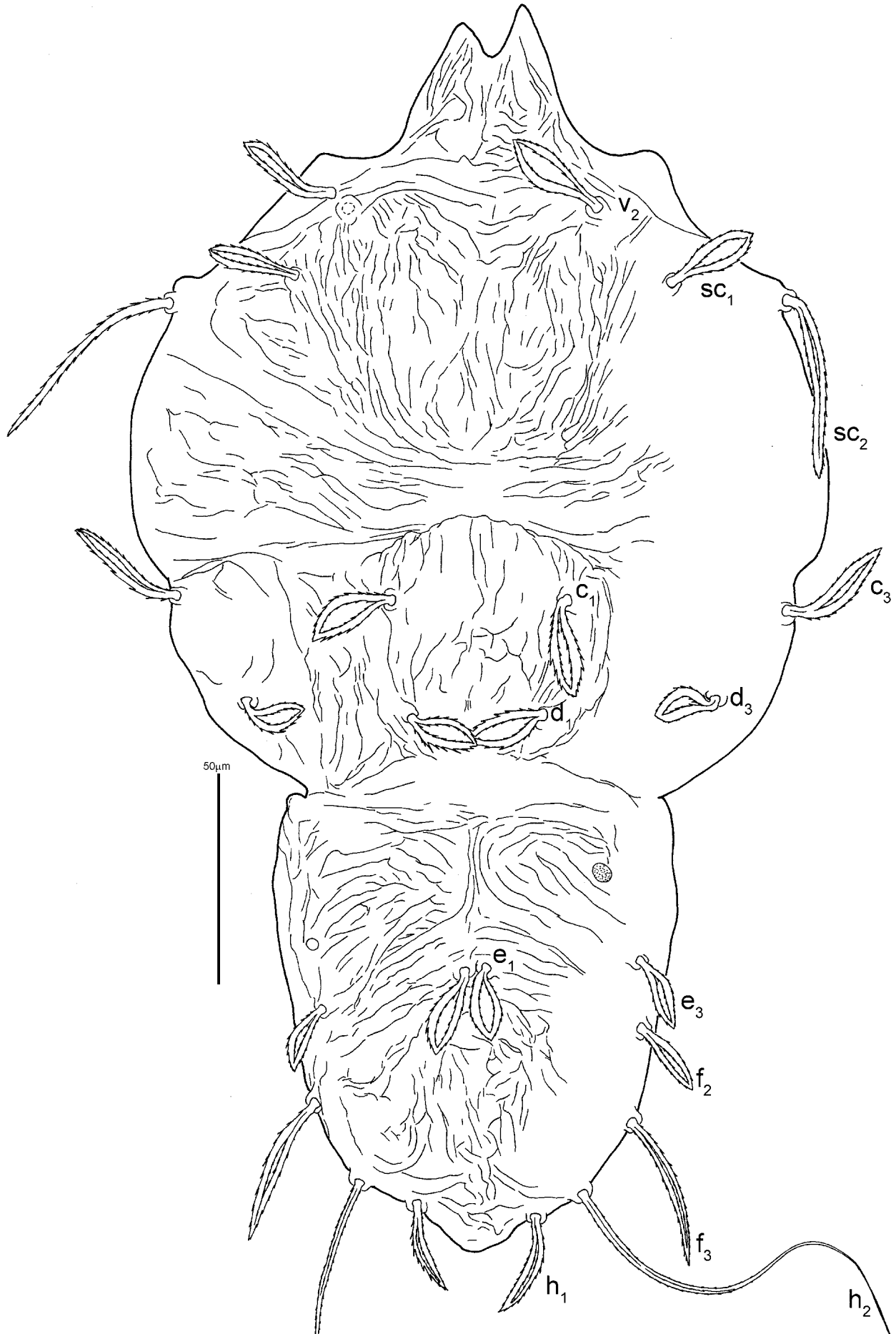


FIGURE 89. *Tenuipalpus rangiorae* Collyer (male). Dorsal view of idiosoma.



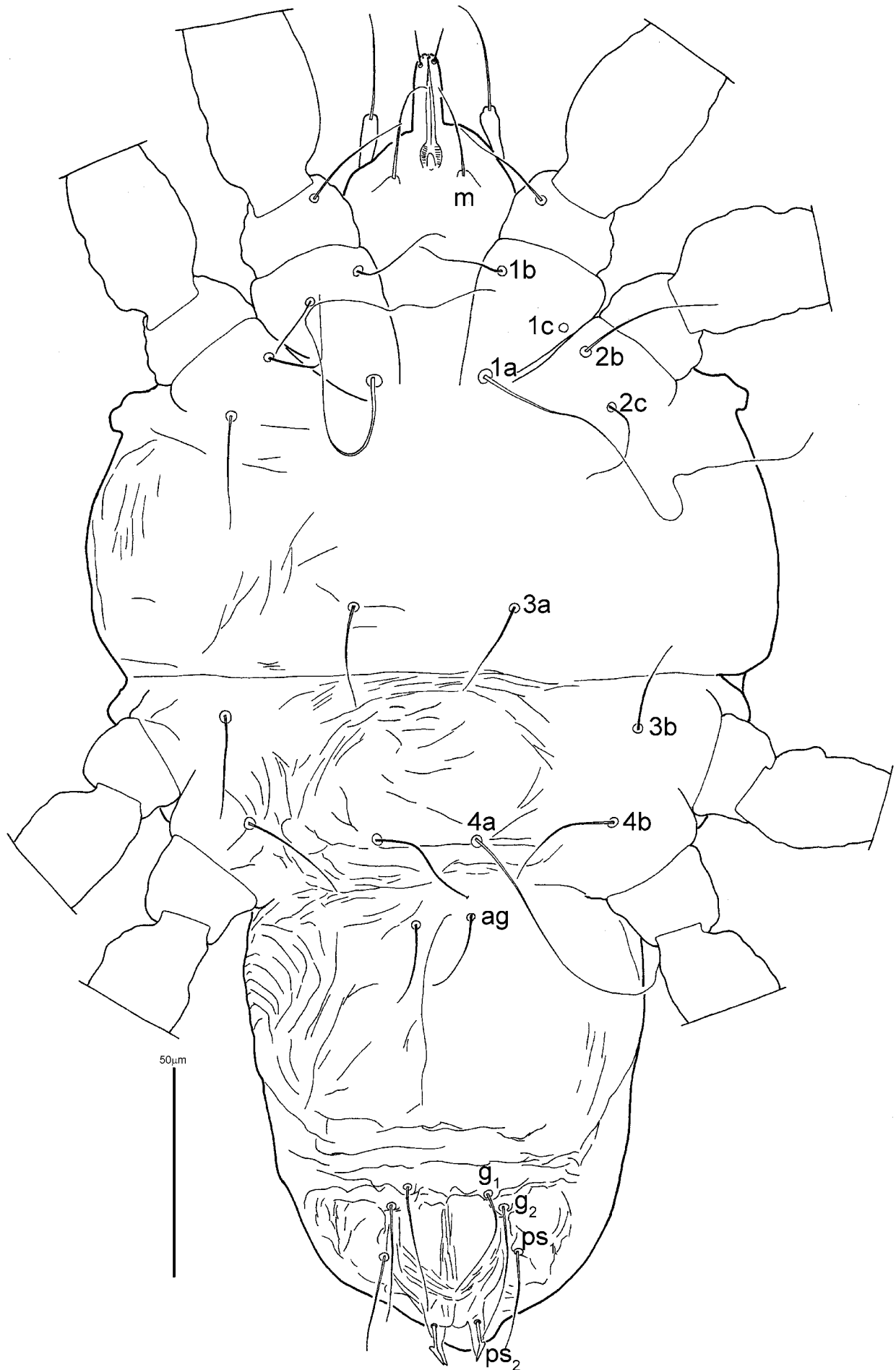


FIGURE 90. *Tenuipalpus rangiorae* Collyer (male). Ventral view of idiosoma.

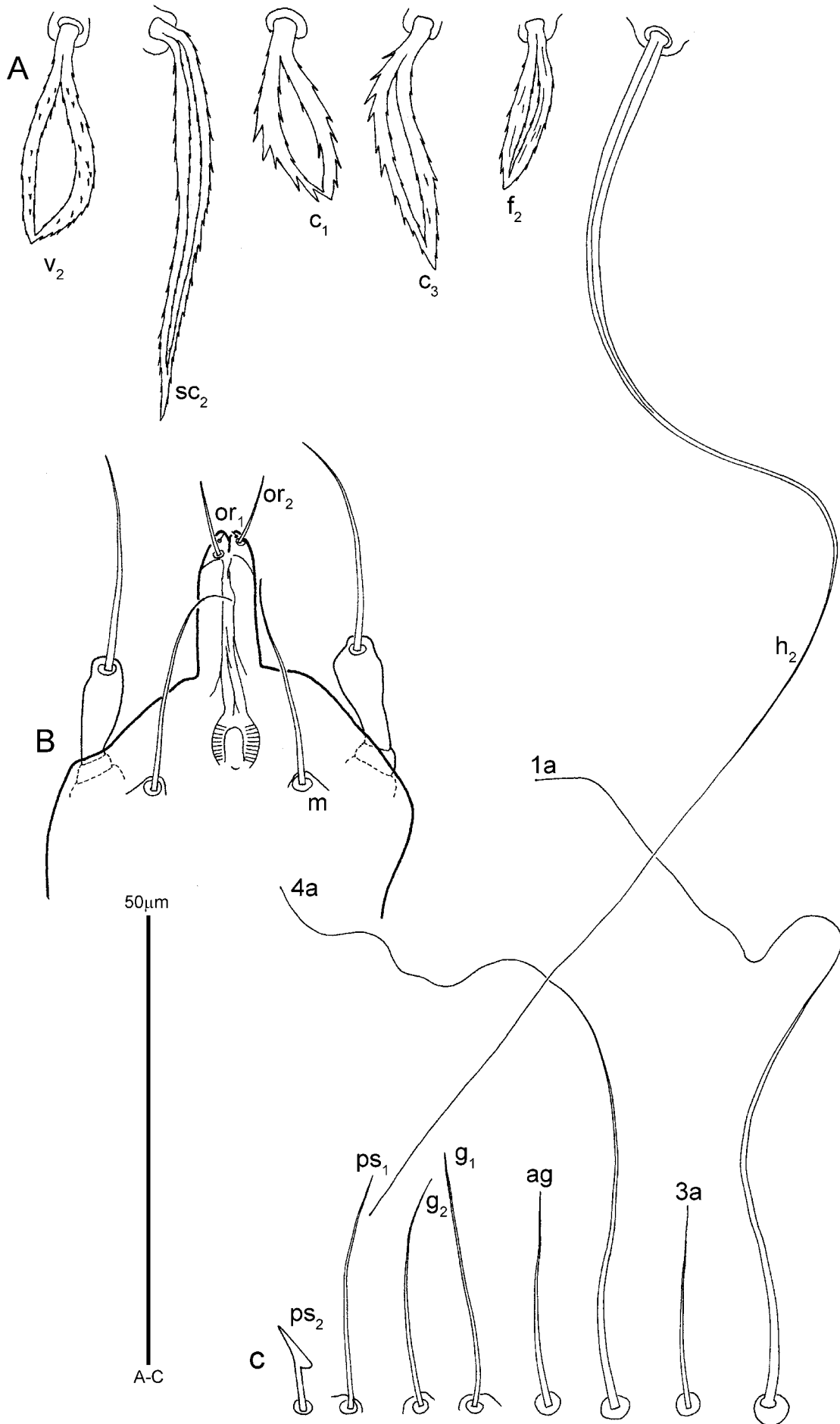


FIGURE 91. *Tenuipalpus rangiorae* Collyer (male). A, dorsal setae; B, subcapitulum; C, ventral setae.

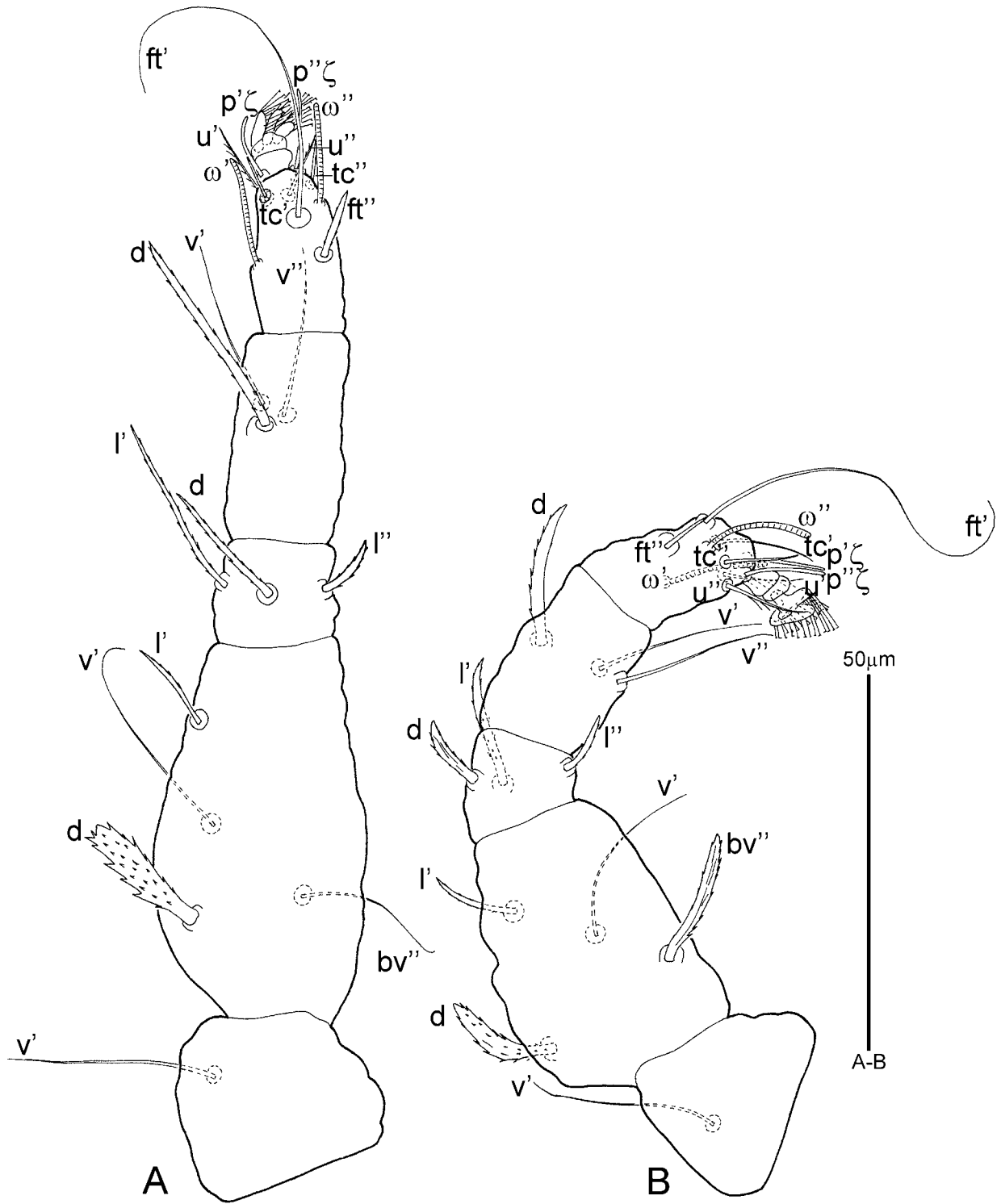


FIGURE 92. *Tenuipalpus rangiorae* Collyer (male). A, leg I; B, leg II.

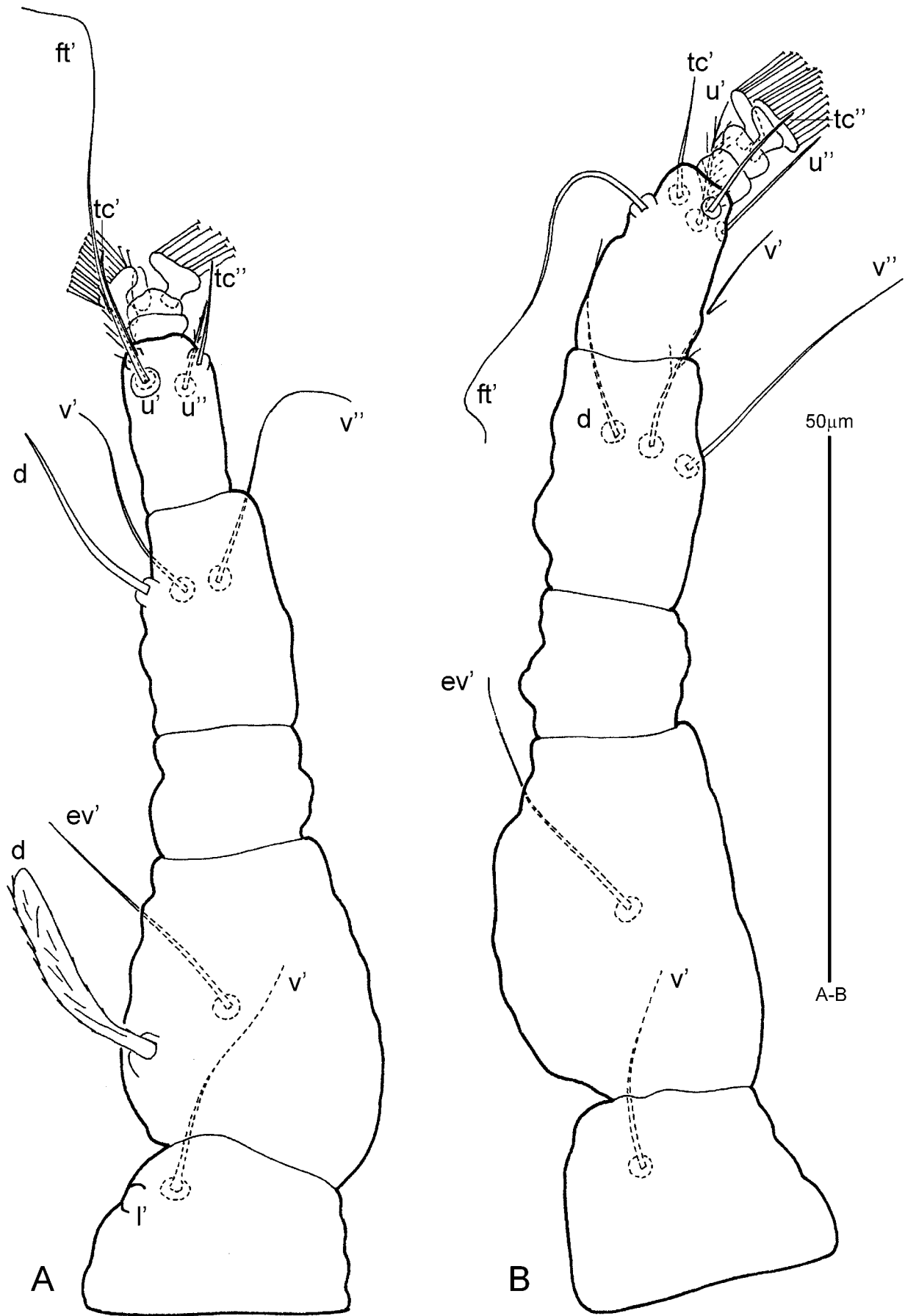


FIGURE 93. *Tenuipalpus rangiorae* Collyer (male). A, leg III; B, leg IV.

