

Rediscovery and redescription of two eriophyid mites (Acari, Prostigmata, Eriophyidae) from Baccharis salicifolia (Asteraceae), from Argentina with remarks on the eriophyoid coverflap base

C.H.W. Flechtmann, M. Arana, F. Ciarrocchi, P.E. Chetverikov, J.W. Amrine Jr.

▶ **To cite this version:**

C.H.W. Flechtmann, M. Arana, F. Ciarrocchi, P.E. Chetverikov, J.W. Amrine Jr.. Rediscovery and redescription of two eriophyid mites (Acari, Prostigmata, Eriophyidae) from Baccharis salicifolia (Asteraceae), from Argentina with remarks on the eriophyoid coverflap base. Acarologia, 2015, 55 (4), pp.387-396. ⟨10.1051/acarologia/20152178⟩. ⟨hal-01548605⟩

HAL Id: hal-01548605

https://hal.science/hal-01548605v1

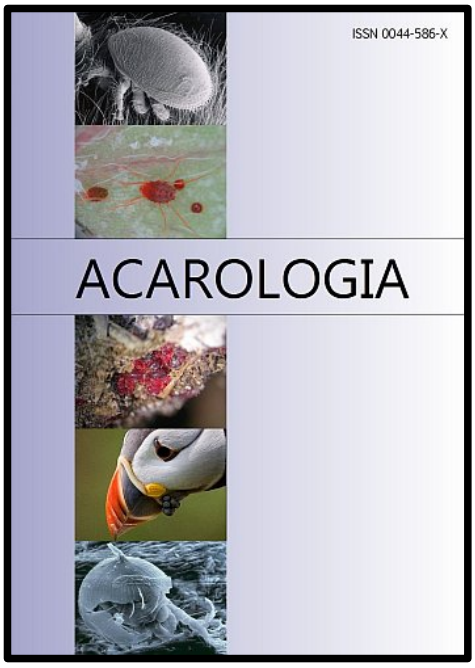
Submitted on 27 Jun 2017

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons CC BY-NC-ND 4.0 - Attribution - Non-commercial use - No Derivative Works - International License



ACAROLOGIA

A quarterly journal of acarology, since 1959
Publishing on all aspects of the Acari

All information:

http://www1.montpellier.inra.fr/CBGP/acarologia/
acarologia@supagro.inra.fr

OPEN ACCESS

Acarologia is proudly non-profit,
with no page charges and free open access

Please help us maintain this system by
encouraging your institutes to subscribe to the print version of the journal
and by sending us your high quality research on the Acari.

Subscriptions: Year 2017 (Volume 57): 380 €
http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php
Previous volumes (2010-2015): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d'avenir » programme (Labex Agro: ANR-10-LABX-0001-01)

INVESTISSEMENTS D'AVENIR

agropolis fondation
Supporting agricultural research for sustainable development

Acarologia is under **free license** and distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.

Acarologia 55(4): 387–396 (2015)
DOI: 10.1051/acarologia/20152178

Rediscovery and redescription of two eriophyid mites (Acari, Prostigmata, Eriophyidae) from *Baccharis salicifolia* (Asteraceae), from Argentina with remarks on the eriophyoid coverflap base

Carlos H.W. FLECHTMANN[1], Marcelo ARANA[2], Fiorella CIARROCCHI[2], P.E. CHETVERIKOV[3,4] and J.W. AMRINE JR.[5]

(Received 22 May 2015; accepted 13 October 2015; published online 18 December 2015)

[1] *CNPq-Brasil Researcher, Universidade de São Paulo, Escola Superior de Agricultura "Luiz de Queiroz", Departamento de Entomologia e Acarologia, 13480-900 Piracicaba, São Paulo, Brazil. chwflech@usp.br*
[2] *Departamento de Ciencias Naturales, Facultad de Ciencias Exactas, Fisico-Quimicas y Naturales, Universidad Nacional de Rio Cuarto, Ruta 36 km 601, X5804ZAB Rio Cuarto, Argentina. marana@exa.unrc.edu.ar; fcciarrocchi@gmail.com*
[3] *Department of Invertebrate Zoology, Saint-Petersburg State University, Universitetskaya nab., 7/9, 199034, St. Petersburg, Russia*
[4] *Zoological Institute, Russian Academy of Sciences, Universitetskaya Embankment 1, 199034 St. Petersburg, Russia. philipp-chetverikov@yandex.ru*
[5] *West Virginia University, Division of Plant and Soil Sciences, P.O. Box 6108, Morgantown, West Virginia, 26505-6108 USA. James.Amrine@mail.wvu.edu*

ABSTRACT — The rediscovery of *Aceria cortii* Amrine & Stasny and *Shevtchenkella baccharis* (Keifer) is reported on *Baccharis salicifolia* (Asteraceae) from Central Argentina and both species are redescribed. *Aceria cortii* is a gall inducer in leaves and stems of the plant whereas *S. baccharis* is a leaf vagrant. The topography of the area anterior to the eriophyoid genital coverflap is discussed. This constitutes a first record of *S. baccharis* for South America.

