

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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Keywords:	Acari, Mediterranean area, Brevipalpus, Pentamerismus, Tenuipalpus, Microscopy, Taxonomy, Interceptions, Trombidiformes, Europe, Americas, phytophagous pests

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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)

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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* Donnadeiu 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* Donnadeiu, 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 *Cenopalpus* 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

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3 45 management for tenuipalpid mites, understanding the fauna composition, and constructing
4 46 preparedness strategies for quarantine purposes.
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6 47 **Key words.** Acari, Flat mites, Mediterranean area, *Brevipalpus*, *Pentamerismus*, *Tenuipalpus*
7 48 microscopy, taxonomy, **interceptions**, **Trombidiformes**, **Europe**, **Americas**, phytophagous pests



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50 **Introduction**
11 51 The family Tenuipalpidae in Italy has primarily been studied by Antonio Berlese, Riccardo
12 52 and Giovanni Canestrini, Marisa Castagnoli, Lippo Fanzago, Giocondo Lombardini and Fausta
13 53 Pegazzano (Prasad 1982). In recent years, the economic importance of the Tenuipalpidae stems
14 54 from their global impact and their increased interceptions in international trade on plants (see De
15 55 Giosa et al. 2021a). Despite their importance, no extensive research has been conducted on these
16 56 mites in Italy. Consequently, a knowledge gap exists regarding the current status of tenuipalpid
17 57 mites found in Italy. Furthermore, the economic importance of this family has increased
18 58 significantly as recent studies have shown that some flat mites have the ability to transmit viruses
19 59 (de Lillo et al. 2021).

20
21 60 The first Italian checklist of the family Tenuipalpidae was published by Bernini et al. in
22 61 1995, encompassing a total of 4 genera and 20 species. This checklist was comprised of ten species
23 62 from the genus *Brevipalpus* Donnadieu, six from the genus *Cenopalpus* Pritchard and Baker, three
24 63 from the genus *Tenuipalpus* Donnadieu, and one species of the genus *Pentamerismus* McGregor.
25 64 In addition to these records, a misidentification occurred in the checklist where *Acarus mori*
26 65 (Rondani 1970) was inaccurately listed as *Raoiella mori*. Later, Castagnoli and Nannelli (2003)
27 66 provided the first update to the checklist, adding one species to *Cenopalpus* and *Pentamerismus*,
28 67 resulting in a modest increase of 21 tenuipalpid species recorded in Italy. Between 2021 and 2023,
29 68 a series of studies contributed to an increased number of 28 tenuipalpids documented in Italy (De
30 69 Giosa et al. 2021a, 2021b, 2022).

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32 70 The current study primarily aims to describe a new species of *Cenopalpus* from Italy, to
33 71 update the Italian checklist of the family Tenuipalpidae reporting new species records.
34 72 *Cenopalpus* mostly occurs in the Western Palearctic and Oriental zoogeographical regions (Mesa
35 73 et al. 2009, Castro et al. 2023), but despite its distribution, this genus is not well documented in
36 74 Italy. Therefore, we provide new *Cenopalpus* records and host plant associations based on the
37 75 material studied, presenting new morphological traits, to update the taxonomically guided
38 76 identification of this genus.

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41 78 **Material and Methods**
42 79 The new checklist was developed based on national and international revisions, verification
43 80 of species intercepted from Italy at the ports of entry in the USA and recent surveys conducted in
44 81 southern Italy. The material intercepted at the ports of entry in the USA was deposited at the United
45 82 States National Insect and Mite Collection, US National Museum of Natural History, Smithsonian
46 83 (housed at the Systematic Entomology Laboratory in Beltsville, Maryland, USA).

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48 84 Surveys were conducted in 2019 in the Apulia District of southern Italy and consisted of
49 85 randomly collected plant materials from various Mediterranean tree and plant families in different
50 86 habitats. Each sample, consisting of small branches with leaves and flowers if present, was
51 87 packaged individually in tightly sealed polyethylene bags with paper towels to control humidity.
52 88 The samples were transferred to the laboratory the same day and stored at low temperature (about
53 89 +4°C). The collection data for each sample includes the locality, date, host, and global positioning
54 90 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 al. (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

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3 137 • Di.S.S.P.A.
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5 138 Entomological and Zoological Section, Department of Soil, Plant and Food Sciences,
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7 139 University of Bari Aldo Moro, Italy (UNIBA)
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9 140 • CREA-DC
10 141 Council for Agricultural Research and Economics - Research centre for Plant Protection
11 142 and Certification, via Lancia 12a del Riccio, Firenze, Italy
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13 143 • USNM
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15 144 National Insect and Mite Collection, National Museum of Natural History, Smithsonian,
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17 145 housed at the Systematic Entomology Laboratory (SEL), Beltsville Agricultural Research
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19 146 Centre West (BARC West), United States Department of Agriculture (USDA), 10300
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21 147 Baltimore Ave, Beltsville, Maryland, USA, 20705
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23 148 • APHIS PPQ USDA
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25 149 Animal and Plant Health Inspection Service, Plant Protection and Quarantine, 11200
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27 150 Metro Airport Center Drive, Suite 140, Romulus, Michigan, 48174
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29 151 • DEES
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31 152 Departamento de Entomologia e Acarologia, Escola Superior de Agricultura “Luiz de
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33 153 Queiroz”, Universidade de São Paulo (ESALQ-USP), Piracicaba, São Paulo, Brazil
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35 154 (DEES).
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37 155 • JFKIA
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39 156 John F. Kennedy International Airport, USA
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41 157 • DTW
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43 158 Detroit Metro Airport, USA
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49 162 **Results**



50 163 In this study, we reported five *Cenopalpus*, four *Brevipalpus*, two *Tenuipalpus*, and one
51 164 *Pentamerismus* species which are new records and one new species of the genus *Cenopalpus*. This
52 165 increases to 37 the total number of tenuipalpid species present in It Moreover, we reported new
53 166 records of *Cenopalpus* species in seven countries and several new worldwide host plant
54 167 associations. We did not provide updated identification keys to the world species of *Cenopalpus*,
55 168 including the new species, since a revision of the genus is needed. Several types of *Cenopalpus*
56 169 species have been lost (Mesa et al. 2009, Castro et al. 2023), descriptions in some cases are
57 170 incomplete, and redescriptions of some species are based on specimens not collected in the local
58 171 types. The current taxonomical information of the genus *Cenopalpus* present in the old species

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3 172 descriptions lacks important information in other tenuipalpid genera about morphological
4 characteristics, as highlighted by Beard et al. (2015). Based on the authors' personal observations,
5 morphological characters such as spermathecal apparatus, microplates, and different dorsal and
6 ventral reticulation patterns are also relevant in separating the species in the genus *Cenopalpus*.
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10 177 **Checklist of the family Tenuipalpidae in Italy**
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14 179 ***Brevipalpus* Donnadieu**
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16 180
17 181 1 *B. californicus* Banks, 1904
18 182 2 *B. cuneatus* Canestrini et Fanzago, 1876
19 183 3 *B. garmani* Baker, 1949
20 184 4 *B. lewisi* McGregor, 1949
21 185 5 *B. oleae* Baker, 1949
22 186 6 *B. olearius* Sayed, 1950
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24 187 7 *B. olivicola* Pegazzano et Castagnoli, 1972
25 188 8 *B. rotai* Castagnoli et Pegazzano, 1979
26 189 9 *B. russulus* Boisduval, 1867
27 190 10 *B. mitrofanovi* Pegazzano, 1975
28 191 11 *B. obovatus* Donnadieu, 1875
29 192 12 *B. recki* Livshitz et Mitrofanov, 1967
30 193 13 *B. hondurani* Evans 1993
31 194 14 *B. papayensis* Baker, 1949
32 195 15 *B. phoenicis* Geijskes, 1939
33 196 16 *B. yothersi* Baker, 1949
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38 199 ***Cenopalpus* Pritchard et Baker, 1958**
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40 200
41 201 17 *C. bakeri* Düzgünes, 1967
42 202 18 *C. lanceolatisetae* Attiah, 1956
43 203 19 *C. longirostris* Livshitz et Mitrofanov, 1967
44 204 20 *C. halperini* Castagnoli, 1987
45 205 21 *C. mespili* Livshitz et Mitrofanov, 1967
46 206 22 *C. pegazzanoae* Castagnoli, 1987
47 207 23 *C. pulcher* Canestrini et Fanzago, 1876
48 208 24 *C. spinosus* Donnadieu, 1875
49 209 25 *C. ulmifolius* sp. nov. De Giosa, de Lillo et Ochoa 2023
50 210 26 *C. lineola* Canestrini et Fanzago, 1876
51 211 27 *C. wainsteini* Livshitz et Mitrofanov, 1967
52 212 28 *C. adventicus* Ueckermann et Ripka, 2016
53 213 29 *C. officinalis* Papaioannou-Souliotis, 1986
54 214 30 *C. pterinus* Pritchard et Baker, 1958
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3 216 **Pentamerismus** McGregor, 1949
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5 218 31 *P. coronatus* Canestrini et Fanzago, 1876
6 219 32 *P. oregonensis* McGregor, 1949
7 220 33 *P. taxi* Haller, 1877
8 221
9 222 **Tenuipalpus** Donnadieu, 1875
10 223 34 *T. caudatus* Dugès, 1834
11 224 35 *T. granati* Sayed, 1946
12 225 36 *T. pacificus* Baker, 1945
13 226 37 *T. sarcophilus* Welbourn et Beard, 2017
14 227
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16 229 **Family Tenuipalpidae Berlese, 1913**
17 230
18 231 **Genus *Brevipalpus***
19 232
20 233 Type species – *Brevipalpus obovatus* Donnadieu, 1875
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22 235 ***Brevipalpus californicus* species group** Baker and Tuttle, 1987
23 236
24 237 **Diagnosis (adult female).** Seven dorsolateral setae on opisthosoma. The palpus is 4-segmented
25 and palp tarsus with 1 solenidion and 2 eupathidia. Tarsus on leg II with 2 solenidia.
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29 241 **1. *Brevipalpus californicus*** Banks, 1904
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31 243 **Type Depository.** USNM.
32 244
33 245 **Distribution** (Castro et al. 2023). Algeria; Angola; Australia: New South Wales, Northern
34 Territory, South Australia, Victoria; Brazil; China; Costa Rica; Cuba; Cyprus; Dominican
35 Republic; Congo; Egypt; Fiji; France; Georgia; Greece; Honduras; Hungary; India: Assam,
36 Haryana, Karnataka, Kerala, Meghalaya, Punjab, Uttar Pradesh, West Bengal; Iran, Iraq; Israel;
37 Italy; Japan; Libya; Malawi; Malaysia; Mauritius; Mexico; Mozambique; Nepal; Netherlands;
38 New Zealand; Nigeria; Pakistan; Peru; Philippines; Portugal; Rwanda; Samoa; Saudi Arabia;
39 South Africa; South Korea; Spain; Syria; Taiwan; Uganda; USA; Yemen, Zimbabwe.
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41 252
42 253 **Remarks.** *Brevipalpus californicus* was reported for the first time from Sicily (southern Italy) on
43 lemon (Di Martino 1960). However, the validity of its presence in Italy is questionable since it
44 belongs to species complex (Tassi et al. in prep.).
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46 256
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48 258 ***Brevipalpus cuneatus* species group** Baker and Tuttle, 1987
49 259
50 260 **Diagnosis (adult female).** Seven dorsolateral setae on opisthosoma. The palpus is 4-segmented
51 and palp tarsus with 1 solenidion and 2 eupathidia. Tarsus on leg II with 1 solenidion.
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2. *Brevipalpus cuneatus* Canestrini et Fanzago, 1876

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Type Depository. Unknown.

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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).

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

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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 Mollie. 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*.

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3. *Brevipalpus garmani* Baker, 1949

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Type Depository. USNM.

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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).

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

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

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4. *Brevipalpus lewisi* McGregor, 1949

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Type Depository. USNM.

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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

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3 307 district), ex. *A. chinensis* var. *deliciosa* cv. Hayward, October 23 2012, legit S. Simoni (CREA-
4 308 DC).
5 309

6 310 *Distribution* (Castro et al. 2023). Australia; China: Jiangsu; Egypt; Georgia; Greece; Hungary;
7 311 India: West Bengal; Iran; Israel; Italy; Japan; Mexico; Portugal; Saudi Arabia; South Africa; South
8 312 Korea; Spain; Taiwan; Tunisia; Turkey; Ukraine; USA.
9 313

10 314 *Remarks.* *Brevipalpus lewisi* has been reported for the first time in Italy by Tshikhudo et al. (2022).
11 315
12 316
13 317 **5. *Brevipalpus oleae* Baker, 1949**
14 318

15 319 *Type Depository.* USNM.
16 320

17 321 *Distribution* (Castro et al. 2023). Greece; Israel; Italy; Morocco; Spain; Syria; Tunisia; Turkey.
18 322

19 323 *Remarks.* *Brevipalpus oleae* has been reported for the first time from Italy by Castagnoli and
20 324 Pegazzano (1979) after surveys in olive orchard areas.
21 325
22 326
23 327 **6. *Brevipalpus olearius* Sayed, 1950**
24 328

25 329 *Type Depository.* Unknown.
26 330

27 331 *Distribution* (Castro et al. 2023). Egypt; Greece; Iran; Israel; Italy; Turkey; Ukraine.
28 332

29 333 *Remarks.* *Brevipalpus olearius* has been reported for the first time from Italy by Castagnoli and
30 334 Pegazzano (1979) during surveys conducted in olive orchard areas.
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32 336
33 337 **7. *Brevipalpus olivicola* Pegazzano et Castagnoli, 1972**
34 338 (SM Figs 1a-1b)
35 339

36 340 *Type Depository.* CREA- DC.
37 341

38 342 *Material examined.* **ITALY:** Martina Franca (southern Italy) ex. *Olea europaea* (Linnaeus)
39 343 (Oleaceae), January 27, 1988, legit E. de Lillo (Di.S.S.P.A.); 1 ♀, Bitetto (southern Italy),
40 344 41°02'29"N 16°43'43"E, 164 m, ex. *O. europaea*, February 10 2019, legit M. De Giosa
41 345 (Di.S.S.P.A.); 1 ♀, Bitetto (southern Italy), 41°02'30"N 16°44'12"E, 134 m, ex. *O. europaea*,
42 346 September 13 2019, legit M. De Giosa (Di.S.S.P.A.); 1 ♀, Corato (southern Italy), 41°06'32"N
43 347 16°22'42"E, 313 m, ex. *O. europaea*, May 19 2019, legit M. De Giosa (Di.S.S.P.A.); 1 ♀, Ginosa
44 348 caves (southern Italy), 40°34'52"N 16°45'35"E, 229 m, ex. *O. europaea*, May 10 2019, legit M.
45 349 De Giosa (Di.S.S.P.A.); 1 ♀, Mattinata (southern Italy), 41°42'49"N 16°03'22"E, 87 m, ex. *O.
46 350 europaea*, April 20 2019, legit M. De Giosa (Di.S.S.P.A.); 1 ♀, Bari (southern Italy), 41°06'35"N
47 351 16°52'53"E, 28 m, ex. *O. europaea*, April 4 2019, legit M. De Giosa (Di.S.S.P.A.).
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3 353 *Distribution* (Castro et al. 2023). Greece; Italy; Portugal; Tunisia.
4 354
5 355 *Remarks.* *Brevipalpus olivicola* has been described from Italy (Canestrini and Fanzago 1972). The
6 356 redescription of the holotype and paratypes is in progress (De Giosa et al. in prep.)
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11 361 **8. *Brevipalpus rotai*** Castagnoli et Pegazzano, 1979
12 362
13 363 *Type Depository.* CREA- DC.
14 364
15 365 *Distribution* (Castro et al. 2023). Greece; Italy; Turkey.
16 366
17 367 *Remarks.* *Brevipalpus rotai* has been described from Italy (Castagnoli and Fanzago 1979). The
18 368 redescription of the holotype and paratypes is in progress (De Giosa et al. in prep.)
19 369
20 370
21 371 **9. *Brevipalpus russulus*** Boisduval, 1967
22 372
23 373 *Type Depository.* Unknown.
24 374
25 375
26 376 *Distribution* (Castro et al. 2023). Argentina; Belgium; Brazil; China; Costa Rica; France;
27 377 Germany; Greece; Hungary; Italy; Japan; Mexico; Netherlands; New Zealand; Peru; Ukraine;
28 378 USA.
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31 381 ***Brevipalpus obovatus* species group** Baker and Tuttle, 1987
32 382
33 383 **Diagnosis (adult female).** Six dorsolateral setae on opisthosoma. The palpus is 4-segmented and
34 384 palp tarsus with 1 solenidion and 2 eupathidia. Tarsus on leg II with 1 solenidion.
35 385
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37 387 **10. *Brevipalpus mitrofanovi*** Pegazzano, 1975
38 388
39 389 *Type Depository.* CREA- DC.
40 390
41 391 *Distribution* (Castro et al. 2023). India: West Bengal; Italy.
42 392
43 393 *Remarks.* *Brevipalpus mitrofanovi* has been described from Italy on *Quercus cerris* Linnaeus
44 394 (Pegazzano 1975). The redescription of the holotype and paratypes is in progress (De Giosa et al.
45 395 in prep.)
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48 398 **11. *Brevipalpus obovatus*** Donnadeieu, 1975
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3 399 (SM Figs 2a-2b)
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Type Depository. Faculté des Sciences de Lyon, France.

6 402
7 403 *Material examined. ITALY:* 14 ♀♀ Latina (central-Italy), ex. *Citrus limon* (L.) Osbeck, October
8 404 25 2013, legit Sauro R. (DEES); 8 ♀♀ Sermoneta (Lazio district), ex. *A. chinensis* var. *deliciosa*
9 405 cv. Hayward, November 17 2012, legit S. Simoni (CREA- DC); 9 ♀♀, 2 deutonymphs, Cisterna
10 406 di Latina (Lazio district), ex. *A. chinensis* var. *deliciosa* cv. Hayward, November 16 2012, legit S.
11 407 Simoni (CREA- DC); 2 ♀♀, 1 deutonymph, Pontinia (Lazio district), ex. *A. chinensis* var.
12 408 *deliciosa* cv. Hayward, November 17 2012, legit S. Simoni (CREA- DC).
13 409
14 410

Distribution (Castro et al. 2023). Angola; Argentina; Australia; Azores; Bermuda; Brazil;
15 411 Cameroon, Canada: Ontario; Chile; China; Colombia; Congo; Cook Islands; Costa Rica; Cuba;
16 412 Cyprus; Egypt; Fiji; France; Georgia; Greece; Guadeloupe; Honduras; Hong Kong; Hungary;
17 413 India: Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Mizoram,
18 414 Punjab, Rajasthan, West Bengal; Iran; Iraq; Israel; Italy; Jamaica; Japan; Kenya; Libya; Malawi;
19 415 Mauritius; Mexico; Morocco; Nepal; New Caledonia; New Zealand; Norfolk Island; Pakistan;
20 416 Philippines; Poland; Puerto Rico; Saudi Arabia; South Africa; South Korea; Spain; Sri Lanka;
21 417 Syria; Taiwan; Thailand; Turkey; Uganda; Ukraine; USA; Venezuela; Yemen; Zimbabwe.
22 418
23 419

Remarks. *Brevipalpus obovatus* has been reported for the first time from Italy by Castagnoli et al.
24 420 (1984) on peach and De Giosa et al. (2021a) due to an interception in the United States. Moreover,
25 421 *C. limon* is a new host plant record. This species is a recognized vector of virus to plants,
26 422 specifically, *solanum violifolium* ringspot virus (SvRSV, *Cilevirus solani*), that affects the
27 423 ornamental plant *Solanum violifolium* (Ramos Gonzalez et al. 2022, 2023) 

28 424
29 425
30 426 **12. *Brevipalpus recki* Livshitz et Mitrofanov, 1967**
31 427
32 428

Type Depository. Unknown.

33 429
34 430 *Distribution* (Castro et al. 2023). Greece; Hungary; Israel; Italy; Turkey; Ukraine.
35 431
36 432

Remarks. *Brevipalpus recki* has been reported for the first time from Italy by Pegazzano (1975)
37 433 and De Giosa et al. (2022) during surveys conducted on *Quercus* spp.
38 434
39 435
40 436

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

41 437
42 438 **Diagnosis (adult female).** Six dorsolateral setae on opisthosoma. The palpus is 4-segmented and
43 439 palp tarsus with 1 solenidion and 2 eupathidia. Tarsus on leg II with 2 solenidia.
44 440
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13. *Brevipalpus hondurani* Evans, 1993

47 443
48 444 Type Depository. USNM.

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446 *Distribution* (Castro et al. 2023). Bermuda; Honduras; Italy.
447

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

450
451
452 **14. *Brevipalpus papayensis* Baker, 1949**
453 (SM Figs 3a-3b)

454
455 *Type Depository.* USNM.

456
457 *Material examined.* **ITALY:** 5 ♀♀ Catanzaro (southern Italy), ex. *Citrus* sp. December 16 1961,
458 legit Constantino (Acarological Collection Universidad de Chile, Chile).

459
460 *Distribution* (Castro et al. 2023). Australia; Brazil; Costa Rica; Cuba; Hawaii; Indonesia; USA:
461 Washington.

462 *Remarks.* *Brevipalpus papayensis* is a new record for Italy. Italy is the first European country
463 where this species has been reported. This species is a recognized vector of virus to plants,
464 specifically, citrus leprosis virus c (CiLV-C, *Cilevirus leprosis*), ligustrum chlorotic spot virus
465 (*LigCSV*, *Cilevirus ligustri*) and coffee ringspot virus (CoRSV, *Dichorhavirus coffeae*), that
466 affects respectively citrus, ligustrum and coffee plants (de Lillo et al 2021; **Ramos Gonzalez** et al.
467 2022; 2023).



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471 **15. *Brevipalpus phoenicis* Geijskes, 1939**

472
473 *Type Depository.* Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 Ra Leiden,
474 The Netherlands.

475
476 *Distribution* (Castro et al. 2023). Angola; Argentina; Australia; Austria; Azores; Bermuda; Brazil;
477 Cameroon; China; Colombia; Congo; Cook Islands; Costa Rica; Cuba; Dominican Republic;
478 Egypt; Ethiopia; Fiji; Gaza Strip; Georgia; Greece; Guadalupe; Guyana; Honduras; Hungary;
479 India; Iran; Israel; Italy; Jamaica; Japan, Kenya; Madeira Island; Malawi; Malaysia; Marie
480 Galante; Mauritania; Mauritius; Mexico; Morocco; Mozambique; Myanmar; Netherlands; New
481 Caledonia; New Zealand; Nigeria; Norfolk Island; Pakistan; Papua New Guinea; Paraguay; Peru;
482 Philippines; Poland; Portugal; Puerto Rico; Reunion Island; Rwanda; Saint Helena; Saint Martin;
483 Samoa; Saudi Arabia; South Africa; Spain; Sudan; Syria; Tahiti; Taiwan; Thailand; Tonga;
484 Trinidad; Turkey; Uganda; Ukraine, USA.

485
486 *Remarks.* *Brevipalpus phoenicis* was reported for the first time from Calabria and Sicily regions
487 (southern Italy) on mandarin orange (Di Martino 1960). This species has been found to cause
488 greyish scabby patches and cracks on mandarin oranges (Di Martino 1985, Vacante 2010).
489 However, the validity of its presence in Italy is questionable since it belongs to species
490 complex. As reported on the Tenuipalpidae Database (Castro et al. 2023) "All data pertaining to
complex".



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3 491 the taxon name *B. phoenicis* prior to the publication of Beard et al. (2015) should be considered
4 492 questionable, due to synonymies and historic misidentifications (see Beard et al. (2015) for
5 493 detailed information). Any data pertaining to this taxon name after 2015 that have not referenced
6 494 Beard et al. (2015) for identifications should be assessed with care".
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8 495
9 496
10 497 **16. *Brevipalpus yothersi* Baker, 1949**
11 498 (SM Figs 4a-4b)
12 499
13 500 *Type Depository.* USNM.
14 501
15 502 *Material examined.* ITALY: 10 ♀♀ Velletri (central-Italy), ex. *Citrus* sp., October 25 2013, legit
16 503 Sauro R. (DEES).
17 504
18 505 *Distribution* (Castro et al. 2023). Argentina; Brazil; China; Colombia; Costa Rica; Cuba;
19 506 Dominican Republic; Congo; Ecuador; El Salvador; Ethiopia; France; Guatemala; Honduras;
20 507 India; Delhi, Himachal Pradesh, Maharashtra, Punjab; Indonesia; Israel; Italy; Malaysia; Mexico;
21 508 Myanmar; Nigeria; Pakistan; Peru; Philippines; Puerto Rico; South Africa; Spain; Sri Lanka;
22 509 Trinidad; USA; Venezuela.
23 510
24 511 *Remarks.* *Brevipalpus yothersi* has been reported for the first time from Italy by De Giosa et al.
25 512 due to an interception in the United States. Moreover, *Citrus* sp. is a new host plant record
26 513 for this species. This species is associated with the transmission of the viruses citrus leprosis c,
27 514 citrus leprosis c2 (CiLV-C2, *Cilevirus columbaense*), in the Americas and passion fruit green spot
28 515 virus (PfGSV, *Cilevirus passiflorae*), clerodendrum chlorotic spot virus (ClCSV, *Dichorhavirus*
29 516 *clerodendri*) and Citrus chlorotic spot virus (CiCSV, *Dichorhavirus citri*), in Brazil (Ramos
30 517 Gonzalez et al. 2020; 2023).



36 518
37 519
38 520 **Genus *Cenopalpus***
39 521
40 522 Type species – *Cenopalpus spinosus* Donnadiieu, 1875
41 523
42 524 ***Cenopalpus spinosus* species group** Hatzinikolis et al. 1999
43 525
44 526 **Diagnosis (adult female).** Seven dorsolateral setae on opisthosoma; *f2* present and inserted in
45 527 lateral position. Anterior margin of propodosoma with broad flat projection extending over coxae
46 528 I-II and gnathosoma, can be reduced in some species. Often with a characteristic cuticular pattern
47 529 in dorsal cuticle that can be mostly smooth or weakly wrinkled. The palpus is 4-segmented, rarely
48 530 3-segmented. Setae formula: 0-1-2-3: palp trochanter without setae, palp femur with 1 dorsal seta,
49 531 palp genu-tibia with 2 setae, palp tarsus with 1 solenidion and 2 eupathidia. Ventral and genital
50 532 plates distinct and well developed. Two pairs of pseudanal setae are present (*ps* 1-2). Leg setae
51 533 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
52 534 chaetotaxy as follows: coxae I-II each with two setae (*1b*, *1c* and *2b*, *2c* respectively); coxae III-
53 535 IV each with one seta (*3b* and *4b*). Trochanters I-II-IV each with one seta (*v'*); trochanter III with
54 536 two setae (*l'*, *v'*). Femora I-II with four setae (*d*, *l'*, *v'*, *bv''*); femur III with two setae (*d*, *ev'*); femur

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3 537 IV with one seta (*ev'*). Genua I-II with three setae (*d, l', l''*); genu III with one seta (*l'*); genu IV
4 538 without setae. Tibia I-II with five setae (*d, v', v'', l', l''*); tibia III-IV with three setae (*d, v', v''*). Tarsi
5 539 I-II with eight setae and each with one long, slender, and tapering solenidion; tarsi III-IV with five
6 540 setae (*ft', tc', tc'', u', u''*).
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8 541
9 542
10 543 **17. *Cenopalpus bakeri* Düzgüneş, 1967**
11 544 (Figs 1a-18b)
12 545
13 546 *Type Depository.* Department of Plant Protection, Faculty of Agriculture, Ankara University,
14 547 Turkey.
15 548
16 549 *Material examined.* **ARGENTINA:** 1 deutonymph, Cinco saltos (Province of Rio Negro), ex.
17 550 manzano (could be *Capsicum pubescens* (Ruiz et Pav.), April 1982, legit Perley (USNM); **ITALY:**
18 551 2 deutonymphs, 27 ♀♀, Molfetta (southern Italy), ex. lower leaf surface, *Prunus domestica*
19 552 (Linnaeus) (Rosaceae), October 12 1986, legit E. de Lillo (Di.S.S.P.A); 1 larva, 2 protonymphs, 2
20 553 deutonymphs, 1 ♂, 16 ♀♀, Bitetto (southern Italy) 41°02'27"N 16°44'12"E, 130 m, ex. stem and
21 554 lower leaf surface, *Crataegus monogyna* (Jacq.) (Rosaceae), September 13 2019, legit M. De
22 555 Giosa (Di.S.S.P.A.).
23 556
24 557 **Diagnosis (adult female).** As per *C. spinosus* species group, in addition to the following. In the
25 current description, two females with different morphology are reported. Rostral shield with
26 regular reticulation: longitudinal cells between medial and submedial lobes; vertical reticulation
27 on lateral lobes. Coxisternal area between coxae I-II with weak transverse striae, becoming almost
28 smooth medially. Metapodosoma smooth between coxae III and IV, with transverse folds on each
29 coxa. The region posterior to coxae IV with uniform reticulation. Ventral plate reticulated, with
30 polygonal and transversely elongated cells. Genital plate: non-uniform verrucose pattern, with
31 "warts" aligned transversely to form weak transverse bands. Cuticular microplates: separate
32 individual, rounded to irregularly shaped plates of various sizes, with circular clusters over dorsal
33 surface (Figs 7a-7b)*.
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35 566
36 567
37 568 *Mites were collected in southern Italy from two different host plant species, *C. monogyna* and *P.
38 569 domestica*. The analyzed samples presented three different dorsal cuticular patterns occurring
39 simultaneously on both hosts. The females cannot be separated by several similar characteristics:
40 570 3 rounded lobes with the same reticulation; propodosoma with 3 bumps: large and regular cells in
41 571 the middle and smaller in the lateral. Opisthosoma with the same reticulation and orientation of
42 572 cells. Venter with regular reticulation between legs IV; anal plate with same shape and reticulation.
43 573 The shape of the setae on the subcapitulum, palpus and legs is the same. The microplates confirm
44 574 a match. Based on the current taxonomical data they are considered to belong to the same species.
45 575 However, studies involving an integrative approach with morphological, morphometric, and
46 576 molecular markers should be conducted to confirm the absence of cryptic species.
47 577
48 578
49 579 **FEMALE (n=43). *Dorsum.*** (Figs 1a, 3a-3b, 4a-4c) Length of the body 320-325 including
50 580 gnathosoma and 275-285 excluding gnathosoma; width propodosoma 135-160; width
51 581 opisthosoma 110-170. Distance between setae *v2-h1* 300. Setal lengths *v2* 19-24, *sc1* 14-22, *sc2*
52 582 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,
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3 583 *h1* 5-8. Distance between setae *v2-v2* 45, *sc1-sc1* 114, *sc2-sc2* 145, *c1-c1* 55, *c2-c2* 125, *c3-c3*
4 584 149, *d1-d1* 39, *d3-d3* 155, *e1-e1* 37, *e3-e3* 150, *f2-f2* 130, *f3-f3* 87, *h2-h2* 51, *h1-h1* 20.
5 585
6
7 586 *Venter.* (Figs 1b, 3c-3d, 4d-4f) Coxisternal area between coxae I-II covered with weak transverse
8 striae medially almost smooth. Between coxae III-IV irregular reticulations laterally. Coxisternal
9 III-IV with transverse striae medially almost smooth; each coxa III-IV mostly with vertical striae.
10 Area posterior behind coxae IV with regular cells. Ventral plate with one pair of aggenital setae
11 (*ag*); genital plate with two pairs of genital setae (*g1-g2*). Both plates reticulate with irregular and
12 elongate cells. Genital and anal plates well developed and sclerotized, included by four transverse
13 and narrow bands. Ventral plate with irregular reticulations and elongated cells. Genital plate with
14 regular reticulation and large rounded cells. Setal lengths *1a* 100, *1b* 25, *2b* 19-20, *1c* 21-24, *2c*
15 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*
16 11-12. Distances between setae *ag-ag* 25, *g1-g1* 22, *g2-g2* 45, *ps1-ps1* 23, *ps2-ps2* 13. Ventral
17 setae short except *1a* and *4a*, lanceolate and fine (difficult to measure the full length).
18 596
19 597
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21 598 *Gnathosoma.* (Figs 1c-1d, 5a-5c, 6a-6c). Setal formula for palps as in diagnosis of *C. spinosus*
22 species group. Solenidion 6-7 and eupathidia 5-9. Femur seta finely serrate-barbed; genu-tibia
23 setae smooth and lanceolate. Subcapitulum extending to the distal end of femur I. Subcapitulum
24 with subcapitular setae *m* 12-15; distance between setae *m-m* 14.
25
26 603 *Spermathecal apparatus.* (Fig 1e) Very long and narrow, distal end not visible.
27
28 604
29 605 *Legs.* (Figs 2a-2d) Leg chaetotaxy formula as *C. spinosus* species group, in addition to the
30 following. Femur I with setae serrate, lanceolate and barbed (*bv''*, *d*, *l'*, *v'*); genu I setae *d* and *l'*
31 serrate and barbed, *l'* slightly smooth; tibia I with setae lanceolate, serrate, and barbed (*d*, *l'*, *l''*,
32 *v'*, *v''*). Shape of setae on leg II, as following leg I. Femur III with lanceolate and barbed seta (*d*)
33 and lanceolate-smooth seta (*ev'*); seta *l'* on genu III, serrate and barbed; tibia with lanceolate,
34 serrate, and barbed setae (*d*, *v'*, *v''*). Shape of setae on leg IV as following leg III. Measurements
35 of legs (coxae to tarsi): I 150-155; II 125-135; III 130-135; IV 140-140.
36
37 613 MALE (n=1). *Dorsum.* (Figs 8a, 9) Length of the body including the gnathosoma 300; length body
38 excluding gnathosoma 205; width propodosoma 61-130; width opisthosoma 69-110. Distance
39 between setae *v2-h1* 200. Setal lengths *v2* 19-24, *sc1* 18-24, *sc2* 22-24, *c1* 13-15, *c2* 12-14, *c3* 21-
40 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
41 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,
42 *e1-e1* 34, *e3-e3* 105, *f2-f2* 88, *f3-f3* 61, *h2-h2* 22, *h1-h1* 6.
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44 619
45
46 620 *Venter.* (Fig 8b) Ventral cuticle almost completely smooth with weak transverse striae. Area
47 posterior behind coxae IV with broad band. Ventral opisthosoma almost smooth, band of smooth
48 cuticle posterior to *ag-ag*. Setal lengths *1a* 63-68 (very long, distal not visible), *1b* 22-23, *2b* 19-
49 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*
50 10-11, *ps2* 30-32. Distance between setae *ag-ag* 24, *g1-g1* 54, *g2-g2* 53, *ps1-ps1* 51, *ps2-ps2* 11.
51 Ventral setae short except *1a* and *4a* lanceolate and fine (difficult to measure the full length).
52
53 626
54 627 *Aedeagus.* Aedeagus narrow, elongate and sclerotised, 105, tapering to a blunt point distally
55 (towards genital opening).
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4 630 *Gnathosoma*. (Fig 8c-8d) Palps similar to adult female. Solenidion 5 and eupathidia 5-6.
5 Subcapitulum not reaching the distal end of femur I. Subcapitulum with subcapitular setae *m* 12-
6 15; distance between setae *m-m* 14.
7
8 633
9 634 *Legs*. Similar to adult female.
10 635
11 636 DEUTONYMPH (n=3). *Dorsum*. (Figs 10, 12) Length of the body including the gnathosoma 320-
12 330; length body excluding gnathosoma 275-275; width propodosoma 90-160; width opisthosoma
13 107-158. Dorsal propodosoma: mostly smooth with longitudinal to oblique striations, light in the
14 middle. Dorsal opisthosoma: mostly smooth with light transverse striae. Dorsal propodosomal and
15 opisthosomal setae *v2, sc1, sc2, c3, d3, e3, f2, f3* thin with long setules (lanceolate and serrate);
16 setae *c1, c2, d1, e1, h1, h2* smooth and minute. Distance between setae *v2-h1* 235-265. Setal lengths
17 *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-
18 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,
19 20 *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*
21 22 17-19, *f2-f2* 105-115, *f3-f3* 72-76, *h2-h2* 28-34, *h1-h1* 10-13.
23 646
24 647 *Venter*. (Fig 12b) Cuticle almost completely plicate, covered with mostly transverse striae until
25 leg IV, except coxal fields smooth. Ventral, genital, and anal shields indistinct. Setal lengths *1a*
26 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-
27 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.
28 651 Ventral setae short except *1a* and *4a* lanceolate.
29 652
30 653 *Gnathosoma*. Palps with setal lengths formula as in diagnosis of *C. spinosus* species group.
31 Solenidion 7-9 and eupathidia 4-17. Femur seta finely tapered, barbed; genu-tibia setae smooth
32 and lanceolate. Subcapitulum with setae *m* 8-28; distance between setae *m-m* 9-33.
33 655
34 656
35 657 *Legs*. (Figs 11a-11d) Leg chaetotaxy formula as *C. spinosus* species group, in addition to the
36 following. Femur I with setae *d* and *l'* plumose and lanceolate, *v'* and *bv''* smooth and lanceolate;
37 genu I with barbed and short setae (*d, l'*) and shorth-smooth seta *l''*; tibia I setae lanceolate and
38 moderately barbed, almost smooth (*l', l'', v'*), serrate and barbed (*d, v''*). Shape of setae on leg II,
39 as following leg I. Femur III with barbed seta (*d*) and smooth seta (*ev'*); seta *l'* on genu III short
40 and moderately barbed; tibia III with lanceolate and moderately serrate setae (*v', v''*), short and
41 barbed setae (*d*). Shape of setae on leg IV, as following leg III. Measurements of legs (coxae to
42 tarsi): I 120-120, II 92-100, III 94-95, IV 99-100.
43 664
44 665
45 666 PROTONYMPH (n=2). *Dorsum*. (Figs 13, 15) Length of the body including the gnathosoma 235;
46 length body excluding gnathosoma 212; width propodosoma 61-130; width opisthosoma 72-120.
47 Dorsal propodosoma: smooth with longitudinal to oblique striations, light in the middle. Dorsal
48 opisthosoma with light transverse striae and after *e1* with longitudinal striations. Dorsal
49 propodosoma and opisthosoma setae *v2, sc1, sc2, c3, d3, e3, f2, f3* thin with long setules (lanceolate
50 and serrate); setae *c1, c2, d1, e1, h1, h2* smooth and minute. Distance between setae *v2-h1* 195.
51 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-
52 49, *f2* 37-38, *f3* 53-57, *h2* 3-4, *h1* 3. Distances between setae: *v2-v2* 37, *sc1-sc1* 80, *sc2-sc2* 106,

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3 674 *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*
4 675 18, *h1-h1* 7.
5 676

6 677 *Venter.* Cuticle almost completely plicate, covered with mostly transverse striae, except coxal
7 smooth fields. Ventral, genital, and anal shields indistinct. Setal lengths *1a* 74-80 (distal end fine),
8 *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
9 between setae *ag-ag* 20, *ps1-ps1* 6, *ps2-ps2* 4. Ventral setae short except *1a* longer than the others.
10 680
11 681
12 682 *Gnathosoma.* Palps with setal lengths formula as in diagnosis of *C. spinosus* species group.
13 Solenidion 3 and eupathidia 5-6. Femur seta finely tapered, barbed; genu-tibia setae smooth and
14 lanceolate. Subcapitulum not reaching the distal end of femur I. Subcapitulum with subcapitular
15 setae *m* 6-7; distance between setae *m-m* 12.
16 685
17 686
18 687 *Legs.* (Figs 14a-14d) Leg chaetotaxy formula as *C. spinosus* species group, in addition to the
19 following. Shape of setae on legs: leg I with three setae on femur, *d* plumose and lanceolate, *bv''*
20 and *v'* smooth and lanceolate; genu with barbed and short setae (*l'*); tibia setae lanceolate and
21 moderately barbed, almost smooth (*l', l'', v', v''*), serrate and barbed (*d*). Shape of setae on leg II,
22 as following leg I. Leg III with moderately barbed femur seta (*d*) and lanceolate-smooth seta (*ev'*);
23 seta *l'* on genu short and smooth; tibia with lanceolate and moderately serrate setae (*v', v''*), short
24 and barbed setae (*d*). Shape of setae on leg IV, as following leg III. Measurements of legs (coxae
25 to tarsi): I 100-100, II 95-97, III 82-83, IV 77-80.
26 694
27 695
28 696 LARVA (n=1). *Dorsum.* (Figs 16, 18a) Length of the body including the gnathosoma 180; length
29 body excluding gnathosoma 151; width propodosoma 48-105; width opisthosoma 66-89. Dorsal
30 propodosoma: mostly smooth with longitudinal to oblique striations, light in the middle. Dorsal
31 opisthosoma: mostly smooth with light transverse striae and longitudinal to oblique around seta
32 *e1*. Dorsal propodosomal and opisthosomal setae *v2*, *sc1*, *sc2*, *c3*, *d3*, *e3*, *f2*, *f3* thin with long
33 setules (lanceolate and serrate); setae *c1*, *c2*, *d1*, *e1*, *h1*, *h2* smooth and minute. Distance between
34 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,
35 *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-*
36 *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,
37 *f3-f3* 32, *h2-h2* 15, *h1-h1* 6.
38 705
39 706
40 707 *Venter.* (Fig 18b) Venter similar to that of protonymph.
41 708
42 709 *Legs.* (Figs 17a-17c) Setal lengths formula and leg chaetotaxy formula as *C. spinosus* species
43 group, in addition to the following. Shape of setae on leg II, as following leg I. Leg III with barbed
44 femur seta *d* and lanceolate-smooth seta *ev'*; seta *l'* on genu short and moderately barbed; tibia
45 with lanceolate and moderately serrate setae (*v', v''*), short and barbed setae (*d*). Measurements of
46 legs (coxae to tarsi): I 53-56, II 47-48, III 79-80.
47 714
48 715 EGGS. Not examined.
49 716
50 717 *Distribution* (Castro et al. 2023). Greece; Iran; Italy; Lebanon; Turkey.
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3 719 *Remarks.* *Cenopalpus bakeri* is a new record for Argentina and Italy. We retain inappropriate to
4 design *C. pubescens* as a new host plant association since only 1 specimen of *C. bakeri* has been
5 found. The redescription of this species is needed since misidentifications and confusion are
6 present in international scientific articles. The redescription made by Çobanoğlu et al. (2016) and
7 Khanjani et al. (2012) reported two different chaetotaxies of the legs of *C. bakeri*. The setae on the
8 genua I (*d*, *l'*, *l''*) and tibia I (*d*) of the adult females differ in shapes in both redescriptions, as well
9 the setae on the genua I-IV (*l'*, *l''*) and tibia I-IV (*l'*) of the deutonymph. Also, the setae on the
10 genua I (*l'*) and tibia I (*d*, *l''*), and on the trochanter (*d*), genua (*l'*), and tibia (*d*) III of the larvae
11 differ in shapes in both redescriptions. A detailed study involving and integrative approach with
12 molecular markers and comprehensive morphological review of the holotypes and paratypes is
13 needed to understand the taxonomical status of this specie. The mouthparts were studied by
14 Nuzzaci and de Lillo (1989, 1991) and de Lillo et al. (2002) on tenuipalpid samples collected at
15 Molfetta and referred as *C. pulcher* (Canestrini and Fanzago) in those papers; vice versa, based on
16 the current study, *C. bakeri* has to be correctly intended.
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24 735 **18. *Cenopalpus lanceolatisetae* Attiah, 1956**
25 (Figs 19a-24b)
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27 738 *Type Depository.* Unknown.

28 739 *Material examined.* **ENGLAND:** 3 ♀♀, intercepted in Boston, USA, interception 009376, ex.
29 plum, *Prunus* sp. (Rosaceae), June 18 1979, legit Batcheller-Crump (USNM); **ITALY:** 4 ♀♀, Bari
30 (southern Italy), ex. *Citrus × aurantium* (Linnaeus) (young tree, Rutaceae), in 1962 (USNM); 18
31 ♀♀, Altopiano delle Murge, Cassano (southern Italy) 40°52'26"N 16°41'41"E, 440 m, ex. bud,
32 *Pyrus spinosa* (*amygdaliformis*) (Forssk.) (Rosaceae), March 10 2019, legit M. De Giosa
33 (Di.S.S.P.A and USNM); 2 ♀♀, Bari (southern Italy) 41°06'33"N 16°52'57"E, 173 m, ex. lower
34 leaf surface, *Cotoneaster lacteus* (W.W.Sm.) (Rosaceae), March 13 2019, legit M. De Giosa
35 (Di.S.S.P.A and USNM); 3 ♀♀, Ginosa caves (southern Italy) 40°34'32"N 16°45'37"E, 215 m,
36 ex. branch, leaf and twig, *Prunus dulcis* ((Mill.) (D.A.Webb)) (Rosaceae), May 10 2019, legit M.
37 De Giosa (Di.S.S.P.A and USNM); 16 ♀♀, Altopiano delle Murge, Gravina (southern Italy)
38 40°52'49"N 16°23'35"E, 420 m, ex. lower leaf surface and twig, *Elaeagnus angustifolia* (Linnaeus)
39 (Elaeagnaceae), October 25 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 15 ♀♀, Altopiano
40 delle Murge, San Magno (southern Italy) 41°01'30"N 16°23'57"E, 420 m, *P. spinosa*, October 29
41 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 7 ♀♀, Altopiano delle Murge, Castel del Monte
42 (southern Italy) 41°04'36"N 16°16'37"E, 470 m, ex. leaf and twig, *Malus domestica* (Borkh.)
43 (Rosaceae), October 29 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 11 ♀♀, Altopiano delle
44 Murge, Castel del Monte (southern Italy) 41°04'00"N 16°14'48"E, 500 m, ex. leaf, twig and fruit,
45 *P. spinosa*, collected October 29 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 2 ♀♀, Molfetta
46 (southern Italy), ex. lower leaf surface, *P. domestica*, October 12 1986, legit E. de Lillo (USNM);
47 **JORDAN:** 1 ♀, intercepted in Chicago 008349 IL, USA, interception 84-05894, ex. stem, *Prunus*
48 sp. (Rosaceae), May 31 1984, legit J. Rennhack (USNM); 1 ♀, intercepted in DTW, interception
49 5995, USA, ex. *Malus sylvestris* ((Linnaeus) Mill.) (Rosaceae), collected September 1968, legit
50 J.M. Smith (USNM).