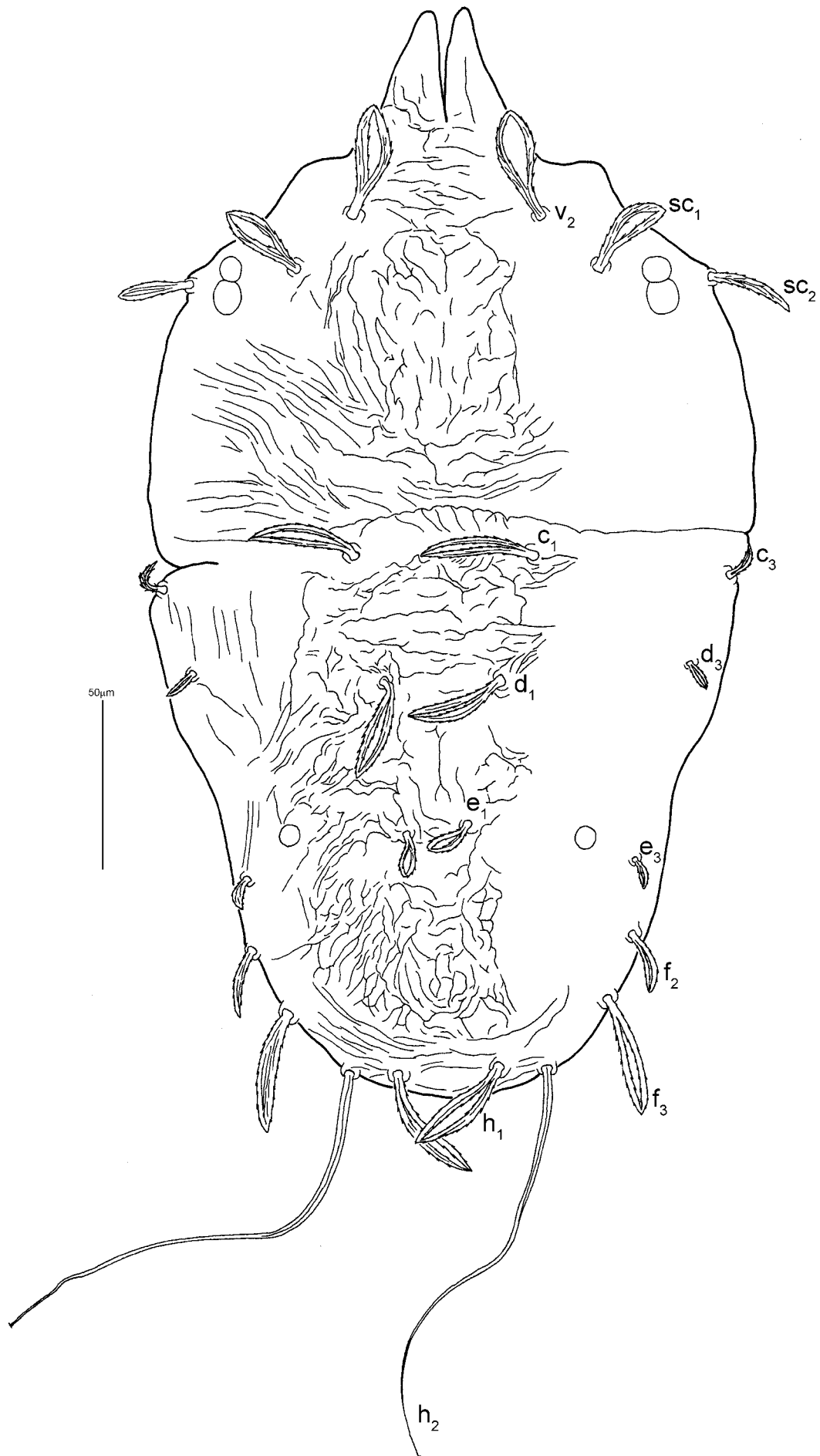


FIGURE 94. *Tenuipalpus senecionis* Collyer (female). Dorsal view of idiosoma.

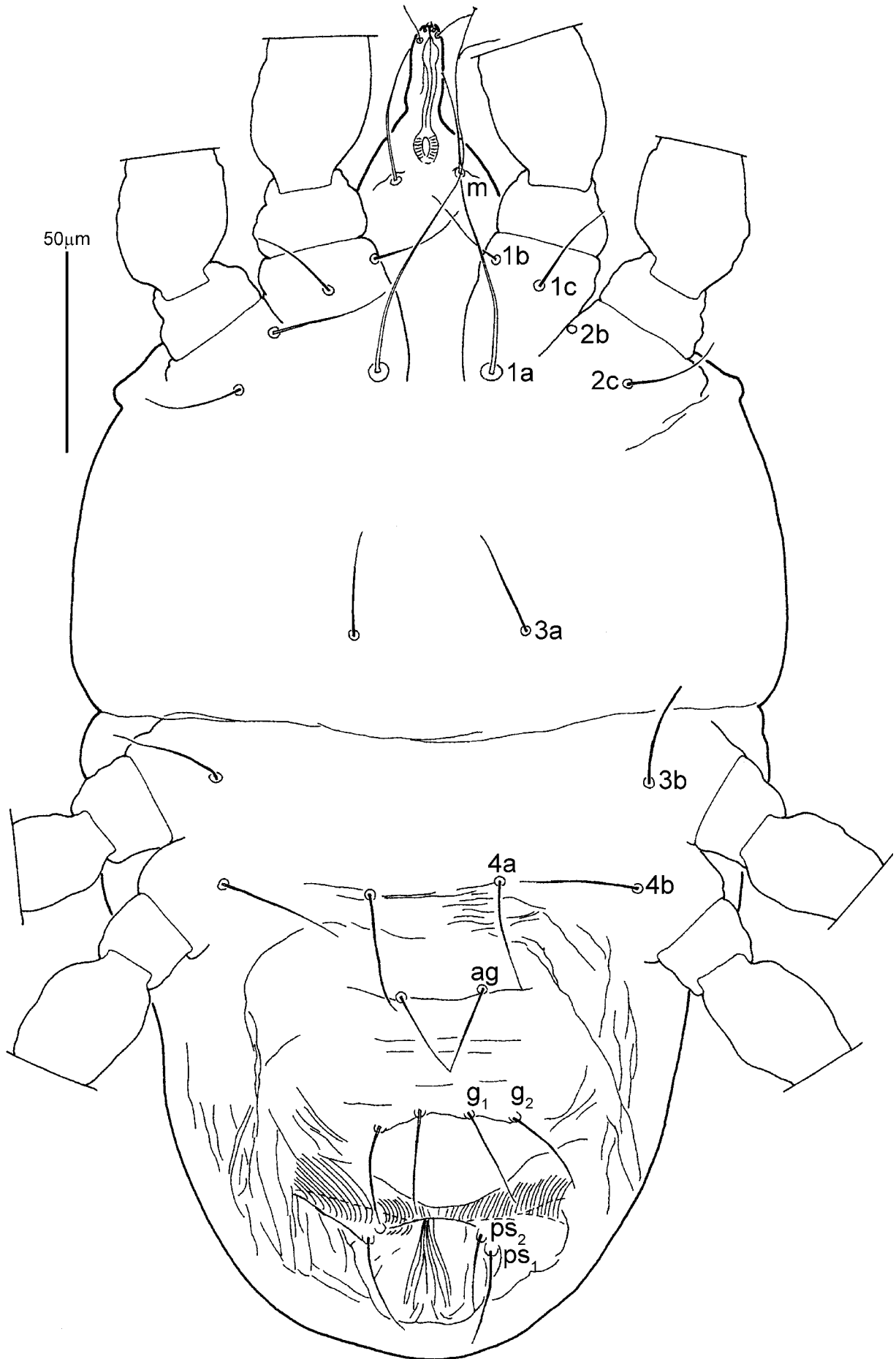


FIGURE 95. *Tenuipalpus senecionis* Collyer (female). Ventral view of idiosoma.

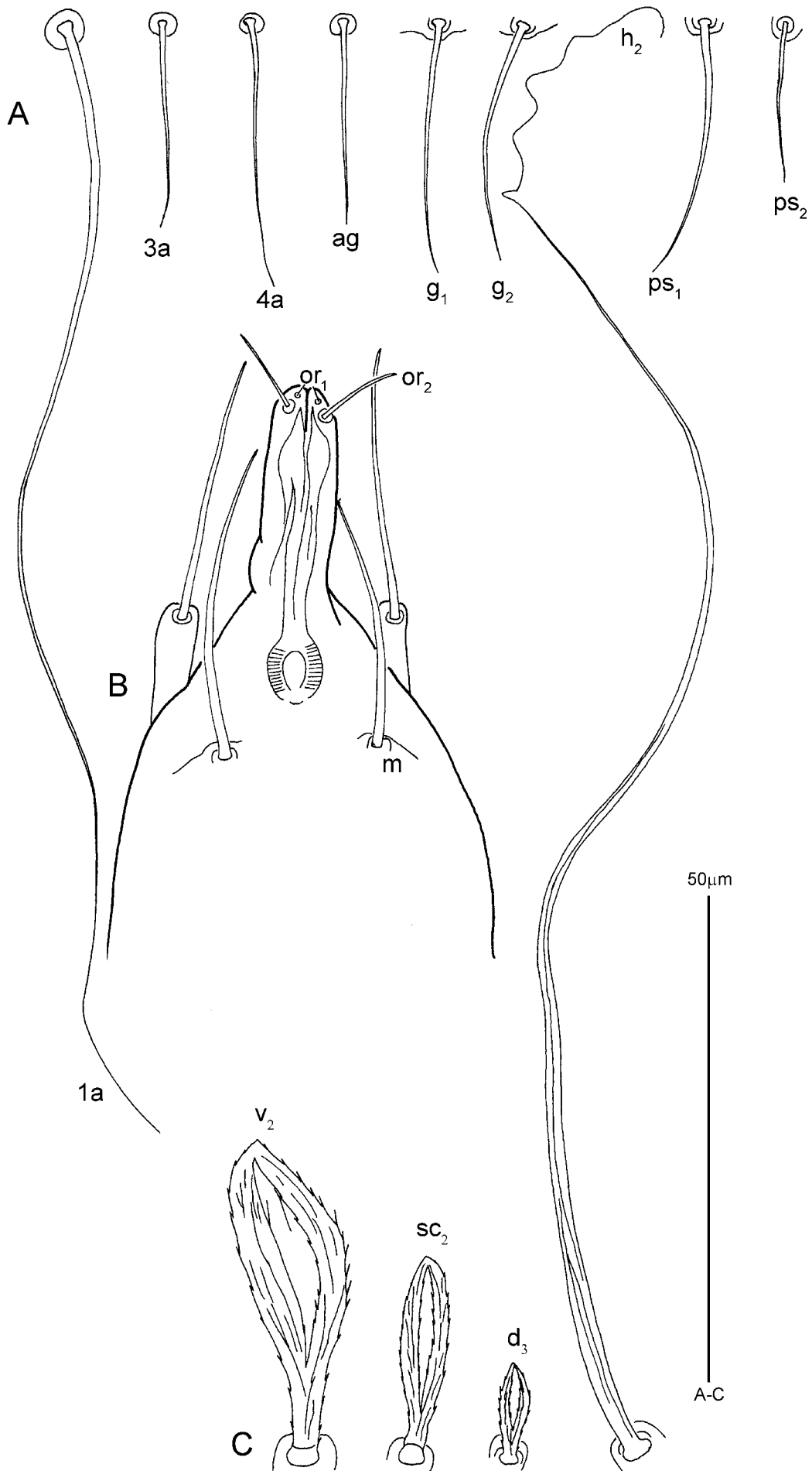


FIGURE 96. *Tenuipalpus senecionis* Collyer (female). A, ventral setae; B, subcapitulum; C, dorsal setae.

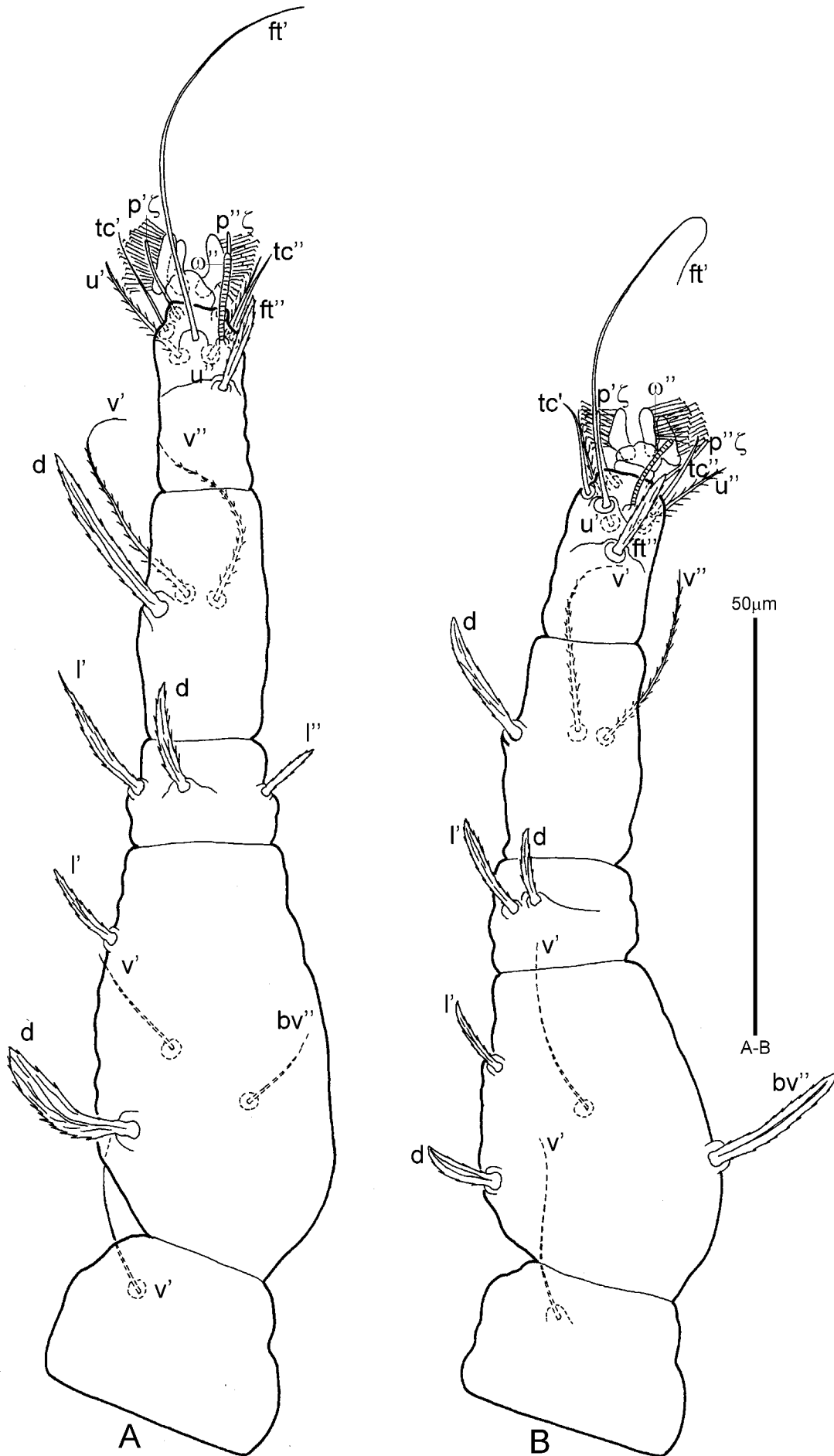


FIGURE 97. *Tenuipalpus senecionis* Collyer (female). A, leg I; B, leg II.



