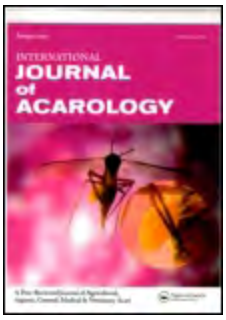

Updated Italian checklist of Tenuipalpidae with description of a new species and new worldwide records of the genus Cenopalpus (Pritchard et Baker)

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Complete List of Authors:	Giosa, Marcello; University of Florida Department of Entomology and Nematology Tropical Research and Education Center Homestead FL 33031 USA Department of Soil Plant and Food Sciences (DiSSPA) University of Bari Aldo Moro Bari Italy, Entomology and Nematology; Di.S.S.P.A. Ochoa, Ronald; Systematic Entomology Laboratory ARS-USDA BARC-West Beltsville MD 20705 USA, Systematic Entomology Castro, Elizeu; Graduate Program in Biodiversity Department of Biological Sciences São Paulo State University (UNESP) São José do Rio Preto SP 15054-000 Brazil, Department of Biological Sciences Simoni, Sauro; Council for Agricultural Research and Economics Research Center for Plant Protection and Certification Lanciola del Riccio Firenze Italy, CREA-DC Glik, Tobias; USDA Animal and Plant Health Inspection Service Plant Protection and Quarantine Romulus MI 48174 USA, Plant Protection and Quarantine Tassi, Aline; University of Florida Department of Entomology and Nematology Tropical Research and Education Center Homestead FL 33031 USA, Department of Entomology and Nematology de Lillo, Enrico; Department of Soil Plant and Food Sciences (DiSSPA) University of Bari Aldo Moro Bari Italy, Department of Soil, Plant and Food Sciences
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Updated Italian checklist of Tenuipalpidae with description of a new species and new worldwide records of the genus *Cenopalpus* (Pritchard et Baker)

MARCELLO DE GIOSA[1,2*], RONALD OCHOA[3], ELIZEU B. CASTRO[4], SAURO SIMONI[5], TOBIAS GLIK[6], ALINE D. TASSI[1], ENRICO DE LILLO[2]

[1]University of Florida, Department of Entomology and Nematology, Tropical Research and Education Center, Homestead, FL, 33031, USA;
[2]Department of Soil, Plant and Food Sciences (Di.S.S.P.A.), University of Bari Aldo Moro, Bari, Italy;
[3]Systematic Entomology Laboratory, ARS-USDA, BARC-West, Beltsville, MD, 20705 USA;
[4]Graduate Program in Biodiversity, Department of Biological Sciences, São Paulo State University (UNESP), São José do Rio Preto, SP, 15054-000, Brazil;
[5]Council for Agricultural Research and Economics Research Center for Plant Protection and Certification, Lanciola del Riccio, Firenze, Italy;
[6]USDA Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Romulus, MI, 48174, USA;

[*]*Corresponding author, e-mail: m.degiosa@ufl.edu;*
- Marcello De Giosa https://orcid.org/0000-0002-7457-001X
- Ronald Ochoa https://orcid.org/0000-0003-1680-3601
- Elizeu B. Castro https://orcid.org/0000-0002-8056-6893
- Sauro Simoni https://orcid.org/0000-0003-2396-2344
- Tobias Glik https://orcid.org/0009-0001-5966-3621
- Aline D. Tassi https://orcid.org/0000-0002-8622-5977
- Enrico de Lillo https://orcid.org/0000-0003-0364-4963

Abstract

The family Tenuipalpidae includes agricultural pests that have garnered extensive attention from the global research community. Despite the economic importance of tenuipalpids, due to their ecology and global trade of the infested plants, there has not been any corresponding and comprehensive research on these mites in Italy in recent decades. This study aimed to determine the species composition of tenuipalpid mites in Italy, update the Italian checklist for the taxon, and include new records and host plant associations of the genera *Brevipalpus* Donnadieu and *Cenopalpus* Pritchard and Baker worldwide. The research used advanced microscope including cryo-scanning electron microscopy (Cryo-SEM), Table-top SEM, and differential interference contrast (DIC), to analyze the morphological characteristics of the mites in detail. The study found several new records of tenuipalpid species in Italy, including five *Cenopalpus*, three *Brevipalpus*, two *Tenuipalpus* Donnadieu, and one *Pentamerismus* McGregor species. Additionally, one new species *Cenopalpus ulmifolius* (De Giosa, Ochoa et de Lillo) was added to the list. The research also incorporated new records of *Cenopalpus* species in different countries and several new host plant associations and the description of novel taxonomic characters were present for the Cenopal species studied during this work, since they were the most abundant tenuipalpid collected in the sampled areas. The study's findings are crucial for developing effective

management for tenuipalpid mites, understanding the fauna composition, and constructing preparedness strategies for quarantine purposes.

Key words. Acari, Flat mites, Mediterranean area, *Brevipalpus*, *Pentamerismus*, *Tenuipalpus* microscopy, taxonomy, interceptions, Trombidiformes, Europe, Americas, phytophagous pests

Introduction

The family Tenuipalpidae in Italy has primarily been studied by Antonio Berlese, Riccardo and Giovanni Canestrini, Marisa Castagnoli, Filippo Fanzago, Giocondo Lombardini and Fausta Pegazzano (Prasad 1982). In recent years, the economic importance of the Tenuipalpidae stems from their global impact and their increased interceptions in international trade on plants (see De Giosa et al. 2021a). Despite their importance, no extensive research has been conducted on these mites in Italy. Consequently, a knowledge gap exists regarding the current status of tenuipalpid mites found in Italy. Furthermore, the economic importance of this family has increased significantly as recent studies have shown that some flat mites have the ability to transmit viruses (de Lillo et al. 2021).

The first Italian checklist of the family Tenuipalpidae was published by Bernini et al. in 1995, encompassing a total of 4 genera and 20 species. This checklist was comprised of ten species from the genus *Brevipalpus* Donnadieu, six from the genus *Cenopalpus* Pritchard and Baker, three from the genus *Tenuipalpus* Donnadieu, and one species of the genus *Pentamerismus* McGregor. In addition to these records, a misidentification occurred in the checklist where *Acarus mori* (Rondani 1970) was inaccurately listed as *Raoiella mori*. Later, Castagnoli and Nannelli (2003) provided the first update to the checklist, adding one species to *Cenopalpus* and *Pentamerismus*, resulting in a modest increase of 21 tenuipalpid species recorded in Italy. Between 2021 and 2023, a series of studies contributed to an increased number of 28 tenuipalpids documented in Italy (De Giosa et al. 2021a, 2021b, 2022).

The current study primarily aims to describe a new species of *Cenopalpus* from Italy, to update the Italian checklist of the family Tenuipalpidae reporting new species records . *Cenopalpus* mostly occurs in the Western Paleartic and Oriental zoogeographical regions (Mesa et al. 2009, Castro et al. 2023), but despite its distribution, this genus is not well documented in Italy. Therefore, we provide new *Cenopalpus* records and host plant associations based on the material studied, presenting new morphological traits, to update the taxonomically guided identification of this genus.

Material and Methods

The new checklist was developed based on national and international revisions, verification of species intercepted from Italy at the ports of entry in the USA and recent surveys conducted in southern Italy. The material intercepted at the ports of entry in the USA was deposited at the United States National Insect and Mite Collection, US National Museum of Natural History, Smithsonian (housed at the Systematic Entomology Laboratory in Beltsville, Maryland, USA).

Surveys were conducted in 2019 in the Apulia District of southern Italy and consisted of randomly collected plant materials from various Mediterranean tree and plant families in different habitats. Each sample, consisting of small branches with leaves and flowers if present, was packaged individually in tightly sealed polyethylene bags with paper towels to control humidity. The samples were transferred to the laboratory the same day and stored at low temperature (about +4ºC). The collection data for each sample includes the locality, date, host, and global positioning system (GPS) coordinates of each sample. The coordinates were taken using Map Coordinates,

version 4.8.28. Plant samples were examined under Olympus SZH10 stereomicroscope at the Department of Soil, Plant and Food Sciences (Di.S.S.P.A.), University of Bari Aldo Moro, Italy. The stereomicroscope photos were taken with a Canon Mark III camera using EOS utility 0.1.18.0. The collected mite specimens were mounted in Hoyer's medium (Walter and Krantz 2009) and cured in an oven (40-50°C) for a week. The slides were labeled by indicating the host (genus and species), mite (genus and species), life stage, sex, collection data and collector's name (Walter and Krantz 2009). The specimens were examined and identified under Zeiss Imager D1 and Leica DMR microscopes with differential interference contrast (DIC) and Phase Contrast at the Systematic Entomology Laboratory, Beltsville, Maryland, USA. Differential Interference Contrast microphotographs were taken with a Zeiss AxioCam ICc5 using AxionVision SE64 and hand drawings were prepared using a *camera lucida* mounted on a Leica DMR microscope, following de Lillo et al. (2010). Drawings and microphotographs were optimized by Adobe Photoshop 10 version 21.0.3. Specimens in 70% ethanol were used for Tabletop scanning electron microscopy, low-temperature scanning electron microscopy, and cryo-scanning electron microscopy studies (Bolton et al. 2014).

Mite identifications were based on the current literature, including the original descriptions and redescriptions cited in Mesa et al. (2009) and Castro et al (2023). The morphometrics, description of reticulation, and the description of novel considered structures for other tenuipalpid groups and spermathecal apparatus and microplates morphology are presented according to Beard et el. (2015).

All measurements are presented in micrometers (µm). Measurements of the holotype of the new species are followed by the measurements of the paratypes in bracket parentheses. Setae measurements for adult females are presented as a range (including paratype measurements and non-type material where available) followed by the holotype data in square brackets. All other stages are presented as a range. Setae were measured from the center of the seta base to the tip of the seta; distances between setae were measured from the inside edge of the setae bases. Body size was measured at the level of *v2-h1* (excluding gnathosoma), tarsus of the palpus-h1 (including gnathosoma), propodosoma between *v2-sc1* and between *sc1-sc2* (Saito et al. 1999), opisthosoma measurements after the leg IV. Additionally, the description reported the measurement of the subcapitular setae, eupathidia and solenidia on palps. Adult body chaetotaxy is derived from Grandjean (1939), and leg chaetotaxy is derived from Lindquist (1985), Quiros-Gonzalez (1985), Kane (2003), Zhang and Fan (2004), Xu and Fan (2010), Seeman and Beard (2011), Beard and Ochoa (2011), Xu et al. (2013), Khanjani et al. (2013), Beard et al. (2014, 2016), Castro et al. (2015, 2016a, 2016b, 2017) and Welbourn (2017). Legs were measured from the posterior margin of the coxa to the distal end of the claws. The terminology follows Baker and Tuttle (1987), Mesa et al. (2009) and Beard et al. (2015, 2018). Plant species identification follows World Flora Online (WFO) Plant List (2023). The reported distribution for each tenuipalpid species follows Castro et al. (2023).

Mounted slides and the holotype of the new species are deposited at the Entomological and Zoological Section, Department of Soil, Plant and Food Sciences (Di.S.S.P.A.), University of Bari Aldo Moro, Italy. Paratypes of the new species and other mounted slides are deposited at the National Insect and Mite Collection, National Museum of Natural History, Smithsonian (housed at the Systematic Entomology Laboratory in Beltsville, Maryland, USA). Several specimens from the Cryo-SEM studies were recovered and stored at the National Insect and Mite Collection.

List of abbreviations

- Di.S.S.P.A.
  Entomological and Zoological Section, Department of Soil, Plant and Food Sciences, University of Bari Aldo Moro, Italy (UNIBA)
- CREA-DC
  Council for Agricultural Research and Economics - Research centre for Plant Protection and Certification, via Lanciola 12a del Riccio, Firenze, Italy
- USNM
  National Insect and Mite Collection, National Museum of Natural History, Smithsonian, housed at the Systematic Entomology Laboratory (SEL), Beltsville Agricultural Research Centre West (BARC West), Unites States Department of Agriculture (USDA), 10300 Baltimore Ave, Beltsville, Maryland, USA, 20705
- APHIS PPQ USDA
  Animal and Plant Health Inspection Service, Plant Protection and Quarantine, 11200 Metro Airport Center Drive, Suite 140, Romulus, Michigan, 48174
- DEES
  Departamento de Entomologia e Acarologia, Escola Superior de Agricultura “Luiz de Queiroz”, Universidade de São Paulo (ESALQ-USP), Piracicaba, São Paulo, Brazil (DEES).
- JFKIA
  John F. Kennedy International Airport, USA
- DTW
  Detroit Metro Airport, USA

Results

In this study, we reported five *Cenopalpus*, four *Brevipalpus*, two *Tenuipalpus*, and one *Pentamerismus* species which are new records and one new species of the genus *Cenopalpus*. This increases to 37 the total number of tenuipalpid species present in It Moreover, we reported new records of *Cenopalpus* species in seven countries and several new worldwide host plant associations. We did not provide updated identification keys to the world species of *Cenopalpus*, including the new species, since a revision of the genus is needed. Several types of *Cenopalpus* species have been lost (Mesa et al. 2009, Castro et al. 2023), descriptions in some cases are incomplete, and redescriptions of some species are based on specimens not collected in the local types. The current taxonomical information of the genus *Cenopalpus* present in the old species

descriptions lacks important information in other tenuipalpid genera about morphological characteristics, as highlighted by Beard et al. (2015). Based on the authors' personal observations, morphological characters such as spermathecal apparatus, microplates, and different dorsal and ventral reticulation patterns are also relevant in separating the species in the genus *Cenopalpus*.

Checklist of the family Tenuipalpidae in Italy

Brevipalpus Donnadieu

1 *B. californicus* Banks, 1904
2 *B. cuneatus* Canestrini et Fanzago, 1876
3 *B. garmani* Baker, 1949
4 *B. lewisi* McGregor, 1949
5 *B. oleae* Baker, 1949
6 *B. olearius* Sayed, 1950
7 *B. olivicola* Pegazzano et Castagnoli, 1972
8 *B. rotai* Castagnoli et Pegazzano, 1979
9 *B. russulus* Boisduval, 1867
10 *B. mitrofanovi* Pegazzano, 1975
11 *B. obovatus* Donnadieu, 1875
12 *B. recki* Livshitz et Mitrofanov, 1967
13 *B. hondurani* Evans 1993
14 *B. papayensis* Baker, 1949
15 *B. phoenicis* Geijskes, 1939
16 *B. yothersi* Baker, 1949

Cenopalpus Pritchard et Baker, 1958

17 *C. bakeri* Düzgünes, 1967
18 *C. lanceolatisetae* Attiah, 1956
19 *C. longirostris* Livshitz et Mitrofanov, 1967
20 *C. halperini* Castagnoli, 1987
21 *C. mespili* Livshitz et Mitrofanov, 1967
22 *C. pegazzanoae* Castagnoli, 1987
23 *C. pulcher* Canestrini et Fanzago, 1876
24 *C. spinosus* Donnadieu, 1875
25 *C. ulmifolius* **sp. nov.** De Giosa, de Lillo et Ochoa 2023
26 *C. lineola* Canestrini et Fanzago, 1876
27 *C. wainsteini* Livshitz et Mitrofanov, 1967
28 *C. adventicus* Ueckermann et Ripka, 2016
29 *C. officinalis* Papaioannou-Souliotis, 1986
30 *C. pterinus* Pritchard et Baker, 1958

Pentamerismus McGregor, 1949

31 *P. coronatus* Canestrini et Fanzago, 1876
32 *P. oregonensis* McGregor, 1949
33 *P. taxi* Haller, 1877

Tenuipalpus Donnadieu, 1875
34 *T. caudatus* Dugès, 1834
35 *T. granati* Sayed, 1946
36 *T. pacificus* Baker, 1945
37 *T. sarcophilus* Welbourn et Beard, 2017

Family Tenuipalpidae Berlese, 1913

Genus *Brevipalpus*

Type species – *Brevipalpus obovatus* Donnadieu, 1875

***Brevipalpus californicus* species group** Baker and Tuttle, 1987

Diagnosis (adult female). Seven dorsolateral setae on opisthosoma. The palpus is 4-segmented and palp tarsus with 1 solenidion and 2 eupathidia. Tarsus on leg II with 2 solenidia.

1. *Brevipalpus californicus* Banks, 1904

Type Depository. USNM.

Distribution (Castro et al. 2023). Algeria; Angola; Australia: New South Wales, Northern Territory, South Australia, Victoria; Brazil; China; Costa Rica; Cuba; Cyprus; Dominican Republic; Congo; Egypt; Fiji; France; Georgia; Greece; Honduras; Hungary; India: Assam, Haryana, Karnataka, Kerala, Meghalaya, Punjab, Uttar Pradesh, West Bengal; Iran, Iraq; Israel; Italy; Japan; Libya; Malawi; Malaysia; Mauritius; Mexico; Mozambique; Nepal; Netherlands; New Zealand; Nigeria; Pakistan; Peru; Philippines; Portugal; Rwanda; Samoa; Saudi Arabia; South Africa; South Korea; Spain; Syria; Taiwan; Uganda; USA; Yemen, Zimbabwe.

Remarks. Brevipalpus californicus was reported for the first time from Sicily (southern Italy) on lemon (Di Martino 1960). However, the validity of its presence in Italy is questionable since it belongs to species complex (Tassi et al. in prep.).

***Brevipalpus cuneatus* species group** Baker and Tuttle, 1987

Diagnosis (adult female). Seven dorsolateral setae on opisthosoma. The palpus is 4-segmented and palp tarsus with 1 solenidion and 2 eupathidia. Tarsus on leg II with 1 solenidion.

2. *Brevipalpus cuneatus* Canestrini et Fanzago, 1876

Type Depository. Unknown.

Material examined. **ITALY**: 1 ♀, Portici (southern Italy) ex. juke, June 23 1984, legit Canestrini G. and Fanzago F. (CREA-DC); 1 ♀, Portici (southern Italy) ex. juke, June 23 1984, legit Canestrini G. and Fanzago F. (CREA-DC).

Distribution (Castro et al. 2023). Georgia; Greece; Italy; Ukraine.

Remarks. According to Vacante and Nucifora (2022), the presence of *B. cuneatus* on lemon trees in the Sicily region of southern Italy has been documented since 1903 by Cavara and Molli[illegible] This species has been known to cause greyish patches on both lemon fruits and mandarin oranges in the same region (Tardo 1960). The family Rutaceae is a new host plant record for *B. cuneatus*.

3. *Brevipalpus garmani* Baker, 1949

Type Depository. USNM.

Material examined. **ITALY**: 4 ♀♀, Lazio district, ex. *Actinidia chinensis* var. *deliciosa* (A.Chev.) A.Chev. cv. Hayward (Actinidiaceae), November 21 2012, legit S. Simoni (CREA-DC); 7 ♀♀, Romagnano (Trentino-Alto Adige district), ex. *A.chinensis* var. *deliciosa* cv. Hayward, November 8 2012, legit S. Simoni (CREA- DC); 5 ♀♀, 1 ♂, 1 deutonymph, Romagnano (Trentino-Alto Adige district), ex. *A. chinensis* var. *deliciosa* cv. Hayward, November 2 2012, legit S. Simoni (CREA- DC); 24 ♀♀, 2 deutonymphs, Cisterna di Latina (Lazio district), ex. *A. chinensis* var. *deliciosa* cv. Hayward, November 16 2012, legit S. Simoni (CREA- DC); 3 ♀♀, Arco (Trentino-Alto Adige district), ex. *A. chinensis* var. *deliciosa* cv. Hayward, November 8 2012, legit S. Simoni (CREA- DC).

Distribution (Castro et al. 2023). Italy; USA.

Remarks. *Brevipalpus garmani* is a new record for Italy. Italy is the first European country where this species has been reported.

4. *Brevipalpus lewisi* McGregor, 1949

Type Depository. USNM.

Material examined. **ITALY**: Turi (southern Italy) ex. *Vitis* spp. (Linnaeus), October 2001, legit V. Romita (Di.S.S.P.A.); 18 ♀♀, Mordano (Emilia-Romagna district), ex. *A. chinensis* var. *deliciosa* cv. Hayward, November 7 2012, legit S. Simoni (CREA- DC); 6 ♀♀, Errano (Emilia-Romagna

district), ex. *A. chinensis* var. *deliciosa* cv. Hayward, October 23 2012, legit S. Simoni (CREA-DC).

Distribution (Castro et al. 2023). Australia; China: Jiangsu; Egypt; Georgia; Greece; Hungary; India: West Bengal; Iran; Israel; Italy; Japan; Mexico; Portugal; Saudi Arabia; South Africa; South Korea; Spain; Taiwan; Tunisia; Turkey; Ukraine; USA.

Remarks. *Brevipalpus lewisi* has been reported for the first time in Italy by Tshikhudo et al. (2022).

5. *Brevipalpus oleae* Baker, 1949

Type Depository. USNM.

Distribution (Castro et al. 2023). Greece; Israel; Italy; Morocco; Spain; Syria; Tunisia; Turkey.

Remarks. Brevipalpus oleae has been reported for the first time from Italy by Castagnoli and Pegazzano (1979) after surveys in olive orchard areas.

6. *Brevipalpus olearius* Sayed, 1950

Type Depository. Unknown.

Distribution (Castro et al. 2023). Egypt; Greece; Iran; Israel; Italy; Turkey; Ukraine.

Remarks. Brevipalpus olearius has been reported for the first time from Italy by Castagnoli and Pegazzano (1979) during surveys conducted in olive orchard areas.

7. *Brevipalpus olivicola* Pegazzano et Castagnoli, 1972
(SM Figs 1a-1b)

Type Depository. CREA- DC.

Material examined. **ITALY**: Martina Franca (southern Italy) ex. *Olea europaea* (Linnaeus) (Oleaceae), January 27, 1988, legit E. de Lillo (Di.S.S.P.A.); 1 ♀, Bitetto (southern Italy), 41°02'29"N 16°43'43"E, 164 m, ex. *O. europaea*, February 10 2019, legit M. De Giosa (Di.S.S.P.A.); 1 ♀, Bitetto (southern Italy), 41°02'30"N 16°44'12"E, 134 m, ex. *O. europaea*, September 13 2019, legit M. De Giosa (Di.S.S.P.A.); 1 ♀, Corato (southern Italy), 41°06'32"N 16°22'42"E, 313 m, ex. *O. europaea*, May 19 2019, legit M. De Giosa (Di.S.S.P.A.); 1 ♀, Ginosa caves (southern Italy), 40°34'52"N 16°45'35"E, 229 m, ex. *O. europaea*, May 10 2019, legit M. De Giosa (Di.S.S.P.A.); 1 ♀, Mattinata (southern Italy), 41°42'49"N 16°03'22"E, 87 m, ex. *O. europaea*, April 20 2019, legit M. De Giosa (Di.S.S.P.A.); 1 ♀, Bari (southern Italy), 41°06'35"N 16°52'53"E, 28 m, ex. *O. europaea*, April 4 2019, legit M. De Giosa (Di.S.S.P.A.).

Distribution (Castro et al. 2023). Greece; Italy; Portugal; Tunisia.

Remarks. Brevipalpus olivicola has been described from Italy (Canestrini and Fanzago 1972). The redescription of the holotype and paratypes is in progress (De Giosa et al. in prep.)

8. *Brevipalpus rotai* Castagnoli et Pegazzano, 1979

Type Depository. CREA- DC.

Distribution (Castro et al. 2023). Greece; Italy; Turkey.

Remarks. *Brevipalpus rotai* has been described from Italy (Castagnoli and Fanzago 1979). The redescription of the holotype and paratypes is in progress (De Giosa et al. in prep.)

9. *Brevipalpus russulus* Boisduval, 1967

Type Depository. Unknown.

Distribution (Castro et al. 2023). Argentina; Belgium; Brazil; China; Costa Rica; France; Germany; Greece; Hungary; Italy; Japan; Mexico; Netherlands; New Zealand; Peru; Ukraine; USA.

Remarks. *Brevipalpus russulus* has been reported for the first time from Italy by De Giosa et al. (2021a) due to an interception in the United States.

***Brevipalpus obovatus* species group** Baker and Tuttle, 1987

Diagnosis (adult female). Six dorsolateral setae on opisthosoma. The palpus is 4-segmented and palp tarsus with 1 solenidion and 2 eupathidia. Tarsus on leg II with 1 solenidion.

10. *Brevipalpus mitrofanovi* Pegazzano, 1975

Type Depository. CREA- DC.

Distribution (Castro et al. 2023). India: West Bengal; Italy.

Remarks. *Brevipalpus mitrofanovi* has been described from Italy on *Quercus cerris* Linnaeus (Pegazzano 1975). The redescription of the holotype and paratypes is in progress (De Giosa et al. in prep.)

11. *Brevipalpus obovatus* Donnadieu, 1975

(SM Figs 2a-2b)

Type Depository. Faculté des Sciences de Lyon, France.

Material examined. **ITALY**: 14 ♀♀ Latina (central-Italy), ex. *Citrus limon* ((L.) Osbeck), October 25 2013, legit Sauro R. (DEES); 8 ♀♀ Sermoneta (Lazio district), ex. *A. chinensis* var. *deliciosa* cv. Hayward, November 17 2012, legit S. Simoni (CREA- DC); 9 ♀♀, 2 deutonymphs, Cisterna di Latina (Lazio district), ex. *A. chinensis* var. *deliciosa* cv. Hayward, November 16 2012, legit S. Simoni (CREA- DC); 2 ♀♀, 1 deutonymph, Pontinia (Lazio district), ex. *A. chinensis* var. *deliciosa* cv. Hayward, November 17 2012, legit S. Simoni (CREA- DC).

Distribution (Castro et al. 2023). Angola; Argentina; Australia; Azores; Bermuda; Brazil; Cameroon, Canada: Ontario; Chile; China; Colombia; Congo; Cook Islands; Costa Rica; Cuba; Cyprus; Egypt; Fiji; France; Georgia; Greece; Guadeloupe; Honduras; Hong Kong; Hungary; India: Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Mizoram, Punjab, Rajasthan, West Bengal; Iran; Iraq; Israel; Italy; Jamaica; Japan; Kenya; Libya; Malawi; Mauritius; Mexico; Morocco; Nepal; New Caledonia; New Zealand; Norfolk Island; Pakistan; Philippines; Poland; Puerto Rico; Saudi Arabia; South Africa; South Korea; Spain; Sri Lanka; Syria; Taiwan; Thailand; Turkey; Uganda; Ukraine; USA; Venezuela; Yemen; Zimbabwe.

Remarks. *Brevipalpus obovatus* has been reported for the first time from Italy by Castagnoli et al. (1984) on peach and De Giosa et al. (2021a) due to an interception in the United States. Moreover, *C. limon* is a new host plant record. This species is a recognized vector of virus to plants, specifically, solanum violifolium ringspot virus (SvRSV, *Cilevirus solani*), that affects the ornamental plant *Solanum violifolium* (Ramos Gonzalez et al. 2022, 2023).

12. *Brevipalpus recki* Livshitz et Mitrofanov, 1967

Type Depository. Unknown.

Distribution (Castro et al. 2023). Greece; Hungary; Israel; Italy; Turkey; Ukraine.

Remarks. *Brevipalpus recki* has been reported for the first time from Italy by Pegazzano (1975) and De Giosa et al. (2022) during surveys conducted on *Quercus* spp.

***Brevipalpus phoenicis* species group** Baker and Tuttle, 1987

Diagnosis (adult female). Six dorsolateral setae on opisthosoma. The palpus is 4-segmented and palp tarsus with 1 solenidion and 2 eupathidia. Tarsus on leg II with 2 solenidia.

13. *Brevipalpus hondurani* Evans, 1993

Type Depository. USNM.

Distribution (Castro et al. 2023). Bermuda; Honduras; Italy.

Remarks. *Brevipalpus hondurani* has been reported for the first time from Italy by Tshikhudo et al. (2022) due to an interception in South Africa.

14. *Brevipalpus papayensis* Baker, 1949
(SM Figs 3a-3b)

Type Depository. USNM.

Material examined. **ITALY**: 5 ♀♀ Catanzaro (southern Italy), ex. *Citrus* sp. December 16 1961, legit Constantino (Acarological Collection Universidad de Chile, Chile).

Distribution (Castro et al. 2023). Australia; Brazil; Costa Rica; Cuba; Hawaii; Indonesia; USA: Washington.

Remarks. *Brevipalpus papayensis* is a new record for Italy. Italy is the first European country where this species has been reported. This species is a recognized vector of virus to plants, specifically, citrus leprosis virus c (CiLV-C, *Cilevirus leprosis*), ligustrum chlorotic spot virus (LigCSV, *Cilevirus ligustri*) and coffee ringspot virus (CoRSV, *Dichorhavirus coffeae)*, that affects respectively citrus, ligustrum and coffee plants (de Lillo et al 2021; Ramos Gonzalez et al. 2022; 2023).

15. *Brevipalpus phoenicis* Geijskes, 1939

Type Depository. Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 Ra Leiden, The Netherlands.

Distribution (Castro et al. 2023). Angola; Argentina; Australia; Austria; Azores; Bermuda; Brazil; Cameroon; China; Colombia; Congo; Cook Islands; Costa Rica; Cuba; Dominican Republic; Egypt; Ethiopia; Fiji; Gaza Strip; Georgia; Greece; Guadalupe; Guyana; Honduras; Hungary; India; Iran; Israel; Italy; Jamaica; Japan, Kenya; Madeira Island; Malawi; Malaysia; Marie Galante; Mauritania; Mauritius; Mexico; Morocco; Mozambique; Myanmar; Netherlands; New Caledonia; New Zealand; Nigeria; Norfolk Island; Pakistan; Papua New Guinea; Paraguay; Peru; Philippines; Poland; Portugal; Puerto Rico; Reunion Island; Rwanda; Saint Helena; Saint Martin; Samoa; Saudi Arabia; South Africa; Spain; Sudan; Syria; Tahiti; Taiwan; Thailand; Tonga; Trinidad; Turkey; Uganda; Ukraine, USA.

Remarks. *Brevipalpus phoenicis* was reported for the first time from Calabria and Sicily regions (southern Italy) on mandarin orange (Di Martino 1960). This species has been found to cause greyish scabby patches and cracks on mandarin oranges (Di Martino 1985, Vacante 2010). However, the validity of its presence in Italy is questionable since it belongs to species complex. As reported on the Tenuipalpidae Database (Castro et al. 2023) “All data pertaining to

the taxon name *B. phoenicis* prior to the publication of Beard et al. (2015) should be considered questionable, due to synonymies and historic misidentifications (see Beard et al. (2015) for detailed information). Any data pertaining to this taxon name after 2015 that have not referenced Beard et al. (2015) for identifications should be assessed with care".

16. *Brevipalpus yothersi* Baker, 1949
(SM Figs 4a-4b)

Type Depository. USNM.

Material examined. **ITALY**: 10 ♀♀ Velletri (central-Italy), ex. *Citrus* sp., October 25 2013, legit Sauro R. (DEES).

Distribution (Castro et al. 2023). Argentina; Brazil; China; Colombia; Costa Rica; Cuba; Dominican Republic; Congo; Ecuador; El Salvador; Ethiopia; France; Guatemala; Honduras; India: Delhi, Himachal Pradesh, Maharashtra, Punjab; Indonesia; Israel; Italy; Malaysia; Mexico; Myanmar; Nigeria; Pakistan; Peru; Philippines; Puerto Rico; South Africa; Spain; Sri Lanka; Trinidad; USA; Venezuela.

Remarks. *Brevipalpus yothersi* has been reported for the first time from Italy by De Giosa et al. (2021a) due to an interception in the United States. Moreover, *Citrus* sp. is a new host plant record for this species. This species is associated with the transmission of the viruses citrus leprosis c, citrus leprosis c2 (CiLV-C2, *Cilevirus columbiaense*), in the Americas and passion fruit green spot virus (PfGSV, *Cilevirus passiflorae*), clerodendrum chlorotic spot virus (ClCSV, *Dichorhavirus clerodendri*) and Citrus chlorotic spot virus (CiCSV, Dichorhavirus citri), in Brazil (Ramos Gonzalez et al. 2020; 2023).

Genus *Cenopalpus*

Type species – *Cenopalpus spinosus* Donnadieu, 1875

***Cenopalpus spinosus* species group** Hatzinikolis et al., 1999

Diagnosis (adult female). Seven dorsolateral setae on opisthosoma; *f2* present and inserted in lateral position. Anterior margin of propodosoma with broad flat projection extending over coxae I-II and gnathosoma, can be reduced in some species. Often with a characteristic cuticular pattern in dorsal cuticle that can be mostly smooth or weakly wrinkled. The palpus is 4-segmented, rarely 3-segmented. Setae formula: 0-1-2-3: palp trochanter without setae, palp femur with 1 dorsal seta, palp genu-tibia with 2 setae, palp tarsus with 1 solenidion and 2 eupathidia. Ventral and genital plates distinct and well developed. Two pairs of pseudanal setae are present (*ps* 1-2). Leg setae formula (coxae to tarsi): 2-1-4-3-5-8 (1ω), 2-1-4-3-5-8 (1ω), 1-2-2-1-3-5, 1-1-1-0-3-5. Leg chaetotaxy as follows: coxae I-II each with two setae (*1b, 1c* and *2b, 2c* respectively); coxae III-IV each with one seta (*3b* and *4b*). Trochanters I-II-IV each with one seta (*v′*); trochanter III with two setae (*l′, v′*). Femora I-II with four setae (*d, l′, v′, bv″*); femur III with two setae (*d, ev′*); femur

IV with one seta (*ev′*). Genua I-II with three setae (*d, l′, l″*); genu III with one seta (*l′*); genu IV without setae. Tibia I-II with five setae (*d, v′, v″, l′, l″*); tibia III-IV with three setae (*d, v′, v″*). Tarsi I-II with eight setae and each with one long, slender, and tapering solenidion; tarsi III-IV with five setae (*ft′, tc′, tc″, u′, u″*).

17. *Cenopalpus bakeri* Düzgüneş, 1967
(Figs 1a-18b)

Type Depository. Department of Plant Protection, Faculty of Agriculture, Ankara University, Turkey.

Material examined. **ARGENTINA**: 1 deutonymph, Cinco saltos (Province of Rio Negro), ex. manzano (could be *Capsicum pubescens* (Ruiz et Pav.), April 1982, legit Perley (USNM); **ITALY**: 2 deutonymphs, 27 ♀♀, Molfetta (southern Italy), ex. lower leaf surface, *Prunus domestica* (Linnaeus) (Rosaceae), October 12 1986, legit E. de Lillo (Di.S.S.P.A); 1 larva, 2 protonymphs, 2 deutonymphs, 1 ♂, 16 ♀♀, Bitetto (southern Italy) 41°02'27"N 16°44'12"E, 130 m, ex. stem and lower leaf surface, *Crataegus monogyna* (Jacq.) (Rosaceae), September 13 2019, legit M. De Giosa (Di.S.S.P.A.).

Diagnosis (adult female). As per *C. spinosus* species group, in addition to the following. In the current description, two females with different morphology are reported. Rostral shield with regular reticulation: longitudinal cells between medial and submedial lobes; vertical reticulation on lateral lobes. Coxisternal area between coxae I-II with weak transverse striae, becoming almost smooth medially. Metapodosoma smooth between coxae III and IV, with transverse folds on each coxa. The region posterior to coxae IV with uniform reticulation. Ventral plate reticulated, with polygonal and transversely elongated cells. Genital plate: non-uniform verrucose pattern, with "warts" aligned transversely to form weak transverse bands. Cuticular microplates: separate individual, rounded to irregularly shaped plates of various sizes, with circular clusters over dorsal surface (Figs 7a-7b)*.

*Mites were collected in southern Italy from two different host plant species, *C. monogyna* and *P. domestica*. The analyzed samples presented three different dorsal cuticular patterns occurring simultaneously on both hosts. The females cannot be separated by several similar characteristics: 3 rounded lobes with the same reticulation; propodosoma with 3 bumps: large and regular cells in the middle and smaller in the lateral. Opisthosoma with the same reticulation and orientation of cells. Venter with regular reticulation between legs IV; anal plate with same shape and reticulation. The shape of the setae on the subcapitulum, palpus and legs is the same. The microplates confirm a match. Based on the current taxonomical data they are considered to belong to the same species. However, studies involving an integrative approach with morphological, morphometric, and molecular markers should be conducted to confirm the absence of cryptic species.

FEMALE (n=43). *Dorsum*. (Figs 1a, 3a-3b, 4a-4c) Length of the body 320-325 including gnathosoma and 275-285 excluding gnathosoma; width propodosoma 135-160; width opisthosoma 110-170. Distance between setae *v2-h1* 300. Setal lengths *v2* 19-24, *sc1* 14-22, *sc2* 18-20, *c1* 11-13, *c2* 11-13, *c3* 12-16, *d1* 8-11, *d3* 11-14, *e1* 6-7, *e3* 9-12, *f2* 9-12, *f3* 10-13, *h2* 7-8,

h1 5-8. Distance between setae *v2-v2* 45, *sc1-sc1* 114, *sc2-sc2* 145, *c1-c1* 55, *c2-c2* 125, *c3-c3* 149, *d1-d1* 39, *d3-d3* 155, *e1-e1* 37, *e3-e3* 150, *f2-f2* 130, *f3-f3* 87, *h2-h2* 51, *h1-h1* 20.

Venter. (Figs 1b, 3c-3d, 4d-4f) Coxisternal area between coxae I-II covered with weak transverse striae medially almost smooth. Between coxae III-IV irregular reticulations laterally. Coxisternal III–IV with transverse striae medially almost smooth; each coxa III-IV mostly with vertical striae. Area posterior behind coxae IV with regular cells. Ventral plate with one pair of aggenital setae (*ag*); genital plate with two pairs of genital setae (*g1-g2*). Both plates reticulate with irregular and elongate cells. Genital and anal plates well developed and sclerotized, included by four transverse and narrow bands. Ventral plate with irregular reticulations and elongated cells. Genital plate with regular reticulation and large rounded cells. Setal lengths *1a* 100, *1b* 25, *2b* 19-20, *1c* 21-24, *2c* 25-26, *3a* 17-18, *3b* 18-20, *4a* 110-120, *4b* 14-17, *ag* 17-18, *g1* 10-11, *g2* 12-13, *ps1* 10-11, *ps2* 11-12. Distances between setae *ag-ag* 25, *g1-g1* 22, *g2-g2* 45, *ps1-ps1* 23, *ps2-ps2* 13. Ventral setae short except *1a* and *4a*, lanceolate and fine (difficult to measure the full length).

Gnathosoma. (Figs 1c-1d, 5a-5c, 6a-6c). Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion 6-7 and eupathidia 5-9. Femur seta finely serrate-barbed; genu-tibia setae smooth and lanceolate. Subcapitulum extending to the distal end of femur I. Subcapitulum with subcapitular setae *m* 12-15; distance between setae *m–m* 14.

Spermathecal apparatus. (Fig 1e) Very long and narrow, distal end not visible.

Legs. (Figs 2a-2d) Leg chaetotaxy formula as *C. spinosus* species group, in addition to the following. Femur I with setae serrate, lanceolate and barbed (*bv'', d, l', v'*); genu I setae *d* and *l'* serrate and barbed, *l'* slightly smooth; tibia I with setae lanceolate, serrate, and barbed (*d, l', l'', v', v''*). Shape of setae on leg II, as following leg I. Femur III with lanceolate and barbed seta (*d*) and lanceolate-smooth seta (*ev'*); seta *l'* on genu III, serrate and barbed; tibia with lanceolate, serrate, and barbed setae (*d, v', v''*). Shape of setae on leg IV as following leg III. Measurements of legs (coxae to tarsi): I 150-155; II 125-135; III 130-135; IV 140-140.

MALE (n=1). *Dorsum*. (Figs 8a, 9) Length of the body including the gnathosoma 300; length body excluding gnathosoma 205; width propodosoma 61-130; width opisthosoma 69-110. Distance between setae *v2-h1* 200. Setal lengths *v2* 19-24, *sc1* 18-24, *sc2* 22-24, *c1* 13-15, *c2* 12-14, *c3* 21-23, *d1* 13-16, *d3* 34-35, *e1* 14-15, *e3* 31-33, *f2* 27, *f3* 27-29, *h2* 17-18, *h1* 13-14. Distances between setae *v2-v2* 32, *sc1-sc1* 79, *sc2-sc2* 110, *c1-c1* 47, *c2-c2* 110, *c3-c3* 125, *d1-d1* 44, *d3-d3* 115, *e1-e1* 34, *e3-e3* 105, *f2-f2* 88, *f3-f3* 61, *h2-h2* 22, *h1-h1* 6.

Venter. (Fig 8b) Ventral cuticle almost completely smooth with weak transverse striae. Area posterior behind coxae IV with broad band. Ventral opisthosoma almost smooth, band of smooth cuticle posterior to *ag-ag*. Setal lengths *1a* 63-68 (very long, distal not visible), *1b* 22-23, *2b* 19-22, *1c* 15-18, *2c* 21-22, *3a* 17-18, *3b* 13-17, *4a* 100, *4b* 16-20, *ag* 20-26, *g1* 12-12, *g2* 11-13, *ps1* 10-11, *ps2* 30-32. Distance between setae *ag-ag* 24, *g1-g1* 54, *g2-g2* 53, *ps1-ps1* 51, *ps2-ps2* 11. Ventral setae short except *1a* and *4a* lanceolate and fine (difficult to measure the full length).

Aedeagus. Aedeagus narrow, elongate and sclerotised, 105, tapering to a blunt point distally (towards genital opening).

Gnathosoma. (Fig 8c-8d) Palps similar to adult female. Solenidion 5 and eupathidia 5-6. Subcapitulum not reaching the distal end of femur I. Subcapitulum with subcapitular setae *m* 12-15; distance between setae *m–m* 14.

Legs. Similar to adult female.

DEUTONYMPH (n=3). *Dorsum*. (Figs 10, 12) Length of the body including the gnathosoma 320-330; length body excluding gnathosoma 275-275; width propodosoma 90-160; width opisthosoma 107-158. Dorsal propodosoma: mostly smooth with longitudinal to oblique striations, light in the middle. Dorsal opisthosoma: mostly smooth with light transverse striae. Dorsal propodosomal and opisthosomal setae *v2, sc1, sc2, c3, d3, e3, f2, f3* thin with long setules (lanceolate and serrate); setae *c1, c2, d1 e1, h1, h2* smooth and minute. Distance between setae *v2-h1* 235-265. Setal lengths *v2* 35-42, *sc1* 46-56, *sc2* 41-51, *c1* 3-4, *c2* 3-5, *c3* 47-59, *d1* 2-4, *d3* 49-66, *e1* 2-3, *e3* 48-66, *f2* 47-56, *f3* 56-75, *h2* 2-4, *h1* 1-3. Distance between setae *v2-v2* 38-43, *sc1-sc1* 91-94, *sc2-sc2* 115-130, *c1-c1* 40-49, *c2-c2* 115-115, *c3-c3* 130-130, *d1-d1* 32-34, *d3-d3* 130-135, *e3-e3* 120-130, *e1-e1* 17-19, *f2-f2* 105-115, *f3-f3* 72-76, *h2-h2* 28-34, *h1-h1* 10-13.

Venter. (Fig 12b) Cuticle almost completely plicate, covered with mostly transverse striae until leg IV, except coxal fields smooth. Ventral, genital, and anal shields indistinct. Setal lengths *1a* 53-85, *1b* 13-19, *2b* 9-21, *1c* 7-14, *2c* 12-15, *3a* 4-14, *3b* 7-11, *4a* 36-44, *4b* 6-8, *ag* 9-16, *g1* 11-12, *g2* 9, *ps1* 5-9, *ps2* 5. Distance between setae *ag-ag* 21-22, *g1-g1* 16-23*ps1-ps1* 15, *ps2-ps2* 25. Ventral setae short except *1a* and *4a* lanceolate.

Gnathosoma. Palps with setal lengths formula as in diagnosis of *C. spinosus* species group. Solenidion 7-9 and eupathidia 4-17. Femur seta finely tapered, barbed; genu-tibia setae smooth and lanceolate. Subcapitulum with setae *m* 8-28; distance between setae *m–m* 9-33.

Legs. (Figs 11a-11d) Leg chaetotaxy formula as *C. spinosus* species group, in addition to the following. Femur I with setae *d* and *l'* plumose and lanceolate, *v'* and *bv''* smooth and lanceolate; genu I with barbed and short setae (*d, l'*) and shorth-smooth seta *l''*; tibia I setae lanceolate and moderately barbed, almost smooth (*l', l'', v'*), serrate and barbed (*d, v''*). Shape of setae on leg II, as following leg I. Femur III with barbed seta (*d*) and smooth seta (*ev'*); seta *l'* on genu III short and moderately barbed; tibia III with lanceolate and moderately serrate setae (*v', v''*), short and barbed setae (*d*). Shape of setae on leg IV, as following leg III. Measurements of legs (coxae to tarsi): I 120-120, II 92-100, III 94-95, IV 99-100.

PROTONYMPH (n=2). *Dorsum*. (Figs 13, 15) Length of the body including the gnathosoma 235; length body excluding gnathosoma 212; width propodosoma 61-130; width opisthosoma 72-120. Dorsal propodosoma: smooth with longitudinal to oblique striations, light in the middle. Dorsal opisthosoma with light transverse striae and after *e1* with longitudinal striations. Dorsal propodosoma and opisthosoma setae *v2, sc1, sc2, c3, d3, e3, f2, f3* thin with long setules (lanceolate and serrate); setae *c1, c2, d1, e1, h2, h2* smooth and minute. Distance between setae *v2-h1* 195. Setal lengths *v2* 30-32, *sc1* 34, *sc2* 36-41, *c1* 4, *c2* 3-4, *c3* 34-41, *d1* 2-4, *d3* 39-41, *e1* 3-4, *e3* 45-49, *f2* 37-38, *f3* 53-57, *h2* 3-4, *h1* 3. Distances between setae: *v2-v2* 37, *sc1-sc1* 80, *sc2-sc2* 106,

c1-c1 34, *c2-c2* 99, *c3-c3* 114, *d1-d1* 28, *d3-d3* 113, *e1-e1* 18, *e3-e3* 105, *f2-f2* 87, *f3-f3* 57, *h2-h2* 18, *h1-h1* 7.

Venter. Cuticle almost completely plicate, covered with mostly transverse striae, except coxal smooth fields. Ventral, genital, and anal shields indistinct. Setal lengths *1a* 74-80 (distal end fine), *1b* 16-19, *2b* 14-19, *1c* 14-23, *2c* 7-10, *3a* 13-11, *3b* 7-11, *4a* 9-10, *ag* 7-8, *g1* 4-3, *ps1* 4. Distance between setae *ag-ag* 20, *ps1-ps1* 6, *ps2-ps2* 4. Ventral setae short except *1a* longer than the others.

Gnathosoma. Palps with setal lengths formula as in diagnosis of *C. spinosus* species group. Solenidion 3 and eupathidia 5-6. Femur seta finely tapered, barbed; genu-tibia setae smooth and lanceolate. Subcapitulum not reaching the distal end of femur I. Subcapitulum with subcapitular setae *m* 6-7; distance between setae *m-m* 12.

Legs. (Figs 14a-14d) Leg chaetotaxy formula as *C. spinosus* species group, in addition to the following. Shape of setae on legs: leg I with three setae on femur, *d* plumose and lanceolate, *bv''* and *v'* smooth and lanceolate; genu with barbed and short setae (*l'*); tibia setae lanceolate and moderately barbed, almost smooth (*l', l'', v', v''*), serrate and barbed (*d*). Shape of setae on leg II, as following leg I. Leg III with moderately barbed femur seta (*d*) and lanceolate-smooth seta (*ev'*); seta *l'* on genu short and smooth; tibia with lanceolate and moderately serrate setae (*v', v''*), short and barbed setae (*d*). Shape of setae on leg IV, as following leg III. Measurements of legs (coxae to tarsi): I 100-100, II 95-97, III 82-83, IV 77-80.