KEYWORDS — *Aceria cortii*; *Shevtchenkella baccharis*; redescription; eriophyoid coverflap

INTRODUCTION

In the course of investigating leaf galls on *Baccharis salicifolia* (Ruiz. & Pav.) Pers. (Asteraceae), "chilca", "mulefat", in Cordoba, Argentina, two eriophyid species were collected – one from within leaf and young stem galls, identified as *Aceria cortii* Amrine & Stasny, 1994, originally described from this plant in the same area, as *Aceria baccharidis* by Corti in 1917, and one vagrant on the same leaves and identified as *Shevtchenkella baccharis* (Keifer, 1939), originally described from this same plant, in California, USA. Both species are herein described and illustrated.

MATERIALS AND METHODS

Infested plant leaves and stems were preserved in ethanol 70 % and rapidly conveyed to the laboratory in Brazil. Eriophyid vagrant specimens were needled out of the liquid and gall forming eriophyids from within dissected leaf galls and mounted in modified Berlese medium (Amrine & Manson, 1996) in microcopic preparations

for optical microscopy examination and in Hoyer's medium for CLSM.

Measurements are in micrometers and refer to the length of the structure unless otherwise stated. Dimensions from Keifer's descriptions for the same structure are added in brackets. Ventral annuli count start from the first annulus behind genitalia.

CLSM studies were performed at the "Center for Molecular and Cell Technologies" and "Center for Microscopy and Microanalysis" of the Research Park of St. Petersburg State University, Russia.

Aceria cortii Amrine & Stasny, 1994 (Figs. 1, 2)

Replacement name for *Aceria baccharidis* (Corti, 1917) , preoccupied by homonymy of *Aceria baccharidis* (Kieffer & Herbst, 1911) (Flechtmann, 1983).
Eriophyes baccharidis Corti, 1917 – objective synonym of *Aceria cortii*.
Aceria cortii Amrine & Stasny, 1994: 37.

Female — (n = 6) Body elongate, 119 – 218, 39 – 73 wide.

Gnathosoma projecting down, pedipalp coxal seta (*ep*) 4, dorsal pedipalp genual seta (*d*) 3 – 5, simple, cheliceral stylets 14 – 16. Prodorsal shield 23 – 26, 32 – 46 wide, frontal lobe absent; shield design with median and admedian lines extending over entire shield length, submedian lines on posterior half variously inclined and converging posteriorly. Scapular tubercles 23 – 29 apart, scapular setae (*sc*) 22 – 33 long, directed backwards and extending over 12 – 18 opisthosomal dorsal annuli.

Coxal plates – smooth; anterolateral seta on coxisternum I (*1b*) 6 – 9, 11 – 13 apart, proximal setae on coxisternum I (*1a*) 18 – 22, 8 – 9 apart, proximal setae on coxisternum II (*2a*) 26 – 38, 19 – 25 apart. Prosternal apodeme present, 5, straight, bifurcate terminally.

Legs with usual series of setae. Leg I 26 – 28, femur 7 – 9, basiventral femoral seta (*bv*) 5 – 7; genu 3 – 4, antaxial genual seta (*l″*) 18 – 23; tibia 4 – 6, paraxial tibial seta (*l′*) 3 – 4, placed on proximal half; tarsus 5 – 6, paraxial fastigial tarsal seta (*ft′*) 4 – 9, antaxial fastigial tarsal seta (*ft″*) 12 – 19, paraxial unguinal tarsal seta (*u′*) 3 – 4, tarsal solenidion curved, slightly knobbed, 7, tarsal empodium 5, 5-rayed, distallly bifurcate. Leg II 24 – 26; femur 7, *bv* 5 – 7; genu 4, *l″* 5 – 10; tibia 4 – 6; tarsus 5 – 6, *ft′* 5, *ft″* 16 – 18, *u′* 4, solenidion 7 – 8, empodium 5, 5-rayed.

Opisthosoma dorsally with 60-68 annuli, microtuberculate except for the caudal 5-7 annuli which are devoid of microtubercles. Microtubercles small, bead-like and pointed posteriorly. Opisthosoma circular in cross-section. Total ventral annuli 50-62, microtuberculate. Lateral setae (*c2*) 19-26, on ventral annulus 3-5 counting from first complete transversal anulus behind genitalia. Ventral seta I (*d*) 15 – 20, 28 – 43 apart, on ventral annulus 12 – 16 from genitalia rear border; ventral seta II (*e*) very short, 3 – 5, 16 – 17 apart, on annulus 23 – 32; ventral seta III (*f*) 26 – 30, 23 – 33 apart, on annulus 40 – 57 or 6 – 7th from rear. Caudal setae (*h2*) 53 (probably broken) – 99; accessory setae (*h1*) robust, 4.

Genitalia 14 – 11, 18 – 22 wide, coverflap with 8-10 conspicuous longitudinal scorings in some specimens, apparently smooth in other.

Male — not seen.

Larva (n = 2). Body 53 long; prodorsal shield 22 long, no shield design discernible; opisthosoma with 44 dorsal annuli, microtuberculate, except for the caudal 5.