51 762
52 763 **Diagnosis (adult female).** As per *C. spinosus* species group, in addition to the following. Body
53 ovate, flat, and completely reticulated. Developed rostral shield and it can vary: the first rostral
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3 765 shape is with 4 short medial and submedial lobes (i.e., medial lobes more acute), 2 short lateral
4 766 lobes, the submedial and lateral lobes distal end more rounded than medially; the second rostral
5 767 shape can be with 2 medial lobes strong and developed, 4 short (strongly reduced) submedial and
6 768 lateral lobes. Hood reticulation is irregular with elongate to rounded cells and oblique to vertical
7 769 folds. Propodosoma with one bump medially (slightly flat) on which there are large and polygonal
8 770 cells medially and posteriorly; dorsolateral cells smaller and polygonal to elongate. A strong
9 771 sejugal furrow between propodosoma and opisthosoma. Dorsal opisthosoma completely
10 772 reticulated with one bump medially (between *c1-c1* and *e1-e1*) that becomes narrow on posterior
11 773 margin of opisthosoma; cuticle on bump with largest cells (some fused creating folds) than
12 774 dorsolateral and lateral ones. Dorsolateral and lateral cells elongate to rounded; some lateral cells
13 775 are fused. Cuticle between setae *1a* to *4a* with weak transverse striae beyond seta *4a*; anterior
14 776 margin of propodosoma (near setae *1a*) with 2 deep transverse striae. Polygonal cells near to each
15 777 coxa IV and weak transverse striae medially. Ventral, genital, and anal plates completely
16 778 reticulated with polygonal to almost elongated cells; genital and ventral plates developed included
17 779 four transverse and narrow bands. Dorsal propodosomal setae are quite longer than opisthosomal
18 780 ones; dorsal propodosomal and opisthosomal setae spatulate\serrate, well developed except *h1* and
19 781 *h2* smooth. Cuticular microplates (Figs 24a-24b): rounded to irregularly rounded plates, with
20 782 multiple short irregular ridges on dorsal surface; ridges aligned in haphazard directions, no parallel
21 783 ridges present. Ventral plate with one pair of aggenital setae (*ag*); genital plate with two pairs of
22 784 genital setae (*g1-g2*) smooth and lanceolate; anal plate with two pairs of pseudanal setae (*ps1-ps2*).
23 785 All ventral setae almost smooth (finely barbed); genital setae (*ag*) lanceolate.
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28 786 FEMALE (n=81). *Dorsum*. (Figs 19a, 21a, 22a-22b) Length of the body including the gnathosoma
29 787 355; length body excluding gnathosoma 275; width propodosoma 145-180; width opisthosoma
30 788 95-180. Distance between setae *v2-h1* 265. Setal lengths *v2* 28-32, *sc1* 24-25, *sc2* 22-23, *c1* 18-
31 789 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
32 790 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*
33 791 160, *e1-e1* 19, *e3-e3* 150, *f2-f2* 129, *f3-f3* 97, *h2-h2* 62, *h1-h1* 22.
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36 792 *Venter*. (Fig 19b, 21b, 22c-22d) Setal lengths *1a* 83-89, *1b* 25-30, *1c* 32, *2b* 26-24, *2c* 9-10, *3a* 15,
37 793 *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
38 794 between setae *ag-ag* 22, *g1-g1* 27, *g2-g2* 46, *ps1-ps1* 23, *ps2-ps2* 32. Setae *1a* and *4a* longer than
39 795 the others and lanceolate, smooth, and fine. Aggenital (*ag-ag*), genital (*g1-g2*) and pseudanal setae
40 796 (*ps1-ps2*) smooth.
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43 797 *Gnathosoma*. (Fig 19c-19d, 23a-23b) Setal formula for palps as in diagnosis of *C. spinosus* species
44 798 group. Solenidion 6 and 2 eupathidia 7-8. Subcapitulum well developed, almost reaching the distal
45 799 end of genu. Subcapitulum with subcapitular setae *m* 16-19; distance between setae *m-m* 13.
46 800
47

48 801 *Spermatheca apparatus*. (Fig 19e) A long, narrow, and convoluted duct ending in a spherical bulb
49 802 or in a small and rounded vesicle. Vesicle may be undeveloped, with duct ending blindly or in
50 803 small, membranous bulb.
51 804
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53 805 *Legs*. (Figs 19a-19e) Leg chaetotaxy formula as *C. spinosus* species group, in addition to the
54 806 following. Femur I with setae *d* spatulate and *bv'*, *l*, *v'* smooth; genu I with spatulate and finely
55 807 serrate setae (*d*, *l'*) and smooth seta (*l''*); all tibia I setae moderately barbed and lanceolate (*l'*, *l''*,
56 808 *v'*, *v''*), except *d* (smooth). Shape of setae on leg II, as following leg I, except the setae on femur:
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3 809 *bv''* and *l'* spatulate and lanceolate, such as *d*. Femur III with finely barbed-lanceolate seta *d* and
4 smooth seta *ev'*; genu III with smooth setae (*l'*) and tibia III (*d*, *v'*, *v''*). Shape of setae on leg IV,
5 as following leg III, except *v'* and *v''* on tibia moderately barbed. Measurements of legs (coxae to
6 tarsi): I 170-180, II 145-150, III 140-145, IV 145-150.
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8 813
9 814 MALE. DEUTONYMPH. PROTONYMPH. LARVA. EGGS. Not examined.
10 815
11 816 Distribution (Castro et al. 2023). Armenia; Cyprus; Egypt; England; Greece; Iran; Israel; Italy;
12 Jordan; Libya; Portugal; Saudi Arabia; Syria; Turkey.
13
14 818
15 819 Remarks. *Cenopalpus lanceolatisetae* is a new record for England, Italy, and Jordan. Therefore,
16 new host plant associations include *C. lacteus*, *C. nobilis*, *E. angustifolia*, *M. domes* (), and *P.*
17 *spinosa* (*amygdaliformis*). We retain inappropriate to design *M. sylvestris* as a new host plant
18 association since only 1 specimen of *C. lanceolatisetae* has been found on this host plant species.
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20 823
21 824
22 825 **19. *Cenopalpus longirostris* Liveschitz et Mitrofanov, 1967**
23 (Figs 25a-32b)
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25 828 Type Depository. Unknown.
26 829
27 830 Material examined. ITALY: 6 ♀♀, 1 ♂, 2 deutonymphs, Bitetto (southern Italy) 41°02'27"N
28 16°44'12"E, 125 m, ex. twigs and leaves, *Quercus pubescens* (Willd.) (Fagaceae), September 13
29 2019, legit M. De Giosa (Di.S.S.P.A and USNM); 6 ♀♀, San Magno, Alta Murgia National Park
30 (southern Italy) 41°02'18"N 16°24'06"E, 410 m, ex. twig and leaf, *Q. pubescens*, October 29, 2019,
31 legit M. De Giosa (Di.S.S.P.A and USNM).
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33 835
34 836 **Diagnosis (adult female).** As per *C. spinosus* species group, in addition to the following. Anterior
35 margin of propodosoma well developed, with elongate to fused cells. Propodosoma with polygonal
36 cells medially and rounded to irregular (almost fused) cells laterally. Irregular reticulation on
37 dorsal opisthosoma except between setae *c1-c1* to *d1-d1* with polygonal cells and *c1-c1* to the end
38 of *e1-e1*, with well-developed transversal folds. Sublateral cuticle with fused cells. Dorsal
39 propodosomal setae are well developed and decreasing in length from *v2* to *h1*. Propodosomal and
40 opisthosomal setae lanceolate and plumose. Cuticle between *4a* and ventral plate completely
41 smooth with only polygonal to elongated small cells near to each coxa IV. Ventral plate entirely
42 smooth with few-light rounded cells. Genital and ventral plates developed and including five
43 transverse and narrow bands. Genital plate with weak raised bands, mostly transverse in orientation
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45 846
46 847 FEMALE (n=12). *Dorsum*. (Figs 25a, 27a-27b, 28) Length of the body including the gnathosoma
47 375; length body excluding gnathosoma 265; width propodosoma 83-155; width opisthosoma 75-
48 155. Body: distance between setae *v2-h1* 250. Setal lengths *v2* 26, *scl* 21-26, *sc2* 21-26, *c1* 14-23,
49 *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.
50 Distance between setae *v2-v2* 36, *scl-sc1* 82, *sc2-sc2* 129, *c1-c1* 50, *c2-c2* 125, *c3-c3* 145, *d1-d1*
51 40, *d3-d3* 145, *e1-e1* 32, *e3-e3* 137, *f2-f2* 95, *f3-f3* 120, *h2-h2* 57, *h1-h1* 31.
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3 854 *Venter.* (Figs 25b, 27c) Setal lengths *1a* 76-96 (very long), *1b* 32-36, *2b* 27-34, *1c* 15-16, *2c* 24,
4 855 *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.
5 856 Distance between setae *ag-ag* 19, *g1-g1* 27, *g2-g2* 43, *ps1-ps1* 32, *ps2-ps2* 25. Ventral setae *1a*
6 857 and *4a* longer than the others lanceolate, smooth, and fine. Aggenital setae (*ag-ag*), genital (*g1-*
7 858 *g2*) and pseudanal setae (*ps1-ps2*) smooth.
8 859
9

10 860 *Gnathosoma.* (Fig 25c-25d) Setal formula for palps as in diagnosis of *C. spinosus* species group.
11 861 Solenidion 7 and eupathidia 7. Femur seta finely serrate-barbed; genu-tibia setae long, smooth,
12 862 and lanceolate. Subcapitulum well developed and narrow, almost reaching the distal end of tibia.
13 863 Subcapitulum with finely barbed setae *m* 17-23; distance between setae *m-m* 11.
14 864
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16 865 *Spermathecal apparatus.* A long, narrow, and convoluted duct is visible.
17 866
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19 867 *Legs.* (Figs 26a-26d) Setal formula and leg chaetotaxy as in diagnosis of *C. spinosus* species group.
20 868 Shape of setae on legs: leg I, femur with plumose-lanceolate (*bv''*, *d*, *l'*) and smooth-lanceolate
21 869 (*v'*) setae; genu with barbed (*d*, *l'*) and short-smooth setae (*l''*); all tibia setae moderately barbed
22 870 and lanceolate (*d*, *l'*, *l''*, *v'*, *v''*). Shape of setae on leg II, as following leg I. Leg III with plumose-
23 871 lanceolate femur seta (*d*) and smooth-lanceolate seta (*ev'*); seta *l'* on genu smooth and lanceolate;
24 872 tibia with lanceolate and moderately serrate setae (*v'*, *v''*), barbed seta (*d*). Shape of setae on leg
25 873 IV as following leg III. Measurements of legs (coxae to tarsi): I 170-115, II 165-170, III 135-140,
26 874 IV 145-150.
27 875
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29 876 MALE (n=1). *Dorsum.* (Figs 29a) Propodosoma with polygonal and large cells in the middle,
30 rounded to elongated small cells laterally. Anterior margin of opisthosoma with smaller cells than
31 propodosoma, rounded medially and elongate sub-medially. Reticulation of posterior margin of
32 opisthosoma with elongate and vertical cells; some rounded and small cells are present around *e1-*
33 *e3*. Length of the body including the gnathosoma 290; length body excluding gnathosoma 215;
34 880 width propodosoma 120-210; width opisthosoma 64-94. Distance between setae *v2-h1* 205. Setae
35 881 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,
36 882 *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-*
37 883 *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*
38 884 74, *h2-h2* 18, *h1-h1* 6.
39 885
40 886

41 887 *Venter.* (Fig 29b) Ventral cuticle smooth, with some weak mostly transverse to longitudinal striae.
42 888 Area posterior after coxae IV with broad band of strong transverse striae; after ventral setae *ag-ag*
43 889 weak raised bands, mostly transverse in orientation (some vertically). Setal lengths *1b* 27-32, *2b*
44 890 25-26, *1c* 15-20, *2c* 28-29, *3b* 16, *4b* 18-24, *ag* 20-22. Distance between *ag-ag* 19. Aggenital setae
45 891 (*ag*) smooth, except *g1*, *g2*, *ps1* barbed; pseudanal setae *ps2* very long, lanceolate, and fine.
46 892
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48 893 *Aedeagus.* Aedeagus narrow, elongate, and sclerotized, ending in a rounded membranous bulb.
49 894 Measurement: 130.
50 895

51 896 *Gnathosoma.* (Fig 34a-34b) Setal formula for palps as in diagnosis of *C. spinosus* species group.
52 897 Solenidion (10) and eupathidia (7). Femur seta finely serrate-barbed; genu-tibia setae long,
53 898 smooth, and lanceolate. Subcapitulum well developed and narrow, almost reaching the distal end
54 899 of tibia. Subcapitulum with two finely barbed subcapitular setae *m* 16-18; distance between setae
55 900 *m-m* 10.
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3 901
4 902 *Legs.* Similar to adult female. Measurement of legs (coxae to tarsi): I 155-160; II 140-145; III 125;
5 903 IV 130-140.
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7 904
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9 905 DEUTONYMPH (n=2). *Dorsum.* (Figs 30, 32a) Length of the body including the gnathosoma
10 906 350; length body excluding gnathosoma 286; width propodosoma 105-140; width opisthosoma
11 907 85-130. Dorsal propodosoma and opisthosoma reticulations mostly smooth with weak and short
12 908 transversal to vertical striations. Dorsal opisthosoma with transverse striae medially between *c*3-
13 909 *c*3 to *f*3-*f*3. Dorsal propodosomal and opisthosomal setae developed with short setules (lanceolate
14 910 and finely serrate): *v*2, *sc*1, *sc*2, *c*1, *c*2, *c*3, *d*1, *d*3, *e*3, *f*2, *f*3, *h*2 longer than *e*1 and *h*1. Distance
15 911 between setae *v*2-*h*1 275. Setal lengths *v*2 36-39, *sc*1 33-34, *sc*2 35-36, *c*1 35-37, *c*2 25-26, *c*3 30-
16 912 34, *d*1 18-25, *d*3 30-31, *e*1 21-25 *e*3 31-32, *f*2 28-31, *f*3 27-28, *h*2 23-26, *h*1 5-6. Distance between
17 913 setae *v*2-*v*2 42, *sc*1-*sc*1 89, *sc*2-*sc*2 120, *c*1-*c*1 40, *c*2-*c*2 120, *c*3-*c*3 133, *d*1-*d*1 27, *d*3-*d*3 124,
18 914 *e*1-*e*1 19, *e*3-*e*3 121, *f*2-*f*2 77, *f*3-*f*3 100, *h*2-*h*2 38, *h*1-*h*1 15.
19 915
20

21 916 *Venter.* (Fig 32b) Cuticle completely plicate, covered with transverse and narrow striae. Ventral,
22 917 genital, and anal shields indistinct, with short transverse striae. Setal lengths *1a* 60-74, *1b* 18-25,
23 918 *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.
24 919 Distance between setae *ag-ag* 25, *g1-g1* 18, *ps1-ps1* 13, *ps2-ps2* 11.
25 920

26 921 *Gnathosoma.* Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion 6
27 922 and eupathidia 6-7. Femur seta finely barbed; genu-tibia setae smooth and lanceolate.
28 923 Subcapitulum with subcapitular setae *m* 4-6; distance between setae *m-m* 10.
29 924
30

31 925 *Legs.* (Figs 31a-31d) Leg chaetotaxy as in diagnosis of *C. spinosus* species group. Shape of setae
32 926 on legs: leg I with four setae on femur, *bv*'' smooth and short, *d* and *l'* mostly plumose and
33 927 lanceolate, *v'* finely barbed; genu with barbed setae *d* and *l'* and shorth-smooth seta *l''*; tibia setae
34 928 moderately barbed and lanceolate (*l'*, *l''*, *v'*, *v''*), mostly barbed and lanceolate (*d*). Shape of setae
35 929 on leg II, as following leg I, except *bv*'' on femur, plumose and lanceolate. Leg III with barbed
36 930 femur seta *d* and finely barbed seta *ev'*; seta *l'* on genu barbed; tibia with lanceolate and moderately
37 931 serrate setae (*v'*, *v''*), short and barbed seta (*d*). Shape of setae on leg IV, as following leg III.
38 932 Measurements of legs (coxae to tarsi): I 115-125, II 96-110, III 84-92, IV 100-105.
39 933
40

41 934 PROTONYMPH. LARVA. EGGS. Not examined.
42 935
43 936 *Distribution* (Castro et al. 2023). Greece; Italy; Ukraine.
44 937
45 938 *Remarks.* *Cenopalpus longirostris* was found associated with *B. recki* in Italy (De Giosa et al.
46 939 2022).
47 940
48 941
49 942 **20. *Cenopalpus halperini* Castagnoli, 1987** 
50 943 (Figs 33a-36)
51 944
52 945 *Type Depository.* CREA- DC.
53 946
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3 947 *Material examined.* ITALY: 3 ♀♀, San Magno, Alta Murgia National Park (southern Italy)
4 948 41°02'30"N 16°44'11"E, 130 m, ex. needles and scaly leaves, *Pinus halepensis* (Mill.) (Pinaceae),
5 949 October 30 2019, legit M. De Giosa (Di.S.S.P.A and USNM).
6
7 950
8 951 **Diagnosis (adult female).** As per *C. spinosus* species group, in addition to the following.
9 952 *Cenopalpus halperini* is similar to *C. longirostris* for the length of subcapitulum but differs in
10 953 having different significant morphological characters. Dorsal propodosoma with irregular
11 954 reticulations: dorsomedial cuticle with transverse and narrow folds; dorsolateral cells small,
12 955 polygonal to elongate. Dorsal opisthosoma mostly striate and partly reticulate: dorsocentral
13 956 between *c1-c1* and after *e1-e1* with narrow and developed transverse folds; dorsolateral cells
14 957 irregular and small, polygonal, and vertical. Dorsal propodosomal setae are quite longer than
15 958 opisthosomal ones: *v2, sc1-sc2* almost narrow, lanceolate, and plumose. Dorsal opisthosomal setae
16 959 plumose. Cuticle between *1a* to *4a* mostly smooth with weak transverse striae beyond seta *4a*.
17 959 Elongate cells near to each coxa IV. Ventral plate entirely smooth with few-light transverse striae.
18 960 Genital and ventral plates developed and including five transverse and narrow bands; also, weak
19 961 raised bands are present between these two plates. Genital plate partly smooth with rounded cells
20 962 posteriorly.
21 963
22 964
23 965 FEMALE (n=3). *Dorsum.* (Figs 33a, 35a) Length of the body including the gnathosoma 410;
24 966 length body excluding gnathosoma 285; width propodosoma 160-210; width opisthosoma 110-
25 967 175. Distance between setae *v2-h1* 300. Setal lengths *v2* 35-38, *sc1* 32, *sc2* 38-45, *c1* 27-32, *c2*
26 968 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
27 969 between setae *v2-v2* 57, *sc1-sc1* 125, *sc2-sc2* 170, *c1-c1* 78, *c2-c2* 170, *c3-c3* 195, *d1-d1* 61, *d3-*
28 970 *d3* 190, *e1-e1* 47, *e3-e3* 170, *f2-f2* 160, *f3-f3* 120, *h2-h2* 86, *h1-h1* 37.
29 971
30 972 *Venter.* (Figs 33b, 35b) Cuticle completely covered with fine transverse striae, almost smooth.
31 973 Each coxa IV with irregular and defined reticulations laterally. Genital and anal plates developed
32 974 and sclerotized, included by four transverse and narrow bands. Ventral plate: cuticle with few
33 975 transverse striae, generally smooth. Genital plate: cuticle with weak transverse bands. Setal lengths
34 976 *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*
35 977 24-25, *g1* 18-19, *g2* 18-19, *ps1* 13-15, *ps2* 12. Distance between setae *ag-ag* 29, *g1-g1* 40, *g2-g2*
36 978 62, *ps1-ps1* 35, *ps2-ps2* 33. Setae *1a* (difficult to measure the full length) and *4a* are longer than
37 979 the others; ventral setae lanceolate, smooth and fine.
38 980
39 981 *Gnathosoma.* (Fig 33c-33d) Setal formula for palps as in diagnosis of *C. spinosus* species group.
40 982 Solenidion 10 and eupathidia 7. Femur seta finely serrate-barbed; genu-tibia setae long, smooth
41 983 and lanceolate. Subcapitulum well developed, at level of distal end of genu. Subcapitulum with
42 984 subcapitular setae *m* 17-18; distance between setae *m-m* 11.
43 985
44 986 *Spermathecal apparatus.* (Figs 33e, 36) An elongated, narrow, weakly convoluted duct. The basal
45 987 section of the duct broadens slightly towards external opening. Duct ending with a membranous,
46 988 bulbous lobes; appears to be 6 small subequal lobes.
47 989
48 990 *Legs.* (Figs 34a-34d) Leg chaetotaxy as in diagnosis of *C. spinosus* species group. Shape of setae
49 991 on legs: leg I, femur with plumose-lanceolate (*d, l', v'*) and smooth-lanceolate (*bv''*) setae; genu
50 992 with plumose setae (*d, l', l''*); all tibia setae moderately barbed and lanceolate (*d, l', l'', v', v''*).
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3 993 Shape of setae on leg II, as following leg I. Leg III with plumose-lanceolate femur seta *d* and
4 994 moderately barbed seta *ev'*; seta *l'* on genu plumose; tibia with lanceolate and moderately serrate
5 995 setae (*v'*, *v''*), plumose seta (*d*). Shape of setae on leg IV as following leg III. Measurements of
6 996 legs (coxae to tarsi): I 180-190, II 175-180, III 140-145, IV 150-155.
7 997
8 998 MALE. DEUTONYMPH. PROTONYMPH. LARVA. EGGS. Not examined.
9 999
10 1000 *Distribution* (Castro et al. 2023). Israel; Italy.
11 1001
12 1002 *Remarks.* *Cenopalpus halperini* has been observed in Sardinia (Italy) on *Pinus pinaster*
13 (Castagnoli 1974), associated with large populations of *C. wainsteini* (Livschitz and Mitrofanov
14 1967). In addition, *C. halperini* has also been found in the Apulian District on *Pinus halepensis*
15 (Mill), near needles and scaly leaves, always associated with *C. wainsteini*. No alteration has been
16 observed in the presence of *C. halperini* from our study and Castagnoli (1974). The biology of *C.
17 halperini* is poorly known and requires detailed study.
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19 1004
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24 1009
25 1010 **21. *Cenopalpus mespili*** Livschitz et Mitrofanov, 1967
26 1011
27 1012 *Type Depository.* Unknown.
28 1013
29 1014 *Distribution* (Castro et al. 2023). Greece; Italy; Hungary; Ukraine.
30 1015
31 1016 *Remarks.* *Cenopalpus mespili* has been reported in the updated Tenuipalpidae checklist
32 (Castagnoli and Nannelli 2003). The effective presence of this species in Italy remains
33 questionable due to the absence of information in both national and international scientific
34 journals.
35 1020
36 1021
37 1022 **22. *Cenopalpus pegazzanoae*** Castagnoli, 1987
38 1023
39 1024 *Type Depository.* CREA- DC.
40 1025
41 1026 *Distribution* (Castro et al. 2023). Italy.
42 1027
43 1028 *Remarks.* Currently *C. pegazzanoae* has been described and reported only from Italy.
44 1029
45 1030
46 1031 **23. *Cenopalpus pulcher*** Canestrini et Fanzago, 1876
47 1032 (Figs 37a-50b)
48 1033
49 1034 *Type Depository.* CREA- DC.
50 1035
51 1036 *Material examined.* **ARGENTINA:** 4 ♀♀, ex. *M. sylvestris* fruit, interception N.D. OZ6137, April
52 1037 14 1984 (USNM); **ENGLAND AND NORTH IRELAND:** 4 ♀♀, ex. *Malus* sp. fruit, intercepted
53 in CA San Francisco CBP, USA, October 17 2007, legit S. Tanner (USNM); **FRANCE:** 1 nymph
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3 1039 ex. apple fruit (Rosaceae), intercepted in IFK, USA 81.10795, USA, September 15 1981, legit J.
4 1040 Plummer (USNM); **INDIA:** 2 ♀♀ ex. *Malus* sp., intercepted in CA San Francisco CBP, USA,
5 interception 3013, December 13 2008 (APHIS PPQ USDA); **IRAN:** 1 ♀, ex. *Malus* sp., March 14
6 1041 1966, legit D. Campt (USNM); **ITALY:** 1 ♀, ex. apple fruit (Rosaceae), intercepted in Boston,
7 1042 USA, interception 007450, April 14 1975 (USNM); 1 ♀, ex. *Cydonia oblonga* fruit (Rosaceae),
8 1043 intercepted in JSKIA, interception A2610, USA, August 25 1982, legit J. Plummer (USNM); 6
9 1044 ♀♀, Bari (southern Italy) 41°06'33"N 16°52'57"E, 173 m, ex. lower leaf surface, *C. lacteus*, March
10 1045 13 2019, legit M. De Giosa (Di.S.S.P.A and UNSM); 1 ♀, Bari (southern Italy) 41°06'39"N
11 1046 16°52'55"E, 173 m, ex. *Eriobotrya japonica* ((Thunb.) Lindl.) (Rosaceae), October 18 2019, legit
12 1047 M. De Giosa (Di.S.S.P.A); 10 ♀♀, Mattinata (southern Italy) 41°43'01"N 16°04'36"E, 80 m ex.
13 1048 branch and twigs, *M. sylvestris*, April 19 2019, legit M. De Giosa (Di.S.S.P.A and UNSM);
14 1049 **LEBANON:** 1 ♂, ex. apple fruit, interception 63-24774, Nakahava, Scattle 17999, October 11
15 1050 1963, legit D. M. Pike (USNM); **NETHERLANDS:** 3 ♀♀, ex. *Salix* sp. (Salicaceae), August 08
16 1051 1954, legit A. E. Pritchard (USNM); **PAKISTAN:** 28 ♀♀, Parachinar, ex. apple tree bark,
17 1052 interception 83-3630, collected January 23 1983, legit Mohyuddin A.I. (USNM); 5 slides; 5 ♀♀,
18 1053 Beltsville, MD 001779, ex. *Malus scions* (Rosaceae), February 22 1983, legit T. Denny (USNM);
19 1054 **PORTUGAL:** 1 ♀, ex. *Buxus* sp. (Buxaceae), intercepted in Boston, interception Lot 58-8697,
20 1055 USA, May 15 1958, legit D. D. Crump (USNM); 1 ♀, ex. *E. japonica*, intercepted in Boston,
21 1056 interception 005258 MA, USA, April 28 1973, legit Holt and Crump. (USNM); 1 ♀, ex. *M.
22 1057 sylvestris*, intercepted in JFKIA, USA, interception 435, USA, October 16 1994, legit Schroeder
23 1058 (USNM); **SPAIN:** 3 nymphs, 9 ♀♀, Valencia, ex. *Ligustrum* sp. (Oleaceae), intercepted in JFKIA,
24 1059 USA, interception 82-4186, July 17 2015, legit E. W. Kitajima (USNM); **TURKEY:** 2
25 1060 deutonymphs, 6 ♀♀, ex. *Pyrus* sp. (Rosaceae), intercepted in JFKIA, USA, interception 133018,
26 1061 November 9 1998, legit Schroeder (USNM); **Former YUGOSLAVIA:** 1 ♀, ex. *C. oblonga* fruit,
27 1062 intercepted in JFKIA, USA, interception 82-4186, collected March 23 1982, legit Fiuk E.; 1 ♀,
28 1063 ex. apple fruit, intercepted in JFKIA, USA, interception 83-2831, USA, January 27 1983, legit E.
29 1064 Fiuk (USNM).
30 1065
31 1066
32 1067 **Diagnosis (adult female).** As per *C. spinosus* species group, in addition to the following. Dorsal
33 propodosomal setae are longer than opisthosomal ones: *v2* narrow with long and short setules, *sc1-*
34 *sc2* lanceolate and slightly serrate-barbed. Dorsal opisthosomal setae moderately barbed (almost
35 smooth), short and tapering (Figs 44a-44f). Cuticular microplates: separate and individual plates,
36 always rounded in shape, with a distinct cluster on their dorsal surface (Figs 45a-45b). Coxisternal
37 area between coxae I-II covered with some strong and weak transverse striae medially.
38 Metapodosoma with weak transverse striae between coxae III and IV, and vertically strong folds
39 on each coxa. The region posterior to coxae IV with irregular reticulation: elongate and fused cells.
40 Ventral plate with elongate and fused cells that form transverse bands. Genital plate: cuticle
41 uniformly verrucose to verrucose-reticulate, with large cells. Spermathecal apparatus with a long
42 fine duct terminating in small rounded vesicle.
43 1073
44 1074
45 1075
46 1076
47 1077
48 1078
49 1079 FEMALE (n=80). *Dorsum.* (Figs 37a, 39a, 40a-40c) Length of the body 330-345 including
50 gnathosoma and 270-300 excluding gnathosoma; width propodosoma 125-170; width opisthosoma
51 82-165. Distance between setae *v2-h1* 270. Setal lengths *v2* 29-30, *sc1* 22-23, *sc2* 14-19, *c1* 11-12,
52 *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
53 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*
54 160, *e1-e1* 125, *e3-e3* 150, *f2-f2* 130, *f3-f3* 97, *h2-h2* 59, *h1-h1* 23.
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3 1085
4 1086 *Venter.* (Figs 37b, 39b, 40d-40f, 43a-43b) Setal lengths *1a* 62-74, *1b* 22-27, *1c* 14-16, *2b* 18-22, *2c*
5 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.
6 1088 Distance between setae *ag-ag* 22, *g1-g1* 48, *g2-g2* 31, *ps1-ps1* 10, *ps2-ps2* 14. Ventral setae short
7 1089 except *1a* and *4a* lanceolate, smooth, and fine.
8 1090

9
10 1091 *Gnathosoma.* (Figs 37c-37d, 42a-42b, 51a-51b) Setal formula for palps as in diagnosis of *C.*
11 *spinosis* species group. Solenidion 6-7 and eupathidia 4-6. Femur seta short and strongly barbed in
12 the end; genu-tibia setae smooth and slightly barbed in the distal end. Palps extending to end of
13 femur I. The distal end of subcapitulum always reaching the posterior margin of genu I.
14 Subcapitulum with lanceolate, and slightly barbed subcapitular setae *m* 34-35; distance between
15 setae *m-m* 32.
16 1096
17 1097

18 1098 *Spermathecal apparatus.* (Fig 33) A long narrow, convoluted duct is visible, ending in a small,
19 rounded vesicle.
20 1100

21 1101 *Legs.* (Figs 38a-38d) Leg chaetotaxy as in diagnosis of *C. spinosus* species group. Shape setae on
22 legs: leg I with femur setae serrate, lanceolate and barbed (*d*, *l'*, *v'*), and lanceolate-smooth (*bv''*);
23 genu setae *d* and *l'* serrate and barbed, *l''* smooth; tibia setae lanceolate, serrate and barbed (*d*, *l''*,
24 *v'*, *v''*), and *l'* lanceolate-smooth. Leg II with serrate, lanceolate and barbed setae (*bv''*, *d*, *l'*, *v'*);
25 setae on genu I lanceolate and smooth (*d-l'-l''*); tibia I with lanceolate, serrate and barbed setae
26 (*d*, *l*, *v'*, *v''*), and *l''* lanceolate and smooth. Leg III with lanceolate and barbed femur setae (*d*, *ev'*);
27 seta *l'* on genu, lanceolate and smooth; tibia with lanceolate, serrate and barbed setae (*d*, *v'*, *v''*).
28 Shape of setae on leg IV as following leg III. Measurements of legs (coxae to tarsi): I 150-155; II
29 1108 115-120; III 135-140; IV 145-150.
30 1109
31 1110

32 1111 MALE (n=1). *Dorsum.* (Figs 46a, 47a) Propodosoma with polygonal and large cells in the middle,
33 rounded cells laterally. Anterior margin of opisthosoma with cells having the same shape and size
34 as the ones on the propodosoma. Reticulation of posterior margin of opisthosoma with elongate
35 and vertical cells. Length of the body including the gnathosoma 255; length body excluding
36 gnathosoma 200; width propodosoma 99-135; width opisthosoma 68-120. Distance between setae
37 *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,
38 *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-*
39 *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-*
40 *e3* 112, *f2-f2* 87, *f3-f3* 64, *h2-h2* 32, *h1-h1* 9.
41 1118
42 1119
43 1120

44 1121 *Venter.* (Figs 47b) Ventral cuticle smooth, with some weak mostly transverse to longitudinal striae.
45 Area posterior after coxae IV with broad band of strong transverse striae. Setal lengths *1a* 100-
46 105, *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
47 between setae *ag-ag* 22-23, *g1-g1* 5, *g2-g2* 8. Ventral setae *ag*, *g1-g2*, *ps1-ps2* barbed.
48 1124
49 1125

50 1126 *Aedeagus.* Aedeagus narrow, elongate, and sclerotized, ending in a rounded membranous bulb;
51 110 long.
52 1127

53 1129 *Gnathosoma.* (Fig 46b-46c) Subcapitulum well developed and narrow, reaching half of the femur.
54 Subcapitulum with finely barbed subcapitular setae *m* 10-10; distance between setae *m-m* 12-13.
55 1130
56 1131

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2
3 1132 *Palps.* (Fig 55b) Setal formula for palps as in diagnosis of *C. spinosus* species group. Solenidion
4 (length 8) and eupathidia (length 6-7). Femur seta finely serrate-barbed; genu-tibia setae finely
5 serrate-barbed and lanceolate.
6
7 1135
8 1136 *Legs.* Similar to adult female. Measurements of legs (coxae to tarsi): I 115-120; II 115-130; III
9 125-135; IV 150-150.
10 1138
11 1139 DEUTONYMPH (n=2). *Dorsum.* (Figs 48a, 50a) Length of the body including the gnathosoma
12 335; length body excluding gnathosoma 290; width propodosoma 135-180; width opisthosoma
13 79-145. Dorsal propodosomal and opisthosomal reticulations mostly smooth with weak and short
14 vertical striations. Dorsal opisthosoma with transverse striae medially between *c3-c3* to *f3-f3*.
15 Dorsal propodosomal and opisthosomal setae developed with short setules (lanceolate and finely
16 serrate): *v2, sc1, sc2, c3, d3, e3, f2, f3, h2* longer than *c1, c2, d1, e1, f2, h2* and *h1*. Distance
17 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,
18 *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*
19 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-*
20 *e3* 138, *f2-f2* 120, *f3-f3* 88, *h2-h2* 45, *h1-h1* 14.
21 1148
22 1149
23 1150 *Venter.* (Fig 50b) Cuticle completely plicate, covered with transverse and narrow striae. Ventral,
24 genital and anal shields indistinct, with short transverse striae. Setae lengths *1a* 105-110, *1b* 12-
25 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*
26 5-5. Distance between setae *ag-ag* 26-26, *g1-g1* 18-18, *ps1-ps1* 6, *ps2-ps2* 6.
27 1153
28 1154
29 1155 *Gnathosoma.* (Fig 48b-48c) Setae formula for palps as in diagnosis of *C. spinosus* species group.
30 Solenidion 6 and eupathidia 6-7. Femur seta finely barbed; genu-tibia setae smooth and lanceolate.
31 Subcapitulum with subcapitular setae *m* 17-17; distance between setae *m-m* 10.
32 1156
33 1157
34 1158
35 1159 *Legs.* (Fig. 49a-49d) Setal formula and leg chaetotaxy as in diagnosis of *C. spinosus* species group.
36 Shape of setae on legs: leg I with four setae on femur, *bv''* smooth and short, *d* and *l'* mostly
37 plumose and lanceolate, *v'* finely barbed; genu with barbed and plumose setae (*d*, *l'*) and shorth-
38 smooth seta (*l''*); tibia setae moderately barbed and lanceolate (*l', l'', v', v''*), mostly barbed and
39 lanceolate (*d*). Shape of setae on leg II, as following leg I, except *bv''* on femur, barbed. Leg III
40 with plumose femur seta (*d*) and finely barbed seta (*ev'*); seta *l'* on genu finely barbed; tibia with
41 lanceolate and moderately serrate setae (*v', v''*), short and barbed seta (*d*). Shape of setae on leg
42 IV similar to leg III. Measurements of legs (coxae to tarsi): I 136-145, II 105-108, III 93-110, IV
43 107-111.
44 1167
45 1168
46 1169 PROTONYMPH. LARVA. EGGS. Not examined.
47 1170
48 1171 *Distribution* (Castro et al. 2023). Afghanistan; Algeria; Armenia; Austria; China; Cyprus;
49 Denmark; Egypt; England; France; Georgia; Germany; Greece; Hungary; India; Iran; Iraq; Israel;
50 Italy; Jordan; Lebanon; Libya; Morocco; Netherlands; Pakistan; Portugal; Syria; Tunisia; Turkey;
51 Ukraine; USA: Oregon.
52 1175
53 1176 *Remarks.* *Cenopalpus pulcher* has been described from Italy (Canestrini and Fanzago 1876).
54 *Cenopalpus pulcher* is a new record for Argentina, England, North Irelandand the former
55 Yugoslavia. Moreover, *Buxus* sp., *C. lacteus*, *Ligustrum* sp., and *M. scions* are new host plant
56 1178
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1
2
3 1179 associations. Furthermore, the adult female of *C. pulcher* is morphologically close to the one of *C.*
4 1180 *bakeri*. For this reason, both species are difficult to separate if the nymphs are unavailable,
5 1181 resulting in misidentification. The current worldwide distribution of *C. pulcher* should be
6 1182 reevaluated and confirmed.
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8 1183
9 1184
10 1185 **24. *Cenopalpus spinosus*** Donnadiieu, 1875
11 1186
12 1187 *Type Depository*. Faculté des Sciences de Lyon, France.
13 1188
14 1189 *Material examined*. ENGLAND: 7 nymphs, 23 ♀♀, 80 High St, Chipping Campden GL55 6BW
15 1190 52°03'02.3"N, 1°46'51.5W, ex. *Cornus mas* (Linnaeus), September 3 2016, legit E. W. Kitajima
16 1191 (DEES).
17
18 1192
19 1193  **Distribution** (Castro et al. 2023). Algeria; Algeria; Croatia; France; Hungary; Iran; Italy; Madeira
20 1194 Island; Monaco; Morocco; Portual; Spain; Tunisia; Turkey.
21
22 1195
23 1196 *Remarks*. *Cenopalpus spinosus* was observed on *Rubus fruticosus* (Linnaeus) in Portici (Campania
24 1197 district, southern Italy) (Leonardi 1899). This species is also a new record in England. Moreover,
25 1198 *C. mas* and *R. fruticosus* are new host plants records.
26 1199 
27
28 1200
29 1201 **25. *Cenopalpus ulmifolius* nov. sp.** De Giosa, de Lillo et Ochoa
30 1202 (Figs 51a-60d) 
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32 1203
33 1204 *Material examined*. ITALY: 1 deutonymph, 20 ♀♀, Bitetto (southern Italy) 41°02'23"N
34 1205 16°43'50"E, 130 m, ex. stem and lower leaf surface, *Rubus ulmifolius* (Schott) (Rosaceae),
35 1206 collected September 13 2019, legit M. De Giosa (Di.S.S.P.A. and USNM); ITALY: 8 ♀♀, Bitetto
36 1207 (southern Italy) 41°02'17"N 16°43'52"E, 135 m, ex. lower leaf surface, *R. ulmifolius*, collected
37 1208 September 13 2019, legit M. De Giosa (Di.S.S.P.A. and USNM); ITALY: 2 deutonymphs, 6 ♀♀,
38 1209 Quadrivio Strada San Magno (southern Italy) 41°05'33"N 16°20'17"E, 400 m, ex. lower leaf
39 1210 surface, near the veins, *R. ulmifolius*, collected October 29 2019, legit M. De Giosa (Di.S.S.P.A.
40 1211 and USNM); ITALY: 4 deutonymphs, 7 ♀♀, San Magno (southern Italy) 41°01'19"N 16°23'35"E,
41 1212 ex. stem and lower leaf surface, *Rosa canina* (Linnaeus) (Rosaceae), collected October 25 2019,
42 1213 legit M. De Giosa (Di.S.S.P.A and USNM).
43
44 1214
45 1215 **Diagnosis (adult female)**. As per *C. spinosus* species group, in addition to the following. Dorsal
46 1216 propodosoma setae v2,-sc1, sc2 narrow, lanceolate, and slightly serrate-barbed (Fig 56). Dorsal
47 1217 opisthosoma setae c1, c2, c3, d1, d3, e1, e3, f2, f3, h2 serrate-barbed, h1 short and finely barbed.
48 1218 Cuticular microplates: separate and individual plates, rounded to rectangular in shape, with
49 1219 multiple series of distinct ridges on their dorsal surface (Figs 57a-57h). Coxisternal area between
50 1220 coxae I-II covered with some strong and weak transverse striae medially. Metapodosoma with
51 1221 weak transverse striae between coxae III and coxae IV. The region posterior to coxae IV with
52 1222 regular reticulation: rounded to oval separated cells. Ventral and genital plates with elongate-fused,
53 1223 separate-rounded and separate-oval cells.
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3 1225 FEMALE (n=41). *Dorsum*. (Figs 51a, 53a-53b, 54a-54b) Length of the body including the
4 gnathosoma 345 [335-340]; length body excluding gnathosoma 290 [275-280]; width
5 propodosoma 135-155 [120-160]; width opisthosoma 130-170 [92-155]. Distance between setae
6 v2-h1 270 [260-265]. Setal lengths v2 20-21 [34-36], sc1 18-18 [28-36], sc2 21-22 [30-31], c1 17-
7 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-
8 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].
9 Distances between setae v2-v2 34 [30-30], sc1-sc1 96 [95-96], sc2-sc2 145 [130-135], c1-c1 56
10 [47-55], c2-c2 115 [130], c3-c3 140 [150-155], d1-d1 44 [37-40], d3-d3 150 [150-160], e1-e1 33
11 [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
12 [21-22].
13 1234
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15 1235 *Venter*. (Figs 51b, 53c-53d, 54c-54d) Setal lengths 1a 62-63 [62-63 – very long, tip not always
16 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-
17 18], 3b 13-14 [17-18], 4a 78-96 [81-68 – very long, tip not always visible], 4b 15-16 [19-21], ag
18 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
19 between setae ag-ag 32 [23-30], g1-g1 37 [25-31], g2-g2 58 [45-55], ps1-ps1 23 [22-24], ps2-ps2
20 18 [16-17]. Setae 1a and 4a are longer and difficult to measure the full length; other ventral setae
21 lanceolate, smooth, and fine.
22 1241
23
24 1242 *Gnathosoma*. (Fig 51c-51d, 55a-55b) Setal formula for palps as in diagnosis of *C. spinosus* species
25 group. Solenidion 7 [8] and eupathidia 5-6 [6-7]. Femur seta finely serrate-barbed on the base,
26 with distal end smooth; genu-tibia setae long, finely barbed, and lanceolate. Subcapitulum reaching
27 beyond of distal end of femur. Subcapitulum with subcapitular setae m 15-22 [16-22]; distance
28 between setae m-m 12 [11-12].
29
30
31 1247 *Spermathecal apparatus*. (Figs 51e) A long, narrow, convoluted duct ending in a small and
32 rounded vesicle. A long narrow vesicle may be undeveloped, with duct ending blindly or in a
33 small, membranous bulb.
34
35 1250 *Legs*. (Figs 52a-52d) Leg chaetotaxy formula as *C. spinosus* species group, in addition to the
36 following. Shape of setae on legs: leg I, femur with spatulate (d) and smooth (bv'', l', v') setae;
37 genu with spatulate and finely serrate setae (d, l') and smooth seta (l''); all tibia setae moderately
38 barbed and lanceolate (l', l'', v', v''), except d (smooth). Shape of setae on leg II, as following leg
39 I, except the setae on femur: bv'' and l' spatulate and lanceolate, such as d. Leg III with finely
40 barbed-lanceolate femur seta (d) and smooth seta (ev'); smooth setae on genu (l') and tibia (d, v',
41 v''). Shape of setae on leg IV as following leg III, except v', v'' on tibia moderately barbed.
42 Measurements of legs (coxae to tarsi): I 145-150 [175-180], II 150-155 [170-180], III 120-125
43 [155-155], IV 130-130 [160-161].
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47 1260 MALE. Not examined.
48
49 1262 DEUTONYMPH (n=7). *Dorsum*. (Figs 58a-58b, 60a-60b) Length of the body including the
50 gnathosoma 250; length body excluding gnathosoma 320; width propodosoma 100-170; width
51 opisthosoma 16-77. Dorsal propodosoma with vertical striations and opisthosoma with transverse
52 striations. Dorsal propodosomal and opisthosomal setae developed with short setules (lanceolate
53 and finely serrate): v2, sc1, sc2, c1, c2, c3, d3, e3, f2, f3, h2 longer than d1, e1, h2, and h1. Distance
54 between setae v2-h1 260. Setal lengths v2 43-53, sc1 110-115, sc2 55-57, c1 29-31, c2 105-110,
55 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
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3 1269 deutonymph characterized by heterometry), *h1* 2-3. Distance between setae *v2-v2* 39, *sc1-sc1* 81,
4 1270 *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,
5 1271 *f3-f3* 66, *h2-h2* 30, *h1-h1* 11.
6 1272
7
8 1273 *Venter.* (Figs 60c-60d) Setal lengths *1a* 115-120, *1b* 16-18, *1c* 11-12, *2b* 10-11, *2c* 13-15, *3a* 9-12,
9 1274 *3b* 7-10, *4a* 56-61, *4b* 8-12, *ag* 8-9, *g1* 3-4. Distance between setae *ag-ag* 28, *g1-g1* 17.
10 1275
11
12 1276 *Gnathosoma.* (Figs 58c-58d) Setal formula for palps as in diagnosis of *C. spinosus* species group.
13 1277 Femur seta finely serrate-barbed; genu-tibia setae long and lanceolate. Subcapitulum with
14 1278 subcapitular setae *m* 13-14; distance between setae *m-m* 7.
15 1279
16 1280 *Legs.* (Figs 59a-59d) Leg chaetotaxy as in diagnosis of *C. spinosus* species group. Shape of setae
17 1281 on legs: leg I with four setae on femur, *bv''* and *l'* mostly plumose and lanceolate, *v'* smooth, *d*
18 1282 short-smooth; genu with barbed seta (*d*) and smooth seta (*l'*, *l''*); tibia setae moderately barbed
19 1283 and lanceolate (*l'*, *l''*, *v'*, *v''*), mostly barbed (*d*). Shape of setae on leg II, as following leg I, except
20 1284 *d* on femur, plumose and lanceolate, and *l'* on genu, barbed. Leg III with barbed femur seta (*d*)
21 1285 and finely barbed seta (*ev'*); seta *l'* on genu moderately barbed; tibia with lanceolate and
22 1286 moderately serrate setae (*v'*, *v''*), short and barbed seta (*d*). Shape of setae on leg IV, as following
23 1287 leg III. Measurements of legs (coxae to tarsi): I 120-120, II 105-105, III 100-140, IV 110-115.
24 1288
25 1289 PROTONYMPH. LARVA. EGGS. Not examined.
26
27 1290
28 1291 *Etymology.* This species is named for the host plant species, *Rubus ulmifolius* where it was
29 1292 collected.
30
31 1293
32 1294 *Remarks.* **Remarks:** The deutonymph of *C. ulmifolius nov. sp.* morphologically resembles several
33 1295 other species, including *C. brachypalpus* Hatzinikolis et al., *C. pseudospinosus* Livshitz et
34 1296 Mitrofanov, *C. quadricornis* Livshitz et Mitrofanov, *C. spinosus* Donnadieu, and *C. taygeticus*
35 1297 Hatzinikolis et al. However, there are also notable differences between the deutonymphs of these
36 1298 species. Deutonymph of *C. ulmifolius* with dorsal setae *c1* *h1* long (whereas these setae are
37 1299 short in *C. brachypalpus* and *c1* are short in *C. pseudospinosus*). **Deutonymph of *C. ulmifolius***
38 1300 **with setae *e1* and *f2* long (whereas these setae are short in *C. quadricornis*)** **Deutonymph of *C.***
40 1301 ***ulmifolius* with *c1*, *c3*, *e3* long (whereas shorter in *C. spinosus*)**. Deutonymph of *C. ulmifolius* with
41 1302 *d1* and *h2* short (whereas longer in *C. taygeticus*).
42
43 1303
44 1304
45 1305 ***Cenopalpus lineola* species group** Hatzinikolis et al. 1999
46
47 1307 **Diagnosis (adult female).** Seven dorsolateral setae on opisthosoma (*c3*, *d3*, *e3*, *f2*, *f3*, *h2*, *h1*); *f2*
48 1308 present and inserted in lateral position. Anterior margin of propodosoma with subcapitulum
49 1309 reaching half of the femora I or extending over them in some species (*C. wainsteini*). Often with a
50 1310 characteristic cuticular pattern in dorsal cuticle; dorsal cuticle can be mostly transverse and
51 1311 longitudinal striae, sometimes weakly smooth. The palpus is 4-segmented: third segment with 1
52 1312 seta and fourth with 3 sensory setae. Ventral and genital plates distinct and well developed,
53 1313 surrounded by characteristic cuticle pattern. Two pairs of pseudanal setae are present (*ps 1-2*). Leg
54 1314 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
55 1315 each with two setae (*1b*, *1c*, *2b*, *2c*); coxae III-IV each with one seta (*3b*, *4b*). Trochanters I-II-IV
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3 1316 each with one seta; trochanter III with two setae. Femora I-II with four setae (d, l', v', bv''); femur
4 1317 III with two setae (d, ev'); femur IV with one seta (ev'). Genua I-II with three setae (d, l', l''); genu
5 1318 III with one seta (l'); genu IV without setae. Tibia I-II with five setae (d, v', v'', l', l''); tibia III-
6 1319 IV with three setae (d, v', v''). Tarsi I-II with eight setae and each with one long, slender and
7 1320 tapering solenidion; tarsi III-IV with five setae (ft', tc', tc'', u', u'').
8
9 1321
10 1322
11 1323 **26. *Cenopalpus lineola*** Canestrini et Fanzago, 1876
12
13 1324
14 1325 *Type Depository.* Unknown.
15
16 1326 
17 1327 **Distribution** (Castro et al. 2023). Algeria; Armenia; Bulgaria; China; France; Greece; Hungary;
18 1328 Iran; Israel; Italy; Japan; Lebanon; Malta; Netherlands; Philippines; Poland; Spain; Syria; Taiwan;
19 1329 Turkey; Ukraine.
20
21 1330
22 1331 *Remarks.* *Cenopalpus lineola* has been described from Italy (Canestrini and Fanzago 1876). The
23 1332 redescription of a neotype is in progress (De Giosa et al. in prep.)
24
25 1333
26 1334
27 1335 **27. *Cenopalpus wainsteini*** Livschitz et Mitrofanov, 1967
28 1336 (Figs. 61a-69c)
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30 1337 *Type Depository.* Unknown.
31
32 1338
33 1339 *Material examined. ITALY:* 1 deutonymph, 7 ♀♀, San Magno, Alta Murgia National Park
34 1340 (Southern Italy) 41°01'42"N 16°23'58"E, 410 m, ex. scaly leaves, *Pinus halepensis* (Mill.)
35 1341 (Pinaceae), October 25 2019, legit M. De Giosa (Di.S.S.P.A. and USNM).
36
37 1342
38 1343 **Diagnosis (adult female).** As per *C. lineola* species group, in addition to the following. The body
39 1344 is oval and very developed, in some cases contracted at the junction of hysterosoma and
40 1345 propodosoma. Further, *C. wainsteini* is completely flat without any bumps. Anterior margin of
41 1346 propodosoma is not developed and appears like a narrow border with a shallow oval depression in
42 1347 the middle. The posterior margin of opisthosoma gradually becoming narrow at its base. Cuticle
43 1348 completely plicate, covered with mostly transverse striae, except some longitudinal ones. In
44 1349 particular, dorsal propodosoma with longitudinal and transversal wrinkles: dorsomedial striae
45 1350 minute-small, transverse and oblique, laterally long and longitudinal. Anterior margin of
46 1351 opisthosoma, between *c3-c3* and *d3-d3*, with generally long-short, transverse, oblique and few
47 1352 longitudinal striae; from *e3-e3* to *h2-h2* becoming elongate strong and longitudinal. Three to five
48 1353 distinct transversal folds (between *d3-d3* and *e3-e3*) on the border of the anterior and posterior of
49 1354 opisthosoma. Between *e1-e1* and *h1-h1* almost smooth, with fine and weak longitudinal striae. The
50 1355 propodosomal and opisthosomal setae, except *c1, c2, d1, e1*, palmate. Otherwise *c1, c2, d1, e1*
51 1356 slightly serrate. Cuticular microplates: separate individual, rounded to irregularly rounded plates,
52 1357 with multiple short irregular ridges over dorsal surface (Figs 66a-66b). Metapodosoma almost
53 1358 smooth between coxae III and coxae IV, with light and fine striae. Beyond setae *4a*, cuticle
54 1359 completely covered with narrow to developed transverse bands (11 or more folds). Ventral, genital
55 1360 and anal plates are well developed but not sclerotized, with fine transverse. Ventral plate with two
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3 1361 smooth setae (*ag-ag*); genital and anal plates with four finely barbed setae each (*g1-g1*, *g2-g2* and
4 1362 *ps1-ps1*, *ps2-ps2*).
5 1363
6 1364
7 FEMALE (n=7). *Dorsum*. (Figs 61a, 63a, 64a) Length of the body including the gnathosoma 345;
8 length body excluding gnathosoma 290; width propodosoma 135-155; width opisthosoma 130-
9 1366 170. Distance between setae *v2-h1* 270. Setal lengths *v2* 20-21, *sc1* 18, *sc2* 21-22, *c1* 17-18, *c2*
10 1367 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.
11 1368 Distances between setae *v2-v2* 34, *sc1-sc1* 96, *sc2-sc2* 143, *c1-c1* 56, *c2-c2* 115, *c3-c3* 140, *d1-d1*
12 1369 44, *d3-d3* 145, *e1-e1* 33, *e3-e3* 148, *f2-f2* 140, *f3-f3* 120, *h2-h2* 84, *h1-h1*.
13 1370
14 1371
15 *Venter*. (Figs 61b, 63b, 64b) Setal lengths *1a* 70, *1b* 24-25, *1c* 19-20, *2b* 14-21, *2c* 24-29, *3a* 17-
16 1372 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
17 1373 *ag-ag* 32, *g1-g1* 37, *g2-g2* 58, *ps1-ps1* 23, *ps2-ps2* 18. Short ventral setae, except *1a* and *4a* are
18 1374 lanceolate and fine (difficult to measure the full length).
19 1375
20 1376
21 *Gnathosoma*. (Figs 61c-61d, 65a-65b) Setal formula for palps as in diagnosis of *C. lineola* species
22 1377 group. Solenidion 7 and 2 eupathidia 2-5; one of the eupathidia is more reduced than the other one.
23 1378 Femur setae lanceolate and weak barbed (almost smooth); genu-tibia setae lanceolate and smooth.
24 1379 Subcapitulum very developed, extends slightly to the distal margin of femur I, without subcapitular
25 1380 setae *m*; distal end with two pairs of adoral setae (*ad*).
26 1381
27 1382 *Spermathecal apparatus*. (Fig. 61e) Only the beginning of duct is visible at genital opening.
28 1383
29 1384
30 *Legs*. (Figs 62a-62d) Setae formula and leg chaetotaxy as in diagnosis of *C. lineola* species group.
31 Leg chaetotaxy as follows as species group, in addition to the following. Shape of setae on legs:
32 1386 leg I, femur with plumose-lanceolate (*d*, *l'*) and smooth-lanceolate (*bv''*, *v'*) setae; genu with all
33 1387 barbed to plumose setae (*d*, *l'*, *l''*); all tibia setae moderately barbed (*d*, *l'*, *l''*, *v'*, *v''*). Shape of
34 1388 setae on leg II, as following leg I, except setae on femur *bv''* (plumose) and *v'* moderately barbed.
35 1389 Leg III with plumose-lanceolate femur seta (*d*) and smooth-lanceolate seta (*ev'*); seta *l'* on genu
36 1390 plumose and lanceolate; tibia with lanceolate and moderately serrate setae (*v'*, *v''*), plumose seta
37 1391 (*d*). Shape of setae on leg IV as following leg III, except seta *ev'* on femur that is moderately
38 1392 barbed. Measurements of legs (coxae to tarsi): I 145-150, II 150-155, III 120-125, IV 130-130.
39 1393
40 1394
41 DEUTONYMPH (n=1). *Dorsum*. (Figs 67, 69a) Length of the body including the gnathosoma
42 1395 300; length body excluding gnathosoma 250; width propodosoma 85-120; width opisthosoma 83-
43 1396 120. Propodosoma with fine and light striae, mostly oblique to longitudinal, some transverse and
44 1397 short. Dorsal opisthosoma with transverse striae well developed and strong, except anterior margin
45 1398 (before *c1-c2-c3*) with narrow striae and posterior margin (beyond *d1-d1*) with oblique to
46 1399 longitudinal weak striae. Dorsal propodosomal and opisthosomal with thin and finely serrate setae.
47 1400 Distance between setae *v2-h1* 243. Setal lengths *v2* 15, *sc1* 15, *sc2* 14-16, *c1* 14-16, *c2* 5-8, *c3* 15-
48 1401 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
49 1402 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-*
50 1403 *e1* 17, *e3-e3* 120, *f2-f2* 115, *f3-f3* 100, *h2-h2* 73, *h1-h1* 30.
51
52
53 1404
54 *Venter*. (Figs 69b-69c) Cuticle mostly plicate, covered with transverse to oblique and narrow
55 1405 striae. Ventral, genital, and anal shields indistinct, with short and narrow transverse to oblique
56 1406 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*