LARVA (n=1). *Dorsum*. (Figs 16, 18a) Length of the body including the gnathosoma 180; length body excluding gnathosoma 151; width propodosoma 48-105; width opisthosoma 66-89. Dorsal propodosoma: mostly smooth with longitudinal to oblique striations, light in the middle. Dorsal opisthosoma: mostly smooth with light transverse striae and longitudinal to oblique around seta *e1*. Dorsal propodosomal and opisthosomal setae *v2, sc1, sc2, c3, d3, e3, f2, f3* thin with long setules (lanceolate and serrate); setae *c1, c2, d1, e1, h1, h2* smooth and minute. Distance between setae *v2-h1* 236-262. Setal lengths *v2* 14-15, *sc1* 14-17, *sc2* 18-20, *c1* 3-5, *c2* 3-4, *c3* 17-23, *d1* 3, *d3* 20-22, *e1* 2-3, *e3* 24-25, *f2* 19-20, *f3* 23-30, *h2* 2-3, *h1* 2. Distance between setae *v2-v2* 19, *sc1-sc1* 41, *sc2-sc2* 57, *c1-c1* 29, *c2-c2* 83, *c3-c3* 95, *d1-d1* 23, *d3-d3* 86, *e1-e1* 14, *e3-e3* 76, *f2-f2* 58, *f3-f3* 32, *h2-h2* 15, *h1-h1* 6.

Venter. (Fig 18b) Venter similar to that of protonymph.

Legs. (Figs 17a-17d) Setal lengths formula and leg chaetotaxy formula as *C. spinosus* species group, in addition to the following. Shape of setae on leg II, as following leg I. Leg III with barbed femur seta *d* and lanceolate-smooth seta *ev'*; seta *l'* on genu short and moderately barbed; tibia with lanceolate and moderately serrate setae (*v', v''*), short and barbed setae (*d*). Measurements of legs (coxae to tarsi): I 53-56, II 47-48, III 79-80.

EGGS. Not examined.

Distribution (Castro et al. 2023). Greece; Iran; Italy; Lebanon; Turkey.

Remarks. *Cenopalpus bakeri* is a new record for Argentina and Italy. We retain inappropriate to design *C. pubescens* as a new host plant association since only 1 specimen of *C. bakeri* has been found. The redescription of this species is needed since misidentifications and confusion are present in international scientific articles. The redescription made by Çobanoğlu et al. (2016) and Khanjani et al. (2012) reported two different chaetotaxies of the legs of *C. bakeri*. The setae on the genua I (*d, l', l''*) and tibia I (*d*) of the adult females differ in shapes in both redescriptions, as well the setae on the genua I-IV (*l', l''*) and tibia I-IV (*l'*) of the deutonymph. Also, the setae on the genua I (*l'*) and tibia I (*d, l''*), and on the trochanter (*d*), genua (*l'*), and tibia (*d*) III of the larvae differ in shapes in both redescriptions. A detailed study involving and integrative approach with molecular markers and comprehensive morphological review of the holotypes and paratypes is needed to understand the taxonomical status of this specie. The mouthparts were studied by Nuzzaci and de Lillo (1989, 1991) and de Lillo et al. (2002) on tenuipalpid samples collected at Molfetta and referred as *C. pulcher* (Canestrini and Fanzago) in those papers; vice versa, based on the current study, *C. bakeri* has to be correctly intended.

18. *Cenopalpus lanceolatisetae* Attiah, 1956
(Figs 19a-24b)

Type Depository. Unknown.

Material examined. **ENGLAND:** 3 ♀♀, intercepted in Boston, USA, interception 009376, ex. plum, *Prunus* sp. (Rosaceae), June 18 1979, legit Batcheller-Crump (USNM); **ITALY**: 4 ♀♀, Bari (southern Italy), ex. *Citrus* × *aurantium* (Linnaeus) (young tree, Rutaceae), in 1962 (USNM); 18 ♀♀, Altopiano delle Murge, Cassano (southern Italy) 40°52'26"N 16°41'41"E, 440 m, ex. bud, *Pyrus spinosa* (*amygdaliformis*) (Forssk.) (Rosaceae), March 10 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 2 ♀♀, Bari (southern Italy) 41°06'33"N 16°52'57"E, 173 m, ex. lower leaf surface, *Cotoneaster lacteus* (W.W.Sm.) (Rosaceae), March 13 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 3 ♀♀, Ginosa caves (southern Italy) 40°34'32"N 16°45'37"E, 215 m, ex. branch, leaf and twig, *Prunus dulcis* ((Mill.) (D.A.Webb)) (Rosaceae), May 10 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 16 ♀♀, Altopiano delle Murge, Gravina (southern Italy) 40°52'49"N 16°23'35"E, 420 m, ex. lower leaf surface and twig, *Elaeagnus angustifolia* (Linnaeus) (Elaeagnaceae), October 25 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 15 ♀♀, Altopiano delle Murge, San Magno (southern Italy) 41°01'30"N 16°23'57"E, 420 m, *P. spinosa*, October 29 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 7 ♀♀, Altopiano delle Murge, Castel del Monte (southern Italy) 41°04'36"N 16°16'37"E, 470 m, ex. leaf and twig, *Malus domestica* (Borkh.) (Rosaceae), October 29 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 11 ♀♀, Altopiano delle Murge, Castel del Monte (southern Italy) 41°04'00"N 16°14'48"E, 500 m, ex. leaf, twig and fruit, *P. spinosa*, collected October 29 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 2 ♀♀, Molfetta (southern Italy), ex. lower leaf surface, *P. domestica*, October 12 1986, legit E. de Lillo (USNM); **JORDAN:** 1 ♀, intercepted in Chicago 008349 IL, USA, interception 84-05894, ex. stem, *Prunus* sp. (Rosaceae), May 31 1984, legit J. Rennhack (USNM); 1 ♀, intercepted in DTW, interception 5995, USA, ex. *Malus sylvestris* ((Linnaeus) Mill.)) (Rosaceae), collected September 1968, legit J.M. Smith (USNM).

Diagnosis (adult female). As per *C. spinosus* species group, in addition to the following. Body ovate, flat, and completely reticulated. Developed rostral shield and it can vary: the first rostral

shape is with 4 short medial and submedial lobes (i.e., medial lobes more acute), 2 short lateral lobes, the submedial and lateral lobes distal end more rounded than medially; the second rostral shape can be with 2 medial lobes strong and developed, 4 short (strongly reduced) submedial and lateral lobes. Hood reticulation is irregular with elongate to rounded cells and oblique to vertical folds. Propodosoma with one bump medially (slightly flat) on which there are large and polygonal cells medially and posteriorly; dorsolateral cells smaller and polygonal to elongate. A strong sejugal furrow between propodosoma and opisthosoma. Dorsal opisthosoma completely reticulated with one bump medially (between *c1-c1* and *e1-e1*) that becomes narrow on posterior margin of opisthosoma; cuticle on bump with largest cells (some fused creating folds) than dorsolateral and lateral ones. Dorsolateral and lateral cells elongate to rounded; some lateral cells are fused. Cuticle between setae *1a* to *4a* with weak transverse striae beyond seta *4a*; anterior margin of propodosoma (near setae *1a*) with 2 deep transverse striae. Polygonal cells near to each coxa IV and weak transverse striae medially. Ventral, genital, and anal plates completely reticulated with polygonal to almost elongated cells; genital and ventral plates developed included four transverse and narrow bands. Dorsal propodosomal setae are quite longer than opisthosomal ones; dorsal propodosomal and opisthosomal setae spatulate\serrate, well developed except *h1* and *h2* smooth. Cuticular microplates (Figs 24a-24b): rounded to irregularly rounded plates, with multiple short irregular ridges on dorsal surface; ridges aligned in haphazard directions, no parallel ridges present. Ventral plate with one pair of aggenital setae (*ag*); genital plate with two pairs of genital setae (*g1-g2*) smooth and lanceolate; anal plate with two pairs of pseudanal setae (*ps1-ps2*). All ventral setae almost smooth (finely barbed); genital setae (*ag*) lanceolate.

FEMALE (n=81). *Dorsum*. (Figs 19a, 21a, 22a-22b) Length of the body including the gnathosoma 355; length body excluding gnathosoma 275; width propodosoma 145-180; width opisthosoma 95-180. Distance between setae *v2-h1* 265. Setal lengths *v2* 28-32, *sc1* 24-25, *sc2* 22-23, *c1* 18-19, *c2* 16-20, *c3* 18, *d1* 11-12, *d3* 14, *e1* 10-11, *e3* 16, *f2* 14-15, *f3* 7-8, *h2* 10-11, *h1* 7-8. Distance between setae *v2-v2* 36, *sc1-sc1* 93, *sc2-sc2* 145, *c1-c1* 51, *c2-c2* 140, *c3-c3* 160, *d1-d1* 36, *d3-d3* 160, *e1-e1* 19, *e3-e3* 150, *f2-f2* 129, *f3-f3* 97, *h2-h2* 62, *h1-h1* 22.

Venter. (Fig 19b, 21b, 22c-22d) Setal lengths *1a* 83-89, *1b* 25-30, *1c* 32, *2b* 26-24, *2c* 9-10, *3a* 15, *3b* 12-17, *4a* 62-95 (very long), *4b* 17-18, *ag* 16-17, *g1* 8-10, *g2* 12, *ps1* 9-10, *ps2* 16-18. Distance between setae *ag-ag* 22, *g1-g1* 27, *g2-g2* 46, *ps1-ps1* 23, *ps2-ps2* 32. Setae *1a* and *4a* longer than the others and lanceolate, smooth, and fine. Aggenital (*ag-ag*), genital (*g1-g2*) and pseudanal setae (*ps1-ps2*) smooth.

Gnathosoma. (Fig 19c-19d, 23a-23b) Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion 6 and 2 eupathidia 7-8. Subcapitulum well developed, almost reaching the distal end of genu. Subcapitulum with subcapitular setae *m* 16-19; distance between setae *m–m* 13.

Spermatheca apparatus. (Fig 19e) A long, narrow, and convoluted duct ending in a spherical bulb or in a small and rounded vesicle. Vesicle may be undeveloped, with duct ending blindly or in small, membranous bulb.

Legs. (Figs 19a-19[illegible]) Leg chaetotaxy formula as *C. spinosus* species group, in addition to the following. Femur I with setae *d* spatulate and *bv', l, v'* smooth; genu I with spatulate and finely serrate setae (*d, l'*) and smooth seta (*l''*); all tibia I setae moderately barbed and lanceolate (*l', l'', v', v''*), except *d* (smooth). Shape of setae on leg II, as following leg I, except the setae on femur:

bv'' and *l'* spatulate and lanceolate, such as *d*. Femur III with finely barbed-lanceolate seta *d* and smooth seta *ev'*; genu III with smooth setae (*l'*) and tibia III (*d, v', v''*). Shape of setae on leg IV, as following leg III, except *v'* and *v''* on tibia moderately barbed. Measurements of legs (coxae to tarsi): I 170-180, II 145-150, III 140-145, IV 145-150.

MALE. DEUTONYMPH. PROTONYMPH. LARVA. EGGS. Not examined.

Distribution (Castro et al. 2023). Armenia; Cyprus; Egypt; England; Greece; Iran; Israel; Italy; Jordan; Libya; Portugal; Saudi Arabia; Syria; Turkey.

Remarks. *Cenopalpus lanceolatisetae* is a new record for England, Italy, and Jordan. Therefore, new host plant associations include *C. lacteus*, *C. nobilis*, *E. angustifolia*, *M. domes*, and *P. spinosa* (*amygdaliformis*). We retain inappropriate to design *M. sylvestris* as a new host plant association since only 1 specimen of *C. lanceolatisetae* has been found on this host plant species.

19. *Cenopalpus longirostris* Livschitz et Mitrofanov, 1967
(Figs 25a-32b)

Type Depository. Unknown.

Material examined. **ITALY**: 6 ♀♀, 1 ♂, 2 deutonymphs, Bitetto (southern Italy) 41°02'27"N 16°44'12"E, 125 m, ex. twigs and leaves, *Quercus pubescens* (Willd.) (Fagaceae), September 13 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 6 ♀♀, San Magno, Alta Murgia National Park (southern Italy) 41°02'18"N 16°24'06"E, 410 m, ex. twig and leaf, *Q. pubescens*, October 29, 2019, legit M. De Giosa (Di.S.S.P.A and USNM).

Diagnosis (adult female). As per *C. spinosus* species group, in addition to the following. Anterior margin of propodosoma well developed, with elongate to fused cells. Propodosoma with polygonal cells medially and rounded to irregular (almost fused) cells laterally. Irregular reticulation on dorsal opisthosoma except between setae *c1-c1* to *d1-d1* with polygonal cells and *c1-c1* to the end of *e1-e1*, with well-developed transversal folds. Sublateral cuticle with fused cells. Dorsal propodosomal setae are well developed and decreasing in length from *v2* to *h1*. Propodosomal and opisthosomal setae lanceolate and plumose. Cuticle between *4a* and ventral plate completely smooth with only polygonal to elongated small cells near to each coxa IV. Ventral plate entirely smooth with few-light rounded cells. Genital and ventral plates developed and including five transverse and narrow bands. Genital plate with weak raised bands, mostly transverse in orientation

FEMALE (n=12). *Dorsum*. (Figs 25a, 27a-27b, 28) Length of the body including the gnathosoma 375; length body excluding gnathosoma 265; width propodosoma 83-155; width opisthosoma 75-155. Body: distance between setae *v2-h1* 250. Setal lengths *v2* 26, *sc1* 21-26, *sc2* 21-26, *c1* 14-23, *c2* 23-24, *c3* 19-27, *d1* 15-16, *d3* 15-21, *e1* 9-11, *e3* 15-17, *f2* 14-15, *f3* 15-17, *h2* 9-11, *h1* 6-8. Distance between setae *v2-v2* 36, *sc1-sc1* 82, *sc2-sc2* 129, *c1-c1* 50, *c2-c2* 125, *c3-c3* 145, *d1-d1* 40, *d3-d3* 145, *e1-e1* 32, *e3-e3* 137, *f2-f2* 95, *f3-f3* 120, *h2-h2* 57, *h1-h1* 31.

Venter. (Figs 25b, 27c) Setal lengths *1a* 76-96 (very long), *1b* 32-36, *2b* 27-34, *1c* 15-16, *2c* 24, *3a* 21-22, *3b* 15-20, *4a* 62-73, *4b* 15-21, *ag* 16-19, *g1* 10-11, *g2* 15-16, *ps1* 10-11, *ps2* 11-11. Distance between setae *ag-ag* 19, *g1-g1* 27, *g2-g2* 43, *ps1-ps1* 32, *ps2-ps2* 25. Ventral setae *1a* and *4a* longer than the others lanceolate, smooth, and fine. Aggential setae (*ag-ag*), genital (*g1-g2*) and pseudanal setae (*ps1-ps2*) smooth.

Gnathosoma. (Fig 25c-25d) Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion 7 and eupathidia 7. Femur seta finely serrate-barbed; genu-tibia setae long, smooth, and lanceolate. Subcapitulum well developed and narrow, almost reaching the distal end of tibia. Subcapitulum with finely barbed setae *m* 17-23; distance between setae *m-m* 11.

Spermathecal apparatus. A long, narrow, and convoluted duct is visible.

Legs. (Figs 26a-26d) Setal formula and leg chaetotaxy as in diagnosis of *C. spinosus* species group. Shape of setae on legs: leg I, femur with plumose-lanceolate (*bv'', d, l'*) and smooth-lanceolate (*v'*) setae; genu with barbed (*d, l'*) and short-smooth setae (*l''*); all tibia setae moderately barbed and lanceolate (*d, l', l'', v', v''*). Shape of setae on leg II, as following leg I. Leg III with plumose-lanceolate femur seta (*d*) and smooth-lanceolate seta (*ev'*); seta *l'* on genu smooth and lanceolate; tibia with lanceolate and moderately serrate setae (*v', v''*), barbed seta (*d*). Shape of setae on leg IV as following leg III. Measurements of legs (coxae to tarsi): I 170-115, II 165-170, III 135-140, IV 145-150.

MALE (n=1). *Dorsum*. (Figs 29a) Propodosoma with polygonal and large cells in the middle, rounded to elongated small cells laterally. Anterior margin of opisthosoma with smaller cells than propodosoma, rounded medially and elongate sub-medially. Reticulation of posterior margin of opisthosoma with elongate and vertical cells; some rounded and small cells are present around *e1-e3*. Length of the body including the gnathosoma 290; length body excluding gnathosoma 215; width propodosoma 120-210; width opisthosoma 64-94. Distance between setae *v2-h1* 205. Setae lengths *v2* 18-22, *sc1* 22-24, *sc2* 26-27, *c1* 19-22, *c2* 18-25, *c3* 25-32, *d1* 14-18, *d3* 25-29, *e1* 12, *e3* 23-24, *f2* 24-25, *f3* 24-25, *h2* 17-22, *h1* 8-11. Distance between setae *v2-v2* 36, *sc1-sc1* 74, *sc2-sc2* 108, *c1-c1* 44, *c2-c2* 105, *c3-c3* 112, *d1-d1* 47, *d3-d3* 105, *e1-e1* 20, *e3-e3* 90, *f2-f2* 52, *f3-f3* 74, *h2-h2* 18, *h1-h1* 6.

Venter. (Fig 29b) Ventral cuticle smooth, with some weak mostly transverse to longitudinal striae. Area posterior after coxae IV with broad band of strong transverse striae; after ventral setae *ag-ag* weak raised bands, mostly transverse in orientation (some vertically). Setal lengths *1b* 27-32, *2b* 25-26, *1c* 15-20, *2c* 28-29, *3b* 16, *4b* 18-24, *ag* 20-22. Distance between *ag-ag* 19. Aggenital setae (*ag*) smooth, except *g1, g2, ps1* barbed; pseudanal setae *ps2* very long, lanceolate, and fine.

Aedeagus. Aedeagus narrow, elongate, and sclerotized, ending in a rounded membranous bulb. Measurement: 130.

Gnathosoma. (Fig 34a-34b) Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion (10) and eupathidia (7). Femur seta finely serrate-barbed; genu-tibia setae long, smooth, and lanceolate. Subcapitulum well developed and narrow, almost reaching the distal end of tibia. Subcapitulum with two finely barbed subcapitular setae *m* 16-18; distance between setae *m-m* 10.

Legs. Similar to adult female. Measurement of legs (coxae to tarsi): I 155-160; II 140-145; III 125; IV 130-140.

DEUTONYMPH (n=2). *Dorsum.* (Figs 30, 32a) Length of the body including the gnathosoma 350; length body excluding gnathosoma 286; width propodosoma 105-140; width opisthosoma 85-130. Dorsal propodosoma and opisthosoma reticulations mostly smooth with weak and short transversal to vertical striations. Dorsal opisthosoma with transverse striae medially between *c3-c3* to *f3-f3*. Dorsal propodosomal and opisthosomal setae developed with short setules (lanceolate and finely serrate): *v2, sc1, sc2, c1, c2, c3, d1, d3, e3, f2, f3, h2* longer than *e1* and *h1*. Distance between setae *v2-h1* 275. Setal lengths *v2* 36-39, *sc1* 33-34, *sc2* 35-36, *c1* 35-37, *c2* 25-26, *c3* 30-34, *d1* 18-25, *d3* 30-31, *e1* 21-25 *e3* 31-32, *f2* 28-31, *f3* 27-28, *h2* 23-26, *h1* 5-6. Distance between setae *v2-v2* 42, *sc1-sc1* 89, *sc2-sc2* 120, *c1-c1* 40, *c2-c2* 120, *c3-c3* 133, *d1-d1* 27, *d3-d3* 124, *e1-e1* 19, *e3-e3* 121, *f2-f2* 77, *f3-f3* 100, *h2-h2* 38, *h1-h1* 15.

Venter. (Fig 32b) Cuticle completely plicate, covered with transverse and narrow striae. Ventral, genital, and anal shields indistinct, with short transverse striae. Setal lengths *1a* 60-74, *1b* 18-25, *1c* 14, *2b* 23, *2c* 21-23, *3a* 18-25, *3b* 16-17, *4a* 51-56, *4b* 17, *ag* 14, *g1* 4-6, *ps1* 5-6, *ps2* 5-6. Distance between setae *ag-ag* 25, *g1-g1* 18, *ps1-ps1* 13, *ps2-ps2* 11.

Gnathosoma. Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion 6 and eupathidia 6-7. Femur seta finely barbed; genu-tibia setae smooth and lanceolate. Subcapitulum with subcapitular setae *m* 4-6; distance between setae *m-m* 10.

Legs. (Figs 31a-31d) Leg chaetotaxy as in diagnosis of *C. spinosus* species group. Shape of setae on legs: leg I with four setae on femur, *bv''* smooth and short, *d* and *l'* mostly plumose and lanceolate, *v'* finely barbed; genu with barbed setae *d* and *l'* and shorth-smooth seta *l''*; tibia setae moderately barbed and lanceolate (*l', l'', v', v''*), mostly barbed and lanceolate (*d*). Shape of setae on leg II, as following leg I, except *bv''* on femur, plumose and lanceolate. Leg III with barbed femur seta *d* and finely barbed seta *ev'*; seta *l'* on genu barbed; tibia with lanceolate and moderately serrate setae (*v', v''*), short and barbed seta (*d*). Shape of setae on leg IV, as following leg III. Measurements of legs (coxae to tarsi): I 115-125, II 96-110, III 84-92, IV 100-105.

PROTONYMPH. LARVA. EGGS. Not examined.

Distribution (Castro et al. 2023). Greece; Italy; Ukraine.

Remarks. Cenopalpus longirostris was found associated with *B. recki* in Italy (De Giosa et al. 2022).

20. *Cenopalpus halperini* Castagnoli, 1987
(Figs 33a-36)

Type Depository. CREA- DC.

Material examined. **ITALY**: 3 ♀♀, San Magno, Alta Murgia National Park (southern Italy) 41°02'30"N 16°44'11"E, 130 m, ex. needles and scaly leaves, *Pinus halepensis* (Mill.) (Pinaceae), October 30 2019, legit M. De Giosa (Di.S.S.P.A and USNM).

Diagnosis (adult female). As per *C. spinosus* species group, in addition to the following. *Cenopalpus halperini* is similar to *C. longirostris* for the length of subcapitulum but differs in having different significant morphological characters. Dorsal propodosoma with irregular reticulations: dorsomedial cuticle with transverse and narrow folds; dorsolateral cells small, polygonal to elongate. Dorsal opisthosoma mostly striate and partly reticulate: dorsocentral between *c1-c1* and after *e1-e1* with narrow and developed transverse folds; dorsolateral cells irregular and small, polygonal, and vertical. Dorsal propodosomal setae are quite longer than opisthosomal ones: *v2*, *sc1-sc2* almost narrow, lanceolate, and plumose. Dorsal opisthosomal setae plumose. Cuticle between *1a* to *4a* mostly smooth with weak transverse striae beyond seta *4a*. Elongate cells near to each coxa IV. Ventral plate entirely smooth with few-light transverse striae. Genital and ventral plates developed and including five transverse and narrow bands; also, weak raised bands are present between these two plates. Genital plate partly smooth with rounded cells posteriorly.

FEMALE (n=3). *Dorsum*. (Figs 33a, 35a) Length of the body including the gnathosoma 410; length body excluding gnathosoma 285; width propodosoma 160-210; width opisthosoma 110-175. Distance between setae *v2-h1* 300. Setal lengths *v2* 35-38, *sc1* 32, *sc2* 38-45, *c1* 27-32, *c2* 27-28, *c3* 26-27, *d1* 20-22, *d3* 24, *e1* 22, *e3* 27, *f2* 27-28, *f3* 28-30, *h2* 24-25, *h1* 16-21. Distance between setae *v2-v2* 57, *sc1-sc1* 125, *sc2-sc2* 170, *c1-c1* 78, *c2-c2* 170, *c3-c3* 195, *d1-d1* 61, *d3-d3* 190, *e1-e1* 47, *e3-e3* 170, *f2-f2* 160, *f3-f3* 120, *h2-h2* 86, *h1-h1* 37.

Venter. (Figs 33b, 35b) Cuticle completely covered with fine transverse striae, almost smooth. Each coxa IV with irregular and defined reticulations laterally. Genital and anal plates developed and sclerotized, included by four transverse and narrow bands. Ventral plate: cuticle with few transverse striae, generally smooth. Genital plate: cuticle with weak transverse bands. Setal lengths *1a* 75-96, *1b* 28-33, *2b* 23-27, *1c* 25-28, *2c* 36-38, *3a* 25-28, *3b* 21-22, *4a* 120-125, *4b* 20-21, *ag* 24-25, *g1* 18-19, *g2* 18-19, *ps1* 13-15, *ps2* 12. Distance between setae *ag-ag* 29, *g1-g1* 40, *g2-g2* 62, *ps1-ps1* 35, *ps2-ps2* 33. Setae *1a* (difficult to measure the full length) and *4a* are longer than the others; ventral setae lanceolate, smooth and fine.

Gnathosoma. (Fig 33c-33d) Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion 10 and eupathidia 7. Femur seta finely serrate-barbed; genu-tibia setae long, smooth and lanceolate. Subcapitulum well developed, at level of distal end of genu. Subcapitulum with subcapitular setae *m* 17-18; distance between setae *m-m* 11.

Spermathecal apparatus. (Figs 33e, 36) An elongated, narrow, weakly convoluted duct. The basal section of the duct broadens slightly towards external opening. Duct ending with a membranous, bulbous lobes; appears to be 6 small subequal lobes.

Legs. (Figs 34a-34d) Leg chaetotaxy as in diagnosis of *C. spinosus* species group. Shape of setae on legs: leg I, femur with plumose-lanceolate (*d, l', v'*) and smooth-lanceolate (b*v''*) setae; genu with plumose setae (*d, l', l''*); all tibia setae moderately barbed and lanceolate (*d, l', l'', v', v''*).

Shape of setae on leg II, as following leg I. Leg III with plumose-lanceolate femur seta *d* and moderately barbed seta *ev'*; seta *l'* on genu plumose; tibia with lanceolate and moderately serrate setae (*v'*, *v''*), plumose seta (*d*). Shape of setae on leg IV as following leg III. Measurements of legs (coxae to tarsi): I 180-190, II 175-180, III 140-145, IV 150-155.

MALE. DEUTONYMPH. PROTONYMPH. LARVA. EGGS. Not examined.

Distribution (Castro et al. 2023). Israel; Italy.

Remarks. Cenopalpus halperini has been observed in Sardinia (Italy) on *Pinus pinaster* (Castagnoli 1974), associated with large populations of *C. wainsteini* (Livschitz and Mitrofanov 1967). In addition, *C. halperini* has also been found in the Apulian District on *Pinus halepensis* (Mill), near needles and scaly leaves, always associated with *C. wainsteini.* No alteration has been observed in the presence of *C. halperini* from our study and Castagnoli (1974). The biology of *C. halperini* is poorly known and requires detailed study.

21. *Cenopalpus mespili* Livschitz et Mitrofanov, 1967

Type Depository. Unknown.

Distribution (Castro et al. 2023). Greece; Italy; Hungary; Ukraine.

Remarks. *Cenopalpus mespili* has been reported in the updated Tenuipalpidae checklist (Castagnoli and Nannelli 2003). The effective presence of this species in Italy remains questionable due to the absence of information in both national and international scientific journals.

22. *Cenopalpus pegazzanoae* Castagnoli, 1987

Type Depository. CREA- DC.

Distribution (Castro et al. 2023). Italy.

Remarks. Currently *C. pegazzanoae* has been described and reported only from Italy.

23. *Cenopalpus pulcher* Canestrini et Fanzago, 1876
(Figs 37a-50b)

Type Depository. CREA- DC.

Material examined. **ARGENTINA:** 4 ♀♀, ex. *M. sylvestris* fruit, interception N.D. OZ6137, April 14 1984 (USNM); **ENGLAND AND NORTH IRELAND:** 4 ♀♀, ex. *Malus* sp. fruit, intercepted in CA San Francisco CBP, USA, October 17 2007, legit S. Tanner (USNM); **FRANCE:** 1 nymph

ex. apple fruit (Rosaceae), intercepted in IFK, USA 81.10795, USA, September 15 1981, legit J. Plummer (USNM); **INDIA:** 2 ♀♀ ex. *Malus* sp., intercepted in CA San Francisco CBP, USA, interception 3013, December 13 2008 (APHIS PPQ USDA); **IRAN**: 1 ♀, ex. *Malus* sp., March 14 1966, legit D. Campt (USNM); **ITALY:** 1 ♀, ex. apple fruit (Rosaceae), intercepted in Boston, USA, interception 007450, April 14 1975 (USNM); 1 ♀, ex. *Cydonia oblonga* fruit (Rosaceae), intercepted in JSKIA, interception A2610, USA, August 25 1982, legit J. Plummer (USNM); 6 ♀♀, Bari (southern Italy) 41°06'33"N 16°52'57"E, 173 m, ex. lower leaf surface, *C. lacteus*, March 13 2019, legit M. De Giosa (Di.S.S.P.A and UNSM); 1 ♀, Bari (southern Italy) 41°06'39"N 16°52'55"E, 173 m, ex. *Eriobotrya japonica* ((Thunb.) Lindl.)) (Rosaceae), October 18 2019, legit M. De Giosa (Di.S.S.P.A); 10 ♀♀, Mattinata (southern Italy) 41°43'01"N 16°04'36"E, 80 m ex. branch and twigs, *M. sylvestris*, April 19 2019, legit M. De Giosa (Di.S.S.P.A and UNSM); **LEBANON:** 1 ♂, ex. apple fruit, interception 63-24774, Nakahava, Scattle 17999, October 11 1963, legit D. M. Pike (USNM); **NETHERLANDS:** 3 ♀♀, ex. *Salix* sp. (Salicaceae), August 08 1954, legit A. E. Pritchard (USNM); **PAKISTAN**: 28 ♀♀, Parachinar, ex. apple tree bark, interception 83-3630, collected January 23 1983, legit Mohyuddin A.I. (USNM); 5 slides; 5 ♀♀, Beltsville, MD 001779, ex. *Malus scions* (Rosaceae), February 22 1983, legit T. Denny (USNM); **PORTUGAL:** 1 ♀, ex. *Buxus* sp. (Buxaceae), intercepted in Boston, interception Lot 58-8697, USA, May 15 1958, legit D. D. Crump (USNM); 1 ♀, ex. *E. japonica*, intercepted in Boston, interception 005258 MA, USA, April 28 1973, legit Holt and Crump. (USNM); 1 ♀, ex. *M. sylvestris*, intercepted in JFKIA, USA, interception 435, USA, October 16 1994, legit Schroeder (USNM); **SPAIN:** 3 nymphs, 9 ♀♀, Valencia, ex. *Ligustrum* sp. (Oleaceae), intercepted in JFKIA, USA, interception 82-4186, July 17 2015, legit E. W. Kitajima (USNM); **TURKEY:** 2 deutonymphs, 6 ♀♀, ex. *Pyrus* sp. (Rosaceae), intercepted in JFKIA, USA, interception 133018, November 9 1998, legit Schroeder (USNM); **Former YUGOSLAVIA**: 1 ♀, ex. *C. oblonga* fruit, intercepted in JFKIA, USA, interception 82-4186, collected March 23 1982, legit Fiuk E.; 1 ♀, ex. apple fruit, intercepted in JFKIA, USA, interception 83-2831, USA, January 27 1983, legit E. Fiuk (USNM).

Diagnosis (adult female). As per *C. spinosus* species group, in addition to the following. Dorsal propodosomal setae are longer than opisthosomal ones: *v2* narrow with long and short setules, *sc1-sc2* lanceolate and slightly serrate-barbed. Dorsal opisthosomal setae moderately barbed (almost smooth), short and tapering (Figs 44a-44f). Cuticular microplates: separate and individual plates, always rounded in shape, with a distinct cluster on their dorsal surface (Figs 45a-45b).Coxisternal area between coxae I-II covered with some strong and weak transverse striae medially. Metapodosoma with weak transverse striae between coxae III and IV, and vertically strong folds on each coxa. The region posterior to coxae IV with irregular reticulation: elongate and fused cells. Ventral plate with elongate and fused cells that form transverse bands. Genital plate: cuticle uniformly verrucose to verrucose-reticulate, with large cells. Spermathecal apparatus with a long fine duct terminating in small rounded vesicle.

FEMALE (n=80). *Dorsum*. (Figs 37a, 39a, 40a-40c) Length of the body 330-345 including gnathosoma and 270-300 excluding gnathosoma; width propodosoma 125-170; width opisthosoma 82-165. Distance between setae *v2-h1* 270. Setal lengths *v2* 29-30, *sc1* 22-23, *sc2* 14-19, *c1* 11-12, *c2* 9-10, *c3* 12-15, *d1* 6-8, *d3* 10-14, *e1* 6-7, *e3* 13-16, *f2* 8-9, *f3* 12-13, *h2* 7-8, *h1* 5-8. Distance between setae *v2-v2* 36, *sc1-sc1* 105, *sc2-sc2* 125, *c1-c1* 48, *c2-c2* 140, *c3-c3* 163, *d1-d1* 36, *d3-d3* 160, *e1-e1* 125, *e3-e3* 150, *f2-f2* 130, *f3-f3* 97, *h2-h2* 59, *h1-h1* 23.

Venter. (Figs 37b, 39b, 40d-40f, 43a-43b) Setal lengths *1a* 62-74, *1b* 22-27, *1c* 14-16, *2b* 18-22, *2c* 25-27, *3a* 8-12, *3b* 15-17, *4a* 65-74, *4b* 15-18, *ag* 16-18, *g1* 8-10, *g2* 9-11, *ps1* 8-10, *ps2* 11-14. Distance between setae *ag-ag* 22, *g1-g1* 48, *g2-g2* 31, *ps1-ps1* 10, *ps2-ps2* 14. Ventral setae short except *1a* and *4a* lanceolate, smooth, and fine.

Gnathosoma. (Figs 37c-37d, 42a-42b, 51a-51b) Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion 6-7 and eupathidia 4-6. Femur seta short and strongly barbed in the end; genu-tibia setae smooth and slightly barbed in the distal end. Palps extending to end of femur I. The distal end of subcapitulum always reaching the posterior margin of genu I. Subcapitulum with lanceolate, and slightly barbed subcapitular setae *m* 34-35; distance between setae *m-m* 32.

Spermathecal apparatus. (Fig 33c) A long narrow, convoluted duct is visible, ending in a small, rounded vesicle.

Legs. (Figs 38a-38d) Leg chaetotaxy as in diagnosis of *C. spinosus* species group. Shape setae on legs: leg I with femur setae serrate, lanceolate and barbed (*d, l', v'*), and lanceolate-smooth (*bv''*); genu setae *d* and *l'* serrate and barbed, *l''* smooth; tibia setae lanceolate, serrate and barbed (*d, l'', v', v''*), and *l'* lanceolate-smooth. Leg II with serrate, lanceolate and barbed setae (*bv'', d, l', v'*); setae on genu I lanceolate and smooth (*d – l'- l''*); tibia I with lanceolate, serrate and barbed setae (*d, l, v', v''*), and *l''* lanceolate and smooth. Leg III with lanceolate and barbed femur setae (*d, ev'*); seta *l'* on genu, lanceolate and smooth; tibia with lanceolate, serrate and barbed setae (*d, v', v''*). Shape of setae on leg IV as following leg III. Measurements of legs (coxae to tarsi): I 150-155; II 115-120; III 135-140; IV 145-150.

MALE (n=1). *Dorsum*. (Figs 46a, 47a) Propodosoma with polygonal and large cells in the middle, rounded cells laterally. Anterior margin of opisthosoma with cells having the same shape and size as the ones on the propodosoma. Reticulation of posterior margin of opisthosoma with elongate and vertical cells. Length of the body including the gnathosoma 255; length body excluding gnathosoma 200; width propodosoma 99-135; width opisthosoma 68-120. Distance between setae *v2-h1* 210. Setal lengths *v2* 30-34, *sc1* 27-29, *sc2* 27-32, *c1* 13-15, *c2* 20-20, *c3* 35-36, *d1* 14-14, *d3* 42-46, *e1* 14-17, *e3* 42-42, *f2* 28-30, *f3* 31-33, *h2* 17-19, *h1* 10-11. Distance between setae *v2-v2* 35 *sc1-sc1* 79, *sc2-sc2* 115, *c1-c1* 47, *c2-c2* 115, *c3-c3* 130, *d1-d1* 45, *d3-d3* 120, *e1-e1* 31, *e3-e3* 112, *f2-f2* 87, *f3-f3* 64, *h2-h2* 32, *h1-h1* 9.

Venter. (Figs 47b) Ventral cuticle smooth, with some weak mostly transverse to longitudinal striae. Area posterior after coxae IV with broad band of strong transverse striae. Setal lengths *1a* 100-105, *1b* 20-26, *2b* 22-31, *2c* 22-24, *3b* 16-21, *4b* 24-27, *ag* 20-22, *g1* 10-11, *g2* 9-10. Distance between setae *ag-ag* 22-23, *g1-g1* 5, *g2-g2* 8. Ventral setae *ag, g1-g2, ps1-ps2* barbed.

Aedeagus. Aedeagus narrow, elongate, and sclerotized, ending in a rounded membranous bulb; 110 long.

Gnathosoma. (Fig 46b-46c) Subcapitulum well developed and narrow, reaching half of the femur. Subcapitulum with finely barbed subcapitular setae *m* 10-10; distance between setae *m-m* 12-13.

Palps. (Fig 55b) Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion (length 8) and eupathidia (length 6-7). Femur seta finely serrate-barbed; genu-tibia setae finely serrate-barbed and lanceolate.

Legs. Similar to adult female. Measurements of legs (coxae to tarsi): I 115-120; II 115-130; III 125-135; IV 150-150.

DEUTONYMPH (n=2). *Dorsum.* (Figs 48a, 50a) Length of the body including the gnathosoma 335; length body excluding gnathosoma 290; width propodosoma 135-180; width opisthosoma 79-145. Dorsal propodosomal and opisthosomal reticulations mostly smooth with weak and short vertical striations. Dorsal opisthosoma with transverse striae medially between *c3-c3* to *f3-f3*. Dorsal propodosomal and opisthosomal setae developed with short setules (lanceolate and finely serrate): *v2, sc1, sc2, c3, d3, e3, f2, f3, h2* longer than *c1, c2, d1, e1, f2, h2* and *h1*. Distance between setae *v2-h1* 273. Setal lengths *v2* 41-41, *sc1* 48-50, *sc2* 45-45, *c1* 3-4, *c2* 3-3, *c3* 56-59, *d1* 2-3, *d3* 59-61, *e1* 21-25 *e3* 2-2, *f2* 3-4, *f3* 67-68, *h2* 2-3, *h1* 2-3. Distance between setae *v2-v2* 45, *sc1-sc1* 103, *sc2-sc2* 120, *c1-c1* 40, *c2-c2* 117, *c3-c3* 135, *d1-d1* 29, *d3-d3* 143, *e1-e1* 22, *e3-e3* 138, *f2-f2* 120, *f3-f3* 88, *h2-h2* 45, *h1-h1* 14.

Venter. (Fig 50b) Cuticle completely plicate, covered with transverse and narrow striae. Ventral, genital and anal shields indistinct, with short transverse striae. Setae lengths *1a* 105-110, *1b* 12-12, *1c* 11-16, *2b* 11-12, *2c* 4-4, *3a* 10-11, *3b* 10-15, *4a* 79-89, *4b* 9-9, *ag* 8-9, *g1* 3-6, *ps1* 5-6, *ps2* 5-5. Distance between setae *ag-ag* 26-26, *g1-g1* 18-18, *ps1-ps1* 6, *ps2-ps2* 6.

Gnathosoma. (Fig 48b-48c) Setae formula for palps as in diagnosis of *C. spinosus* species group. Solenidion 6 and eupathidia 6-7. Femur seta finely barbed; genu-tibia setae smooth and lanceolate. Subcapitulum with subcapitular setae m 17-17; distance between setae *m–m* 10.

Legs. (Fig. 49a-49d) Setal formula and leg chaetotaxy as in diagnosis of *C. spinosus* species group. Shape of setae on legs: leg I with four setae on femur, *bv''* smooth and short, *d* and *l'* mostly plumose and lanceolate, *v'* finely barbed; genu with barbed and plumose setae (*d, l'*) and shorth-smooth seta (*l''*); tibia setae moderately barbed and lanceolate (*l', l'', v', v''*), mostly barbed and lanceolate (*d*). Shape of setae on leg II, as following leg I, except *bv''* on femur, barbed. Leg III with plumose femur seta (*d*) and finely barbed seta (*ev'*); seta *l'* on genu finely barbed; tibia with lanceolate and moderately serrate setae (*v', v''*), short and barbed seta (*d*). Shape of setae on leg IV similar to leg III. Measurements of legs (coxae to tarsi): I 136-145, II 105-108, III 93-110, IV 107-111.

PROTONYMPH. LARVA. EGGS. Not examined.

Distribution (Castro et al. 2023). Afghanistan; Algeria; Armenia; Austria; China; Cyprus; Denmark; Egypt; England; France; Georgia; Germany; Greece; Hungary; India; Iran; Iraq; Israel; Italy; Jordan; Lebanon; Libya; Morocco; Netherlands; Pakistan; Portugal; Syria; Tunisia; Turkey; Ukraine; USA: Oregon.

Remarks. Cenopalpus pulcher has been described from Italy (Canestrini and Fanzago 1876). *Cenopalpus pulcher* is a new record for Argentina, England, North Irelandand the former Yugoslavia. Moreover, *Buxus* sp., *C. lacteus*, *Ligustrum* sp., and *M. scions* are new host plant

associations. Furthermore, the adult female of *C. pulcher* is morphologically close to the one of *C. bakeri*. For this reason, both species are difficult to separate if the nymphs are unavailable, resulting in misidentification. The current worldwide distribution of *C. pulcher* should be reevaluated and confirmed.

24. *Cenopalpus spinosus* Donnadieu, 1875

Type Depository. Faculté des Sciences de Lyon, France.

Material examined. **ENGLAND**: 7 nymphs, 23 ♀♀, 80 High St, Chipping Campden GL55 6BW 52º03'02.3"N, 1º46'51.5W, ex. *Cornus mas* (Linnaeus), September 3 2016, legit E. W. Kitajima (DEES).

Distribution (Castro et al. 2023). Algeria; Algeria; Croatia; France; Hungary; Iran; Italy; Madeira Island; Monaco; Morocco; Portual; Spain; Tunisia; Turkey.

Remarks. *Cenopalpus spinosus* was observed on *Rubus fruticosus* (Linnaeus) in Portici (Campania district, southern Italy) (Leonardi 1899). This species is also a new record in England. Moreover, *C. mas* and *R. fruticosus* are new host plants records.

25. *Cenopalpus ulmifolius* nov. sp. De Giosa, de Lillo et Ochoa
(Figs 51a-60d)

Material examined. **ITALY**: 1 deutonymph, 20 ♀♀, Bitetto (southern Italy) 41°02'23"N 16°43'50"E, 130 m, ex. stem and lower leaf surface, *Rubus ulmifolius* (Schott) (Rosaceae), collected September 13 2019, legit M. De Giosa (Di.S.S.P.A. and USNM); **ITALY**: 8 ♀♀, Bitetto (southern Italy) 41°02'17"N 16°43'52"E, 135 m, ex. lower leaf surface, *R. ulmifolius*, collected September 13 2019, legit M. De Giosa (Di.S.S.P.A. and USNM); **ITALY**: 2 deutonymphs, 6 ♀♀, Quadrivio Strada San Magno (southern Italy) 41°05'33"N 16°20'17"E, 400 m, ex. lower leaf surface, near the veins, *R. ulmifolius*, collected October 29 2019, legit M. De Giosa (Di.S.S.P.A. and USNM); **ITALY**: 4 deutonymphs, 7 ♀♀, San Magno (southern Italy) 41°01'19"N 16°23'35"E, ex. stem and lower leaf surface, *Rosa canina* (Linnaeus) (Rosaceae), collected October 25 2019, legit M. De Giosa (Di.S.S.P.A and USNM).

Diagnosis (adult female). As per *C. spinosus* species group, in addition to the following. Dorsal propodosoma setae *v2*,-*sc1*, *sc2* narrow, lanceolate, and slightly serrate-barbed (Fig 56). Dorsal opisthosoma setae *c1*, *c2*, *c3*, *d1*, *d3*, *e1*, *e3*, *f2*, *f3*, *h2* serrate-barbed, *h1* short and finely barbed. Cuticular microplates: separate and individual plates, rounded to rectangular in shape, with multiple series of distinct ridges on their dorsal surface (Figs 57a-57h). Coxisternal area between coxae I-II covered with some strong and weak transverse striae medially. Metapodosoma with weak transverse striae between coxae III and coxae IV. The region posterior to coxae IV with regular reticulation: rounded to oval separated cells. Ventral and genital plates with elongate-fused, separate-rounded and separate-oval cells.

FEMALE (n=41). *Dorsum*. (Figs 51a, 53a-53b, 54a-54b) Length of the body including the gnathosoma 345 [335-340]; length body excluding gnathosoma 290 [275-280]; width propodosoma 135-155 [120-160]; width opisthosoma 130-170 [92-155]. Distance between setae *v2-h1* 270 [260-265]. Setal lengths *v2* 20-21 [34-36], *sc1* 18-18 [28-36], *sc2* 21-22 [30-31], *c1* 17-18 [18-20], *c2* 14-16 [24-27], *c3* 16-17 [19-22], *d1* 10-11 [13-14], *d3* 12-14 [11-15], *e1* 10-11 [12-13], *e3* 16-17 [17-18], *f2* 17-19 [15-17], *f3* 18-19 [16-19], *h2* 16-16 [14-15], *h1* 14-16 [14-15]. Distances between setae *v2-v2* 34 [30-30], *sc1-sc1* 96 [95-96], *sc2-sc2* 145 [130-135], *c1-c1* 56 [47-55], *c2-c2* 115 [130], *c3-c3* 140 [150-155], *d1-d1* 44 [37-40], *d3-d3* 150 [150-160], *e1-e1* 33 [22-30], *e3-e3* 150 [145-150], *f2-f2* 140 [120-135], *f3-f3* 120 [88-90], *h2-h2* 84 [48-60], *h1-h1* 22 [21-22].

Venter. (Figs 51b, 53c-53d, 54c-54d) Setal lengths *1a* 62-63 [62-63 – very long, tip not always visible], *1b* 25-24 [34-40], *1c* 19-20 [17-20], *2b* 14-21 [24-30], *2c* 24-29 [22-29], *3a* 17-19 [17-18], *3b* 13-14 [17-18], *4a* 78-96 [81-68 – very long, tip not always visible], *4b* 15-16 [19-21], *ag* 11-13 [14-15], *g1* 15-16 [15-15], *g2* 22-23 [18-21], *ps1* 12-14 [11-15], *ps2* 12-13 [10-14]. Distance between setae *ag-ag* 32 [23-30], *g1-g1* 37 [25-31], *g2-g2* 58 [45-55], *ps1-ps1* 23 [22-24], *ps2-ps2* 18 [16-17]. Setae *1a* and *4a* are longer and difficult to measure the full length; other ventral setae lanceolate, smooth, and fine.

Gnathosoma. (Fig 51c-51d, 55a-55b) Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion 7 [8] and eupathidia 5-6 [6-7]. Femur seta finely serrate-barbed on the base, with distal end smooth; genu-tibia setae long, finely barbed, and lanceolate. Subcapitulum reaching beyond of distal end of femur. Subcapitulum with subcapitular setae *m* 15-22 [16-22]; distance between setae *m-m* 12 [11-12].

Spermathecal apparatus. (Figs 51e) A long, narrow, convoluted duct ending in a small and rounded vesicle. A long narrow vesicle may be undeveloped, with duct ending blindly or in a small, membranous bulb.

Legs. (Figs 52a-52d) Leg chaetotaxy formula as *C. spinosus* species group, in addition to the following. Shape of setae on legs: leg I, femur with spatulate (*d*) and smooth (*bv'', l', v'*) setae; genu with spatulate and finely serrate setae (*d, l'*) and smooth seta (*l''*); all tibia setae moderately barbed and lanceolate (*l', l'', v', v''*), except *d* (smooth). Shape of setae on leg II, as following leg I, except the setae on femur: *bv''* and *l'* spatulate and lanceolate, such as *d*. Leg III with finely barbed-lanceolate femur seta (*d*) and smooth seta (*ev'*); smooth setae on genu (*l'*) and tibia (*d, v', v''*). Shape of setae on leg IV as following leg III, except *v', v''* on tibia moderately barbed. Measurements of legs (coxae to tarsi): I 145-150 [175-180], II 150-155 [170-180], III 120-125 [155-155], IV 130-130 [160-161].