Protonymph (n = 4) Body 89 – 135; prodorsal shield 22 – 25, shield design similar to female; opisthosoma with 60-61 annuli, microtuberculate, except for the 5 caudal annuli.

Marerial examined — 24 females, 8 protonymphs, 2 larvae, recovered from dissected leaf galls of *Baccharis salicifolia* (Ruiz. & Pav.) Pers. Asteraceae, and one female vagrant on leaf of the same plant, Cordoba, Argentina, GPS 33°10'S, 64°20'W, collected by M. Arana, October 2014, on eight microscopic preparations in the collection of the Departamento de Entomologia e Acarologia, Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo, Piracicaba, São Paulo, Brazil. Duplicates are in the biological collection of Departamento de Ciencias Naturales, Universidad Nacional de Rio Cuarto, Córdoba, Argentina.

Remarks — One of the females, apparently senile, had a fully grown larva and two eggs inside

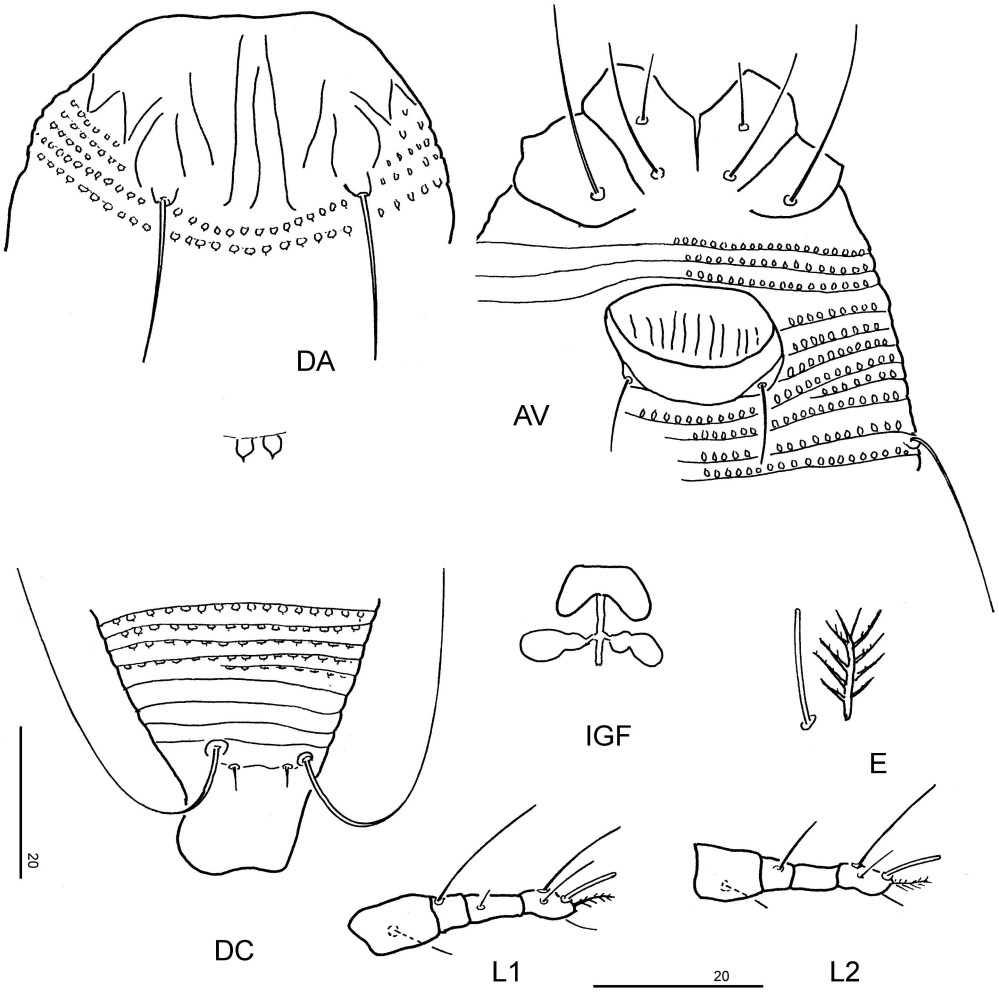


FIGURE 1: *Aceria cortii* Amrine & Stasny, 1994 – Female. AV, anterior ventral aspect; DA, dorsal anterior aspect; DC, dorsal caudal aspect; E, empodium; IGF, internal genital structures of female; L1, leg I; L2, leg II.

her body.

Relation to host — This species is a gall inducer on leaves and young stems of *B. salicifolia*; the galls are glabrous and globose, 1-2 mm in diameter, yellowish, hollow (Fig. 3).

