

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-contact@supagro.fr



**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 2021 (Volume 61): 450 €

<http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php>

Previous volumes (2010-2020): 250 € / year (4 issues)

Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France

ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

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)



Acarologia is under **free license** and distributed under the terms of the Creative Commons-BY.

A description of the male of *Cocoseius elsalvador* Denmark and Andrews (Acari: Phytoseiidae: Typhlodrominae)

Elisângela A. dos S.F. Melo^a, Manoel G.C. Jr Gondim^b, Gilberto J. de Moraes^c, Aníbal R. Oliveira^a

^a Universidade Estadual de Santa Cruz - UESC, Rodovia Jorge Amado, km 16, 45662-900, Ilhéus, BA, Brazil.

^b Universidade Federal Rural de Pernambuco - UFRPE, Área de Fitossanidade, 52171-900, Recife, PE, Brazil.

^c Universidade de São Paulo, Escola Superior de Agricultura "Luiz de Queiroz" - ESALQ, Departamento de Entomologia e Acarologia, 13418-900, Piracicaba, SP, Brazil.

Short note

ABSTRACT

The present work describes the male of *Cocoseius elsalvador* Denmark and Andrews based on specimens collected in Brazil, representing the first characterization of a male of this genus.

Keywords mites; phytoseiid; taxonomy; systematics

Zoobank <http://zoobank.org/0526F48E-A472-46D4-B692-3B641093622E>

Introduction

The original description of *Cocoseius elsalvador* Denmark & Andrews was based on the female specimens, holotype collected from *Cocos nucifera* L. (Arecaceae) in El Salvador, and a female paratype, collected from *Sabal palmetto* (Walter) Loddiges ex J. A. & J. H. Schultes (Arecaceae) in Florida, USA (Denmark and Andrews 1981). Besides those countries, it has also been reported from Brazil, in the states of Amazonas, Bahia, Pará, Pernambuco and Roraima, commonly associated with the mite pests *Aceria guerreronis* Keifer (Eriophyidae) or *Raoiella indica* Hirst (Tenuipalpidae) on *C. nucifera* (Argolo *et al.* 2017; Cruz *et al.* 2015; Gondim Jr. and Moraes 2001; Gondim Jr. *et al.* 2012; Lawson-Balagbo *et al.* 2008; Souza *et al.* 2015; Vasconcelos *et al.* 2006). Although supplementary descriptions of *C. elsalvador* females have been published (Chant and McMurtry 1994, 2007; Denmark *et al.* 1999, Denmark and Evans 2011; Gondim Jr. and Moraes 2001; Souza *et al.* 2015), males remain undescribed. The same is true for the other two known species of *Cocoseius* Denmark and Andrews, *Cocoseius palmarum* Gondim Jr., Moraes and McMurtry and *Cocoseius paucisetis* Moraes, Barbosa and Castro (Gondim Jr. *et al.* 2000; Moraes *et al.* 2013). As taxonomy of Phytoseiidae is traditionally based on female morphological characteristics, male descriptions are relatively rare. However, sexual dimorphism is important and the characterization of the morphological features of males has a really taxonomic value, as it might provide new characters to improve species identification and help in determining whole diversity when samples also contain male specimens. This issue is especially important in the case of the genus *Cocoseius*, for which the description of males has not been reported for any species. Thus, the objective of the present work is to describe the male of *C. elsalvador* based on specimens collected from Arecaceae in Pernambuco and Bahia states, Northeastern Brazil.

Received 26 December 2018

Accepted 07 February 2019

Published 12 February 2019

Corresponding author

Aníbal R. Oliveira:

