

New association between the mite *Erythraeus* sp. (Acari: Prostigmata: Parasitengona) and the psyllid *Russelliana adunca* (Hemiptera: Psylloidea)

BALLOTTE, Carla^{1,*}, AQUINO, Daniel A.^{2,3}, DELLAPÉ, Gimena⁴,
LÓPEZ ARMENGOL, M. Fernanda⁵, GITTINS, Cecilia⁵
& CÉDOLA, Claudia²

¹ Universidad Nacional de La Plata, CIC, División Entomología, Museo de La Plata. La Plata, Buenos Aires, Argentina.

* E-mail: cbalotte@fcnym.unlp.edu.ar

² Centro de Estudios Parasitológicos y de Vectores (CEPAVE), CONICET-UNLP. La Plata, Argentina.

³ Zoología Agrícola, Centro de Investigación de Sanidad Vegetal, Facultad de Agronomía y Ciencias Forestales, Universidad Nacional de La Plata. La Plata, Buenos Aires, Argentina.

⁴ Universidad Nacional de La Plata, CONICET, División de Entomología, Museo de La Plata. Buenos Aires, Argentina.

⁵ Área Investigación y Desarrollo para la Agricultura Familiar, Centro Regional Patagonia Norte, INTA. Plottier, Neuquén, Argentina

Received 10 - IX - 2021 | Accepted 11 - XI - 2021 | Published 30 - XII - 2021

<https://doi.org/10.25085/rsea.800413>

Nueva asociación entre el ácaro *Erythraeus* sp. (Acari: Prostigmata: Parasitengona) y el psílido *Russelliana adunca* (Hemiptera: Psylloidea)

RESUMEN. Se registra por primera vez la asociación entre el ácaro ectoparásito *Erythraeus* Latreille (Acari: Prostigmata: Parasitengona) y el psílido *Russelliana adunca* Burckhardt (Hemiptera: Psylloidea). Las larvas de ácaros eritreidos no son comunes sobre psílicos, por lo que este primer registro adiciona un nuevo huésped y amplía la distribución del ácaro en Sudamérica.

PALABRAS CLAVE. Argentina. Ectoparásito. *Larrea divaricata*. Piojo saltador.

ABSTRACT. The association between the ectoparasitic mite, *Erythraeus* Latreille (Acari: Prostigmata: Parasitengona) and the psyllid *Russelliana adunca* Burckhardt (Hemiptera: Psylloidea) is reported for the first time. Larval erythraeid mites are not common on psyllids, therefore this first report adds a new host association and widens the distribution of the mite in South America.

KEYWORDS. Argentina. Ectoparasite. Jumping plant-lice. *Larrea divaricata*.

Psylloidea or jumping plant-lice are generally highly host specific plant sap sucking hemipterans. Hosts are mostly dicotyledonous plants on which the five larval instars complete their development (Burckhardt, 2008). Psyllidae is the largest family, with more than 1,300 species with a cosmopolitan distribution and a wide range of host families (Burckhardt, 2008; Ouvrard, 2021). In the New World, several species of psyllids are serious agricultural and forestry pests, such as species belonging to *Cacopsylla* pests of pear, and *Russelliana solanicola* Tuthill pest of potato (Percy 2014; Serbina & Burckhardt, 2017). Moreover, some psyllids transmit plant pathogens as *Diaphorina citri* Kuwayama vector for *Candidatus Liberibacter* in citrus (Halbert & Manjunath, 2004; Halbert & Núñez, 2004). The Cohort Parasitengona comprises terrestrial and aquatic mites, whose main characteristic is the complex life-cycle (Proctor, 1998). Larvae of terrestrial