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3 1407 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*
4 1408 are lanceolate and longer than others ventral setae; *ag*, *g1*, *ps1*, *ps2* almost barbed (smooth).
5 1409
6 1410 *Gnathosoma*. (Figs 61b-61c) Setal formula for palps as in diagnosis of *C. lineola* species group.
7 1411 Solenidion 6 and 2 eupathidia 2-5; one of the eupathidia is more reduced than the other one. Femur
8 1412 and genu-tibia setae smooth. Subcapitulum well developed; subcapitular setae *m* absent.
9 1413
10 1414 *Legs*. (Figs 68a-68d) Leg chaetotaxy as in diagnosis of *C. lineola* species group. Shape of setae on
11 legs: leg I with palmate and lanceolate (*bv''*, *d*, *l'*) and smooth (*v'*) setae on femora; with palmate
12 and short seta (*d*) and finely barbed (*l'*, *l''*); tibia setae moderately barbed and lanceolate (*l'*, *l''*)
13 except *v'*, *v''*, *d* is palmate. Shape of leg II as following leg I, except *l'* on femur (finely barbed)
14 and *v'-v''* on tibia (moderately barbed). Leg III with palmate femur seta (*d*) and finely barbed seta
15 (*ev'*); seta *l'* on genu finely barbed; tibia with lanceolate and moderately serrate setae (*v'*, *v''*),
16 short and palmate seta (*d*). Shape of setae on leg IV as following leg III. Measurements of legs
17 (coxae to tarsi): I 110-120, II 95-105, III 81-83, IV 80-82.
18 1421
19 1422
20 1423 PROTONYMPH. LARVA. EGGS. Not examined.
21
22 1424
23 1425 *Distribution* (Castro et al. 2023). Egypt; Gaza Strip; Georgia; Greece; Israel; Italy; Peru; Syria;
24 1426 Ukraine.
25 1427
26 1428 *Remarks*. *Cenopalpus wainsteini* has been first reported from Italy by Pegazzano (1971)
27 1429 *Cenopalpus wainsteini* by could be responsible for causing alterations on *Pinus* sp., as reported by
28 1430 Bianca et al. (2021). This species needs future detailed study concerning the biology, ecology,
29 1431 and its interactions with trees of the family Pinaceae.
30 1432
31 1433
32 1434 ***Cenopalpus pterinus* species group Hatzinikolis et al. 1999**
33 1435
34 1436 **Diagnosis (adult female)**. Six dorsolateral setae on opisthosoma (*c3*, *d3*, *f2*, *f3*, *h2*, *h1*). The palpus
35 1437 is 4-segmented and palpus tarsus with 2 eupathidia. Tarsus on leg II with 1 solenidion.
36 1438
37 1439
38 1440 **28. *Cenopalpus adventicius* Ueckermann et Ripka, 2016**
39 1441
40 1442 *Type Depository*. Department of Plant Protection Development and Coordination, Directorate of
41 1443 Plant Protection, Soil Conservation and Agri-environment, National Food Chain Safety Office,
42 1444 Budapest, Hungary.
43 1445
44 1446 *Distribution* (Castro et al. 2023). Hungary; Italy.
45 1447
46 1448 *Remarks*. *Cenopalpus adventicius* was collected and described from *Rosmarinus*
47 1449 *officinalis* Linnaeus imported from Italy. This species is morphologically close to *C. officinalis*.
48 1450 Future morphological comparisons between the types and molecular analyses are needed to
49 1451 exclude possible synonyms.
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3 1453
4 1454 **29. *Cenopalpus officinalis*** Papaioannou-Souliotis, 1986
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7 1455
8 1456 *Type Depository.* Aghios Gerasimos, Cephalonia, Greece.
9 1457
10 1458 *Material examined.* MOROCCO: 4 ♀♀, ex *Rosmarinus* sp. (Lamiaceae), intercepted at DTW,
11 1459 interception 5006, February 5 2015 (APHIS PPQ USDA).
12 1460
13 1461 *Distribution* (Castro et al. 2023). Greece; Israel; Italy; Mexico; Morocco.
14 1462
15 1463 *Remarks.* *Cenopalpus officinalis* has been reported for the first time from Italy by De Giosa et al.
16 (2021b), which described the Israeli, Italian and Mexican specimens. This species is a new record
17 in Morocco.
18 1466
19 1467
20 1468 **30. *Cenopalpus pterinus*** Pritchard et Baker, 1958
21 1469
22 1470 *Type Depository.* USNM.
23 1471
24 1472 *Material examined.* ITALY: 1 ♀, ex *Rosmarinus* sp. (Lamiaceae), intercepted at JFK, interception
25 1473 8496, September 22 1965 (USNM).
26 1474
27 1475 *Distribution* (Castro et al. 2023). France; Greece; Italy; Spain.
28 1476
29 1477 *Remarks.* *Cenopalpus pterinus* is a new record for Italy.
30 1478
31 1479
32 1480 **Genus *Pentamerismus***
33 1481
34 1482 *Type species – *Tenuipalpus erythreus* Ewing, 1917
35 1483
36 1484
37 1485 **31. *Pentamerismus coronatus*** Canestrini et Fanzago, 1876
38 1486
39 1487 *Type Depository.* Unknown.
40 1488
41 1489 *Distribution* (Castro et al. 2023). Greece; Italy.
42 1490
43 1491 *Remarks.* *Pentamerismus coronatus* has been described from Italy (Canestrini and Fanzago 1876).
44 1492
45 1493
46 1494 **32. *Pentamerismus oregonensis*** McGregor, 1949
47 1495
48 1496 *Type Depository.* USNM
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3 1498 **Distribution** (Castro et al. 2023). Armenia; Brazil; Bulgaria; China; France; Georgia; Greece;
4 1499 Hong Kong; Hungary; India; Italy; Karnataka; Iran; Italy; Japan; Mexico; Pakistan; South Korea;
5 1500 Taiwan; Turkey; Ukraine; USA.
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7 1501
8 1502 *Remarks.* *Pentamerismus oregonensis* has been reported for the first time from Italy by De Giosa
9 1503 et al. (2021a) due to an interception in the United States.
10 1504
11 1505
12 1506 **33. *Pentamerismus taxi*** Haller, 1877
13 1507
14 1508 *Type depository.* Unknown.
15 1509
16 1510 Distribution (Castro et al. 2023). Armenia; Bulgaria; England; France; Georgia; Greece; Hungary;
17 1511 Italy; Japan; Poland; South Korea; Spain; Switzerland; Turkey; Ukraine; USA.
18 1512
19 1513 *Remarks.* *Pentamerismus taxi* has been reported in the first Tenuipalpidae checklist for Italy?
20 1514 (Bernini et al. 1995). The effective presence of this species in Italy remains questionable due to
21 1515 the absence of information in both national and international scientific journals.
22 1516
23 1517
24 1518 **Genus *Tenuipalpus***
25 1519
26 1520 *Type species – *Tenuipalpus palmatus** Donnadieu, 1875
27 1521
28 1522
29 1523 **34. *Tenuipalpus caudatus*** Dugès, 1834
30 1524
31 1525 *Type Depository.* Unknown.
32 1526
33 1527 Distribution (Castro et al. 2023). France; Greece; India; Italy; Portugal; Syria.
34 1528
35 1529 *Remarks.* *Tenuipalpus caudatus* has been reported for the first time from Italy by Castagnoli and
36 1530 Pegazzano (1979).
37 1531
38 1532
39 1533 **35. *Tenuipalpus granati*** Sayed, 1946
40 1534
41 1535 *Type Depository.* Unknown.
42 1536
43 1537 Distribution (Castro et al. 2023). Armenia; Egypt; **Georgia;** Greece; India; Iran; Iraq; Kazakhstan;
44 1538 Morocco; Saudi Arabia; Tunisia; Turkey; Ukraine.
45 1539
46 1540 *Remarks.* *Tenuipalpus granati* has been found on different varieties of grapes in Italy (Peverieri et al.
47 1541 2009).
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3 1544 **36. *Tenuipalpus pacificus*** Baker, 194



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6 1546 *Type Depository.* USNM.
7 1547

8 1548 *Distribution* (Castro et al. 2023). Australia; Brazil; China; Colombia; Costa Rica; England; Fiji;
9 1549 Germany; Greece; Hungary; India; Italy; Kerala; Iraq; Japan; Java; Netherlands; Panama; Philippines;
10 1550 Poland; Singapore; Thailand; USA.
11 1551

12 1552 *Remarks.* *Tenuipalpus pacificus* has been reported in the first Tenuipalpidae checklist for Italy (Bernini
13 1553 et al. 1995). The effective presence of this species in Italy remains questionable due to the absence of
14 1554 information in both national and international scientific journals.
15 1555

16 1556
17 1557 **37. *Tenuipalpus sarcophilus*** Welbourn et Beard, 2017
18 1558

19 1559 *Type Depository.* Florida State Collection of Arthropods, Florida, USA.
20 1560

21 1561 *Distribution* (Castro et al. 2023). Guatemala; Italy; USA.
22 1562

23 1563 *Remarks.* *Tenuipalpus sarcophilus* has been reported for the first time from Italy by De Giosa et al.
24 1564 (2021a) due to an interception in the United States.
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28 1568 **Discussion**
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30 1570 Several microscopy techniques have been proven to be necessary for identifying tenuipalpid
31 1571 species: Low Temperature Scanning Electron Microscopy (LT-SEM) and cryomicroscopy are
32 1572 invaluable and fundamental for morphological studies. Indeed LT-SEM techniques provide to observe
33 1573 delicate structures that are commonly destroyed or seriously altered during the slide mounting process,
34 1574 resulting in some artifacts (Beard et al. 2015, Castro et al. 2016a). Following Beard et al. (2013), phase
35 1575 contrast microscopy is almost inadequate to investigate the ornatelements of a tenuipalpid specimen,
36 1576 but it is great for studying the shape of the setae and spermathecal apparatus. Differential interference
37 1577 contrast (DIC) is recommended whenever possible for tenuipalpid diagnostics. For more information,
38 1578 follow “Flat mites in the world – microscopy for mites” (<http://idtools.org/id/mites/flatmites/>). Since the
39 1579 family Tenuipalpidae present species-complex groups and the number of morphological characters used
40 1580 at the beginning of the taxonomical studies were scarce, morphometric studies and new morphological
41 1581 traits such as microplates (Welbourn et al. 2017) spermathecal apparatus, leg chaetotaxy, and plant
42 1582 associations are enhancing our understanding of the systematics of *Cenopalpus*, while allowing the
43 1583 identification of new significant and critical characters for species separation in this group.
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45 1585 The paper aims not to redescribe *Cenopalpus* species since we have not compared types or
46 1586 designed neotypes when the types were lost but to introduce novel morphological characters for this
47 1587 genus, such as microplates. We have provided morphological data for specimens collected in Italy, and
48 1588 we suggest that the information should be used as a base for future research on the genus *Cenopalpus*.
49 1589 Although we have made comprehensive morphological studies of some *Cenopalpus* species, we still
50 1590 miss relevant molecular and morphological information. Most original descriptions and redescriptions
51 1591 do not meet the current expectations for identifying and describing new species, resulting in
52 1592 misidentification and confusion of the *Cenopalpus* species. For instance, the specimens of *Cenopalpus*
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3 1590 from Iran (Khanjani et al. 2012) and Turkey (Çobanoğlu et al. 2016) were identified as *bakeri* exhibit
4 1591 two different chaetotaxies of the legs, each differing from the specimens of *bakeri* collected in Italy.
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7 1592 Defining the taxonomic identity of organisms is a prerequisite for their study and, in the
8 1593 case of economically important species, misidentification and unprecise host plant associations
9 1594 may lead to the application of inappropriate prevention and control strategies. The diagnostic
10 1595 certainty coupled with the Phylogenetic signal as a predictor of the host range of plant pests and
11 1596 pathogens is an evolutionarily based tool for phytosanitary risk analysis (Gilbert et al. 2012).
12 1597 Knowing which local plant species are vulnerable is necessary for calculating the risk posed by a
13 1598 novel pest or pathogen (Robles-Fernández & Lira-Noriega 2017). Empirical data on the local host
14 1599 range of novel pests are usually lacking, but we know that some pests are more likely to attack
15 1600 closely related plant species than species separated by greater evolutionary distance.

16 1601 *Brevipalpus* are known to be vectors of plant viruses. Therefore, the presence in Italy of *B.*
17 1602 *papayensis*, *B. yothersi*, and *B. obovatus* should alert the phytosanitary system to the introduction
18 1603 of these vectors in the country and Europe since contact with the viruses they transmit can cause
19 1604 outbreaks. Moreover, it is still unclear if some *Cenopalpus* species (e.g., *C. waisteini*- see Huanca
20 1605 et al. 2022) can be vectors of plant pathogens or cause severe mechanical damage to the plants.

21 1606 We encourage researchers to contribute to the expansion of our understanding of the family
22 1607 Tenuipalpidae by comparison with type specimens or vouchers and better documenting species.
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35 1619 recommendation or endorsement by the USDA; USDA is an equal opportunity provider and
36 1620 employer.
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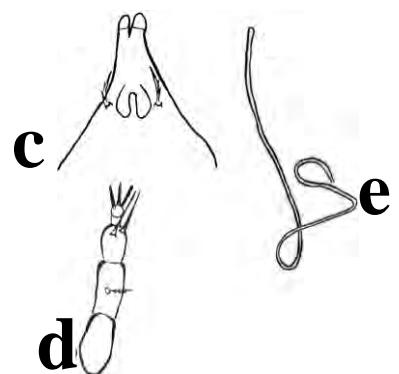
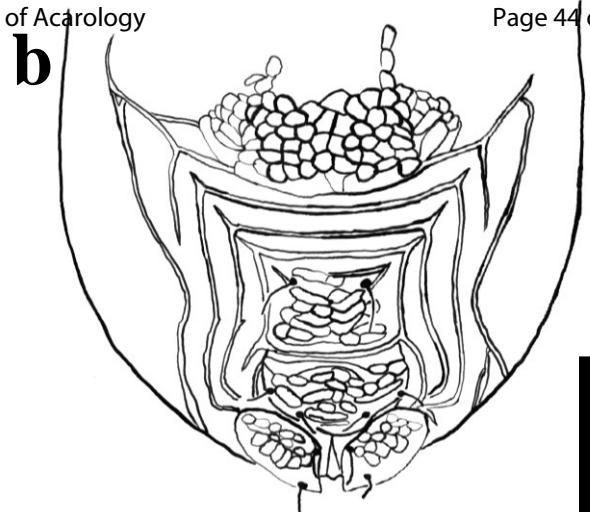
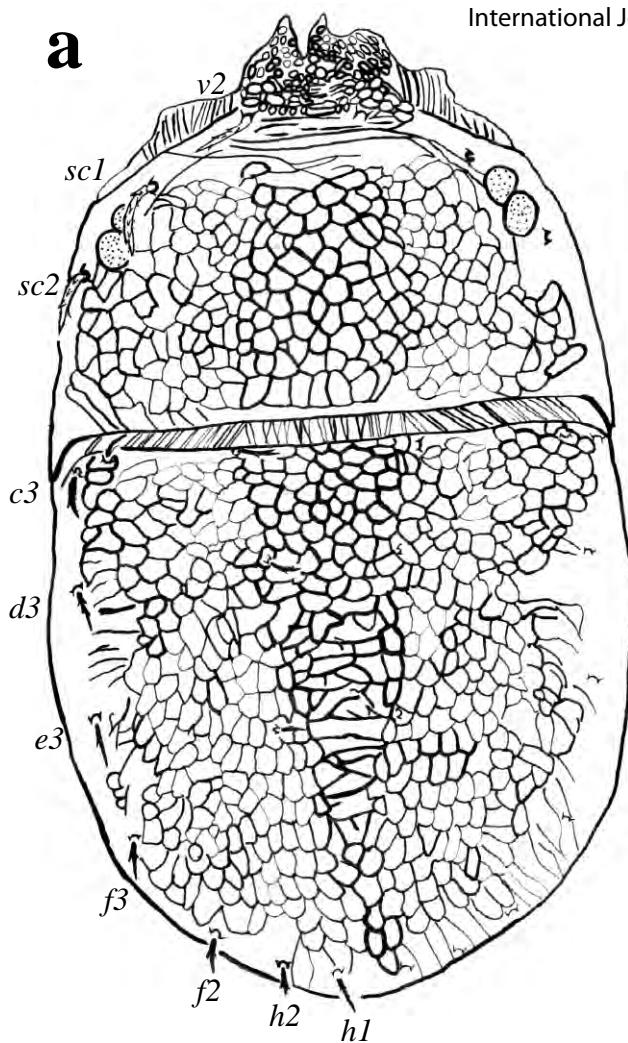
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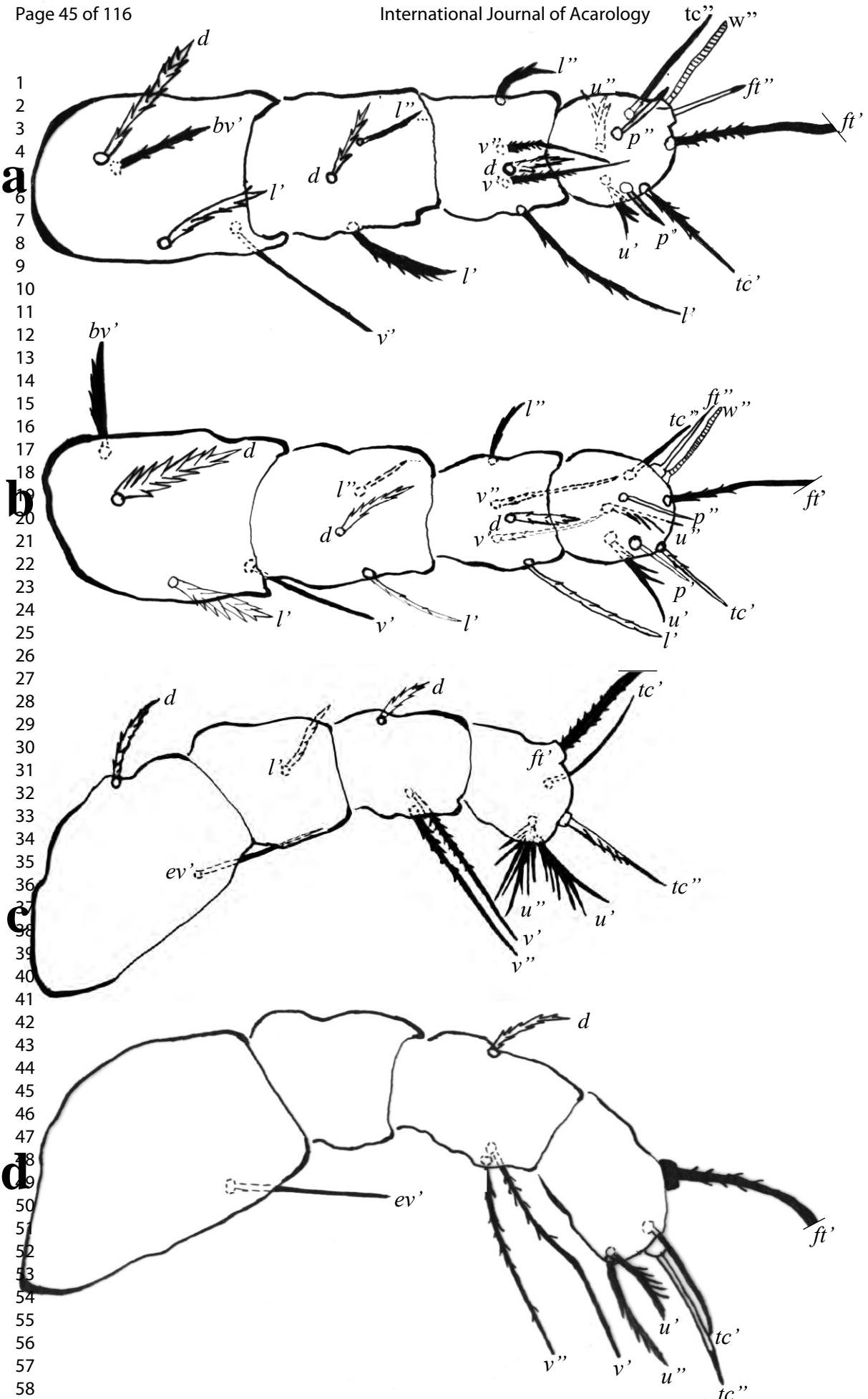


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31 **Figure 1.** Drawings adult female *C. bakeri*: a. dorsal habitus; b. ventral, genital, and anal plate; c.
32 subcapitulum; d. palp; e. spermatheca (scales 50 μm).
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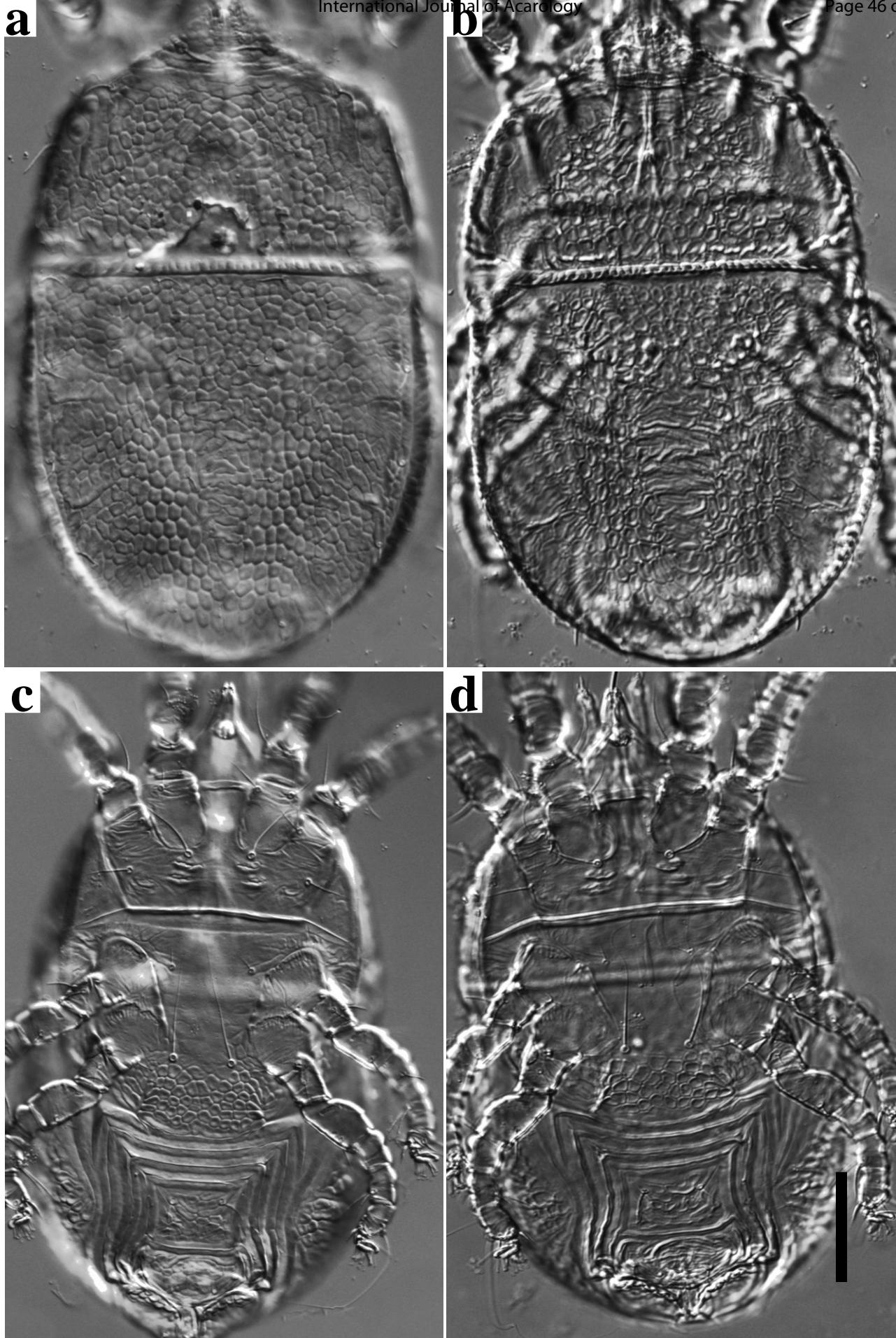


Figure 3. Differential Interference Contrast micrographs of adult females *G. bakeri*, both collected at the same place (Bitetto) and on the same host plant species (*Crataegus monogyna*): a-b. dorsal habitus; c-d. ventral habitus (scales 50 μ m).

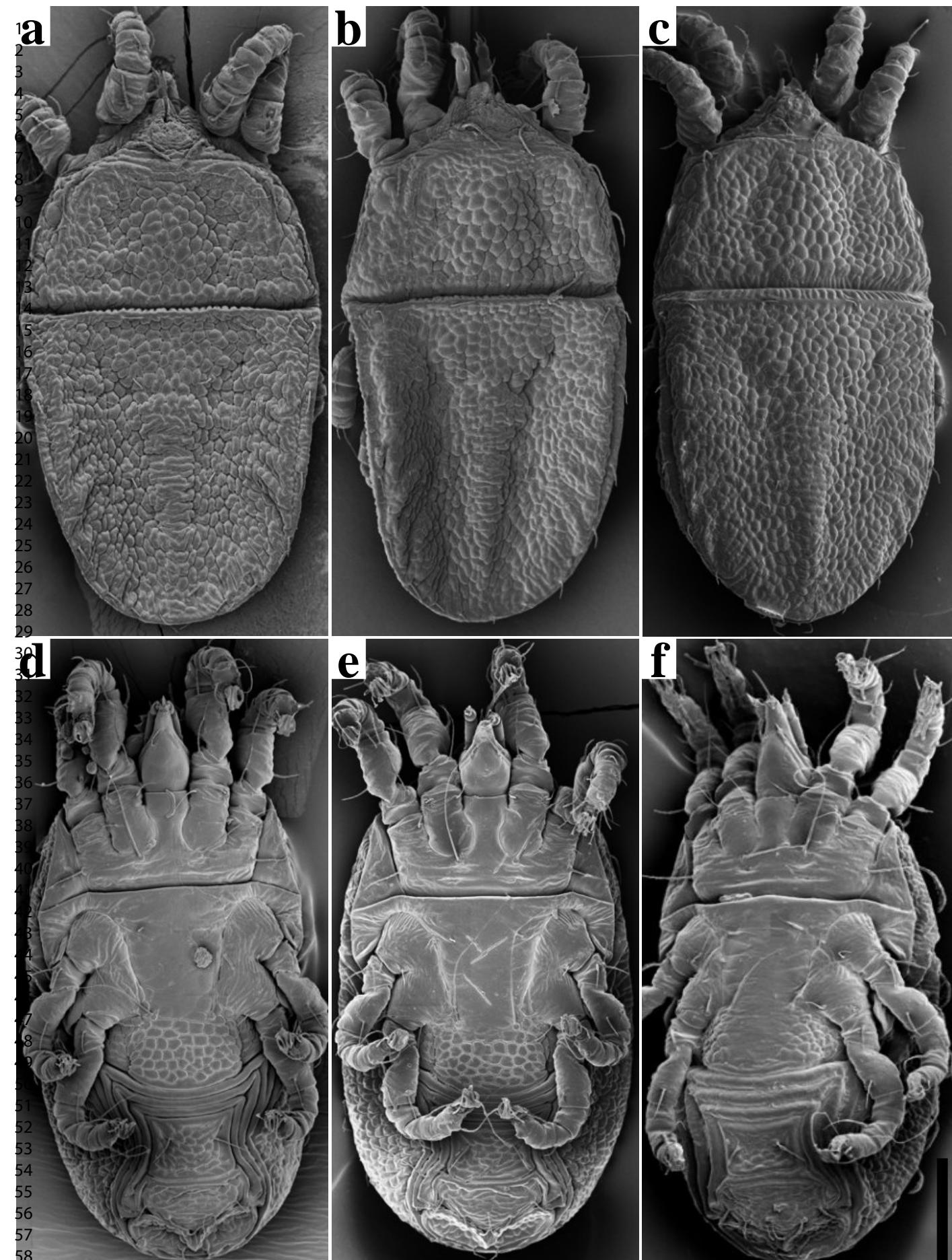


Figure 4. Dorsal and ventral habitus of adult female *C. bakeri*: a-b-d-e. specimens collected on *C. monogyna*; c-f. specimens collected on *P. domestica* (scales μm).

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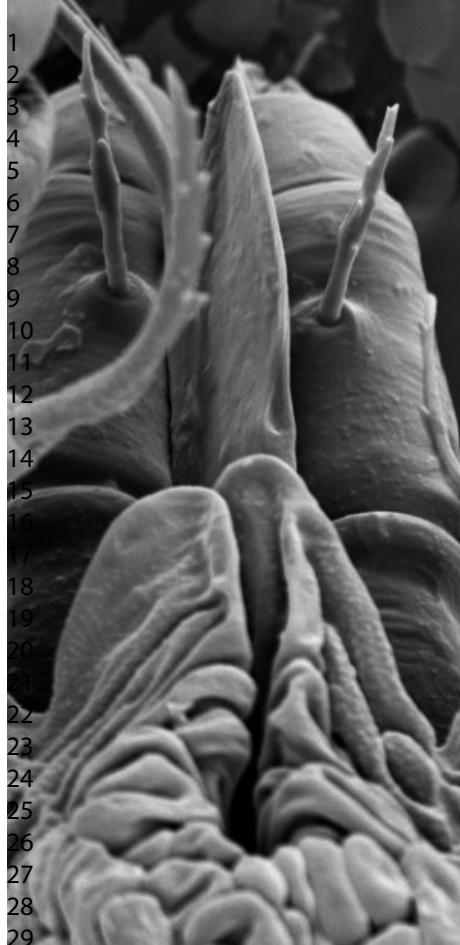
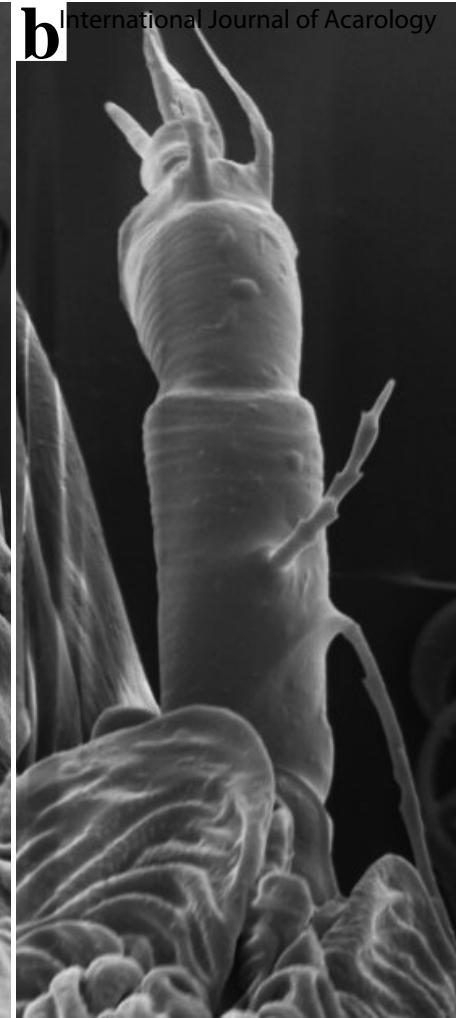
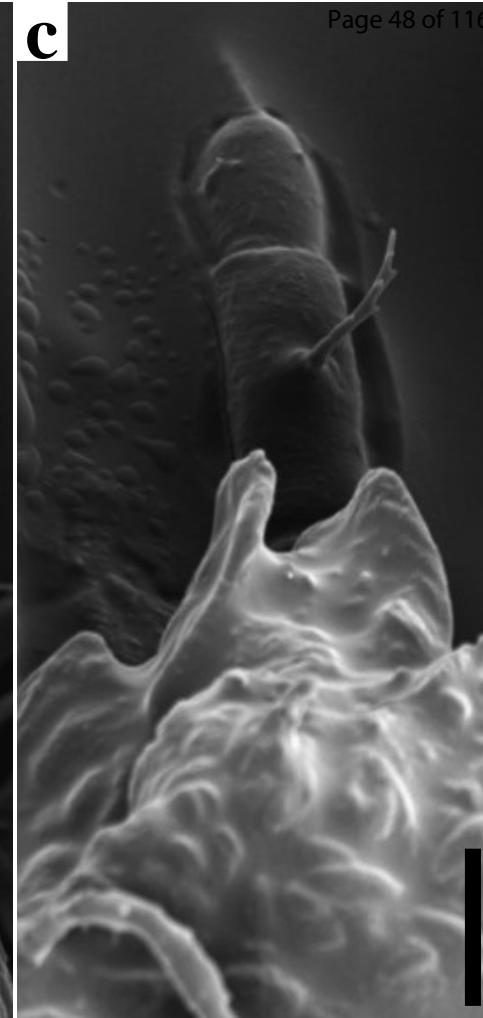
a**b****c**

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).



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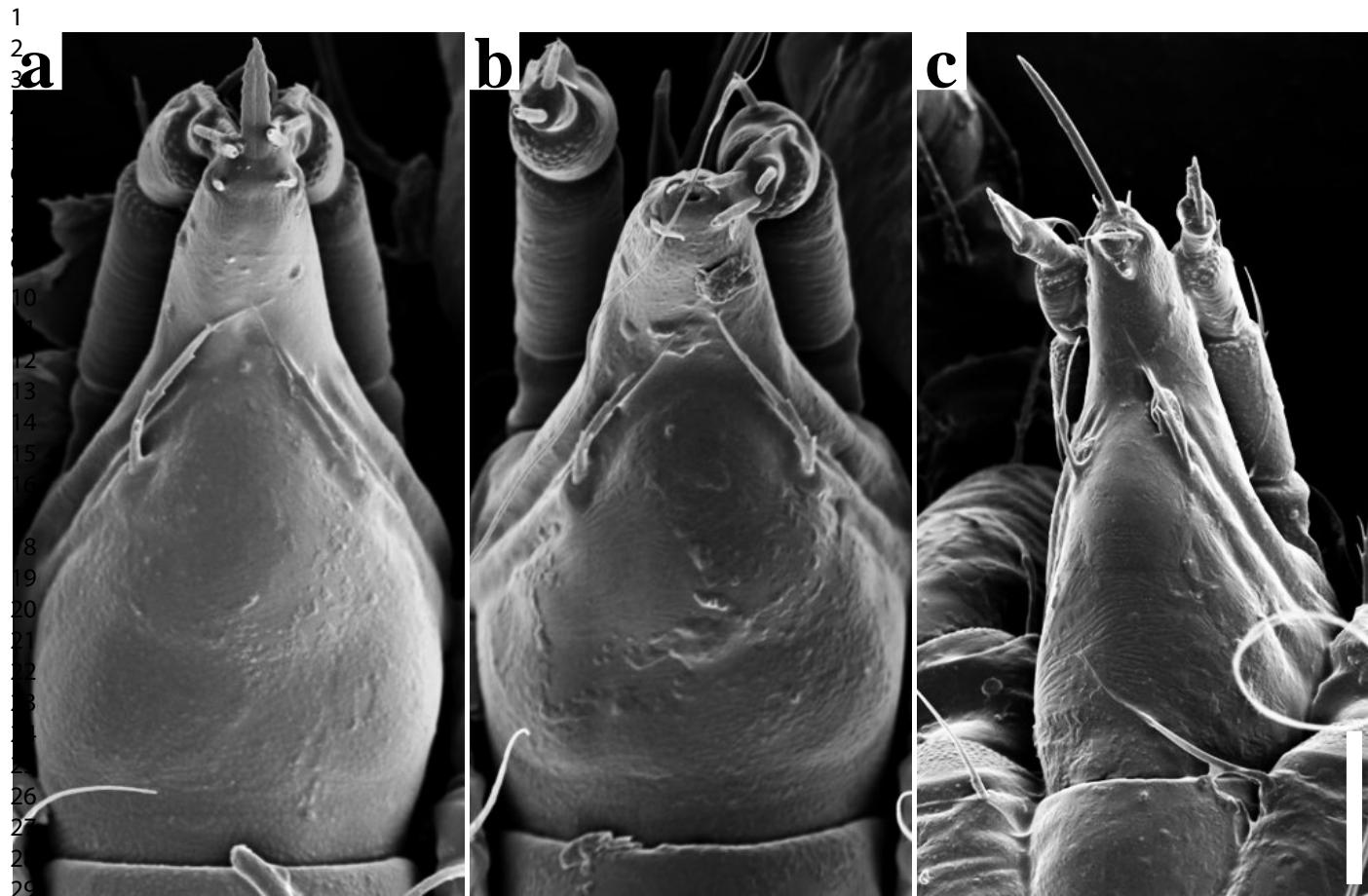


Figure 6. Subcapitulum of adult female *C. bakeri*: a-b. specimens collected on *C. monogyna*; c. specimens collected on *P. domestica* (scales 50 µm).