aroliveir@gmail.com

Academic editor

Tixier, Marie-Stéphane

DOI

10.24349/acarologia/20194317

© Copyright

Melo E. A. S. F. *et al.*

Distributed under

Creative Commons CC-BY 4.0



Materials and methods

Males and females of *C. elsalvador* collected from leaves of *Acrocomia aculeata* (Jacq.) Lodd. Ex Mart. and *Euterpe oleraceae* Mart. (Arecaceae) in Igarassu, Pernambuco state, and Una, Bahia state, Brazil, and mounted on slides with Hoyer's medium were identified under a phase contrast microscope Leica DM2500. Males were measured using a graduate eyepiece and drawn using a *camera lucida* attached to the microscope, with plates finalized using Adobe Illustrator CC. Setal notation used in this paper follows Lindquist and Evans (1965), as adapted to Phytoseiidae by Rowell *et al.* (1978) and Chant and Yoshida-Shaul (1989) for dorsal and by Chant and Yoshida-Shaul (1991) for ventral idiosoma, respectively. Measurements are given in micrometers and presented as the mean in bold followed by the range in parenthesis. The system of classification follows that of Chant and McMurtry (2007). Specimens described are deposited in the mite collections of UESC, UFRPE and ESALQ.

Results and discussion

Subfamily Typhlodrominae Wainstein

Typhlodromini Wainstein 1962: 26;
Typhlodrominae, Chant and McMurtry 1994: 235.

Tribe Chanteiini Chant and Yoshida-Shaul

Chantiinae Chant and Yoshida-Shaul 1986: 2025;
Chanteiini, Chant and McMurtry 1994: 237.

Genus *Cocoseius* Denmark and Andrews

Cocoseius Denmark and Andrews 1981: 155.
Type species *Cocoseius elsalvador* Denmark and Andrews

Cocoseius elsalvador Denmark and Andrews 1981: 156.

Chant and McMurtry 1994: 238; Denmark *et al.* 1999: 87; Gondim Jr. and Moraes 2001: 88; Moraes *et al.* 2004: 263; Vasconcelos *et al.* 2006: 93; Chant and McMurtry 2007: 134; Lawson-Balagbo *et al.* 2008: 88; Denmark and Evans 2011: 325; Gondim Jr. *et al.* 2012: 531; Souza *et al.* 2015: 104; Argolo *et al.* 2017: 348.

Adult male description (Fig. 1) (n = 4)

Dorsum (Fig. 1A) — Dorsal shield reticulate, 236 (230 – 240) long and 148 (140 – 160) wide, with 6 distinguishable pairs of lyrifissures, 3 pairs of pores, and 18 pairs of pointed, serrated setae: *j1* 20 (19 – 21), *j3* 48 (44 – 49), *j4* 33 (32 – 34), *j5* 50 (47 – 55), *j6* 56 (53 – 61), *J2* 55 (50 – 60), *J5* 22 (21 – 23), *z2* 21 (20 – 22), *z3* 27 (26 – 28), *z4* 60 (58 – 62), *z5* 31 (26 – 33), *z6* 75 (71 – 76), *Z4* 59 (57 – 60), *Z5* 59 (56 – 62), *s4* 65 (60 – 68), *S4* 53 (50 – 56), *r3* 34 (32 – 35), *R1* 54 (51 – 57). Peritreme extending to the level of *z3*.

Venter (Fig. 1B) — Sternogenital shield reticulate, with 5 pairs of setae and 2 pairs of lyrifissures. Distances between *st1-st5* 99 (95 – 100), *st1-st1* 47 (45 – 48), *st2-st2* 54 (52 – 56), *st3-st3* 53 (52 – 55), *st4-st4* 46 (43 – 50), *st5-st5* 38 (35 – 40). Ventrianal shield subtriangular and reticulate, 100 (95 – 105) long, 138 (134 – 144) wide at level of anterior corners and 57 (55 – 58) at anus level, with 4 pairs of pre-anal setae (*JV1*, *JV2*, *JV3* and *ZV2*), 1 pair of small pre-anal pores and 3 pairs of lyrifissures. Membrane surrounding the ventrianal shield with only one pair of long, serrated setae *JV5* 44 (43 – 45), and 1 pair of lyrifissures.

Chelicera (Fig. 1C) — Fixed digit 19 (18 – 20), with 2 subapical teeth, all distal to *pilus dentilis*, and movable digit 20 (19 – 20) with 1 tooth. Spermatodactyl shaft 12 (11 – 13), foot 16 (13 – 18).