Kieffer & Jorgensen (1910, p. 374) referred to "Eriophyidengallen" on *Baccharis salicifolia* from Mendoza, Argentina. Kieffer & Herbst (1911, p. 703) refer to the galls mentioned in the previous paper , however inform that they were collected from *Baccharis subulata* D. Don ex Hook. & Arn. (= *Baccharis juncea* (Cass.) Desf.), and which they attribute to *Eriophyes baccharidis* n.sp., but, they only described the gall. Amrine & Stasny (1994) made a new combination, transferring the mite species to *Aceria baccharidis* and updated the host plant name to *Baccharis juncea*. At this point we do not have sufficient information to further comment on *Aceria baccharidis*: there is no description nor figure of the mite, no material (gall or mite) from *B. juncea* exists and Amrine & Stasny (1994) maintained this species distinct from *A. cortii*. Specimens from *Baccharis juncea* in Mendoza, Argentina need to be found and

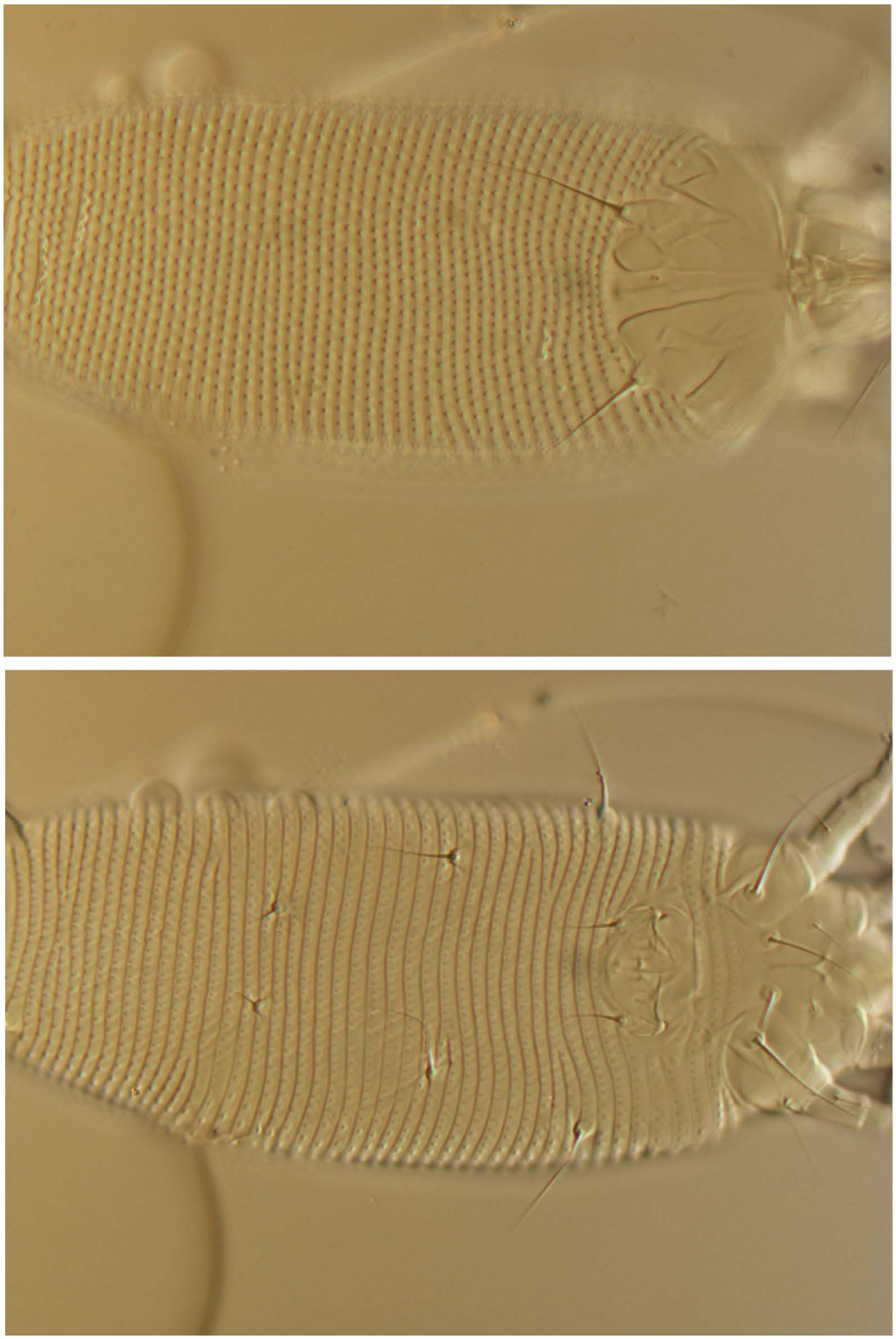


FIGURE 2: ***Aceria cortii*** Amrine & Stasny, 1994 – Female. Differential contrast image of dorsal, top, and ventral, bottom.



FIGURE 3: *Baccharis salicifolia*: top, leaf galls, bottom, twig galls elicited by *Aceria cortii*Amrine & Stasny.