MALE. Not examined.

DEUTONYMPH (n=7). *Dorsum*. (Figs 58a-58b, 60a-60b) Length of the body including the gnathosoma 250; length body excluding gnathosoma 320; width propodosoma 100-170; width opisthosoma 16-77. Dorsal propodosoma with vertical striations and opisthosoma with transverse striations. Dorsal propodosomal and opisthosomal setae developed with short setules (lanceolate and finely serrate): *v2, sc1, sc2, c1, c2, c3, d3, e3, f2, f3, h2* longer than *d1*, *e1*, *h2*, and *h1*. Distance between setae *v2-h1* 260. Setal lengths *v2* 43-53, *sc1* 110-115, *sc2* 55-57, *c1* 29-31, *c2* 105-110, *c3* 45-50, *d1* 2-3, *d3* 54-57, *e1* 2-3, *e3* 39-43, *f2* 62-63, *f3* 115-130, *h2* 3-4 (length of *f2* 20 in the

deutonymph characterized by heterometry), *h1* 2-3. Distance between setae *v2-v2* 39, *sc1-sc1* 81, *sc2- sc2* 130, *c1-c1* 35, *c2-c2* 120, *c3-c3* 135, *d1-d1* 22, *d3-d3* 140, *e1-e1* 19, *e3-e3* 115, *f2-f2* 135, *f3-f3* 66, *h2-h2* 30, *h1-h1* 11.

Venter. (Figs 60c-60d) Setal lengths *1a* 115-120, *1b* 16-18, *1c* 11-12, *2b* 10-11, *2c* 13-15, *3a* 9-12, *3b* 7-10, *4a* 56-61, *4b* 8-12, *ag* 8-9, *g1* 3-4. Distance between setae *ag-ag* 28, *g1-g1* 17.

Gnathosoma. (Figs 58c-58d) Setal formula for palps as in diagnosis of *C. spinosus* species group. Femur seta finely serrate-barbed; genu-tibia setae long and lanceolate. Subcapitulum with subcapitular setae *m* 13-14; distance between setae *m-m* 7.

Legs. (Figs 59a-59d) Leg chaetotaxy as in diagnosis of *C. spinosus* species group. Shape of setae on legs: leg I with four setae on femur, *bv''* and *l'* mostly plumose and lanceolate, *v'* smooth, *d* short-smooth; genu with barbed seta (*d*) and smooth seta (*l', l''*); tibia setae moderately barbed and lanceolate (*l', l'', v', v''*), mostly barbed (*d*). Shape of setae on leg II, as following leg I, except *d* on femur, plumose and lanceolate, and *l'* on genu, barbed. Leg III with barbed femur seta (*d*) and finely barbed seta (*ev'*); seta *l'* on genu moderately barbed; tibia with lanceolate and moderately serrate setae (*v', v''*), short and barbed seta (*d*). Shape of setae on leg IV, as following leg III. Measurements of legs (coxae to tarsi): I 120-120, II 105-105, III 100-140, IV 110-115.

PROTONYMPH. LARVA. EGGS. Not examined.

Etymology. This species is named for the host plant species, *Rubus ulmifolius* where it was collected.

Remarks. ~~*Remarks.*~~ The deutonymph of *C. ulmifolius* **nov. sp.** morphologically resembles several other species, including *C. brachypalpus* Hatzinikolis et al., *C. pseudospinosus* Livshitz et Mitrofanov, *C. quadricornis* Livshitz et Mitrofanov, *C. spinosus* Donnadieu, and *C. taygeticus* Hatzinikolis et al. However, there are also notable differences between the deutonymphs of these species. Deutonymph of *C. ulmifolius* with dorsal setae *c1, h1* long (whereas these setae are short in *C. brachypalpus* and *c1* are short in *C. pseudospinosus*). Deutonymph of *C. ulmifolius* with setae *e1* and *f2* long (whereas these setae are short in *C. quadricornis*). Deutonymph of *C. ulmifolius* with *c1, c3, e3* long (whereas shorter in *C. spinosus*). Deutonymph of *C. ulmifolius* with *d1* and *h2* short (whereas longer in *C. taygeticus*).

***Cenopalpus lineola* species group** Hatzinikolis et al., 1999

Diagnosis (adult female). Seven dorsolateral setae on opisthosoma (*c3, d3, e3, f2, f3, h2, h1*); *f2* present and inserted in lateral position. Anterior margin of propodosoma with subcapitulum reaching half of the femora I or extending over them in some species (*C. wainsteini*). Often with a characteristic cuticular pattern in dorsal cuticle; dorsal cuticle can be mostly transverse and longitudinal striae, sometimes weakly smooth. The palpus is 4-segmented: third segment with 1 seta and fourth with 3 sensory setae. Ventral and genital plates distinct and well developed, surrounded by characteristic cuticle pattern. Two pairs of pseudanal setae are present (*ps 1-2*). Leg Setae formula 4-3-5-8 (1w), 4-3-5-8 (1w), 2-1-3-5, 1-0-3-5. Leg chaetotaxy as follows: coxae I-II each with two setae (*1b, 1c, 2b, 2c*); coxae III-IV each with one seta (*3b, 4b*). Trochanters I-II-IV

each with one seta; trochanter III with two setae. Femora I-II with four setae (*d, l', v', bv''*); femur III with two setae (*d, ev'*); femur IV with one seta (*ev'*). Genua I-II with three setae (*d, l', l''*); genu III with one seta (*l'*); genu IV without setae. Tibia I-II with five setae (*d, v', v'', l', l''*); tibia III-IV with three setae (*d, v', v''*). Tarsi I-II with eight setae and each with one long, slender and tapering solenidion; tarsi III-IV with five setae (*ft', tc', tc'', u', u''*).

26. *Cenopalpus lineola* Canestrini et Fanzago, 1876

Type Depository. Unknown.

Distribution (Castro et al. 2023). Algeria; Armenia; Bulgaria; China; France; Greece; Hungary; Iran; Israel; Italy; Japan; Lebanon; Malta; Netherlands; Philippines; Poland; Spain; Syria; Taiwan; Turkey; Ukraine.

Remarks. *Cenopalpus lineola* has been described from Italy (Canestrini and Fanzago 1876). The redescription of a neotype is in progress (De Giosa et al. in prep.)

27. *Cenopalpus wainsteini* Livschitz et Mitrofanov, 1967
(Figs. 61a-69c)

Type Depository. Unknown.

Material examined. **ITALY**: 1 deutonymph, 7 ♀♀, San Magno, Alta Murgia National Park (Southern Italy) 41°01'42"N 16°23'58"E, 410 m, ex. scaly leaves, *Pinus halepensis* (Mill.) (Pinaceae), October 25 2019, legit M. De Giosa (Di.S.S.P.A. and USNM).

Diagnosis (adult female). As per *C. lineola* species group, in addition to the following. The body is oval and very developed, in some cases contracted at the junction of hysterosoma and propodosoma. Further, *C. wainsteini* is completely flat without any bumps. Anterior margin of propodosoma is not developed and appears like a narrow border with a shallow oval depression in the middle. The posterior margin of opisthosoma gradually becoming narrow at its base. Cuticle completely plicate, covered with mostly transverse striae, except some longitudinal ones. In particular, dorsal propodosoma with longitudinal and transversal wrinkles: dorsomedial striae minute-small, transverse and oblique, laterally long and longitudinal. Anterior margin of opisthosoma, between *c3-c3* and *d3-d3*, with generally long-short, transverse, oblique and few longitudinal striae; from *e3-e3* to *h2-h2* becoming elongate strong and longitudinal. Three to five distinct transversal folds (between *d3-d3* and *e3-e3*) on the border of the anterior and posterior of opisthosoma. Between *e1-e1* and *h1-h1* almost smooth, with fine and weak longitudinal striae. The propodosomal and opisthosomal setae, except *c1, c2, d1, e1*, palmate. Otherwise *c1, c2, d1, e1* slightly serrate. Cuticular microplates: separate individual, rounded to irregularly rounded plates, with multiple short irregular ridges over dorsal surface (Figs 66a-66b). Metapodosoma almost smooth between coxae III and coxae IV, with light and fine striae. Beyond setae *4a*, cuticle completely covered with narrow to developed transverse bands (11 or more folds). Ventral, genital and anal plates are well developed but not sclerotized, with fine transverse. Ventral plate with two

smooth setae (*ag-ag*); genital and anal plates with four finely barbed setae each (*g1-g1*, *g2*-g2 and *ps1-ps1*, *ps2-ps2*).

FEMALE (n=7). *Dorsum*. (Figs 61a, 63a, 64a) Length of the body including the gnathosoma 345; length body excluding gnathosoma 290; width propodosoma 135-155; width opisthosoma 130-170. Distance between setae *v2-h1* 270. Setal lengths *v2* 20-21, *sc1* 18, *sc2* 21-22, *c1* 17-18, *c2* 14-16, *c3* 16-17, d1 10-11, d3 12-14, *e1* 10-11, *e3* 18-19, *f2* 17-19, *f3* 18-19, *h2* 16, *h1* 14-16. Distances between setae *v2-v2* 34, *sc1-sc1* 96, *sc2-sc2* 143, *c1-c1* 56, *c2-c2* 115, *c3-c3* 140, *d1-d1* 44, *d3-d3* 145, *e1-e1* 33, *e3-e3* 148, *f2-f2* 140, *f3-f3* 120, *h2-h2* 84, *h1-h1*.

Venter. (Figs 61b, 63b, 64b) Setal lengths *1a* 70, *1b* 24-25, *1c* 19-20, *2b* 14-21, *2c* 24-29, *3a* 17-19, *3b* 13-14, *4a* 78-96, *4b* 15-16, *ag* 32, *g1* 37, *g2* 22-23, *ps1* 12-14, *ps2* 12-13. Distance between *ag-ag* 32, *g1-g1* 37, *g2-g2* 58, *ps1-ps1* 23, *ps2-ps2* 18. Short ventral setae, except *1a* and *4a* are lanceolate and fine (difficult to measure the full length).

Gnathosoma. (Figs 61c-61d, 65a-65b) Setal formula for palps as in diagnosis of *C. lineola* species group. Solenidion 7 and 2 eupathidia 2-5; one of the eupathidia is more reduced than the other one. Femur setae lanceolate and weak barbed (almost smooth); genu-tibia setae lanceolate and smooth. Subcapitulum very developed, extends slightly to the distal margin of femur I, without subcapitular setae *m*; distal end with two pairs of adoral setae (*ad*).

Spermathecal apparatus. (Fig. 61e) Only the beginning of duct is visible at genital opening.

Legs. (Figs 62a-62d) Setae formula and leg chaetotaxy as in diagnosis of *C. lineola* species group. Leg chaetotaxy as follows as species group, in addition to the following. Shape of setae on legs: leg I, femur with plumose-lanceolate (*d, l'*) and smooth-lanceolate (*bv'', v'*) setae; genu with all barbed to plumose setae (*d, l', l''*); all tibia setae moderately barbed (*d, l', l'', v', v''*). Shape of setae on leg II, as following leg I, except setae on femur *bv''* (plumose) and *v'* moderately barbed. Leg III with plumose-lanceolate femur seta (*d*) and smooth-lanceolate seta (*ev'*); seta *l'* on genu plumose and lanceolate; tibia with lanceolate and moderately serrate setae (*v', v''*), plumose seta (*d*). Shape of setae on leg IV as following leg III, except seta *ev'* on femur that is moderately barbed. Measurements of legs (coxae to tarsi): I 145-150, II 150-155, III 120-125, IV 130-130.

DEUTONYMPH (n=1). *Dorsum.* (Figs 67, 69a) Length of the body including the gnathosoma 300; length body excluding gnathosoma 250; width propodosoma 85-120; width opisthosoma 83-120. Propodosoma with fine and light striae, mostly oblique to longitudinal, some transverse and short. Dorsal opisthosoma with transverse striae well developed and strong, except anterior margin (before *c1-c2-c3*) with narrow striae and posterior margin (beyond *d1-d1*) with oblique to longitudinal weak striae. Dorsal propodosomal and opisthosomal with thin and finely serrate setae. Distance between setae *v2-h1* 243. Setal lengths *v2* 15, *sc1* 15, *sc2* 14-16, *c1* 14-16, *c2* 5-8, *c3* 15-16, *d1* 9-11, *d3* 15-16, *e1* 7-9, *e3* 23-25, *f2* 16-22, *f3* 24-27, *h2* 20-22, *h1* 23-25. Distance between setae *v2-v2* 25, *sc1-sc1* 70, *sc2-sc2* 105, *c1-c1* 33, *c2-c2* 90, *c3-c3* 114, *d1-d1* 30, *d3-d3* 114, *e1-e1* 17, *e3-e3* 120, *f2-f2* 115, *f3-f3* 100, *h2-h2* 73, *h1-h1* 30.

Venter. (Figs 69b-69c) Cuticle mostly plicate, covered with transverse to oblique and narrow striae. Ventral, genital, and anal shields indistinct, with short and narrow transverse to oblique striae. Setal lengths *1a* 71-77, *1b* 17-19, *2b* 12, *1c* 11, *2c* 16-18, *3a* 19-25, *3b* 14-16, *4a* 78-86, *4b*

13, *ag* 10-11, *g1* 9-10, *ps1* 6-7. Distance between setae *ag-ag* 27, *g1-g1* 7, *ps1-ps1* 16. *1a* and *4a* are lanceolate and longer than others ventral setae; *ag*, *g1*, *ps1*, *ps2* almost barbed (smooth).

Gnathosoma. (Figs 61b-61c) Setal formula for palps as in diagnosis of *C. lineola* species group. Solenidion 6 and 2 eupathidia 2-5; one of the eupathidia is more reduced than the other one. Femur and genu-tibia setae smooth. Subcapitulum well developed; subcapitular setae *m* absent.

Legs. (Figs 68a-68d) Leg chaetotaxy as in diagnosis of *C. lineola* species group. Shape of setae on legs: leg I with palmate and lanceolate (*bv''*, *d*, *l'*) and smooth (*v'*) setae on femora; with palmate and short seta (*d*) and finely barbed (*l'*, *l''*); tibia setae moderately barbed and lanceolate (*l'*, *l''*) except *v'*, *v''*, *d* is palmate. Shape of leg II as following leg I, except *l'* on femur (finely barbed) and *v'*-*v''* on tibia (moderately barbed). Leg III with palmate femur seta (*d*) and finely barbed seta (*ev'*); seta *l'* on genu finely barbed; tibia with lanceolate and moderately serrate setae (*v'*, *v''*), short and palmate seta (*d*). Shape of setae on leg IV as following leg III. Measurements of legs (coxae to tarsi): I 110-120, II 95-105, III 81-83, IV 80-82.

PROTONYMPH. LARVA. EGGS. Not examined.

Distribution (Castro et al. 2023). Egypt; Gaza Strip; Georgia; Greece; Israel; Italy; Peru; Syria; Ukraine.

Remarks. *Cenopalpus wainsteini* has been first reported from Italy by Pegazzano (1971) *Cenopalpus wainsteini* by could be responsible for causing alterations on *Pinus* sp., as reported by ıanca et al. (2021). This species needs future detailed study concerning the biology, ecology, and its interactions with trees of the family Pinaceae.

Cenopalpus pterinus species group Hatzinikolis et al., 1999

Diagnosis (adult female). Six dorsolateral setae on opisthosoma (*c3*, *d3*, *f2*, *f3*, *h2*, *h1*). The palpus is 4-segmented and palpus tarsus with 2 eupathidia. Tarsus on leg II with 1 solenidion.

28. *Cenopalpus adventicius* Ueckermann et Ripka, 2016

Type Depository. Department of Plant Protection Development and Coordination, Directorate of Plant Protection, Soil Conservation and Agri-environment, National Food Chain Safety Office, Budapest, Hungary.

Distribution (Castro et al. 2023). Hungary; Italy.

Remarks. *Cenopalpus adventicius* was collected and described from *Rosmarinus officinalis* Linnaeus imported from Italy. This species is morphologically close to *C. officinalis*. Future morphological comparisons between the types and molecular analyses are needed to exclude possible synonyms.

29. *Cenopalpus officinalis* Papaioannou-Souliotis, 1986

Type Depository. Aghios Gerasimos, Cephalonia, Greece.

Material examined. **MOROCCO**: 4 ♀♀, ex *Rosmarinus* sp. (Lamiaceae), intercepted at DTW, interception 5006, February 5 2015 (APHIS PPQ USDA).

Distribution (Castro et al. 2023). Greece; Israel; Italy; Mexico; Morocco.

Remarks. Cenopalpus officinalis has been reported for the first time from Italy by De Giosa et al. (2021b), which described the Israel, Italian and Mexican specimens. This species is a new record in Morocco.

30. *Cenopalpus pterinus* Pritchard et Baker, 1958

Type Depository. USNM.

Material examined. **ITALY**: 1 ♀, ex *Rosmarinus* sp. (Lamiaceae), intercepted at JFK, interception 8496, September 22 1965 (USNM).

Distribution (Castro et al. 2023). France; Greece; Italy; Spain.

Remarks. Cenopalpus pterinus is a new record for Italy.

Genus *Pentamerismus*

Type species – *Tenuipalpus erythreus* Ewing, 1917

31. *Pentamerismus coronatus* Canestrini et Fanzago, 1876

Type Depository. Unknown.

Distribution (Castro et al. 2023). Greece; Italy.

Remarks. Pentamerismus coronatus has been described from Italy (Canestrini and Fanzago 1876).

32. *Pentamerismus oregonensis* McGregor, 1949

Type Depository. USNM

Distribution (Castro et al. 2023). Armenia; Brazil; Bulgaria; China; France; Georgia; Greece; Hong Kong; Hungary; India; Italy; Karnataka; Iran; Italy; Japan; Mexico; Pakistan; South Korea; Taiwan; Turkey; Ukraine; USA.

Remarks. *Pentamerismus oregonensis* has been reported for the first time from Italy by De Giosa et al. (2021a) due to an interception in the United States.

33. *Pentamerismus taxi* Haller, 1877

Type depository. Unknown.

Distribution (Castro et al. 2023). Armenia; Bulgaria; England; France; Georgia; Greece; Hungary; Italy; Japan; Poland; South Korea; Spain; Switzerland; Turkey; Ukraine; USA.

Remarks. *Pentamerismus taxi* has been reported in the first Tenuipalpidae checklist for Italy? (Bernini et al. 1995). The effective presence of this species in Italy remains questionable due to the absence of information in both national and international scientific journals.

Genus *Tenuipalpus*

Type species – *Tenuipalpus palmatus* Donnadieu, 1875

34. *Tenuipalpus caudatus* Dugès, 1834

Type Depository. Unknown.

Distribution (Castro et al. 2023). France; Greece; India; Italy; Portugal; Syria.

Remarks. *Tenuipalpus caudatus* has been reported for the first time from Italy by Castagnoli and Pegazzano (1979).

35. *Tenuipalpus granati* Sayed, 1946

Type Depository. Unknown.

Distribution (Castro et al. 2023). Armenia; Egypt; Georgia; Greece; India; Iran; Iraq; Kazakhstan; Morocco; Saudi Arabia; Tunisia; Turkey; Ukraine.

Remarks. *Tenuipalpus granati* has been found on different varieties of grapes in Italy (Peverieri et al. 2009).

36. *Tenuipalpus pacificus* Baker, 194

Type Depository. USNM.

Distribution (Castro et al. 2023). Australia; Brazil; China; Colombia; Costa Rica; England; Fiji; Germany; Greece; Hungary; India; Italy; Kerala; Iraq; Japan; Java; Netherlands; Panama; Philippines; Poland; Singapore; Thailand; USA.

Remarks. *Tenuipalpus pacificus* has been reported in the first Tenuipalpidae checklist for Italy (Bernini et al. 1995). The effective presence of this species in Italy remains questionable due to the absence of information in both national and international scientific journals.

37. *Tenuipalpus sarcophilus* Welbourn et Beard, 2017

Type Depository. Florida State Collection of Arthropods, Florida, USA.

Distribution (Castro et al. 2023). Guatemala; Italy; USA.

Remarks. *Tenuipalpus sarcophilus* has been reported for the first time from Italy by De Giosa et al. (2021a) due to an interception in the United States.

Discussion

Several microscopy techniques have been proven to be necessary for identifying tenuipalpid species: Low Temperature Scanning Electron Microscopy (LT-SEM) and cryomicroscopy are invaluable and fundamental for morphological studies. Indeed LT-SEM techniques provide to observe delicate structures that are commonly destroyed or seriously altered during the slide mounting process, resulting in some artifacts (Beard et al. 2015, Castro et al. 2016a). Following Beard et al. (2013), phase contrast microscopy is almost inadequate to investigate the ornamentations of a tenuipalpid specimen, but it is great for studying the shape of the setae and spermathecal apparatus. Differential interference contrast (DIC) is recommended whenever possible for tenuipalpid diagnostics. For more information, follow “Flat mites in the world – microscopy for mites” (http://idtools.org/id/mites/flatmites/). Since the family Tenuipalpidae present species-complex groups and the number of morphological characters used at the beginning of the taxonomical studies were scarce, morphometric studies and new morphological traits such as microplates (Welbourn et al. 20[illegible] spermathecal apparatus, leg chaetotaxy, and plant associations are enhancing our understanding of the systematics of *Cenopalpus*, while allowing the identification of new significant and critical characters for species separation in this group.

The paper aims not to redescribe *Cenopalpus* species since we have not compared types or designed neotypes when the types were lost but to introduce novel morphological characters for this genus, such as microplates. We have provided morphological data for specimens collected in Italy, and we suggest that the information should be used as a base for future research on the genus *Cenopalpus*. Although we have made comprehensive morphological studies of some *Cenopalpus* species, we still miss relevant molecular and morphological information. Most original descriptions and redescriptions do not meet the current expectations for identifying and describing new species, resulting in misidentification and confusion of the *Cenopalpus* species. For instance, the specimens of *Cenopalpus*

from Iran (Khanjani et al. 2012) and Turkey (Çobanoğlu et al. 2016) were identified as *bakeri* exhibit two different chaetotaxies of the legs, each differing from the specimens of *bakeri* collected in Italy.

Defining the taxonomic identity of organisms is a prerequisite for their study and, in the case of economically important species, misidentification and unprecise host plant associations may lead to the application of inappropriate prevention and control strategies. The diagnostic certainty coupled with the Phylogenetic signal as a predictor of the host range of plant pests and pathogens is an evolutionarily based tool for phytosanitary risk analysis (Gilbert et al. 2012). Knowing which local plant species are vulnerable is necessary for calculating the risk posed by a novel pest or pathogen (Robles-Fernánde & Lira-Noriega 2017). Empirical data on the local host range of novel pests are usually lacking, but we know that some pests are more likely to attack closely related plant species than species separated by greater evolutionary distance.

Brevipalpus are known to be vectors of plant viruses. Therefore, the presence in Italy of *B. papayensis*, *B. yothersi*, and *B. obovatus* should alert the phytosanitary system to the introduction of these vectors in the country and Europe since contact with the viruses they transmit can cause outbreaks. Moreover, it is still unclear if some *Cenopalpus* species (e.g., *C. waisteini*- see Huanca et al. 2022) can be vectors of plant pathogens or cause severe mechanical damage to the plants.

We encourage researchers to contribute to the expansion of our understanding of the family Tenuipalpidae by comparison with type specimens or vouchers and better documenting species.

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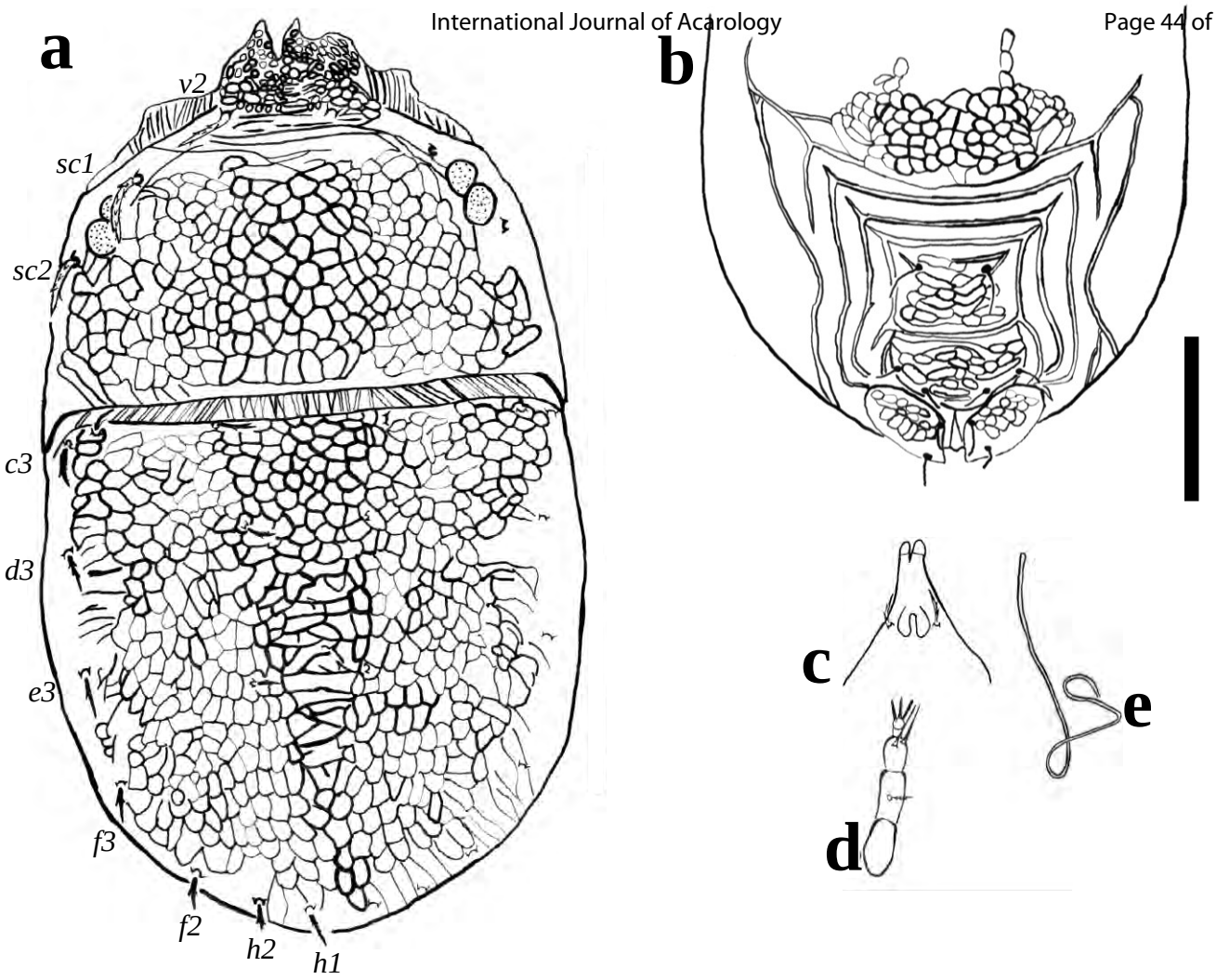

Figure 1. Drawings adult female *C. bakeri*: a. dorsal habitus; b. ventral, genital, and anal plate; c. subcapitulum; d. palp; e. spermatheca (scales 50 µm).

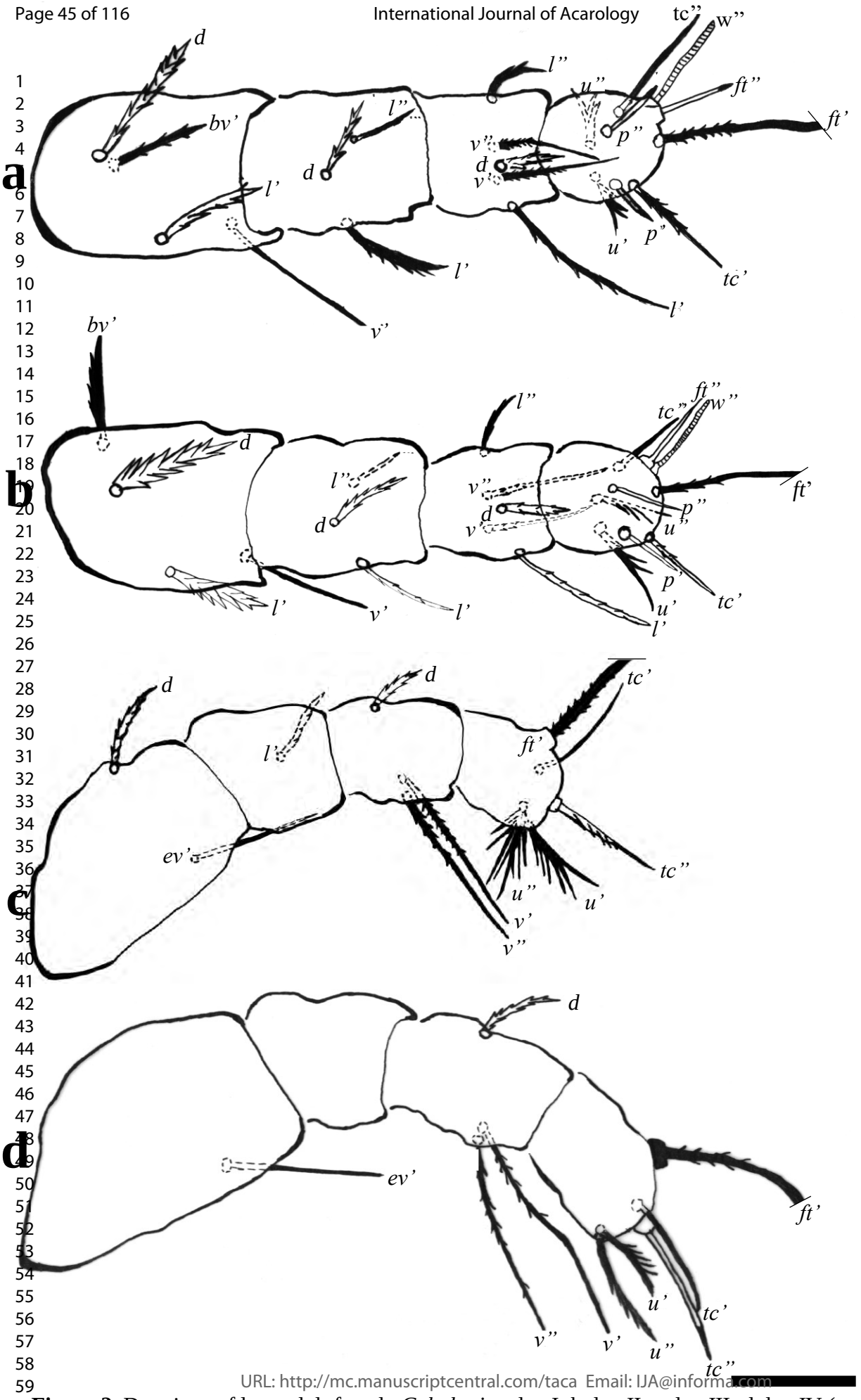

Figure 2. Drawings of legs adult female *C. bakeri*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

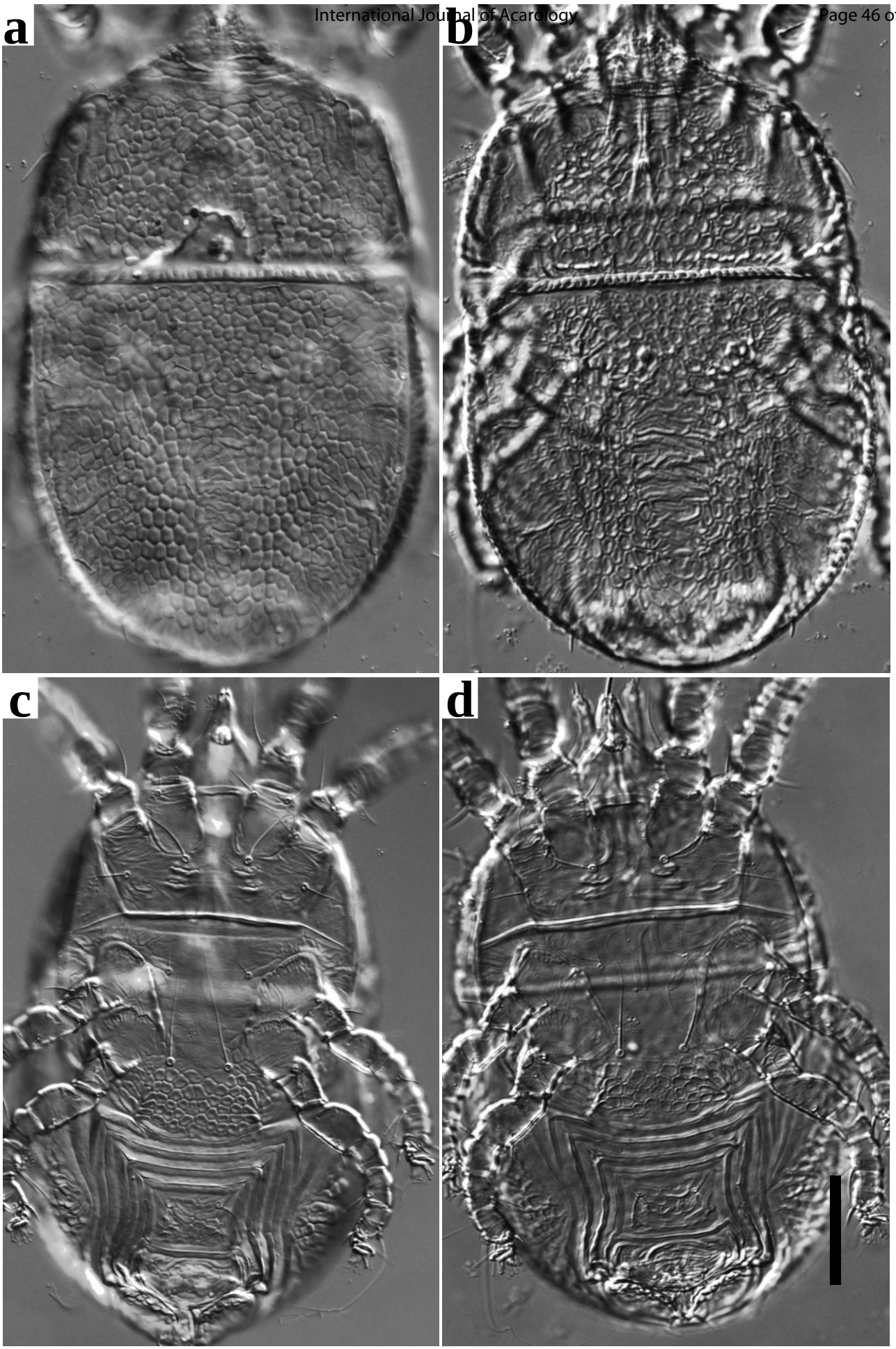

Figure 3. Differential Interference Contrast micrographs of adult females *C. bakeri*, both collected at the same place (Bitetto) and on the same host plant species (*Crataegus monogyna*): a-b. dorsal habitus; c-d. ventral habitus (scales 50 µm).

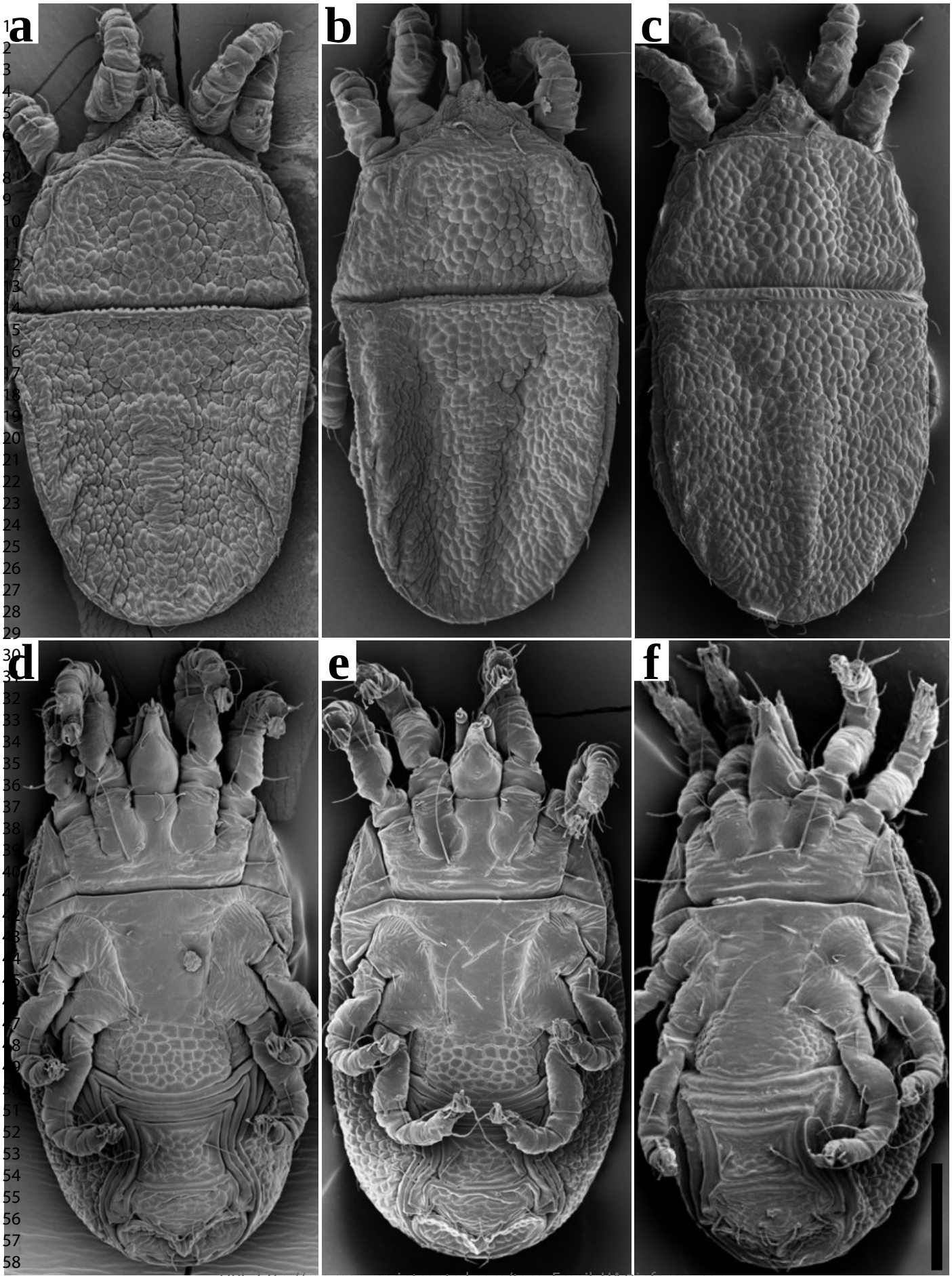

Figure 4. Dorsal and ventral habitus of adult female *C. bakeri*: a-b-d-e. specimens collected on *C. monogyna*; c-f. specimens collected on *P. domestica* (scales [illegible]um).

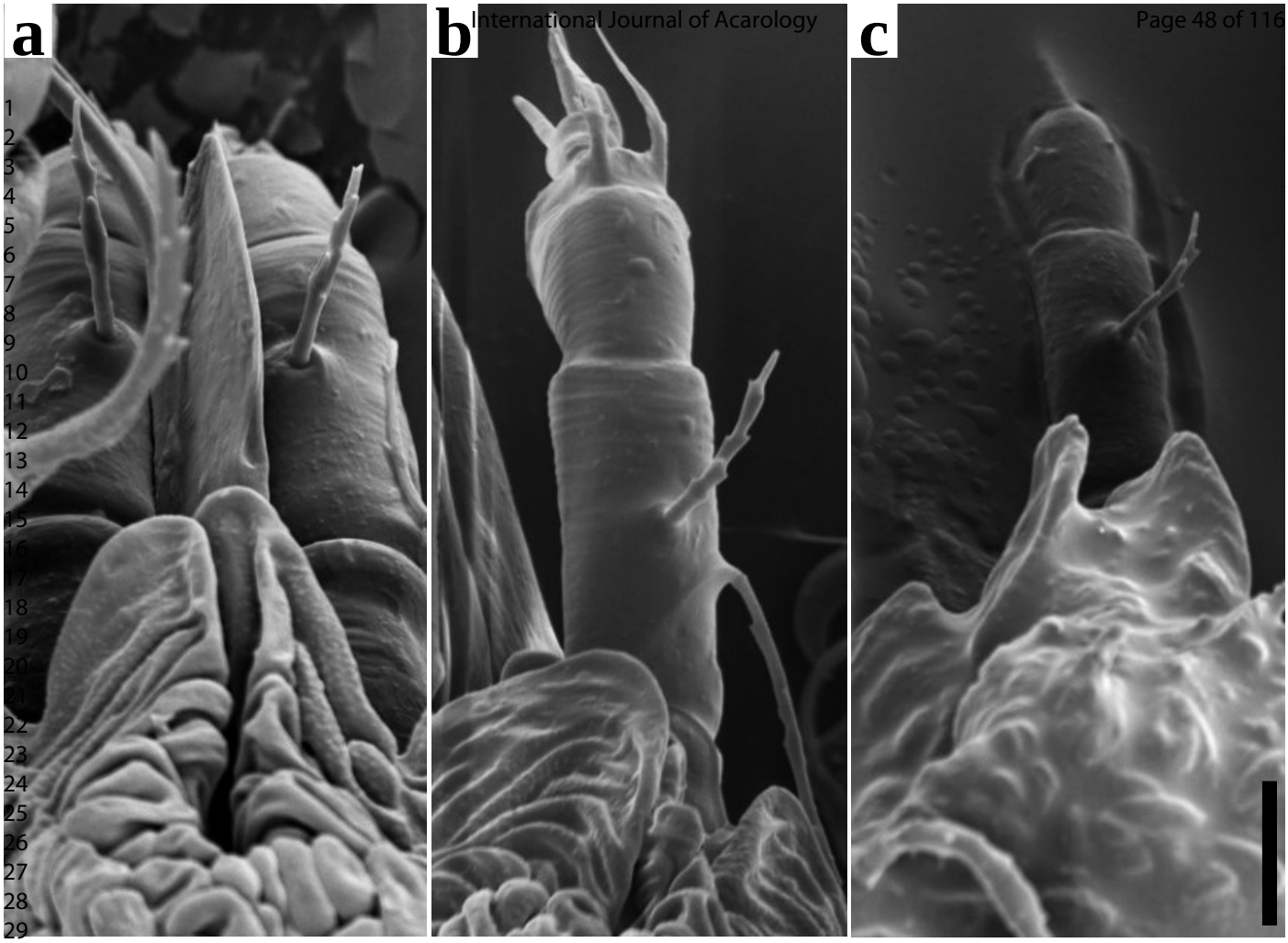

Figure 5. Femora setae of adult female *C. bakeri*: a-b. specimens collected on *C. monogyna*; c. specimens collected on *P. domestica* (scales 50 µm).

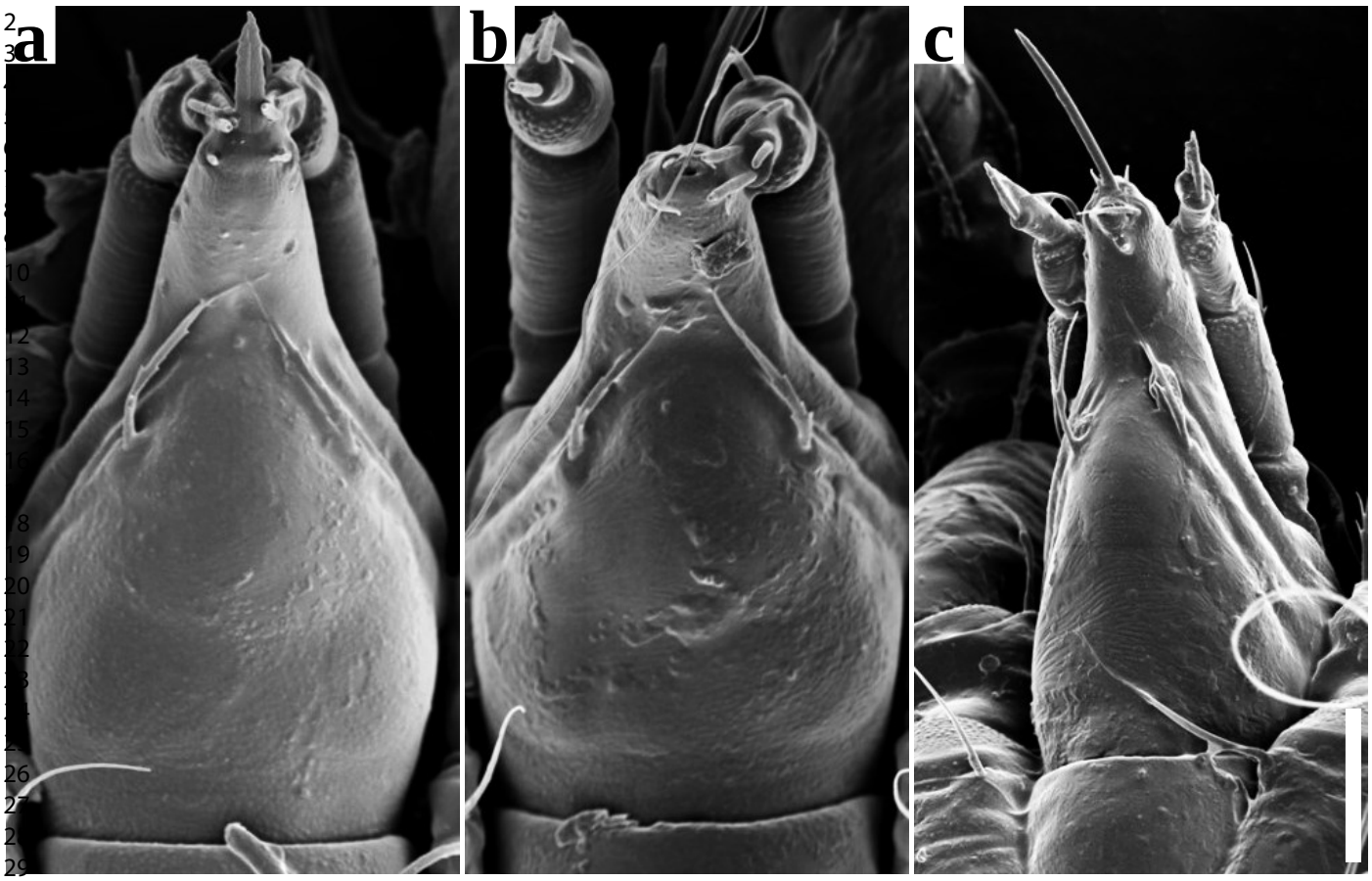

Figure 6. Subcapitulum of adult female *C. bakeri*: a-b. specimens collected on *C. monogyna*; c. specimens collected on *P. domestica* (scales 50 µm).