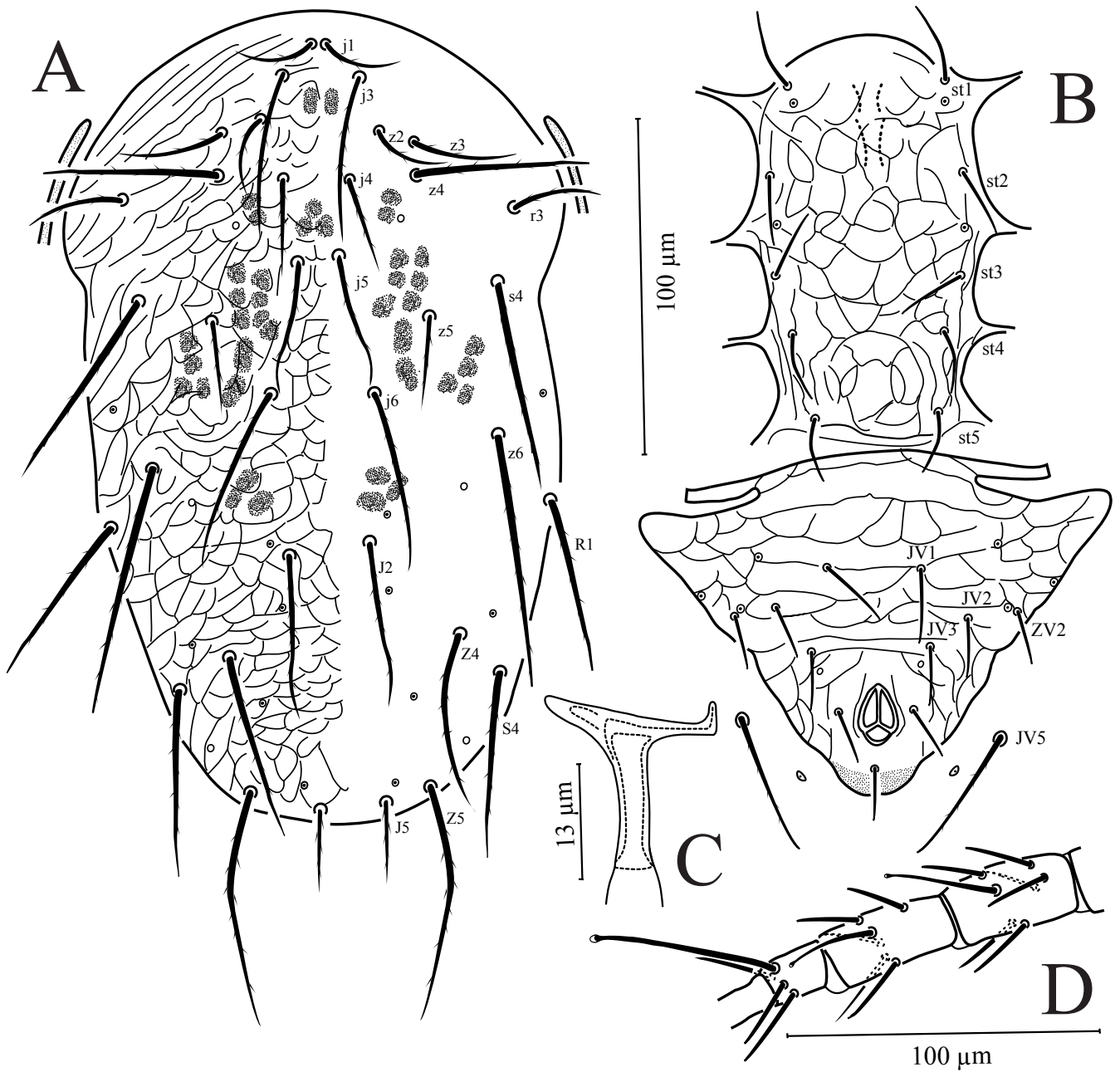


Figure 1 *Cocoseius elsalvador* male: A – Dorsal shield and anterior peritreme; B – Ventral shields; C – Spermatodactyl; D – Leg IV.

Legs (Fig. 1D) — No macrosetae on legs I–III. Macrosetae on leg IV knobbed: *SgeIV* 33 (29 – 35), *StiIV* 28 (23 – 30), *StIV* 57 (50 – 61). Chaetotaxy: genu II 2-2/0, 2/0-1, genu III 1-2/1, 2/0-1.