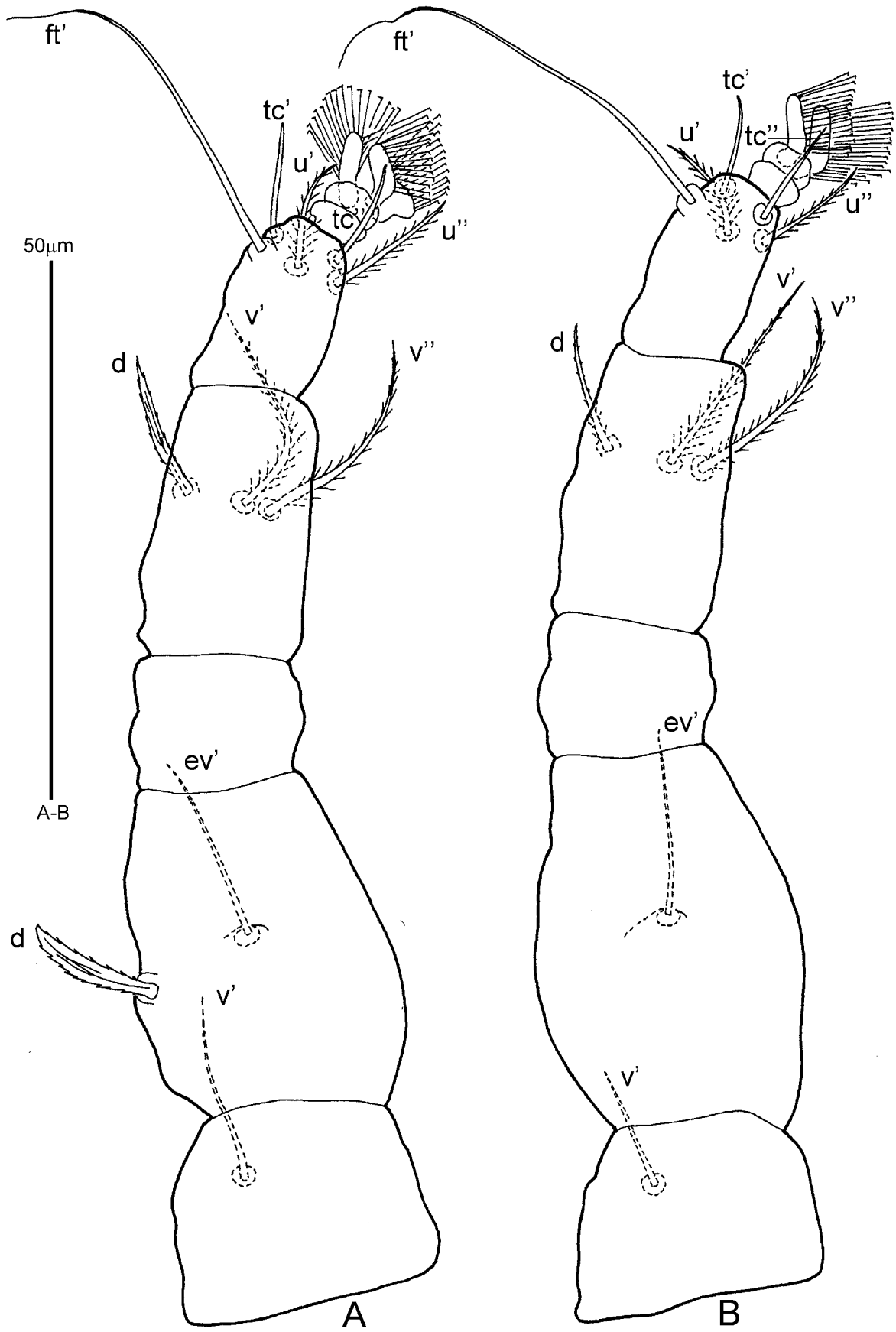


FIGURE 98. *Tenuipalpus senecionis* Collyer (female). A, leg III; B, leg IV.

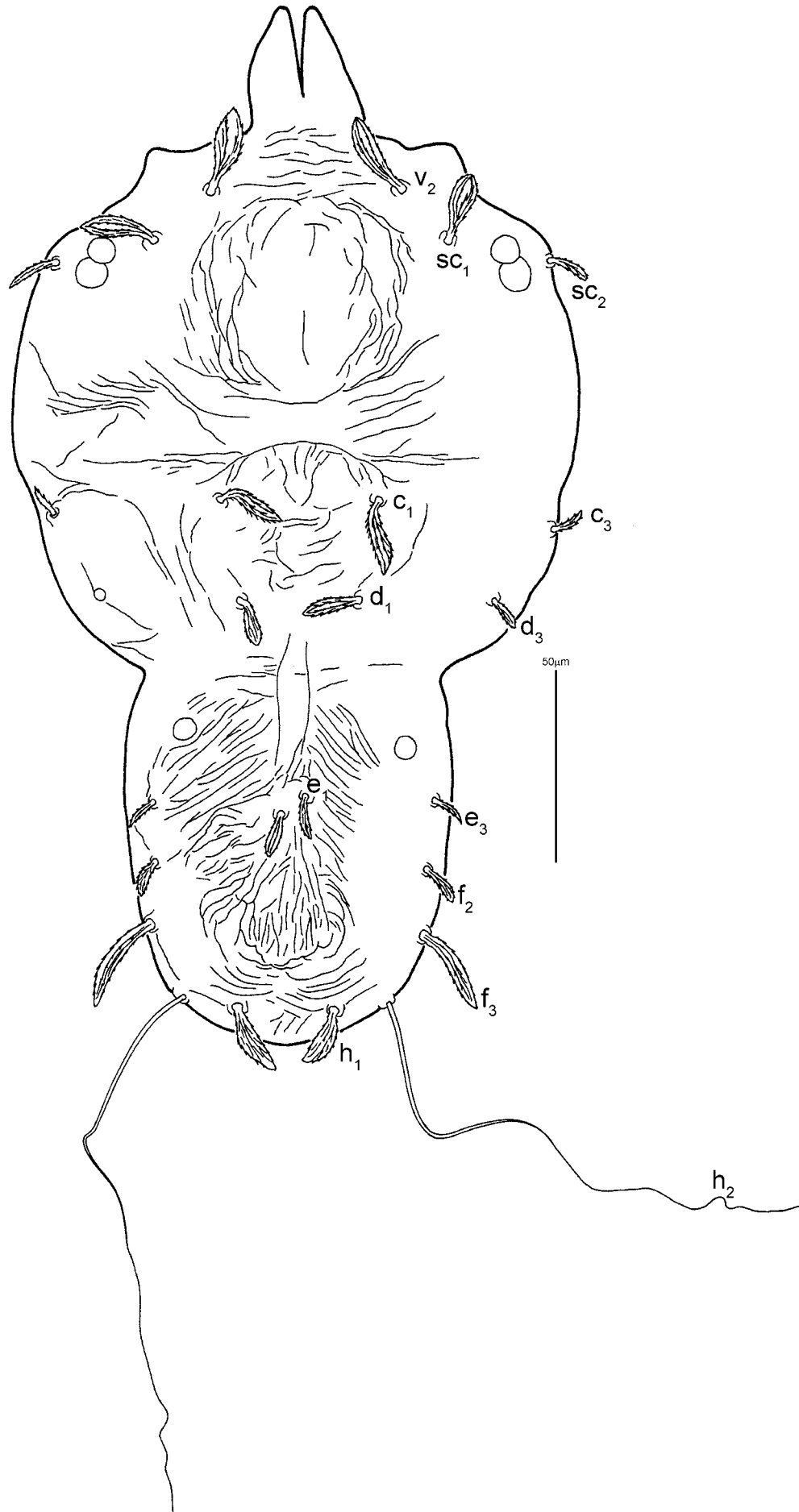


FIGURE 99. *Tenuipalpus senecionis* Collyer (male). Dorsal view of idiosoma.

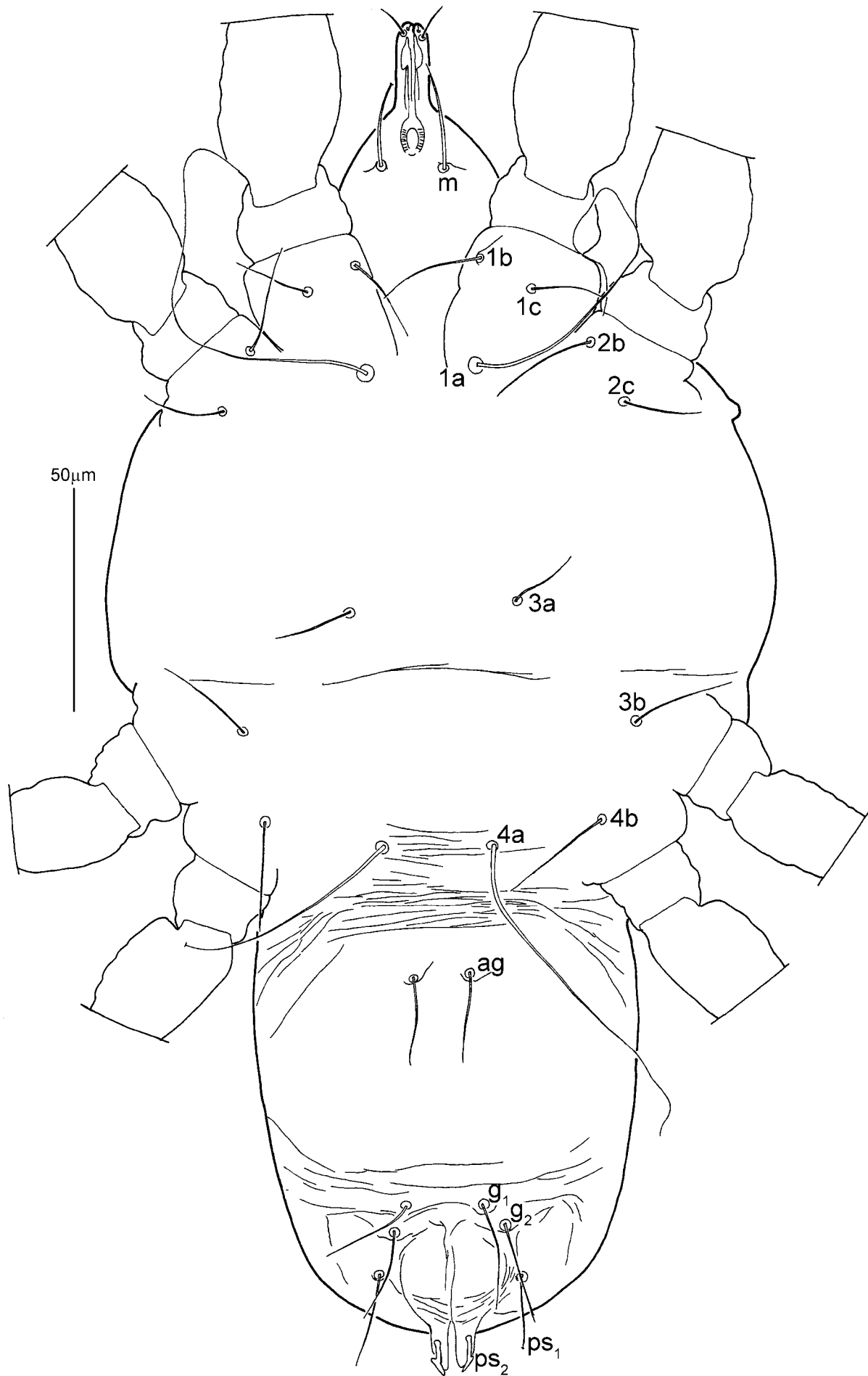


FIGURE 100. *Tenuipalpus senecionis* Collyer (male). Ventral view of idiosoma.

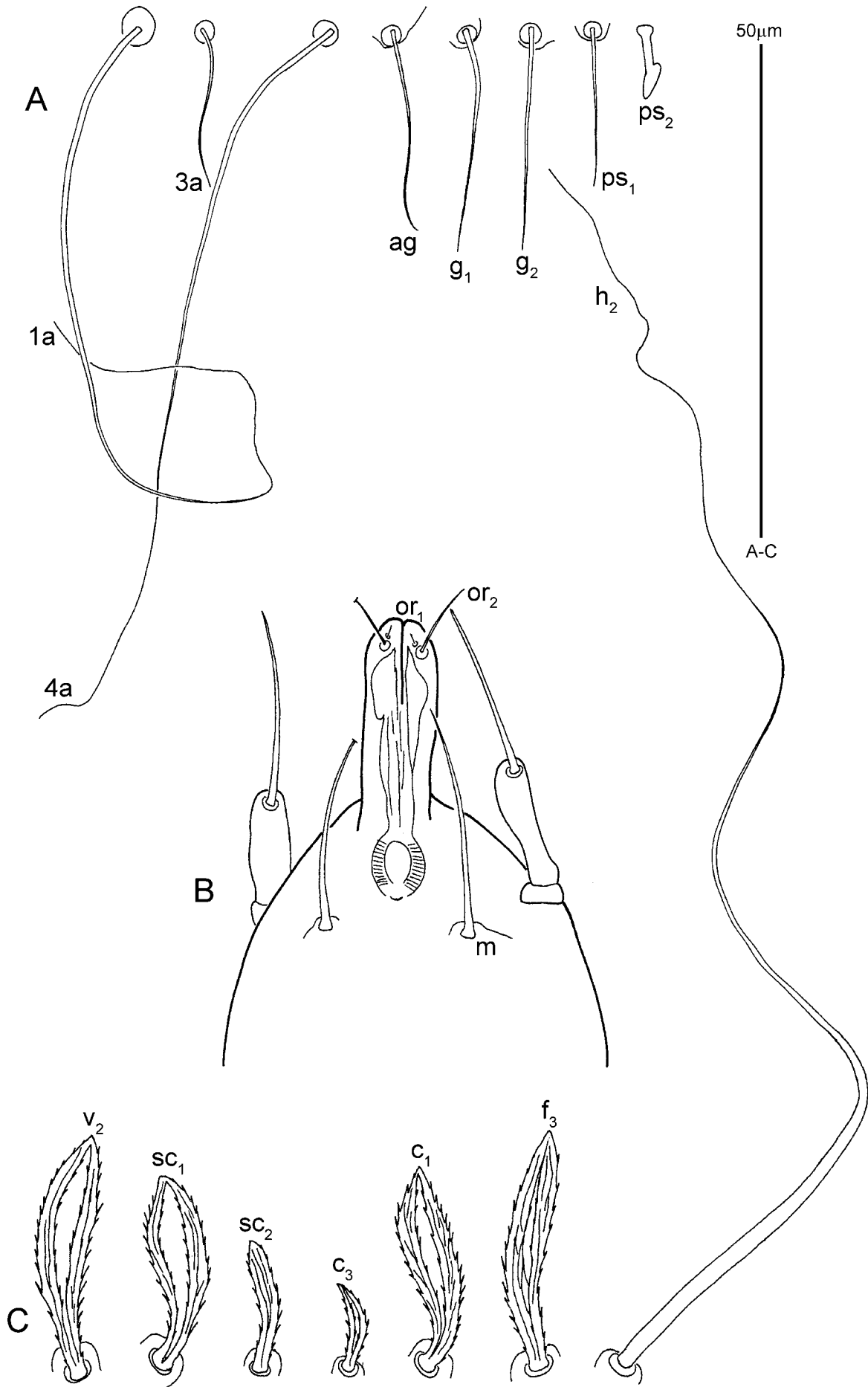


FIGURE 101. *Tenuipalpus senecionis* Collyer (male). A, ventral setae; B, subcapitulum; C, dorsal setae.

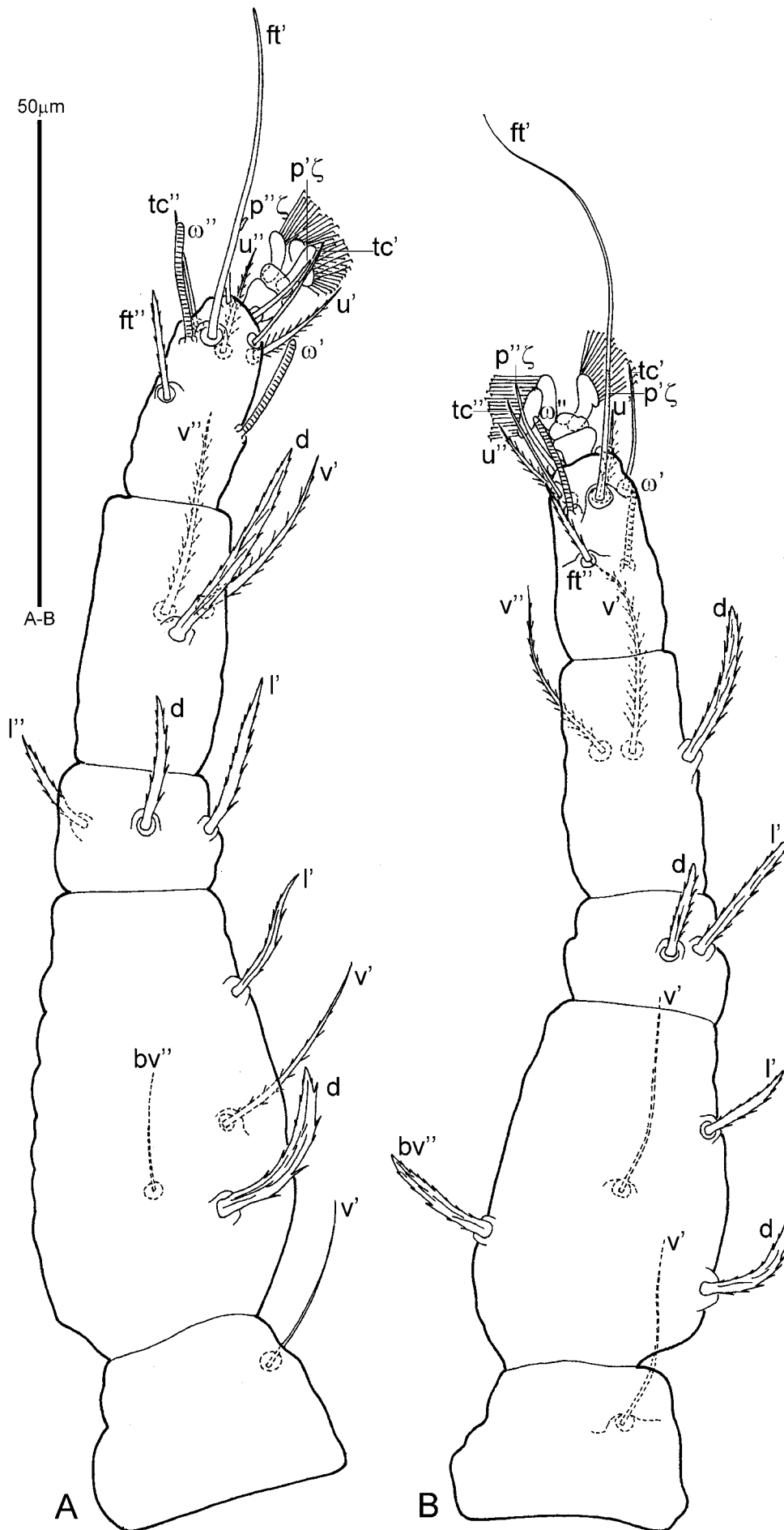


FIGURE 102. *Tenuipalpus senecionis* Collyer (male). A, leg I; B, leg II.