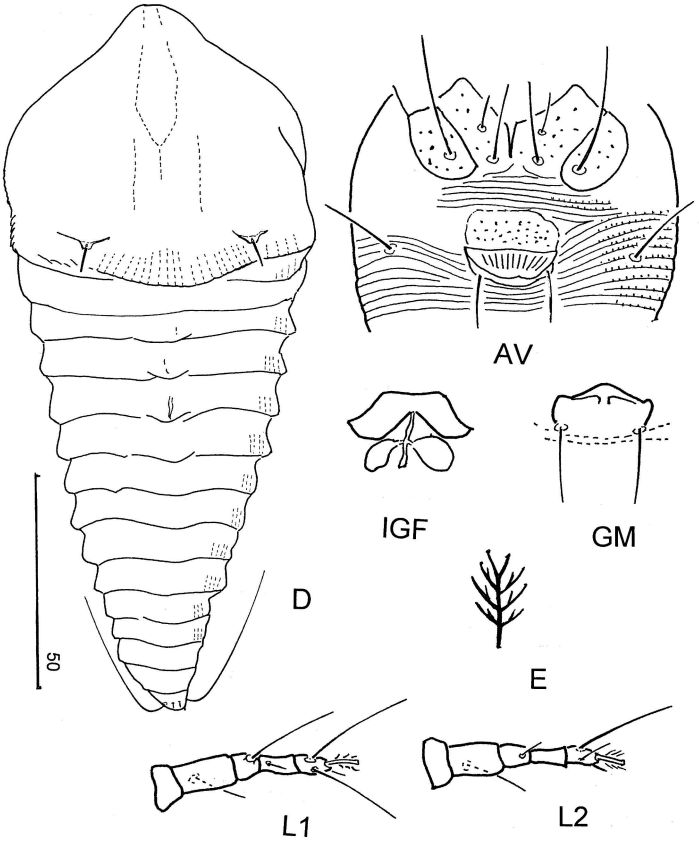


FIGURE 4: ***Shevtchenkella baccharis*** Keifer – AV anterior ventral aspect of female. D dorsum of female. E empodium. GM male genitalia. IGF internal genital structures of female. L1 leg I. L2 leg II.

carefully described. If conspecific with *Aceria cortii*, then *Aceria baccharidis* (Kieffer & Herbst, 1911) becomes the senior synonym.

Shevtchenkella baccharis (Keifer, 1939) (Fig. 4, 5)

Oxypleurites baccharis Keifer, 1939: 238. *Tegonotus baccharis*, Newkirk & Keifer, 1971: 7. *Shevtchenkella baccharis*, Amrine & Stasny, 1994: 283.

Female (n = 6). Body fusiform, 158 – 180 [135 – 150], widest at level of shield, 67 – 73 [60].

Gnathosoma: projecting down, dorsal pedipalp genual seta (*d*) 5 – 7, pedipalp coxal seta (*ep*) 2 – 3, chelicera stylets 15 – 19.

Prodorsal shield: 60 – 66 [46], 70 – 73 [60] wide, shield design very indistinct under light microscopy, with two longitudinal shallow grooves on anterior shield half and which merge posteriorly, and one pair of longitudinal shallow grooves on middle third of shield. Shield surface rough, irregular. Frontal lobe as figured, 7 – 11, base 16 – 20 wide. Scapular seta (*sc*) 5 – 6 [4.5], near shield rear margin, 33 – 35 [28] apart, directed backwards.

Legs: leg I: 28 – 31 [29]; femur 8 – 11, basiventral femoral seta (*bv*) 8 – 11; genu 5 – 6, antaxial genual seta (*l″*) 18 – 26 [22]; tibia 8 – 10 [6.75], paraxial tibial seta (*l′*) basal, 3 – 4; tarsus 5 – 7 [6.5], dorsal tarsal ou paraxial fastigial seta (*ft′*) 6 – 19, lateral tarsal or antaxial fastigial seta (*ft″*) 9 – 25, paraxial unguinal seta (*u′*) 3 – 5, tarsal solenidion (*ω*) 4 – 5 [6.5], slightly knobbed, empodium 4 – 5, four-rayed, apical ray Y-shaped. Leg II 28 – 33 [28]; femur 9 – 10, *bv* 9 – 11; genu 5 – 6, *l″* 3 – 5 [4.5]; tibia 6 – 8 [6.5]; tarsus 5 – 6 [6.5], *ft′* 4 – 5, *ft″* 18 – 19, *u′* 4 – 5, solenidion 5 – 6 [6], empodium 4 – 5, four-rayed.

Coxisternal area: coxae I approximate, fused at level of seta *1a*, prosternal apodeme (sternal line) 5 – 7. Coxae apparently smooth under light microscopy. Coxa I: anterolateral seta on coxisternum I (*1b*) 7 – 11, 12 – 15 apart; proximal seta on coxisternum I (*1a*) 19 – 23, 8 – 10 apart; proximal seta on coxisternum II (*2a*) 27 – 40 [26], 19 – 25 apart. Cox-