Specimens examined — 3 ♂♂ collected by M.G.C. Gondim Jr. on 8 Jan. 1999 from leaves of *Acrocomia aculeata* (Jacq.) Lodd. Ex Mart., Igarassu-PE, Brazil, at 7°53'27"S, 34°58'36"W; 1 ♂ collected by E.A.S.F. Melo on 19 Apr. 2016 from leaves of *Euterpe oleraceae* Mart., Estação Experimental 'Lemos Maia' – CEPLAC, Una-BA, Brazil, at 15°17'34"S, 39°04'38"W.

Remarks — Male dorsal shield reticulation, pores and setae similar to female, except that

r3 and *R1* are inserted on the shield, and that setae are generally shorter in the male (Denmark and Andrews 1981; Chant and McMurtry 1994; Gondim Jr. and Moraes 2001; Souza *et al.* 2015). Peritreme extends to the level of *z3*, as reported for females by Chant and McMurtry (1994) and Gondim Jr. and Moraes (2001), reported by Denmark and Andrews (1981) as extending beyond *s4* in female holotype. Movable cheliceral digit with one tooth, instead of none in the female (Denmark and Andrews 1981; Chant and McMurtry 1994). Although chaetotaxy of genera II and III differ from what was described for the holotype female (Denmark and Andrews 1981), by the absence of a ventral seta on genu II and the presence of a ventral seta on genu III, the chaetotaxy of the male (genu II 2-2/0, 2/0-1, genu III 1-2/1, 2/0-1) is the same of five females we checked from the mite collection of UESC (vouchers from Souza *et al.* 2015) and of *C. palmarum* (Gondim Jr. *et al.* 2000).

Acknowledgements

To FAPESB (Fundação de Amparo à Pesquisa do Estado da Bahia) and PPGPV (Programa de Pós-Graduação em Produção Vegetal - UESC), for the doctoral scholarship to the first author, and to the two anonymous reviewers for their comments and suggestions to the manuscript. This work was partially supported by UESC (Cad. PROPP 00220.1100.1596) and the State of São Paulo Research Foundation (FAPESP 99/04478-3), within the BIOTA/FAPESP, the Virtual Institute of Biodiversity (www.biota.org.br). GJM and MGCGJr. are a CNPq researchers.