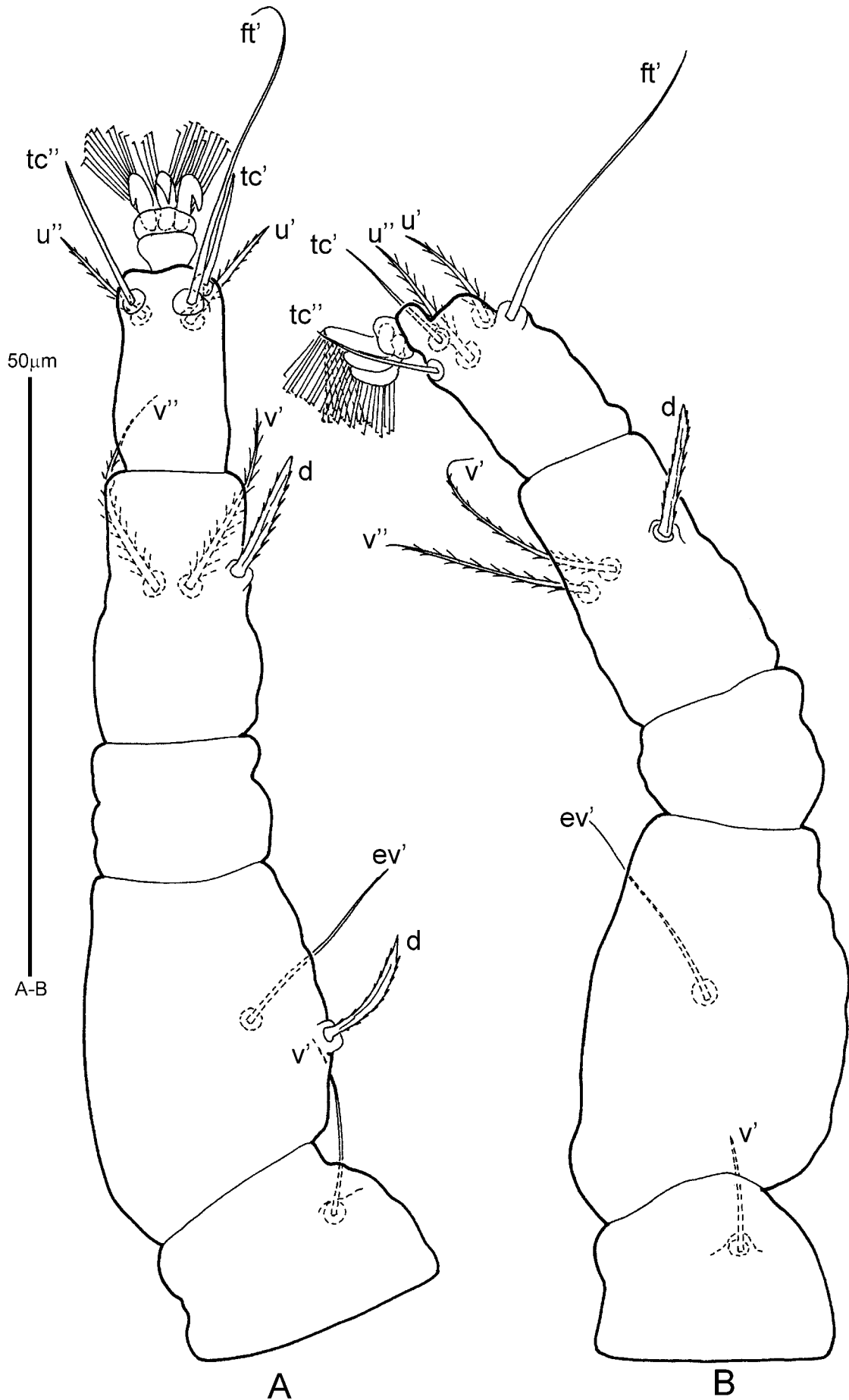


FIGURE 103. *Tenuipalpus senecionis* Collyer (male). A, leg III; B, leg IV.

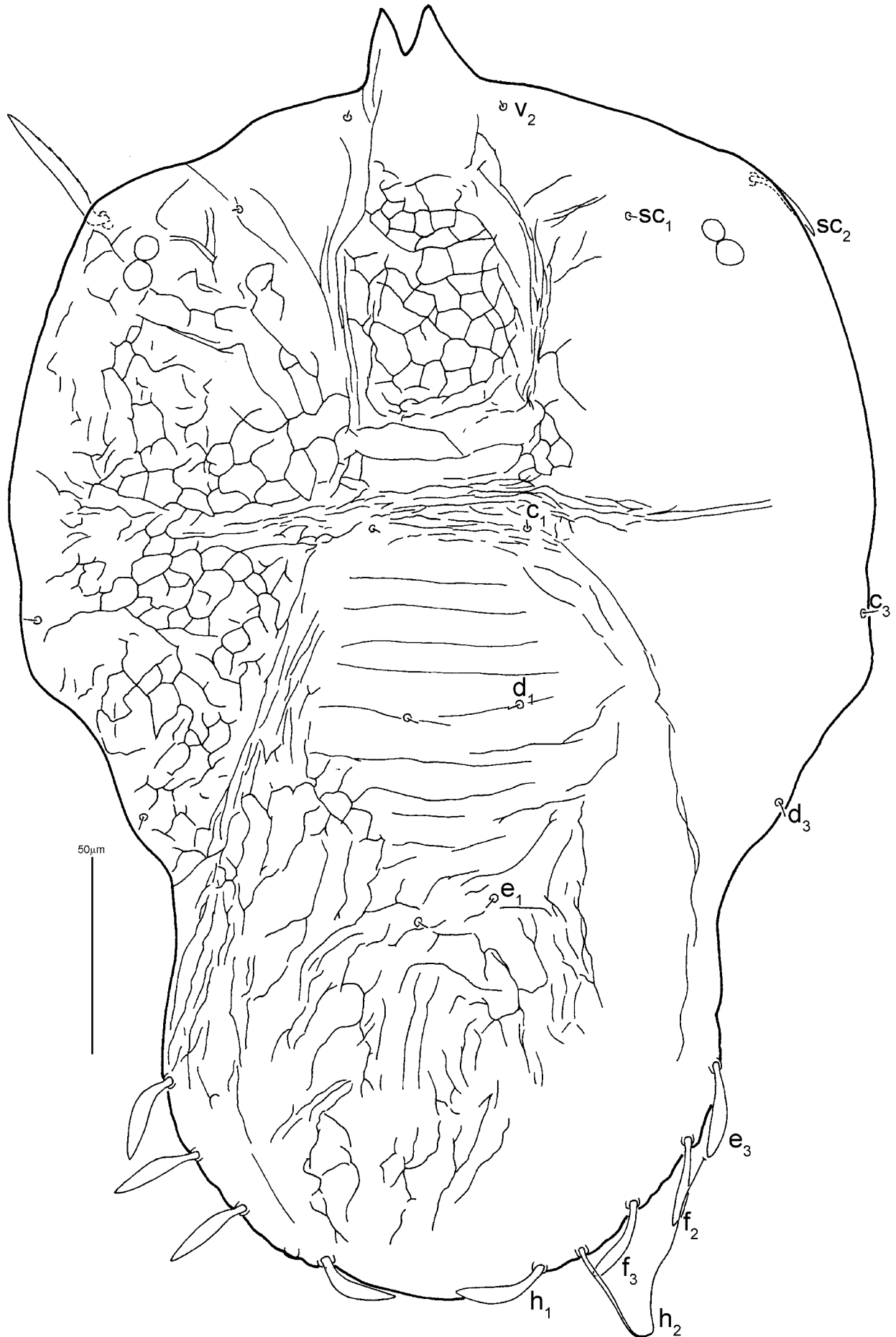


FIGURE 104. *Tenuipalpus venustus* Collyer (female). Dorsal view of idiosoma.

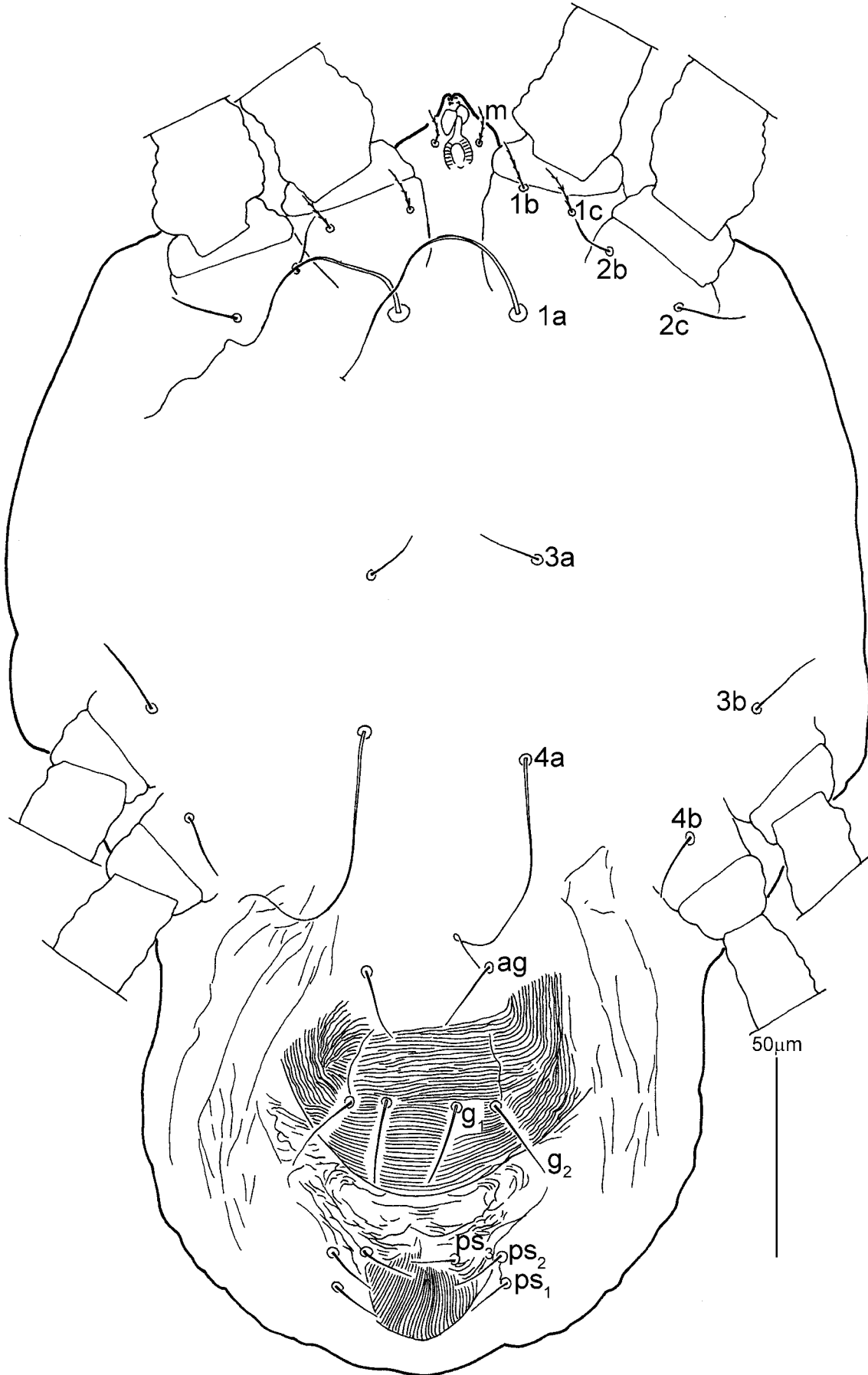


FIGURE 105. *Tenuipalpus venustus* Collyer (female). Ventral view of idiosoma.



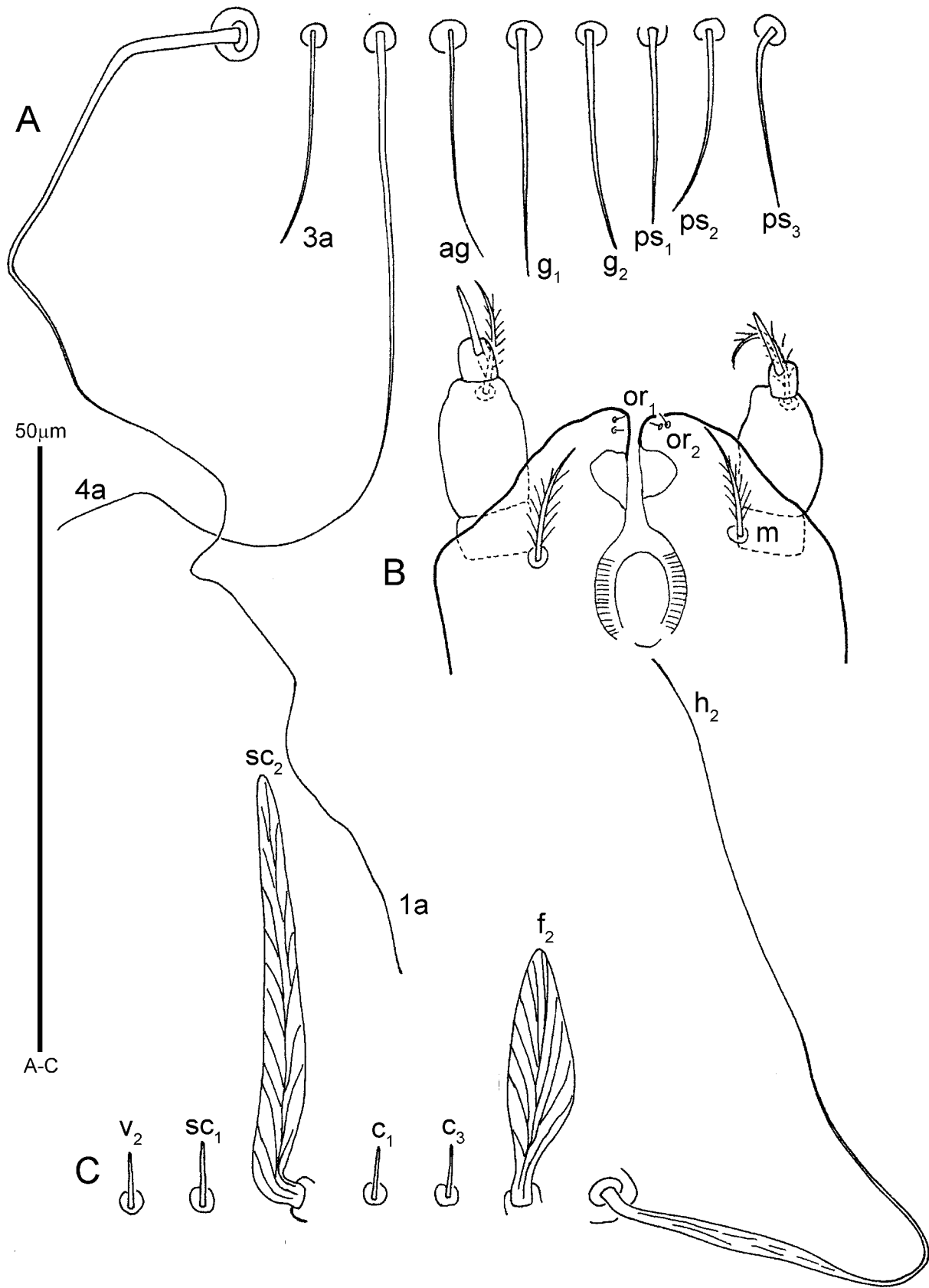


FIGURE 106. *Tenuipalpus venustus* Collyer (female). A, ventral setae; B, subcapitulum; C, dorsal setae

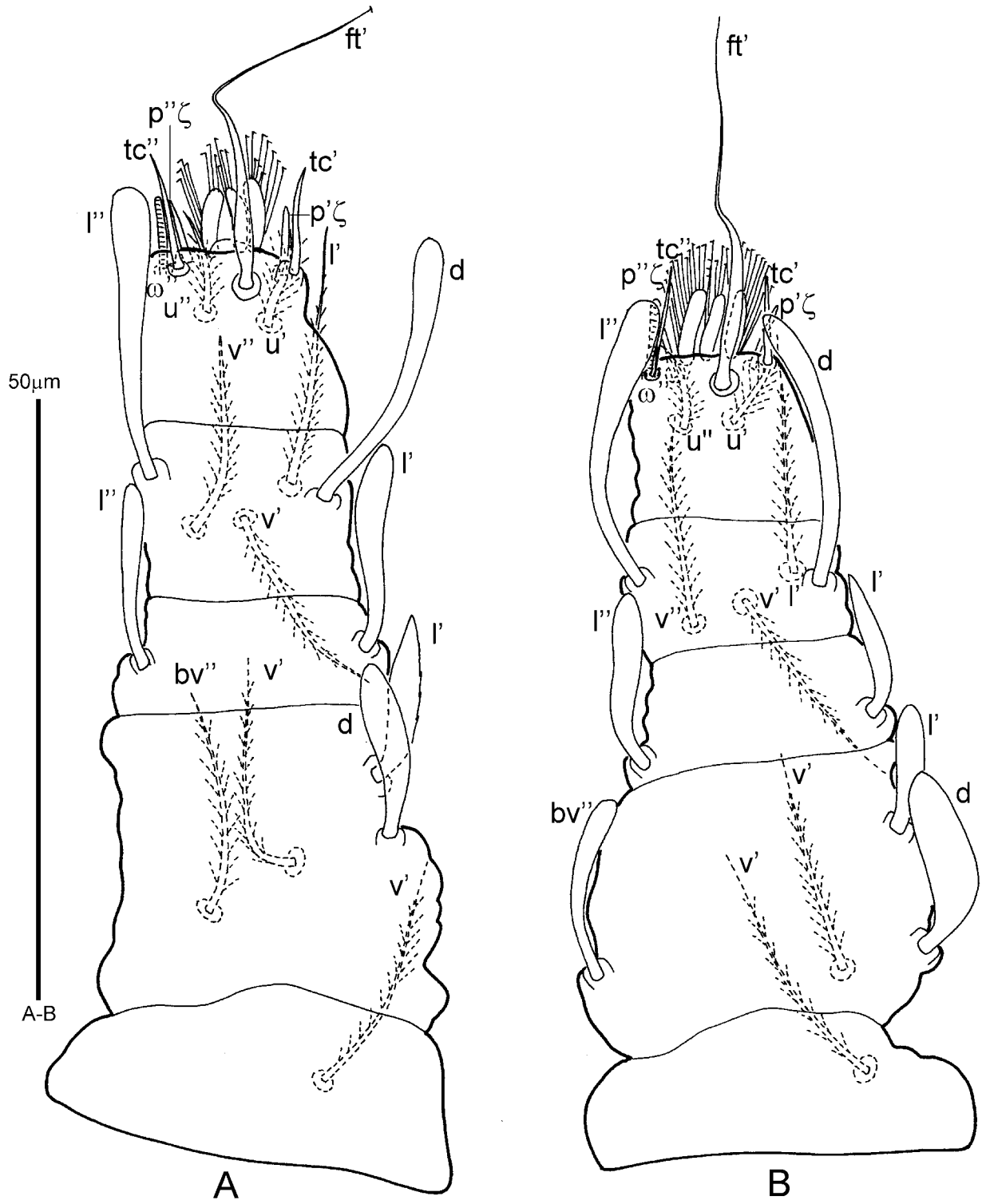


FIGURE 107. *Tenuipalpus venustus* Collyer (female). A, leg I; B, leg II.