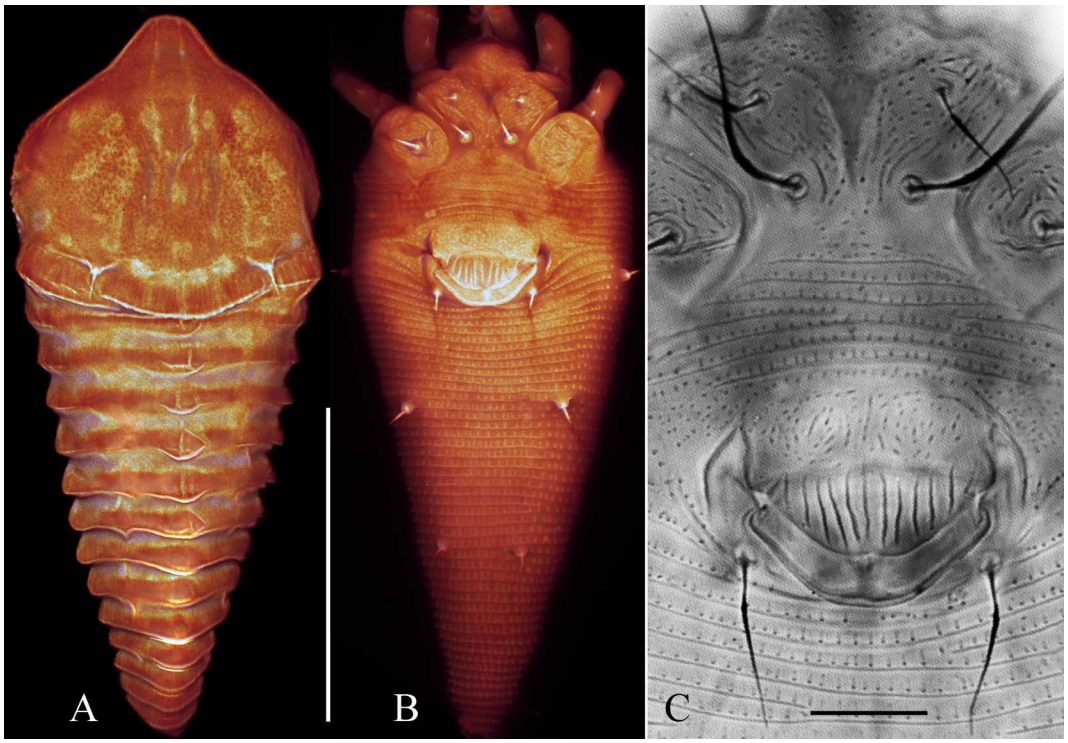


FIGURE 5: CLSM images of female of *Shevtchenkella baccharis* (A,B – autofluorescence; C – transmitted light). A – dorsal view, B – ventral view, C – coxigenital area. Scalebar: A, B=70 μm, C=10 μm.

igenital area with 4-6 annuli [5], microtuberculate, microtubercles about half the length of annulus.

Basal coverflap rectangular shaped, apparently smooth.

Genitalia 22 – 24 [24] wide, 13 – 16 [15] long, coverflap with 12 – 14 [10 – 12] ridges; proximal seta of coxisternum III (*3a*), on lateral margin of genitalia, 14 – 17 [13].

Opisthosoma with a central longitudinal ridge. Total dorsal annuli 17 – 19 [18 – 19], with narrow, numerous microtubercles; total ventral annuli from genitalia rear margin 54 – 63 [50, corrected in ES VII], microtuberculate. Lateral seta (*c2*) 25 – 35 [31], on first or second annulus behind genitalia rear margin; first ventral seta (*d*) long, surpassing basis of second pair, 40 – 48 [48], 26 – 30 apart, on annulus 14; second ventral seta (*e*) 10 – 11 [17], 14 – 18 apart, on annulus 29 – 33; third ventral seta (*f*) 22 – 25 [24], 19 – 21 apart, on anulus 49 – 58 or 4^{th}-5^{th} from rear. Caudal seta (*h2*) 40 – 51 [40], accessory seta (*h1*) 3 – 4.

Male (n = 3) Smaller than female, 145 – 157, 41 – 55 wide. Prodorsal shield 54 – 55, 59 – 64 wide. Seta *sc* 4, 27 – 32 apart. Frontal lobe 7 – 9, basis 21 – 22 wide.

Legs: leg I 27 – 28; femur 6 – 9, *bv* 7 – 10; genu 4 – 5, *l″* 16 – 26, tibia 6 – 7, *l′* 3; tarsus 5 – 6, *ft′* 11 – 17, *ft″* 16 – 18, *u′* 3 – 4, solenidion 5 – 6, empodium 4 – 5, four-rayed. Leg II 26 – 28; femur 9, bv 7 – 10; genu 3 – 5, *l″* 3; tibia 4 – 5; tarsus 5 – 6, *ft′* 2 – 3, *ft″* 15 – 17, u′ 2, solenidion 5 – 6, empodium 4, four-rayed.

Coxisternal area: *1b* 5 – 8, 11 – 13 apart; *1a* 18 – 20, 8 – 10 apart; *2a* 23 – 31, 23 – 25 apart. Prosternal apodeme 6 – 7; coxigenital annuli 6.

Genitalia 16 – 17 wide, 7 – 9 long; *3a* 10 – 13.