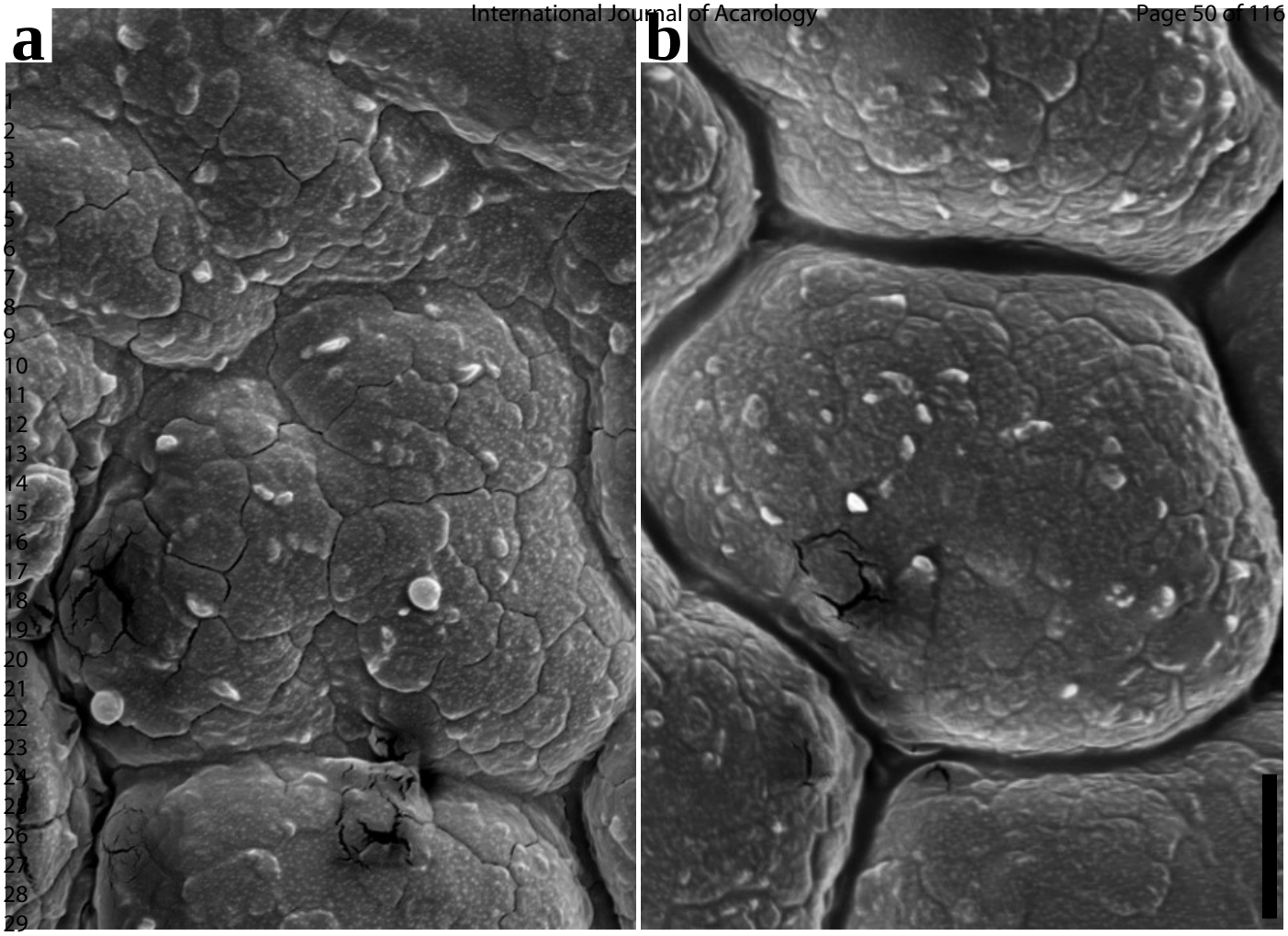

Figure 7. Microplates of adult female *C. bakeri* collected on *C. monogyna*, characterized by variations in the reticulation of the dorsal pattern (scale 50 µm).

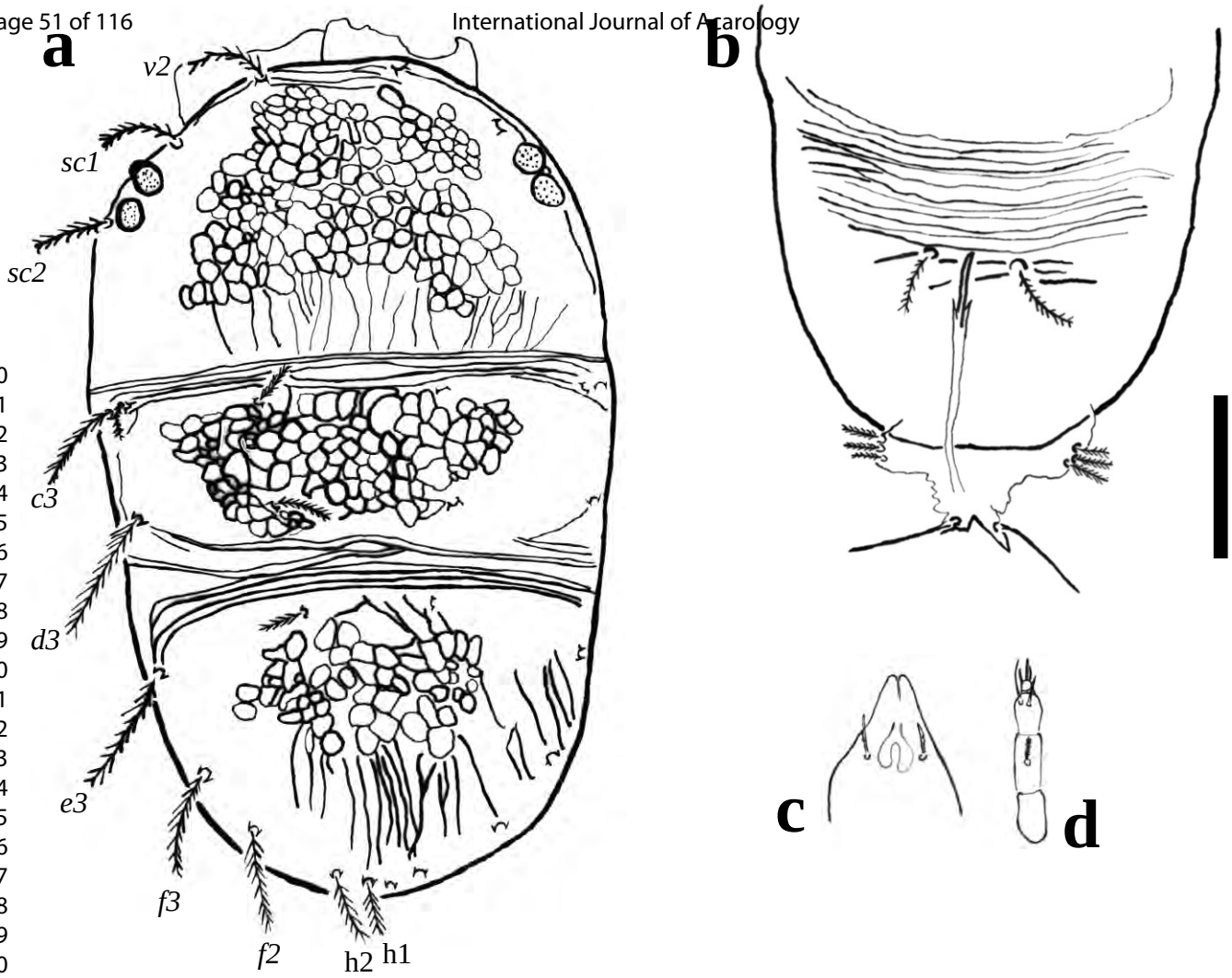

Figure 8. Drawings of adult male C. bakeri: a. dorsal habitus; b. ventral habitus; c. subcapitulum; d. palp (scales 50 µm).

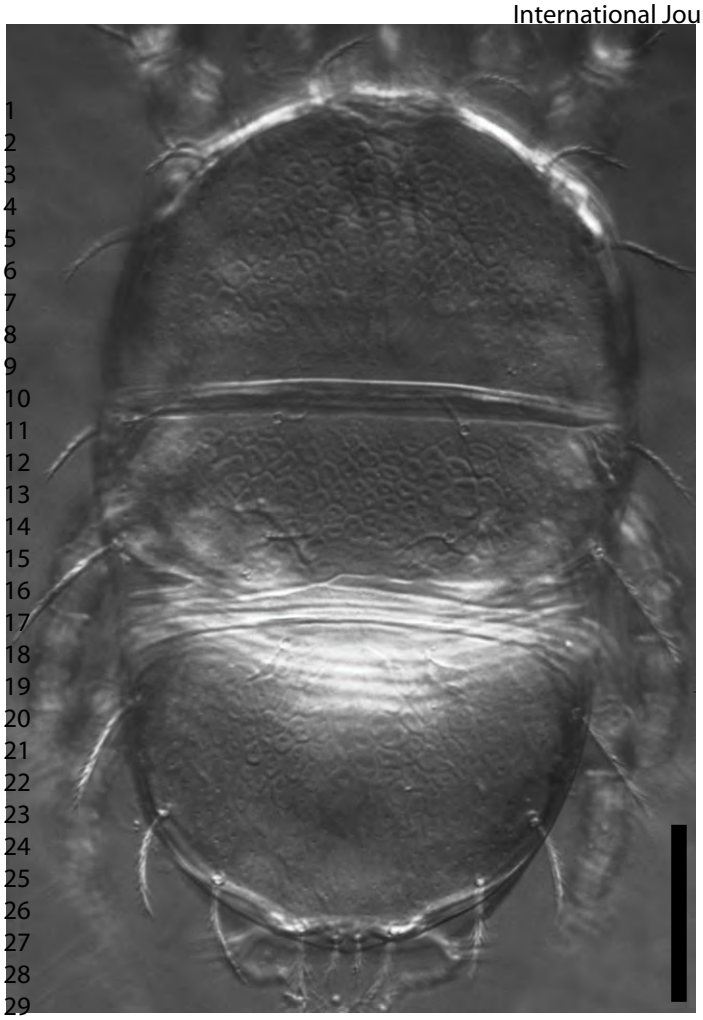

Figure 9. Differential Interference Contrast micrographs of dorsal habitus of adult male *C. bakeri* (scales 50 µm).

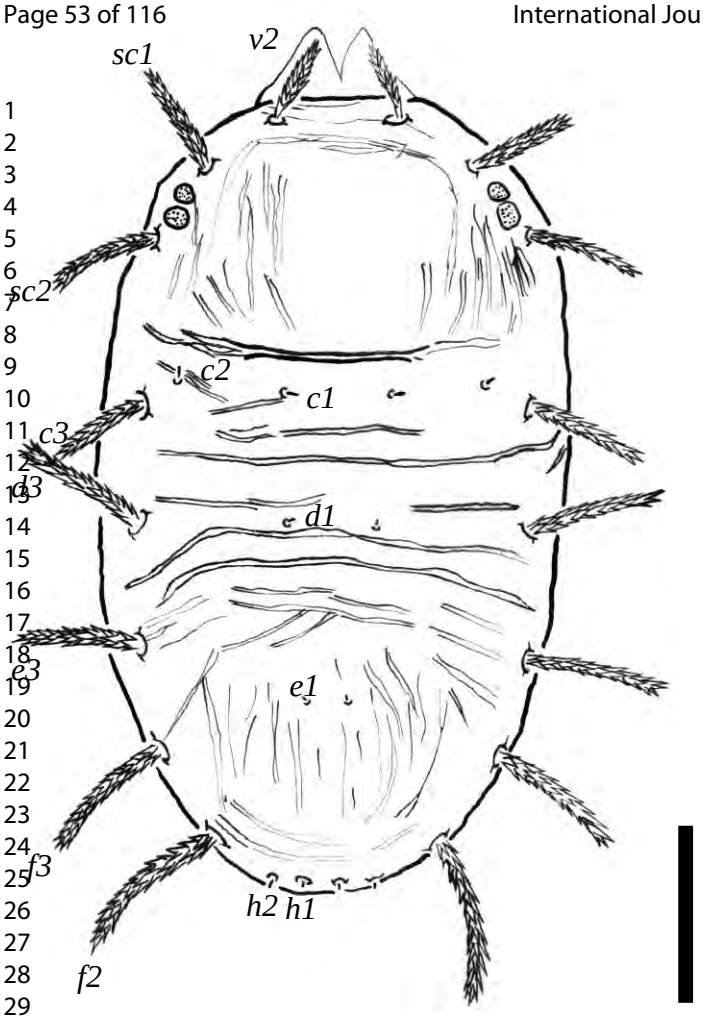

Figure 10. Drawing of dorsal habitus of deutonymph *C. bakeri* (scales 50 µm).

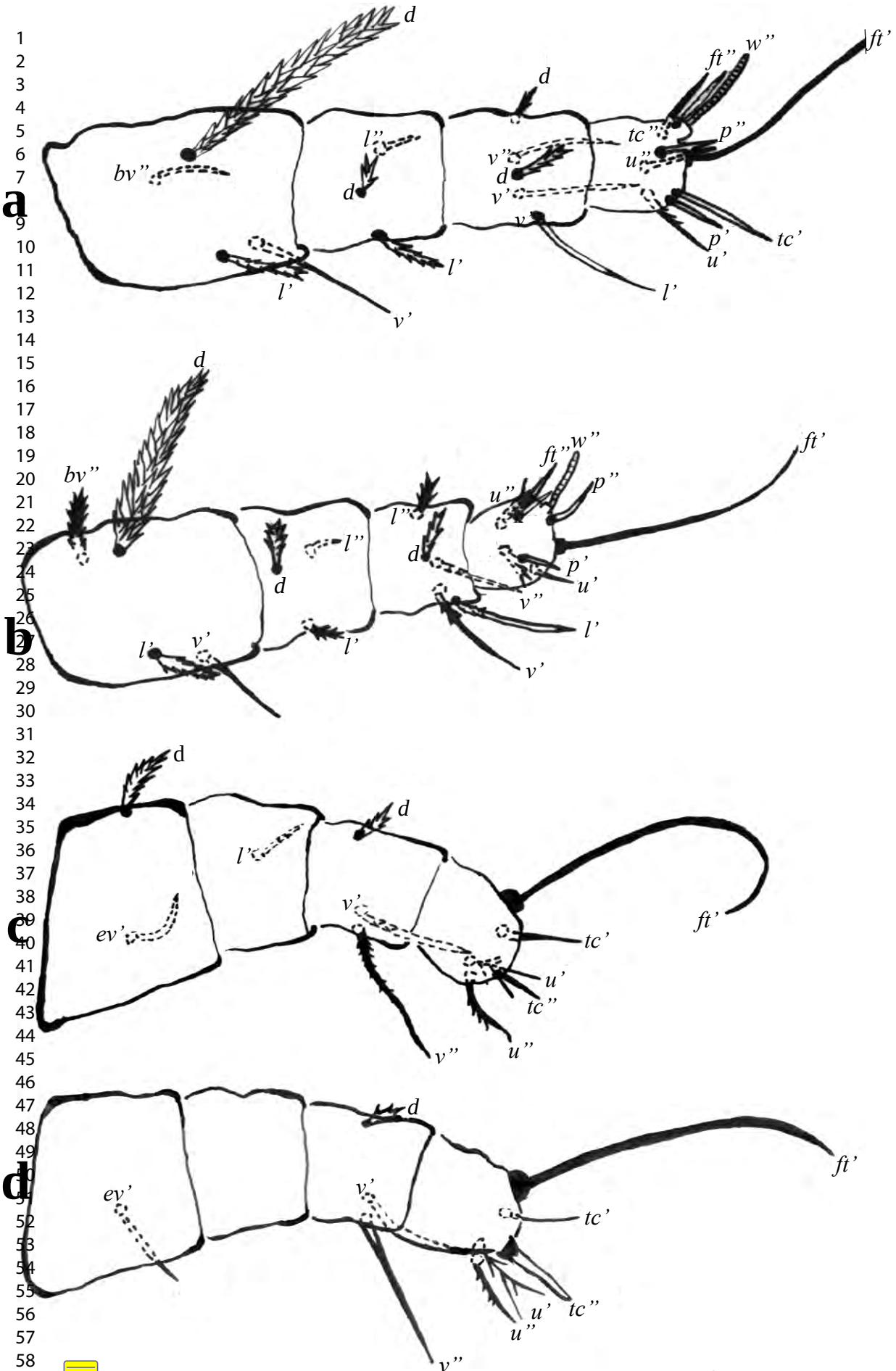

FIGURE 11. Drawings of legs of deutonymph *C. bakeri*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

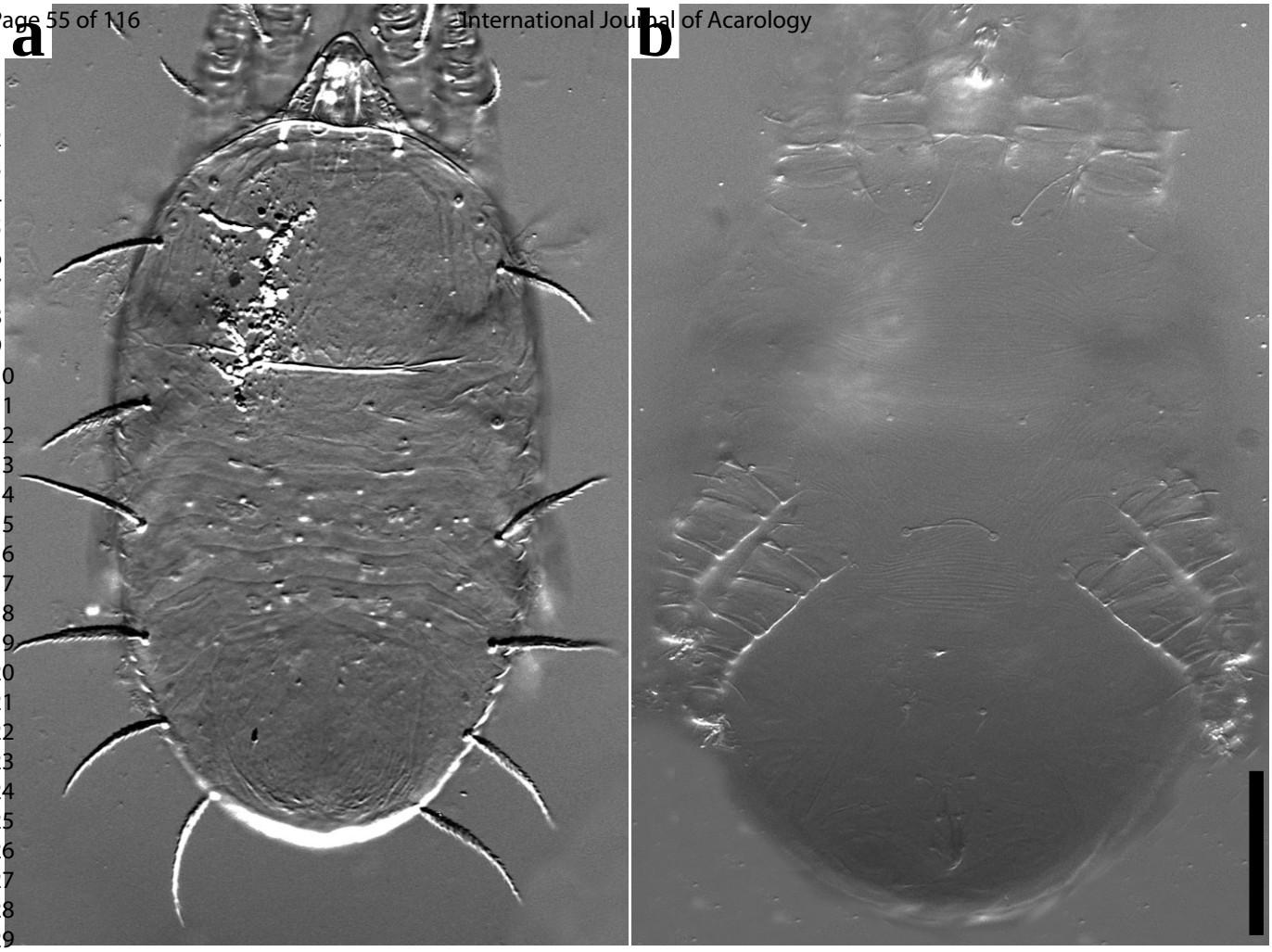

Figure 12. Differential Interference Contrast micrographs of deutonymph *C. bakeri*, collected on *C. monogyna*: a. dorsal habitus; b. ventral habitus (scales 50 µm).

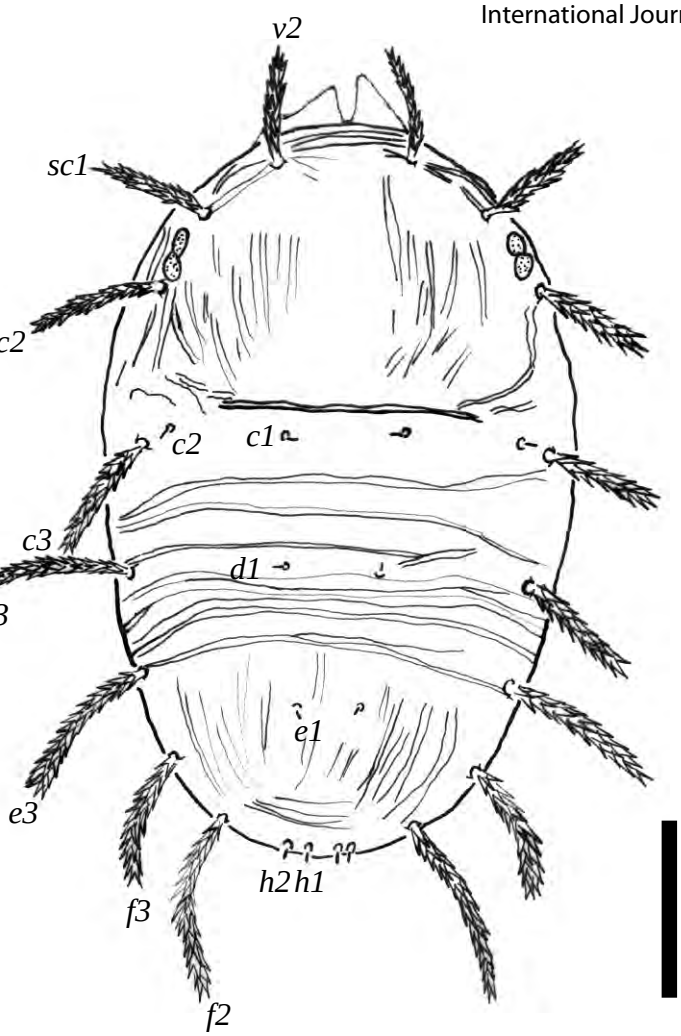

Figure 13. Drawing of dorsal habitus of protonymph *C. bakeri* (scales 50 µm).

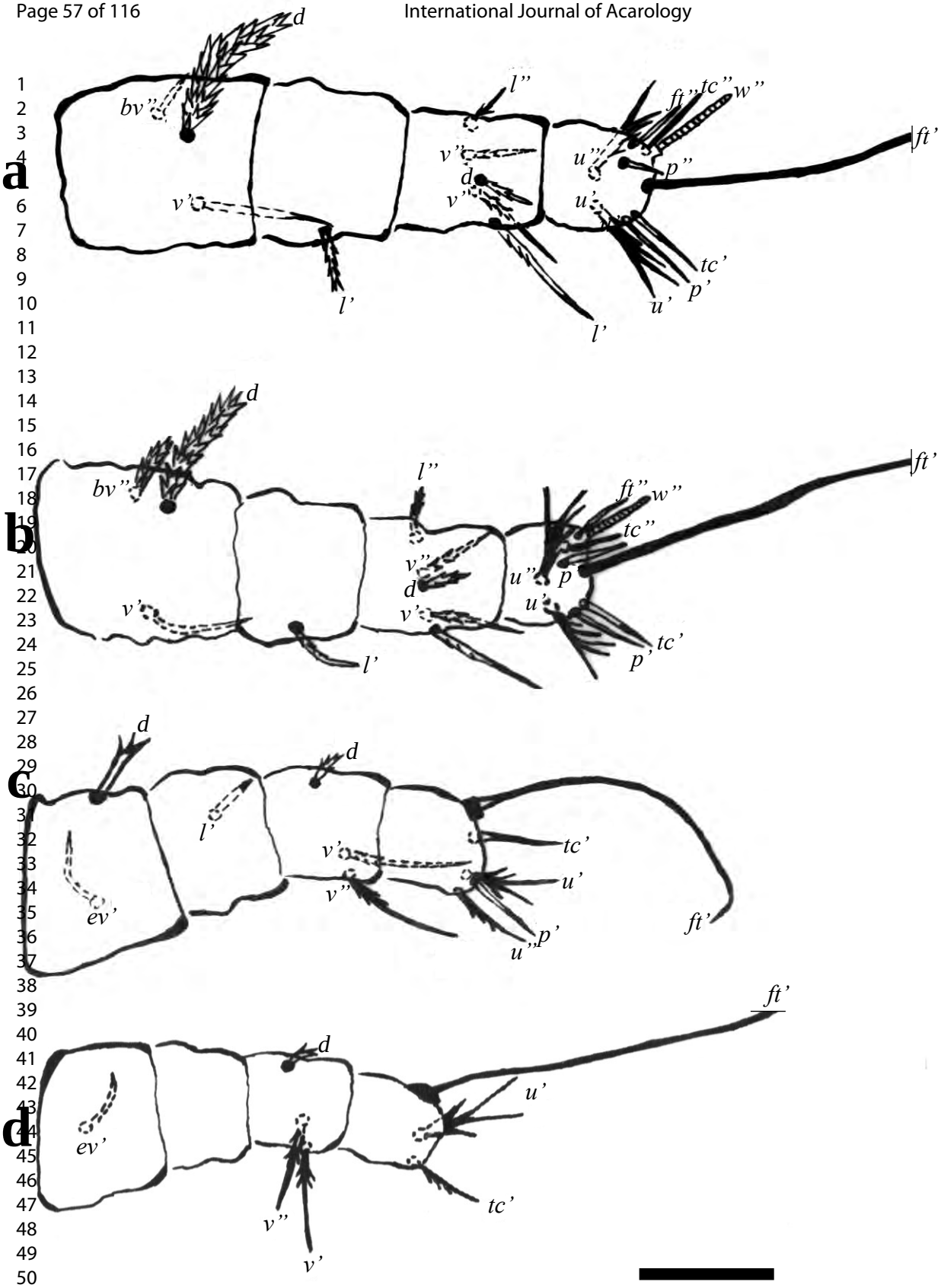

Figure 14. Drawings of legs of *C. bakeri* protonymph: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

Figure 15. Differential Interference Contrast micrographs of protonymph *C. bakeri*, collected on *C. monogyna*: a. dorsal habitus (scales 50 µm).

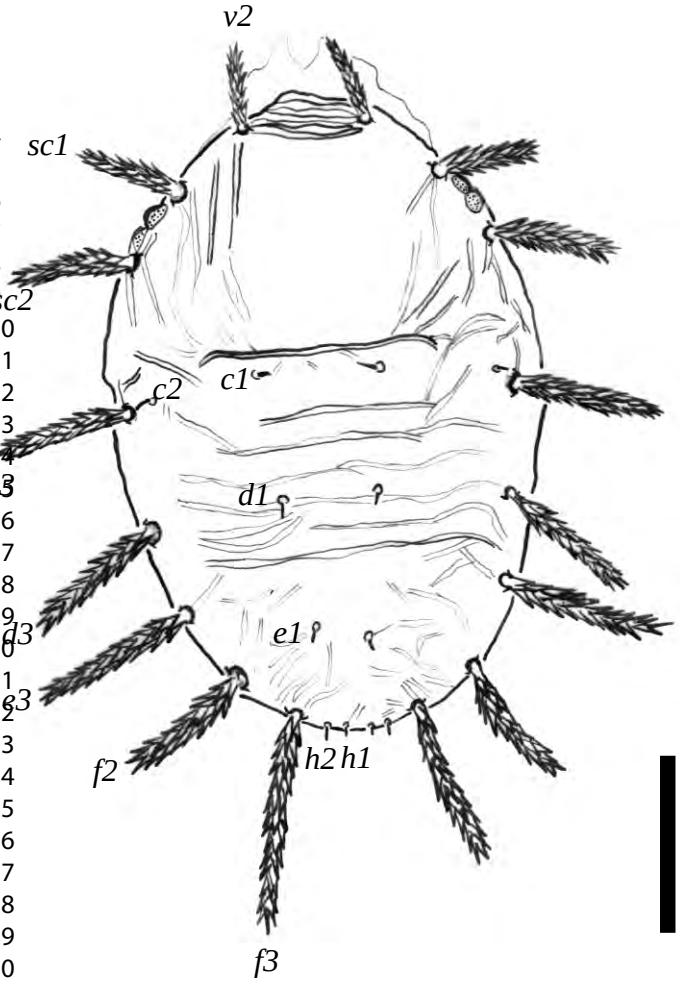

Figure 16. Drawing of dorsal habitus of larva *C. bakeri* (scales 50 µm).

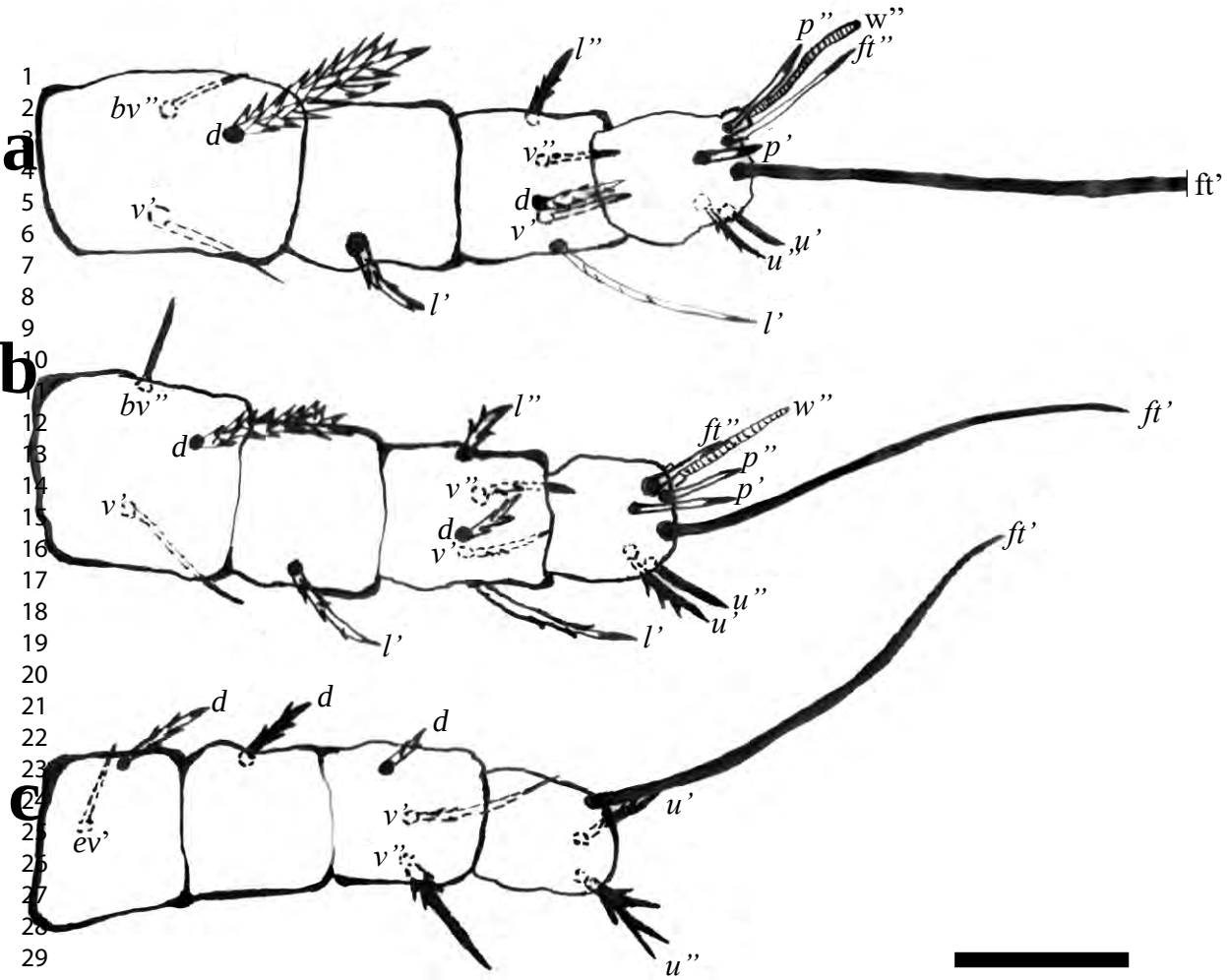

Figure 17. Drawings of legs of larva *C. bakeri*: a. leg I; b. leg II; c. leg III (scales 50 µm).

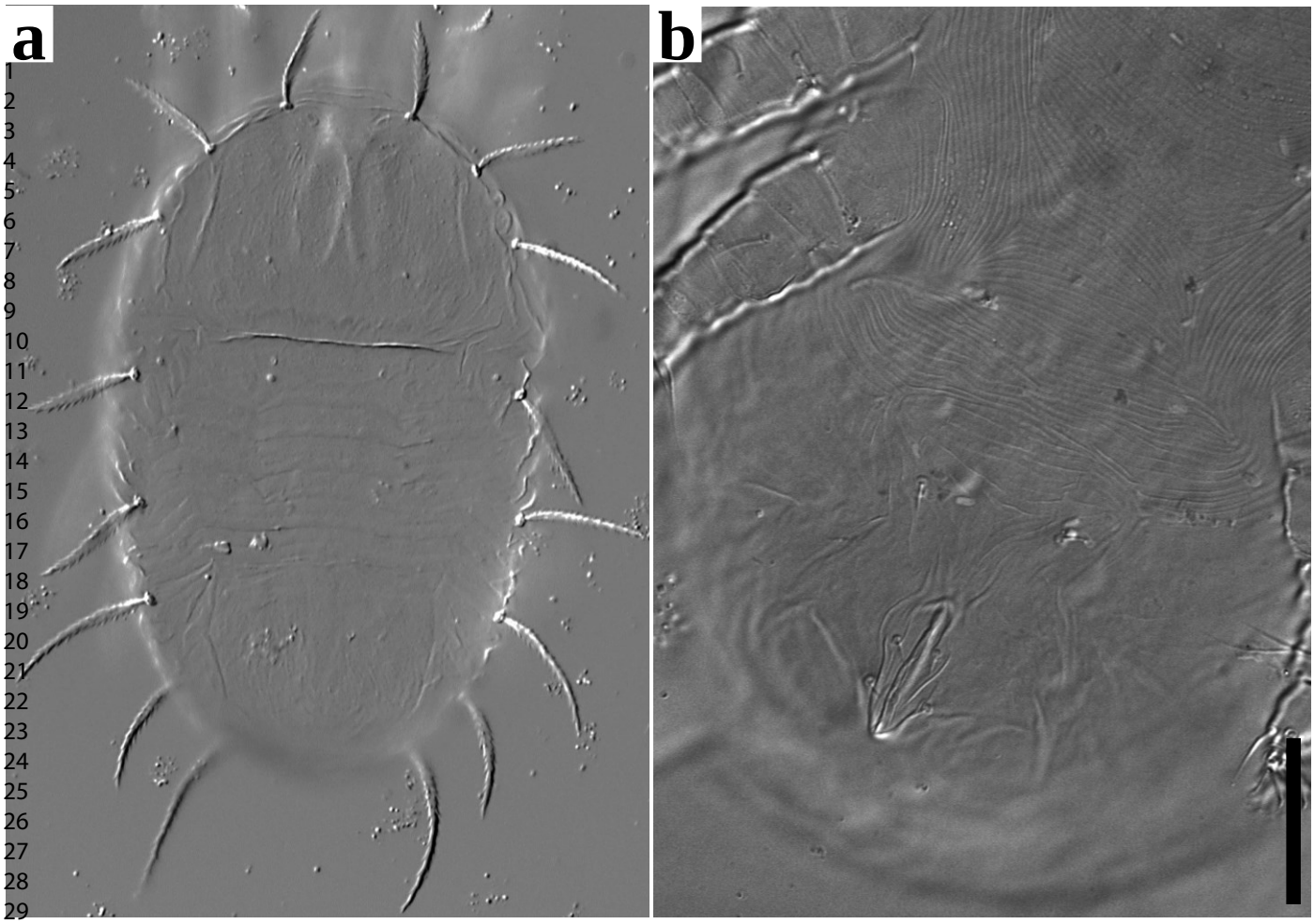

Figure 18. Differential Interference Contrast micrographs of larva *C. bakeri*, collected on *C. monogyna*: a. dorsal habitus; b. ventral habitus (scales 50 µm).

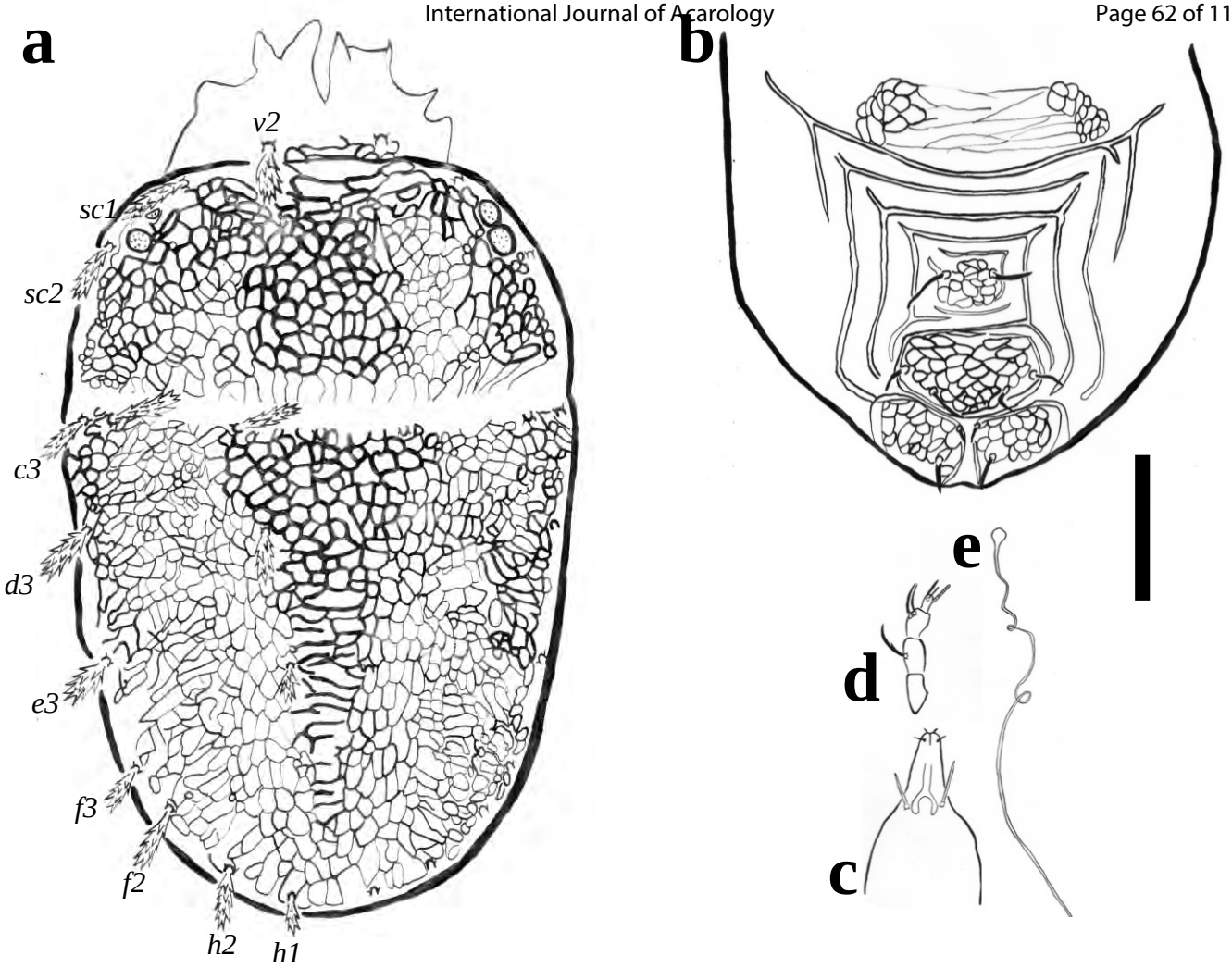

Figure 19. Drawings of adult female *C. lanceolatisetae*: a. dorsal habitus; b. ventral, genital, and anal plate; c. subcapitulum; d. palp; e. spermatheca (scales 50 µm).

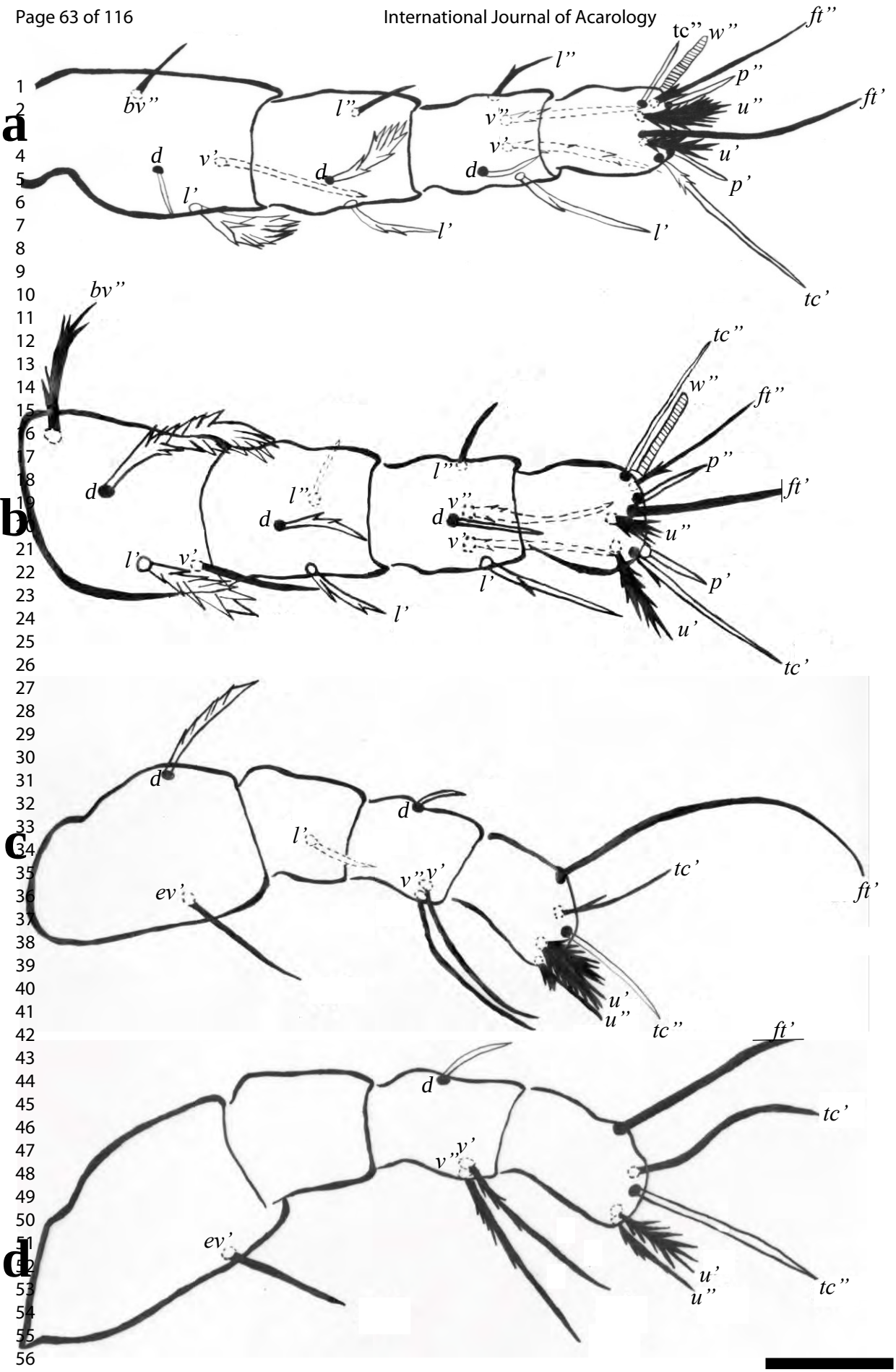

FIGURE 20. Drawings of legs of adult female *C. lanceolatisetae*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

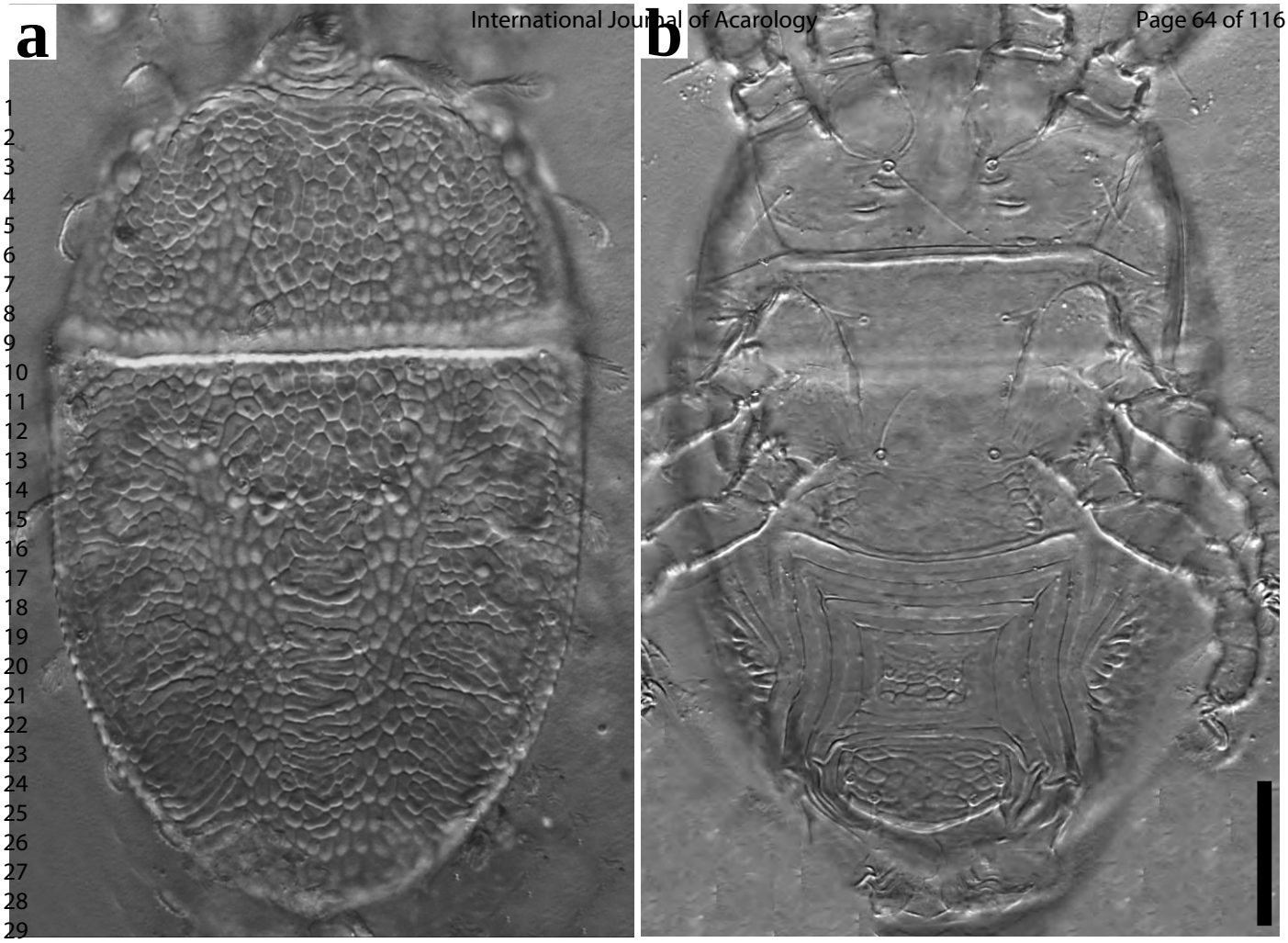

FIGURE 21. Differential Interference Contrast micrographs of adult female *C. lanceolatisetae*: a. dorsal habitus; b. ventral habitus (scales 50 µm).