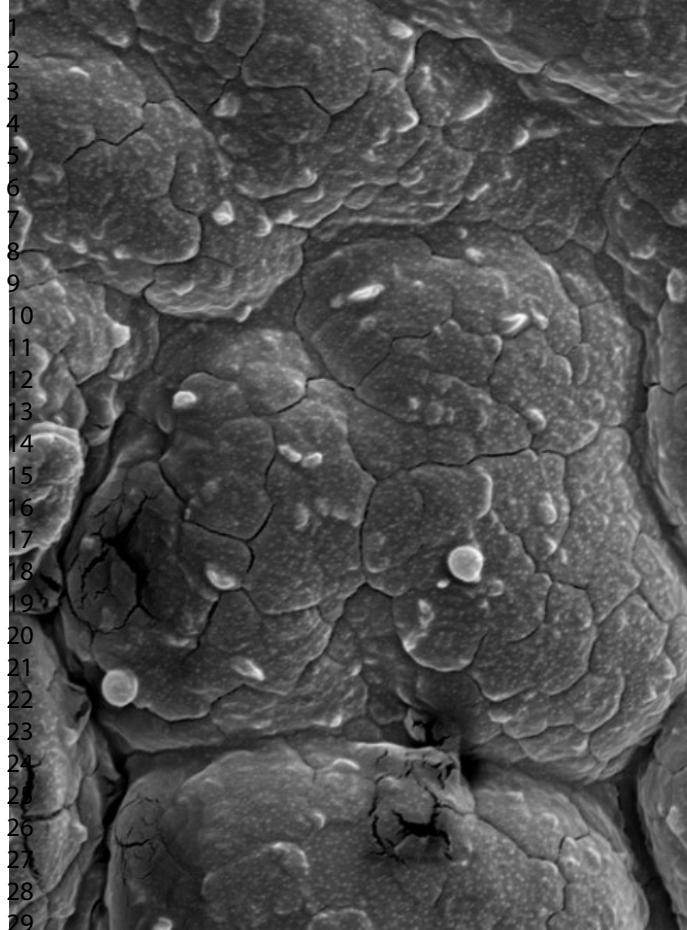
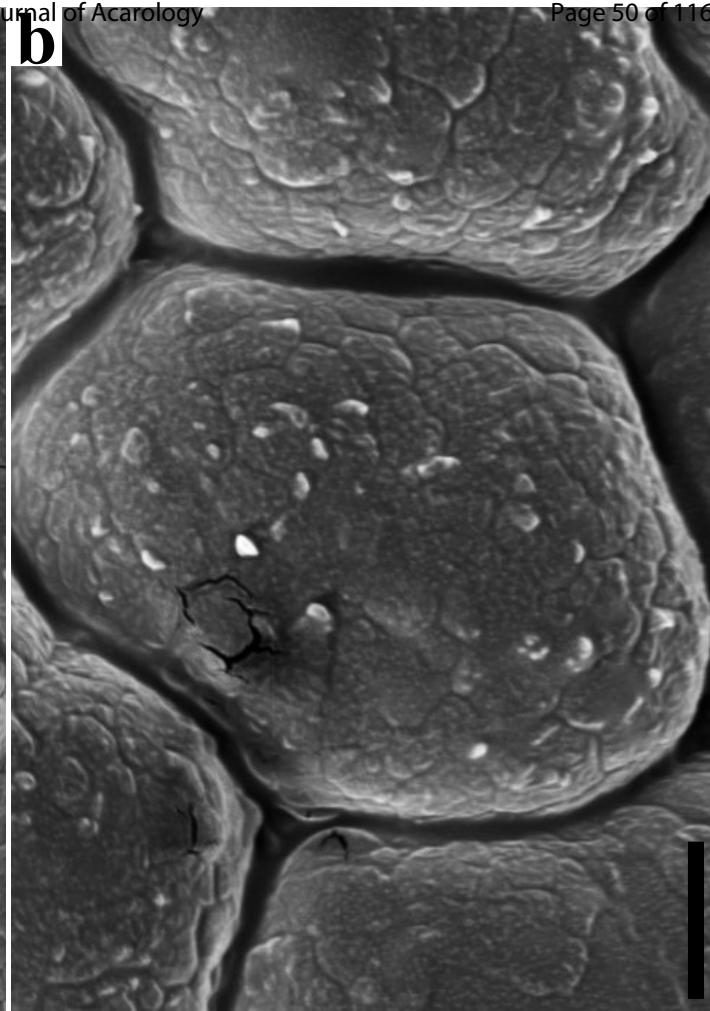
a**b**

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).

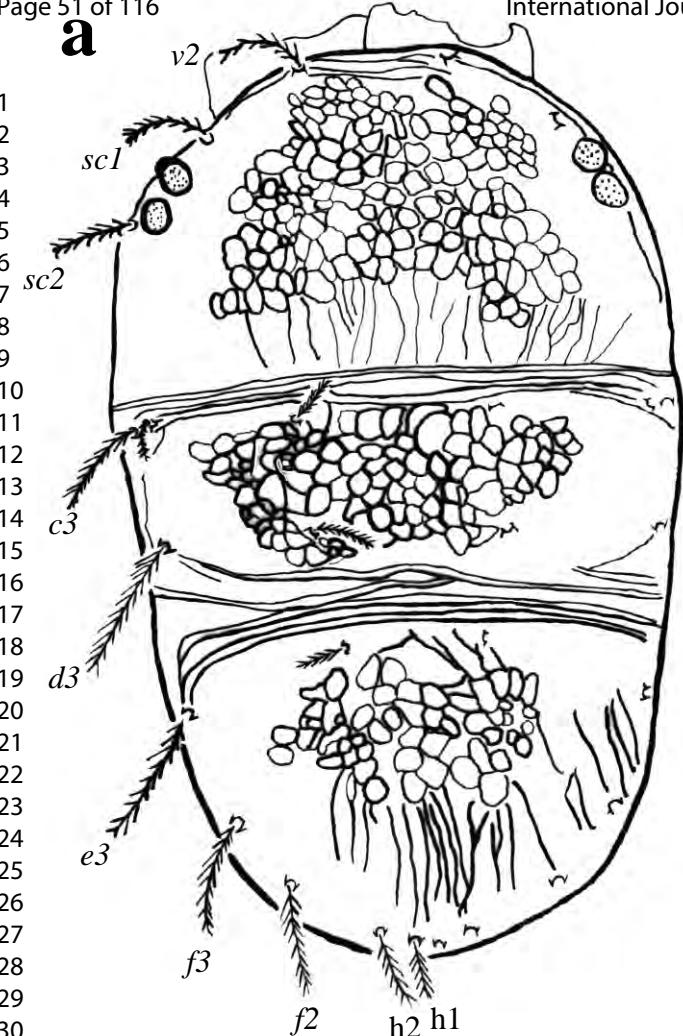
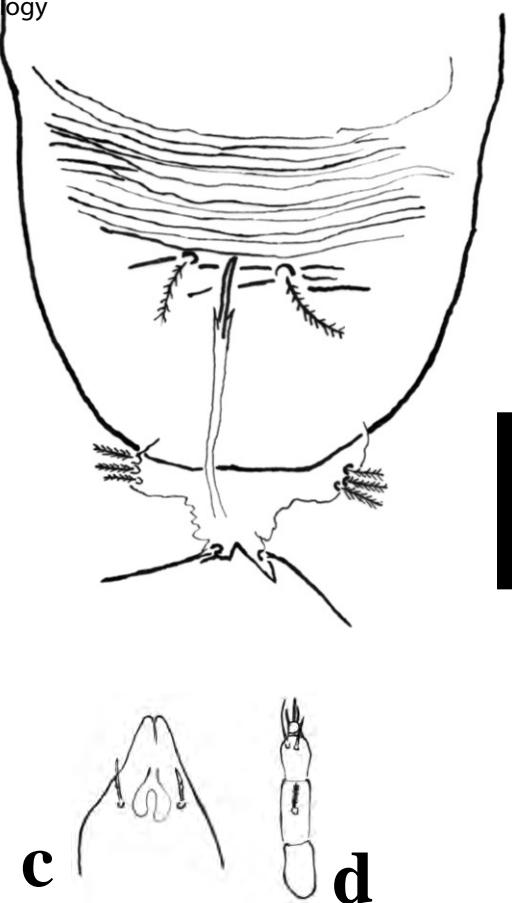
a**b**

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



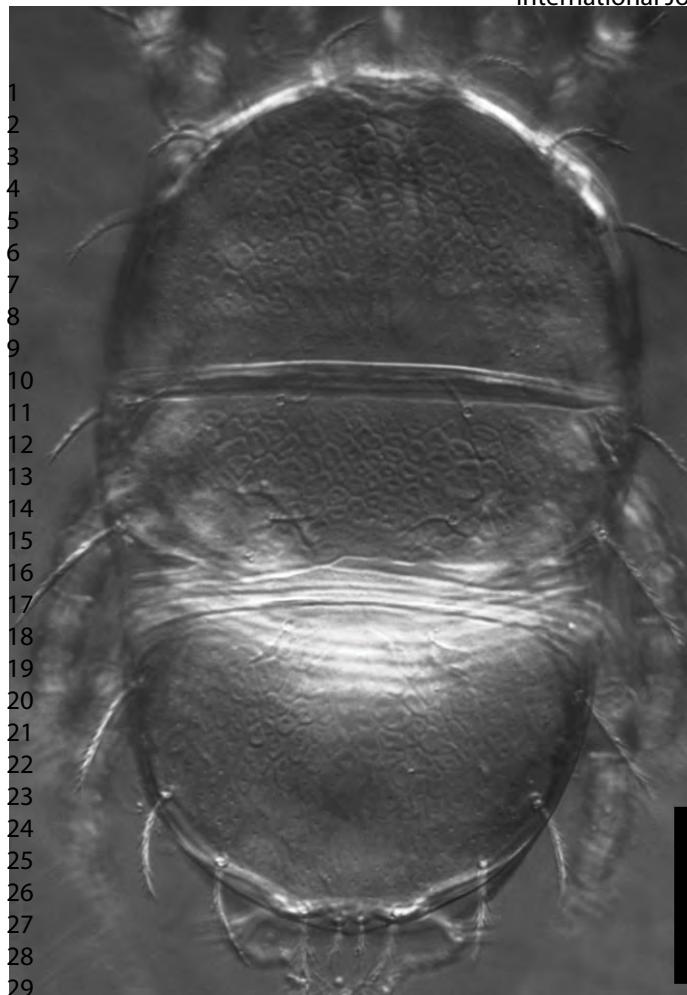


Figure 9. Differential Interference Contrast micrographs of dorsal habitus of adult male *C. bakeri* (scales 50 µm).

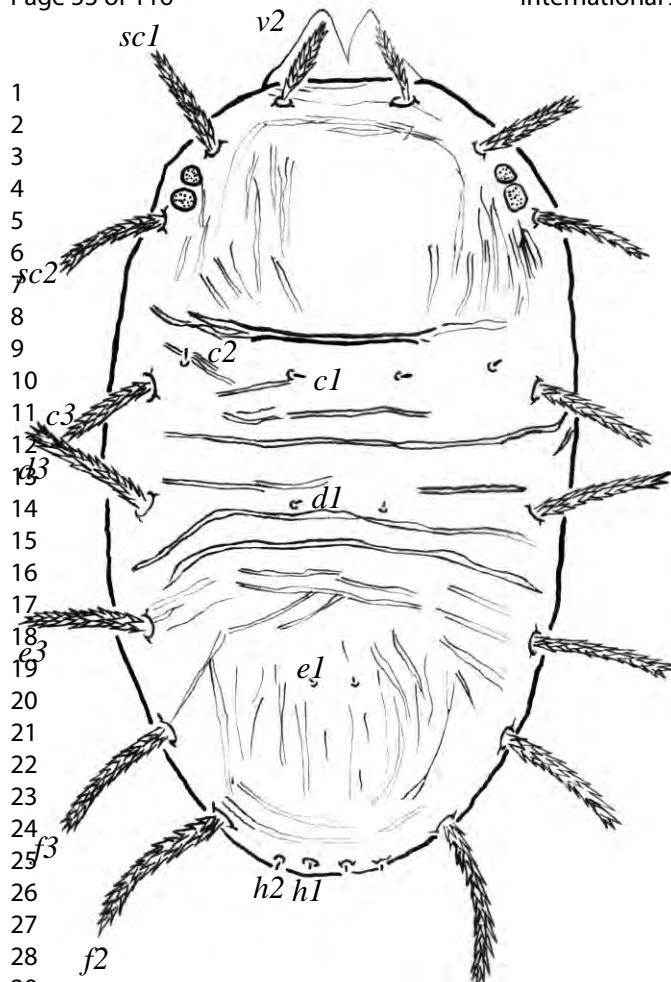
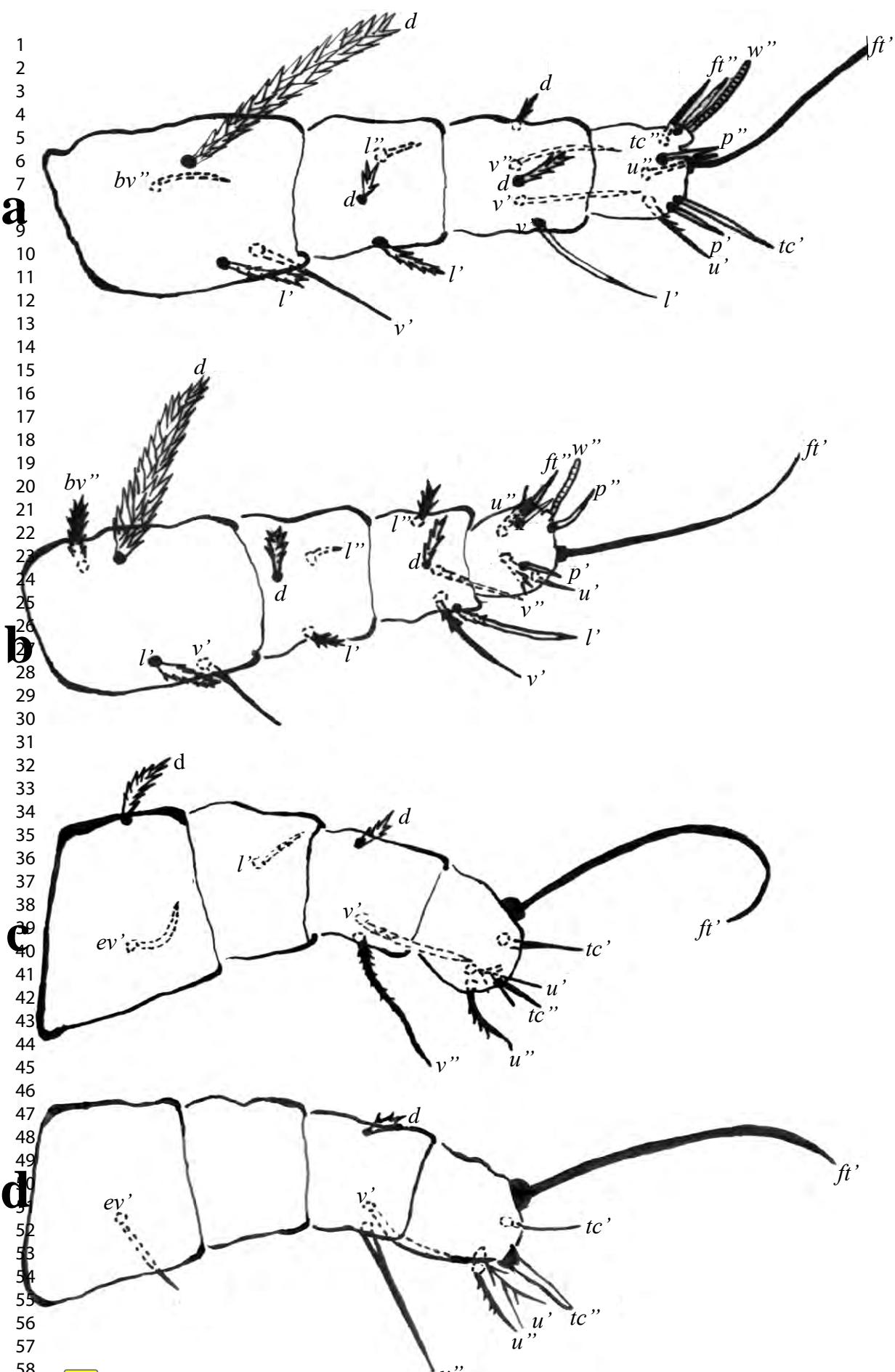


Figure 10. Drawing of dorsal habitus of deutonymph *C. bakeri* (scales 50 µm).



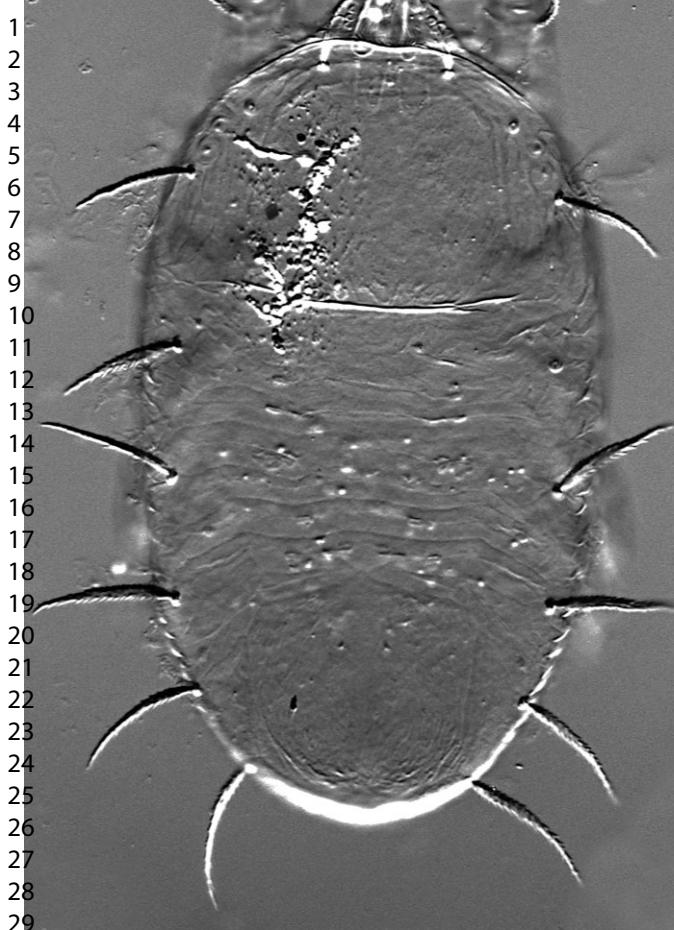
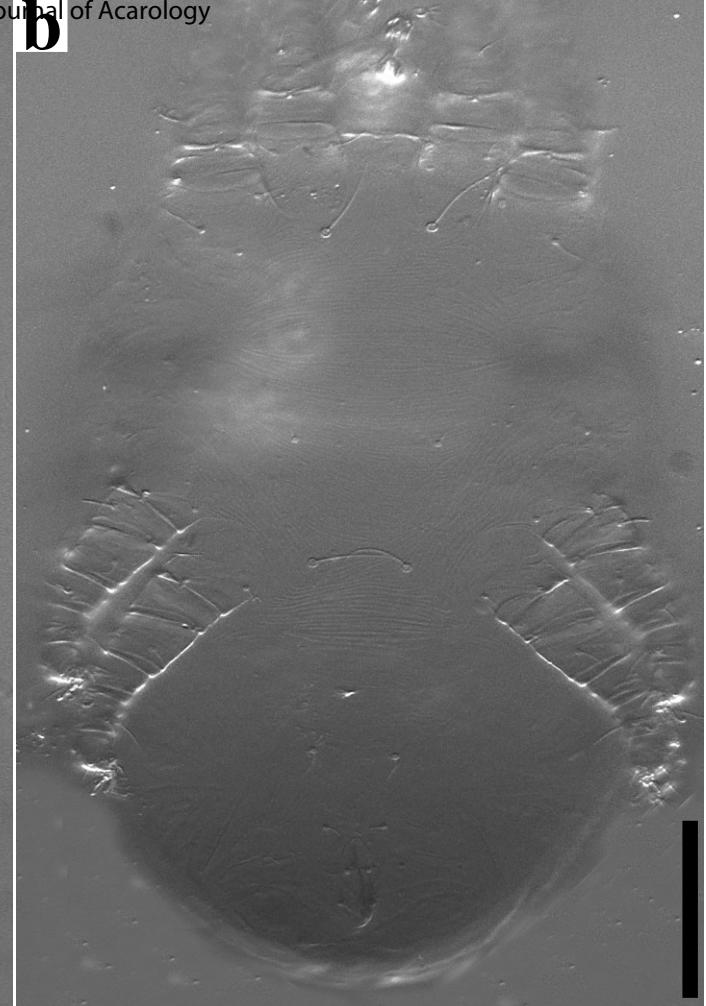
a**b**

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



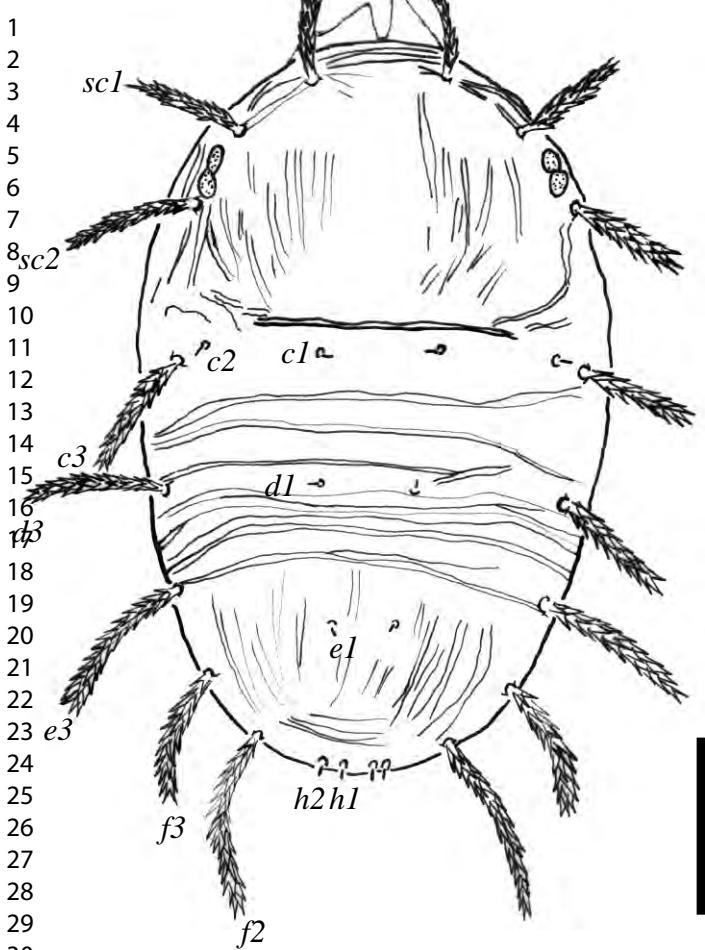


Figure 13. Drawing of dorsal habitus of protonymph *C. bakeri* (scales 50 µm).

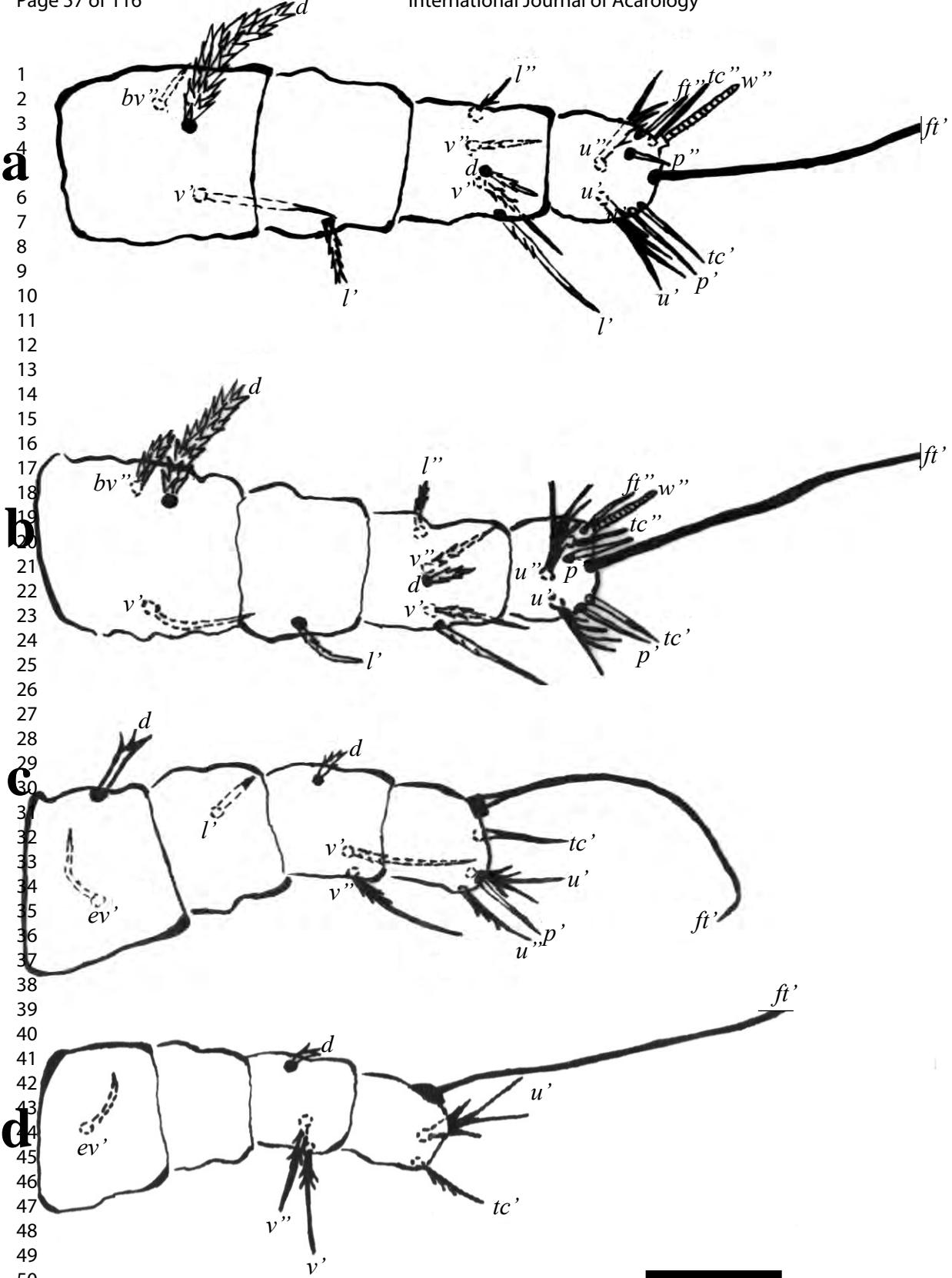


Figure 14. Drawings of legs of *C. bakeri* protonymph: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 μ m).



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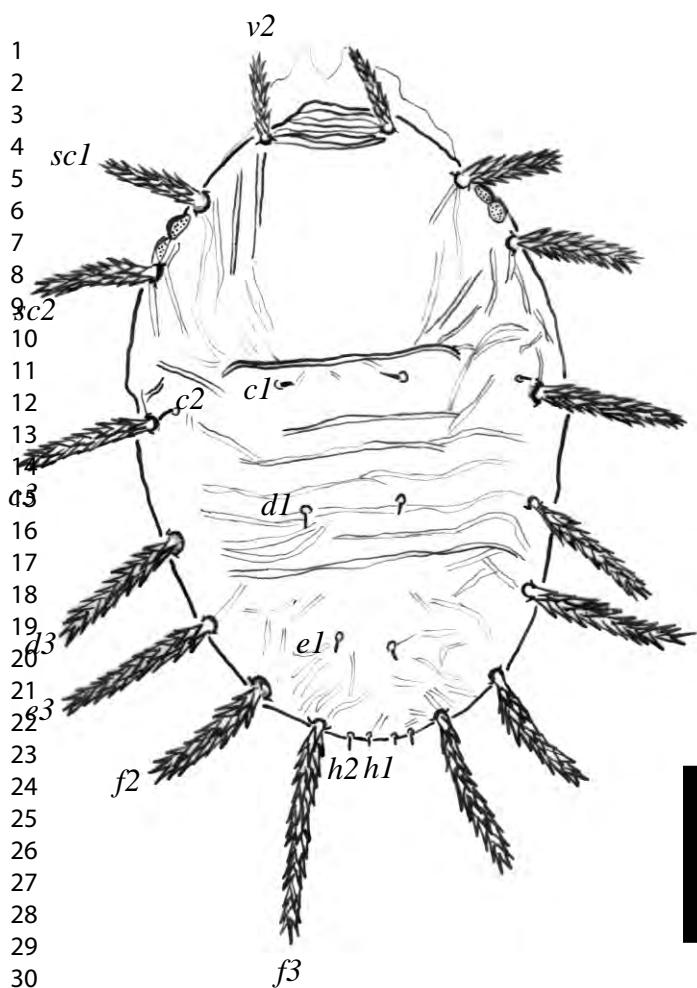


Figure 16. Drawing of dorsal habitus of larva *C. bakeri* (scales 50 µm).

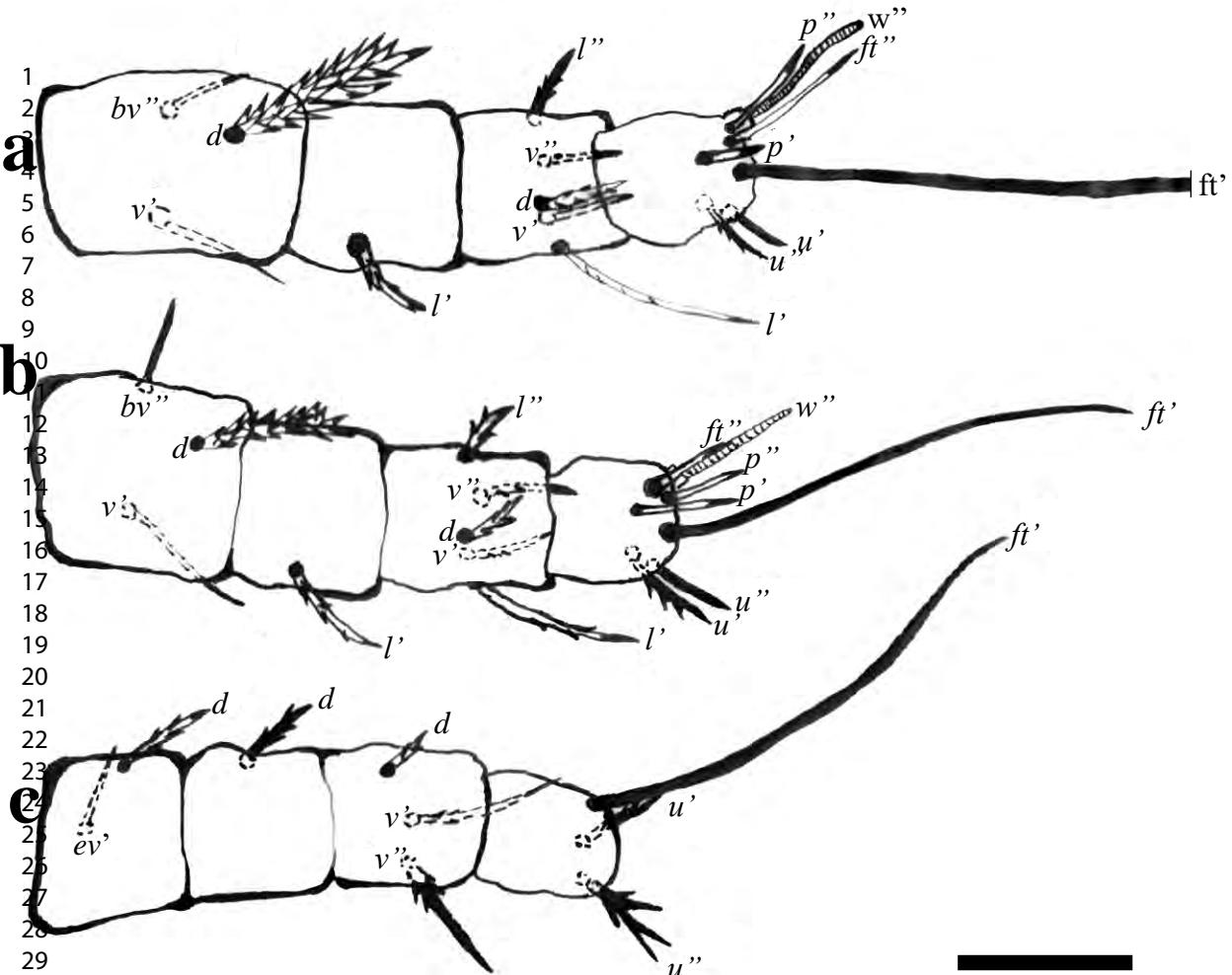
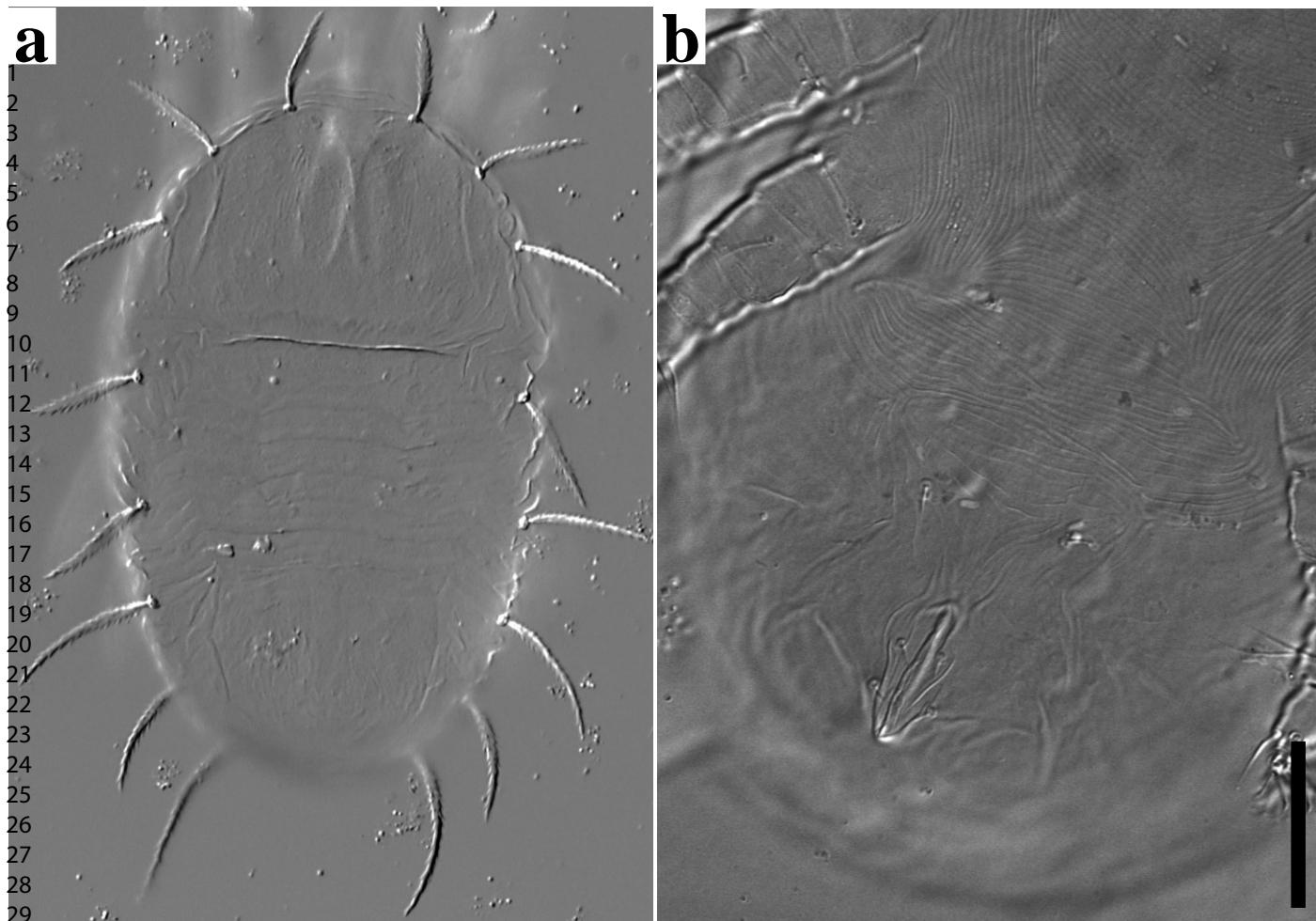
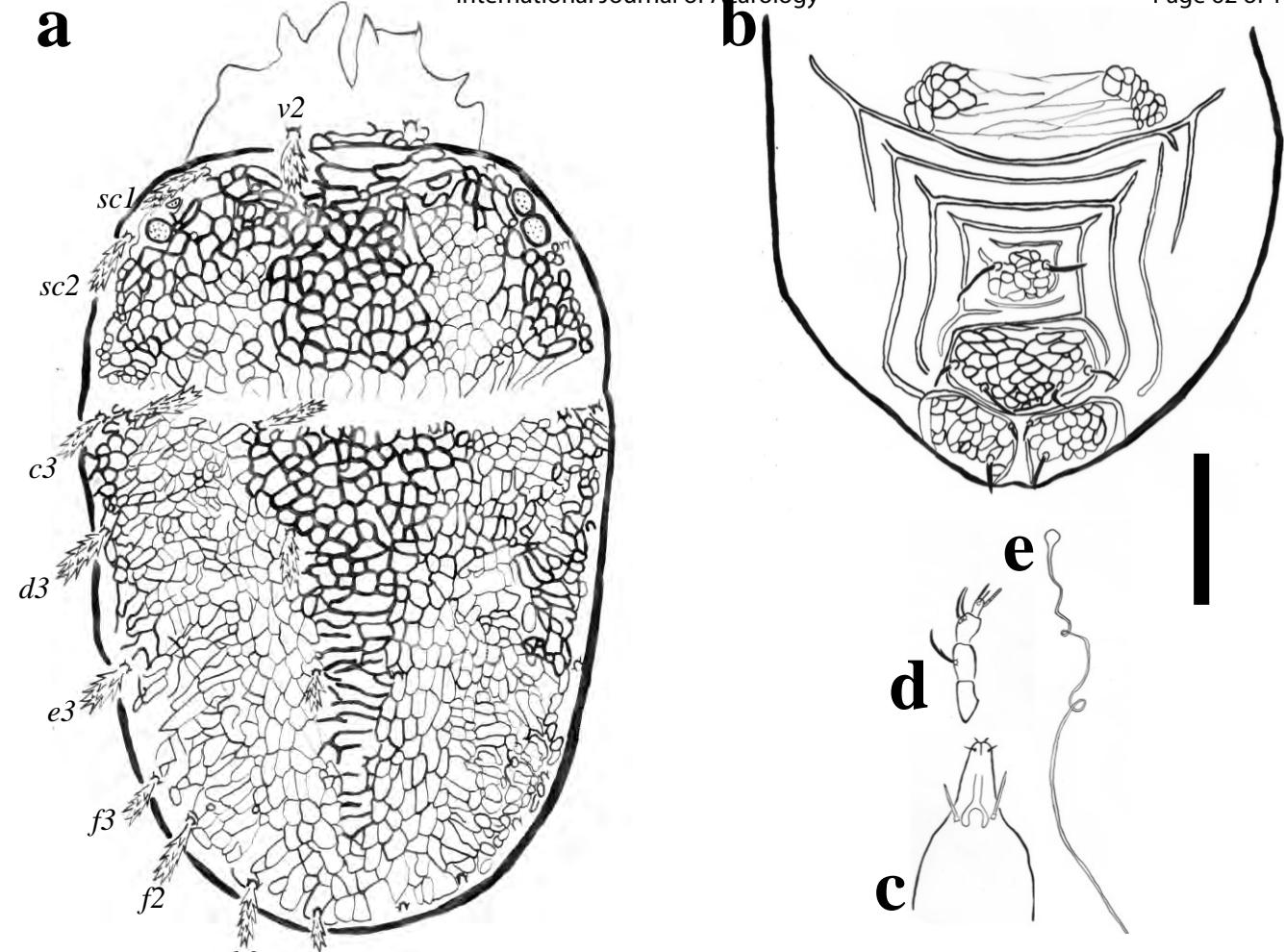


Figure 17. Drawings of legs of larva *C. bakeri*: a. leg I; b. leg II; c. leg III (scales 50 µm).