Parasitengona mites are parasites of insects and arachnids or, exceptionally, free living, while adults and deutonymphs are predators of small arthropods (Salmane & Małol, 2018). Some parasitengone families (between them Erythraeidae) parasitize hemipterans of the Auchenorrhyncha, Heteroptera and Sternorrhyncha suborders (Stroiński et al., 2013). The genus *Erythraeus* Latreille comprises about 124 known species, with two Subgenera: *Erythraeus* Latreille and *Zaracarus* Southcott, mostly distributed in the old world, and in a few regions of the American continent (Peru, USA and Galapagos) (Małol & Wohltmann, 2012; Xu et al., 2019). Larvae of *Erythraeus* (*Erythraeus*) species were found associated with at least 29 hemipteran species belonging to nine families (Haitinger & Mehrnejad, 2017). The family Psyllidae is a rarely host for Parasitengona cohort mites, and only few species are known parasitizing them: *Charletonia postojnensis* Haitlinger on *Psylla* sp. in Slovenia, *C. rocciai* Treat & Flechtmann on *Auchmerina limbatipennis* Enderlein in Brazil, and *Leptus* (*Leptus*) *elderi* Southcott attacking *Heteropsylla cubana* Crawford in Australia (Haitlinger & Mehrnejad, 2017; Costa et al., 2019; Ouvrard, 2021).

The aim of this work is to report for the first time the association between the mite *Erythraeus* sp. (Acari: Prostigmata: Parasitengona) with the psyllid *Russelliana adunca* Burckhardt (Hemiptera: Psylloidea) in Argentina.

During a sampling on *Larrea divaricata* Cav. (Zygophyllaceae) in Añelo, Neuquén province, Argentina (38°19'18"S; 68°44'45"W, 396 m.a.s.l.), one reddish mite firmly attached by their chelicerae to the abdomen of a psyllid (Fig. 1) was collected. The samples were collected within the framework of the Baseline Study of Biodiversity in Areas of the Neuquén Basin, developed by Yacimientos Petrolíferos Fiscales S.A. (YPF S.A.) in October 5, 2019; a 3 m² plastic blanket was placed on the ground around the entire plant and the foliage was tapped with a stick. Then the material was collected from the blanket and stored in 70% ethanol. The mite was removed with a fine forceps and stored in 70% ethanol, then it was cleared in lactophenol for identification and mounted on a semi-permanent slide in Hoyer's (Walter & Krantz, 2009). The terminology and abbreviations are adapted from Haitlinger & Saboori (1996). All measurements were taken from a slide-mounted specimen and are given in micrometers (µm); either as length or length: width. Abbreviations used in the text are: AL: length of anterolateral scutula, PL: length of posterolateral scutula, ASE: length of anterior sensillary seta of dorsal scutum and PSE: length of posterior sensillary seta of dorsal scutum.

The psyllid was preserved in 70% ethanol and one of its forewings was mounted in Canada balsam for the identification using a stereomicroscope Leica S8APO and a microscope Trinocular "Biotraza" XSZ146AT. The studied material was deposited in the collection of the División Entomología of the Museo de La Plata (MLP),



Fig. 1. Larva of *Erythraeus* sp. firmly attached to the abdomen of *Russelliana adunca* (color mite after their conservation in 70% ethanol).

Buenos Aires, Argentina.

The psyllid was identified as *R. adunca* following the keys of Burckhardt (2008) and Serbina & Burckhardt, (2017).

Currently, the genus *Russelliana* includes 43 species restricted to the Neotropics, and they are associated with a surprisingly wide range of hosts from several plant families (Serbina & Burckhardt, 2017). *Russelliana adunca* is distributed in Bolivia, Chile and, in Argentina, it is known from Chubut province (Burckhardt et al., 2012; Serbina & Burckhardt, 2017; Balthotte et al., 2021). Here, the genus *Russelliana* and the species *R. adunca* are recorded for the first time from Neuquén province. In addition, the record in *L. divaricata* must be considered casual, because the adult was not found feeding and no other developmental stage of the species was found (Burckhardt et al., 2014; Ouvrard, 2021). It is important to continue with the sampling to obtain a more accurate association with the plant and to have more representatives of the psyllid, given that there are no females or nymphal stages.