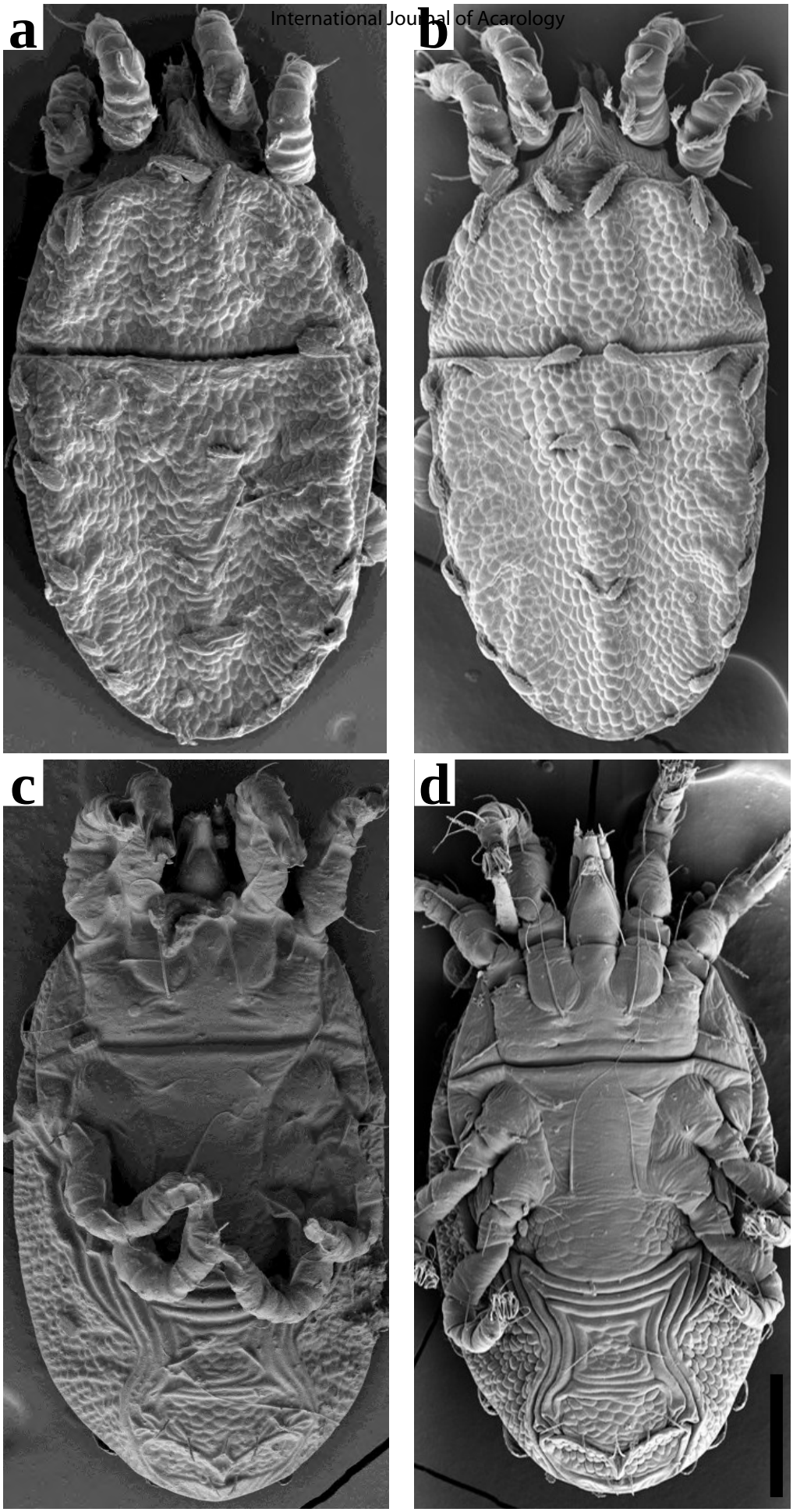

Figure 22. Dorsal and ventral habitus of adult females *C. lanceolatisetae*: a-c. specimens collected on *P. amygdaliformis*; b-d. specimens collected on *E. angustifolia* (scales 50 µm).

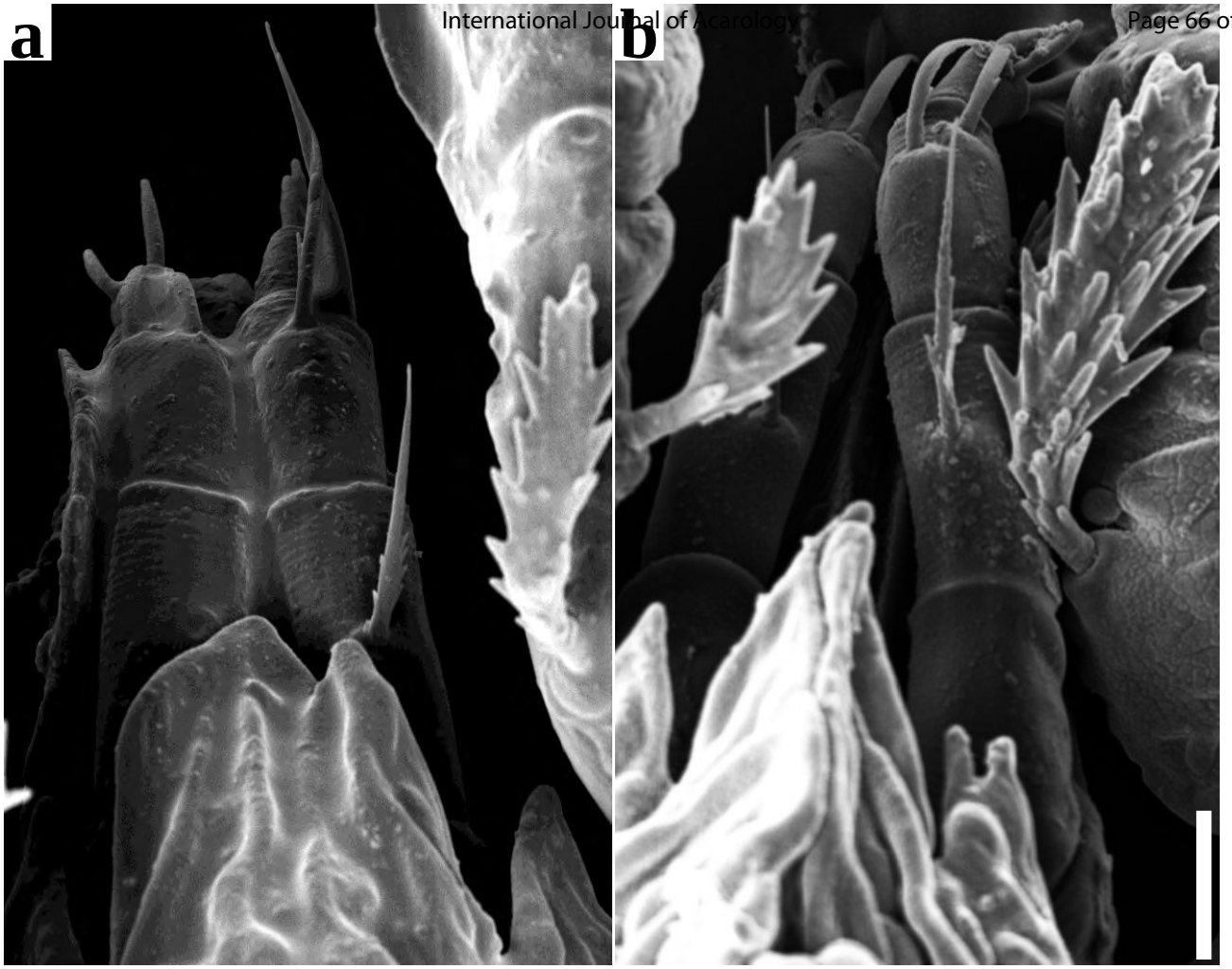

Figure 23. Femora setae of adult females *C. lanceolatisetae*: a-b. specimens collected on *P. amygdaliformis*; c. specimens collected on *E. angustifolia* (scales 50 µm).

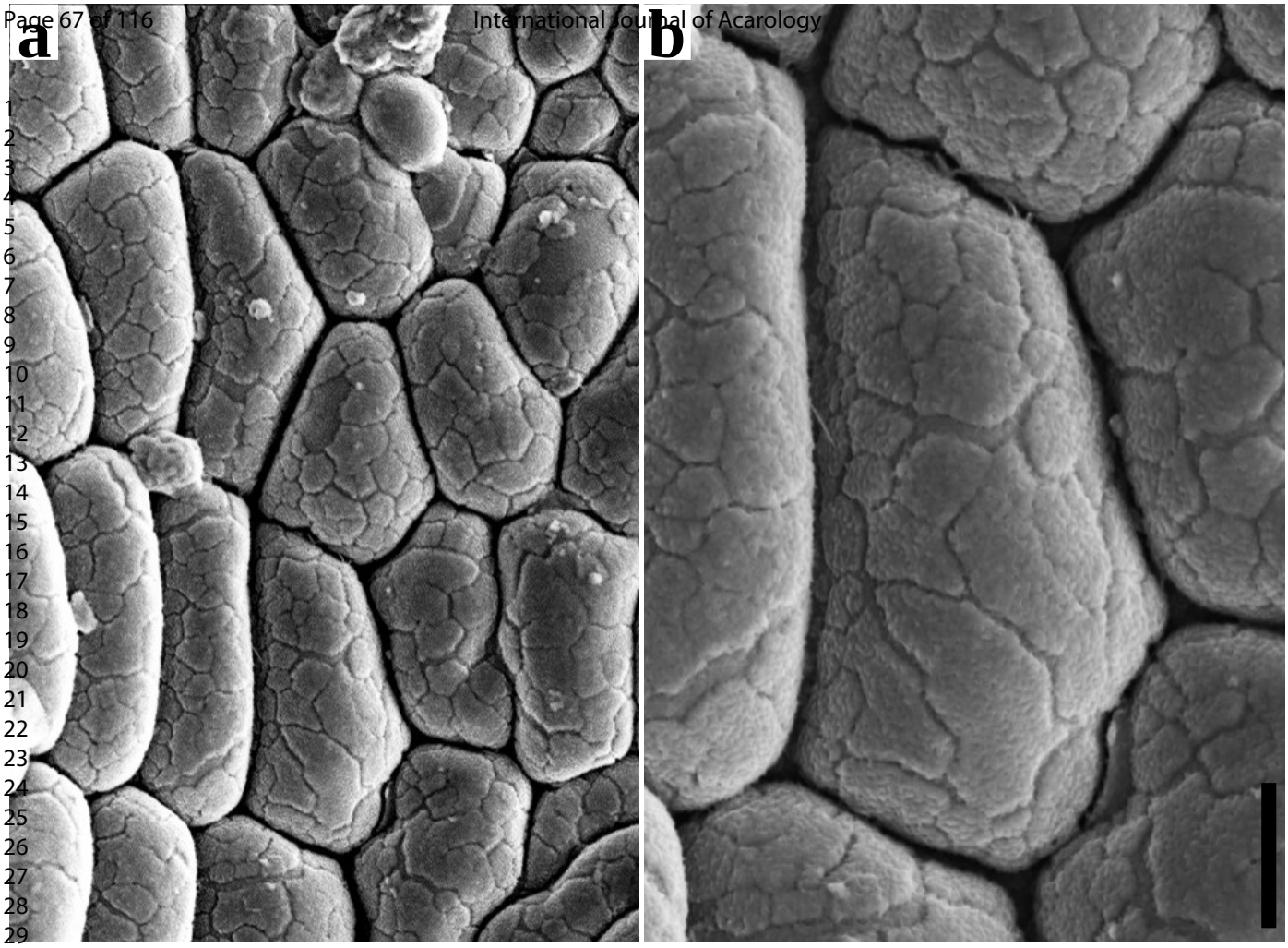

Figure 24. Microplates of female *C. lanceolatisetae* collected on *E. angustifolia* (scales 50 µm).

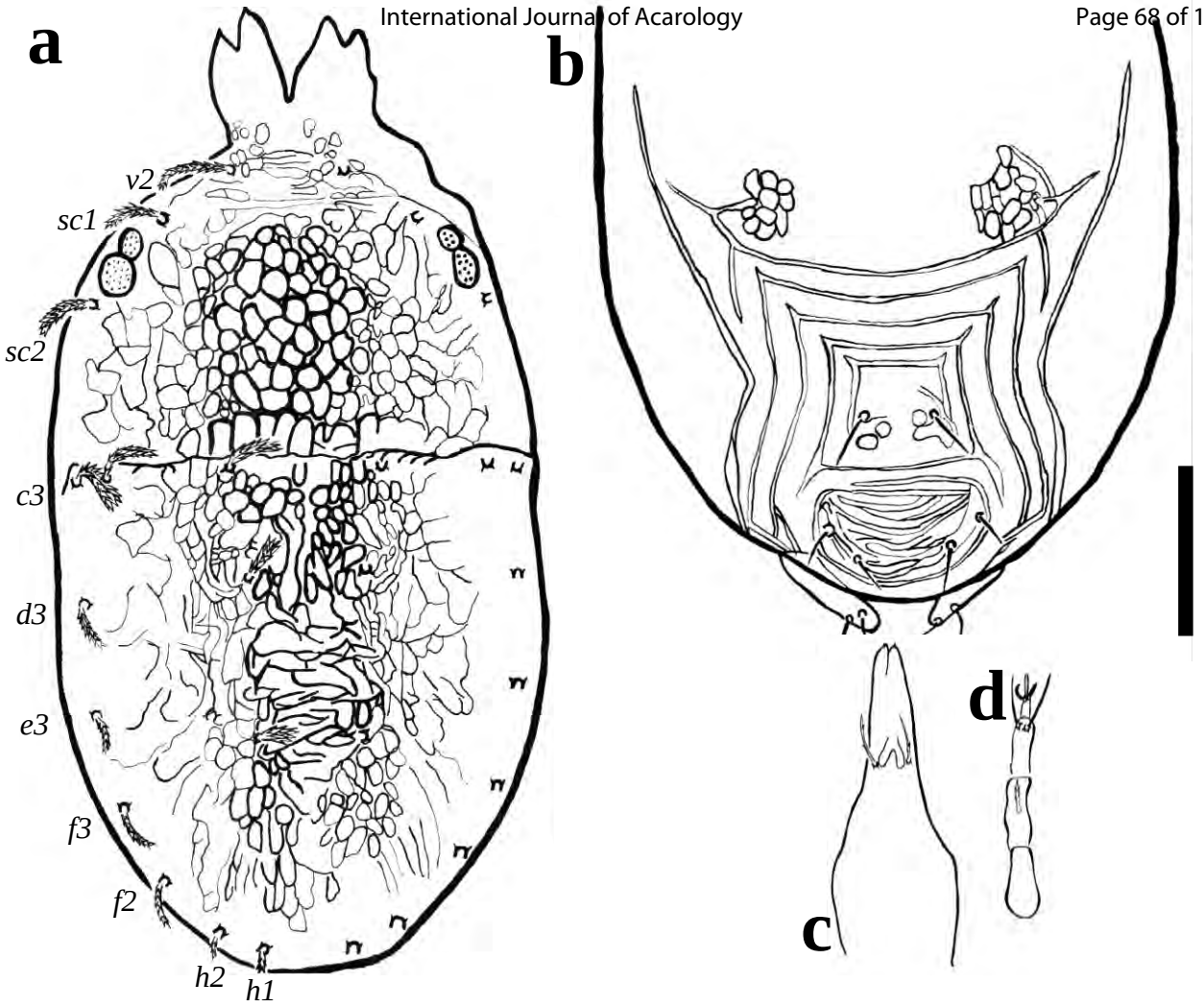

Figure 25. Drawings of adult female *C. longirostris*: a. dorsal habitus; b. ventral, genital, and anal plate; c. subcapitulum; d. palp (scales 50 µm).

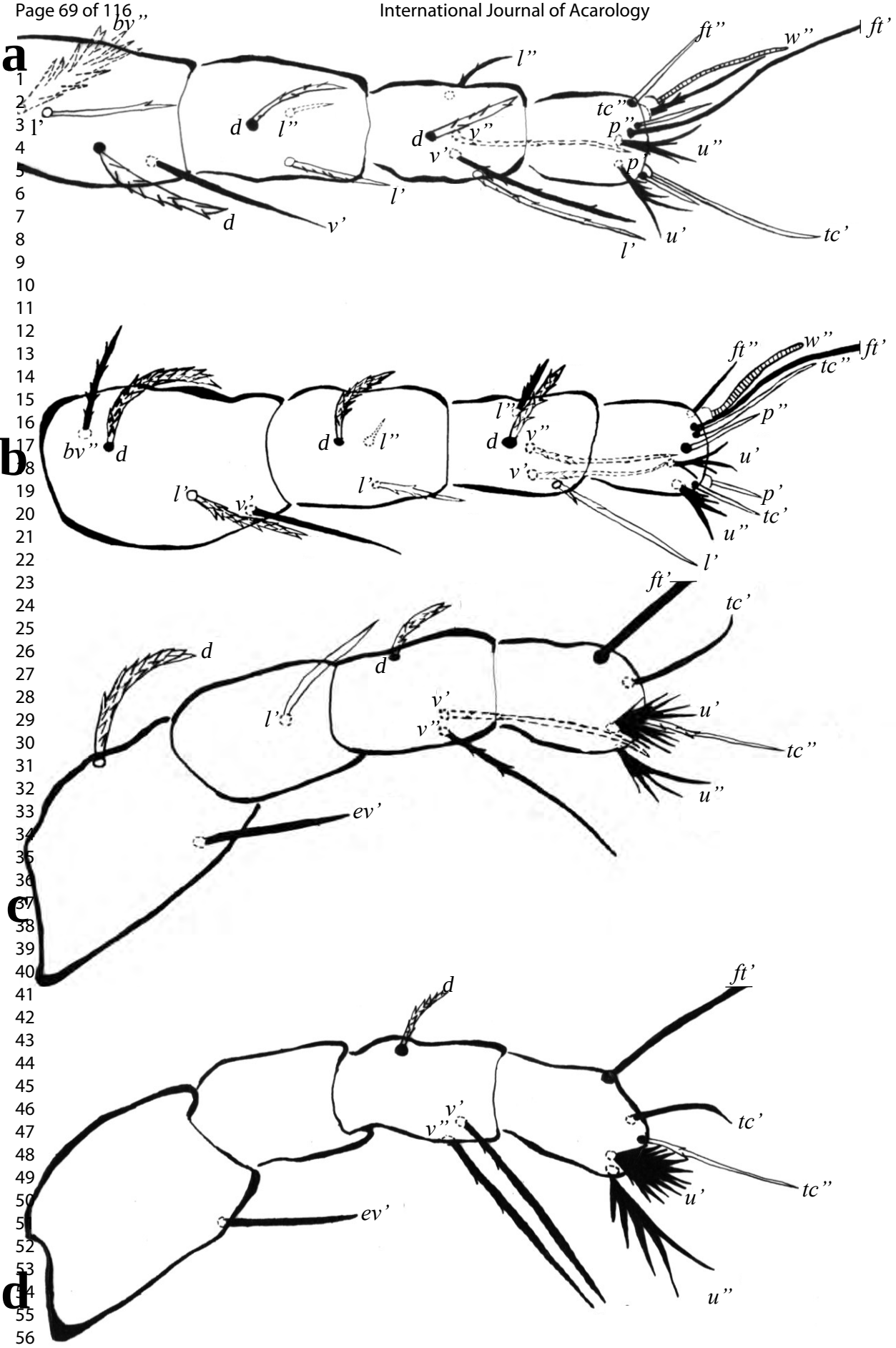

Figure 26. Drawings of legs of adult female *C. longirostris*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

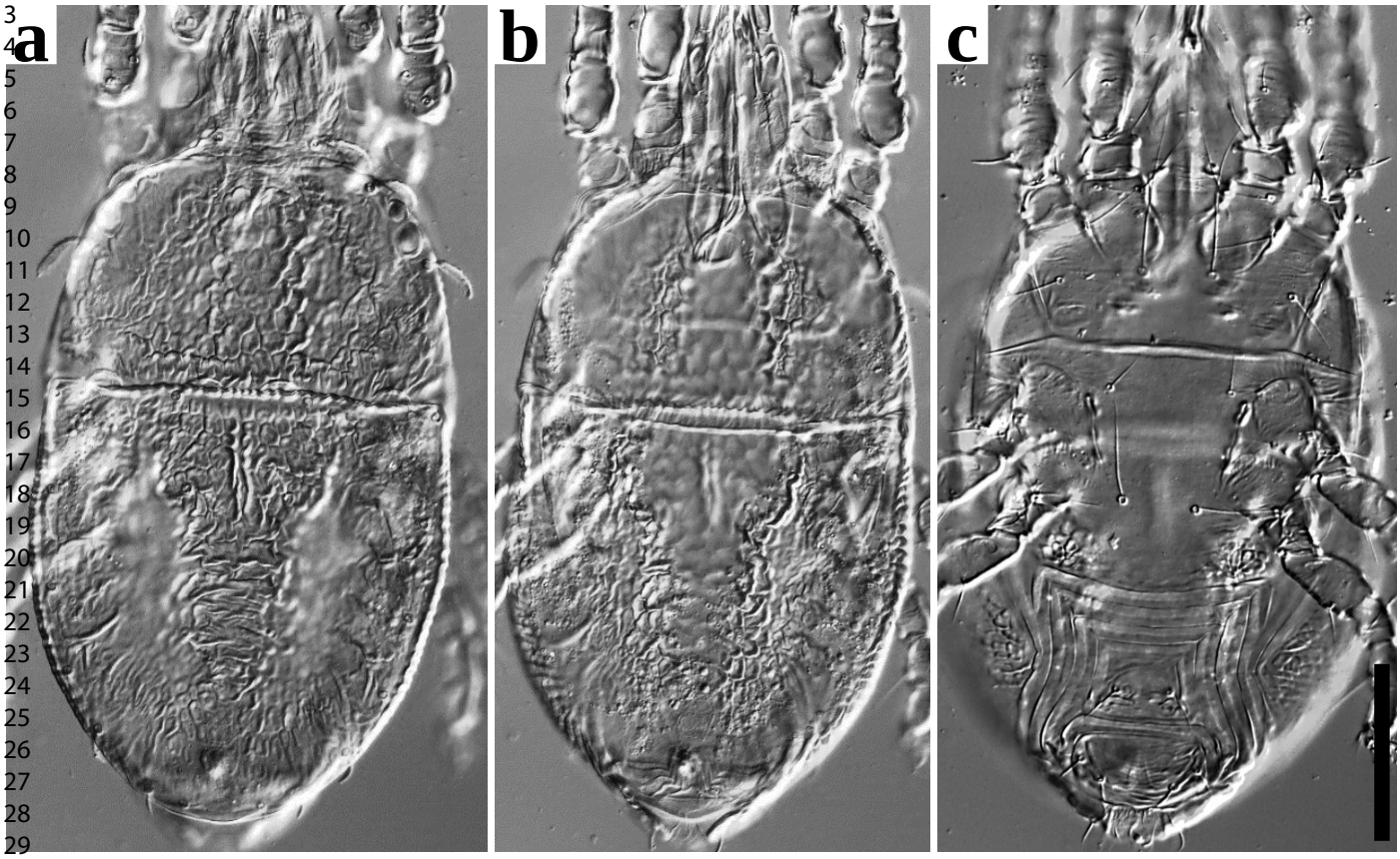

Figure 27. Differential Interference Contrast micrographs of adult female *C. longirostris*: a-b. dorsal habitus; c. ventral habitus (scales 50 µm).

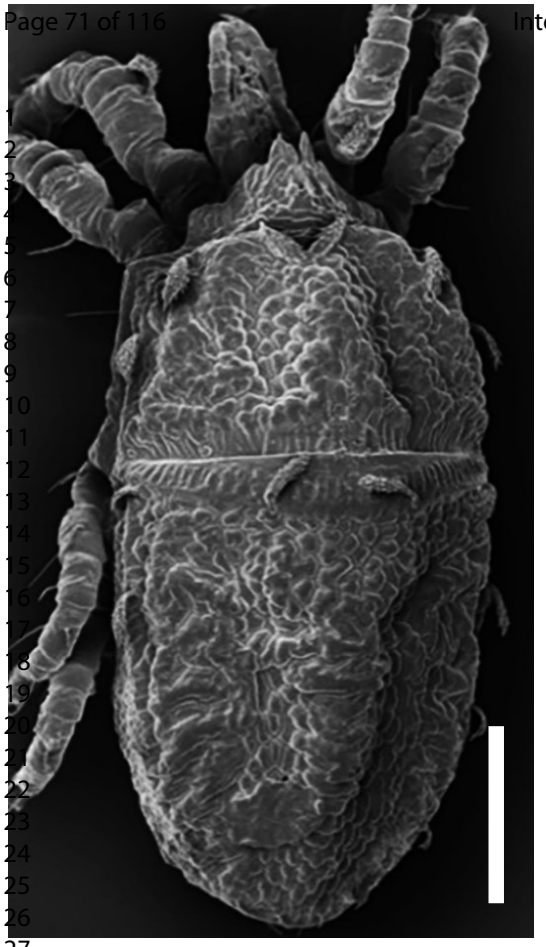

Figure 28. Dorsal habitus of adult female of *C. longirostris* (scales 50 µm).

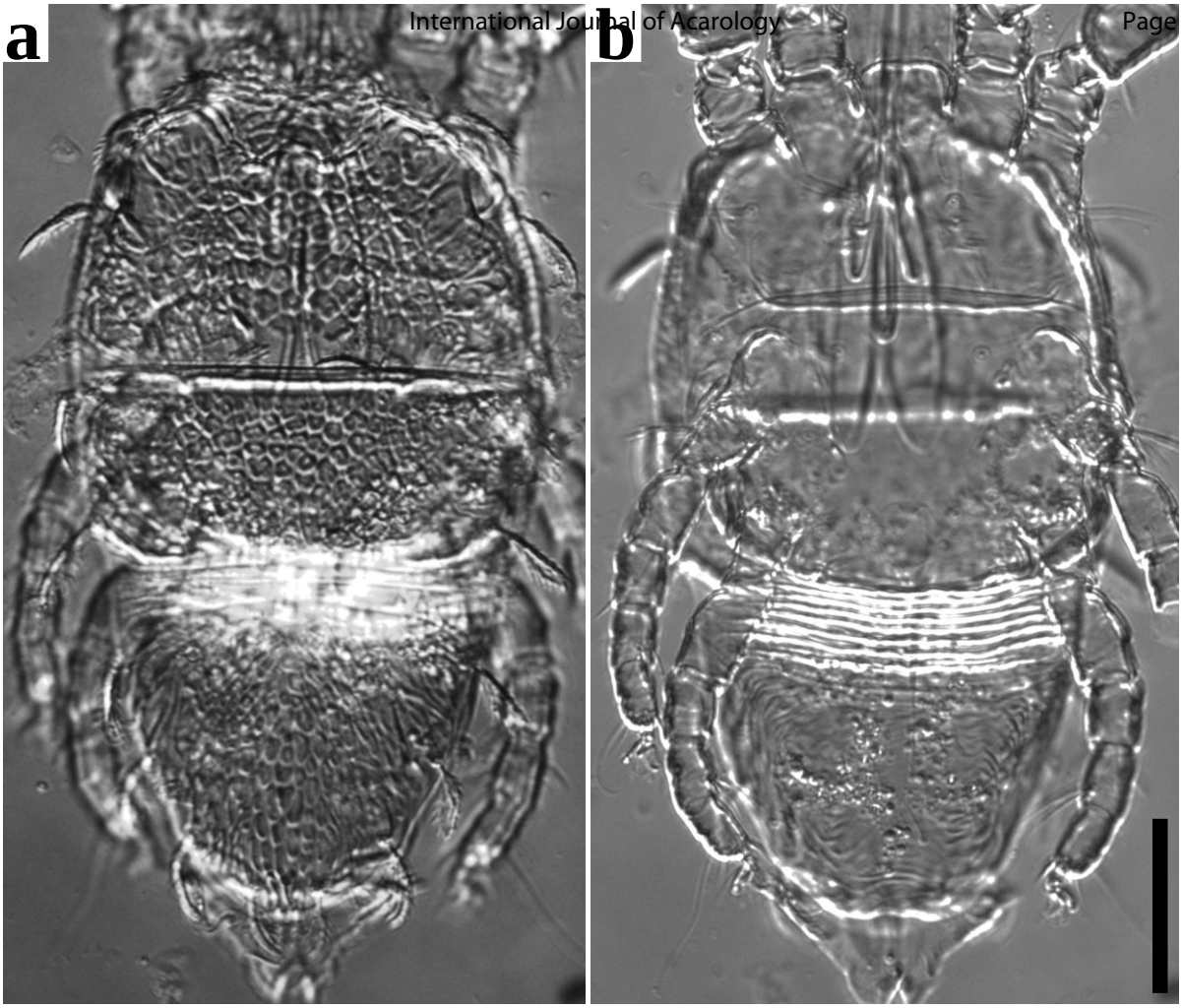

Figure 29. Differential Interference Contrast micrographs of adult male *C. longirostris*: a. dorsal habitus; b. ventral habitus (scales 50 µm)

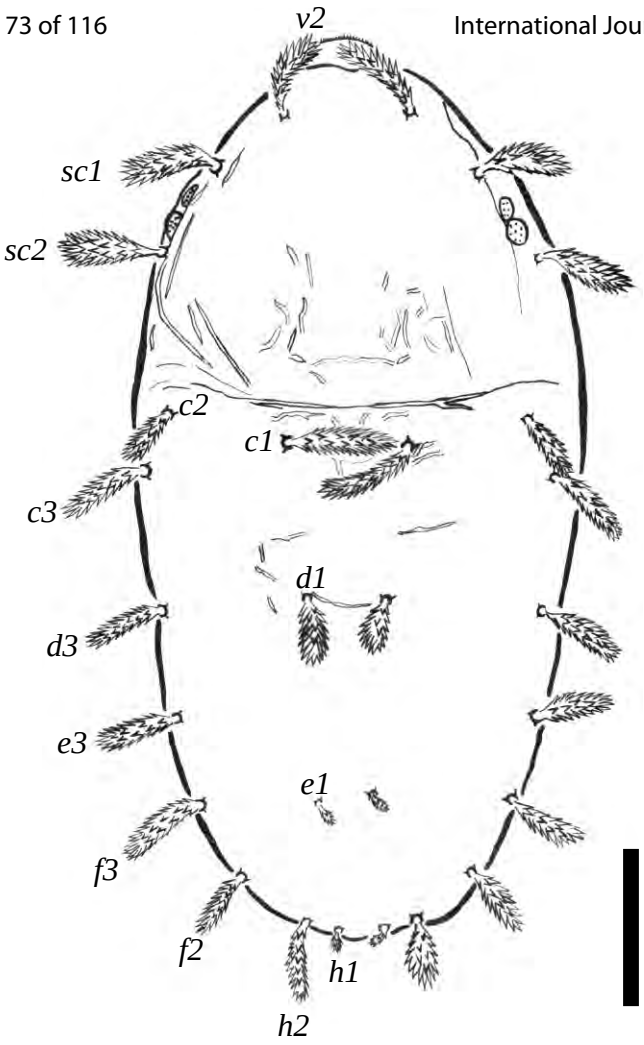

Figure 30. Drawing of dorsal habitus of deutonymph *C. longirostris* (scales 50 µm).

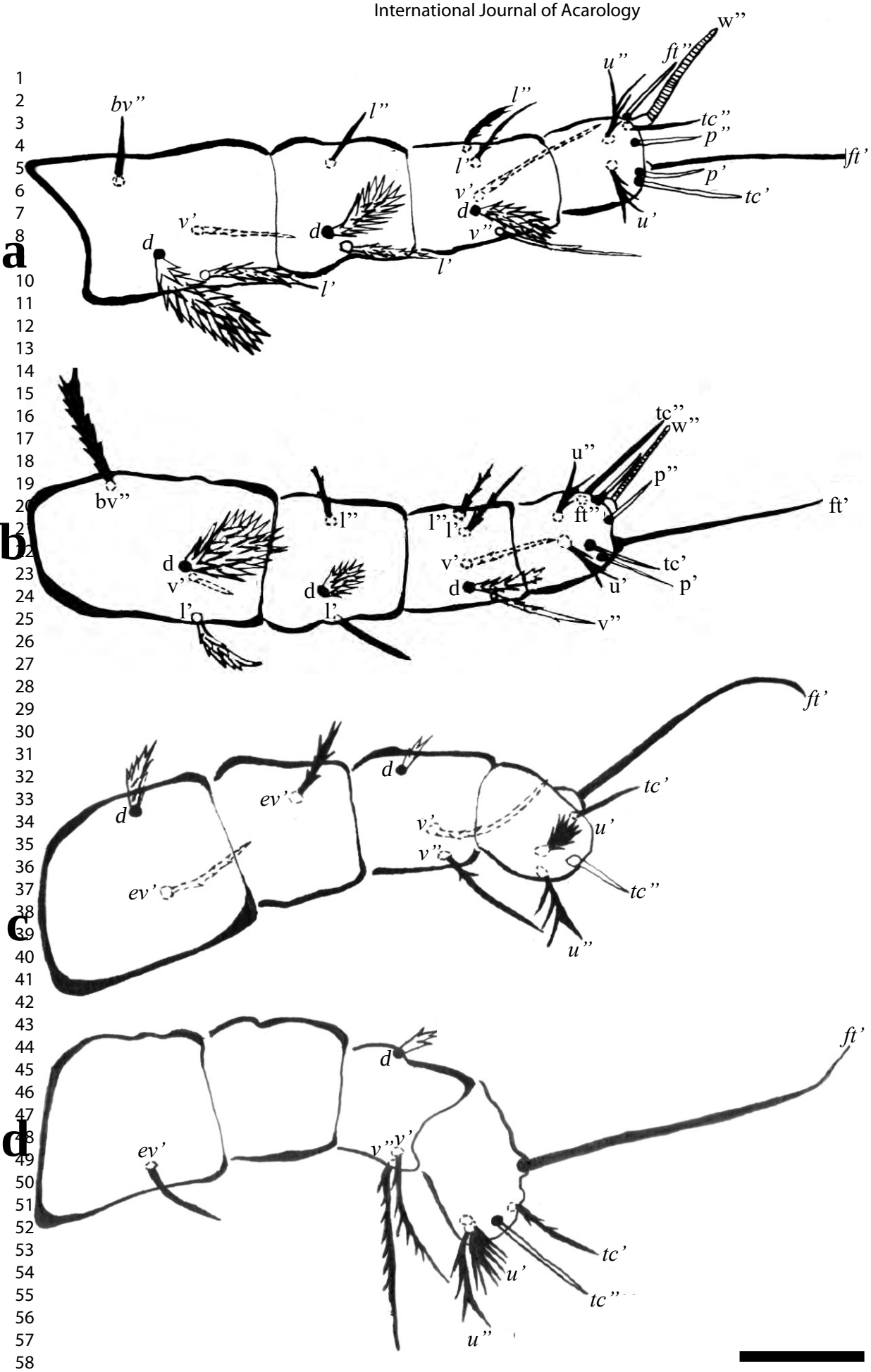

Figure 31. Drawings of legs of deutonymph *C. longirostris*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

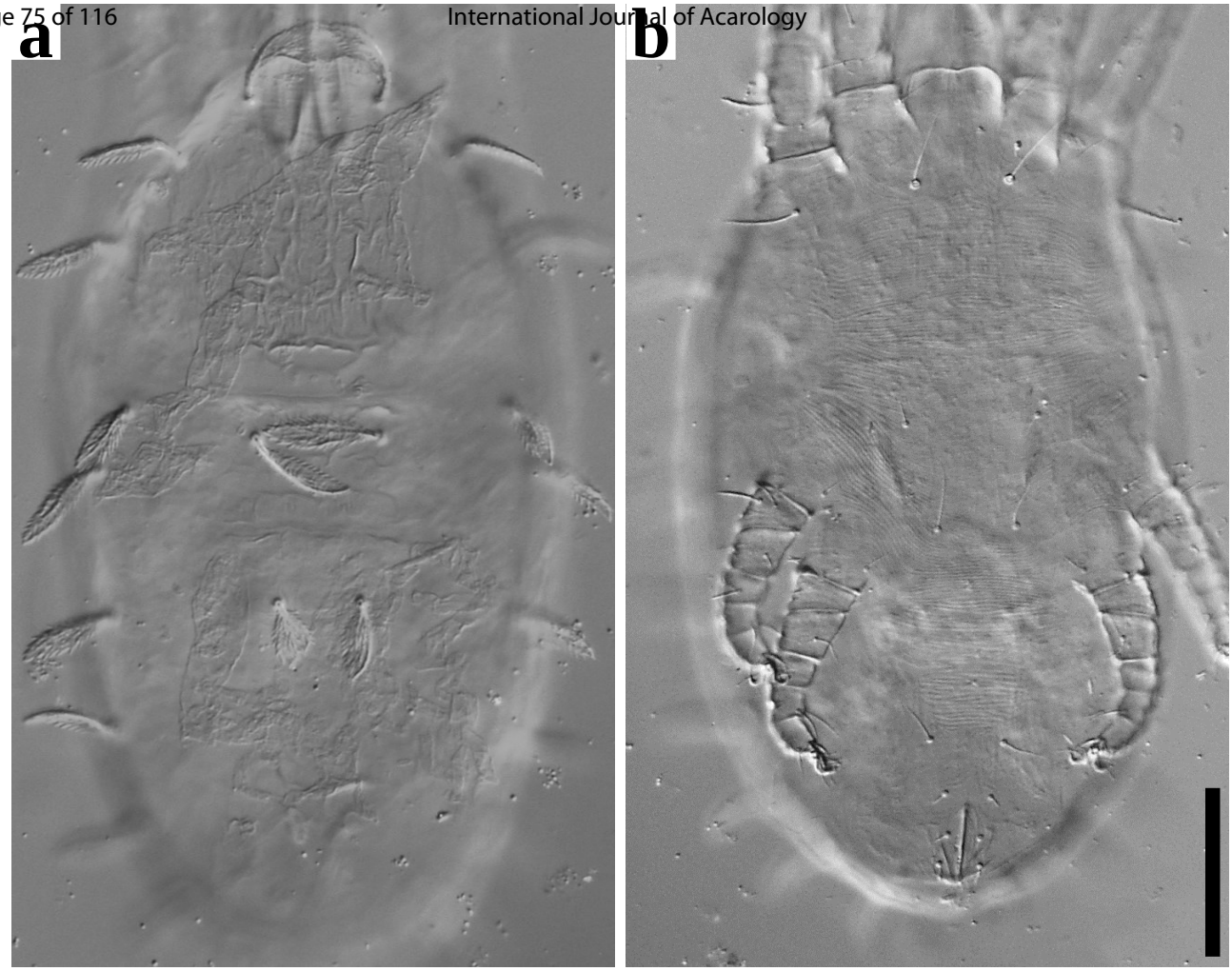

Figure 32. Differential Interference Contrast micrographs of deutonymph *C. longirostris*: a. dorsal habitus; b. ventral habitus (scale 50 µm).

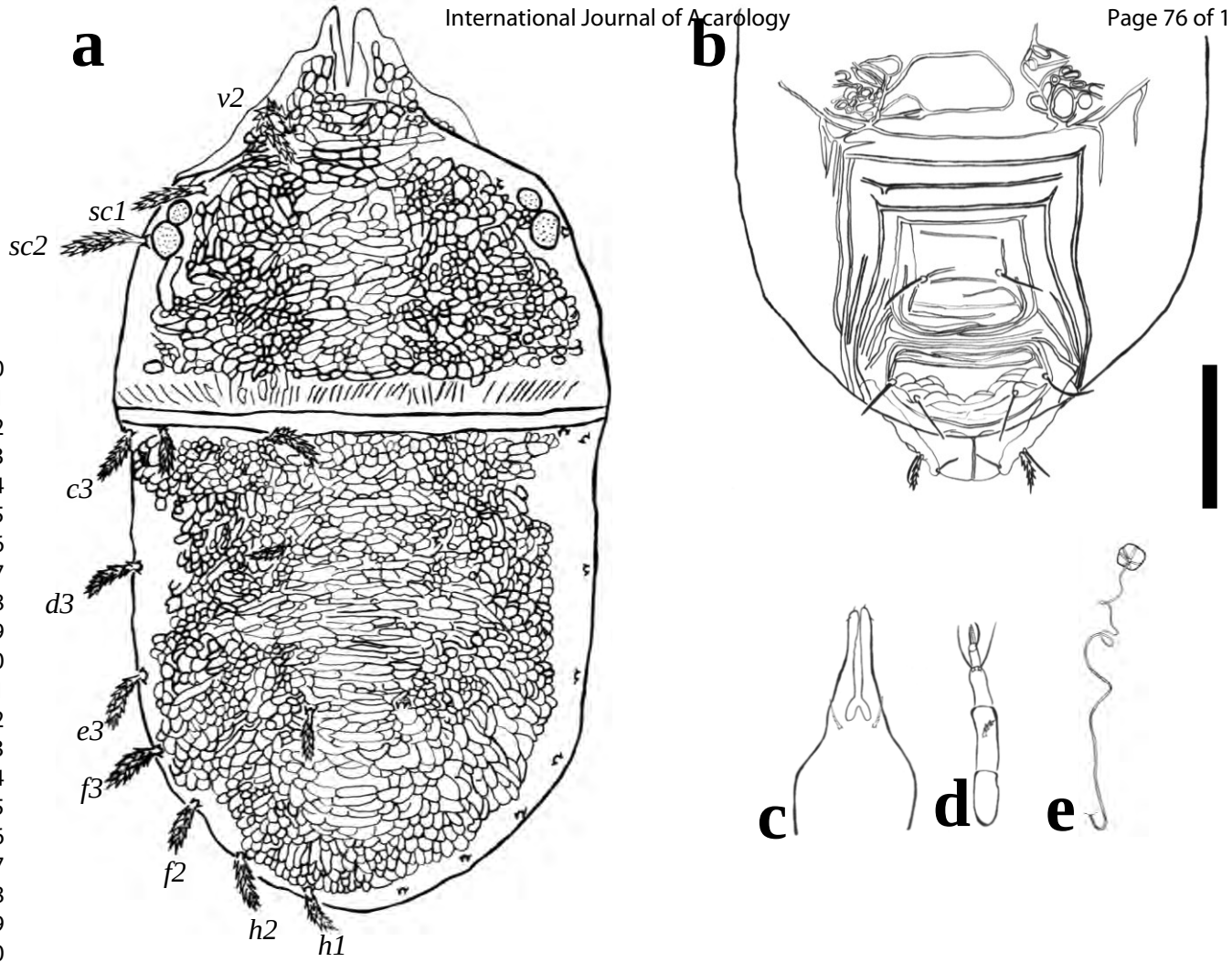

Figure 33. Drawings of adult female *C. halperini*: a. dorsal habitus; b. ventral, genital, and anal plate; c. subcapitulum; d. palp; e. spermatheca (scales 50 µm).

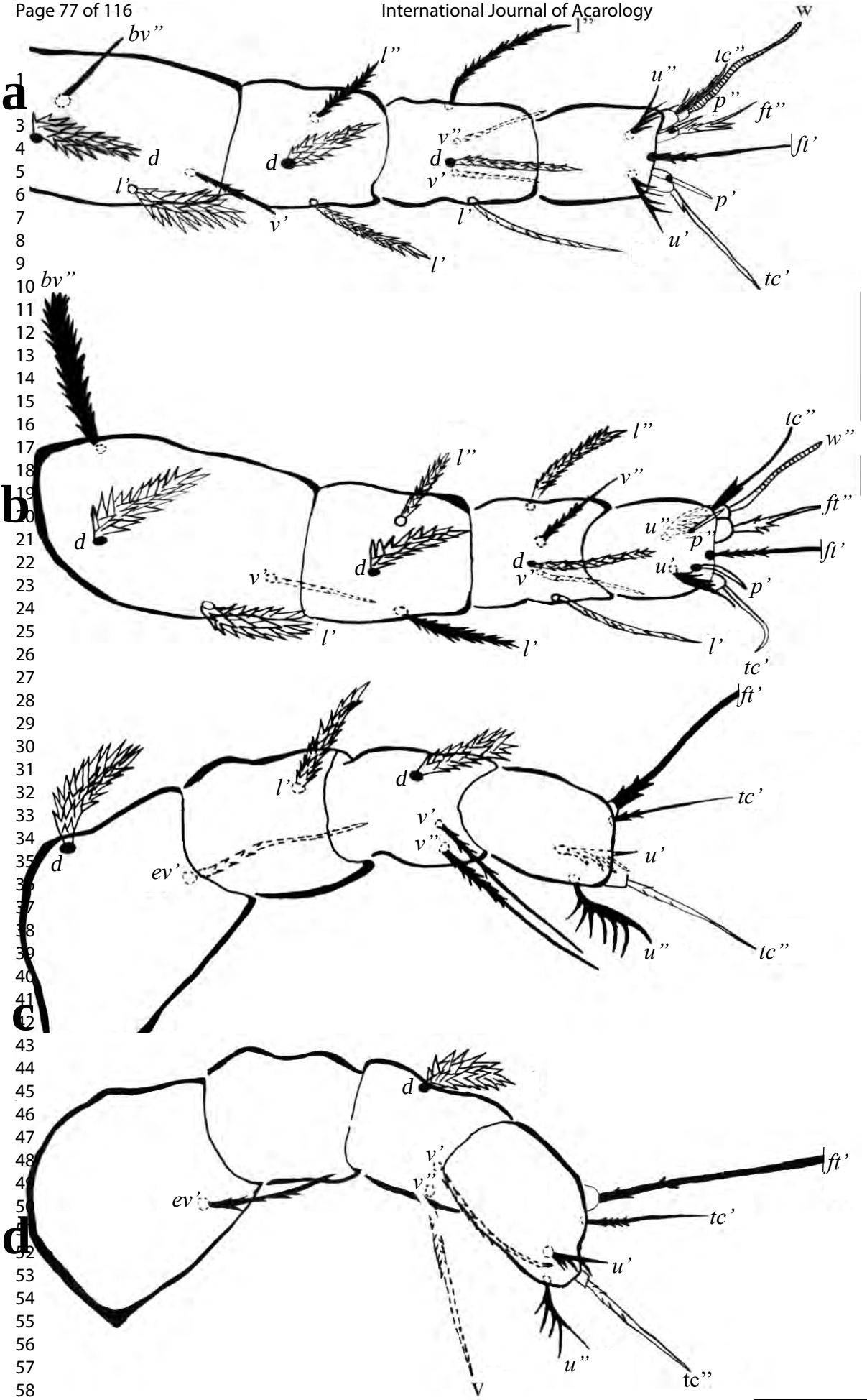

Figure 34. Drawings of legs of adult female *C. halperini*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

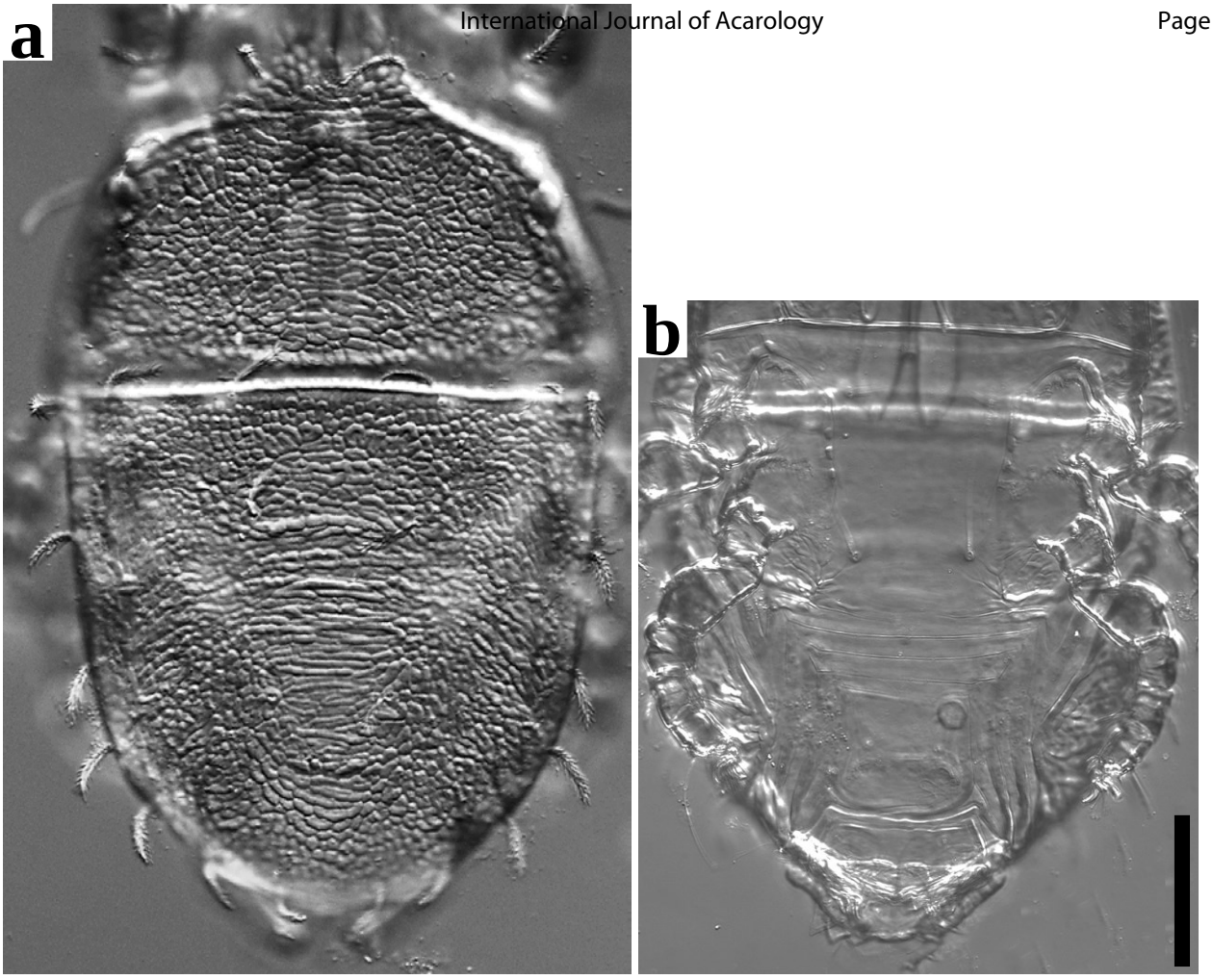

Figure 35. Differential Interference Contrast micrographs of adult female *C. halperini*: a. dorsal habitus; b. ventral habitus (scales 50 µm).