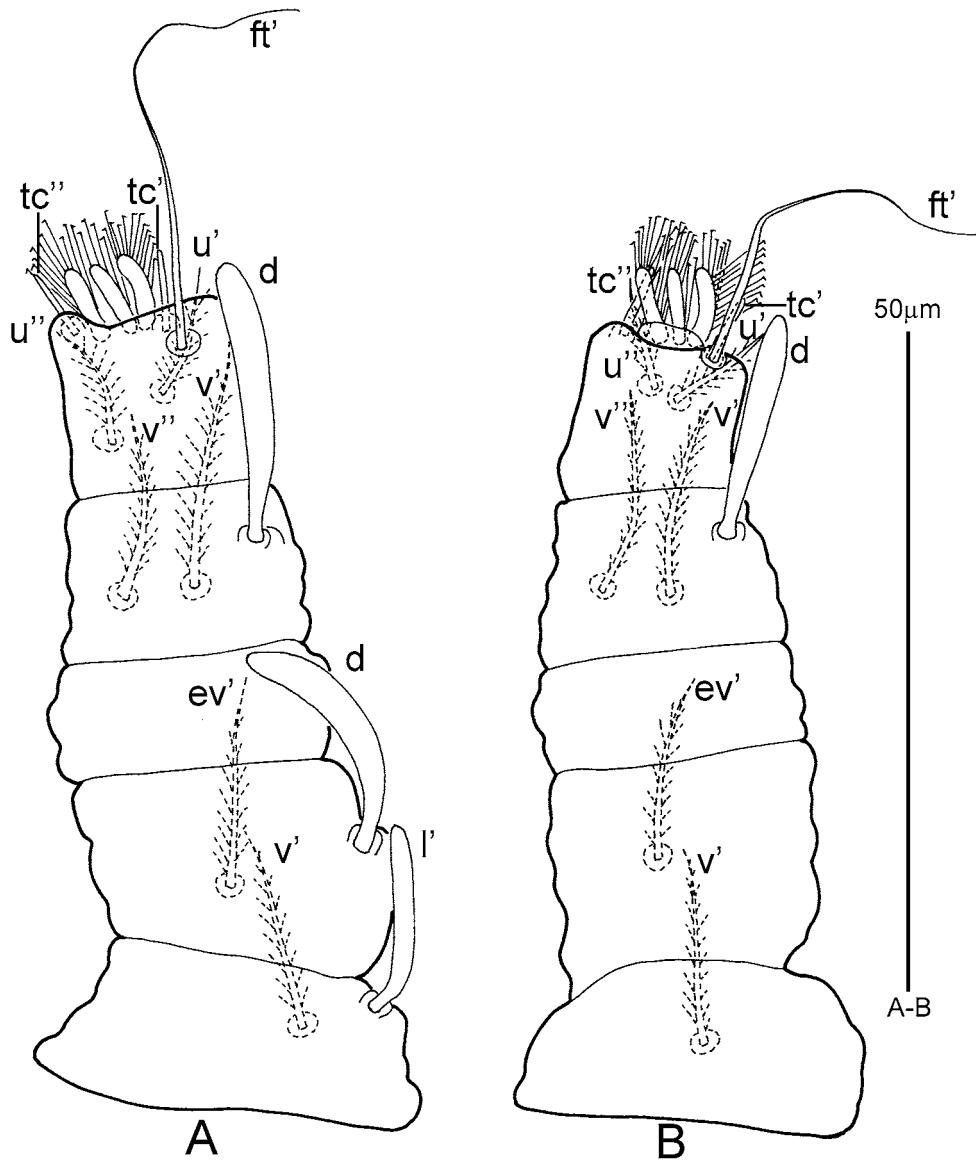
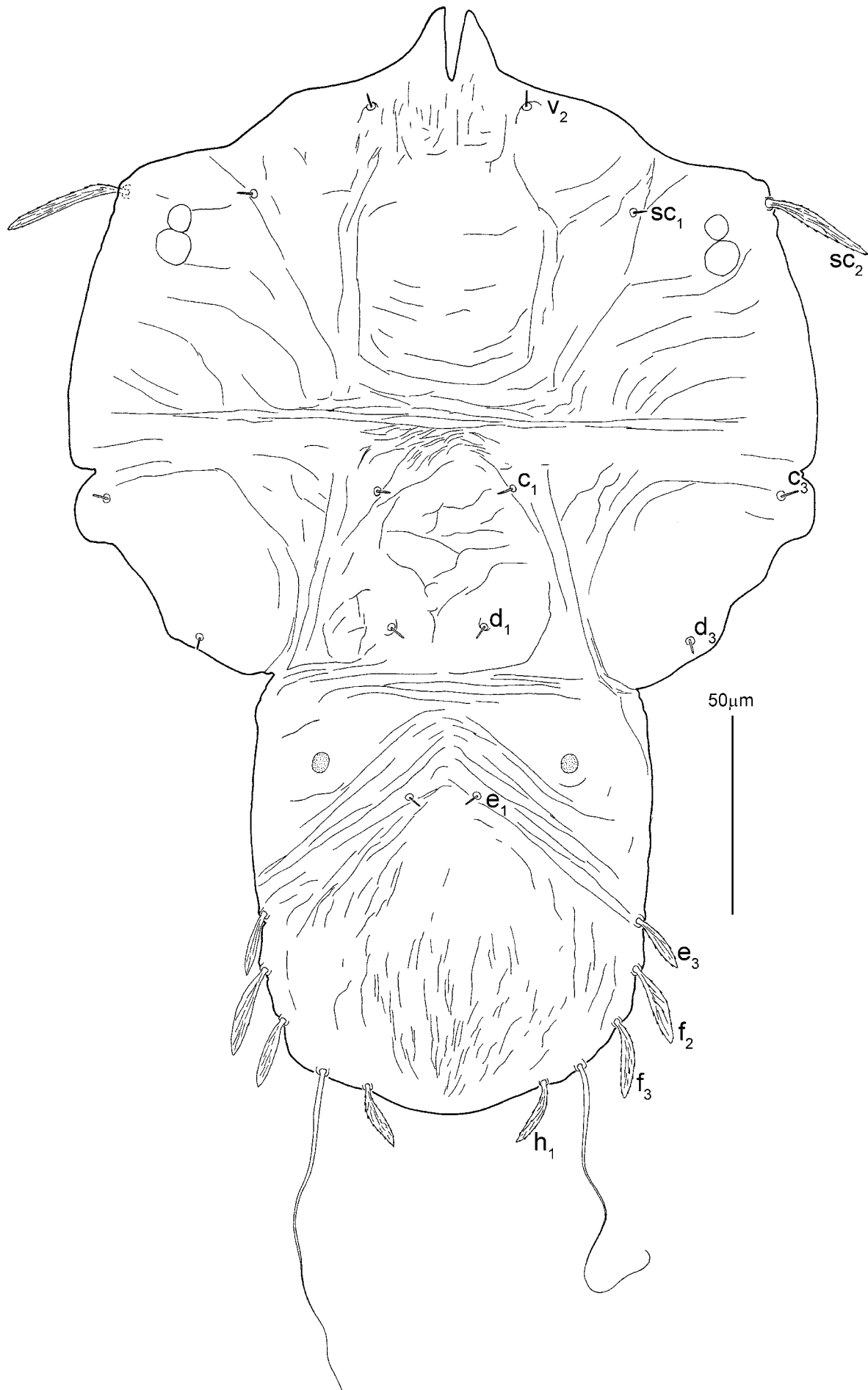


FIGURE 108. *Tenuipalpus venustus* Collyer (female). A, leg III; B, leg IV.



**FIGURE 109.** *Tenuipalpus venustus* Collyer (male). Dorsal view of idiosoma.

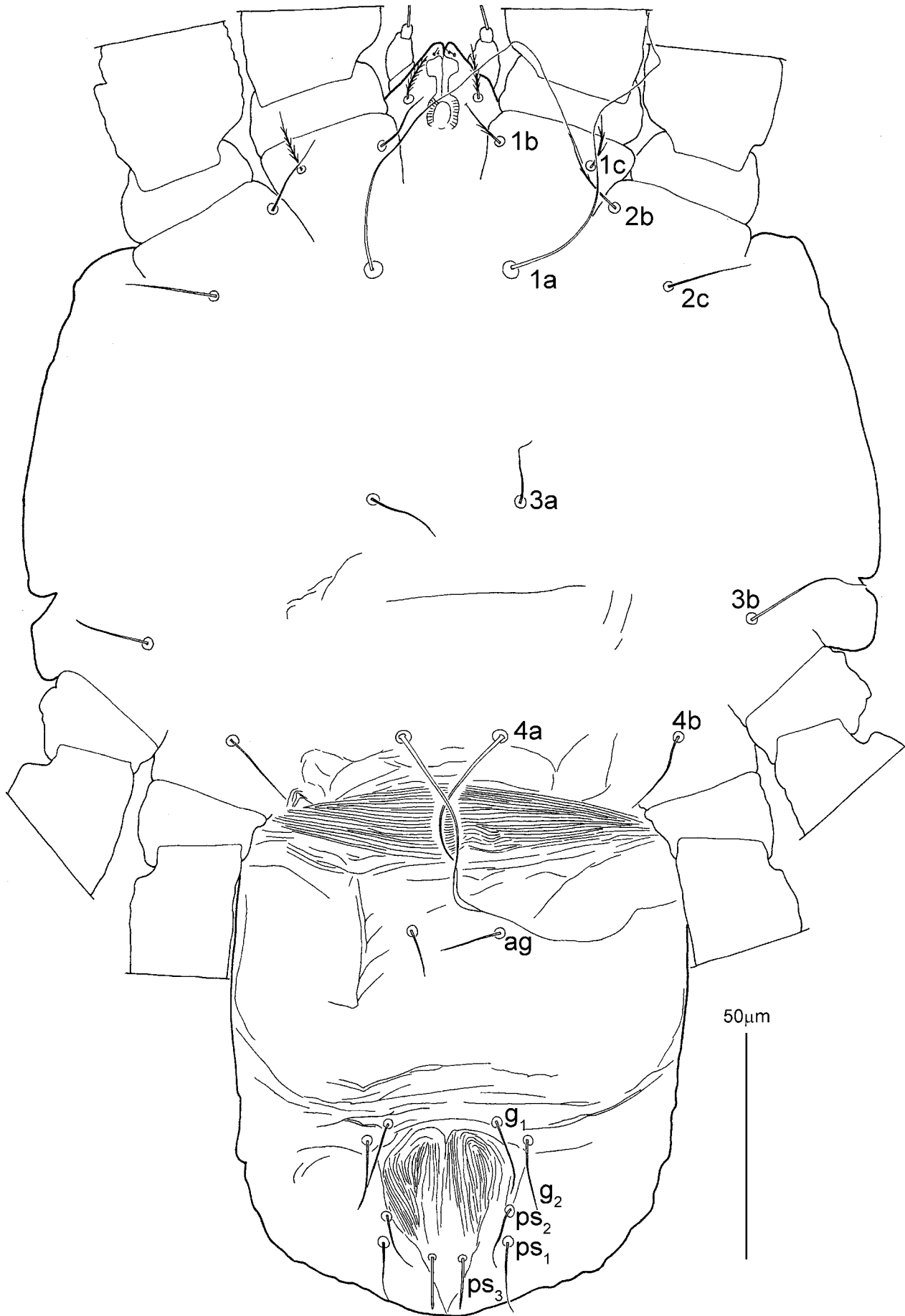


FIGURE 110. *Tenuipalpus venustus* Collyer (male). Ventral view of idiosoma.

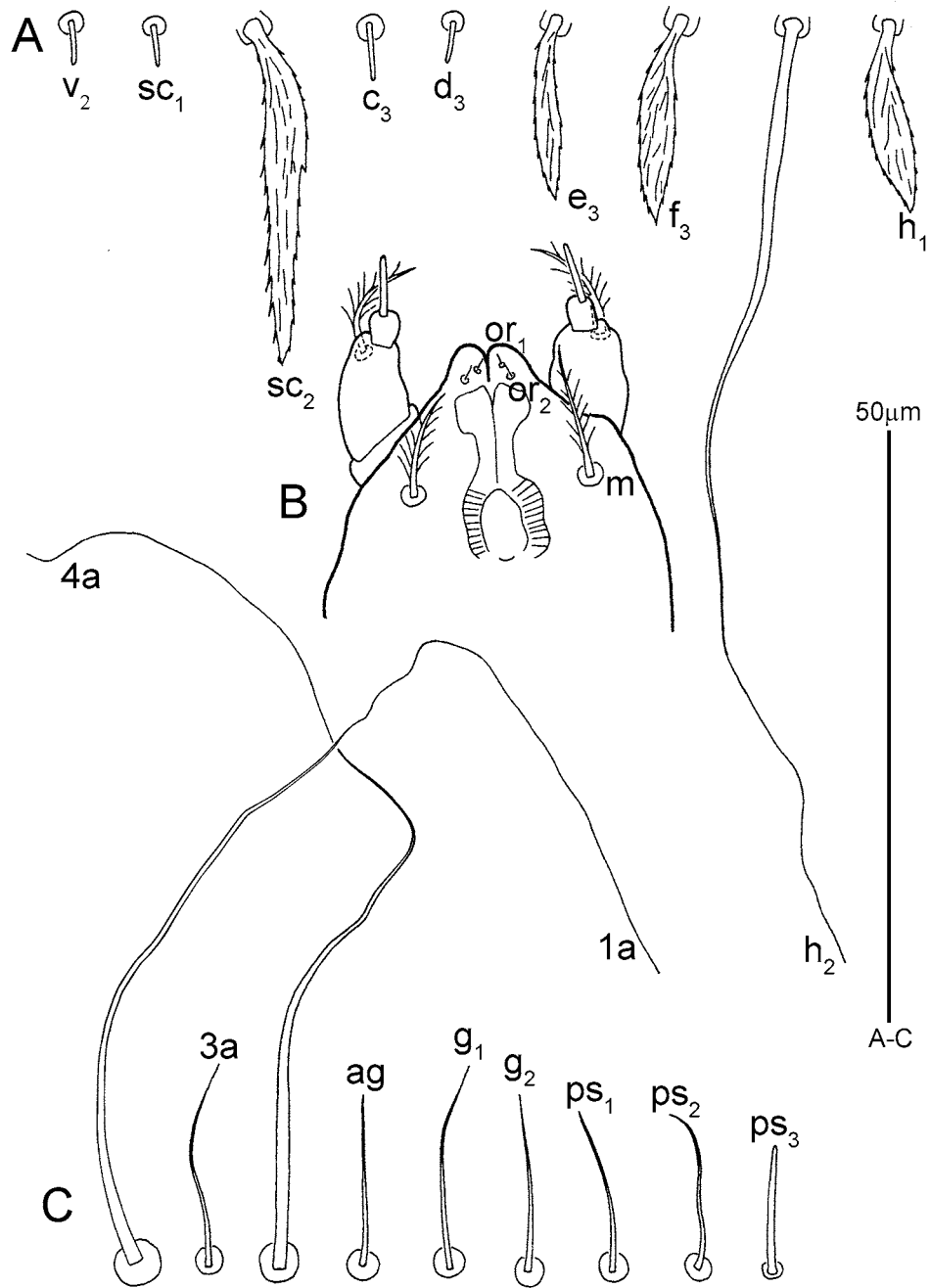


FIGURE 111. *Tenuipalpus venustus* Collyer (male). A, dorsal setae; B, subcapitulum; C, ventral setae.