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

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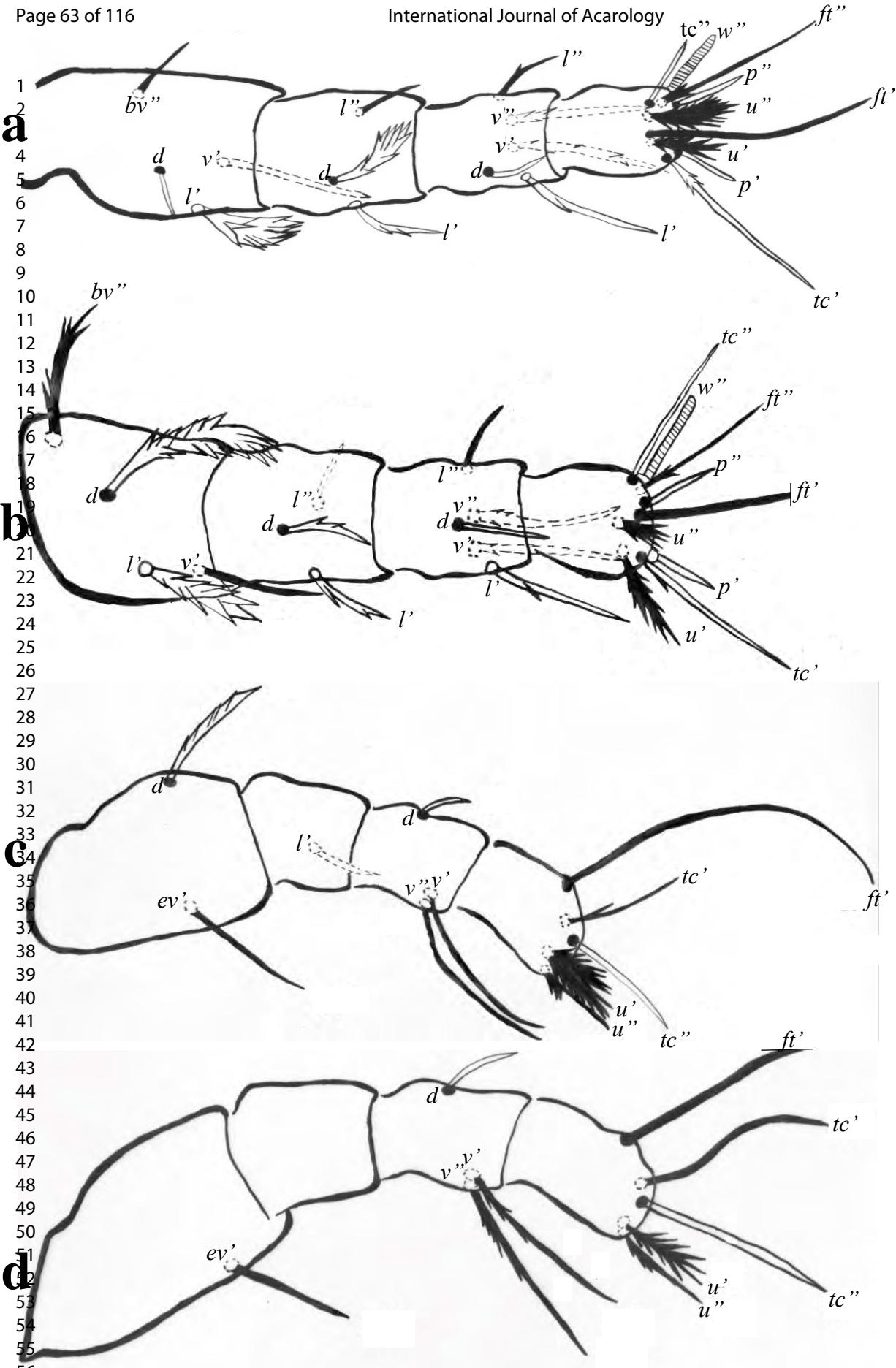


FIGURE 20. Drawings of legs of adult female *C. lanceolatisetae*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm). URL: <http://mc.manuscriptcentral.com/taca> Email: IJA@informa.com

a**b**

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

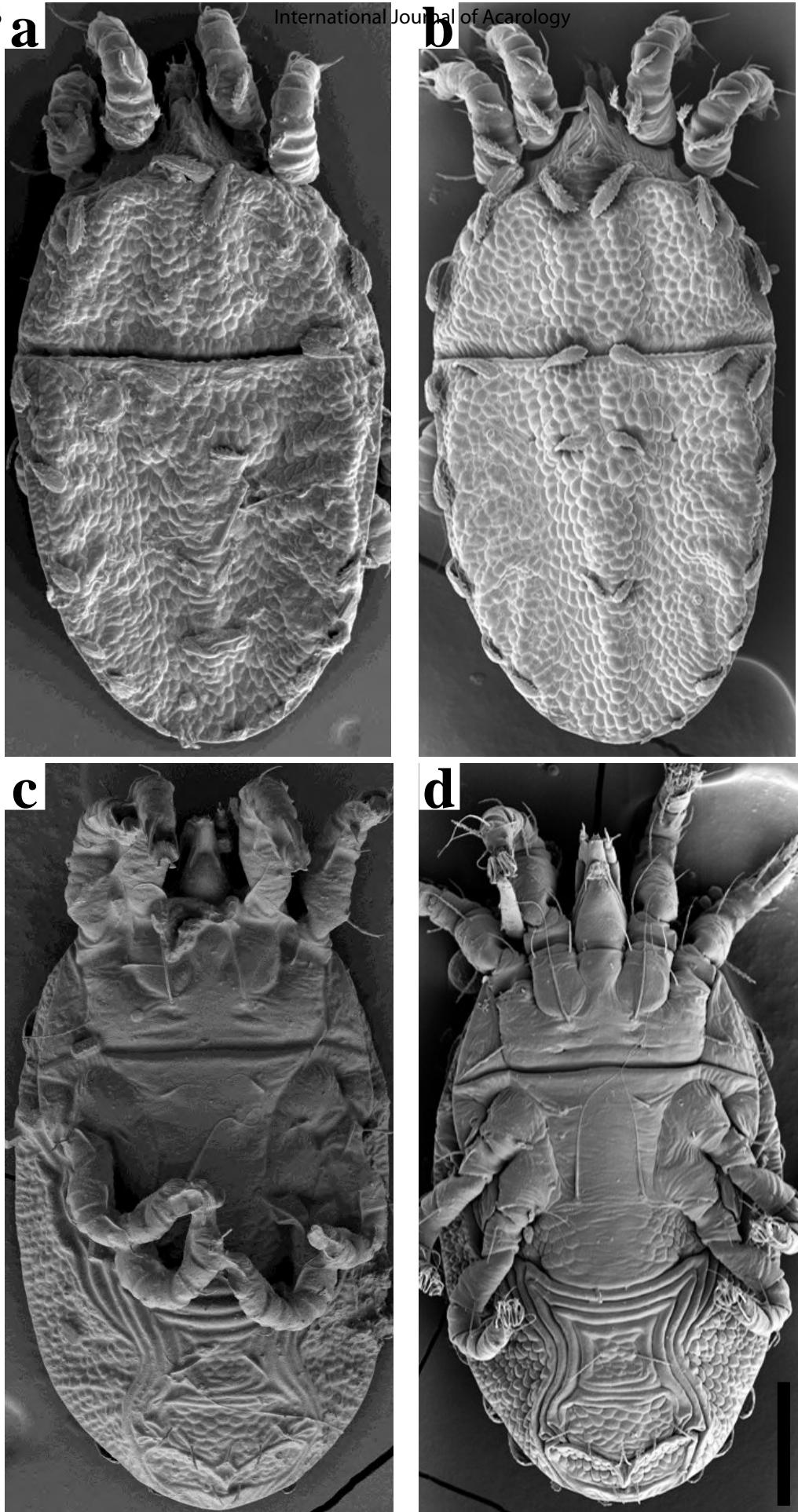
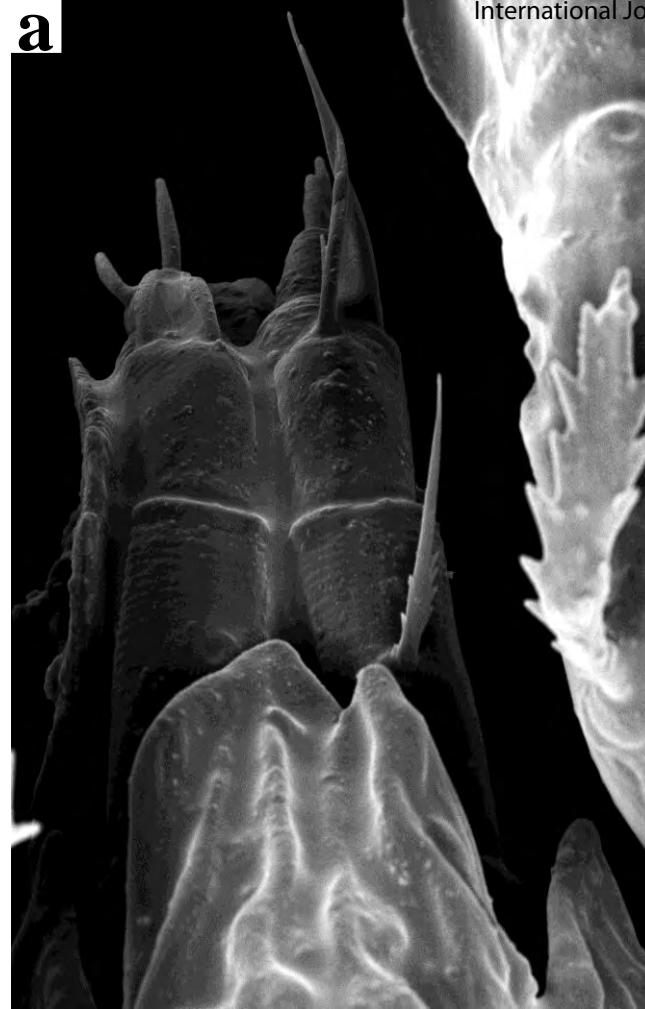


Figure 22. Dorsal and ventral habitus of adult females *Calanoidellus setae*: a-c. specimens collected on *P. amygdaliformis*; b-d. specimens collected on *E. angustifolia* (scales 50 µm).

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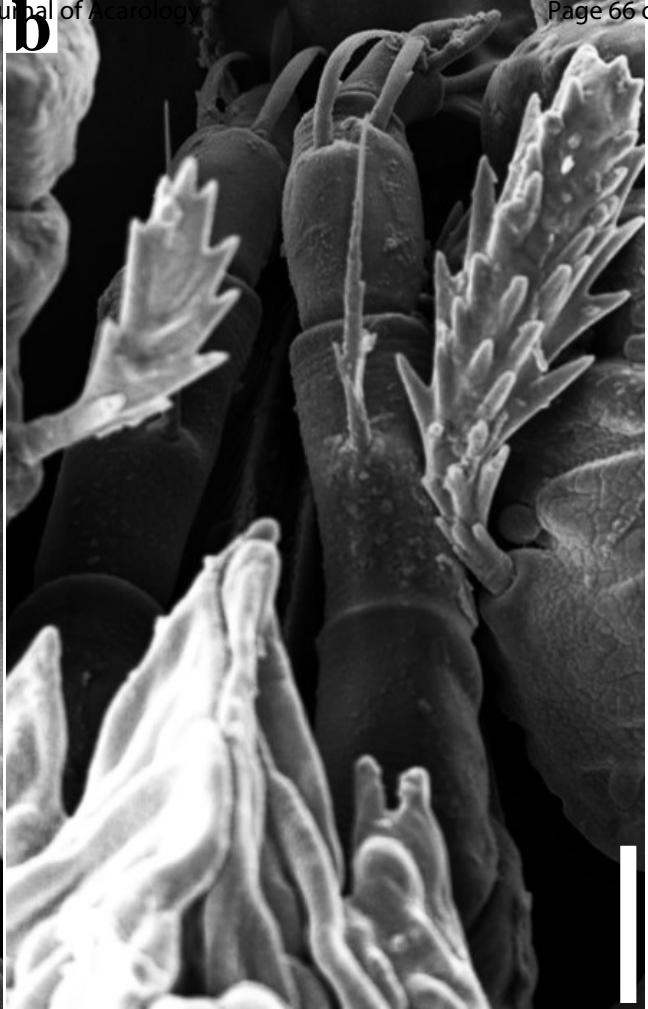


Figure 23. Femora setae of adult females *C. lanceolatisetae*: a-b. specimens collected on *P. amygdaliformis*; c. specimens collected on *E. angustifolia* (scales 50 µm).



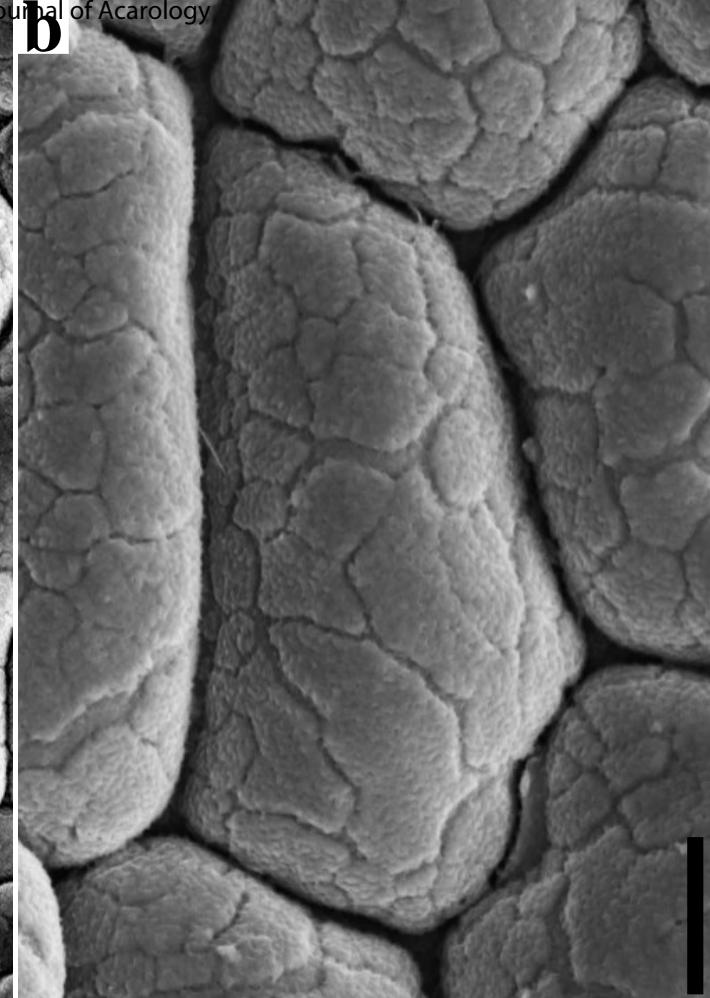
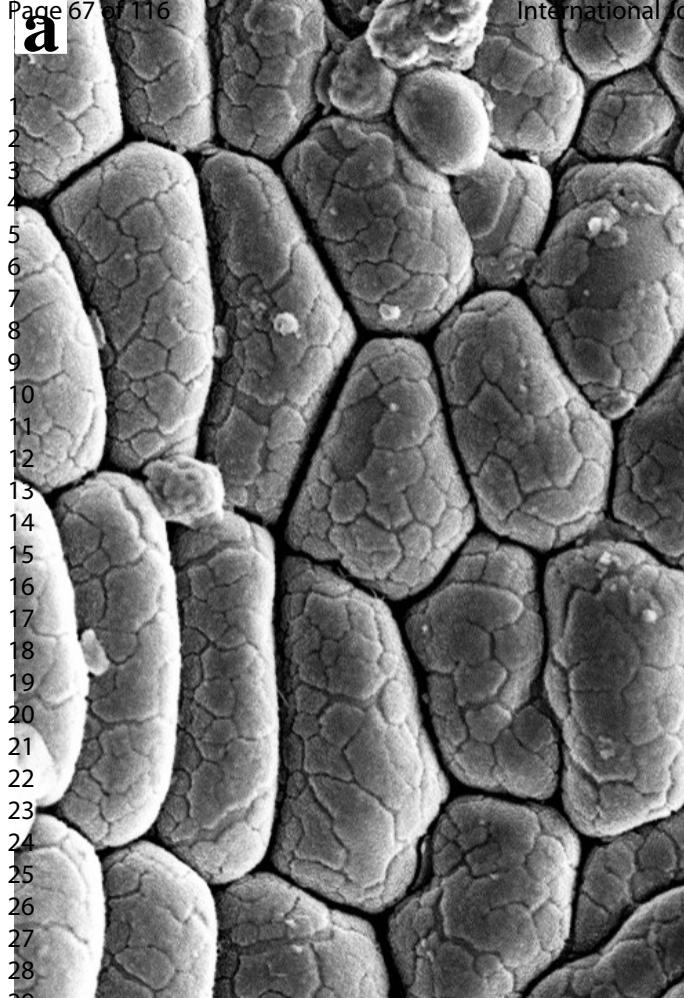
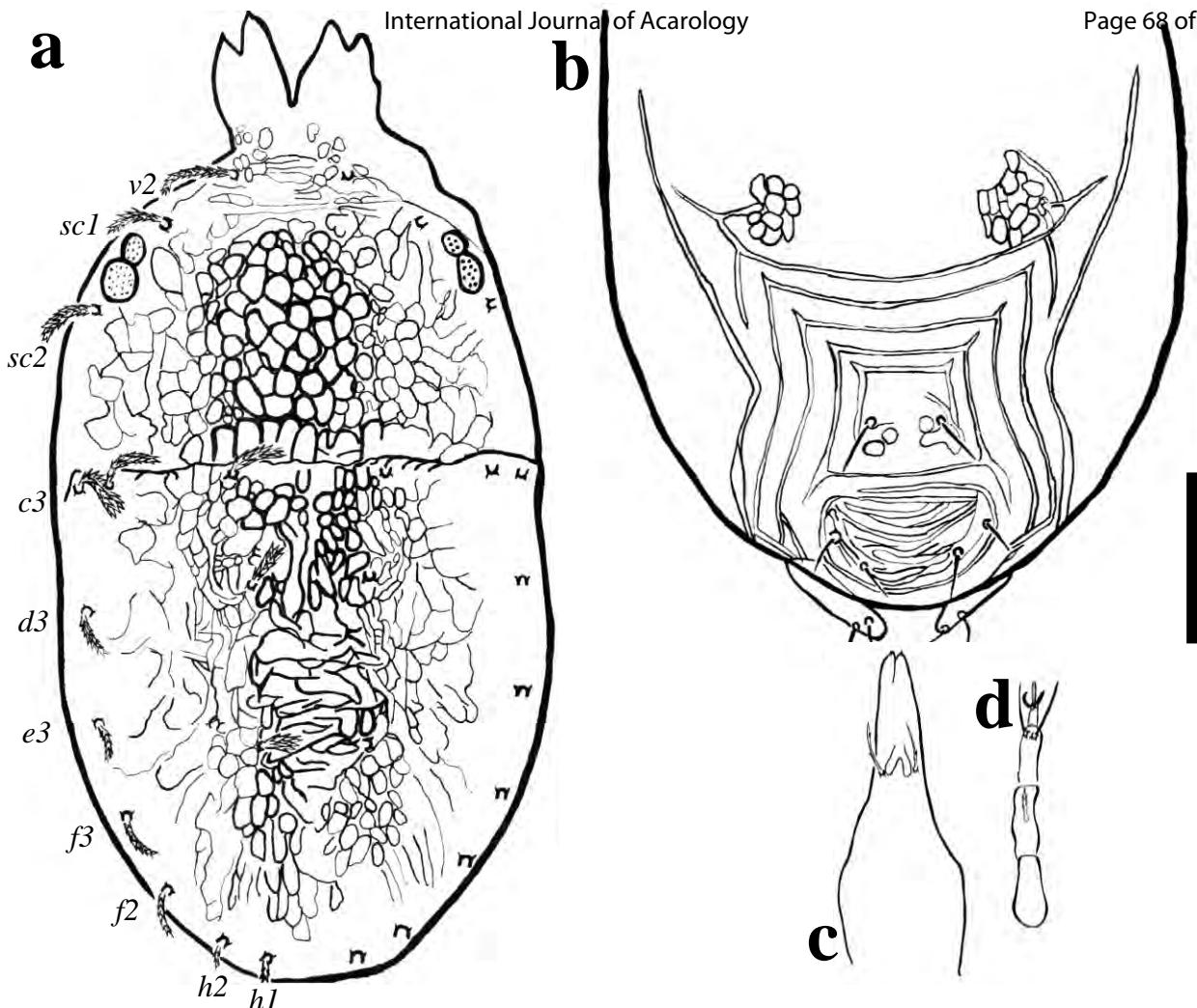
b

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





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

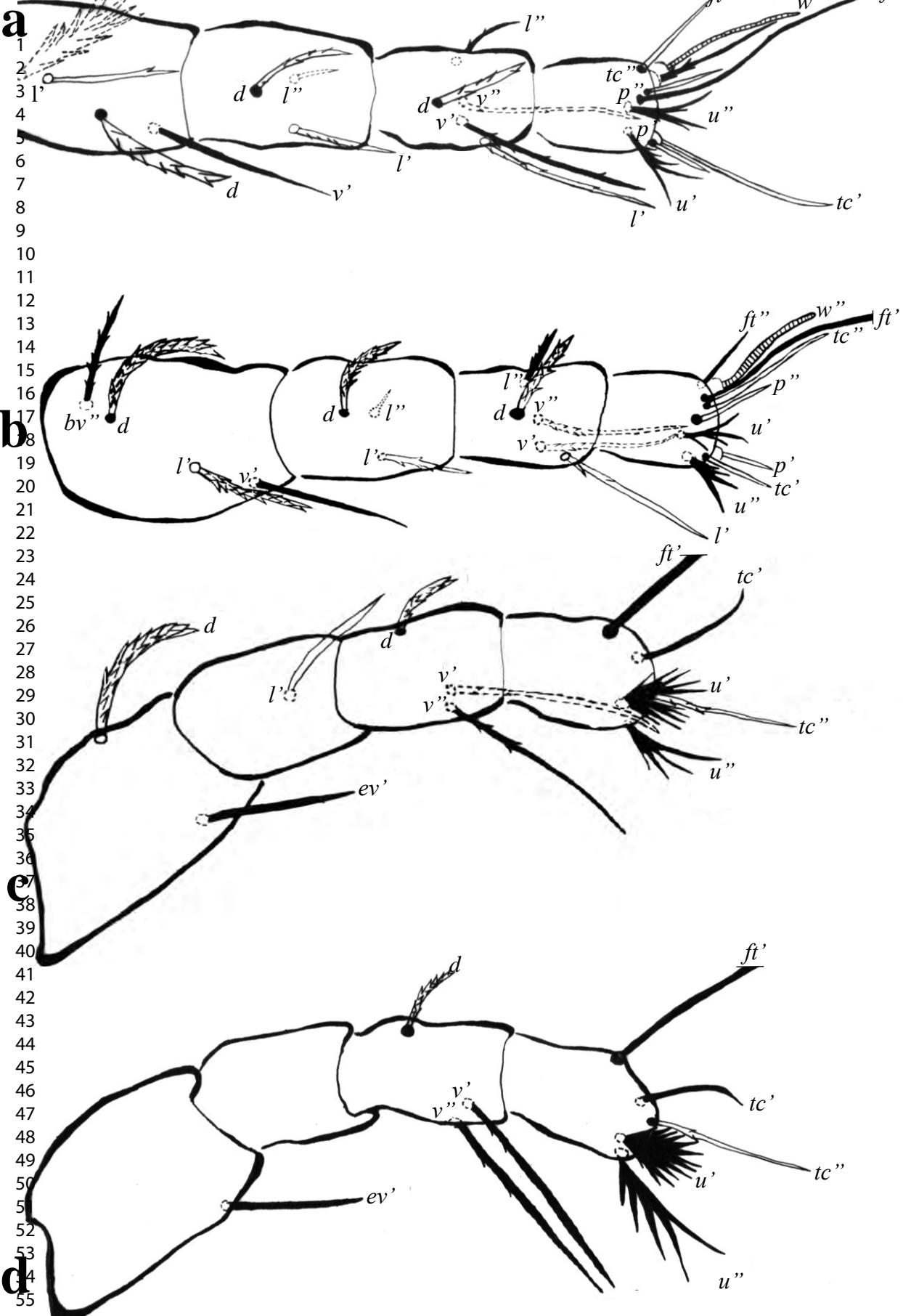


Figure 26. Drawings of legs of adult female *C. longirostris*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

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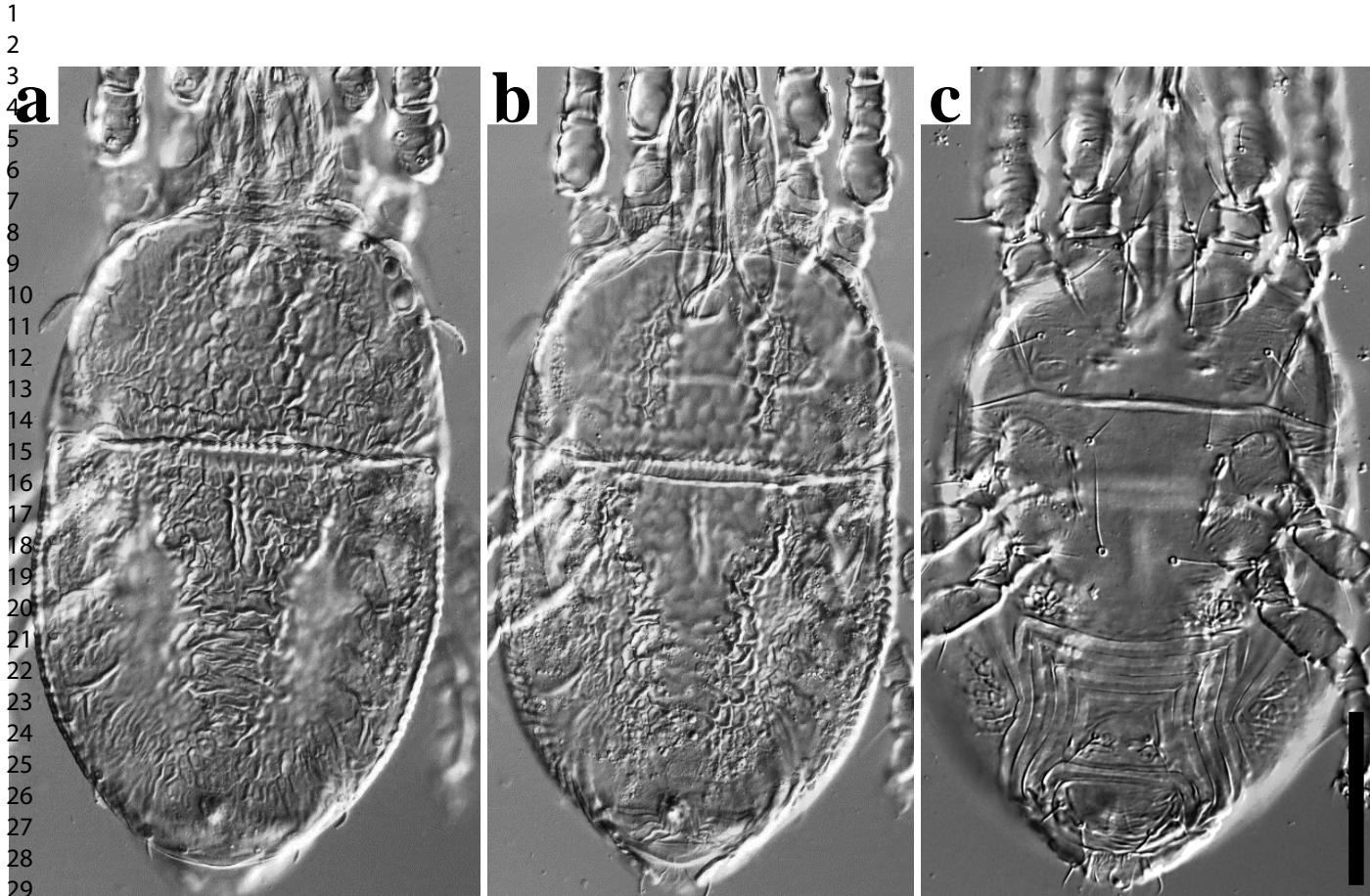


Figure 27. Differential Interference Contrast micrographs of adult female *C. longirostris*: a-b. dorsal habitus; c. ventral habitus (scales 50 µm). 



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

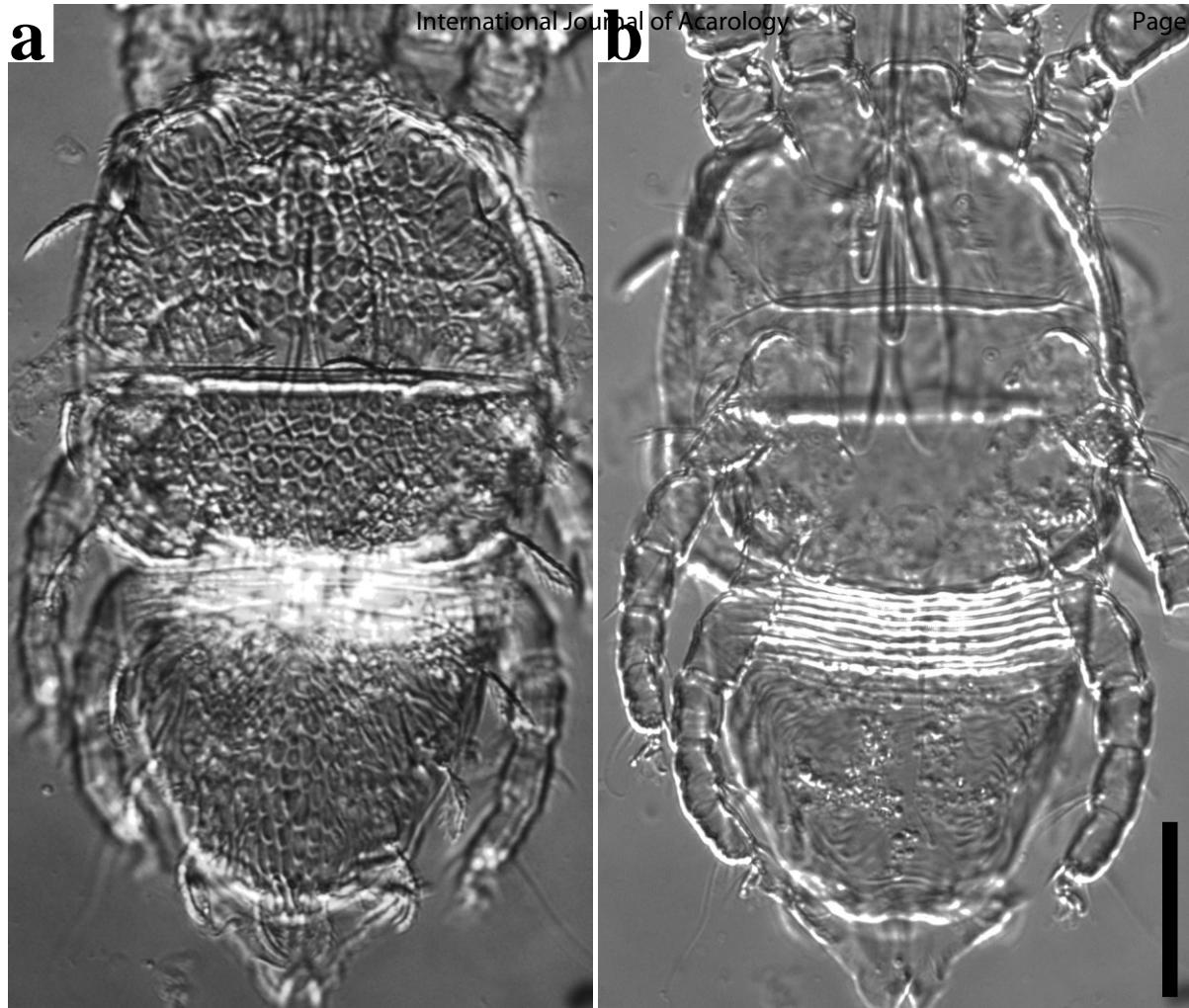


Figure 29. Differential Interference Contrast micrographs of adult male *C. longirostris*: a. dorsal habitus; b. ventral habitus (scales 50 μm)

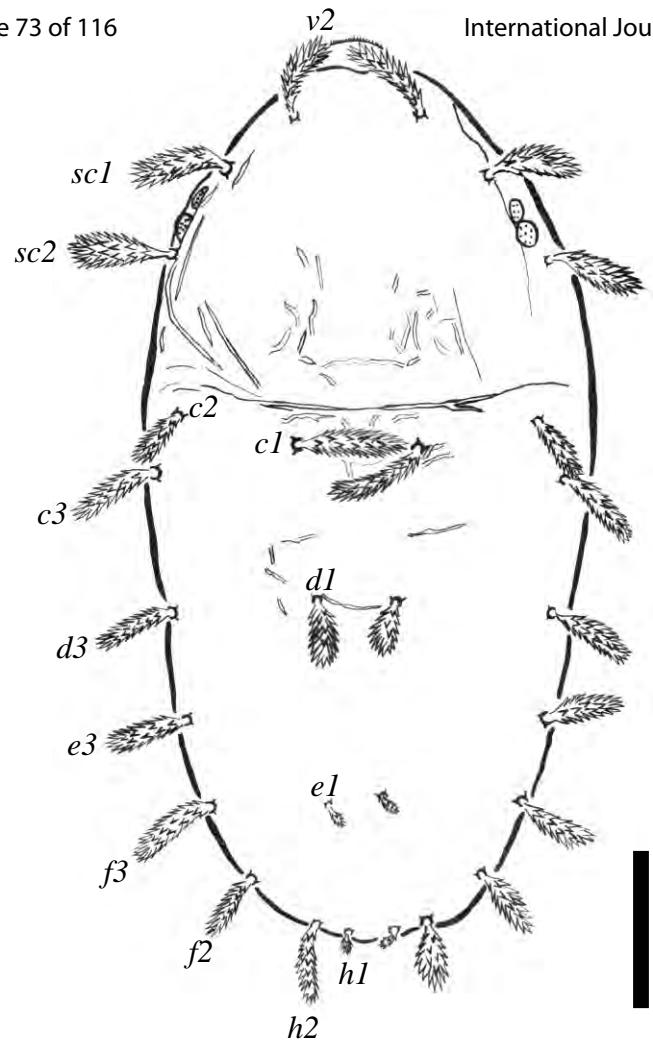


Figure 30. Drawing of dorsal habitus of deutonymph *C. longirostris* (scales 50 µm).

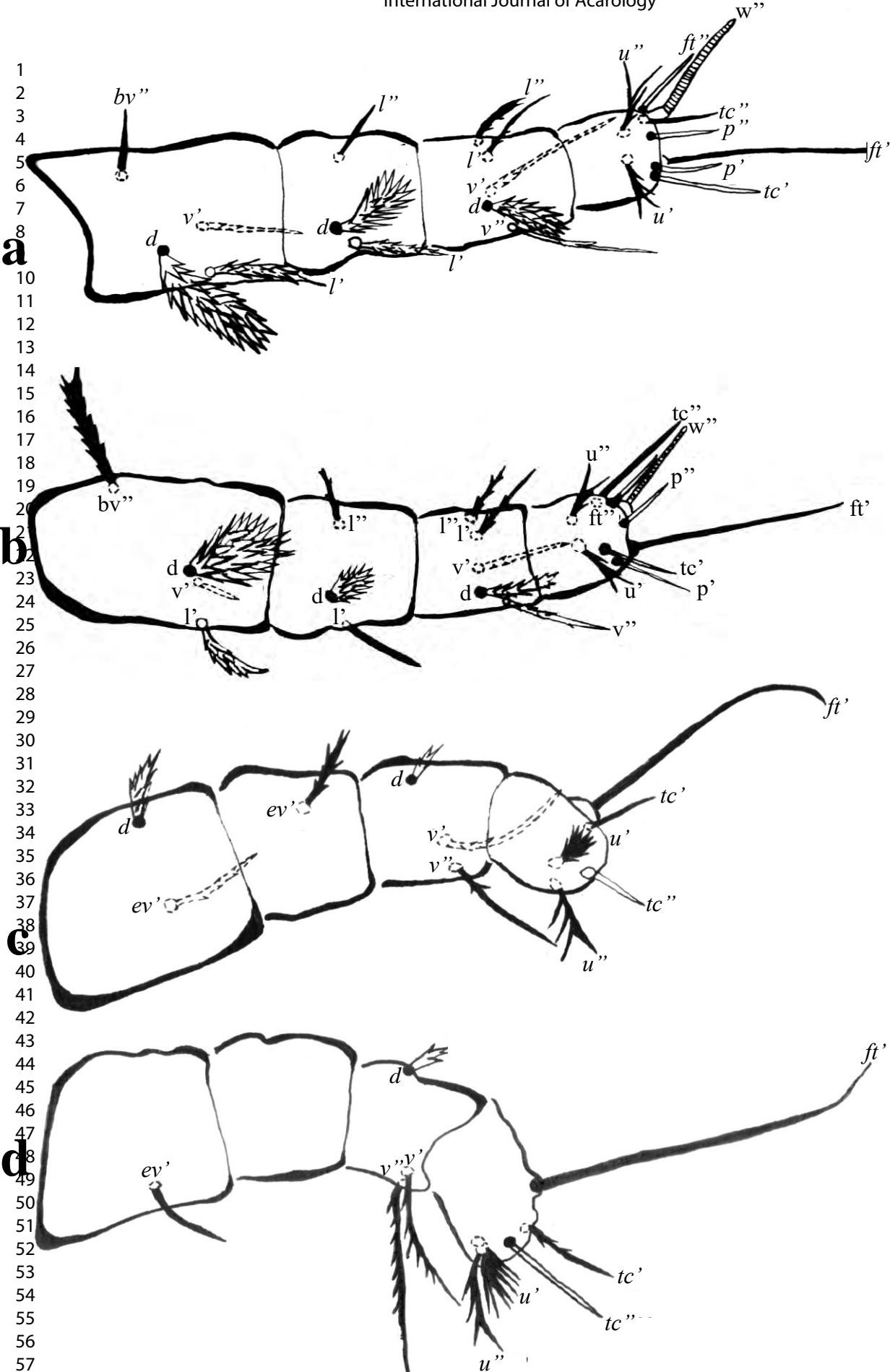
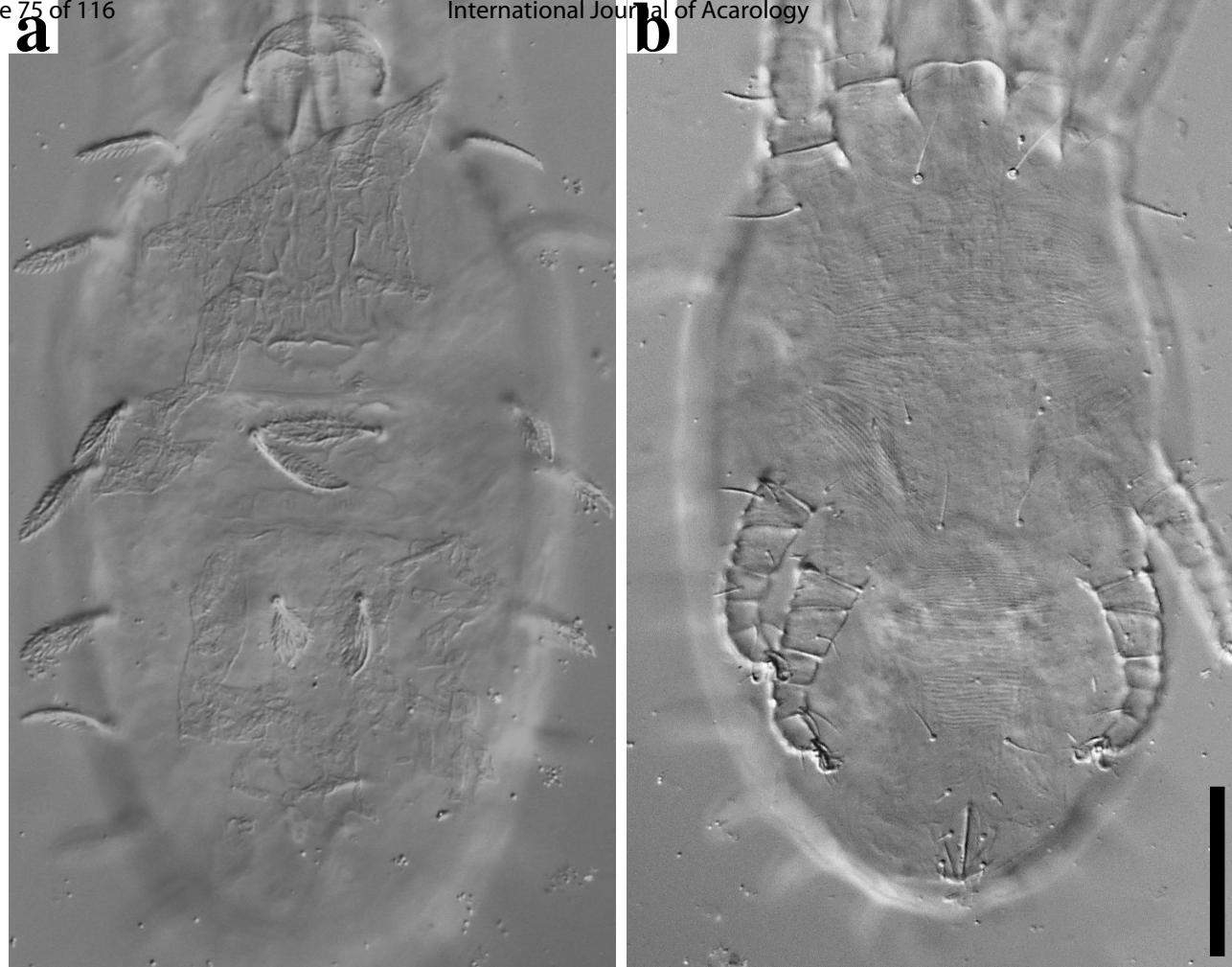


Figure 31. Drawings of legs of deutonymph *C. longirostris*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 650 µm).



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

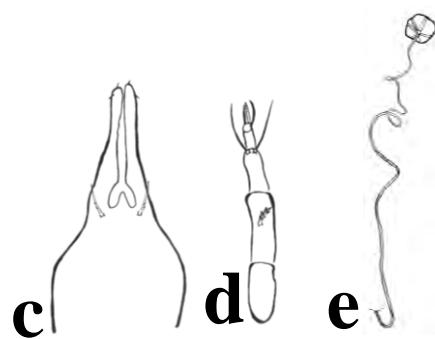
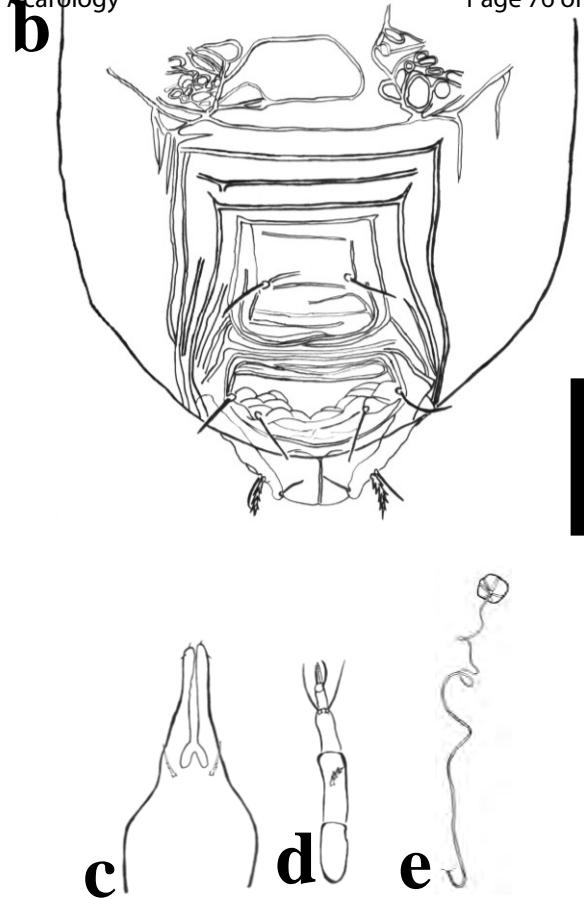
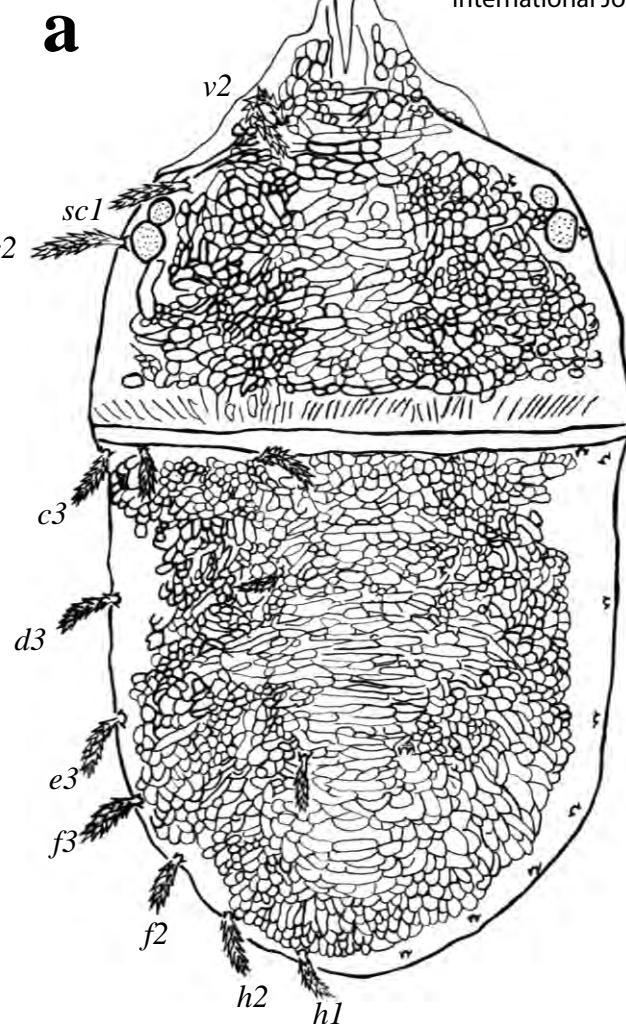
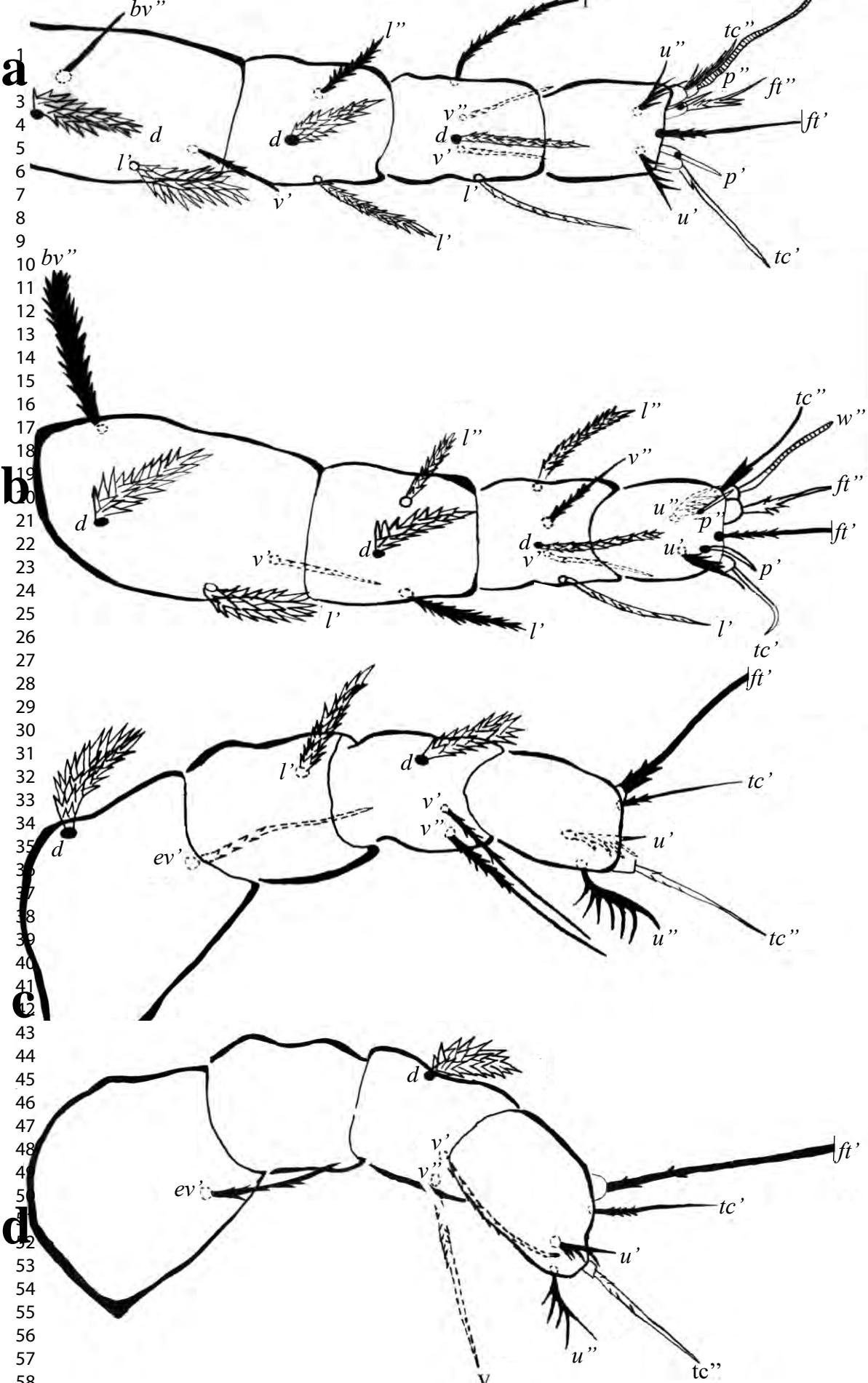
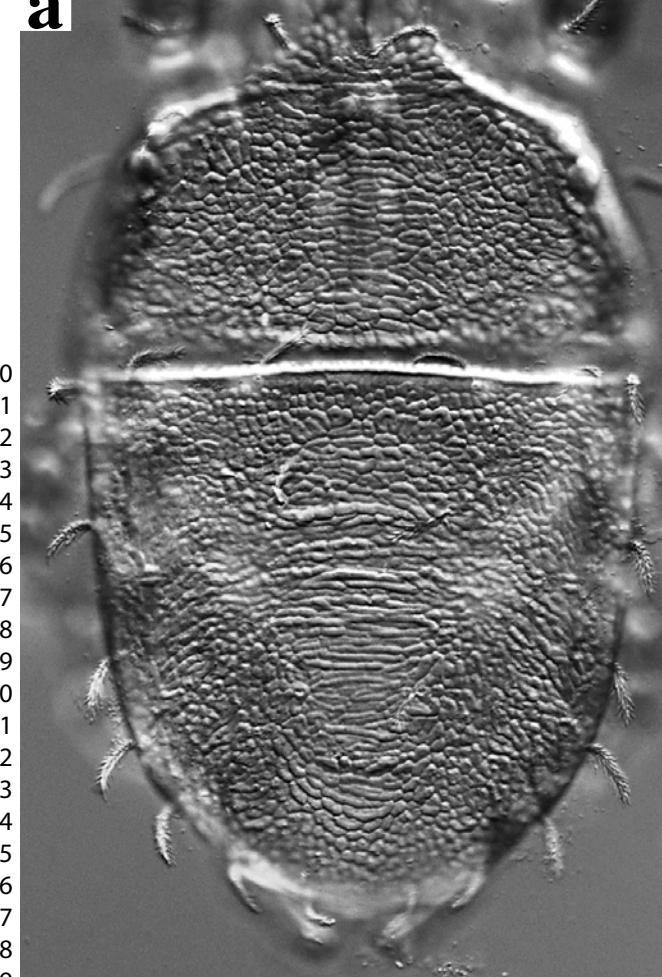


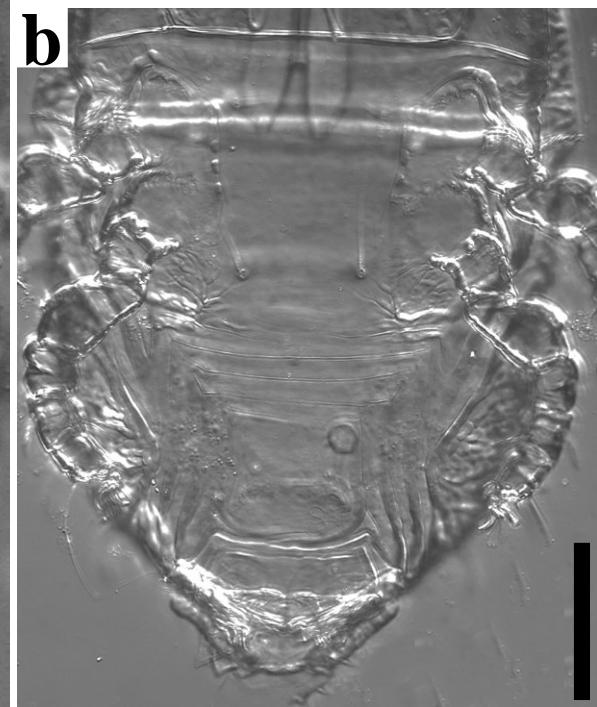
Figure 33. Drawings of adult female *C. halperini*: a. dorsal habitus; b. ventral, genital, and anal plate; c. subcapitulum; d. palp; e. spermatheca (scales 50 μm).