References

- Argolo P.S., Santos R.M.V., Bittencourt M.A.L., Noronha A.C. da S., Moraes G.J. de, Oliveira A.R. 2017. Phytoseiid mites (Acari: Phytoseiidae) associated with tropical ornamental plants, with a checklist and a key to the species of Bahia, Brazil. *Zootaxa*, 3700(3): 301-347. doi:10.11646/zootaxa.4258.4.3
- Chant D.A., McMurtry J.A. 1994. A review of the subfamilies Phytoseiinae and Typhlodrominae. *Intern. J. Acarol.*, 20: 223-310. doi:10.1080/01647959408684022
- Chant D.A., McMurtry J.A. 2007. Illustrated keys and diagnoses for the genera and subgenera of the Phytoseiidae of the world (Acari: Mesostigmata). Indira Publishing House, West Bloomfield, Michigan, USA, 220 pp.
- Chant D.A., Yoshida-Shaul E. 1986. The subfamily Chantiinae in the family Phytoseiidae (Acari: Gamasina). *Can. J. Zool.*, 64(9): 2024-2034. doi:10.1139/z86-306
- Chant D.A., Yoshida-Shaul E. 1989. Adult dorsal setal patterns in the family Phytoseiidae (Acari: Gamasina). *Intern. J. Acarol.*, 15(4): 219-233. doi:10.1080/01647958908683852
- Chant D.A., Yoshida-Shaul E. 1991. Adult ventral setal patterns in the family Phytoseiidae (Acari: Gamasina). *Intern. J. Acarol.*, 17: 187-199. doi:10.1080/01647959108683906 doi:10.1080/01647959108683906
- Cruz W.P. da, Krug C., Vasconcelos G.J.N., Moraes G.J. de 2015. Diversity of mites associated with *Raoiella indica* (Acari: Prostigmata) on coconut palms in the central region of the Brazilian Amazonia, with emphasis on the predaceous Phytoseiidae (Acari: Mesostigmata). *Syst. Appl. Acarol.*, 20(8): 875-886. doi:10.11158/saa.20.8.4
- Denmark H.A., Andrews K.L. 1981. Plant associated Phytoseiidae of El Salvador, Central America (Acarina: Mesostigmata). *Fla. Entomol.*, 64: 147-158. doi:10.2307/3494606
- Denmark H.A., Evans G.A. 2011. Phytoseiidae of North America and Hawaii (Acari: Mesostigmata). Indira Publishing House, West Bloomfield, USA, 451 pp.
- Denmark H.A., Evans G.A., Aguilar H., Vargas C., Ochoa, R. 1999. Phytoseiidae of Central America (Acari: Mesostigmata). Indira Publishing House, West Bloomfield, Michigan, USA, 125 pp.
- Gondim Jr. M.G.C., Castro T.M.M.G., Marsaro Jr. A.L., Navia D., Melo J.W.S., Demite P.R., Moraes G.J. de 2012. Can the red palm mite threaten the Amazon vegetation? *Syst. Biodiv.*, 10: 527-535. doi:10.1080/14772000.2012.752415
- Gondim Jr. M.G.C., Moraes G.J. de 2001. Phytoseiid mites (Acari: Phytoseiidae) associated with palm trees (Arecaceae) in Brazil. *Syst. Appl. Acarol.*, 6: 65-94. doi:10.11158/saa.6.1.11
- Gondim Jr. M.G.C., Moraes G.J. de, McMurtry J.A. 2000. A new species of *Cocoseius* (Acari: Phytoseiidae) from Brazil and redefinition of the genus. *Ann. Entomol. Soc. Am.*, 93(6): 1226-1229. doi:10.1603/0013-8746(2000)093[1226:ANSOCA]2.0.CO;2
- Lawson-Balagbo L.M., Gondim Jr. M.G.C., Moraes G.J. de, Hanna R., Schausberger P. 2008. Exploration of the acarine fauna on coconut palm in Brazil with emphasis on *Aceria guerreronis* (Acari: Eriophyidae) and its natural enemies. *Bull. Entomol. Res.*, 98: 83-96. doi:10.1017/S0007485307005421
- Lindquist E.E., Evans G.O. 1965. Taxonomic concepts in the Ascidae, with a modified setal nomenclature for the idiosoma of the Gamasina (Acarina: Mesostigmata). *Mem. Entomol. Soc. Can.*, 47: 1-64. doi:10.4039/entm9747fv

- Moraes G.J. de, McMurtry J.A., Denmark H.A., Campos C.B. 2004. A revised catalog of the mite family Phytoseiidae. *Zootaxa*, 434: 1-494. doi:10.11646/zootaxa.434.1.1
- Moraes G.J. de, Barbosa M.F.C., Castro T.M.M.G. 2013. Phytoseiidae (Acari: Mesostigmata) from natural ecosystems in the State of São Paulo, Brazil. *Zootaxa*, 3700(3): 301-347. doi:10.11646/zootaxa.3700.3.1
- Rowell H.J., Chant D.A., Hansell R.I.C. 1978. The determination of setal homologies and setal patterns on the dorsal shield in the family Phytoseiidae (Acarina: Mesostigmata). *Can. Entomol.*, 110: 859-876. doi:10.4039/Ent110859-8
- Souza I.V., Argolo P.S., Gondim Jr. M.G.C., Moraes G.J. de, Bittencourt M.A.L., Oliveira A.R. 2015. Phytoseiid mites from tropical fruit trees in Bahia State, Brazil (Acari, Phytoseiidae). *ZooKeys*, 533: 99-131. doi:10.3897/zookeys.533.5981
- Vasconcelos D.E., Silva F.R., Barbosa D.G.F., Gondim Jr. M.G.C., Moraes G.J. de 2006. Diversidade de fitoseídeos (Acari: Phytoseiidae) em fruteiras tropicais no Estado de Pernambuco, Brasil. *Magistra*, 18: 90-101.
- Wainstein B.A. 1962. Révision du genre *Typhlodromus* Scheuten, 1857 et systématique de la famille des Phytoseiidae (Berlese 1916) (Acarina: Parasitiformes). *Acarologia*, 4: 5-30.