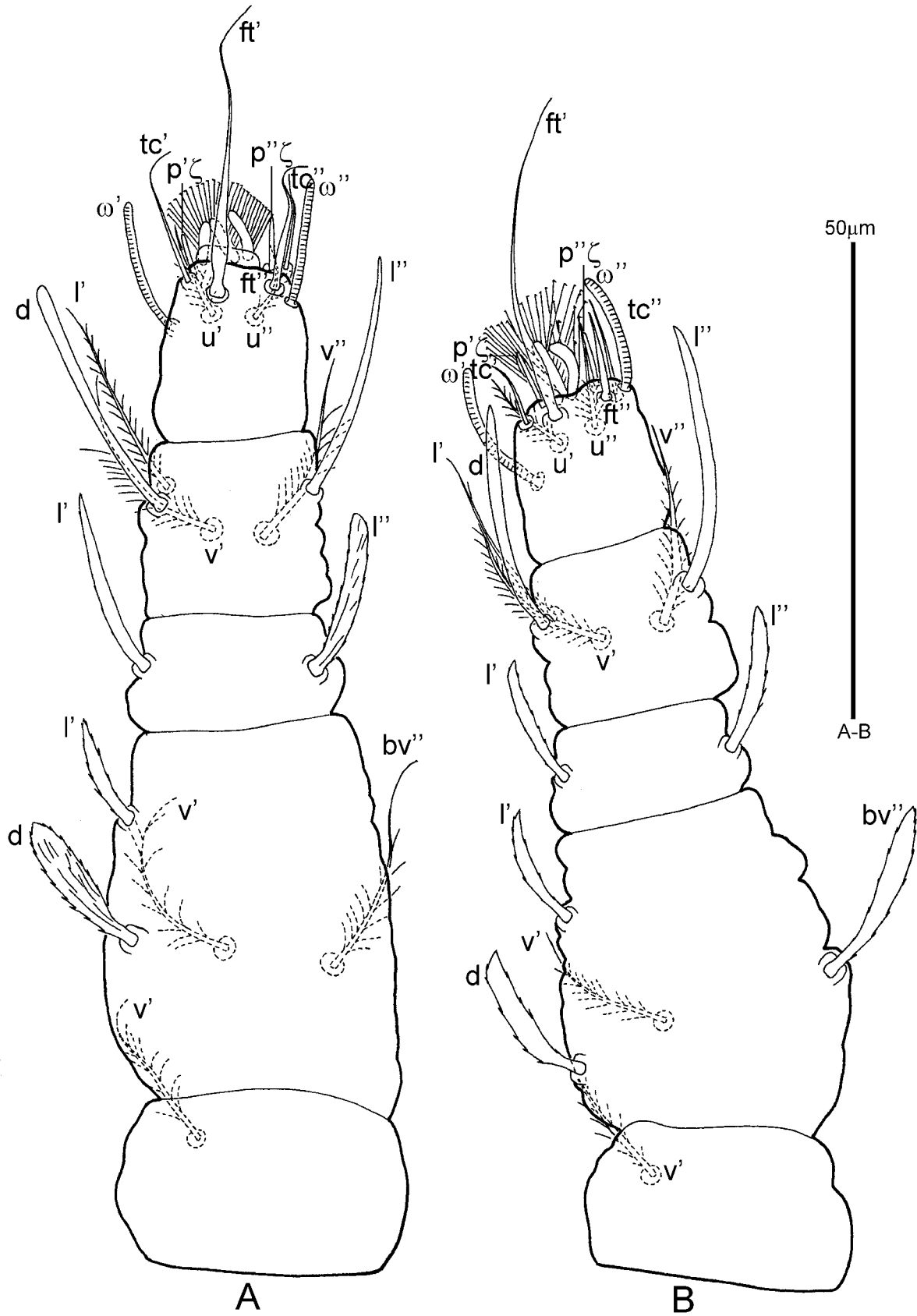


FIGURE 112. *Tenuipalpus venustus* Collyer (male). A, leg I; B, leg II.

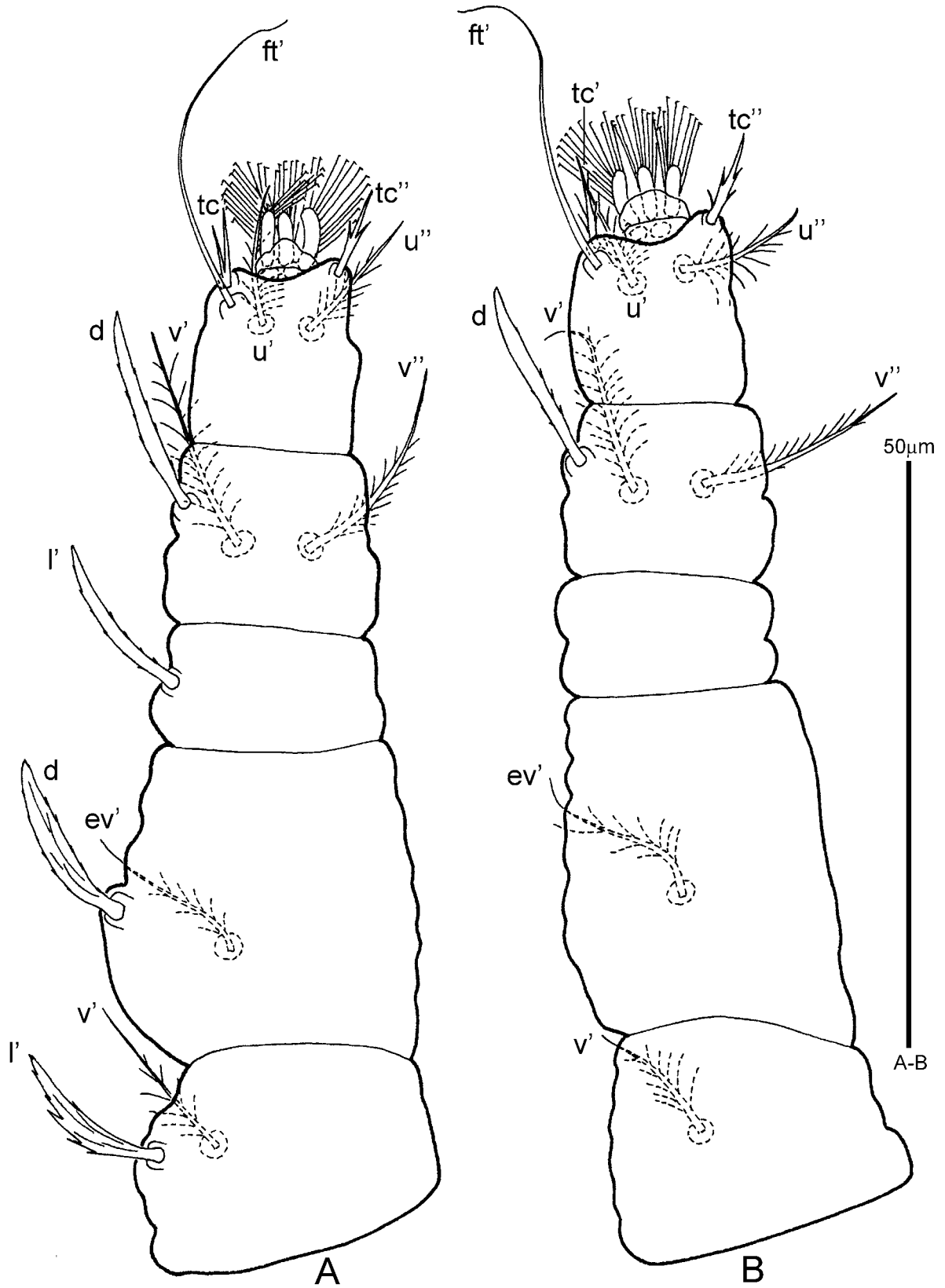
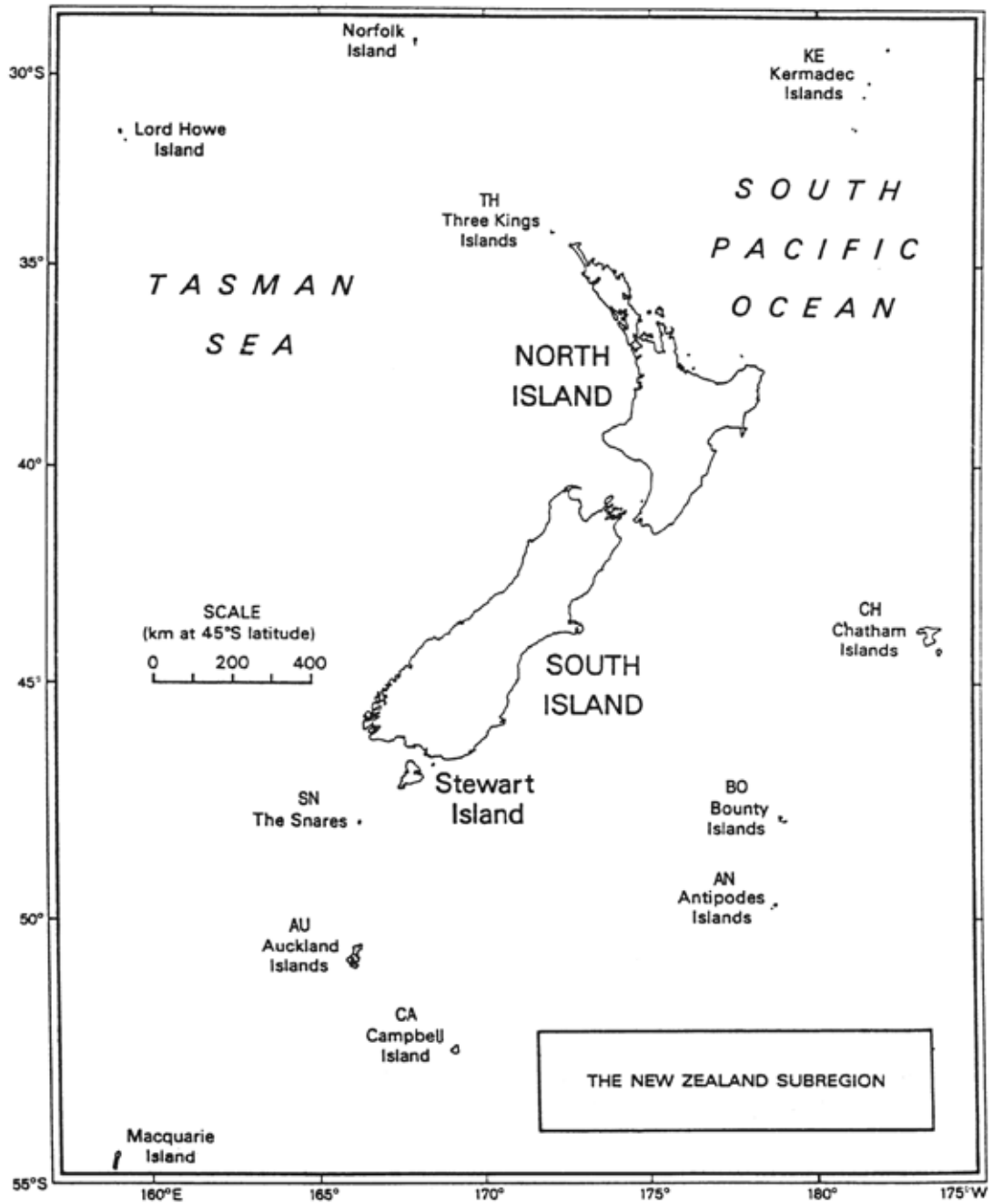
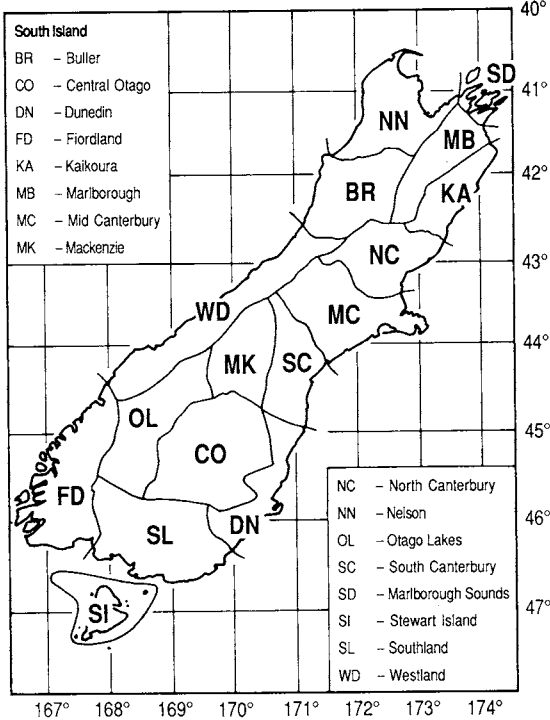
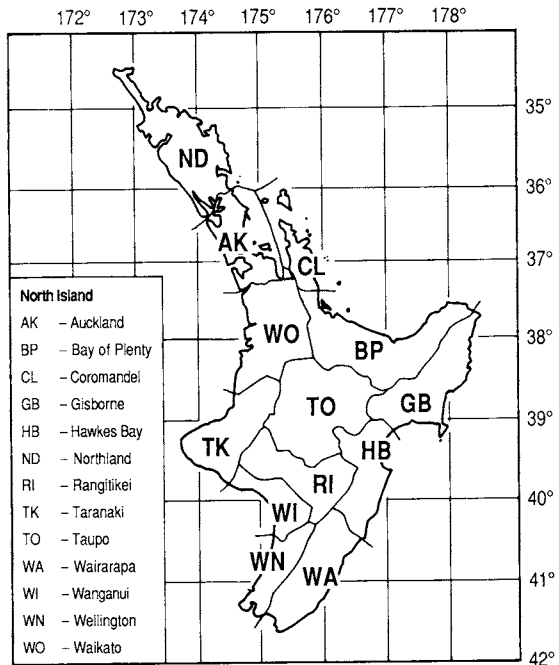


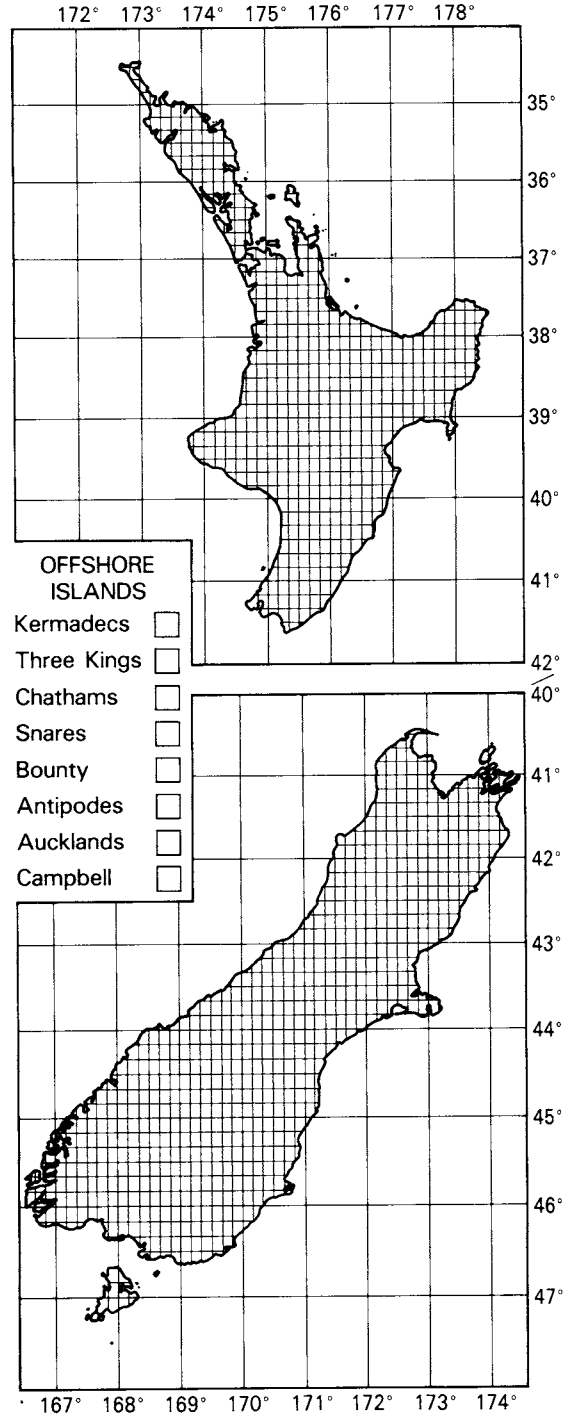
FIGURE 113. *Tenuipalpus venustus* Collyer (male). A, leg III; B, leg IV.