The mite was identified as larva belonging of the genus *Erythraeus* and it was not fit with larval species of the genus worldwide key (Xu et al., 2019). No information about this genus in Argentina is available, nonetheless we mention some features that will help in future identifications: Body 352:175; two pairs of eyes on each side, dorsal scutum rounded and finely dotted

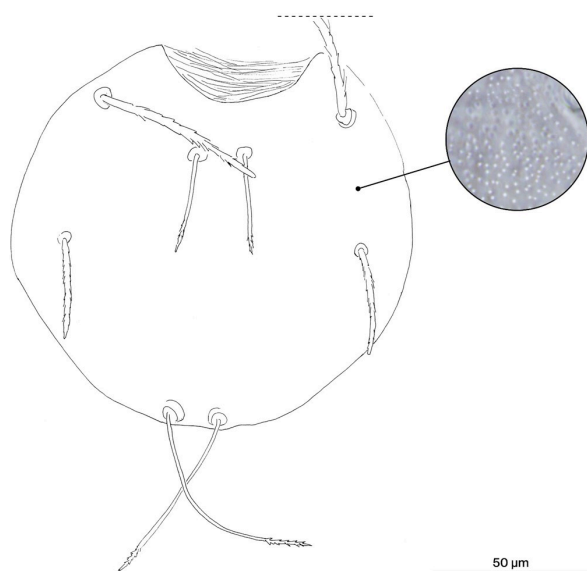


Fig. 2. Detail of the dorsal scutum of the larva of *Erythraeus* sp.

(125:126), bearing AL (54), ASE (32). PL (32) and PSE (60) (Fig. 2), palp femur and palp genu with one barbed seta each; two pairs of sternalae setae, one of them between coxae I, and the other pair between coxae III (no setae between coxae II), between coxae II and III one pair of setae. Each coxa I–III with one seta (coxalae); all opisthosomatic setae are similar in shape and size (28; with barbs), but ventral are more slender than dorsal (38); all setae on the legs similar in shape, with barbs and pointed apex, legs seven-segmented: leg I 713: CxI 52, TrI 42, Fel 185 (basifemur with three normal setae), GeI 142, TiI 195, TaI 97; leg II 724: CxII 62, TrII 42, FeII 190 (basifemur with three normal setae), GeII 115, TiII 198, TaII 117; leg III 801: CxIII 65, TrIII 42, FeIII 180 (basifemur with three normal setae), GeIII 122, TiIII 262, TaIII 130; fD 36, NDV 50. With Xu et al. (2019) key, it was not possible to advance in the determination of the species. However, we consider that the association between the mite *Erythraeus* sp. and *R. adunca* constitutes a valuable record for Argentina and especially for Neuquén, Patagonia.

The association reported herein widens the host list known for this parasite and represents the first record of the same in Argentina. It may promote further efforts regarding jumping plant lice-mite association studies.

ACKNOWLEDGEMENTS

This work was supported by the Comisión de Investigaciones Científicas de la provincia de Buenos Aires (CIC), Consejo Nacional de Investigaciones Científicas y Tecnológicas (CONICET), by the FCNyM, Universidad Nacional de La Plata (UNLP), Argentina,

and by Instituto Nacional de Tecnología Agropecuaria (INTA).