Opisthosoma: *c2* 20 – 23, on annulus 1; *d* 38 – 49, 25 – 28 apart, on annulus 9; *e* 7 – 11, 12 – 15 apart, on annulus 23; *f* 19 – 22, 18 – 22 apart, on annulus 45 or 5^{th} from rear. Total dorsal annuli 17 – 18, total ventral annuli 51. Setae *h2* 31 – 44, *h1* 2 – 3.

Materiel examined — 17 females, 7 males, vagrant on leaves of *Baccharis salicifolia* (Ruiz. & Pav.) Pers. (Asteracee), Cordoba, Argentina, collected by MA and FC, October 2014, on 13 microscopic preparations, deposited in the Mite Reference Collection of Departamento de Entomologia e Acarologia, Escola Superior de Agricultura "Luiz de Queiroz!, Universidade de São Paulo, Piracicaba, São Paulo, Brazil.

Remarks — The geographical distribution of the host plant, *Baccharis salicifolia*, ranges from Southwestern USA to Argentina. Keifer (1939a) described the female of *Oxypleurites baccharis* (now placed in *Shevtchenkella*) from this plant from Riverside, California, USA. A recent collection from the same plant in Argentina revealed a *Shevtchenkella* in conformity with Keifer's species and which is here considered conspecific with it, although we have not seen the type specimens, deposited in the Keifer Collection, USDA, Beltsville, Maryland, USA, which deteriorated and turned black (R. Ochoa personal information).

The finding of *S. baccharis* in Central Argentina constitutes the first record of this species from South America. Following Ballari *et al*. (2013), *S. baccharis* is the eighth species of the genus described from South America and the second from Argentina. In this country, the other species is *S. marceloi* Flechtmann, described from leaves of *Tessaria dodonaefolia* (Hook & Arn.) Cabrera, also an Asteraceae.

Later, Keifer (1939b) described *Oxypleurites acidotus*, a vagrant species close to *O. baccharis*, from *Baccharis pilularis* DC, from San Francisco, California, USA. He stated that *acidotus* differs from *baccharis* by the "lack of striae on the dorsal ridge, the large knob" on the tarsal solenidion, and in "the increase in tergites and sternites in *acidotus* over *baccharis*": 22 dorsal and 60-65 ventral anuli in *acidotus* while respectively 17 and 50 in *baccharis*.

Remarks on the topography of the area anterior to eriophyoid genital coverflap

In the descriptions/illustrations of a few eriophyid species the genital coverflap base may sometimes be illustrated as paired platelike structures, partially fused medially, or consolidated into a single piece, usually ornamented similarly to leg coxae or to the coxigenital annuli. However, the coverflap base is not usually referred to in the descriptions except in a very few instances. In Keifer (1938) this structure is illustrated, apparently for the first time, in the drawing of *Platyphytoptus sabinianae*, as

one single piece, however, it is medially indented;in Keifer (1938), in the illustration of *Stenacis convolvens* (Nalepa), it is drawn as a solid rectangular structure with the same ornamentation as the leg coxae; in Keifer (1939a) this structure is outlined as a rectangle in the drawing of *Oxypleurites baccharis*; in Keifer (1940 and 1951), in the drawings of *O. glabratae* and *O. juglandis*, respectively, this coverflap base appears as a single strcuture and in Keifer (1960, 1961 and 1979), in the drawings of *Ditrymacus athiasella*, *O. solidaginis* and *Eriophyes spermaphaga*, respectively, again it appears as a single structure. In Navia & Flechtmann (2003), in the drawings of *Notostrix miniseta*, the coverflap base appears to have paired fields, deeply indented medially and was considered as the basal part of the "epigynum" or coverflap and in Navia et al. (2011), in the drawing of *Abacarus doctus*, the coverflap base is paired and the authors referred to the composite of the "epigynum" (coverflap) plus these two structures as a "genital coverflap resembling a curtain".

With the introduction of Confocal Laser Scanning Microscopy in the study of eriophyoid mites, Chetverikov et al. (2014) in *Pentasetacus araucariae* show the presence of a short median ridge dividing the coverflap base into two parts and which they called the pregenital plate. In the PCLM microphotographs of *Phyllocoptes* sp. in Chetverikov (2014a, fig. 2B) the paired pregenital plates (coverflap base) are evident and the image displays an ornamentation pattern similar to that of leg coxae. Chetverikov et al., (2015), in the rediagnosis of the genus *Neoprothrix*, also identified a pair of subcuticular "indistinct lateral plates separated medially by a short cuticular ridge", which may be a unique adaptation in this species due to the great distance between the coxae and the genitalia. Finally, Chetverikov (2014b, p. 153, footnote 7 and fig. 9C) reported that *Oziella* spp. have two prominences anterior to the basal part of the genital coverflap, which may be considered to be homologous to the basal coverflap in other species above. The remarkable resemblance of the ornamentation of the pregenital plate to that of coxae in many eriophyoids, and the fact that this plate can be divided into two parts might indicate that this plate is a remnant (rudiment) of the coxae of the legs III or IV. Searching for new examples and careful description of pregenital area in new species will help to clarify this putative homology.