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

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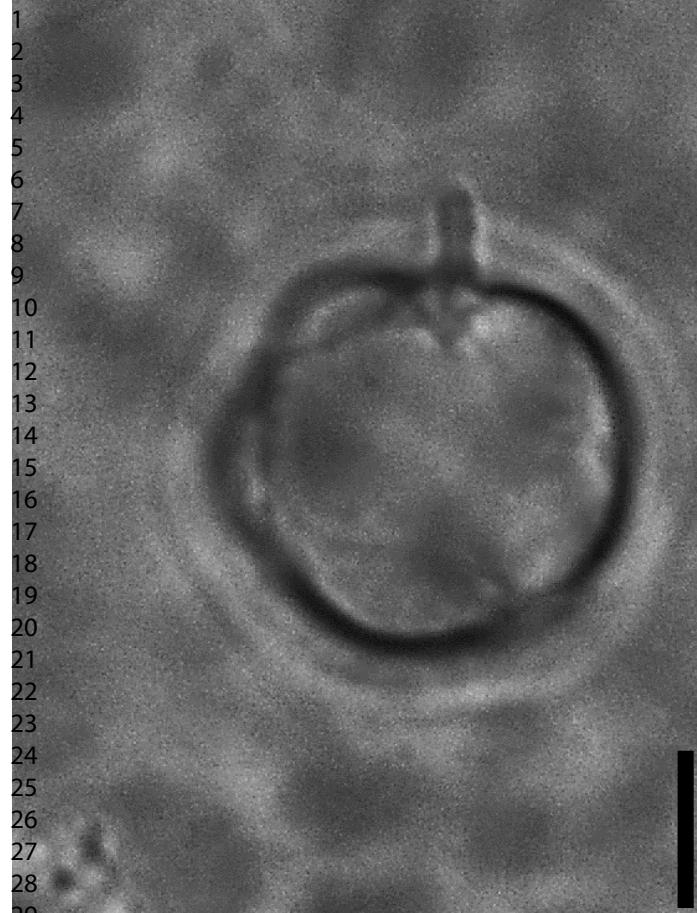
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30 **Figure 36.** Phase Contrast micrographs of spermatheca of adult female *C. halperini* (scales 50 μm).
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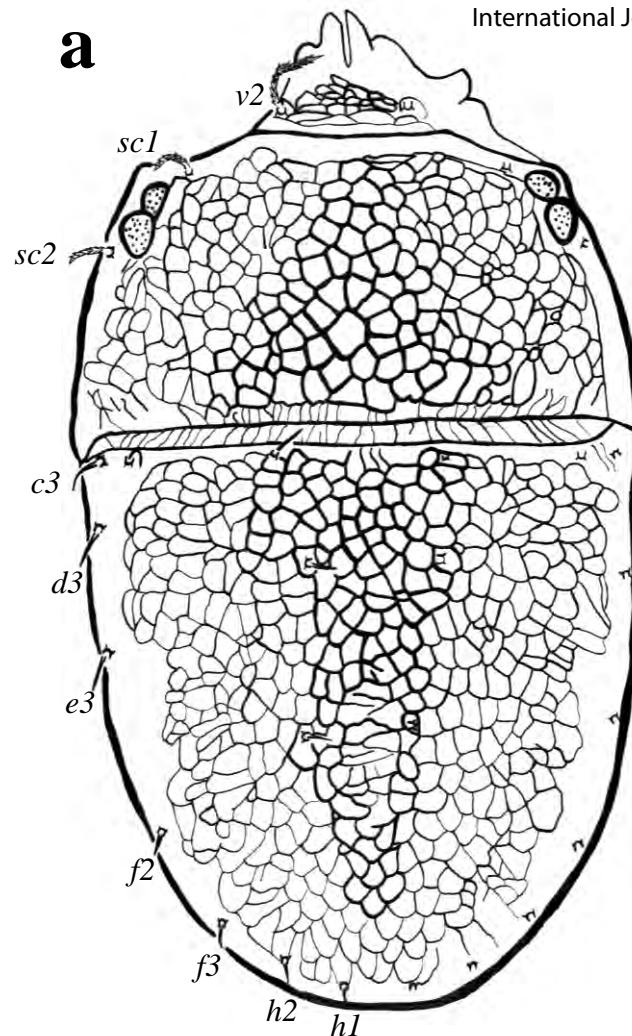
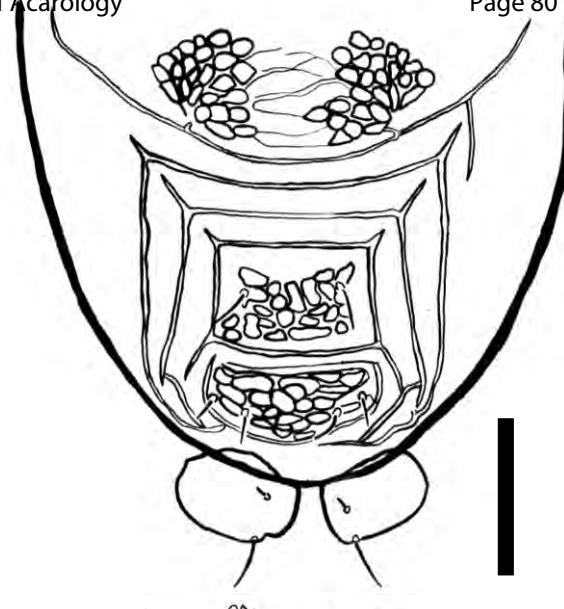
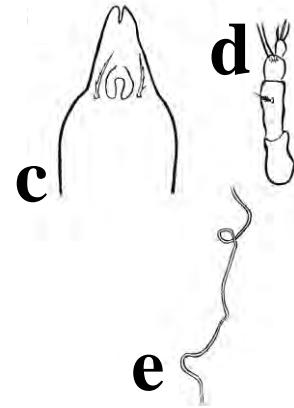
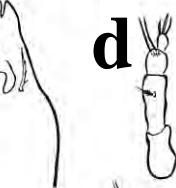
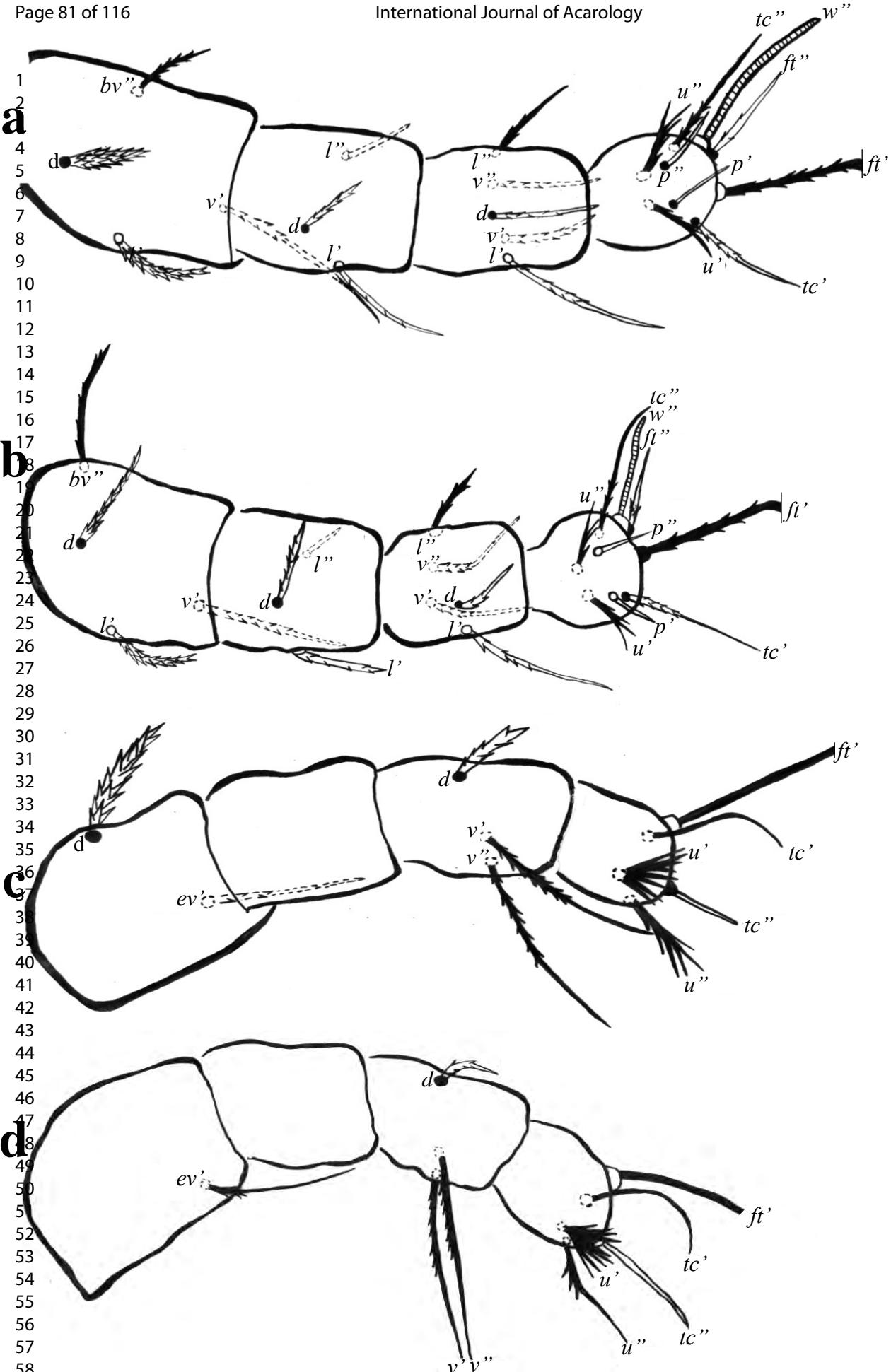
a**b****c****d****e**

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).



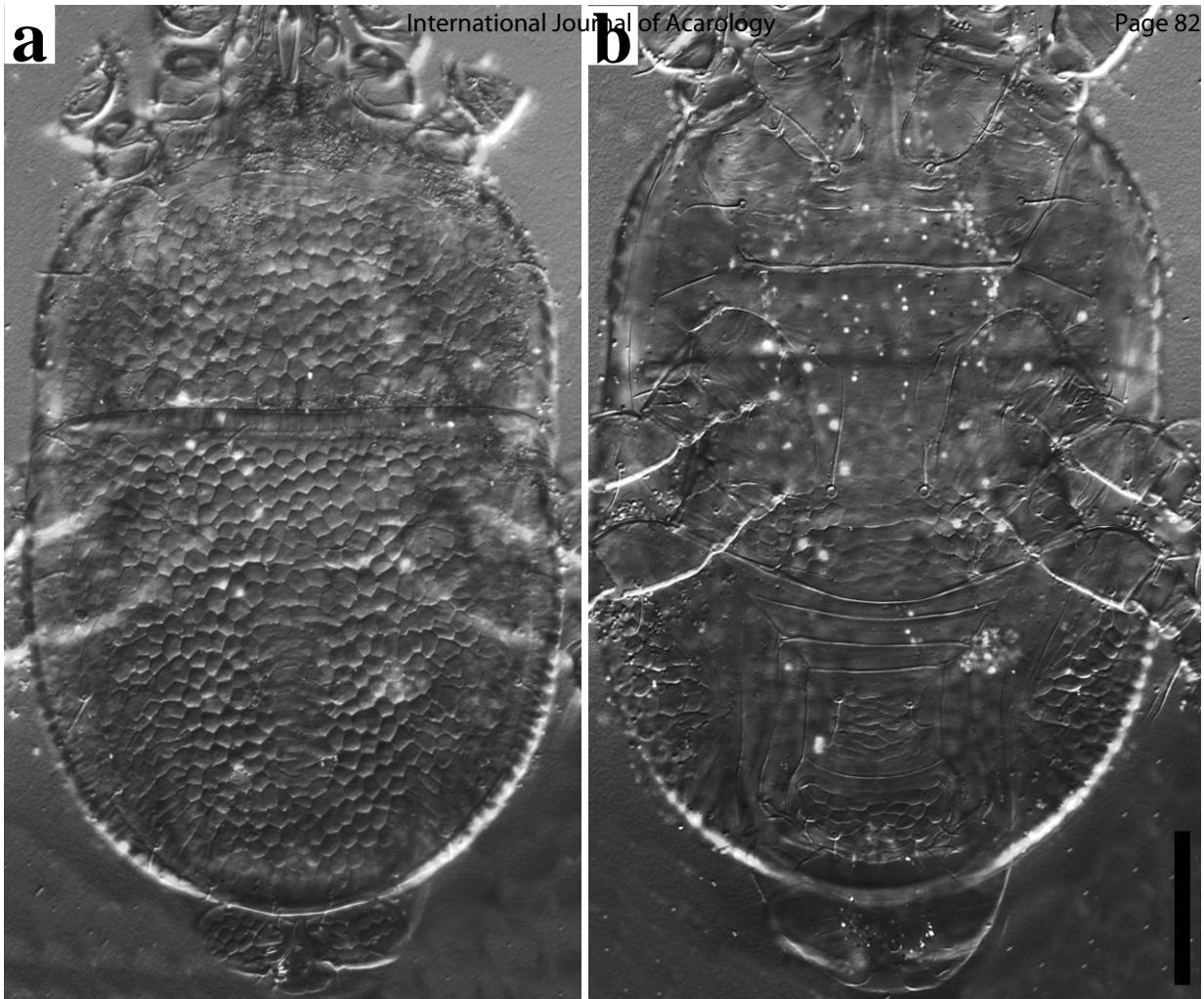
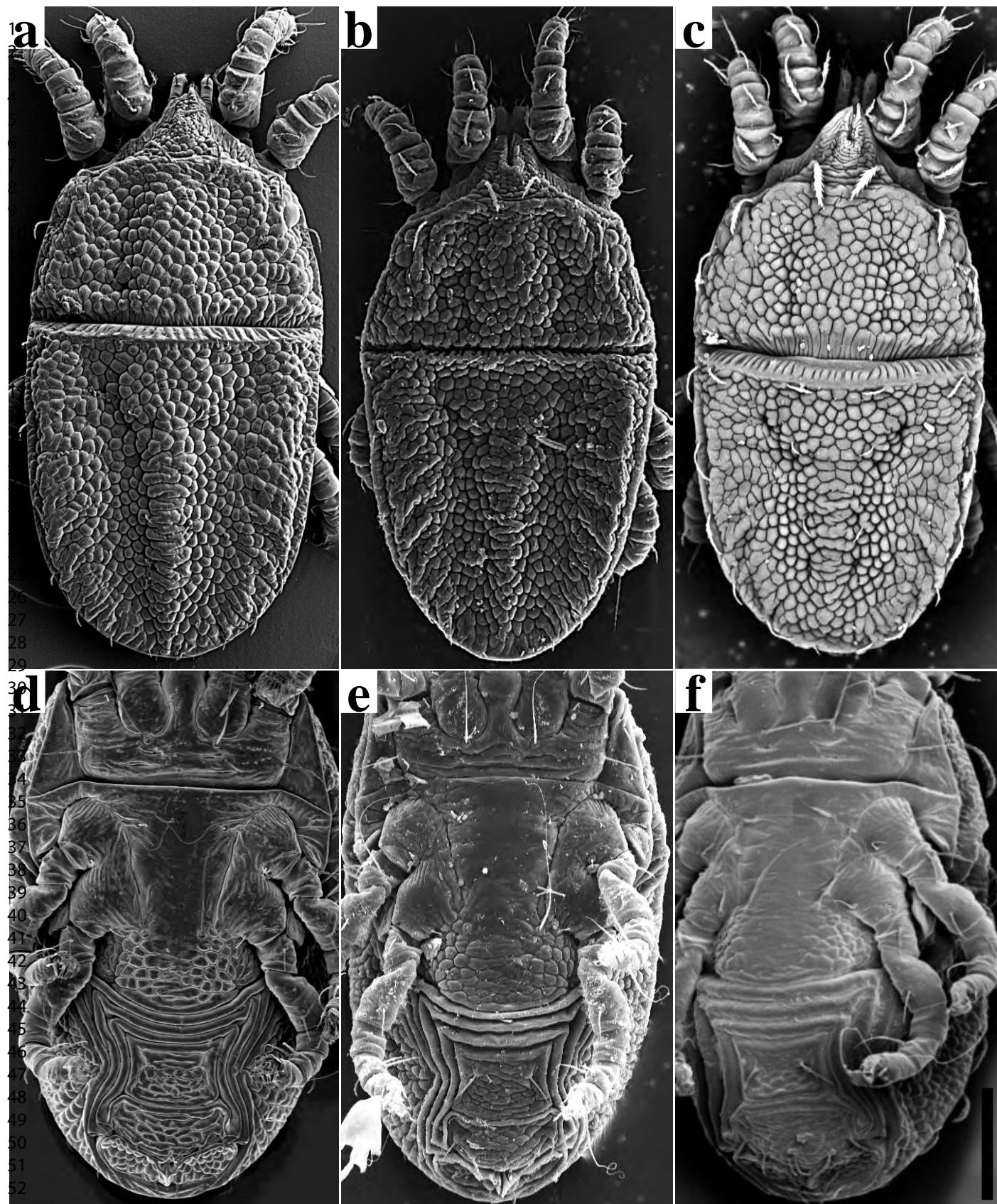


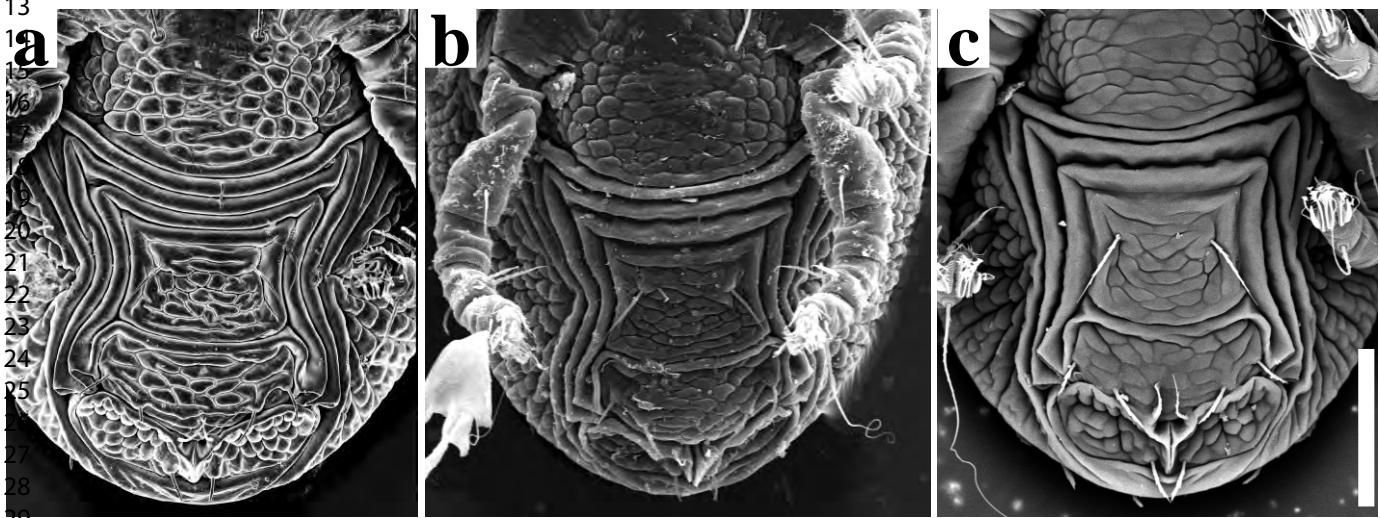
Figure 39. Differential Interference Contrast micrographs of adult female *C. pulcher*: a. dorsal habitus; b. ventral habitus (scales 50 µm)



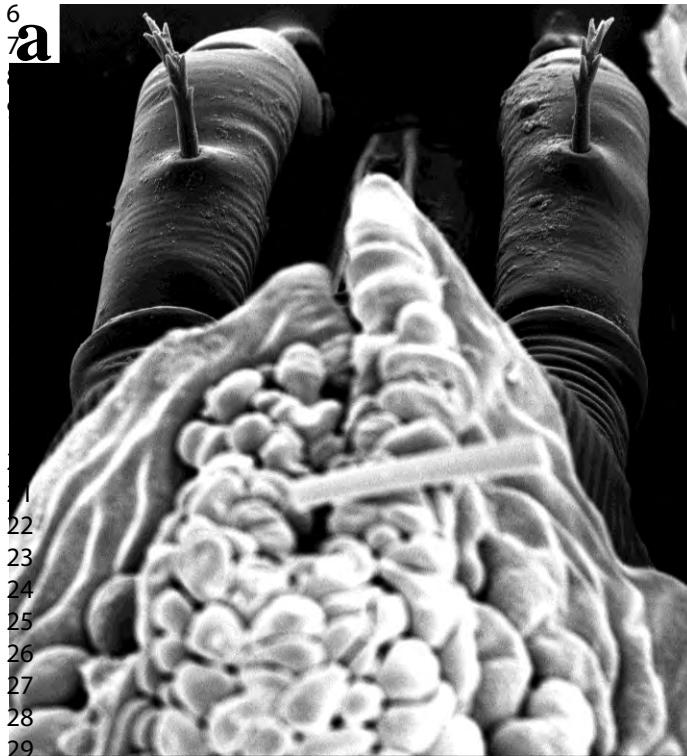
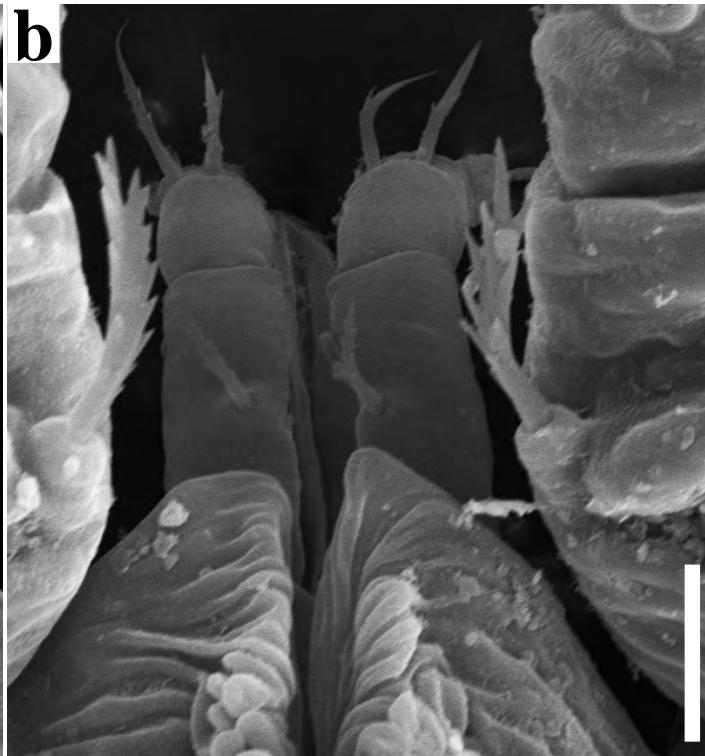
54 **Figure 40.** Dorsal and ventral habitus of adult females *C. pulcher*: a-d. specimens collected on *M. sylvestris*; b-e. specimens collected on *C. lacteus*; c-f. specimens collected on *Ligustrum* sp. (scales 50
55 µm).
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30 **Figure 41.** Ventral, 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).
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30 **Figure 42.** Femora setae of adult females *C. pulcher*: a. specimens collected on *M. sylvestris*; b.
31 specimens collected on *C. lacteus* (scales 50 µm). 

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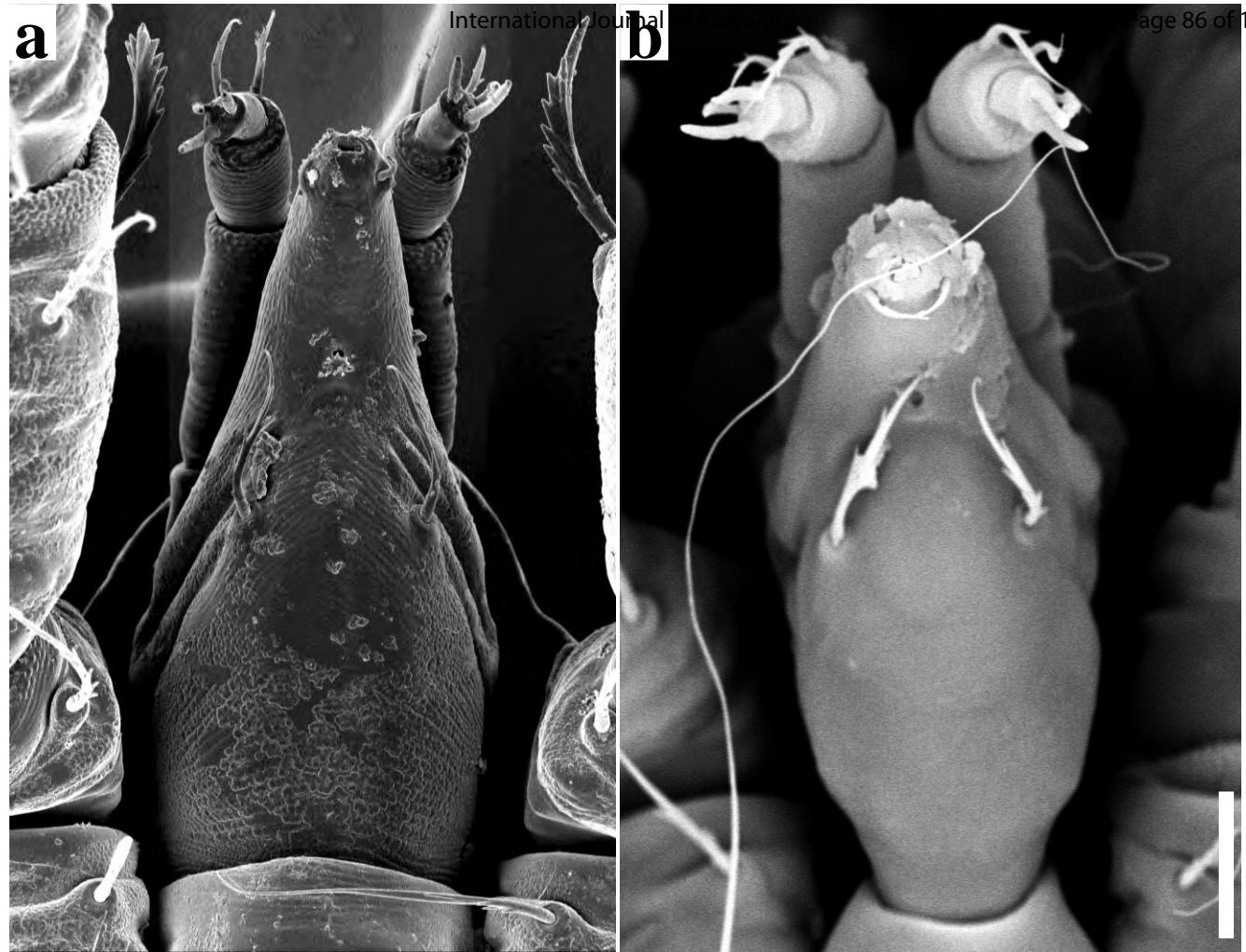


Figure 43. Subcapitulum of adult female *C. pulcher*: a. specimens collected on *M. sylvestris*; b. specimens collected on *Ligustrum* sp. (scales 50 µm).

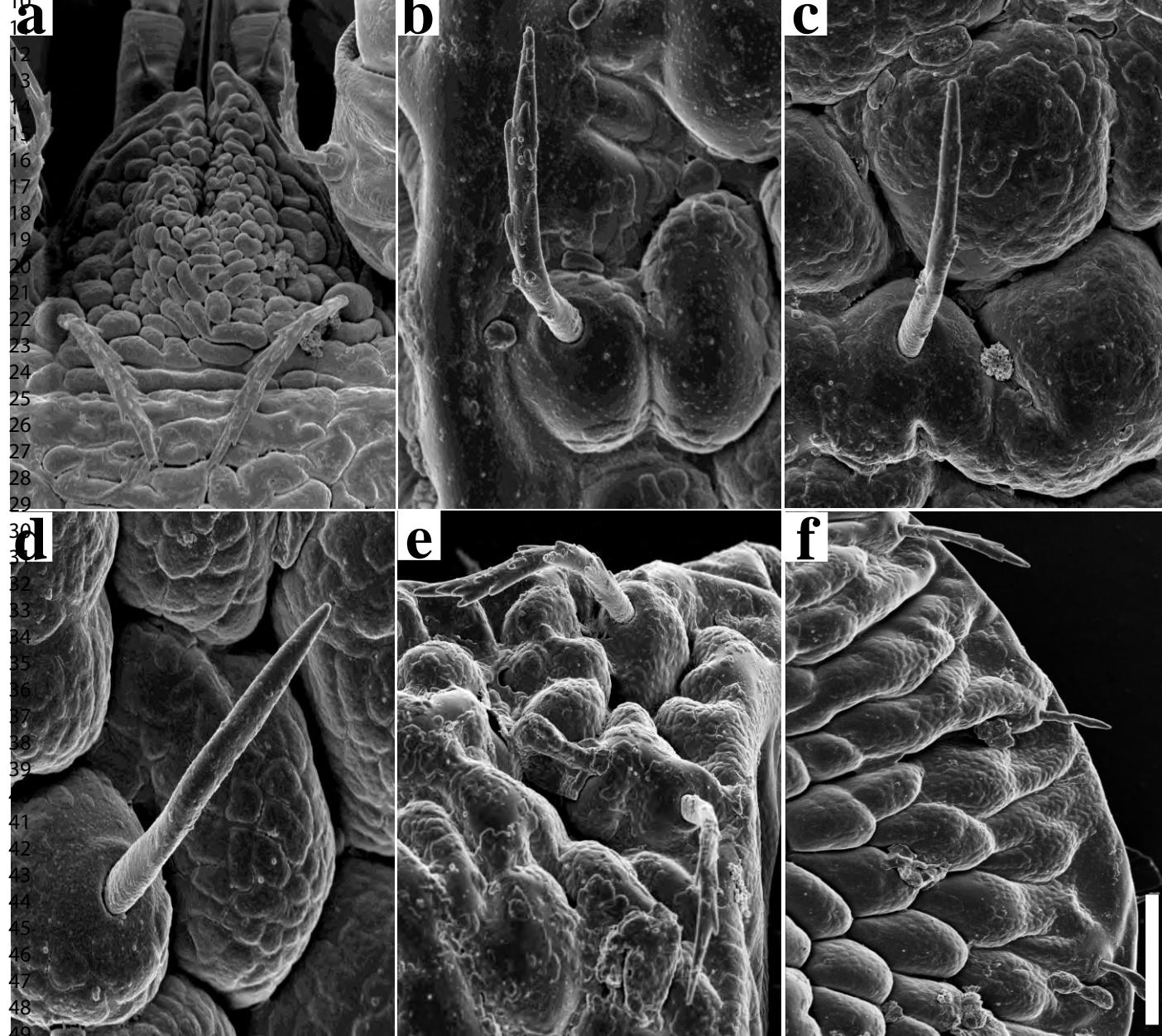
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Figure 44. Shape of the setae of adult females *C. pulcher* collected on *M. sylvestris*: a. setae v2; b. seta c1; c. seta d1; d. seta e1; e. setae c2 and c3; f. setae f3, h2 and f1 (scales 50 µm).

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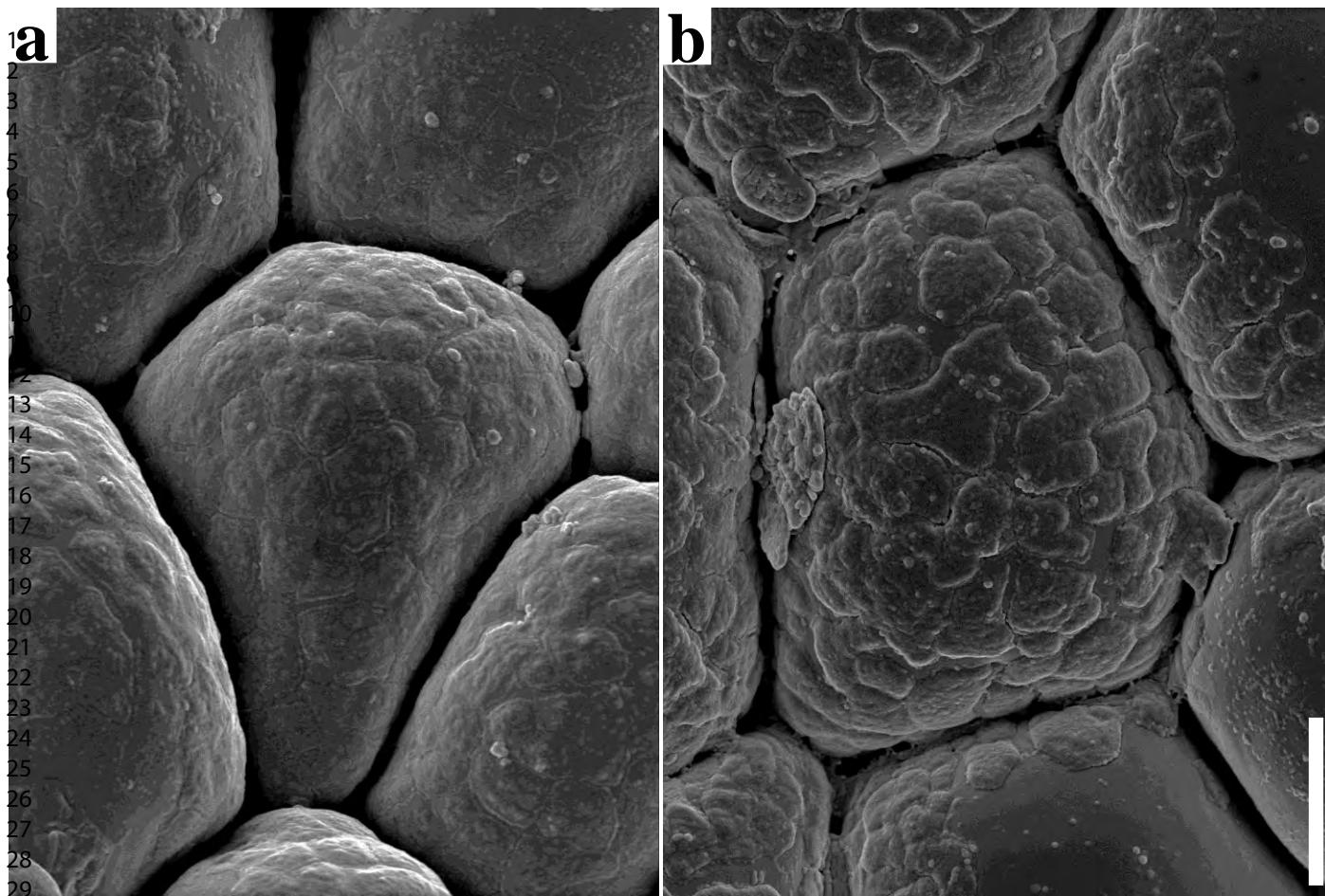
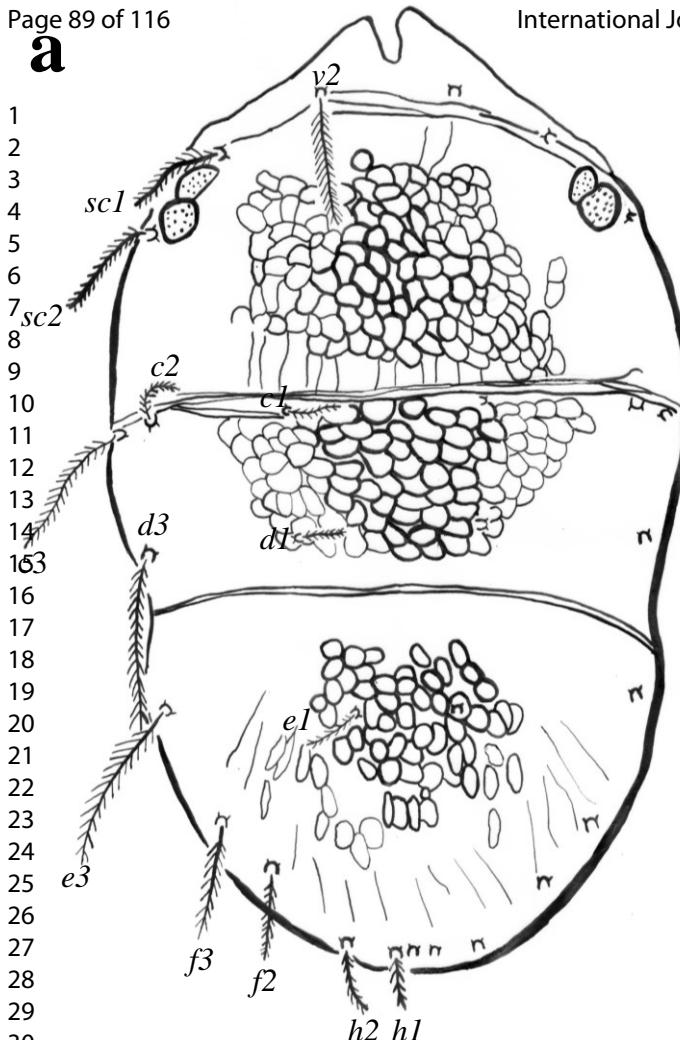


Figure 45. Microplates of adult female *C. pulcher* collected on *M. sylvestris* (scales 50 µm).



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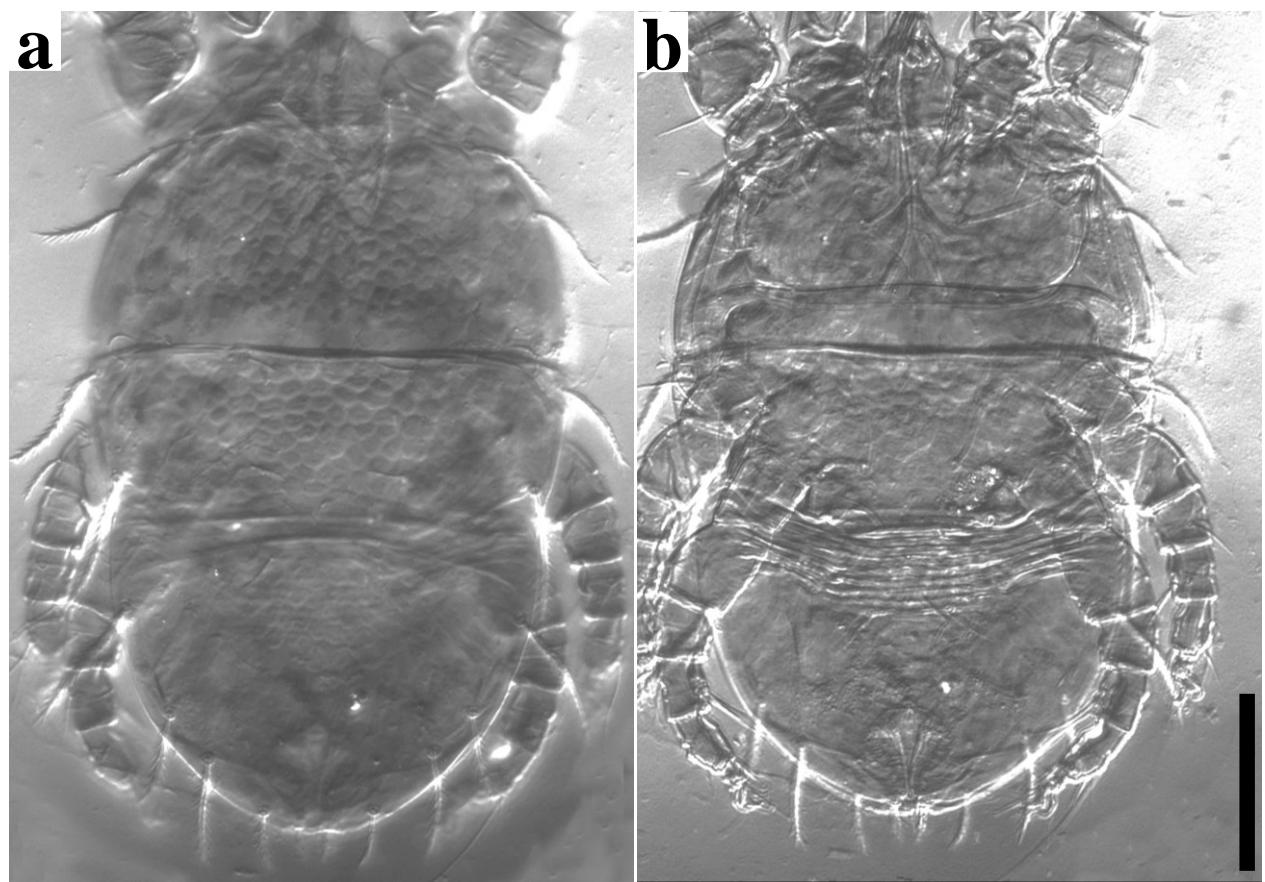


Figure 47. Differential Interference Contrast micrographs of adult male *C. pulcher*: a. dorsal habitus; b. ventral habitus (scales 50 μm). 

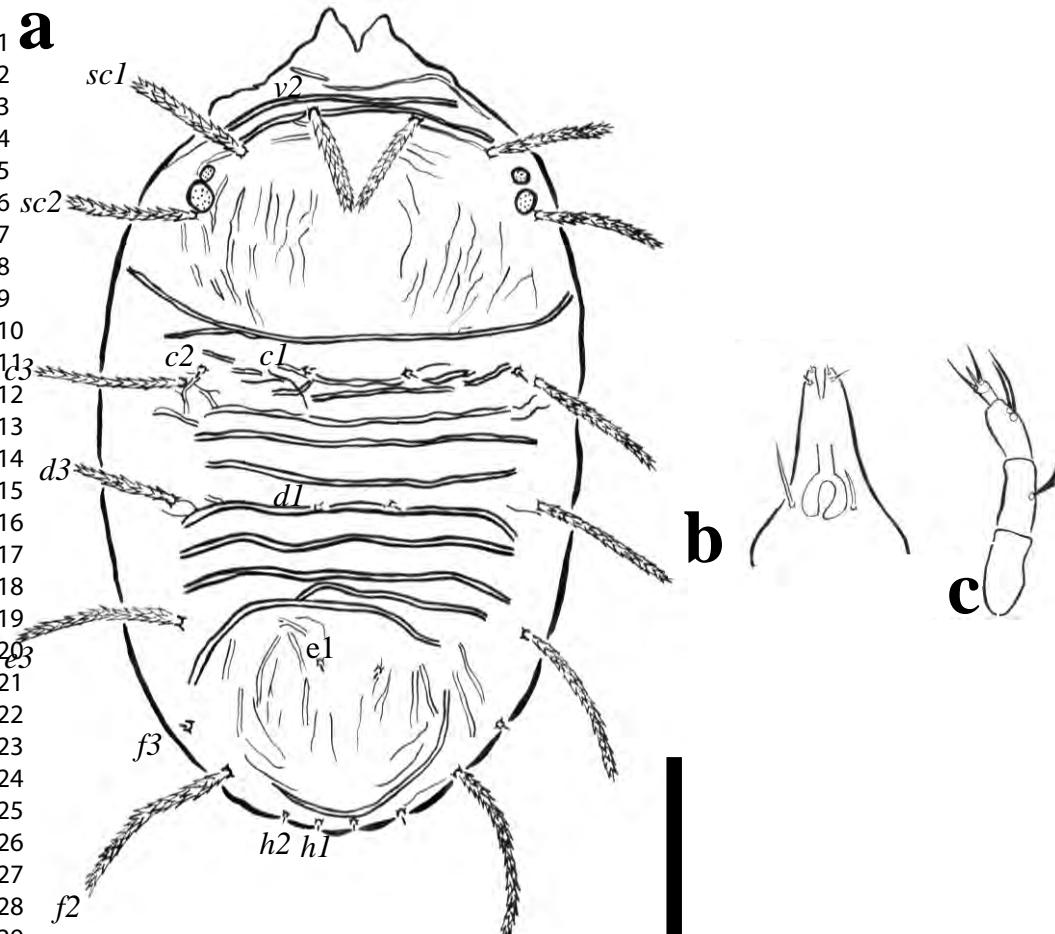


Figure 48. Drawing of deutonymph *C. pulcher*: a. of dorsal habitus; b. subcapitulum; c. palp (scales 50 µm).