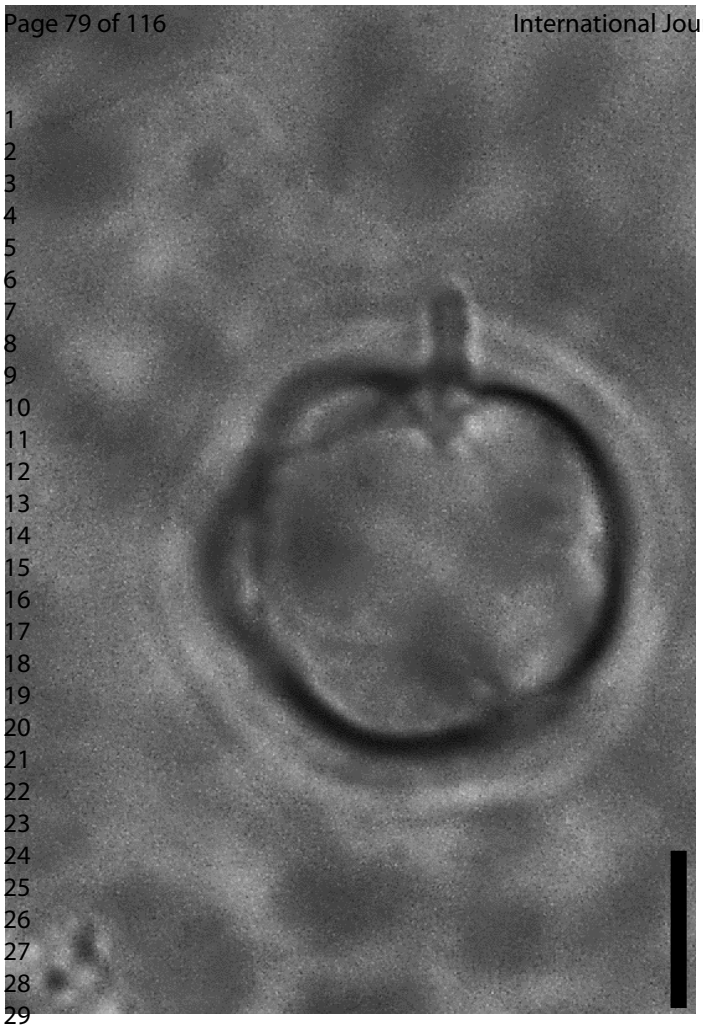

Figure 36. Phase Contrast micrographs of spermatheca of adult female *C. halperini* (scales 50 µm).

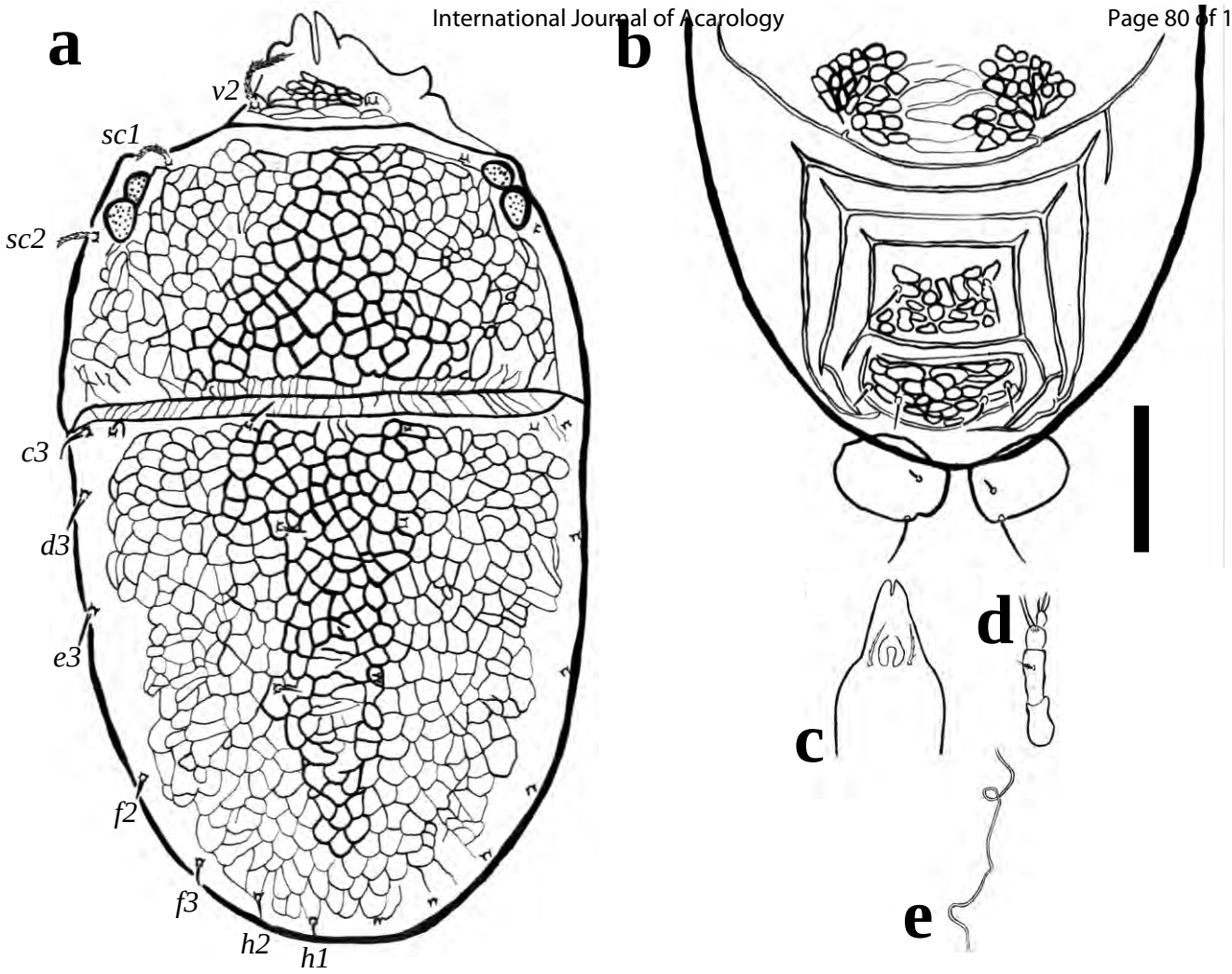

Figure 37. Drawings of adult female *C. pulcher*: a. dorsal habitus; b. ventral, genital, and anal plate; c. subcapitulum; d. palp; e. spermatheca (scales 50 µm).

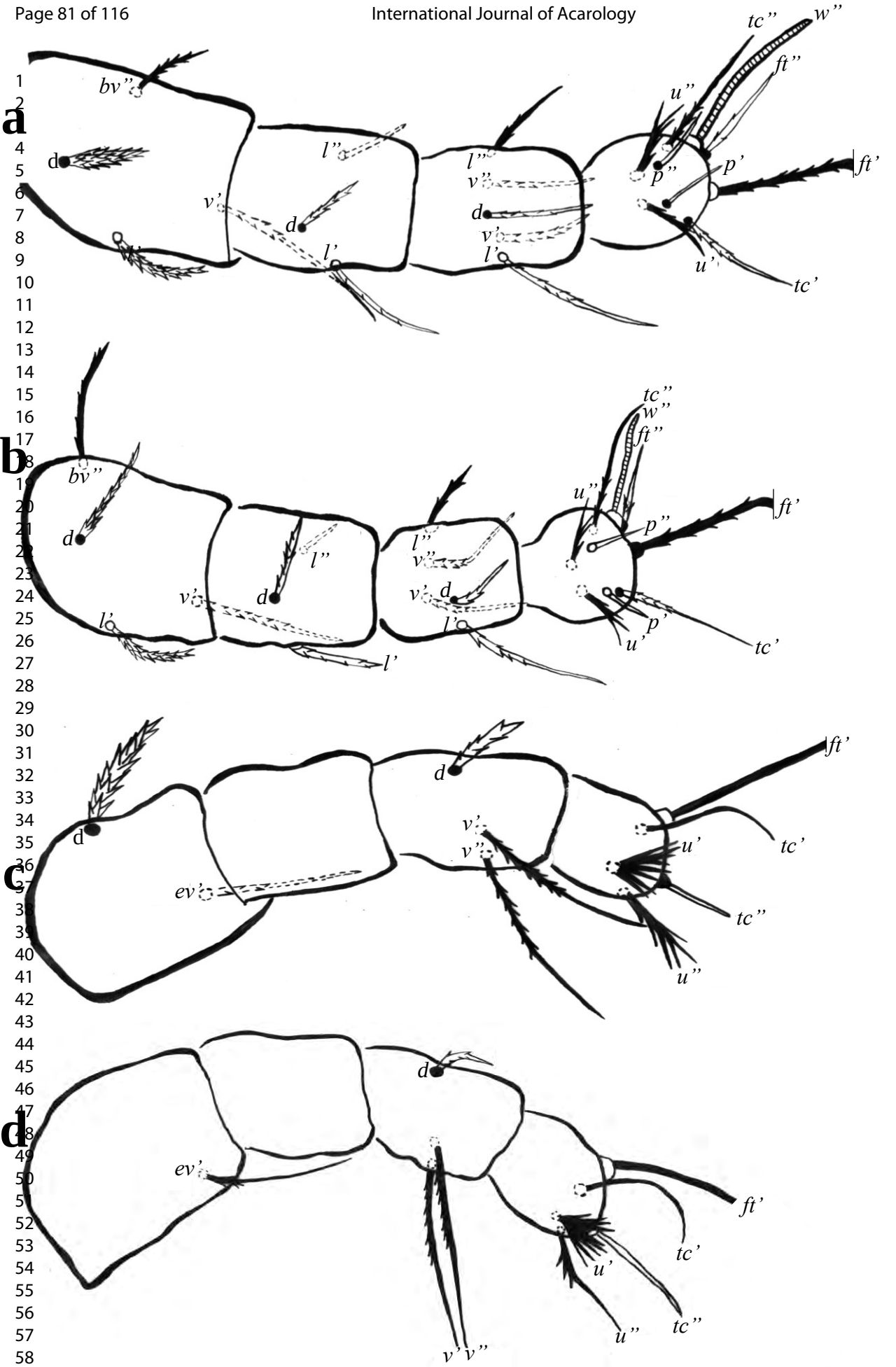

Figure 38. Drawings of legs of adult female *C. pulcher*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

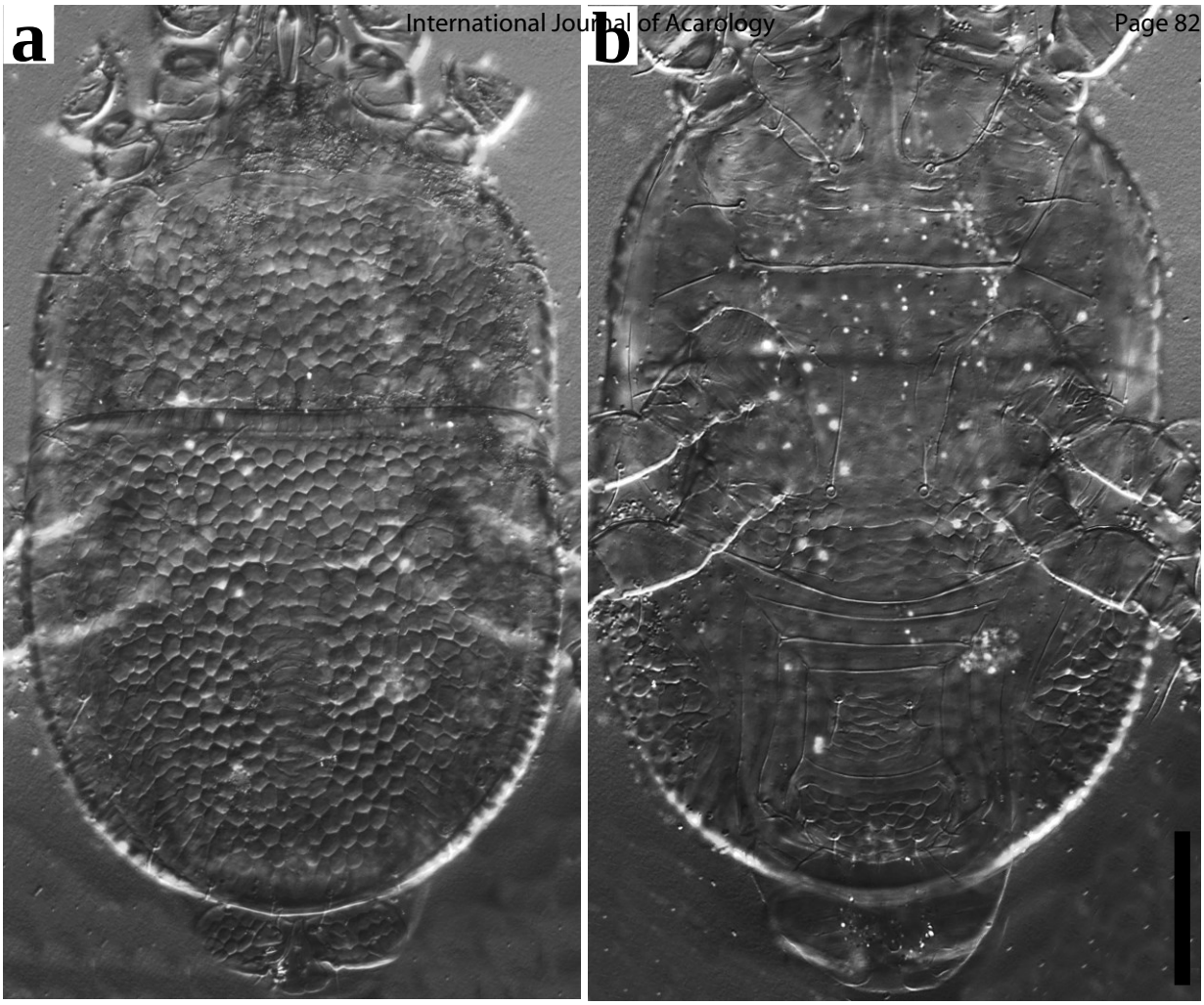

Figure 39. Differential Interference Contrast micrographs of adult female *C. pulcher*: a. dorsal habitus; b. ventral habitus (scales 50 µm)

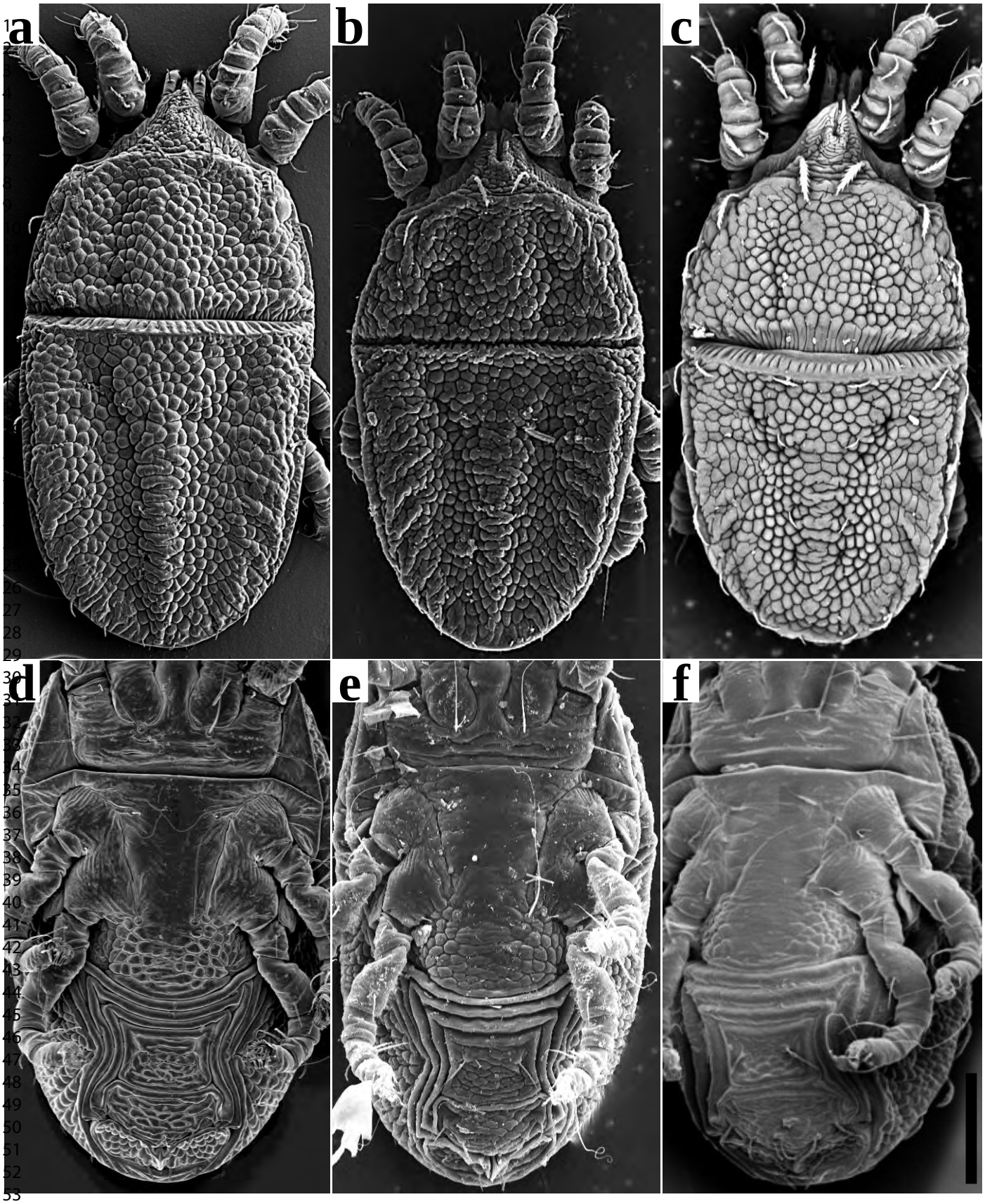

Figure 40. Dorsal and ventral habitus of adult females *C. pulcher*: a-d. specimens collected on *M. sylvestris*; b-e. specimens collected on *C. lacteus*; c-f. specimens collected on *Ligustrum* sp. (scales 50 µm).

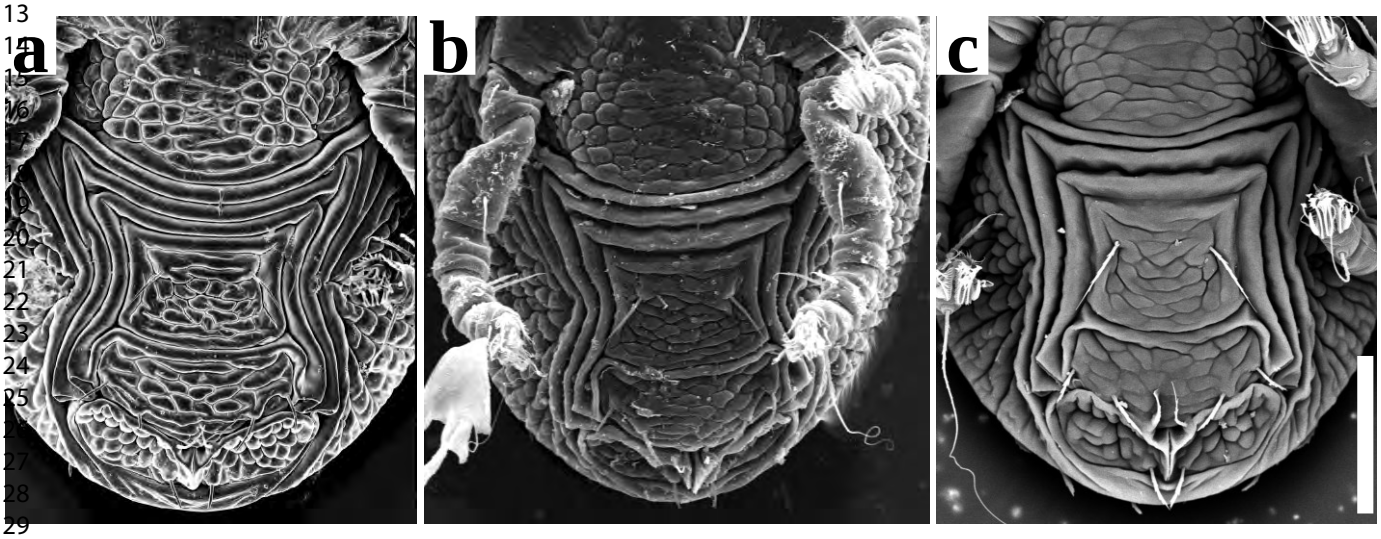

Figure 41. Ventral, genital, and anal plates of adult females *C. pulcher*: a. specimens collected on *M. sylvestris*; b. specimens collected on *C. lacteus*; c. specimens collected on *Ligustrum* sp. (scales 50 µm).

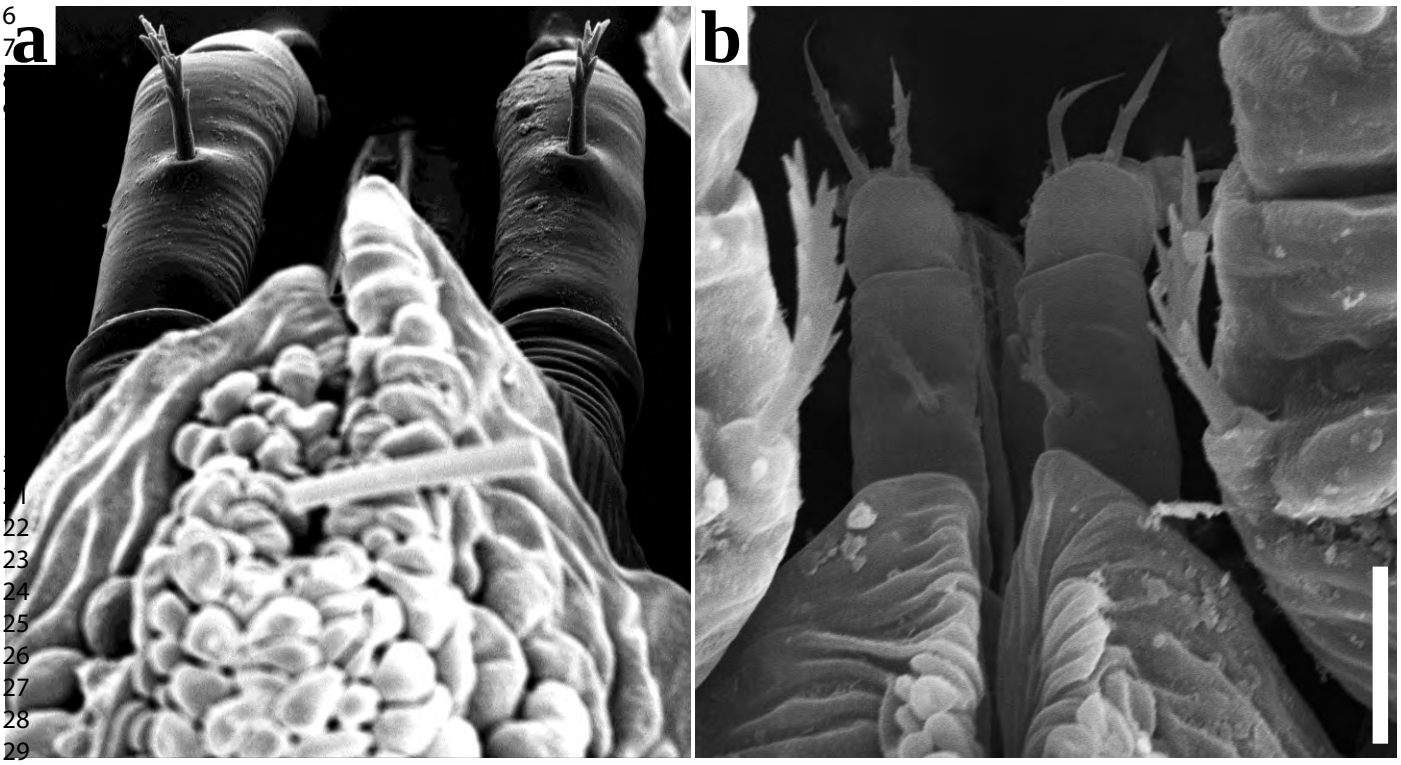

Figure 42. Femora setae of adult females *C. pulcher*: a. specimens collected on *M. sylvestris*; b. specimens collected on *C. lacteus* (scales 50 µm).

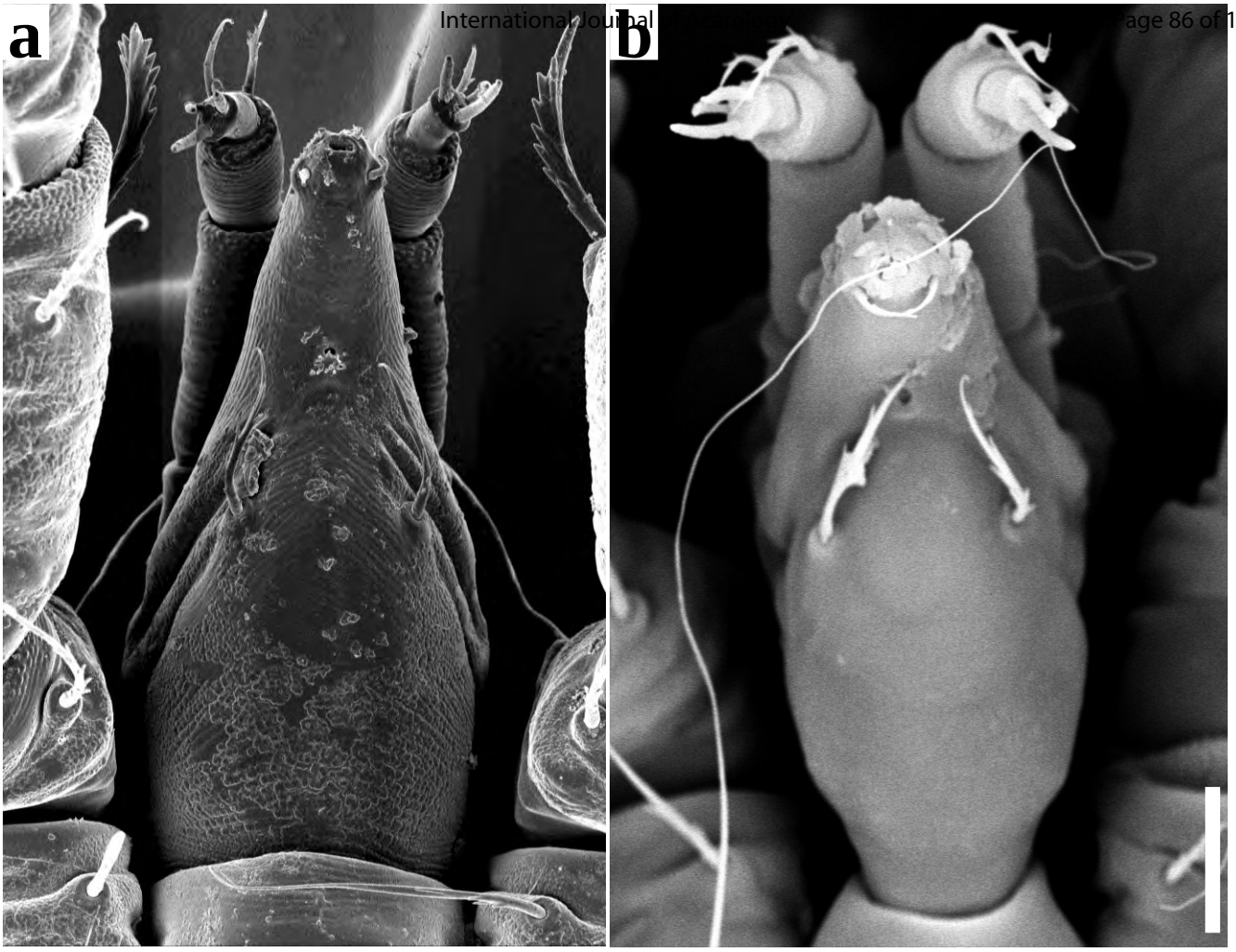

Figure 43. Subcapitulum of adult female *C. pulcher*: a. specimens collected on *M. sylvestris*; b. specimens collected on *Ligustrum* sp. (scales 50 µm).

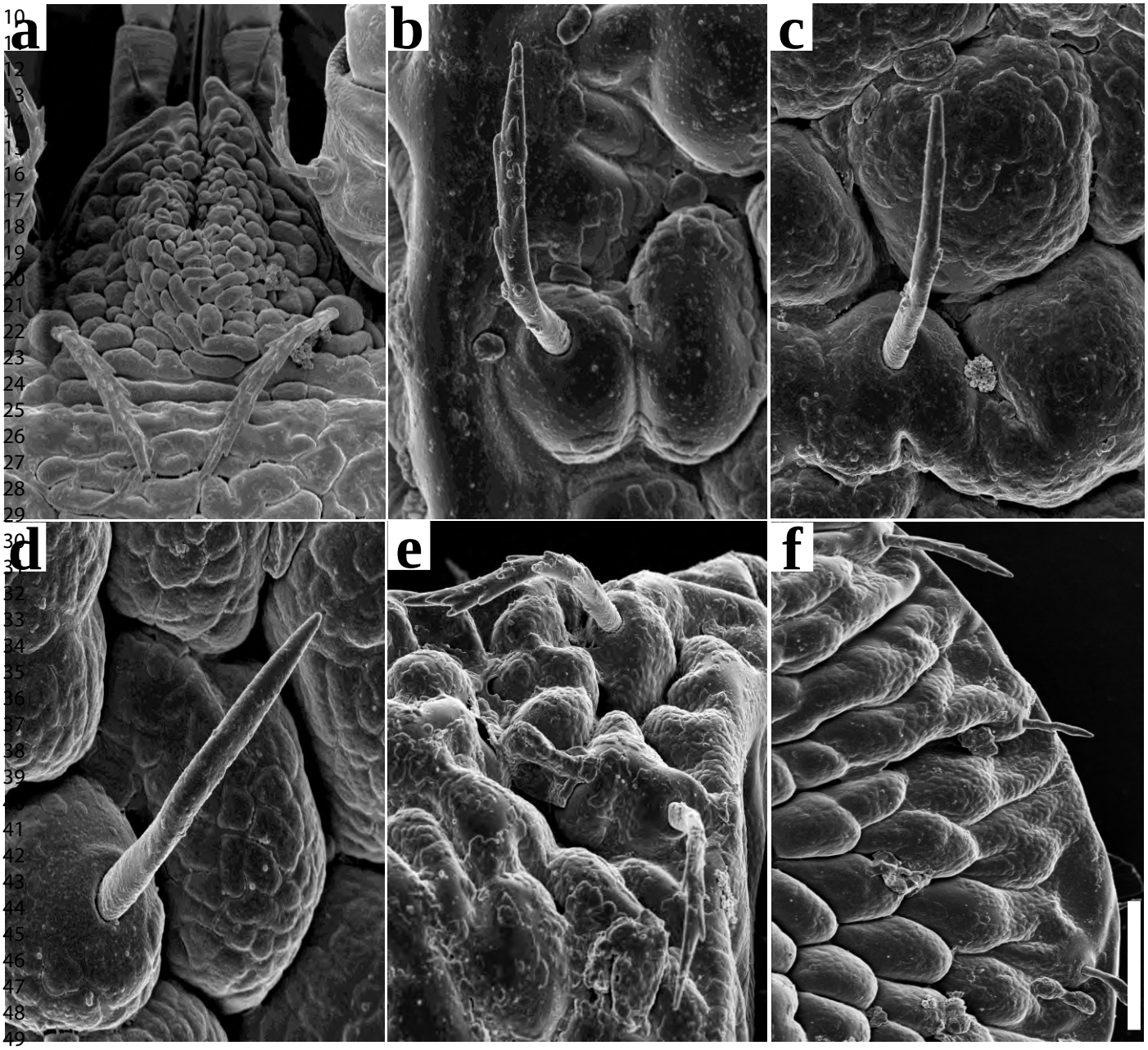

Figure 44. Shape of the setae of adult females *C. pulcher* collected on *M. sylvestris*: a. setae *v2*; b. seta *c1*; c. seta *d1*; d. seta *e1*; e. setae *c2* and *c3*; f. setae *f3*, *h2* and *f1* (scales 50 µm).

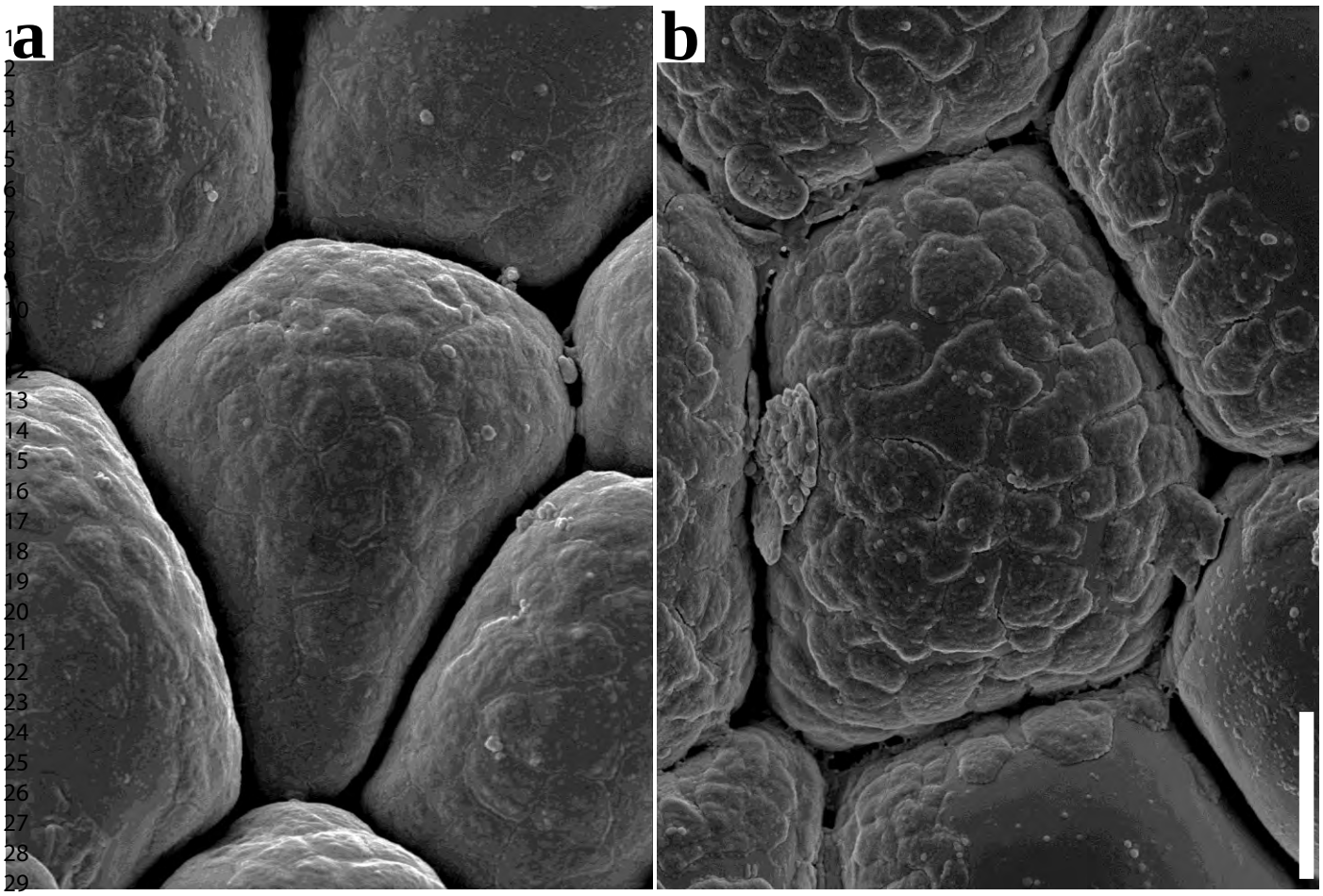

Figure 45. Microplates of adult female *C. pulcher* collected on *M. sylvestris* (scales 50 µm).

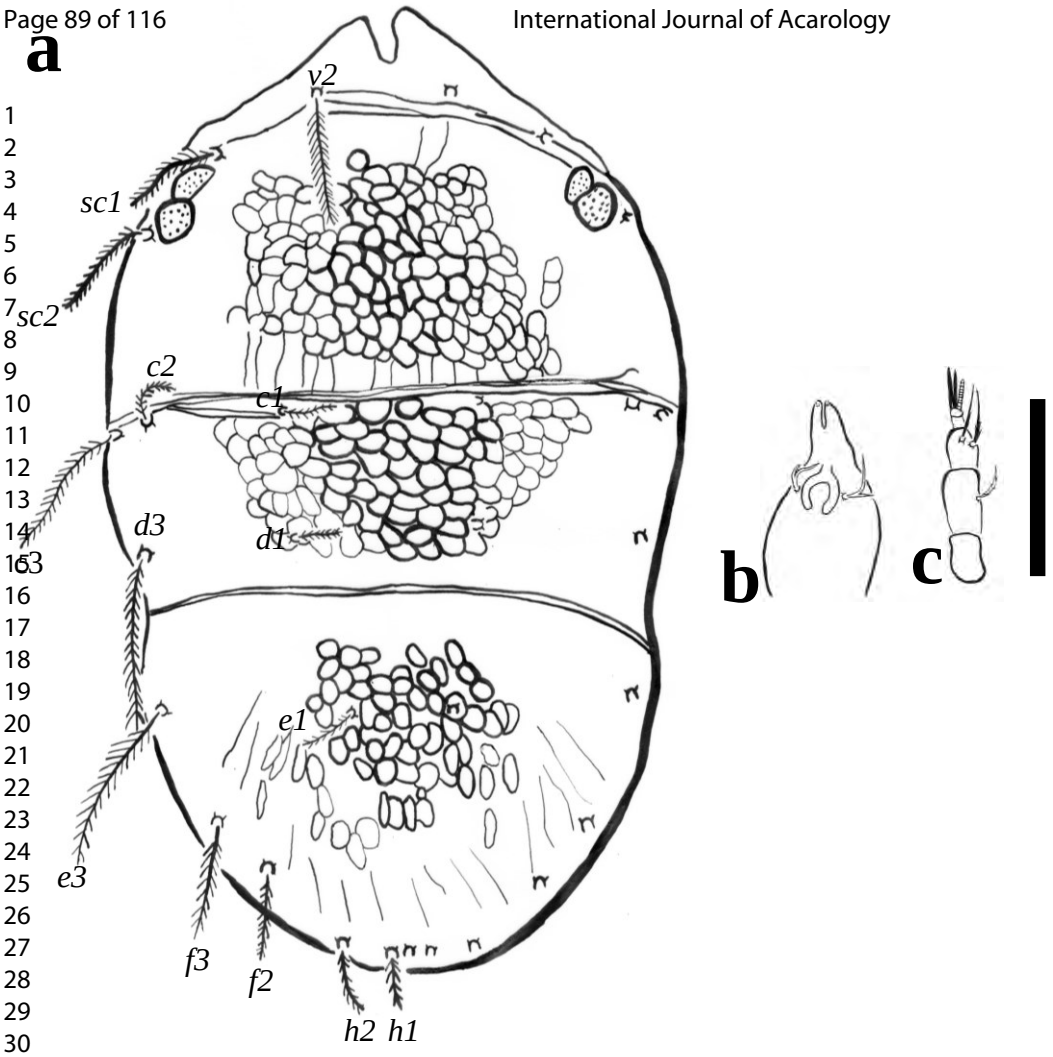

Figure 46. Drawings of adult male *C. pulcher*: a. dorsal habitus; b. subcapitulum; c. palp (scales 50 µm).

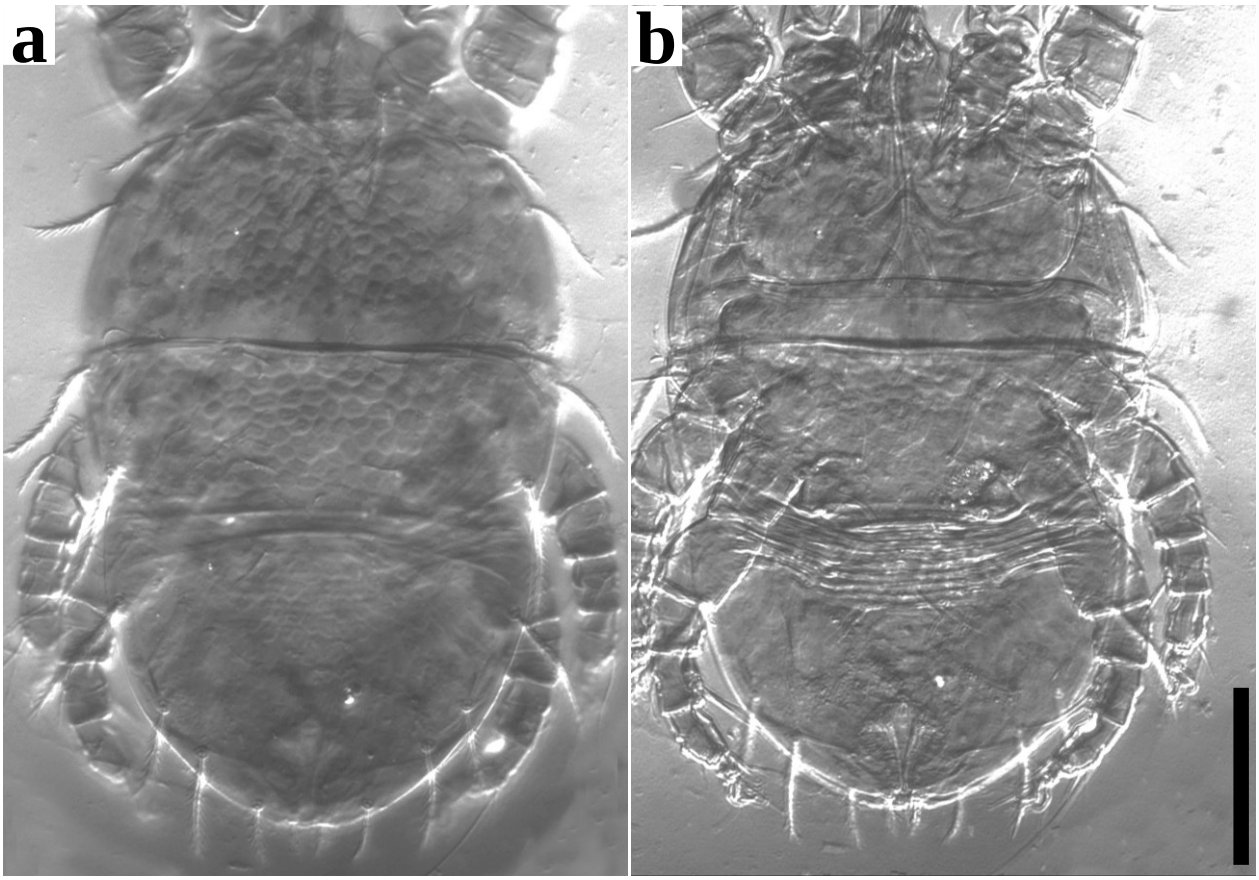

Figure 47. Differential Interference Contrast micrographs of adult male *C. pulcher*: a. dorsal habitus; b. ventral habitus (scales 50 µm).

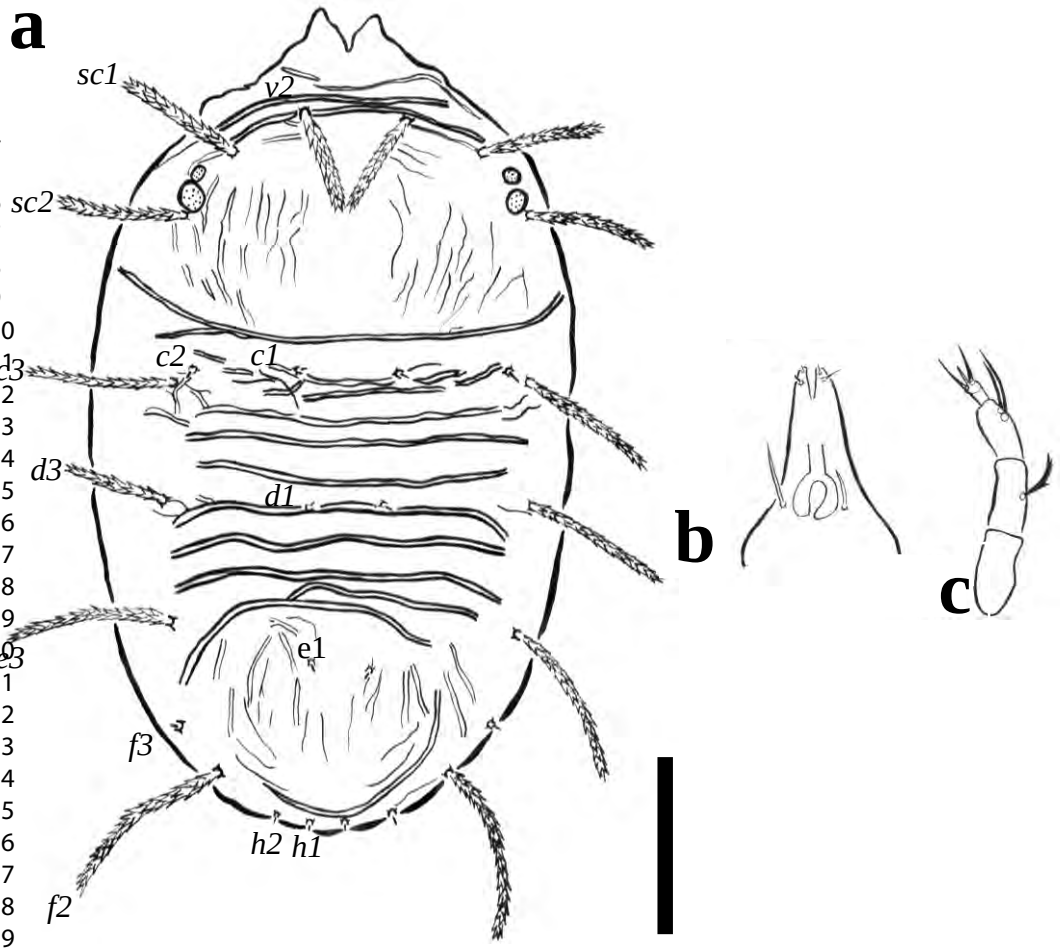

Figure 48. Drawing of deutonymph *C. pulcher*: a. of dorsal habitus; b. subcapitulum; c. palp (scales 50 µm).