Acknowledgements

We cordially thank Dr. R. Ochoa, for checking Keifer's type specimens in the U.S. National Museum, and Dr. Antonia Oggero for helping during fieldwork.

References

Amrine Jr. J.W., Manson D.C.M. 1996 — Preparation, mounting and descriptive study of Eriophyoid mites. In: Lindquist E.E., Sabelis M.W., Bruin, J. (Eds.). Eriophyoid Mites, their biology, natural enemies and control. Amsterdam: Elsevier. p. 383-396. doi:10.1016/S1572-4379(96)80023-6

Amrine Jr. J.W., Stasny T.A. 1994 — Catalog of the Eriophyoidea (Acarina: Prostigmata) of the world — West Bloomfield, Michigan: Indira. 798 pp.

Ballari M.C, Quintana de Quinteros S.L., Flechtmann C.H.W. 2013 — A new species of *Shetchenkella* (Acari, Prostigmata, Eriophyidae) from Argentina — Revista de Agricultura, Piracicaba, 88: 229-234.

Chetverikov P.E. 2014a — Distal oviduct and genital chamber of eriophyoids (Acariformes, Eriophyoidea): refined terminology and remarks on CLSM technique for studying musculature of mites — Exp.Appl. Acarol., 63: 407-428. doi:10.1007/s10493-014-9840-9

Chetverikov P.E. 2014b — Comparative confocal microscopy of internal genitalia of phytoptine mites (Eriophyoidea, Phytoptidae): new generic diagnoses reflecting host-plant associations — Exp.Appl. Acarol., 62:129-160. doi:10.1007/s10493-013-9734-2

Chetverikov P.E., Beaulieu F., Beliavskaia A.Y., Rautian M.S., Sukhareva S. 2014 — Redescription of an early-derivative mite, *Pentasetacus araucariae* (Eriophyoidea, Phytoptidae), and new hypotheses on the eriophyoid reproductive anatomy — Exp.Appl. Acarol., 63:123-155. doi:10.1007/s10493-014-9774-2

Chetverikov P.E., Desnitskiy A.G., Navia D. 2015 — Confocal microscopy refines generic concept of a problematic taxon: rediagnosis of the genus *Neoprothrix* and remarks on female anatomy of eriophyoids (Acari: Eriophyoidea) — Zootaxa, 3919: 179-191. doi:10.11646/zootaxa.3919.1.8

Flechtmann C.H.W. 1983 — New names and new synonyms in Eriophyoidea (Acari) — Internat. J. Acarol. 9: 73-76. doi:10.1080/01647958308683316

Keifer H.H. 1938 — Eriophyid Studies — Bulletin of the Department of Agriculture State of California, 27: 181-206.

Keifer H.H. 1939a — Eriophyid Studies IV — Bulletin of the Department of Agriculture State of California, 28: 223-239.

Keifer H.H. 1939b — Eriophyid Studies VII — Bulletin of the Department of Agriculture State of California, 28: 484-505.

Keifer H.H. 1960 — Eriophyid Studies B-1 — Special Publication, State Bureau of Entomology, California Department of Agriculture. 20 pp.

Keifer H.H. 1961 — Eriophyid Studies B-4 — Special Publication, State Bureau of Entomology, California Department of Agriculture. 20 pp.

Keifer H.H. 1979 — Eriophyid Studies C-17 — Agricultural Reseach, U.S. Department of Agriculture. 24 pp.

Kieffer J.J., Jorgensen P. 1910 — Gallen und Gallentiere aus Argentinien — Centralblatt fuer Bakteriologie, Parasitenkunde und Infektionskrankheiten, 27: 362-445.

Kieffer J.J., Herbst P. 1911 — Ueber Gallen und Gallentiere aus Chile — Centralblatt fuer Bakteriologie, Parasitenkunde und Infektionskrankheiten, 29: 696-704.

Lindquist E.E. 1996 — External Anatomy and Systematics. 1.1.1. External anatomy and notation of structures — In: Lindquist E.E., Sabelis M.W., Bruin J. (Eds.). Eriophyoid Mites, their biology, natural enemies and control. Amsterdam: Elsevier. p.3-31. doi:10.1016/S1572-4379(96)80003-0

Navia D., Flechtmann C.H.W. 2003 — Mites (Acari) of the genus *Notostrix* Keifer (Eriophyidae): new records, description of six new species and key to the world species — Acarologia, 43: 271-289.

Navia D., Flechtmann C.H.W., Lindquist E.E., Aguilar H. 2011 — A new species of *Abacarus* (Acari: Prostigmata: Eriophyidae) damaging sugarcane, *Saccharum officinarum* L., from Costa Rica – the first eriophyoid mite described with a tibial seta on leg II — Zootaxa, 3025:51-58.

Newkirk R.A., Keifer H.H. 1971 — Eriophyid Studies C-5 — Agricultural Research, U.S. Department of Agriculture. 24 pp.

COPYRIGHT

(cc) BY-NC-ND Flechtmann C.H.W. *et al.* Acarologia is under free license. This open-access article is distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.