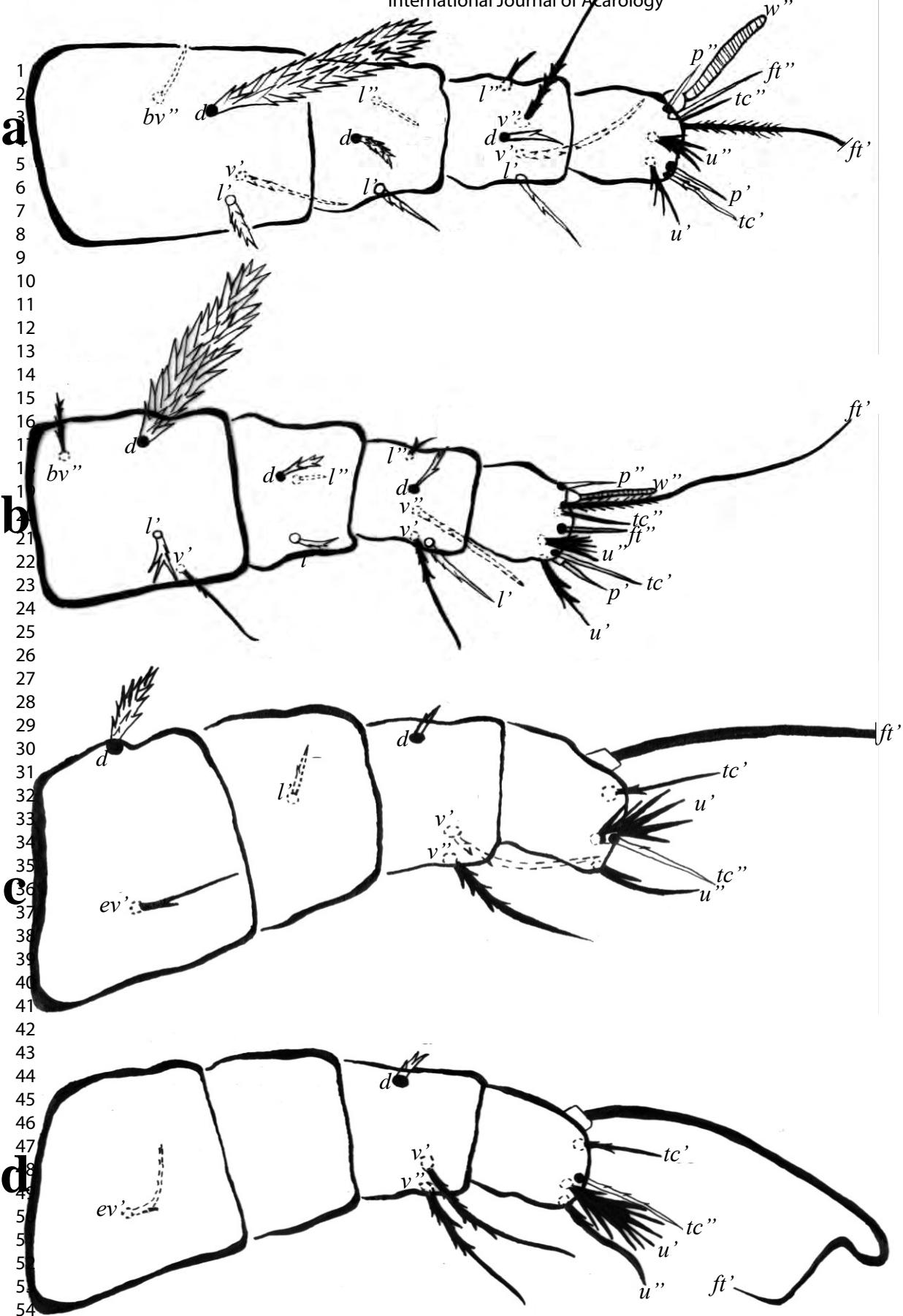


Figure 49. Drawings of legs of deutonymph *C. pulcher*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 µm).

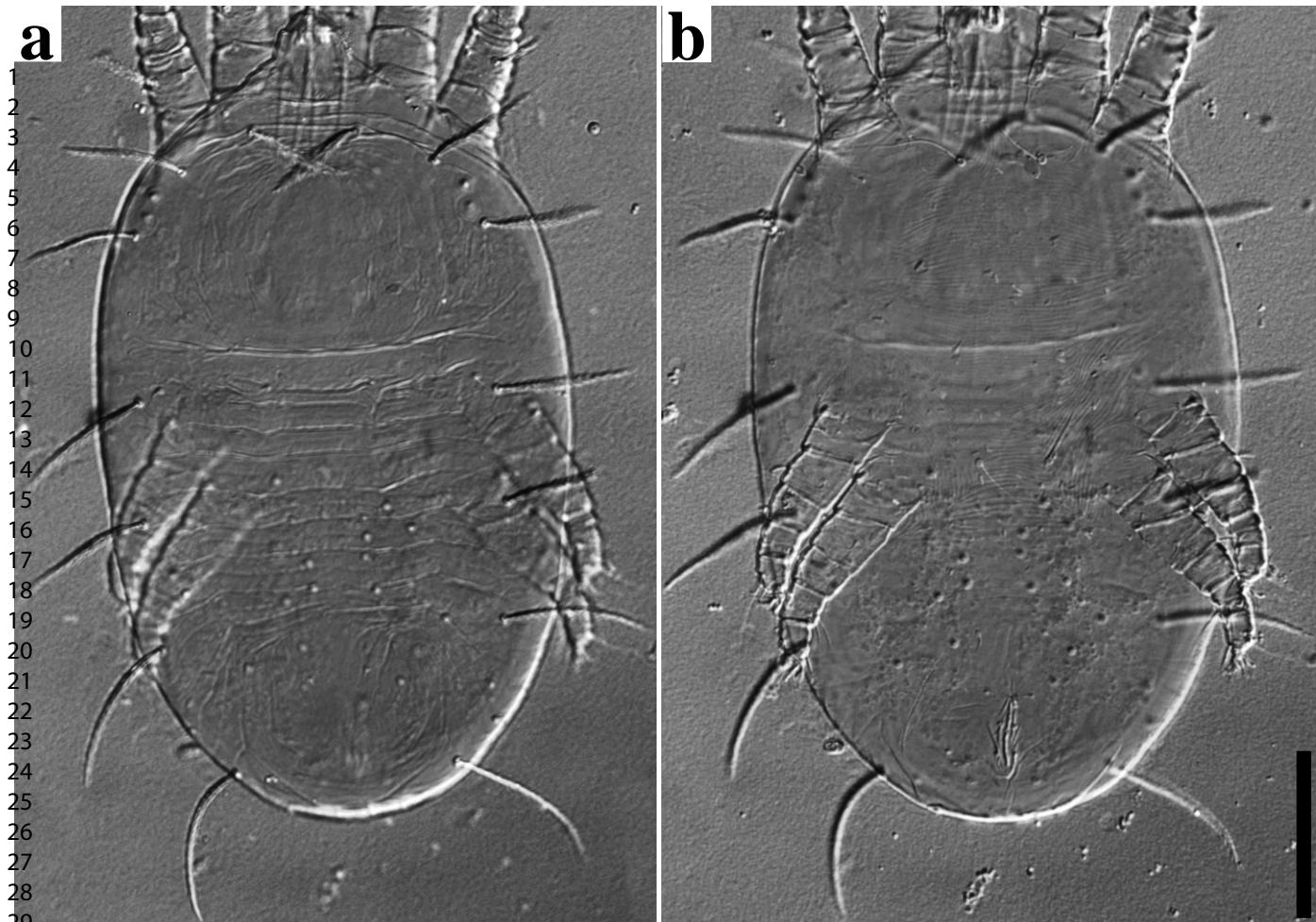


Figure 50. Differential Interference Contrast micrographs of deutonymph *C. pulcher*: a. dorsal habitus; b. ventral habitus (scales 50 μm). 

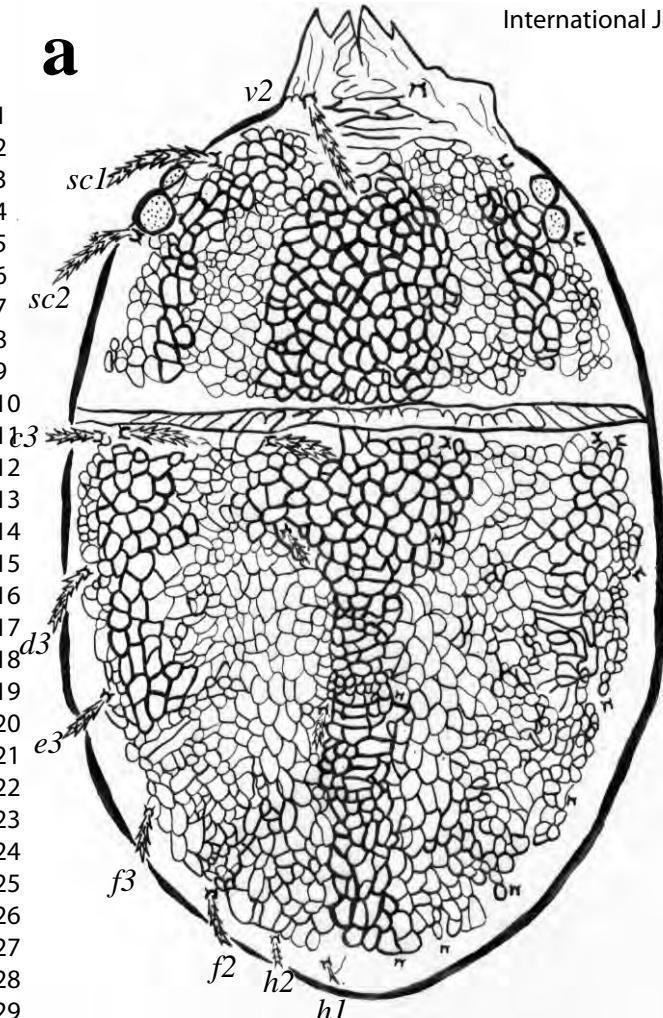
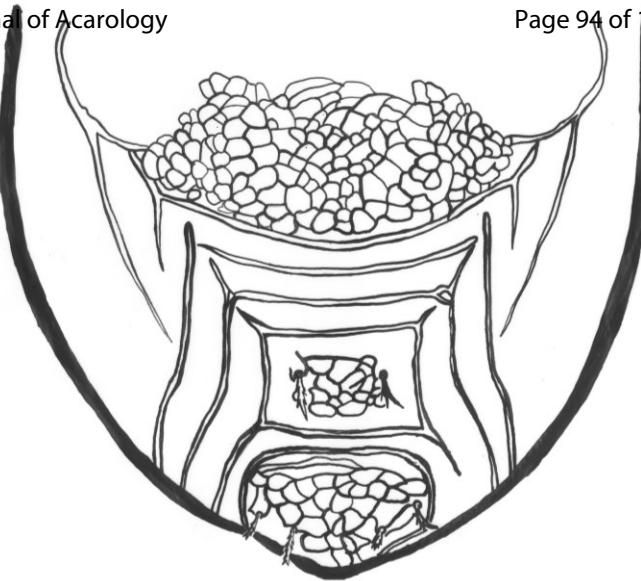
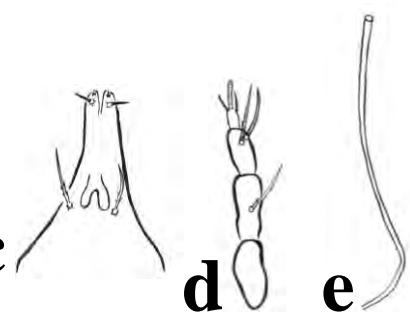
a**b****c****e**

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

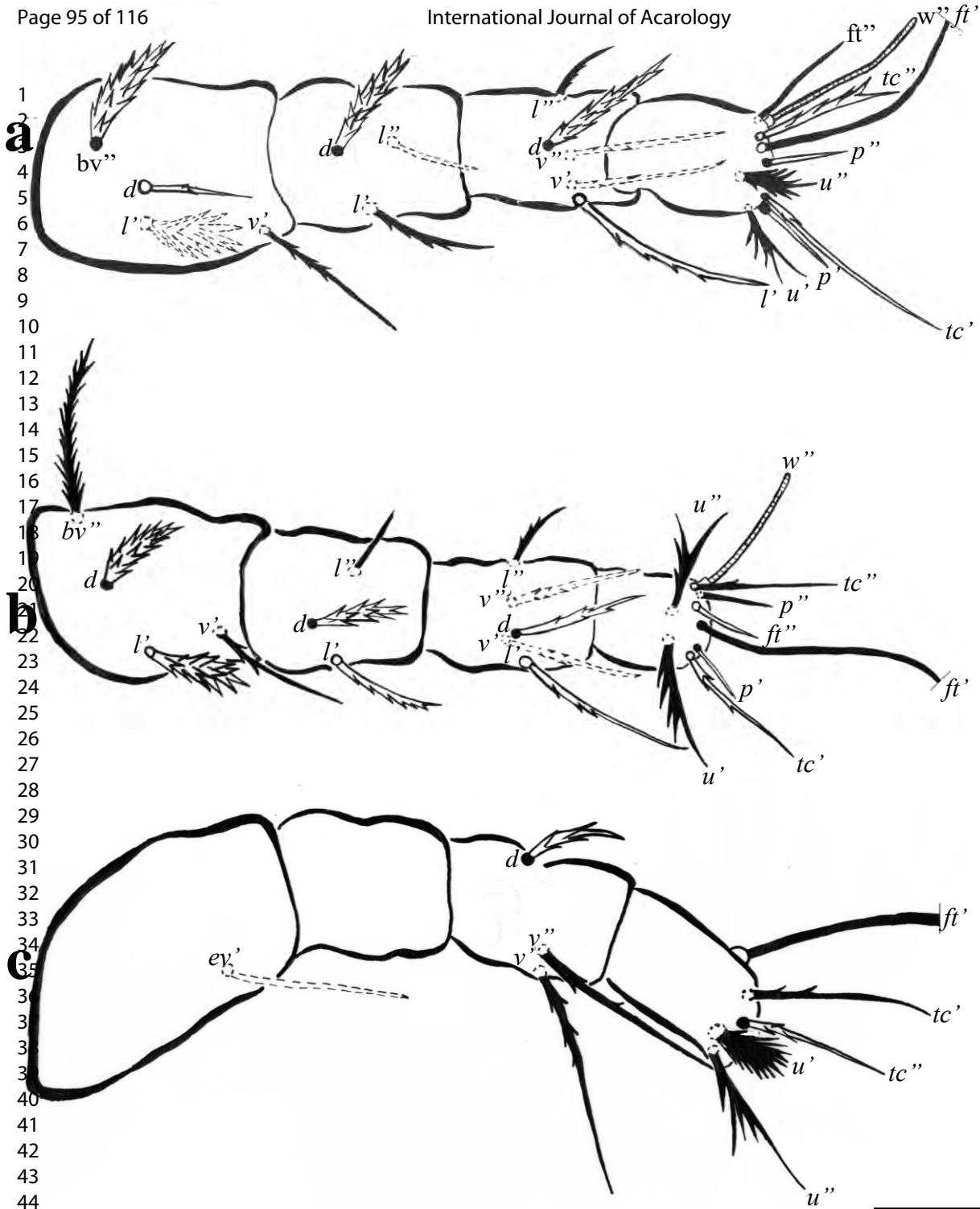


Figure 52. Drawings of legs of adult female *C. ulmifolius*: a. leg I; b. leg II; c. leg IV (scales 50 µm).

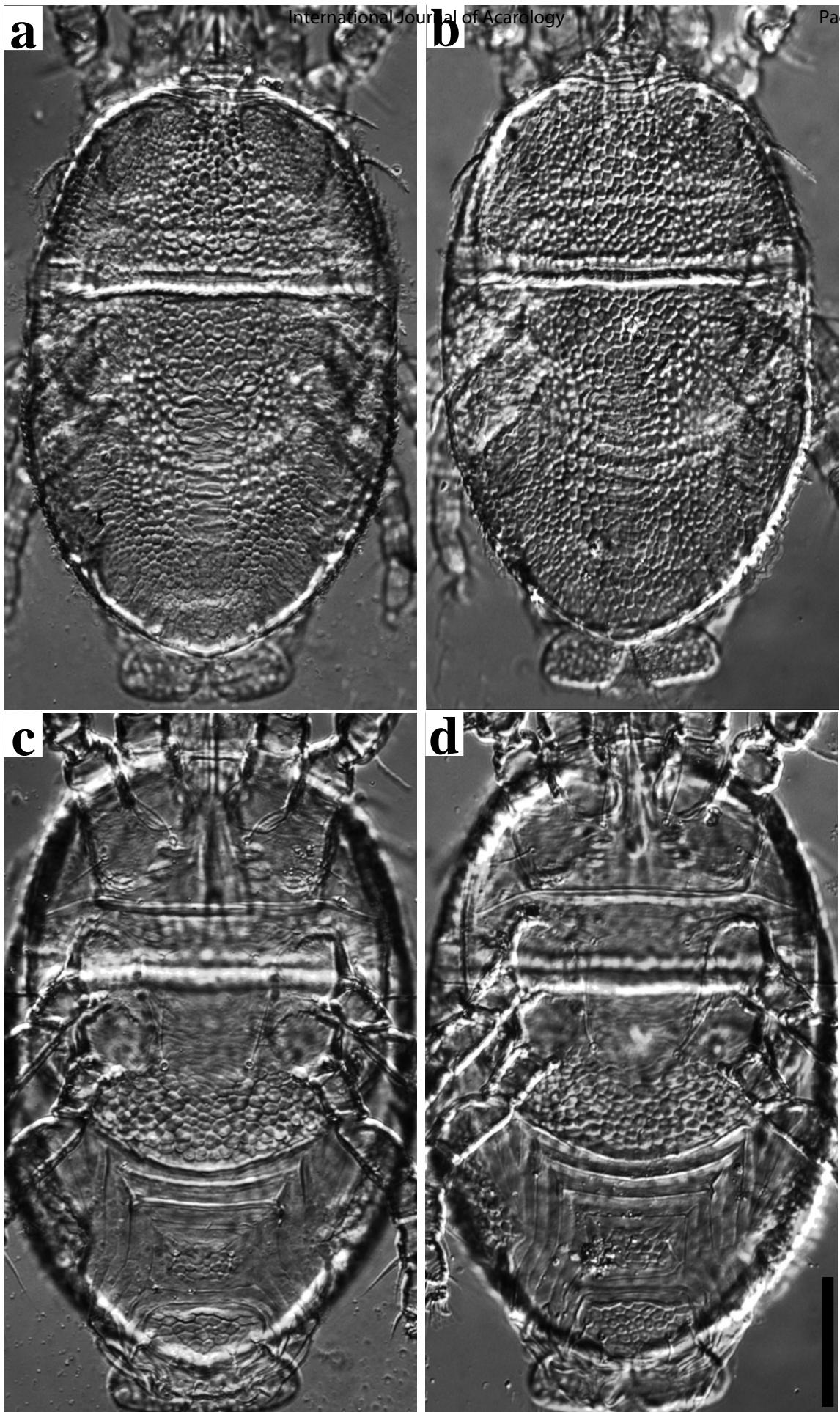


Figure 53. Differential Interference Contrast micrographs of adult females *C. ulmifolius*: a-c. dorsal and ventral habitus of specimens collected on *R. canina*; b-d. dorsal and ventral habitus of specimens collected on *R. ulmifolius* (scales 50 µm).

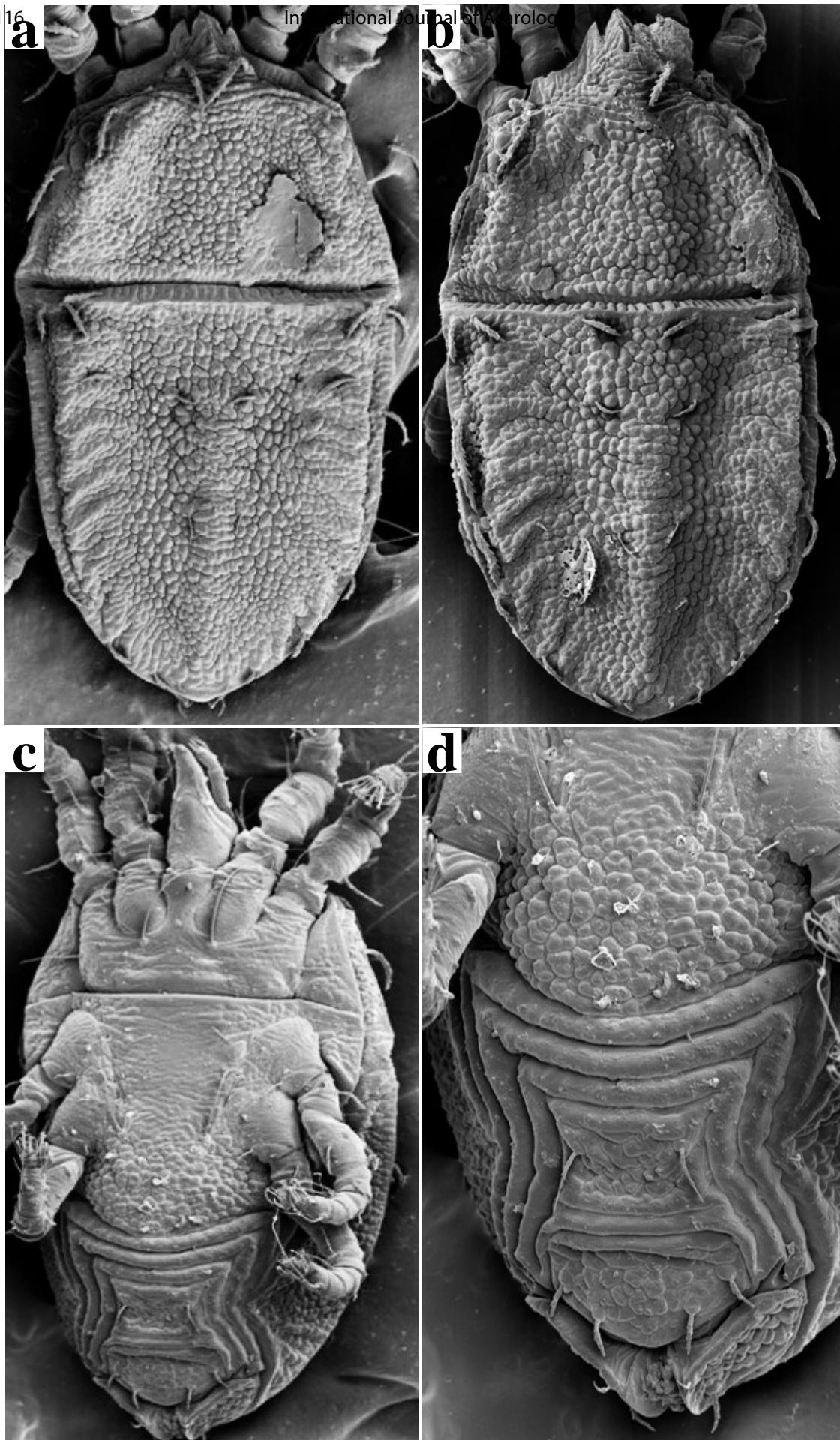


Figure 54. Adult females *C. ulmifolius* collected on *R. ulmifolius*; a-b. dorsal habitus; c-d. ventral habitus of specimens collected on *R. ulmifolius* (scales 50 µm)



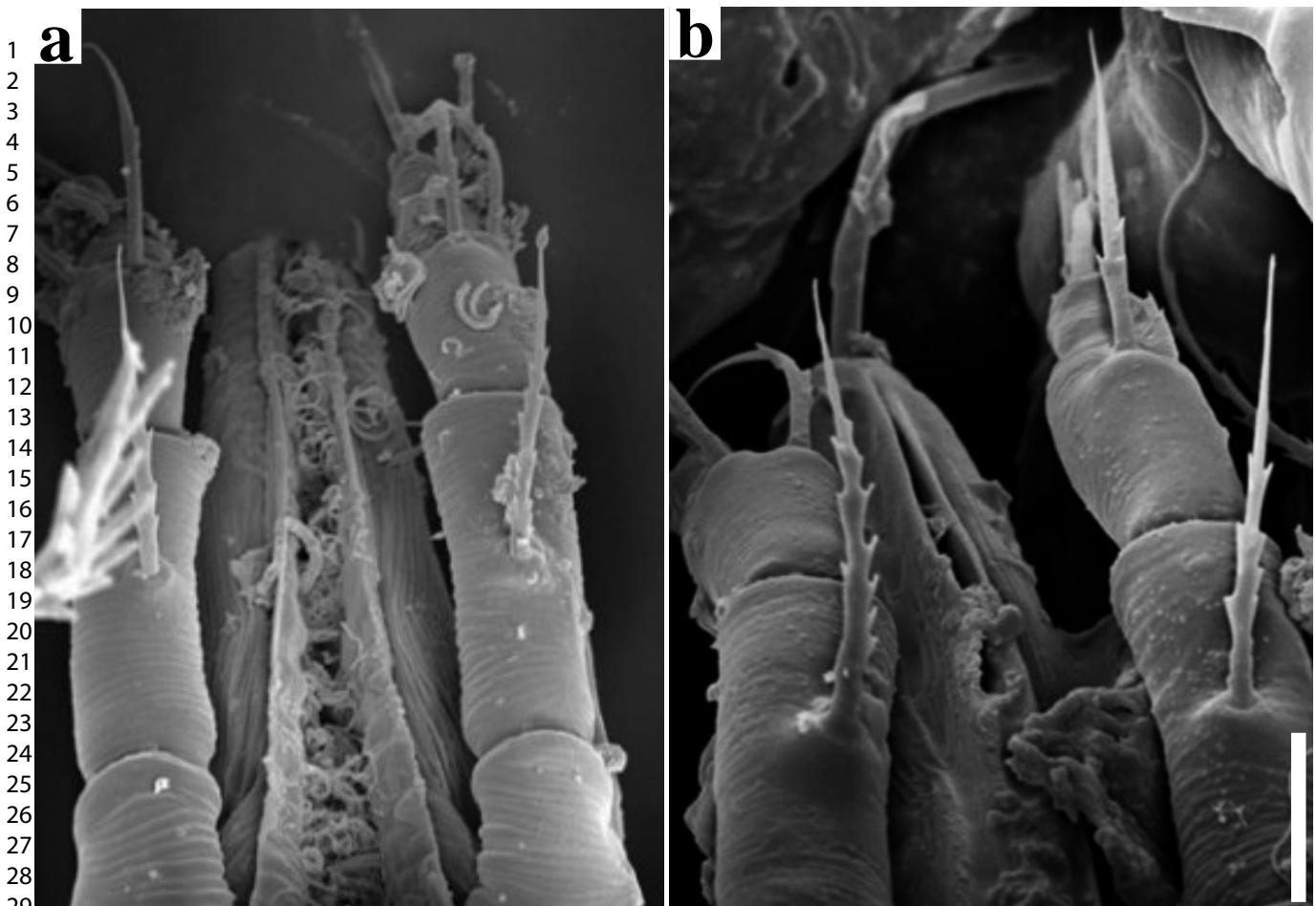


Figure 55. Femora setae on palps of adult females *C. ulmifolius* collected on *R. ulmifolius* (scales 50 μm). 

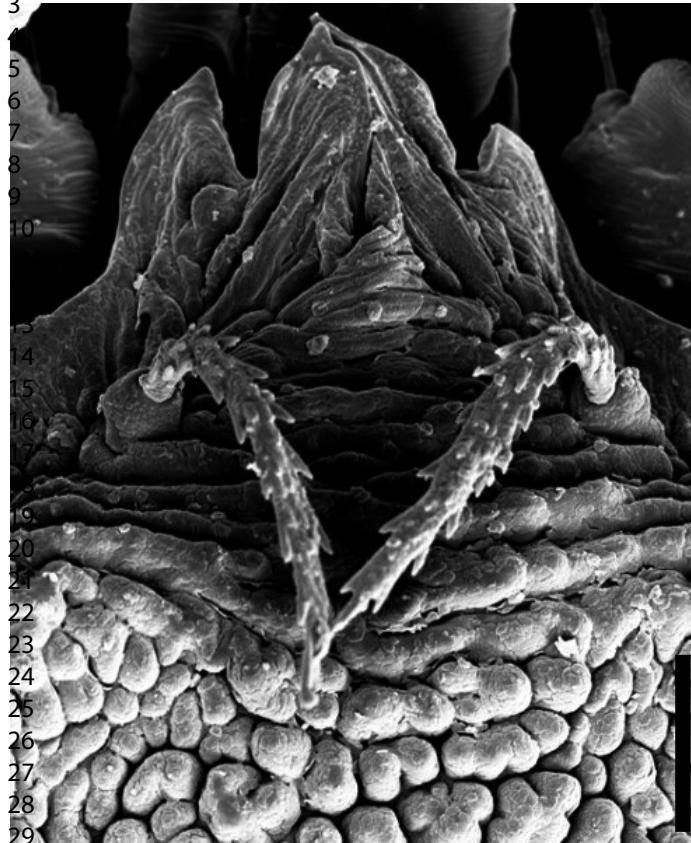
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Figure 56. Shape of the setae v2 of adult female *C. ulmifolius* (scales 50 μm).

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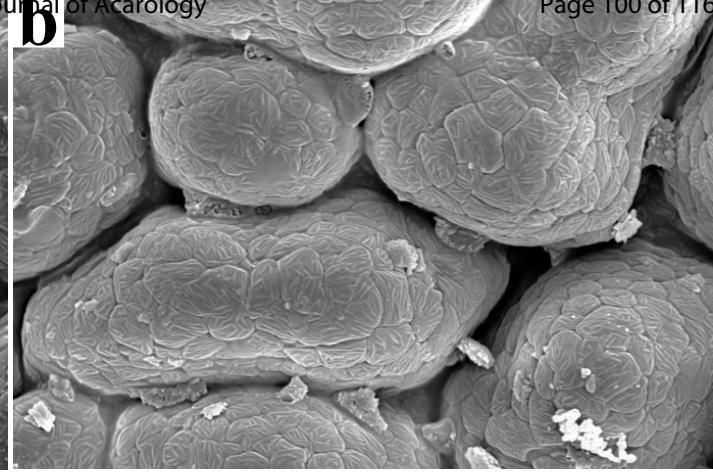
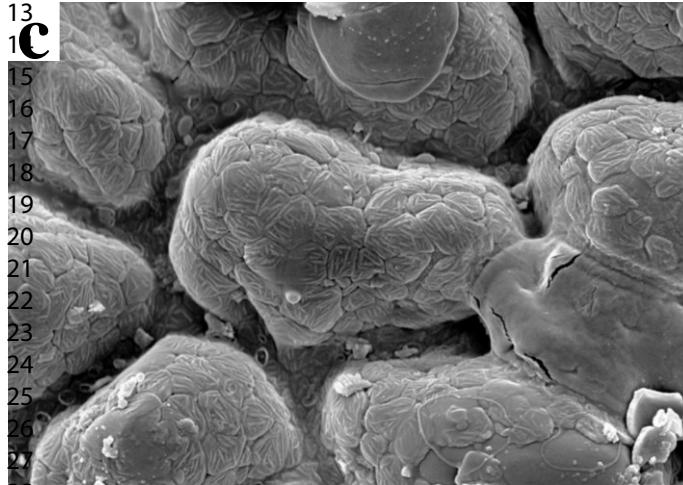
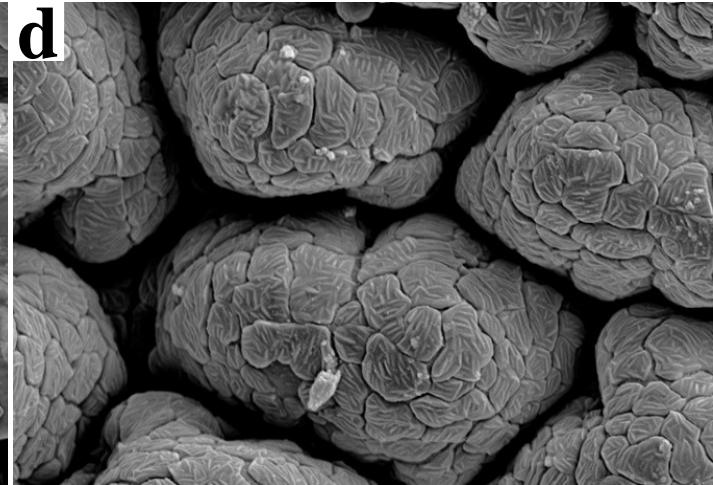
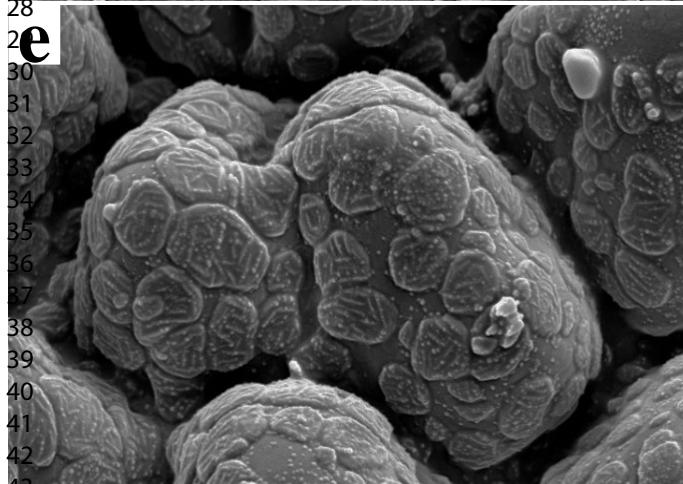
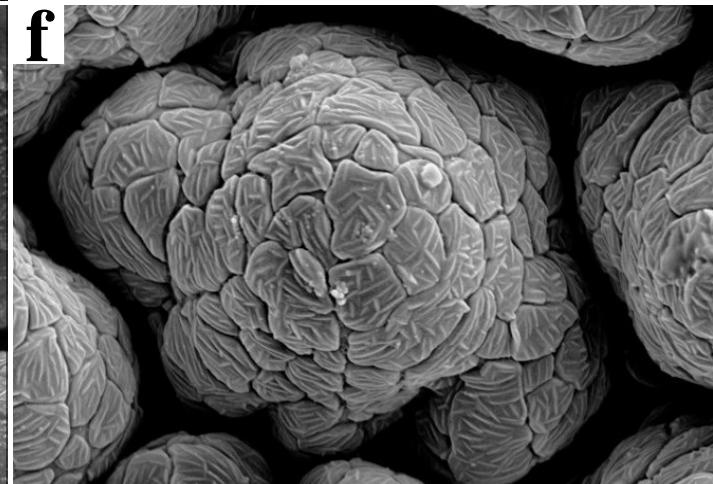
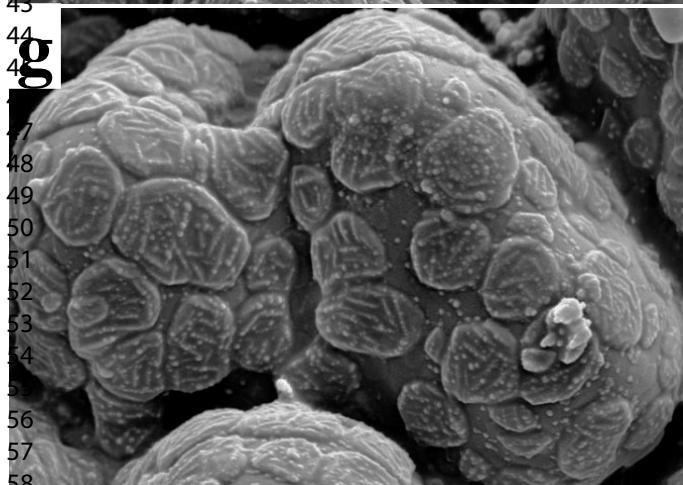
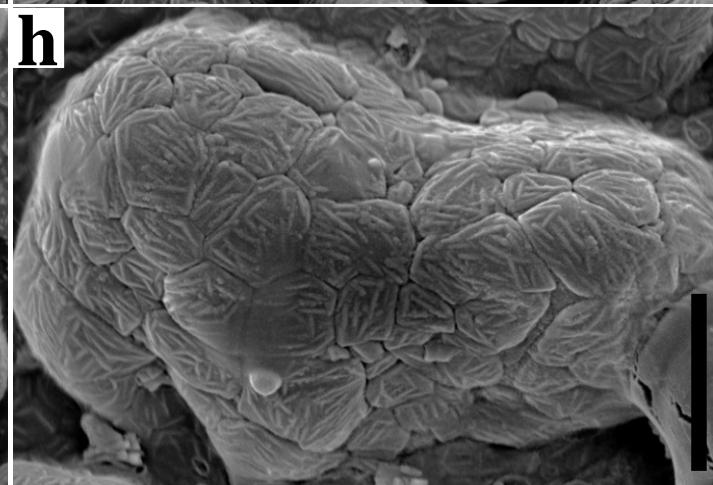
a**b****c****d****e****f****g****h**

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



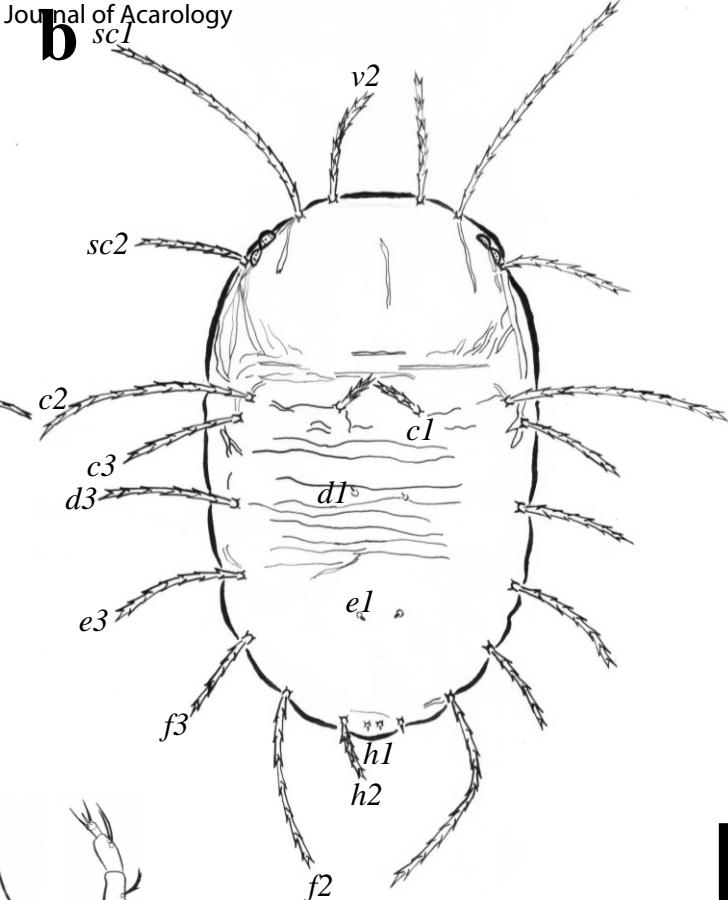
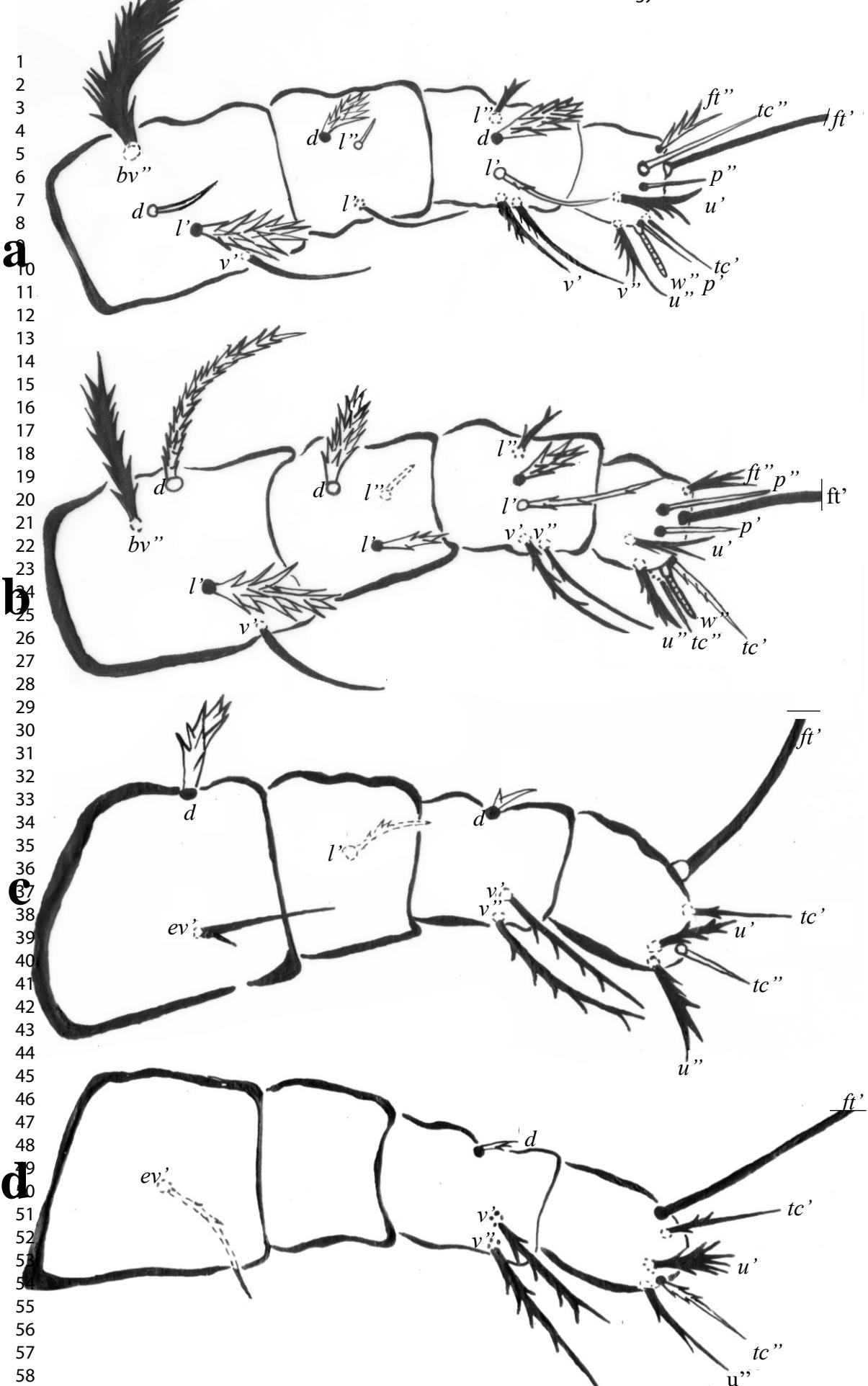
**c****d**

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).