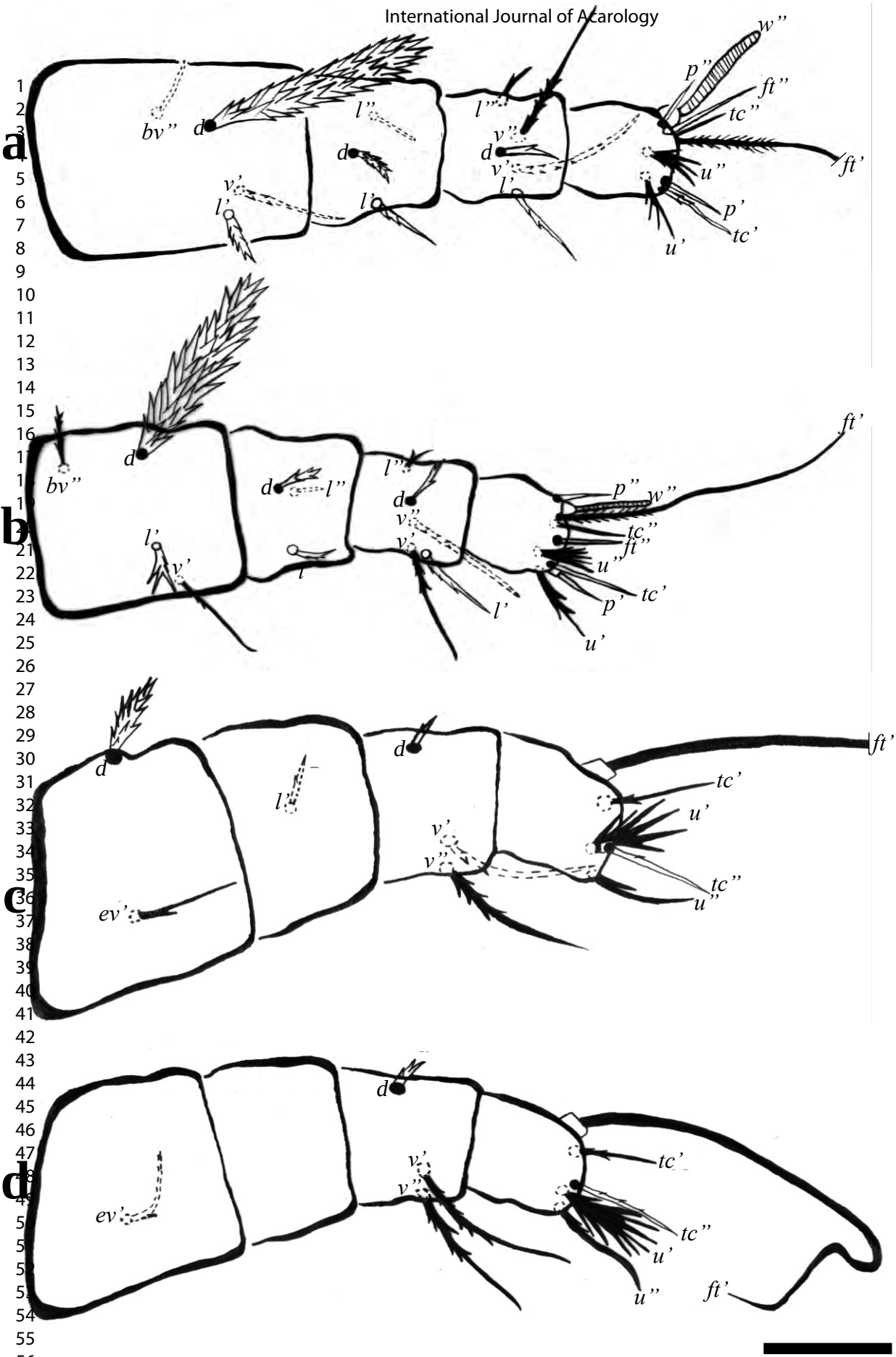

Figure 49. Drawings of legs of deutonymph *C. pulcher*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

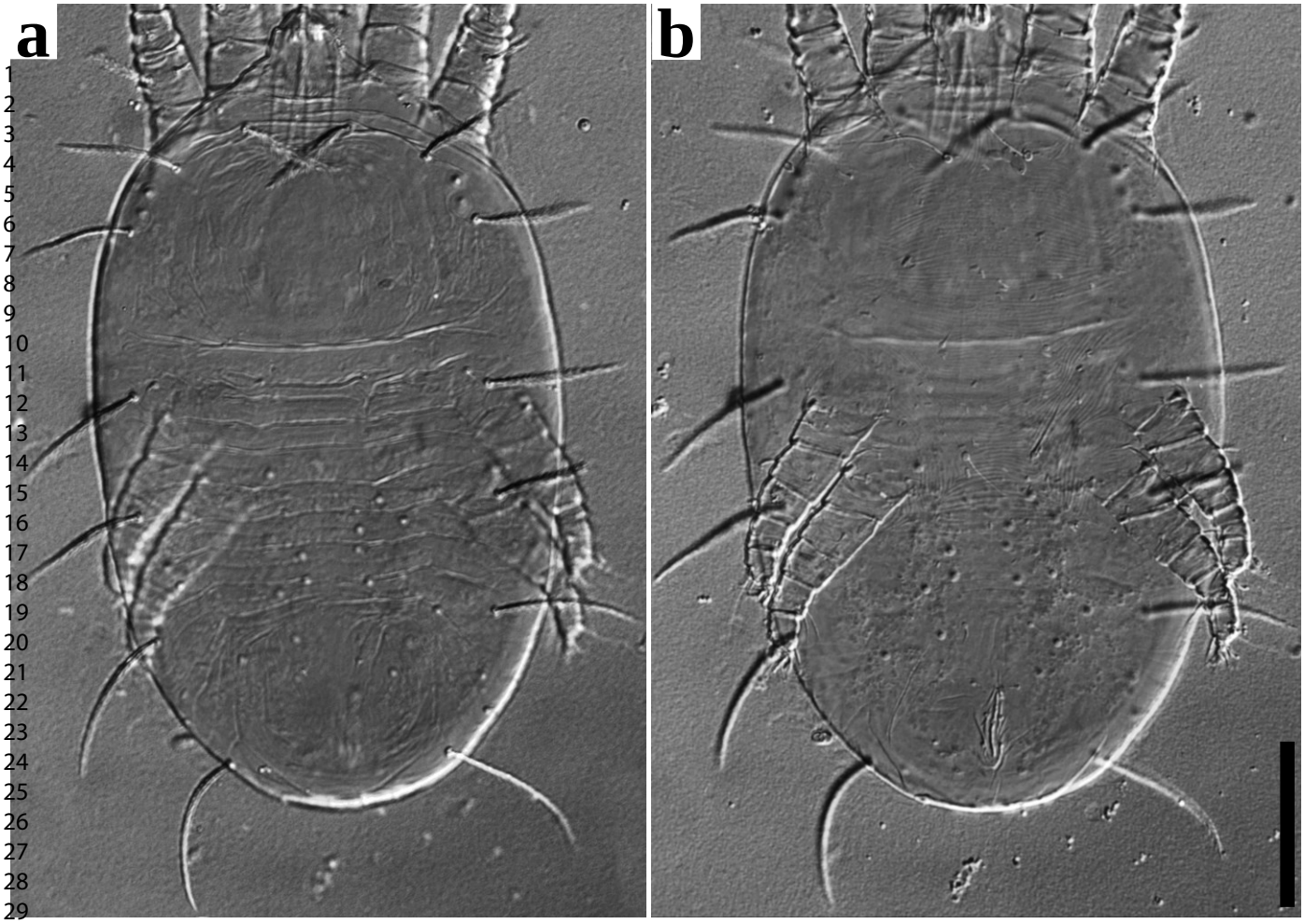

Figure 50. Differential Interference Contrast micrographs of deutonymph *C. pulcher*: a. dorsal habitus; b. ventral habitus (scales 50 µm).

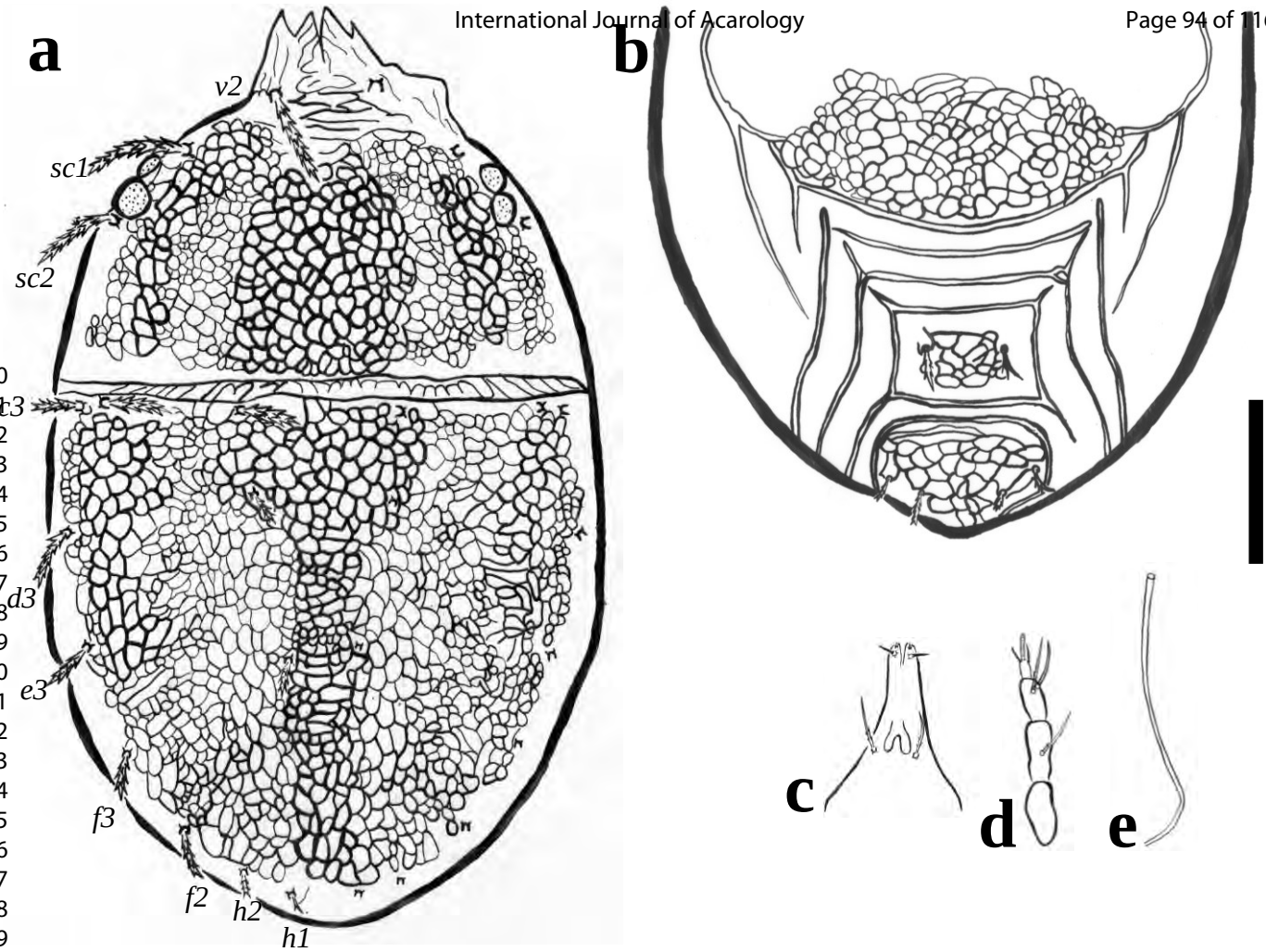

FIGURE 51. Drawings of adult female *C. ulmifolium*. a. dorsal habitus; b. ventral, genital, and anal plate; c. subcapitulum; d. palp; e. spermatheca (scales 50 µm).

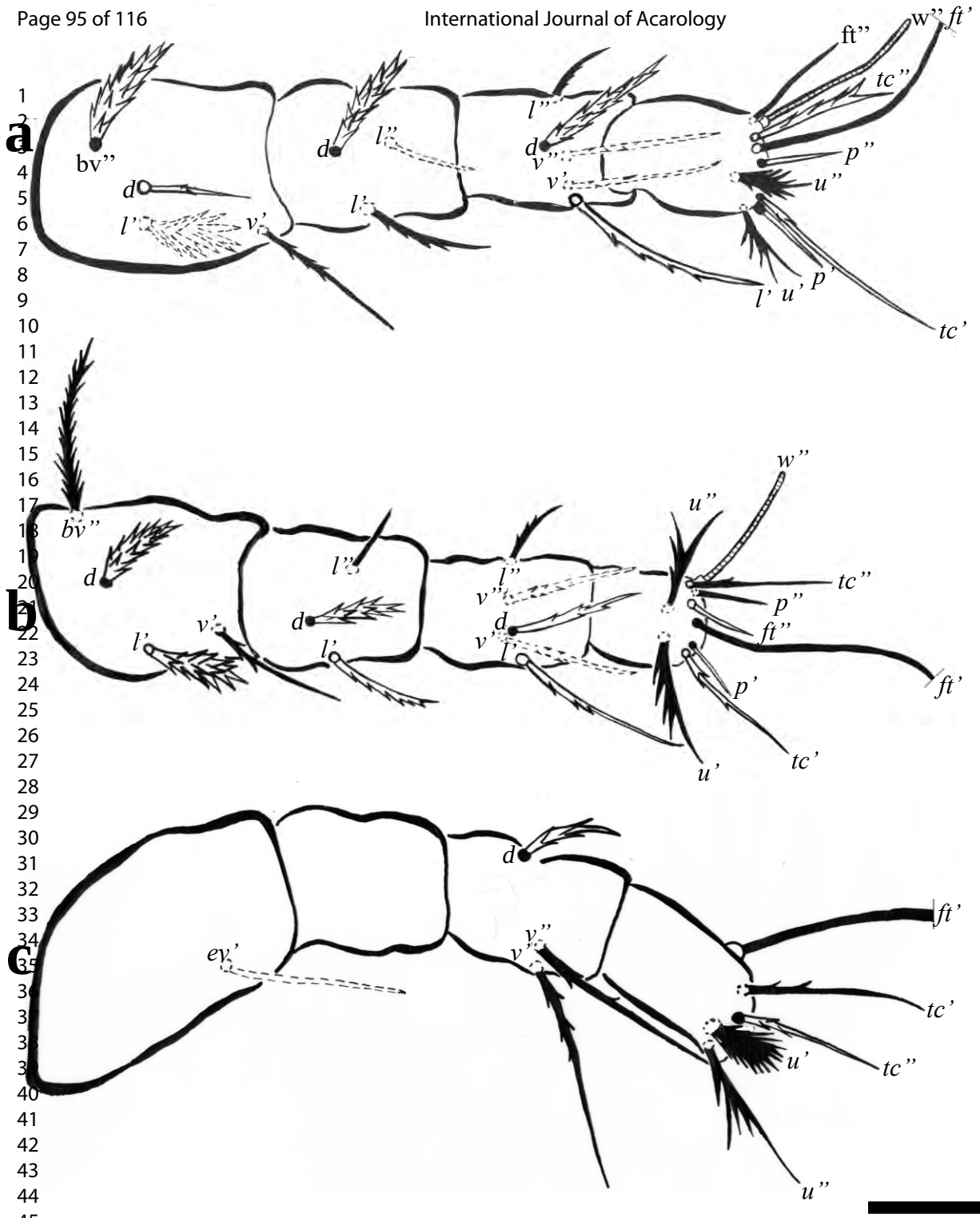

Figure 52. Drawings of legs of adult female *C. ulmifolius*: a. leg I; b. leg II; c. leg IV (scales 50 µm).

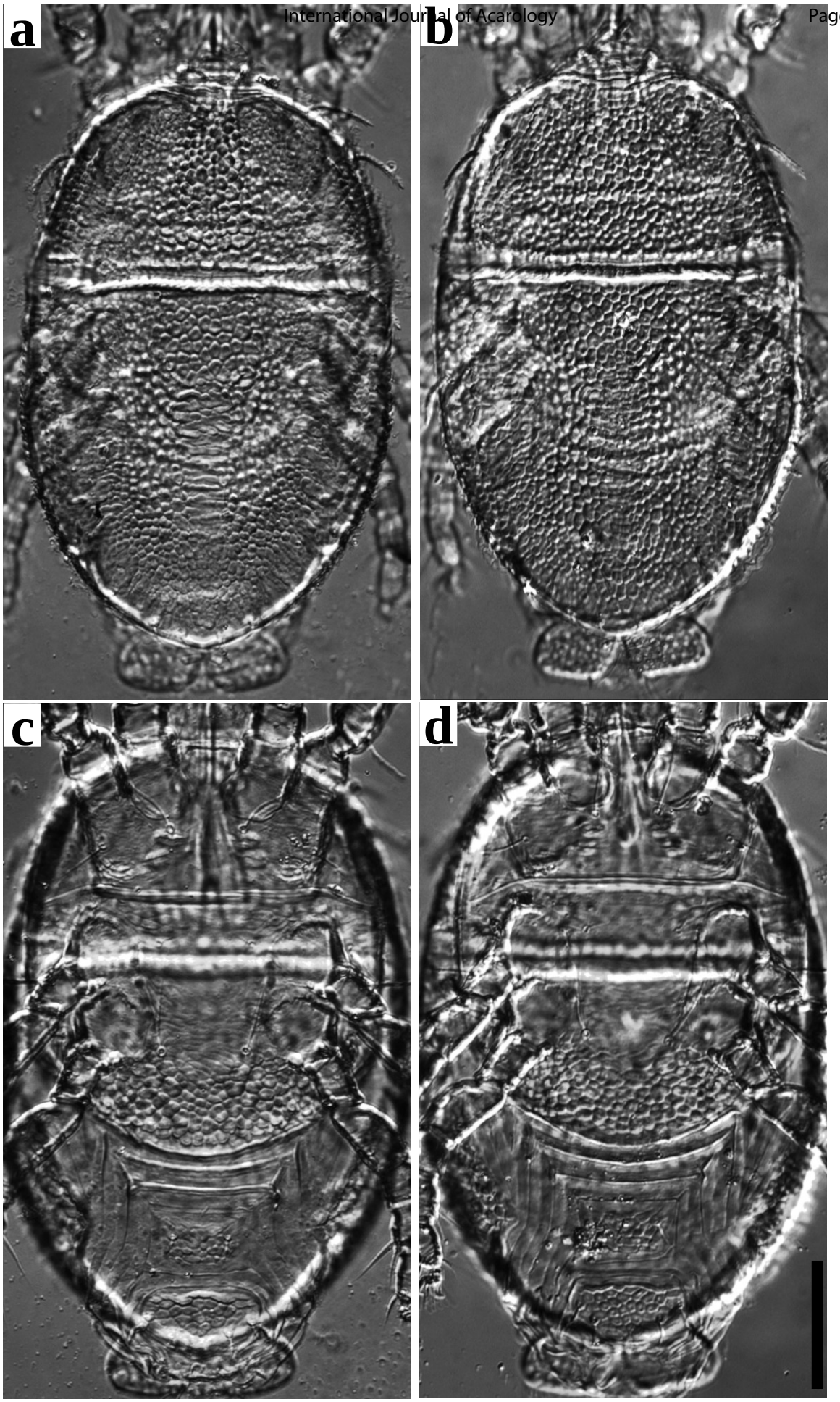

Figure 53. Differential Interference Contrast micrographs of adult females *C. ulmifolius*: a-c. dorsal and ventral habitus of specimens collected on *R. canina*; b-d. dorsal and ventral habitus of specimens collected on *R. ulmifolius* (scales 50 µm).

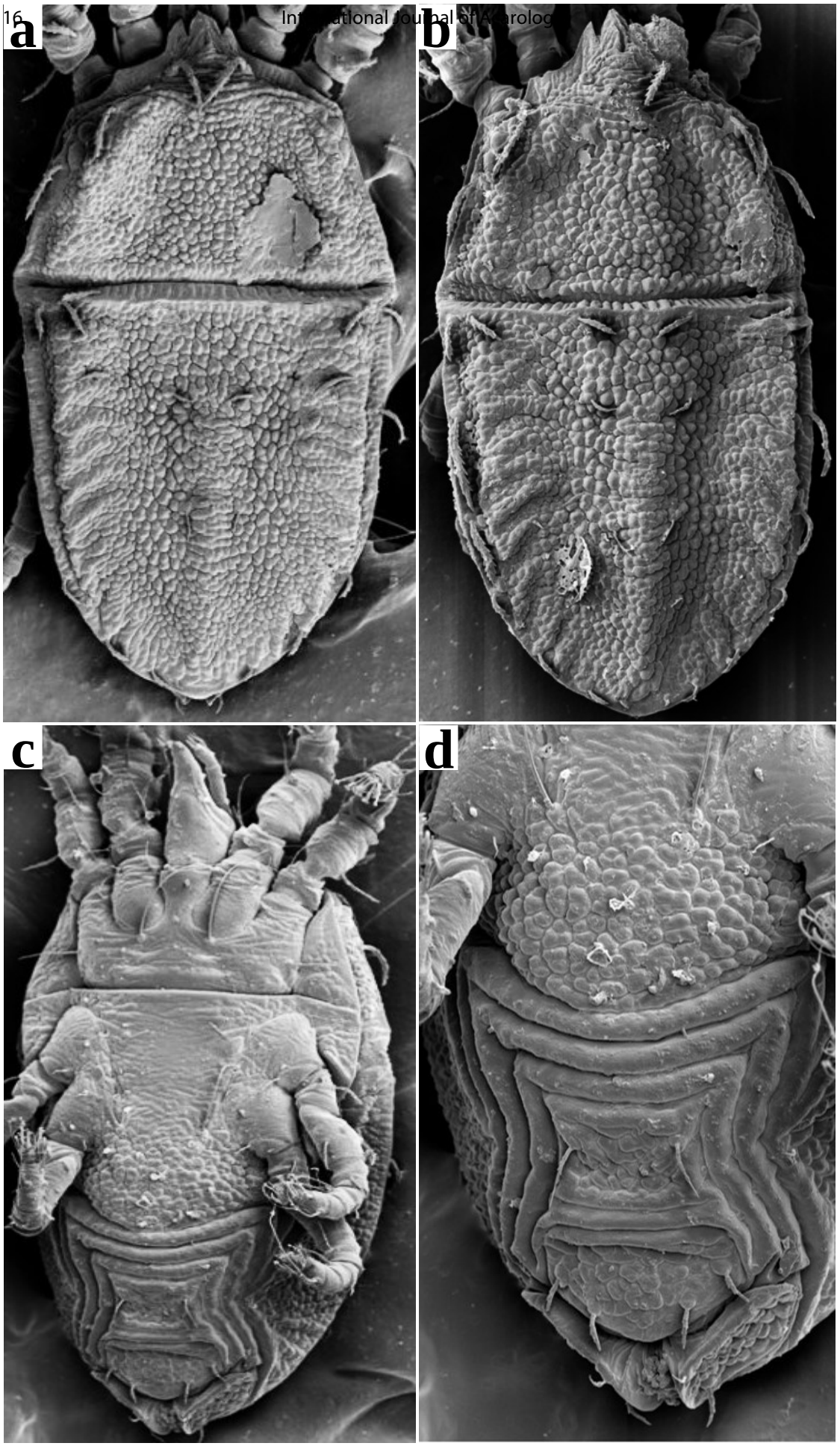

Figure 54. Adult females *C. ulmifolius* collected on *R. ulmifolius*: a-b. dorsal habitus; c-d. ventral habitus of specimens collected on *R. ulmifolius* (scales 50 µm).

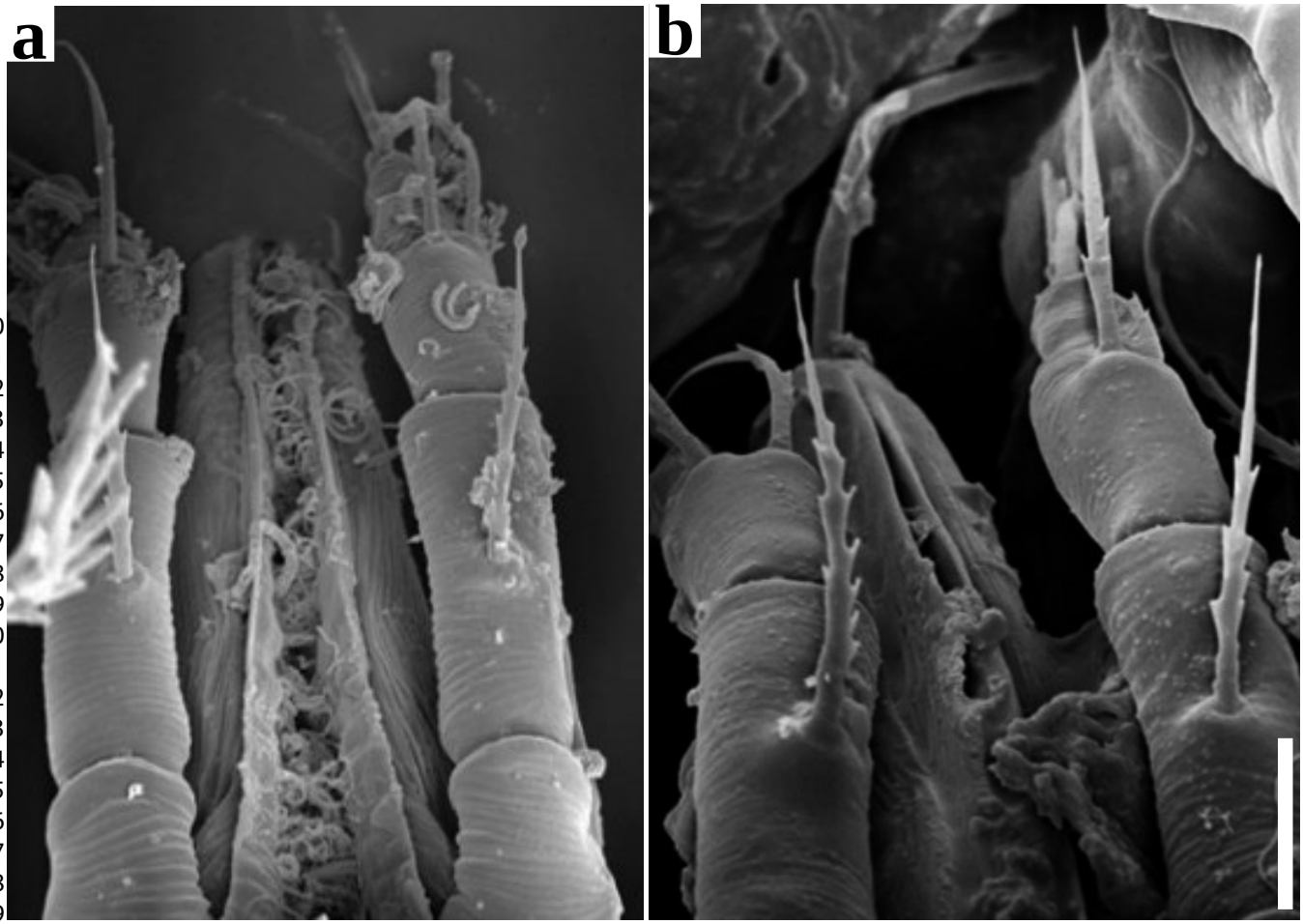

Figure 55. Femora setae on palps of adult females *C. ulmifolius* collected on *R. ulmifolius* (scales 50 µm).

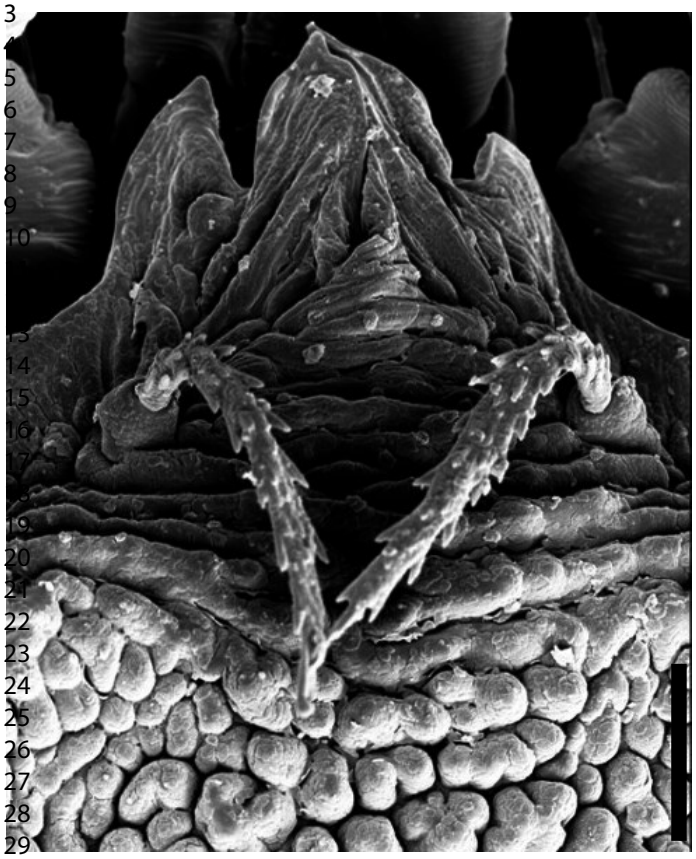

Figure 56. Shape of the setae *v2* of adult female *C. ulmifolius* (scales 50 µm).

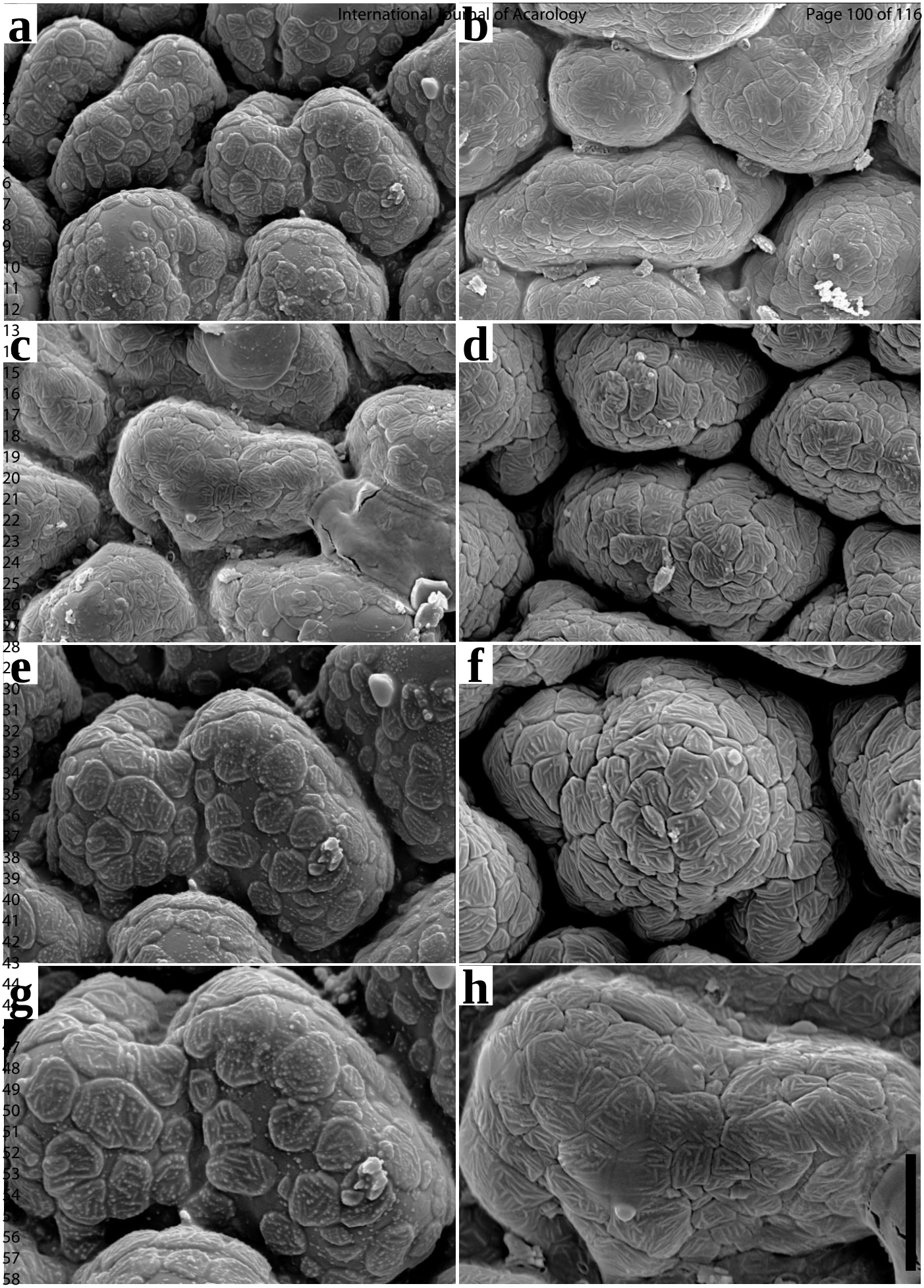

Figure 57. Microplates of adult female *C. ulmifolius* (scales 50 µm).

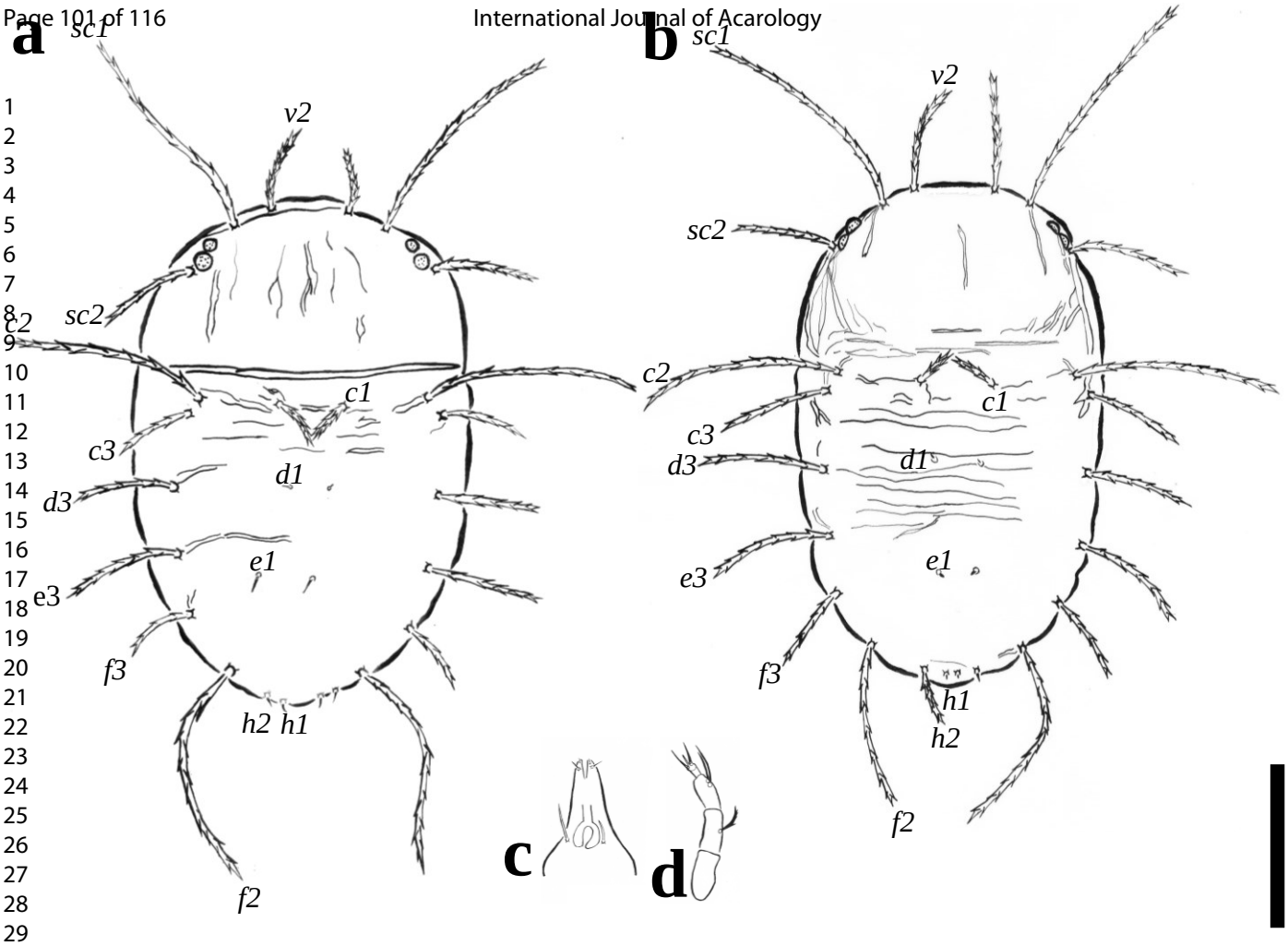

Figure 58. Drawings of deutonymphs *C. ulmifolius* collected on *R. ulmifolius*. a-b. setae *d1-d1* and *h1-h1* are characterized by heterometry; c. subcapitulum; d. palp (scales 50 µm).

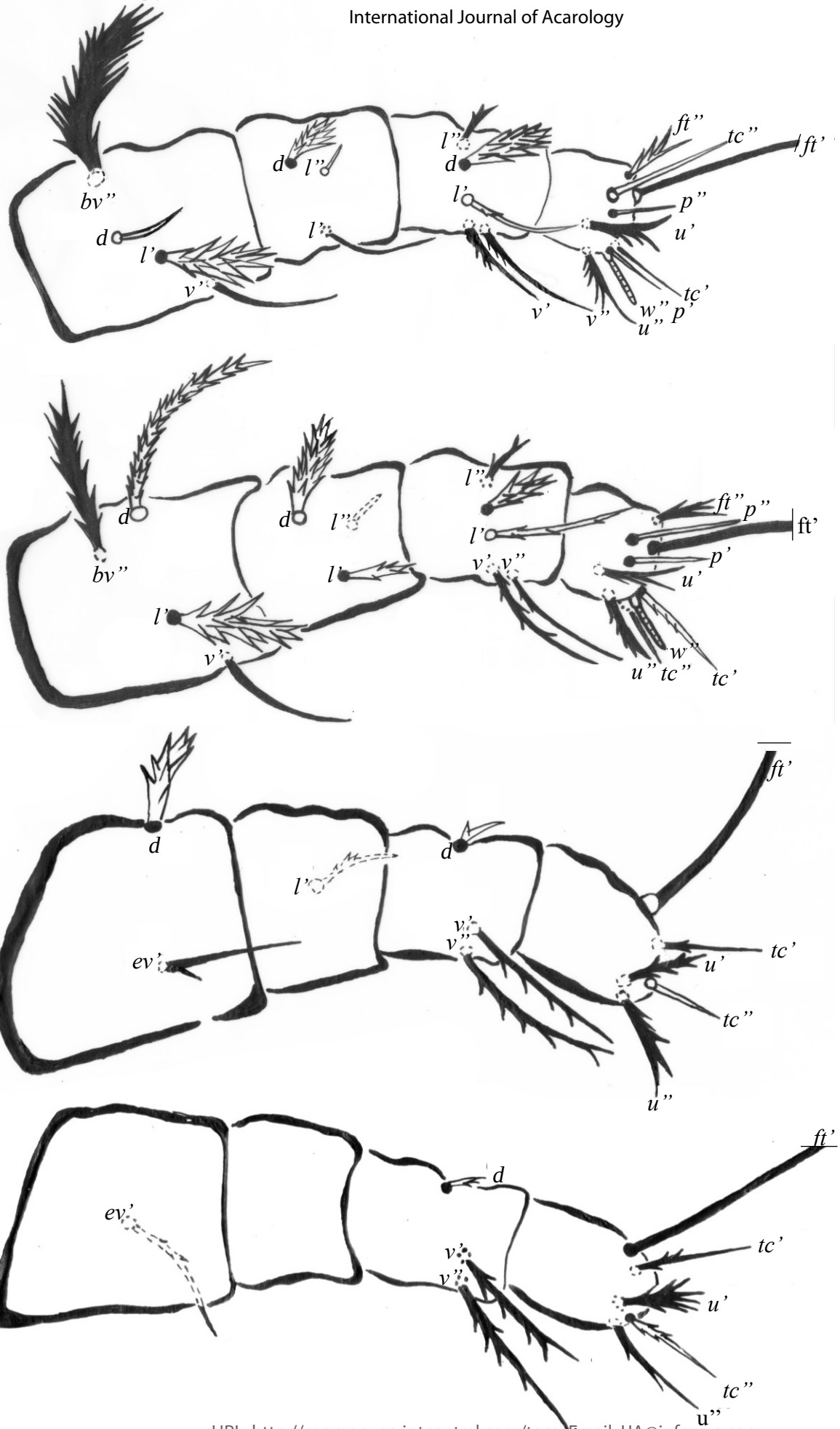

Figure 59. Drawings of legs of deutonymph *C. ulmifolius*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

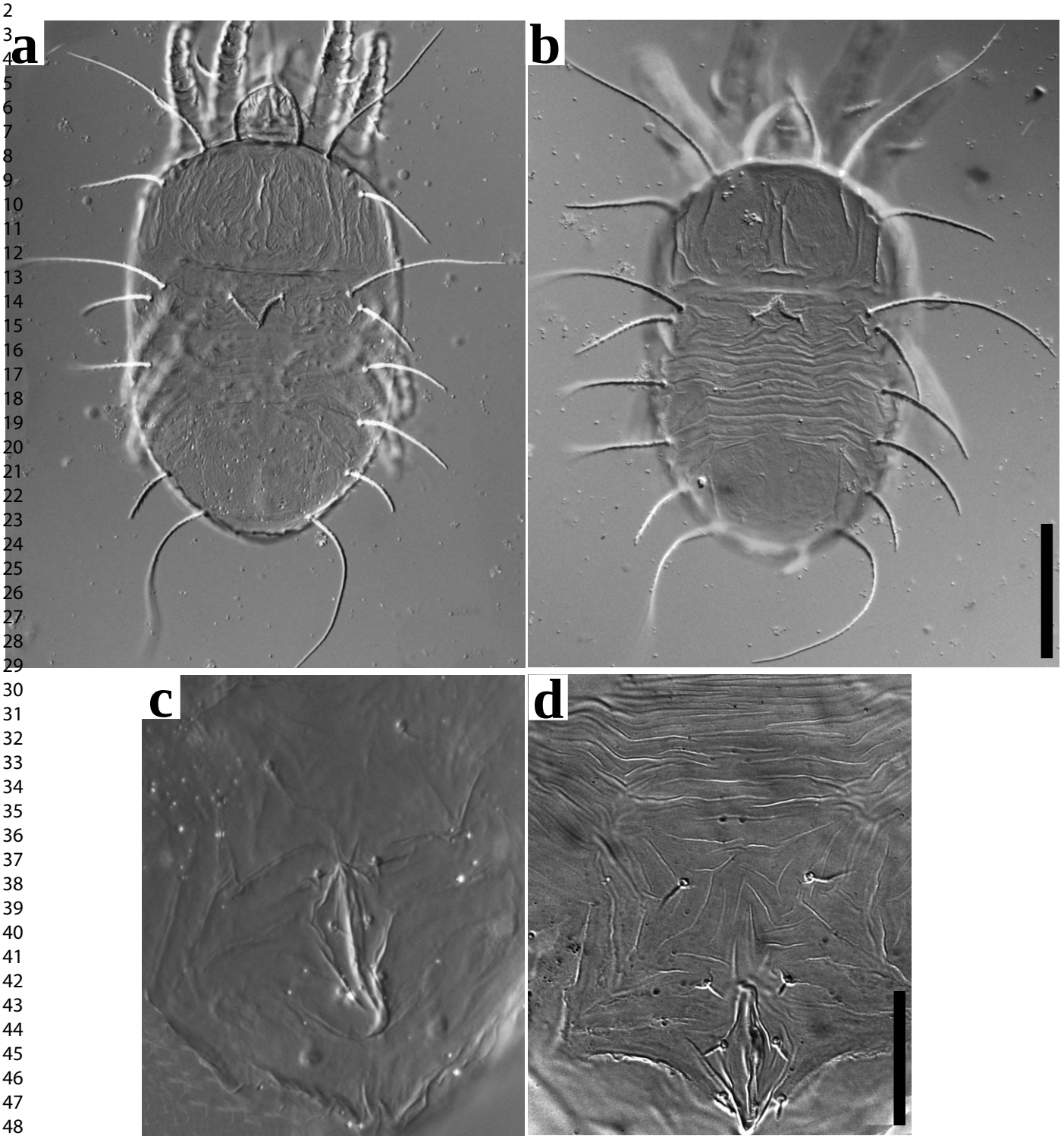

Figure 60. Differential Interference Contrast micrographs of adult females *C. ulmifolius*: a-c. dorsal and ventral habitus of specimens without heterometry; b-d. dorsal and ventral habitus of specimens characterized by heterometry (scales 50 µm).

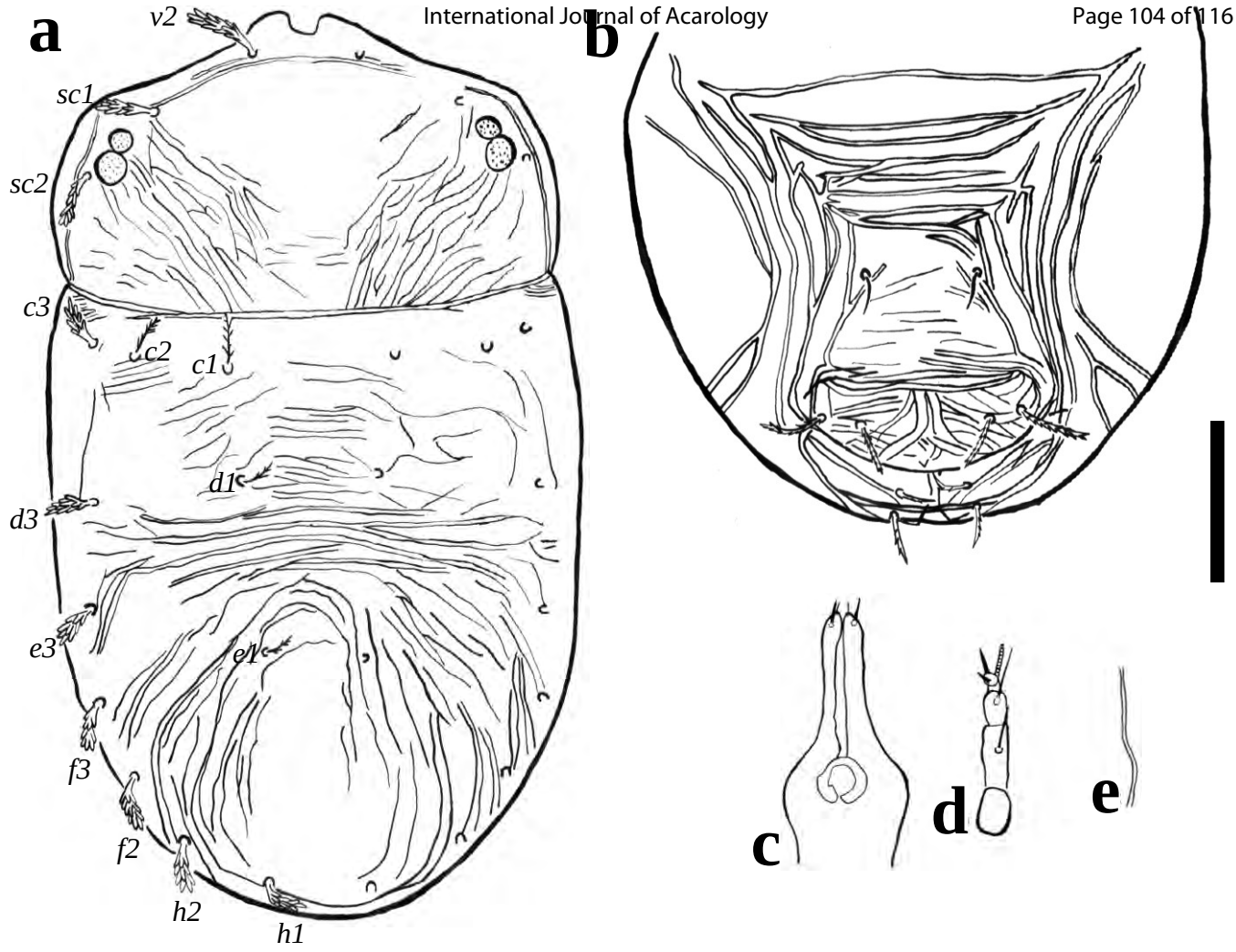

FIGURE 61. Drawings adult female *C. wainsteini*: a. dorsal habitus; b. ventral, genital, and anal plate; c. subcapitulum; d. palp; e. spermatheca (scales 50 µm).