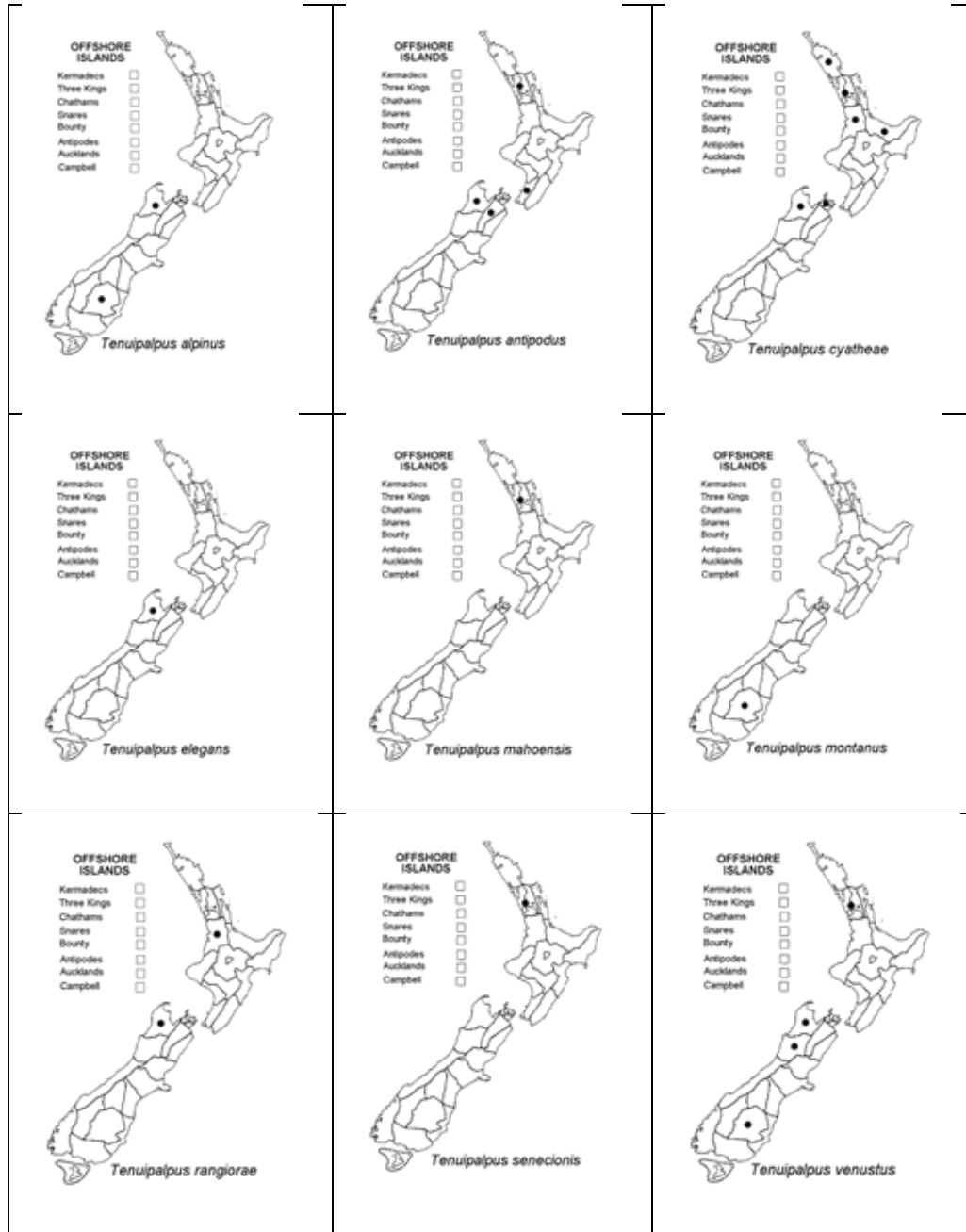




Area codes and boundaries used to categorise specimen locality data (after Crosby *et al.* 1976)



Base-map for plotting collection localities; this may be photocopied without copyright release



Species distribution maps according to the area codes of Crosby *et al.* (1976, 1988).

## TAXONOMIC INDEX

This index covers the nominal taxa mentioned in the text, regardless of their current status in taxonomy. Taxa in bold type are those included in the checklist. Taxa in **bold** indicate valid taxa. Page number in **bold** type denote the start of a description, and in *italic* type a figure.

*Acaricis* 18, 20, 29  
*Aegytopalpus* 10, 15  
*Brevipalpus* 10, 13, 17  
*Brevipalpus californicus* 13  
*Brevipalpus phoenicis* 13  
*Brevipalpus obovatus* 13  
*Colopalpus* 10, 15, 17, 25  
*Deleonipalpus* 10, 15  
*Gnathopalpus* 10, 15  
*Raoiella indica* 13  
*Tenuilichus* 17  
*Tenuipalpus* **15**  
*Tenuipalpus alpinus* 10, 12, 13, 16, 17, **18**, 43–52  
*Tenuipalpus antipodus* 8, 10, 11, 12, 13, 16, 17, 18, **20**, 24, 40–42, 53–76  
*Tenuipalpus barticanus* 15  
*Tenuipalpus caudatus* 15  
*Tenuipalpus cyatheae* 10, 12, 13, 16, 17, 18, **24**, 25, 26, 77–87  
*Tenuipalpus elegans* 10, 12, 13, 16, 17, 18, **25**, 26, 88–91  
*Tenuipalpus granati* 10, 13, 14, 15  
*Tenuipalpus heveae* 10, 13, 14  
*Tenuipalpus hornotinus* 10  
*Tenuipalpus mahoensis* 5, 8, 10, 11, 12, 13, 14, 16, 17, 18, **26**, 92–117  
*Tenuipalpus montanus* 10, 12, 13, 16, 17, 18, 20, **29**, 30, 118–122  
*Tenuipalpus pacificus* 13, 14  
*Tenuipalpus palmatus* 15  
*Tenuipalpus punicae* 10, 13, 14, 24  
*Tenuipalpus rangiorae* 10, 12, 13, 16, 17, 18, **30**, 32, 33, 123–132  
*Tenuipalpus rosae* 15  
*Tenuipalpus senecionis* 10, 12, 13, 16, 17, 18, **32**, 33, 133–142  
*Tenuipalpus trisetosus* 15  
*Tenuipalpus venustus* 10, 12, 13, 16, 18, **33**, 35, 143–152  
*Tuttlepalpus* 10, 15  
*Ultratenuipalpus* 17, 35

## HABITAT INDEX

- Alseuosmia macrophylla*—*Tenuipalpus antipodus* 23, 24  
*Anisotome*—*Tenuipalpus alpinus* 20  
*Astelia*—*Tenuipalpus alpinus* 20  
*Beilschmiedia tawa*—*Tenuipalpus antipodus* 23, 24  
*Beilschmiedia tomaroa*—*Tenuipalpus antipodus* 23, 24  
*Brachyglottis repanda*—*Tenuipalpus rangiorae* 31, 32  
*Chionochoa crassiuscula*—*Tenuipalpus alpinus* 20  
*Clemisia sessiliflora*—*Tenuipalpus alpinus* 20  
*Coprosma* sp.—*Tenuipalpus antipodus* 23, 24  
*Cordyline banksii*—*Tenuipalpus antipodus* 23, 24  
*Ctenitis velutuma*—*Tenuipalpus antipodus* 23, 24  
*Cyathea dealbata*—*Tenuipalpus cyatheae* 25  
*Cyathea medullaris*—*Tenuipalpus cyatheae* 25  
*Cyathodes pumila*—*Tenuipalpus alpinus* 20  
*Dacrydium bidwilli*—*Tenuipalpus venustus* 35  
*Dacrydium intermedium*—*Tenuipalpus venustus* 35  
*Dacrydium laxifolium*—*Tenuipalpus venustus* 35  
*Drosera*—*Tenuipalpus alpinus* 20  
*Dysoxylum spectabile*—*Tenuipalpus antipodus* 23, 24  
*Elaeocarpus dentatus*—*Tenuipalpus antipodus* 23, 24  
fern—*Tenuipalpus cyatheae* 25  
*Gahnia lacera*—*Tenuipalpus antipodus* 23, 24  
*Gaultheria*—*Tenuipalpus alpinus* 20  
*Hebe macrocarpa*—*Tenuipalpus mahoensis* 29  
*Heclycarga aborea*—*Tenuipalpus antipodus* 23, 24  
*Libocedrus bidwillii*—*Tenuipalpus venustus* 35  
*Libocedrus plumose*—*Tenuipalpus venustus* 35  
long smooth leaves—*Tenuipalpus antipodus* 23, 24  
*Melicytus ramiflorus*—*Tenuipalpus antipodus* 23, 24  
*Metrosideros* sp.—*Tenuipalpus rangiorae* 32  
mixed mats taken near tarns—*Tenuipalpus montanus* 30  
*Nothoparax* sp.—*Tenuipalpus antipodus* 23, 24  
*Pimelea sericeo-villosa* with litter and soil from beneath this shrub—*Tenuipalpus montanus* 30  
*Pseudowintera axillars*—*Tenuipalpus antipodus* 23, 24  
*Rhipogonum scanclens*—*Tenuipalpus antipodus* 23, 24  
*Rubus* sp.—*Tenuipalpus rangiorae* 32  
*Senecio hectori*—*Tenuipalpus elegans* 33  
*Senecio kirkii*—*Tenuipalpus senecionis* 33  
tawa—*Tenuipalpus antipodus* 23, 24  
*Veronica macrocarpa*—*Tenuipalpus mahoensis* 29

## FAUNA OF NEW ZEALAND PUBLICATIONS

- 1 **Terebrantia** (Insecta: Thysanoptera). *Laurence A. Mound & Annette K. Walker*. ISBN 0-477-06687-9, 23 December 1982, 120 pp. ....\$29.95
- 2 **Osoriinae** (Insecta: Coleoptera: Staphylinidae). *H. Pauline McColl*. ISBN 0-477-06688-7, 23 December 1982, 96 pp.....\$18.60
- 3 **Anthribidae** (Insecta: Coleoptera). *B. A. Holloway*. ISBN 0-477-06703-4, 23 December 1982, 272 pp. .... \$41.00
- 4 **Eriophyoidea except Eriophyinae** (Arachnida: Acari). *D. C. M. Manson*. ISBN 0-477-06745-X, 12 November 1984, 144 pp.....\$29.95
- 5 **Eriophyinae** (Arachnida: Acari: Eriophyoidea). *D. C. M. Manson*. ISBN 0-477-06746-8, 14 November 1984, 128 pp.....\$29.95
- 6 **Hydraenidae** (Insecta: Coleoptera). *R. G. Ordish*. ISBN 0-477-06747-6, 12 November 1984, 64 pp. .... \$18.60
- 7 **Cryptostigmata** (Arachnida: Acari) — a concise review. *M. Luxton*. ISBN 0-477-06762-X, 8 December 1985, 112 pp.....\$29.95
- 8 **Calliphoridae** (Insecta: Diptera). *James P. Dear*. ISBN 0-477-06764-6. 24 February 1986, 88 pp.....\$18.60
- 9 **Protura** (Insecta). *S. L. Tuxen*. ISBN 0-477-06765-4, 24 February 1986, 52 pp. ....\$18.60
- 10 **Tubulifera** (Insecta: Thysanoptera). *Laurence A. Mound & Annette K. Walker*. ISBN 0-477-06784-0, 22 September 1986, 144 pp.....\$34.65
- 11 **Pseudococcidae** (Insecta: Hemiptera). *J. M. Cox*. ISBN 0-477-06791-3, 7 April 1987, 232 pp. ....\$49.95
- 12 **Pompilidae** (Insecta: Hymenoptera). *A. C. Harris*. ISBN 0-477-02501-3, 13 November 1987, 160 pp.....\$39.95
- 13 **Encyrtidae** (Insecta: Hymenoptera). *J. S. Noyes*. ISBN 0-477-02517-X. 9 May 1988, 192 pp. ....\$44.95
- 14 **Lepidoptera** — annotated catalogue, and keys to family-group taxa. *J. S. Dugdale*. ISBN 0-477-02518-8, 23 September 1988, 264 pp.....\$49.95
- 15 **Ambositrinae** (Insecta: Hymenoptera: Diapriidae). *I. D. Naumann*. ISBN 0-477-02535-8, 30 December 1988, 168 pp.....\$39.95
- 16 **Nepticulidae** (Insecta: Lepidoptera). *Hans Donner & Christopher Wilkinson*. ISBN 0-477-02538-2, 28 April 1989, 92 pp. ....\$22.95
- 17 **Mymaridae** (Insecta: Hymenoptera) — introduction, and review of genera. *J. S. Noyes & E. W. Valentine*. ISBN 0-477-02542-0, 28 April 1989, 100 pp.....\$24.95
- 18 **Chalcidoidea** (Insecta: Hymenoptera) — introduction, and review of genera in smaller families. *J. S. Noyes & E. W. Valentine*. ISBN 0-477-02545-5, 2 August 1989, 96 pp. ....\$24.95
- 19 **Mantodea** (Insecta), with a review of aspects of functional morphology and biology. *G. W. Ramsay*. ISBN 0-477-02581-1, 13 June 1990, 96 pp. ....\$24.95
- 20 **Bibionidae** (Insecta: Diptera). *Roy A. Harrison*. ISBN 0-477-02595-1. 13 November 1990, 28 pp.....\$14.95
- 21 **Margarodidae** (Insecta: Hemiptera). *C. F. Morales*. ISBN 0-477-02607-9, 27 May 1991, 124 pp. ....\$34.95
- 22 **Notonemouridae** (Insecta: Plecoptera). *I. D. McLellan*, ISBN 0-477-02518-8, 27 May 1991, 64 pp.....\$24.95
- 23 **Sciapodinae, Medeterinae** (Insecta: Diptera) with a generic review of the Dolichopodidae. *D. J. Bickel*. ISBN 0-477-02627-3, 13 January 1992, 74 pp. ....\$27.95
- 24 **Therevidae** (Insecta: Diptera). *L. Lyneborg*. ISBN 0-477-02632-X, 4 March 1992, 140 pp. ....\$34.95
- 25 **Cercopidae** (Insecta: Homoptera). *K. G. A. Hamilton & C. F. Morales*. ISBN 0-477-02636-2, 25 May 1992, 40 pp. ....\$17.95
- 26 **Tenebrionidae** (Insecta: Coleoptera): catalogue of types and keys to taxa. *J. C. Watt*. ISBN 0-477-02639-7, 13 July 1992, 70 pp.....\$27.95
- 27 **Antarctoperlinae** (Insecta: Plecoptera). *I. D. McLellan*. ISBN 0-477-01644-8, 18 February 1993, 70 pp. ....\$27.95
- 28 **Larvae of Curculionoidea** (Insecta: Coleoptera): a systematic overview. *Brenda M. May*. ISBN 0-478-04505-0, 14 June 1993, 226 pp. ....\$55.00
- 29 **Cryptorhynchinae** (Insecta: Coleoptera: Curculionidae). *C. H. C. Lyal*. ISBN 0-478-04518-2, 2 December 1993, 308 pp.....\$65.00
- 30 **Hepialidae** (Insecta: Lepidoptera). *J. S. Dugdale*. ISBN 0-478-04524-7, 1 March 1994, 164 pp.....\$42.50
- 31 **Talitridae** (Crustacea: Amphipoda). *K. W. Duncan*. ISBN 0-478-04533-6, 7 October 1994, 128 pp.....\$36.00
- 32 **Sphecidae** (Insecta: Hymenoptera). *A. C. Harris*, ISBN 0-478-04534-4, 7 October 1994, 112 pp.....\$33.50
- 33 **Moranilini** (Insecta: Hymenoptera). *J. A. Berry*. ISBN 0-478-04538-7, 8 May 1995, 82 pp.....\$29.95
- 34 **Anthicidae** (Insecta: Coleoptera). *F. G. Werner & D. S. Chandler*. ISBN 0-478-04547-6, 21 June 1995, 64 pp.....\$26.50