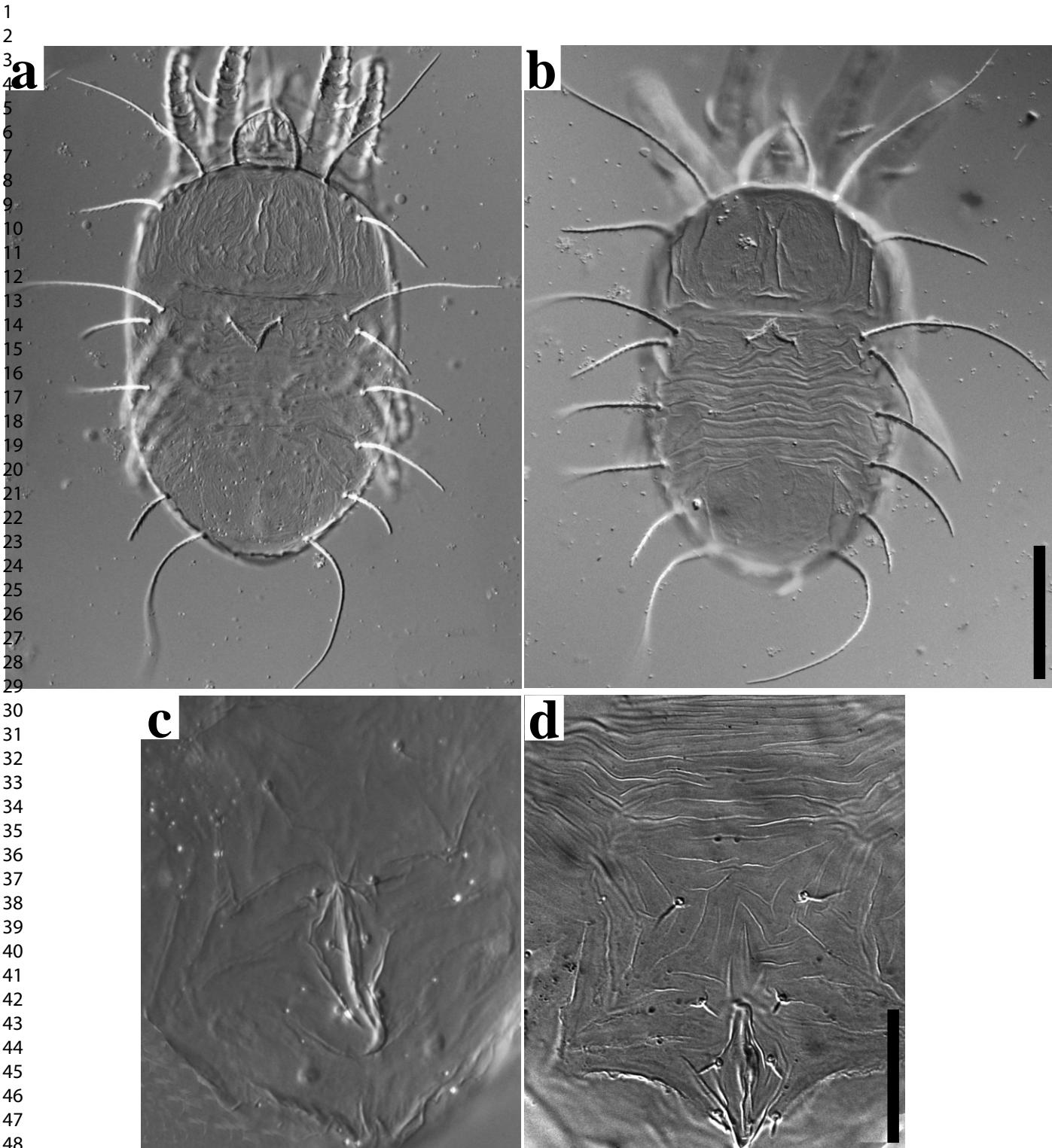
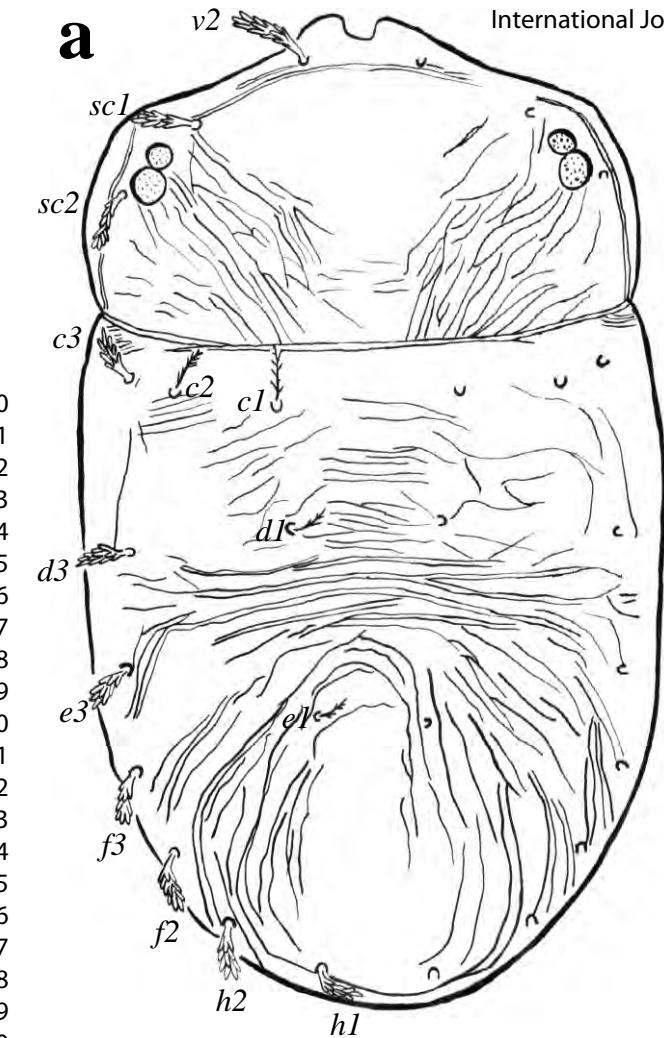
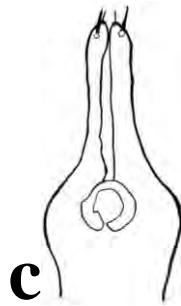
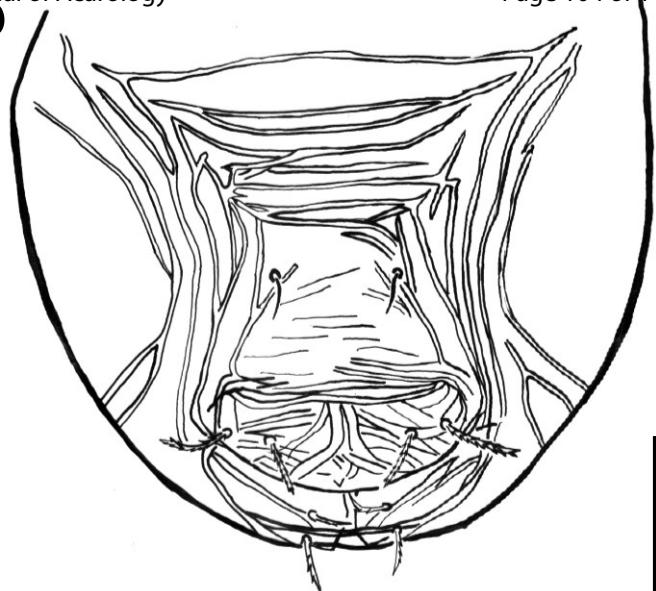


Figure 60. Differential Interference Contrast micrographs of adult females *C. ulmifolius*: a-c. dorsal and ventral habitus of specimens without heterometry; b-d. dorsal and ventral habitus of specimens characterized by heterometry (scales 50 µm).

a



b



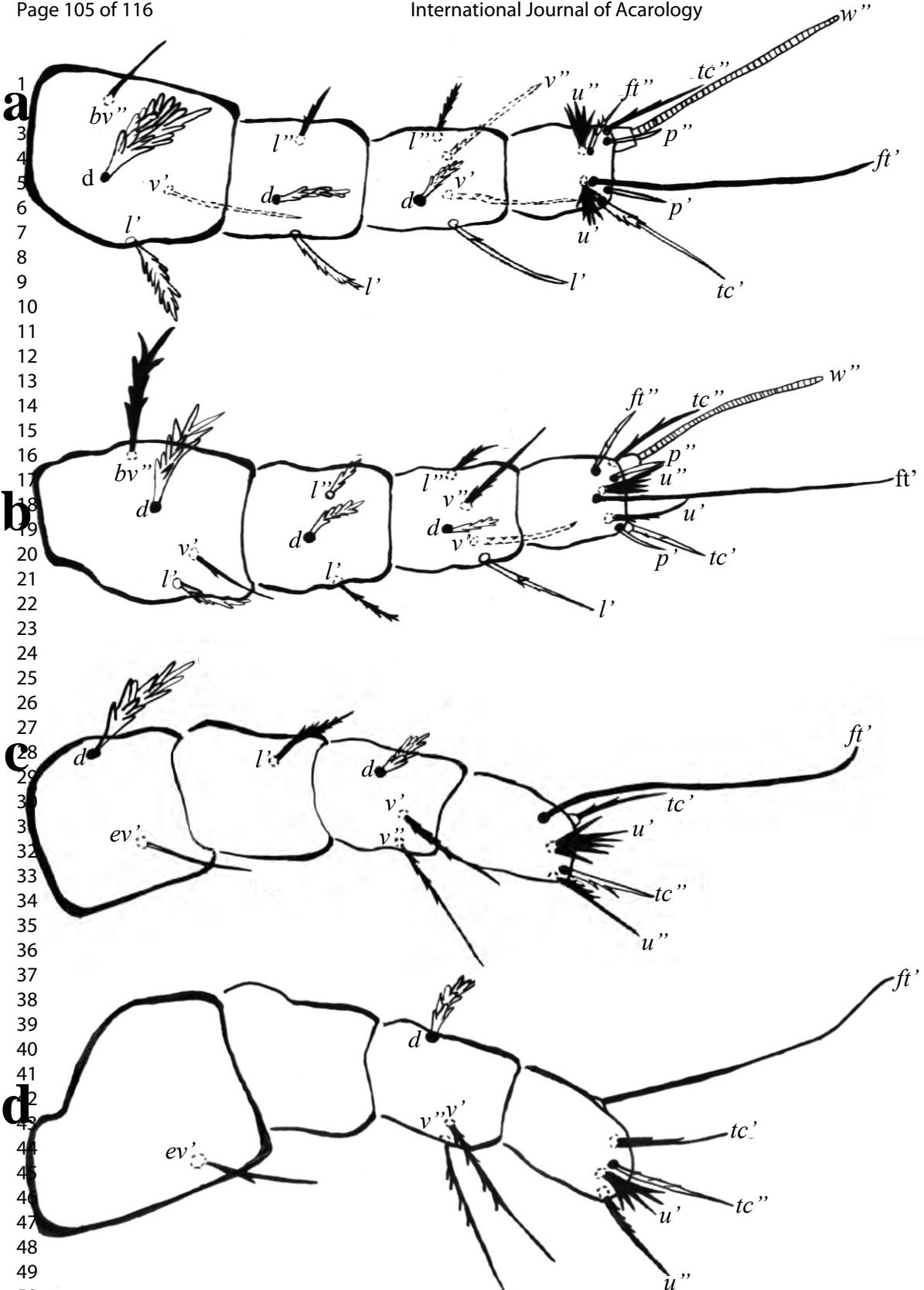
d



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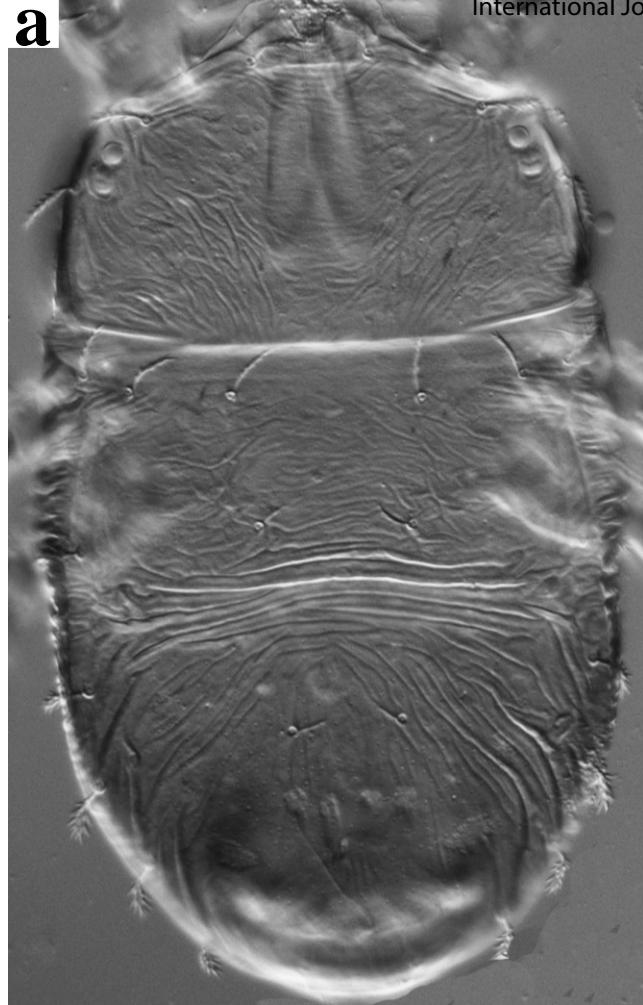


FIGURE 61. Drawings adult female *C. wainsteini*: a. dorsal habitus; b. ventral, genital, and anal plate; c. subcapitulum; d. palp; e. spermatheca (scales 50 μm).



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



b

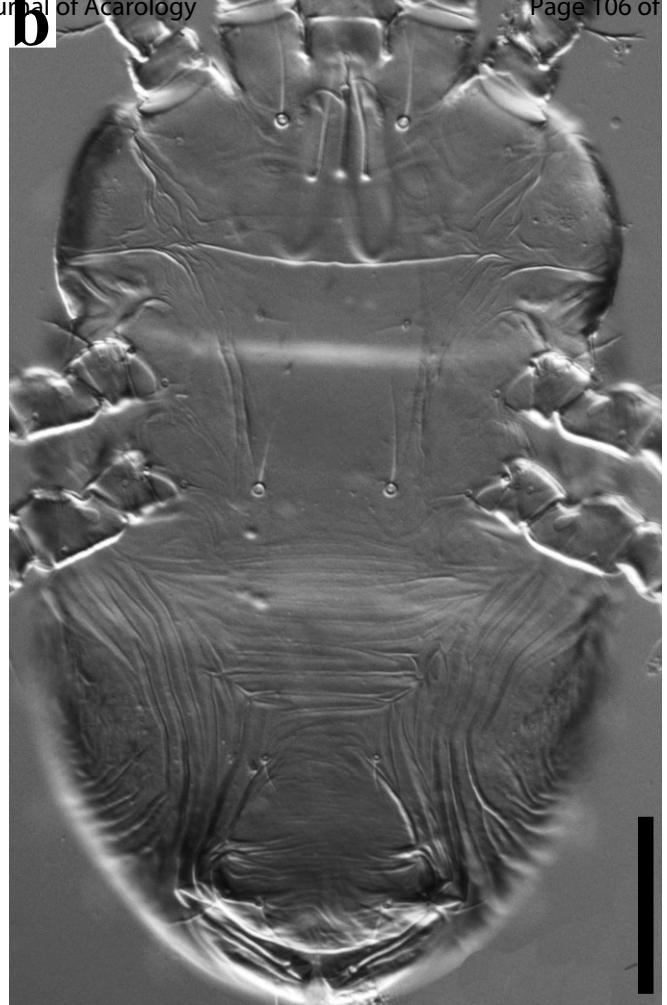


Figure 63. Differential Interference Contrast micrographs of adult female *C. wainsteini*: a. dorsal habitus; b. ventral habitus (scales 50 µm).

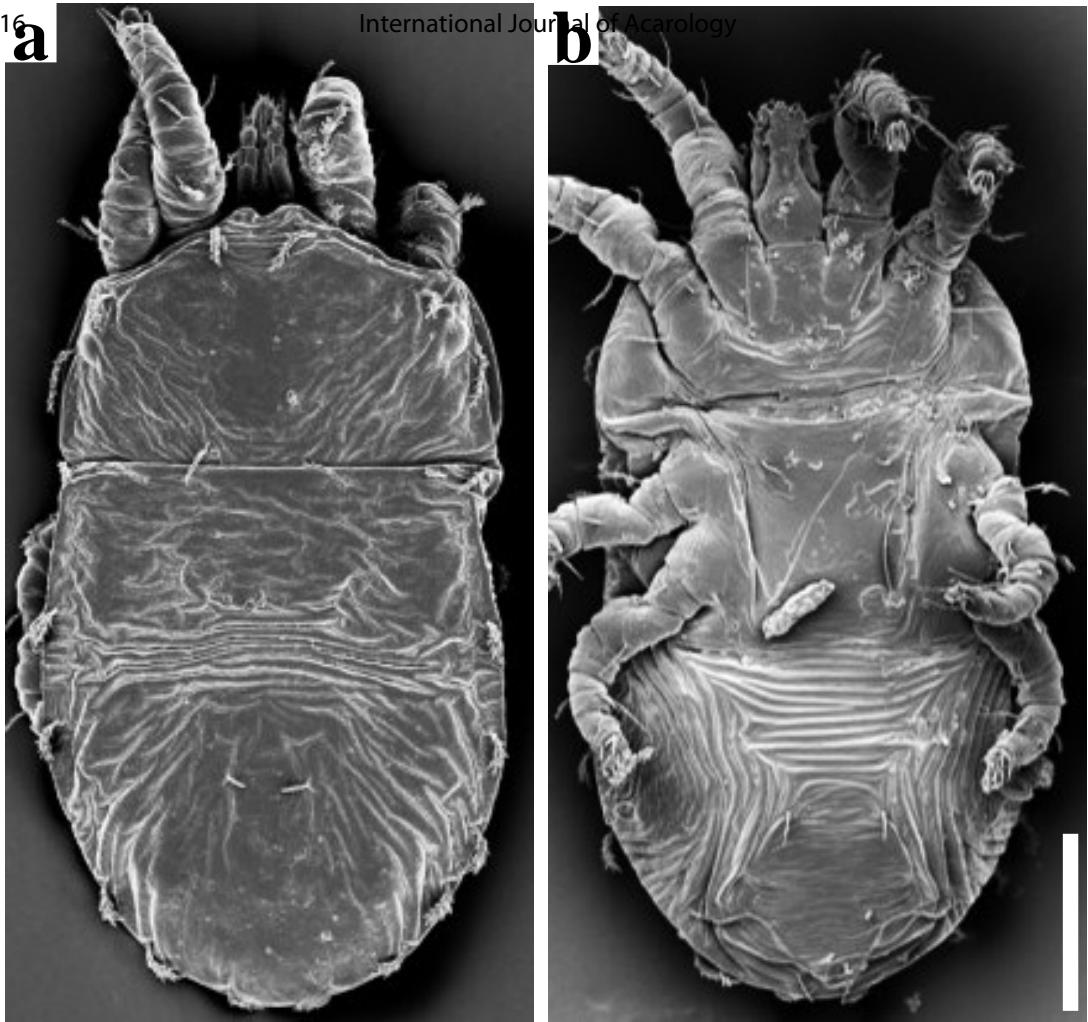


Figure 64. Dorsal and ventral habitus of adult female *C. wainsteini* (scales 50 µm).

a



b



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



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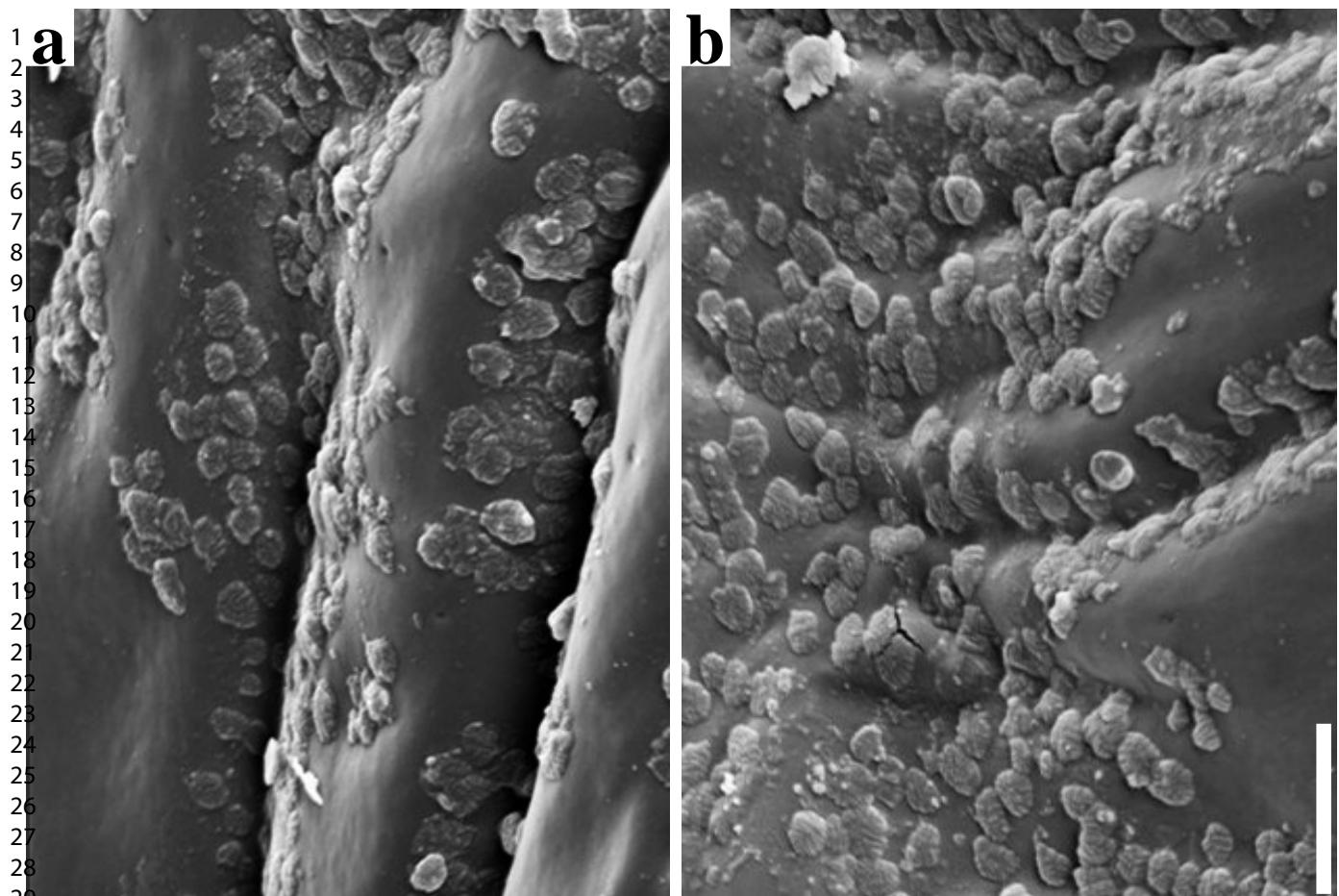
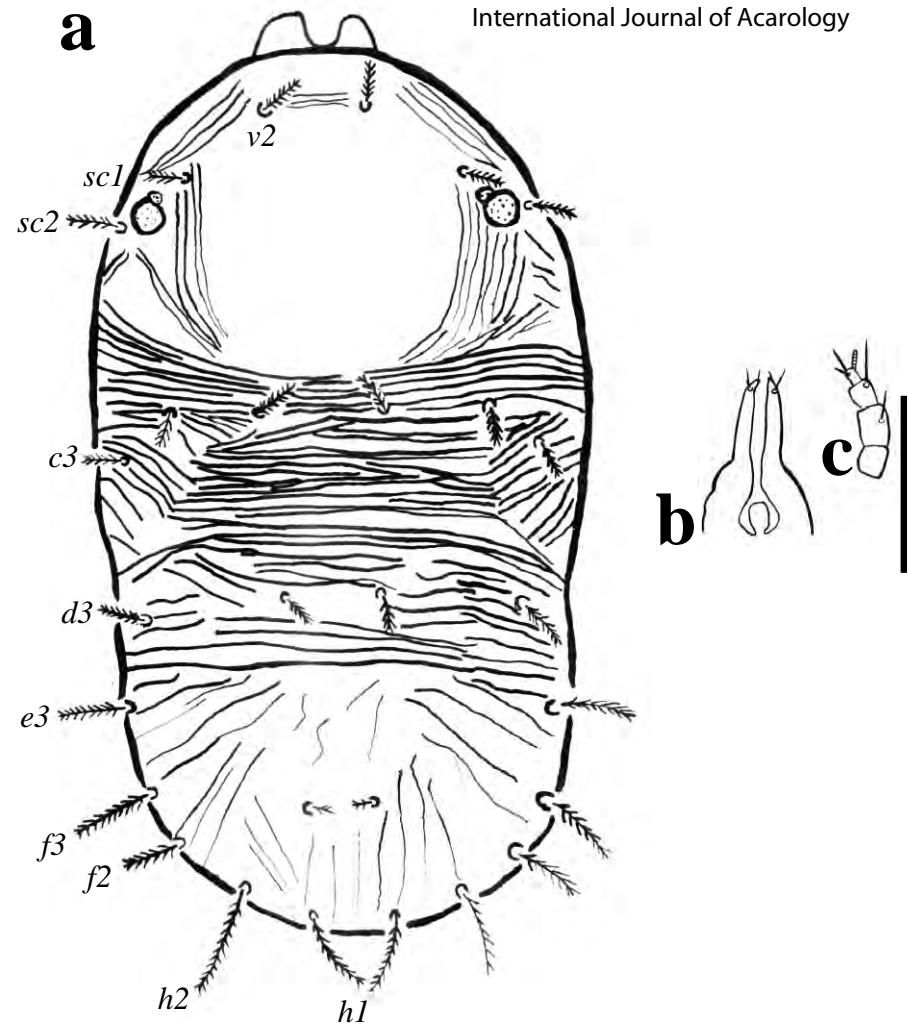
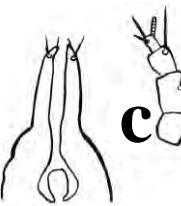


Figure 66. Microplates of adult females *C. wainsteini* (scales 50 µm).



b



c



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

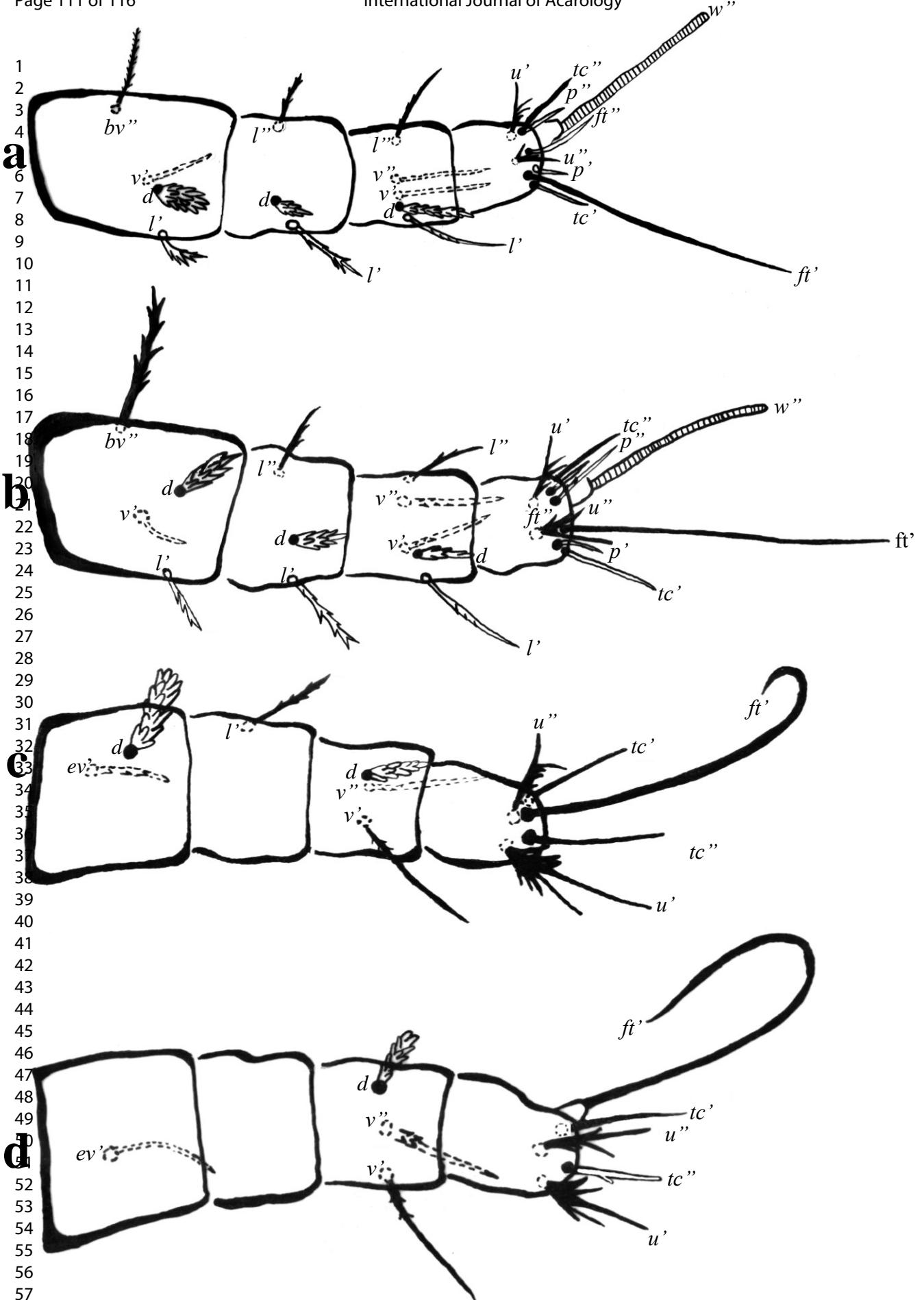


Figure 68. Drawings of legs deutonymph *C. wainsteini*: a. leg I; b. leg II; c. leg III; d. leg IV (scales 50 μm).

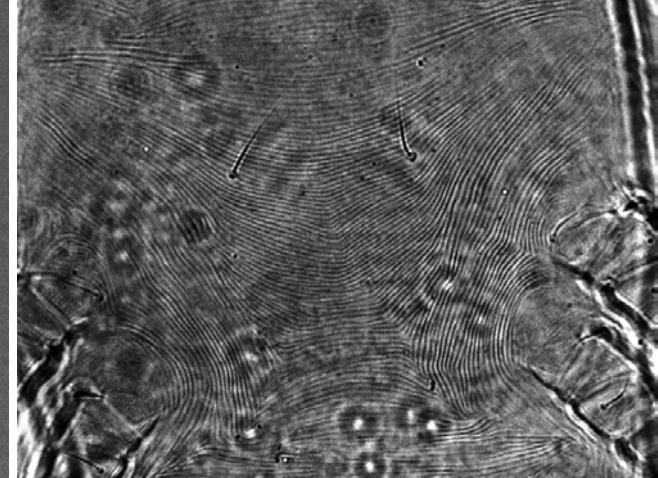
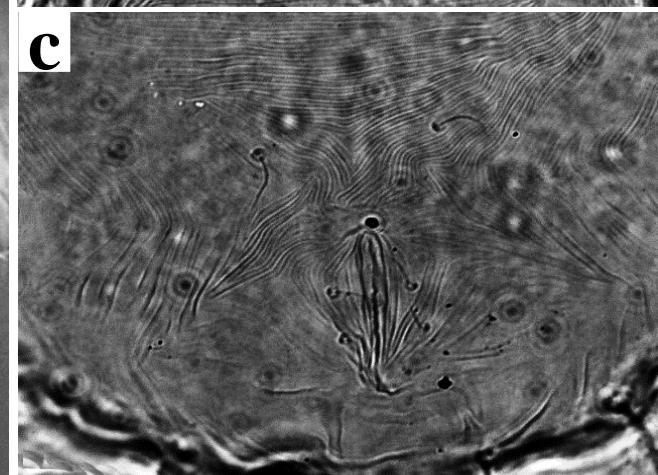
a**b****c**

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



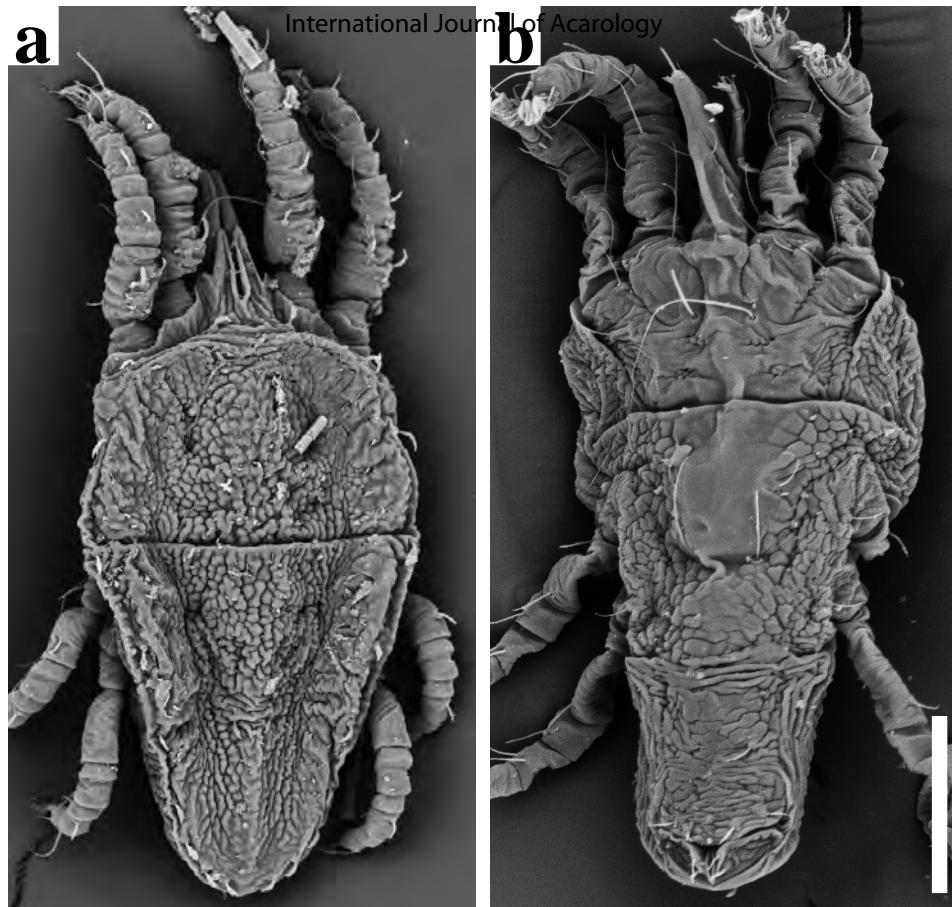


Figure SM 1. Dorsal and ventral habitus of adult female *B. olivicola* (scales 50 μm).

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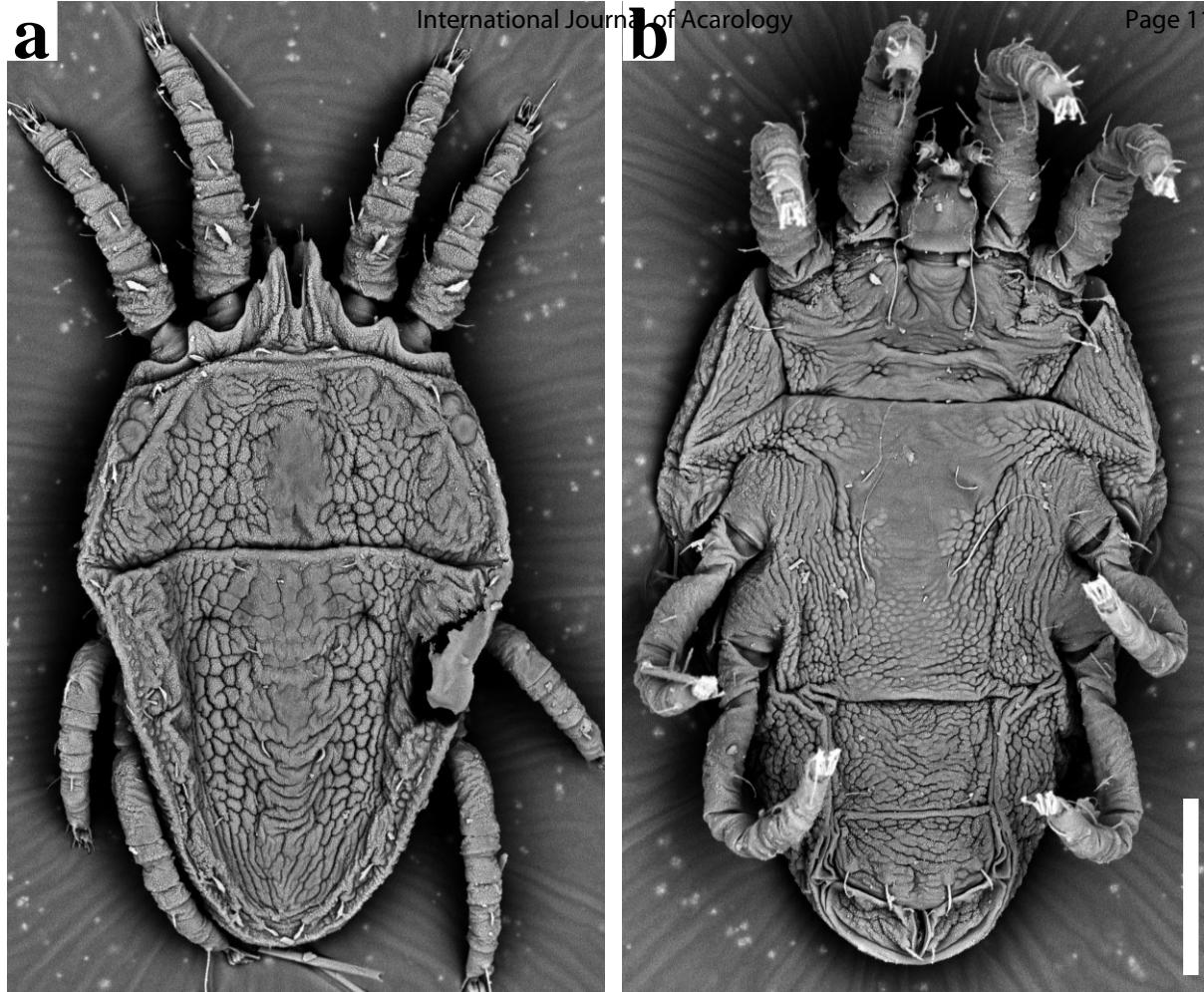
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Figure SM 2. Dorsal and ventral habitus of adult female *B. obovatus* (scales 50 µm).



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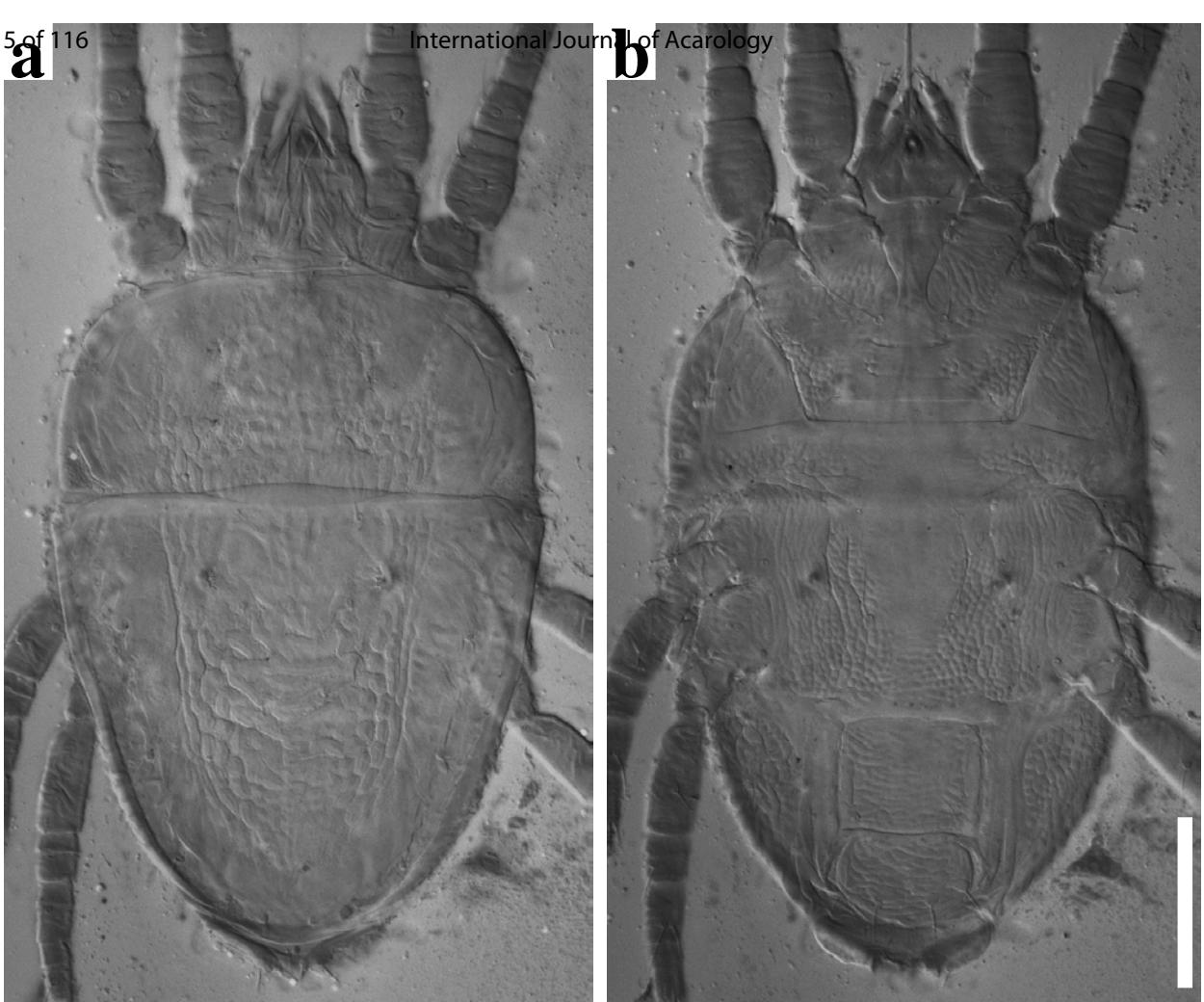


Figure SM 3. Differential Interference Contrast micrographs of adult females *C. papayensi* (scales 50 μm).

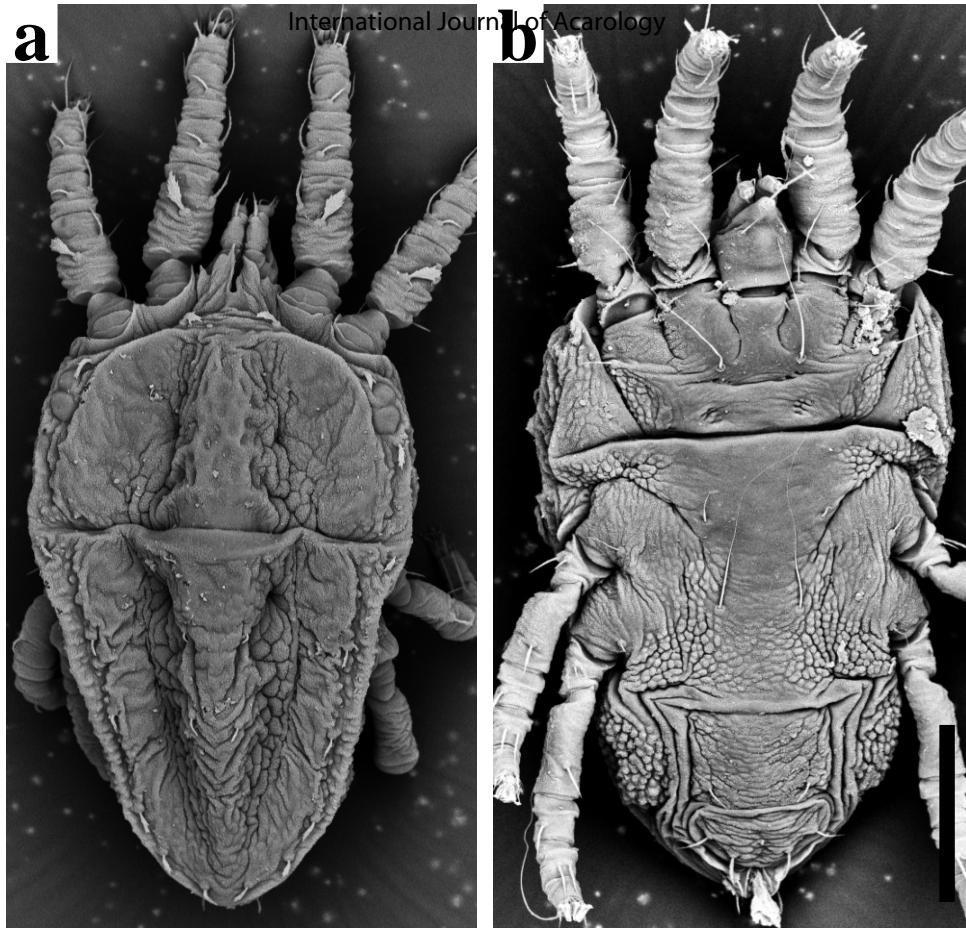
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Figure SM 4. Dorsal and ventral habitus of adult female *B. yothersi* (scales 50 μm). 

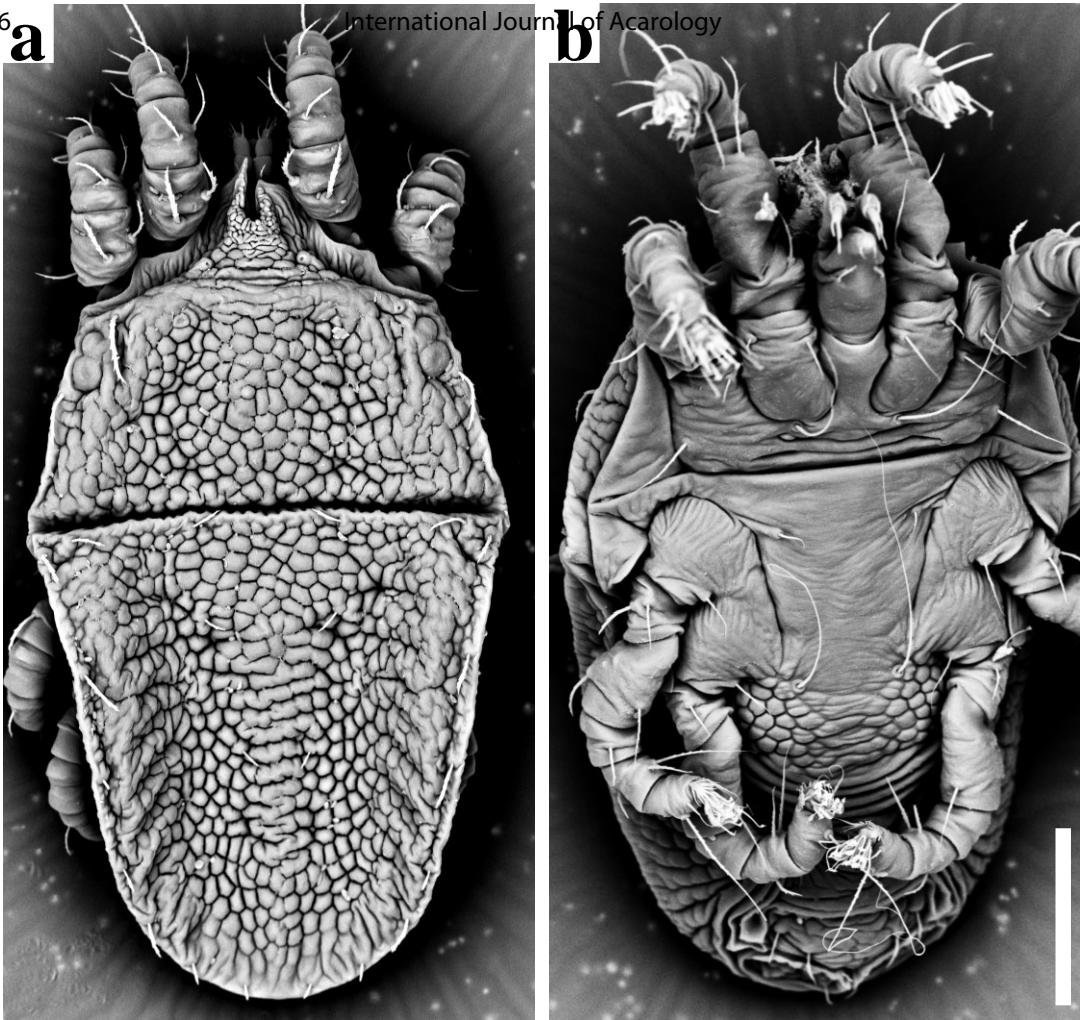


Figure SM 5. Dorsal and ventral habitus of adult female *C. spinosus* (scales 50 µm).