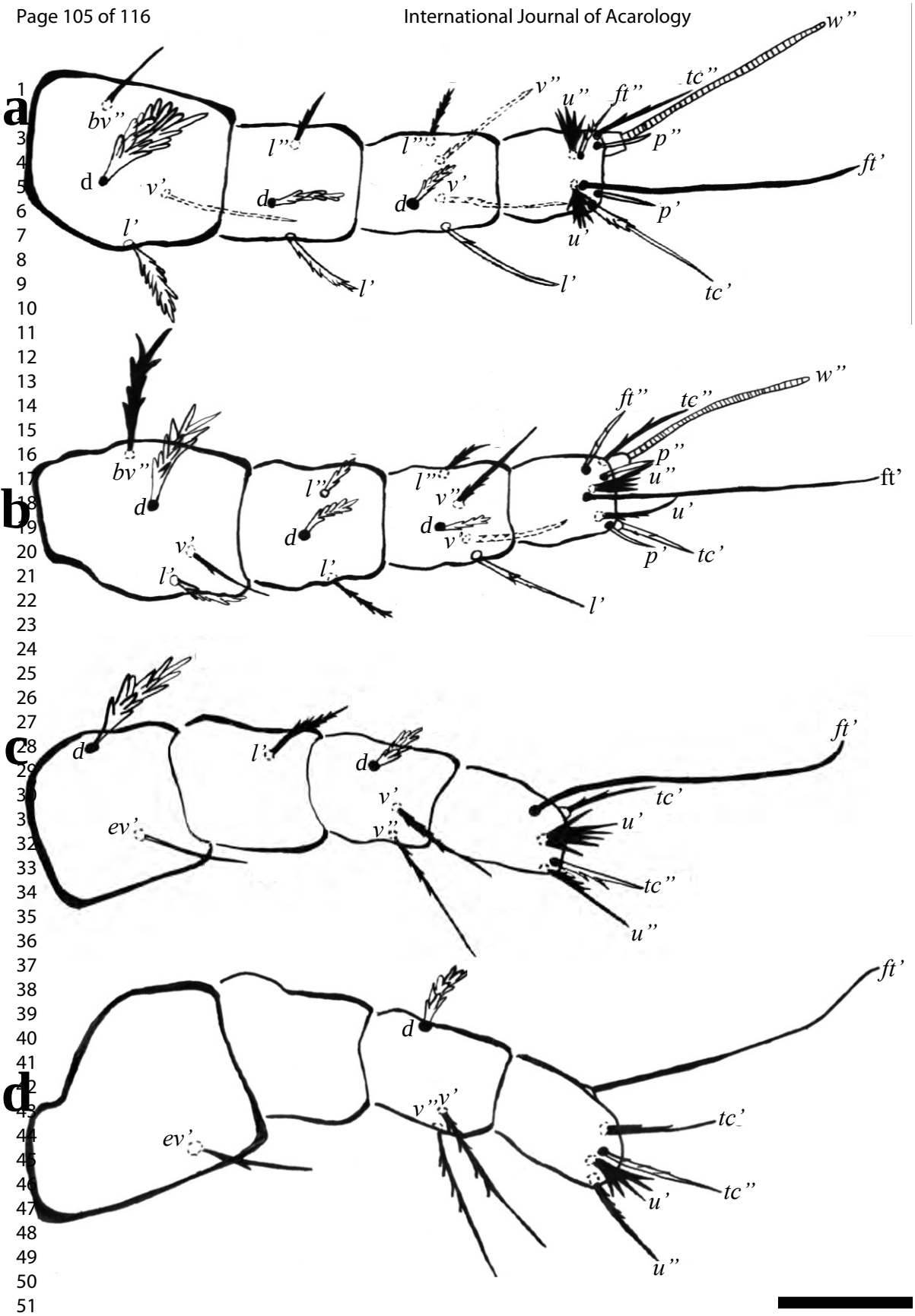

Figure 62. Drawings of legs adult female *C. wainsteini*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

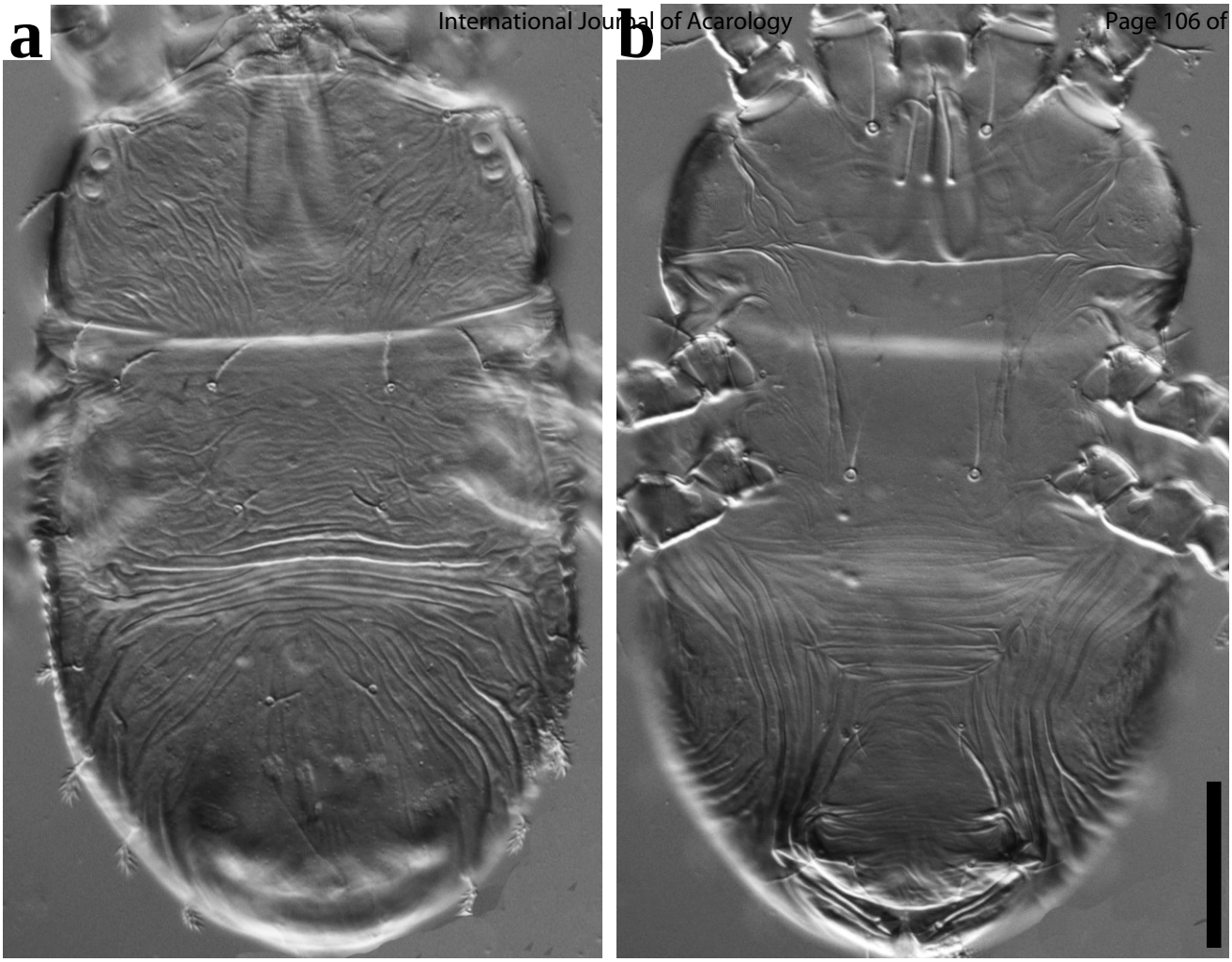

Figure 63. Differential Interference Contrast micrographs of adult female *C. wainsteini*: a. dorsal habitus; b. ventral habitus (scales 50 µm).

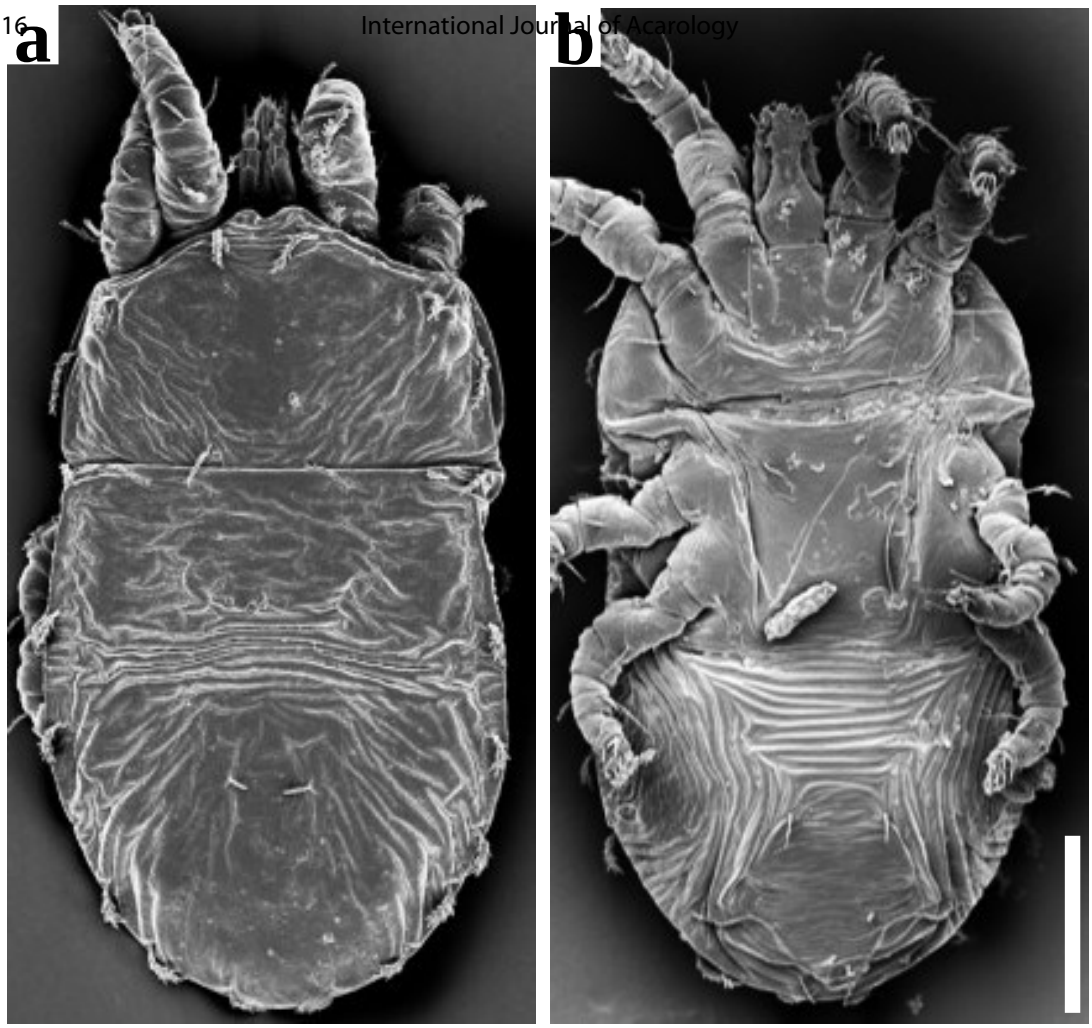

Figure 64. Dorsal and ventral habitus of adult female *C. wainsteini* (scales 50 µm).

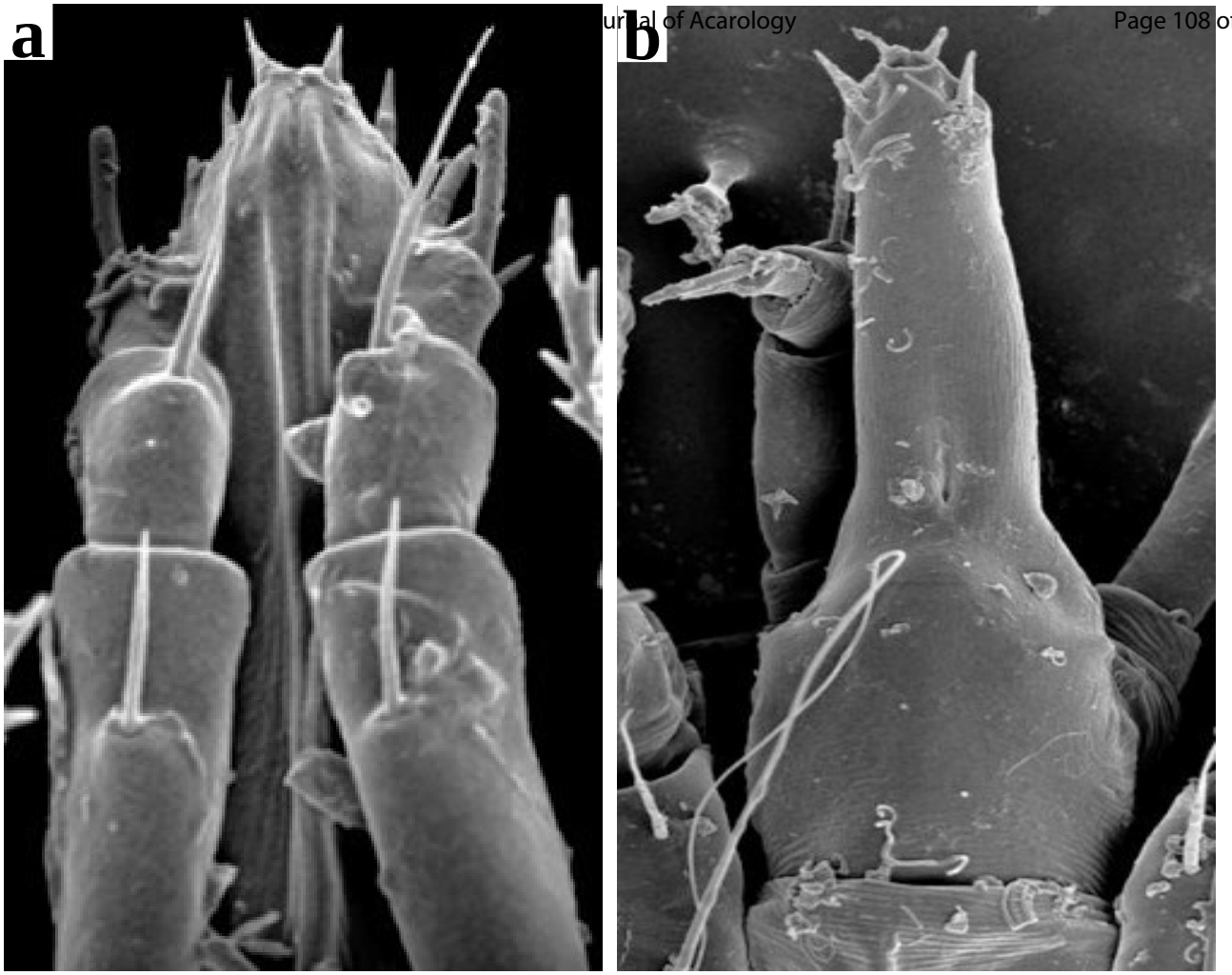

FIGURE 65. Femora setae and subcapitulum of adult female *C. wainsteini* (scales 50 µm).

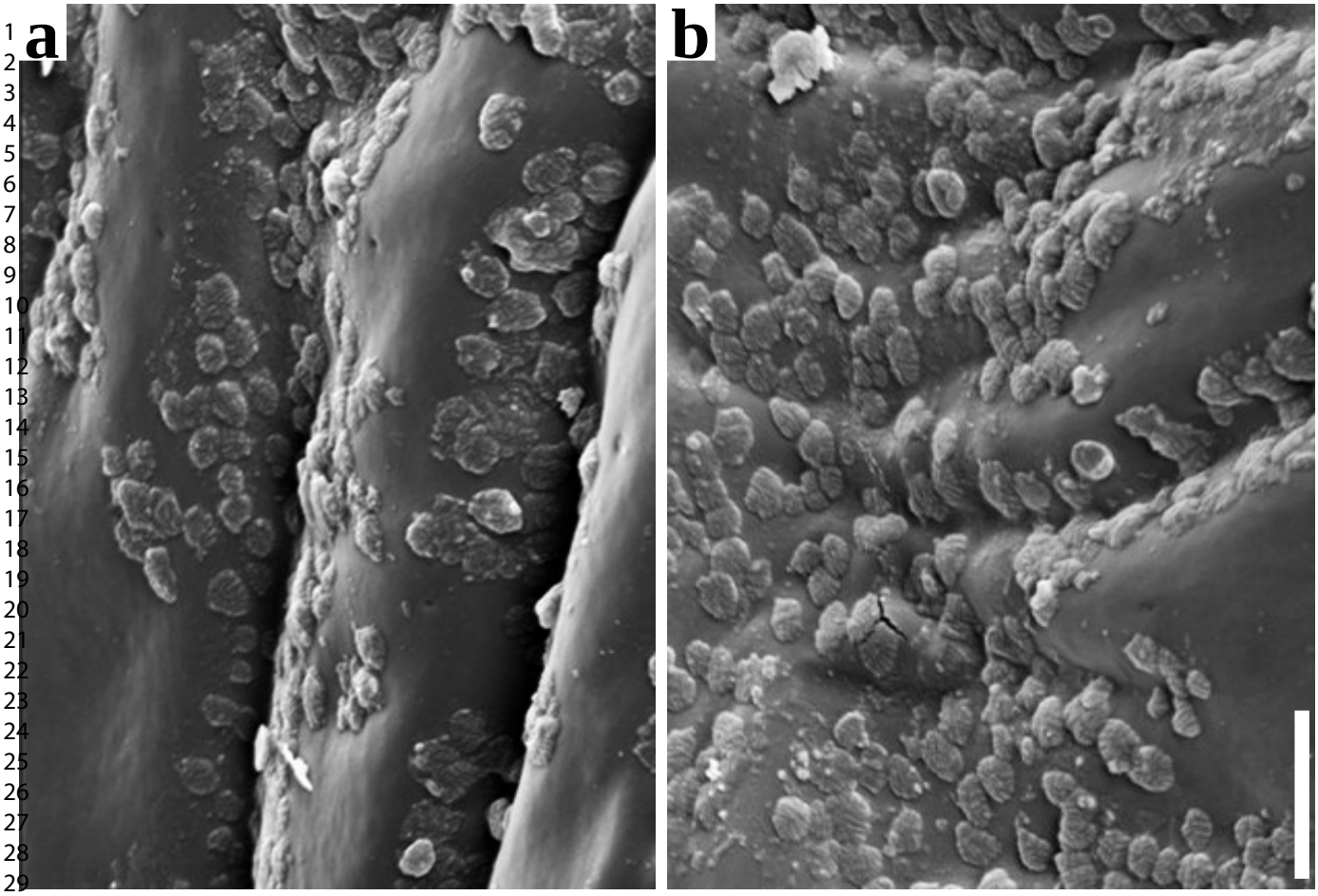

Figure 66. Microplates of adult females *C. wainsteini* (scales 50 µm).

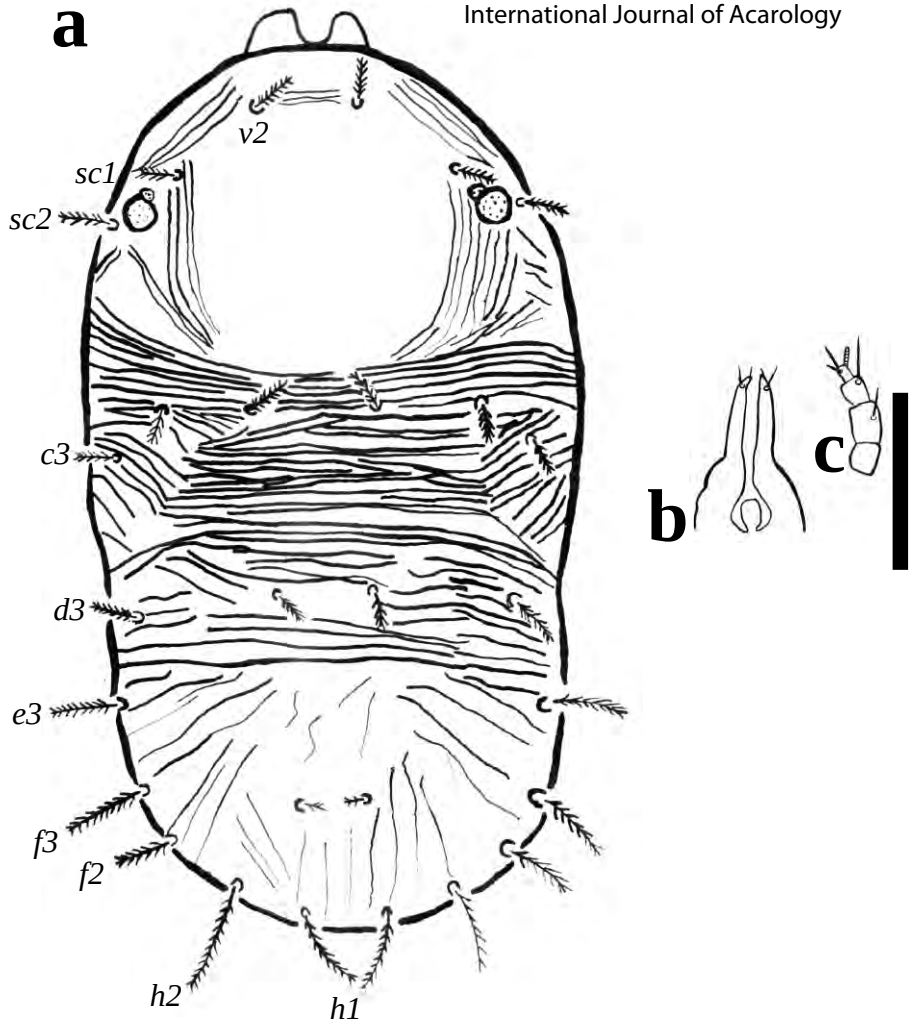

Figure 67. Drawing of dorsal habitus of *C. wainsteini* deutonymph; b. subcapitulum; c. palp (scales 50 µm).

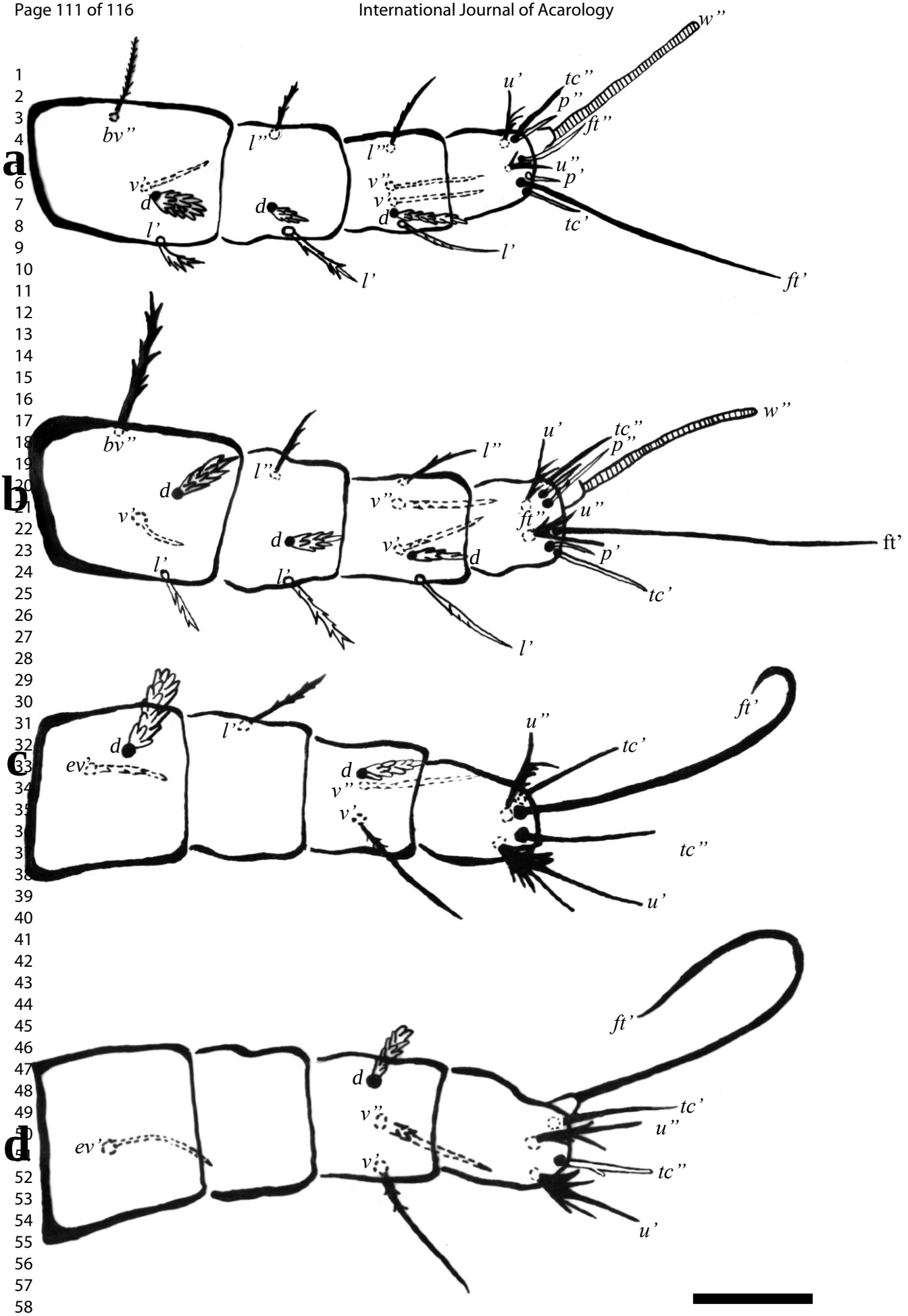

Figure 68. Drawings of legs deutonymph *C. wainsteini*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

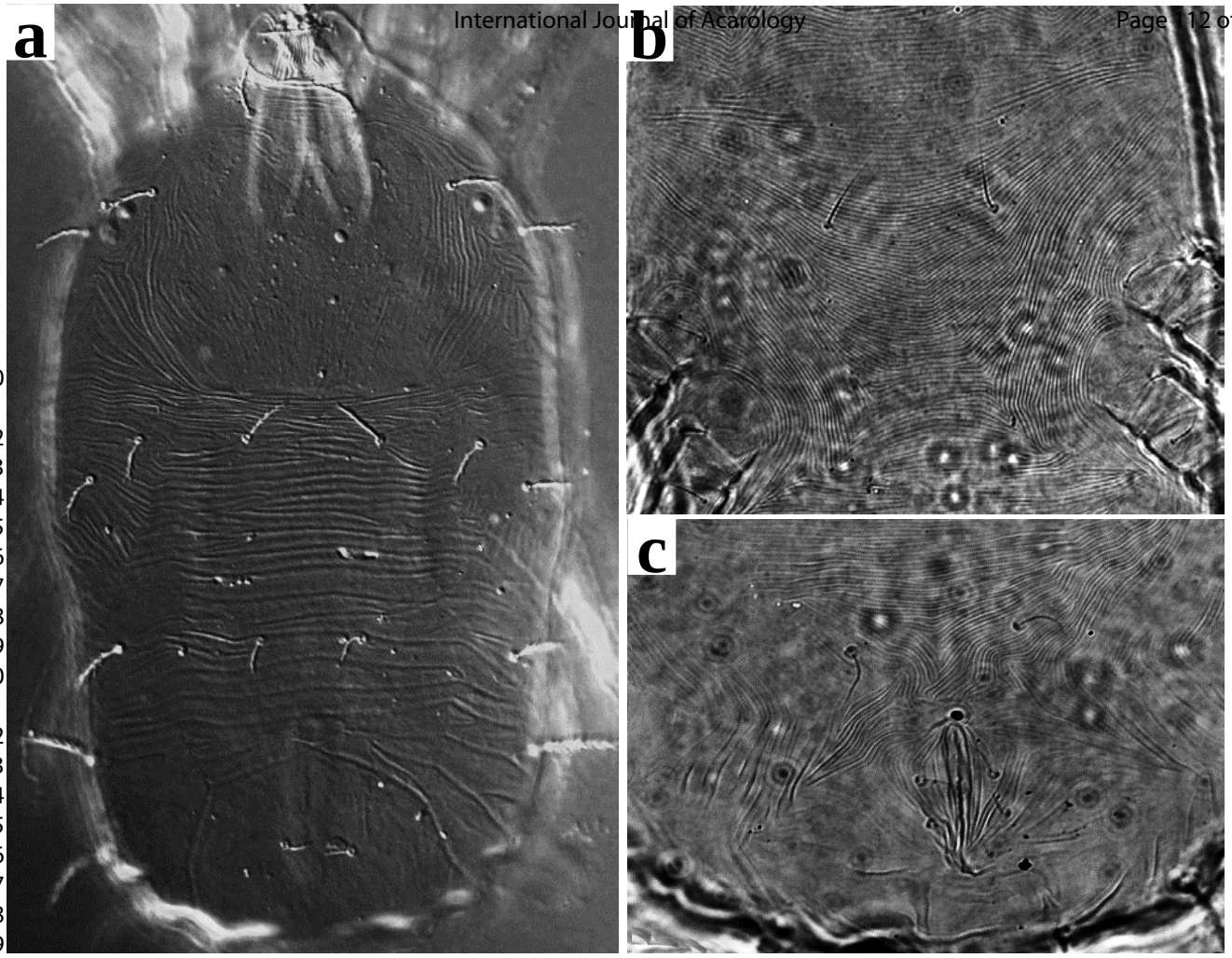

Figure 69. Differential Interference Contrast micrographs of deutonymph *C. wainsteini*: a. dorsal habitus; b. ventral habitus; c. ventral habitus (scales 50 µm).

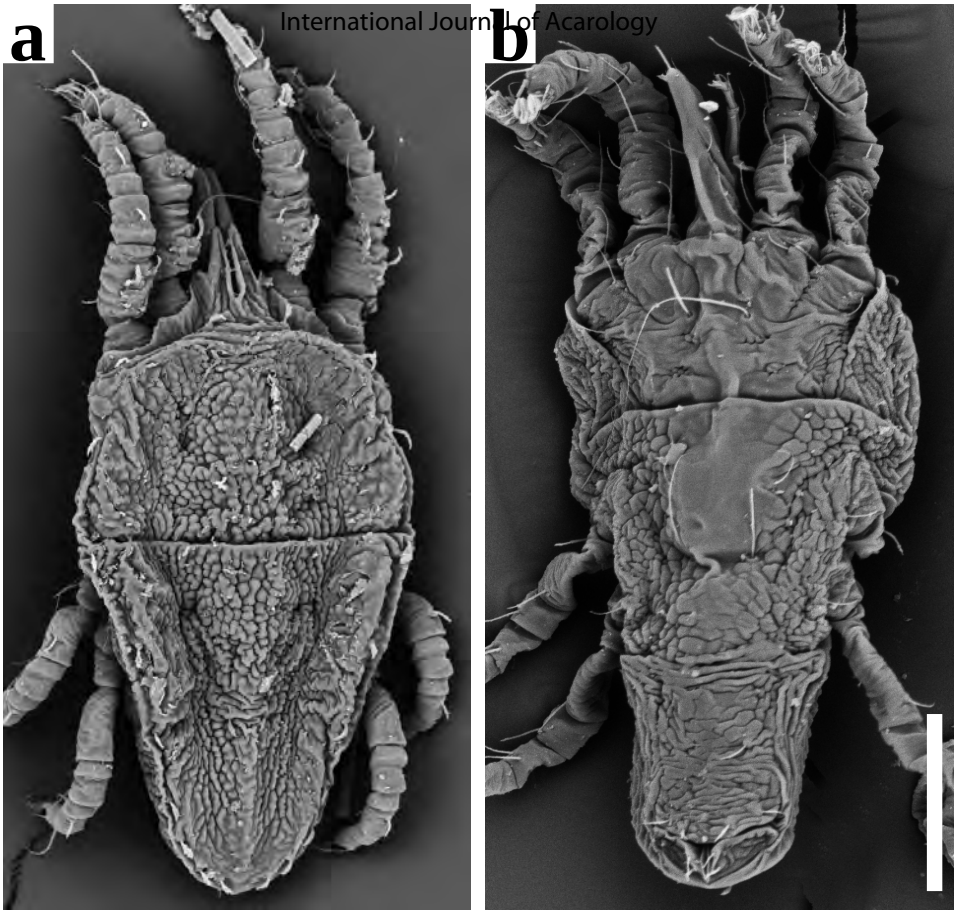

Figure SM 1. Dorsal and ventral habitus of adult female *B. olivicola* (scales 5 µm).

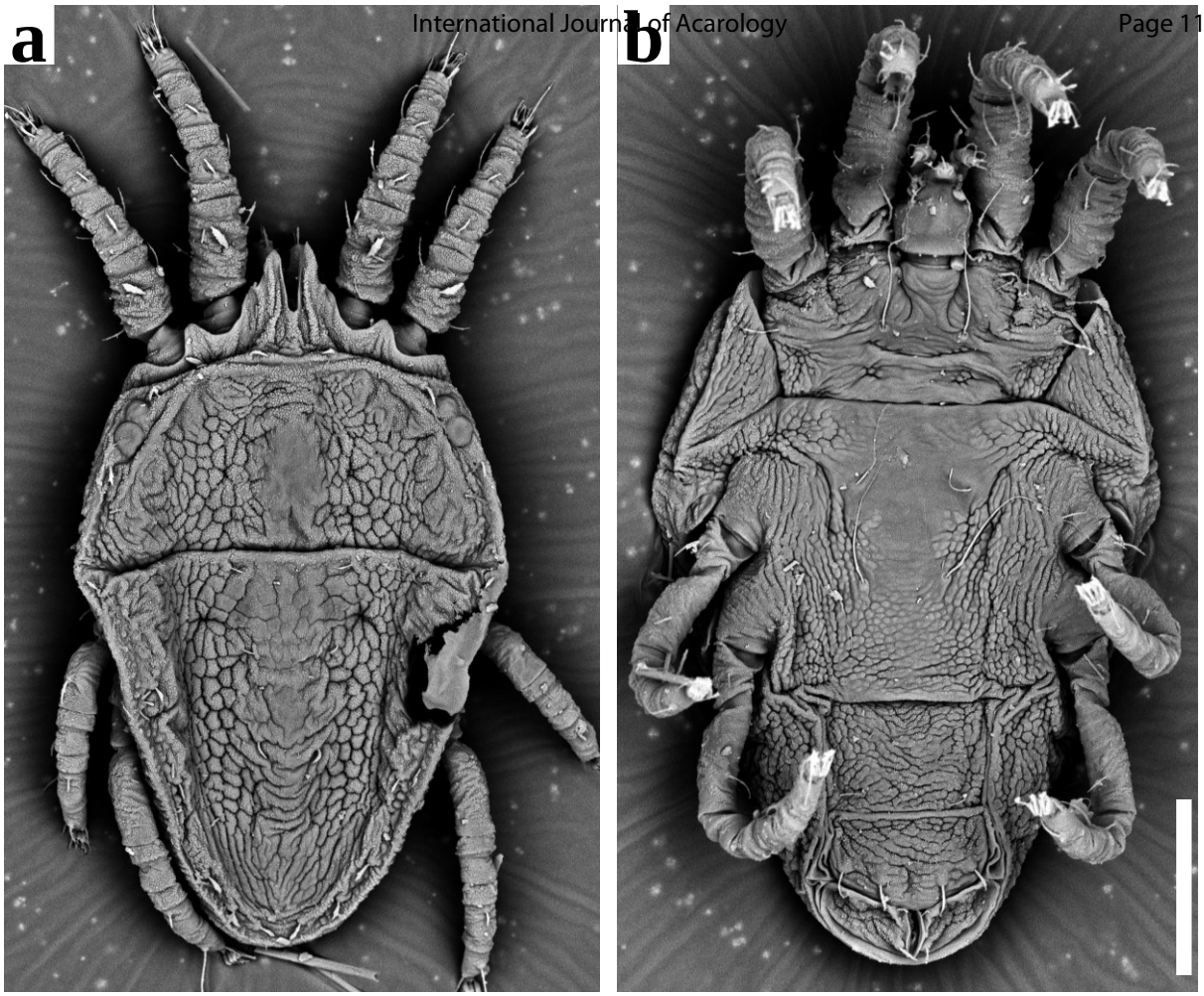

Figure SM 2. Dorsal and ventral habitus of adult female *B. obovatus* (scales 50 µm).

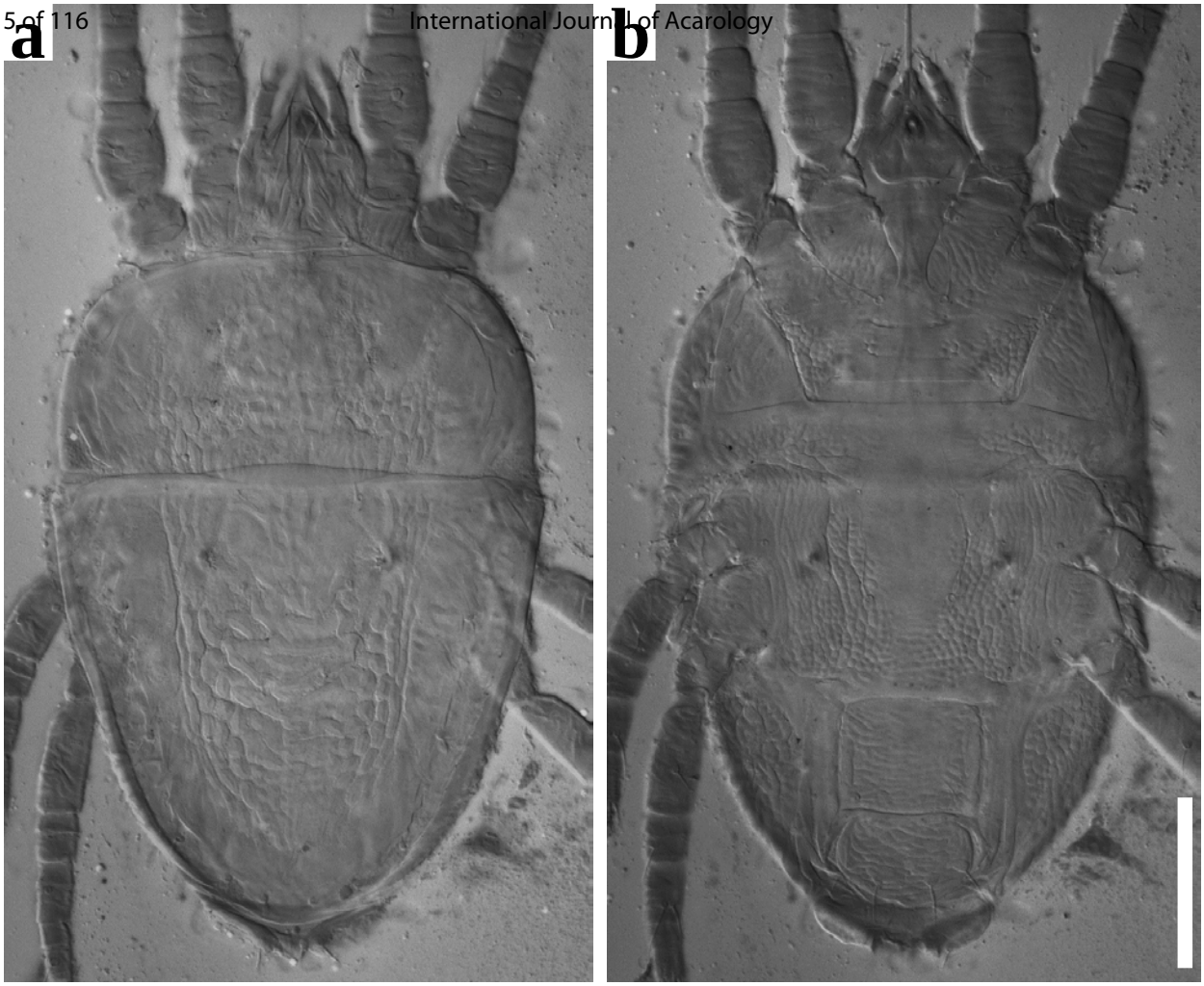

Figure SM 3. Differential Interference Contrast micrographs of adult females *C. papayensi* (scales 50 µm).

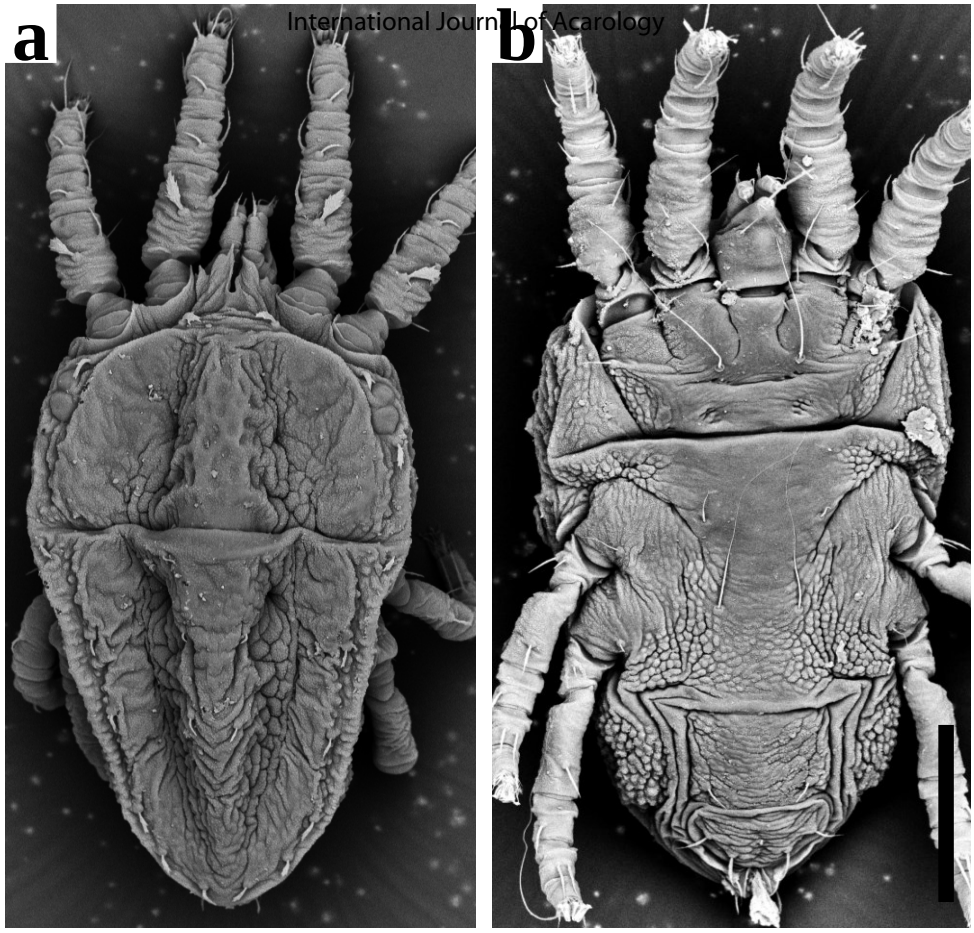

Figure SM 4. Dorsal and ventral habitus of adult female *B. yothersi* (scales 50 µm).

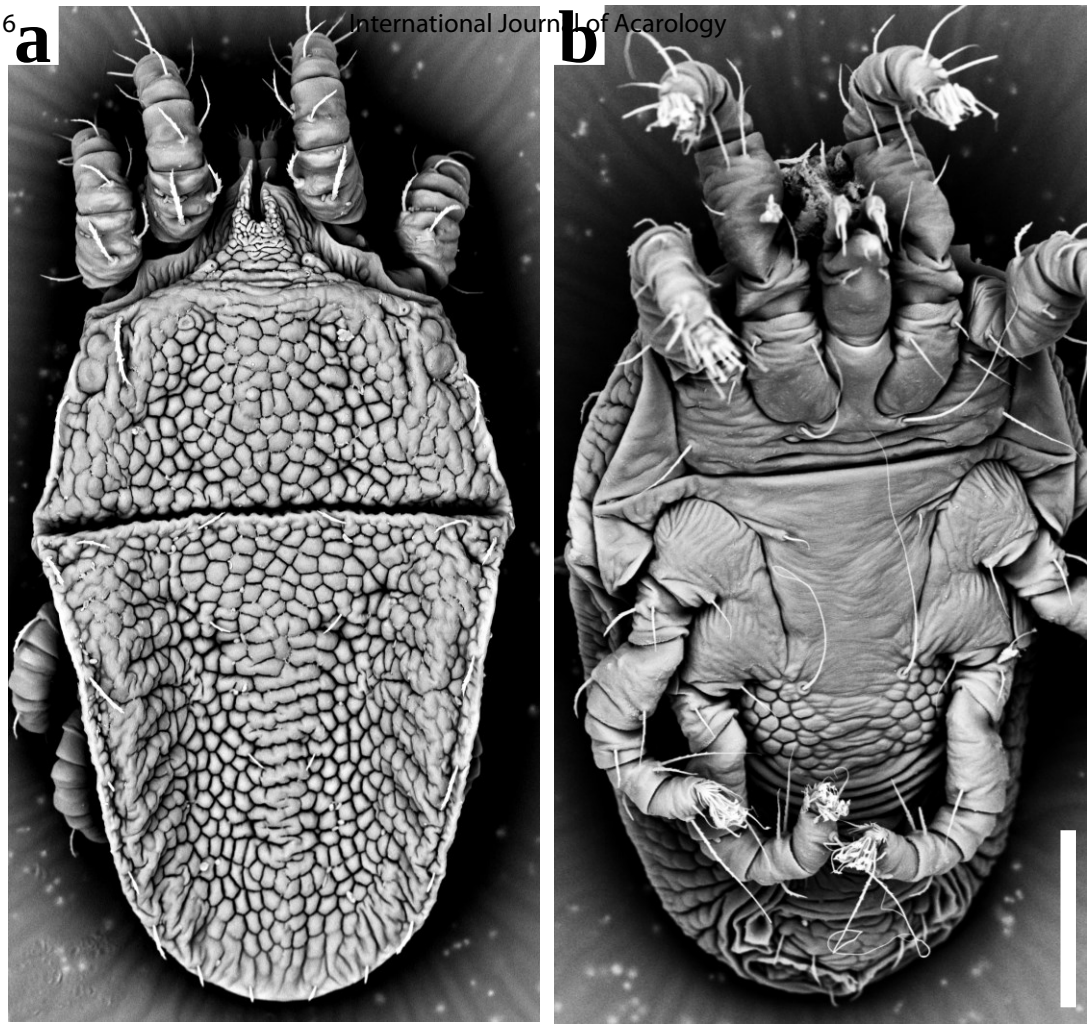

Figure SM 5. Dorsal and ventral habitus of adult female *C. spinosus* (scales 50 µm).