- 35 **Cydnidae, Acanthosomatidae, and Pentatomidae** (Insecta: Heteroptera): systematics, geographical distribution, and bioecology. *M.-C. Larivière*. ISBN 0-478- 09301-2, 23 November 1995, 112 pp. ....\$42.50
- 36 **Leptophlebiidae** (Insecta: Ephemeroptera). *D. R. Towns & W. L. Peters*. ISBN 0-478-09303-9, 19 August 1996, 144 pp. ....\$39.50
- 37 **Coleoptera**: family-group review and keys to identification. *J. Klimaszewski & J. C. Watt*. ISBN 0-478- 09312-8, 13 August 1997, 199 pp. ....\$49.50
- 38 **Naturalised terrestrial Stylommatophora** (Mollusca: Gastropoda). *G. M. Barker*. ISBN 0-478-09322-5, 25 January 1999, 253 pp. ....\$72.50
- 39 **Molytini** (Insecta: Coleoptera: Curculionidae: Molytinae). *R. C. Craw*. ISBN 0-478-09325-X, 4 February 1999, 68 pp. ....\$29.50
- 40 **Cixiidae** (Insecta: Hemiptera: Auchenorrhyncha). *M.-C. Larivière*. ISBN 0-478-09334-9, 12 November 1999, 93 pp. ....\$37.50
- 41 **Coccidae** (Insecta: Hemiptera: Coccoidea). *C. J. Hodgson & R. C. Henderson*. ISBN 0-478-09335-7, 23 February 2000, 264 pp. ....\$72.50
- 42 **Aphodiinae** (Insecta: Coleoptera: Scarabaeidae). *Z. T. Stebnicka*. ISBN 0-478-09341-1, 15 June 2001, 64 pp. ....\$29.50
- 43 **Carabidae** (Insecta: Coleoptera): catalogue. *A. Larochelle & M.-C. Larivière*. ISBN 0-478-09342-X, 15 June 2001, 285 pp. ....\$72.50
- 44 **Lycosidae** (Arachnida: Araneae). *C. J. Vink*. ISBN 0-478- 09347-0, 23 December 2002, 94 pp. ....\$37.50
- 45 **Nemonychidae, Belidae, Brentidae** (Insecta: Coleoptera: Curculionoidea). *G. Kuschel*. ISBN 0-478- 09348-9, 28 April 2003, 100 pp. ....\$40.00
- 46 **Nesameletidae** (Insecta: Ephemeroptera). *Terry R. Hitchings & Arnold H. Staniczek*. ISBN 0-478-09349-7, 14 May 2003, 72 pp. ....\$32.50
- 47 **Erotylidae** (Insecta: Coleoptera: Cucujoidea): phylogeny and review. *R. A. B. Leschen*. ISBN 0-478-09350-0, 5 June 2003, 108 pp. ....\$42.50
- 48 **Scaphidiinae** (Insecta: Coleoptera: Staphylinidae). *I. Löbl & R. A. B. Leschen*. ISBN 0-478-09353-5, 18 November 2003, 94 pp. ....\$37.50
- 49 **Lithinini** (Insecta: Lepidoptera: Geometridae: Ennominae). *J. D. Weintraub & M. J. Scoble*. ISBN 0-478- 09357-8, 29 April 2004, 48 pp. ....\$24.50
- 50 **Heteroptera** (Insecta: Hemiptera): catalogue. *M.-C. Larivière & A. Larochelle*. ISBN 0-478-09358-6, 14 May 2004, 330 pp. ....\$89.00
- 51 **Coccidae** (Insecta: Hemiptera: Coccoidea): adult males, pupae and prepupae of indigenous species. *C. J. Hodgson & R. C. Henderson*. ISBN 0-478-09360-8, 22 June 2004, 228 pp. ....\$65.00
- 52 **Raphignathoidea** (Acari: Prostigmata). *Qing-Hai Fan & Zhi-Qiang Zhang*. ISBN 0-478-09371-3, 20 May 2005, 400 pp. ....\$89.00
- 53 **Harpalini** (Insecta: Coleoptera: Carabidae: Harpalinae). *A. Larochelle & M.-C. Larivière*. ISBN 0-478-09369-1, 4 July 2005, 160 pp. ....\$55.00
- 54 **Hierodoris** (Insecta: Lepidoptera: Gelechoidea: Oecophoridae), and overview of Oecophoridae. *Robert J. B. Hoare*. ISBN 0-478-09378-0, 24 December 2005, 100 pp. ....\$40.00
- 55 **Criconematina** (Nematoda: Tylenchida). *W. M. Wouts*. ISBN 0-478-09381-0, 24 March 2006, 232 pp. ....\$65.00
- 56 **Tyrophagus** (Acari: Astigmata: Acaridae). *Qing-Hai Fan & Zhi-Qiang Zhang*. ISBN 978-0-478-09386-5, 4 June 2007, 291 pp. ....\$80.00
- 57 **Apoidea** (Insecta: Hymenoptera). *B. J. Donovan*. ISBN 978-0-478-09389-6, 7 September 2007, 295 pp. ....\$89.00
- 58 **Alysiinae** (Insecta: Hymenoptera: Braconidae). *J. A. Berry*. ISBN 978-0-478-09390-2, 7 September 2007, 95 pp. . ....\$45.00
- 59 **Erotylinae** (Insecta: Coleoptera: Cucujoidea: Erotylidae): taxonomy and biogeography. *Paul E. Skelley & Richard A. B. Leschen*. ISBN 978-0-478-09391-9, 7 September 2007, 59 pp. ....\$30.00
- 60 **Carabidae** (Insecta: Coleoptera): synopsis of supraspecific taxa. *A. Larochelle & M.-C. Larivière*. ISBN 978-0-478-09394-0, 21 November 2007, 188 pp. ....\$54.00
- 61 **Lucanidae** (Insecta: Coleoptera). *B. A. Holloway*. ISBN 978-0-478-09395-7, 21 November 2007, 254 pp. . \$75.00
- 62 **Trechini** (Insecta: Coleoptera: Carabidae: Trechinae). *J. I. Townsend*. ISBN 978-0-478-34717-9 (print), 978-0-478-34716-6 (online), 16 June 2010, 101 pp. ....\$49.50
- 63 **Auchenorrhyncha** (Insecta: Hemiptera): catalogue. *M.-C. Larivière, M. J. Fletcher & A. Larochelle*. ISBN 978-0-478-34720-3 (print), 978-0-478-34721-0 (online), 16 June 2010, 232 pp. ....\$75.00

- 64 **Pisauridae** (Arachnida: Araneae). C. J. Vink & N. Dupérré. ISBN 978-0-478-34722-7 (print), 978-0-478- 34723-4 (online), 13 July 2010, 60 pp. .... \$37.50
- 65 **Izatha** (Insecta: Lepidoptera: Gelechioidea: Oecophoridae). Robert J. B. Hoare. ISBN 978-0-478-34724-1 (print), 978-0-478-34725-8 (online), 2 September 2010, 201 pp..... \$75.00
- 66 **Diaspididae** (Insecta: Hemiptera: Coccoidea). R. C. Henderson. ISBN 978-0-478-34726-5 (print), 978-0-478-34727-2 (online), 23 May 2011, 275 pp. .... \$89.00
- 67 **Peloriidae** (Insecta: Hemiptera: Coleorrhyncha). M.-C. Larivière, D. Burckhardt & A. Laroche. ISBN 978-0-478- 34730-2 (print), 978-0-478-34731-9 (online), 14 November 2011, 78 pp. .... \$48.00
- 68 **Simuliidae** (Insecta: Diptera). Douglas A. Craig, Ruth E. G. Craig & Trevor K. Crosby. ISBN 978-0-478-34734- 0 (print), 978-0-478-34735-7 (online), 29 June 2012, 336 pp. .... \$95.00
- 69 **Carabidae** (Insecta: Coleoptera): synopsis of species, Cicindelinae to Trechinae (in part) . A. Laroche & M.-C. Larivière. ISBN 978-0-478-34738-8 (print), 978-0-478- 34739-5 (online), 7 March 2013, 193 pp..... \$75.00
- 70 **Periegopidae** (Arachnida: Araneae). C. J. Vink, N. Dupérré & J. Malumbres-Olarte. ISBN 978-0-478-34740- 1 (print), 978-0-478-34741-8 (online), 7 March 2013, 41 pp. .... \$29.00
- 71 **Fanniidae** (Insecta: Diptera). M. Cecilia Domínguez & Adrian C. Pont. ISBN 978-0-478-34745-6 (print), 978-0-478-34746-3 (online), 30 June 2014, 91 pp. .... \$49.00
- 72 **Micropterigidae** (Insecta: Lepidoptera). George W. Gibbs. ISBN 978-0-478-34759-3 (print), 978-0-478-34760- 9 (online), 30 June 2014, 127 pp..... \$59.00
- 73 **Noctuinae** (Insecta: Lepidoptera: Noctuidae) part 1: *Austramathes*, *Cosmodes*, *Proteuxoa*, *Physetica*. R.J.B. Hoare, ISBN 978-0-947525-09-5 (print), 978-0-947525-07-1 (online), 23 June 2017, 130 pp ..... \$60.00
- 74 **Ceratomerinae** (Diptera: Empidoidea: Brachystomatidae), B.J. Sinclair, ISBN 978-0-947525-10-1 (print), 978-0-947525-11-8 (online), 23 June 2017, 157 pp..... \$66.00
- 75 **Licinini** (Insecta: Coleoptera: Carabidae: Harpalinae), R.M. Emberson. ISBN 978-0-947525-13-2 (print), 978-0-947525-12-5 (online), 16 August 2017, 80 pp..... \$48.00
- 76 **Phthiraptera** (Insecta): a catalogue of parasitic lice from New Zealand, Ricardo L. Palma. ISBN 978-0-947525-19-4 (print), 978-0-947525-18-7 (online), 30 September 2017, 400 pp..... \$98.00
- 77 **Tenuipalpus** (Acari: Trombidiformes: Tetranychoidae: Tenuipalpidae), ISBN 978-0-947525-53-8 (print), 978-0-947525-52-1 (online), 12 November 2018, 163 pp..... \$68.00

Visit the Landcare Research Website at: <http://www.landcareresearch.co.nz/> for further information.

Orders for printed books should be sent to the Library of Landcare Research ([library@landcareresearch.co.nz](mailto:library@landcareresearch.co.nz)).

To access on-line version of this series visit: <http://fnz.landcareresearch.co.nz/> or <https://www.biotaxa.org/fnz>



## Taxonomic groups covered in the *Fauna of New Zealand* series

### Insecta

#### Coleoptera

- Family-group review and keys to identification (*J. Klimaszewski & J. C. Watt*, FNZ 37, 1997)
- Anthribidae (*B. A. Holloway*, FNZ 3, 1982)
- Anthicidae (*F. G. Werner & D. S. Chandler*, FNZ 34, 1995)
- Carabidae: catalogue (*A. Larochelle & M.-C. Larivière*, FNZ 43, 2001); synopsis of supraspecific taxa (*A. Larochelle & M.-C. Larivière*, FNZ 60, 2007); synopsis of species, Cicindelinae to Trechinae (in part) (*A. Larochelle & M.-C. Larivière*, FNZ 69, 2013)
- Carabidae: Harpalinae: Harpalini (*A. Larochelle & M.-C. Larivière*, FNZ 53, 2005)
- Carabidae: Trechinae: Trechini (*J. I. Townsend*, FNZ 62, 2010)
- Curculionidae: Cryptorhynchinae (*C. H. C. Lyal*, FNZ 29, 1993)
- Curculionidae: Molytinae: Molytini (*R. C. Craw*, FNZ 39, 1999)
- Curculionoidea: Nemonychidae, Belidae, Brentidae (*G. Ku-schel*, FNZ 45, 2003)
- Curculionoidea larvae: a systematic overview (*Brenda M. May*, FNZ 28, 1993)
- Erotylidae: phylogeny and review (*Richard A. B. Leschen*, FNZ 47, 2003); Erotylinae: taxonomy and biogeography (*Paul E. Skelley & Richard A. B. Leschen*, FNZ 59, 2007)
- Hydraenidae (*R. G. Ordish*, FNZ 6, 1984)
- Lucanidae (*B. A. Holloway*, FNZ 61, 2007)
- Scarabaeidae: Aphodiinae (*Z. T. Stebnicka*, FNZ 42, 2001)
- Staphylinidae: Osoriinae (*H. Pauline McColl*, FNZ 2, 1982)
- Staphylinidae: Scaphidiinae (*I. Löbl & Richard A. B. Leschen*, FNZ 48, 2003)
- Tenebrionidae: catalogue of types and keys to taxa (*J. C. Watt*, FNZ 26, 1992)
- Carabidae: Harpalinae: Licinini (*R.M. Emberson*, FNZ 75, 2017)

#### Diptera

- Bibionidae (*Roy A. Harrison*, FNZ 20, 1990)
- Calliphoridae (*James P. Dear*, FNZ 8, 1986)
- Dolichopodidae: Sciapodinae, Medeterinae with a generic review (*D. J. Bickel*, FNZ 23, 1992)
- Fanniidae (*M. Cecilia Domínguez, Adrian C. Pont*, FNZ 71, 2014)
- Simuliidae (*Douglas A. Craig, Ruth E. G. Craig, Trevor K. Crosby*, FNZ 68, 2012)
- Therevidae (*L. Lyneborg*, FNZ 24, 1992)
- Ceratomerinae (Diptera: Empidoidea: Brachystomatidae) (*B.J. Sinclair*, FNZ 74, 2017)

#### Ephemeroptera

- Leptophlebiidae (*D. R. Towns & W. L. Peters*, FNZ 36, 1996)
- Nesameletidae (*Terry R. Hitchings & Arnold H. Staniczek*, FNZ 46, 2003)

#### Hemiptera

- Auchenorrhyncha: catalogue (*M.-C. Larivière, M. J. Fletcher & A. Larochelle*, FNZ 63, 2010)
- Cercopidae (*K. G. A. Hamilton & C. F. Morales*, FNZ 25, 1992)
- Cixiidae (*M.-C. Larivière*, FNZ 40, 1999)
- Coccidae (*C. J. Hodgson & R. C. Henderson*, FNZ 41, 2000); adult males, pupae and prepupae of indigenous species (*C. J. Hodgson & R. C. Henderson*, FNZ 51, 2004)
- Cydnidae, Acanthosomatidae, and Pentatomidae (*M.-C. Larivière*, FNZ 35, 1995)
- Diaspididae (*R. C. Henderson*, FNZ 66, 2011)
- Heteroptera: catalogue (*M.-C. Larivière & A. Larochelle*, FNZ 50, 2004)
- Margarodidae (*C. F. Morales*, FNZ 21, 1991)
- Pseudococcidae (*J. M. Cox*, FNZ 11, 1987)
- Peloriidae (*M.-C. Larivière, D. Burckhardt & A. Larochelle*, FNZ 67, 2011).

#### Hymenoptera

- Apoidea (*B. J. Donovan*, FNZ 57, 2007)
- Braconidae: Alysiinae (*J. A. Berry*, FNZ 58, 2007)
- Chalcidoidea: introduction, and review of smaller families (*J. S. Noyes & E. W. Valentine*, FNZ 18, 1989)
- Diapriidae: Ambositrinae (*I. D. Naumann*, FNZ 15, 1988)
- Encyrtidae (*J. S. Noyes*, FNZ 13, 1988)
- Mymaridae (*J. S. Noyes & E. W. Valentine*, FNZ 17, 1989)
- Pompilidae (*A. C. Harris*, FNZ 12, 1987)

Pteromalidae: Eunotinae: Moranilini (*J. A. Berry*, FNZ 33, 1995)

Sphecidae (*A. C. Harris*, FNZ 32, 1994)

### **Lepidoptera**

Annotated catalogue, and keys to family-group taxa (*J. S. Dugdale*, FNZ 14, 1988)

Geometridae: Ennominae: Lithinini (*Jason D. Weintraub & Malcolm J. Scoble*, FNZ 49, 2004)

Hepialidae (*J. S. Dugdale*, FNZ 30, 1994)

Micropterigidae (*George W. Gibbs*, FNZ 72, 2014)

Nepticulidae (*Hans Donner & Christopher Wilkinson*, FNZ 16, 1989)

Oecophoridae: *Hierodoris* (*Robert J. B. Hoare*, FNZ 54, 2005); *Izatha* (*Robert J. B. Hoare*, FNZ 65, 2010).

Noctuinae (Insecta: Lepidoptera: Noctuidae) part 1: *Austramathes*, *Cosmodes*, *Proteuxoa*, *Physetica* (*R.J.B. Hoare*, FNZ 73, 2017)

**Mantodea**, with a review of aspects of functional morphology and biology (*G. W. Ramsay*, FNZ 19, 1990)

**Phthiraptera** (Insecta): a catalogue of parasitic lice from New Zealand (*R. L. Palma*, FNZ 76, 2017)

### **Plecoptera**

Antarctoperlinae (*I. D. McLellan*, FNZ 27, 1993)

Notonemouridae (*I. D. McLellan*, FNZ 22, 1991)

**Protura** (*S. L. Tuxen*, FNZ 9, 1986)

### **Thysanoptera**

Terebrantia (*Laurence A. Mound & Annette K. Walker*, FNZ 1, 1982)

Tubulifera (*Laurence A. Mound & Annette K. Walker*, FNZ 10, 1986)

## **Arachnida**

### **Acari**

Acaridae: *Tyrophagus* (*Qing-Hai Fan & Zhi-Qiang Zhang*, FNZ 56, 2007)

Cryptostigmata — a concise review (*M. Luxton*, FNZ 7, 1985)

Eriophyoidea except Eriophyinae (*D. C. M. Manson*, FNZ 4, 1984)

Eriophyinae (*D. C. M. Manson*, FNZ 5, 1984)

Raphignathoidea (*Qing-Hai Fan & Zhi-Qiang Zhang*, FNZ 52, 2005)

Tenuipalpidae: *Tenuipalpus* (*Yun Xu & Zhi-Qiang Zhang*, FNZ 77, 2018)

### **Araneae**

Lycosidae (*C. J. Vink*, FNZ 44, 2002)

Periegopidae (*C. J. Vink, N. Dupérré & Malumbres-Olarte*, FNZ 70, 2013)

Pisauridae (*C. J. Vink & N. Dupérré*, FNZ 64, 2010)

## **Crustacea**

### **Amphipoda**

Talitridae (*K. W. Duncan*, FNZ 31, 1994)

## **Mollusca**

### **Gastropoda**

Naturalised terrestrial Stylommatophora (*G. M. Barker*, FNZ 38, 1999)

## **Nematoda**

**Tylenchida**: Criconematina (*W. M. Wouts*, FNZ 55, 2006)

## NOTICES

This series of refereed publications has been established to encourage those with expert knowledge to publish concise yet comprehensive accounts of elements in the New Zealand fauna. The series is professional in its conception and presentation, yet every effort is made to provide resources for identification and information that are accessible to the non-specialist.

*Fauna of N.Z.* deals with non-marine invertebrates only, since the vertebrates are well documented, and marine forms are covered by the series *NIWA Biodiversity Memoirs*.

**Contributions** are invited from any person with the requisite specialist skills and resources. Material from the N.Z. Arthropod Collection is available for study.

Contributors should discuss their intentions with a member of the Editorial Board or with the Series Editor before commencing work; all necessary guidance will be given.

## NGĀ PĀNUI

Kua whakatūria tēnei huinga pukapuka hei whakahauhau i ngā tohunga whai mātauranga kia whakaputa i ngā kōrero poto, engari he whaikiko tonu, e pā ana ki ngā aitanga pepeke o Aotearoa. He tōtika tonu te āhua o ngā tuhituhi, engari ko te tino whāinga, kia mārama te marea ki ngā tohu tautuhi o ia ngārara, o ia ngārara, me te roanga atu o ngā kōrero mō tēnā, mō tēnā.

He titiro whāiti tā tēnei pukapuka ki ngā mea noho whenua, kāore he tuarā; i pēnei ai i te mea kei te mōhio whānuitia ngā mea whai tuarā, ā, ko ngā mea noho moana, koirā te tino kaupapa o te huinga pukapuka *NIWA Biodiversity Memoirs*.

Ka āhei te tangata ki te **whakauru tuhituhinga** mehemea kei a ia ngā tohungatanga me ngā rauemi e tutuki pai ai tana mahi. Heoi anō, e wātea ana te Kohinga Angawaho o Aotearoa hei āta tiro tiro mā te tangata mehemea he āwhina kei reira.

Me whāki te kaituhi i ōna whakaaro ki tētahi o te Kāhui Ārahi Whakarōpūtanga Tuarā-Kore, ki te Ētita rānei i mua i te tīmatanga, ā, mā rātou a ia e ārahi mō te wāhi ki tana tuhinga.