LITERATURE CITED

- Balioite, C., Dellapé, G., Bouvet J.P., & Aquino D.A. (2021) Psylloidea (Hemiptera: Sternorrhyncha) species from Argentina and Uruguay. (November 2021). <https://biodar.unlp.edu.ar/psylloidea/>
- Burckhardt, D. (2008) Psylloidea. Biodiversidad de Artrópodos Argentinos Volumen 2. (ed. Claps, L.E., Debandi, G., & Roig-Juñent, S.), pp. 189-199. Editorial Sociedad Entomológica Argentina, Mendoza, Argentina.
- Burckhardt, D., Queiroz, D.L., Rezende, M.Q., Queiroz, E.C., & Bouvet, J.P.R. (2012) The capsicum psyllid, *Russelliana capsici* (Hemiptera, Psylloidea), a pest on *Capsicum annuum* (Solanaceae) in Argentina and Brazil. *Mitteilungen der schweizerischen entomologischen Gesellschaft*, **85**(1-2), 71-78.
- Burckhardt, D., Ouvrard, D., Queiroz, D., & Percy, D. (2014) Psyllid host-plants (Hemiptera: Psylloidea): resolving a semantic problem. *Florida Entomologist*, **97**(1), 242-246.
- Costa, S.G.D.S., Klompen, H., Bernardi, L.F.D.O., Gonçalves, L.C., Ribeiro, D.B., & Pepato, A.R. (2019) Multi-instar descriptions of cave dwelling Erythraeidae (Trombidiformes: Parasitengona) employing an integrative approach. *Zootaxa*, **4717**(1), 137-184.
- Haitlinger, R., & Saboori, A. (1996) Seven new larval mites (Acari, Prostigmata: Erythraeidae) from Iran. *Miscel-lània Zoológica*, **19**, 117-131.
- Haitlinger, R., & Mehrnejad, M.R. (2017) First record of hosts and new metric data for *Erythraeus* (*Erythraeus*) *pistacicus* Haitlinger, Mehrnejad and Šundić 2016 with notes on *Erythraeus* hosts. *International Journal of Acarology*, **43**(4), 320-324.
- Halbert, S.E., & Manjunath, K.L. (2004). Asian citrus psyllids (Sternorrhyncha: Psyllidae) and greening disease of citrus: A literature review and assessment of risk in Florida. *Florida Entomologist*, **87**, 330-353.
- Halbert, S.E., & Núñez, C.A. (2004) Distribution of the Asian citrus psyllid, *Diaphorina citri* Kuwayama (Rhynchotha: Psyllidae) in the Caribbean basin. *Florida Entomologist*, **87**, 401-402.
- Mağol, J., & Wohltmann, A. (2012) An annotated checklist of terrestrial Parasitengona (Actinotrichida: Prostigmata) of the world, excluding Trombiculidae and Walchiidae. *Annales Zoologici*, **62**(3), 359-562.
- Ouvrard, D. (2021) Psyllist - The World Psylloidea Database. <http://www.hemiptera-databases.com/psyllist> (November 2021)
- Percy, D. (2014) Psyllids of Economic Importance. March 2021; <https://www.psyllids.org/psyllidsPests.htm>
- Proctor, H. (1998) Parasitengona. Velvet mites, chiggers, water mites. Version 09 August 1998. <http://tolweb.org/Parasitengona/2581/1998.08.09> in The Tree of Life Web Project, <http://tolweb.org/>
- Salmane, I., & Mağol, J. (2018) A brief overview and checklist of terrestrial Parasitengona mites (Actinotrichida, Trombidiformes) of Latvia. *Environmental and Experimental Biology*, **16**, 45-47.
- Serbina, L., & Burckhardt, D. (2017) Systematics, biogeography and host-plant relationships of the Neotropical jumping plant-louse genus *Russelliana* (Hemiptera: Psylloidea). *Zootaxa*, **4266**(1), 1-114.

- Stroiński, A., Felska, M., & Mąkol, J. (2013) A review of host-parasite associations between terrestrial Parasitengona (Actinotrichida: Prostigmata) and bugs (Hemiptera). *Annales Zoologici*, **63**(2), 195-221.
- Walter, D.E., & Krantz, G.W. (2009) Collecting, rearing and preparing specimens. *Manual of Acarology* (ed. Krantz G.W., & Walter, D.E.), pp. 83-95. Lubbock. Texas Tech University press, Texas.
- Xu, S., Yi, T., Guo, J., & Jin, D. (2019) The genus *Erythraeus* (Acari: Erythraeidae) from China with descriptions of two new species and a key to larval species of the genus worldwide. *Zootaxa*, **4647**(1), 54-82.