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New records of Phytoseiidae (Acari: Mesostigmata) from Mauritius

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ABSTRACT

Mauritius is one of the three islands constituting Mascareignes Archipelago, with La Réunion and Rodrigues. So far, only three mite species of the family Phytoseiidae are known from Mauritius, namely *Amblyseius caudatus*, *Euseius ovalis* and *Phytoseius coheni*. We report in this paper the results of a brief survey recently conducted on Mauritius Island, in which four additional species were found, namely *Paraphytoseius orientalis*, *Phytoseiulus persimilis*, *Scapulaseius reptans* and *Typhlodromips culmulus*.

Keywords survey; collection; taxonomy; systematics; Mascareignes**Zoobank** <http://zoobank.org/AFDFBF83-DDCE-4336-A3C1-9398EE412B1E>

Introduction

Mites of the family Phytoseiidae are best known for their predatory habits on phytophagous mites and on small insects. Some of them are used for the control of pest organisms in open fields and protected crops all around the world (McMurtry and Croft 1997; McMurtry *et al.* 2013). This family is widespread around the Globe, consisting presently of 2,521 valid species of 94 genera belonging to three sub-families (Demite *et al.* 2018).


Biodiversity surveys in poorly investigated areas might result in the discovery of additional species potentially useful for biological control as well as having more information on the biodiversity of these areas.

Most of the Indian Ocean constitutes one of the world biodiversity hotspots. The concept of biodiversity hotspot was defined by Myers (1988) in order to identify the most immediately important areas for biodiversity conservation. These hotspots hold high endemism levels and have lost at least 70% of their original natural vegetation (Myers *et al.* 2000). Knowledge of the phytoseiid diversity in these areas may contribute to future establishment of conservation programs.

Located in the Indian Ocean at 1,000 km from the eastern coast of Madagascar, together with La Réunion and Rodrigues, Mauritius is one of the three main islands constituting Mascareignes Archipelago. Only three phytoseiid species have been reported from this island (Moutia 1958, Schicha 1984, Demite *et al.* 2018). The objective of this paper is to present the phytoseiid species found in brief survey recently conducted in Mauritius.

Material and methods

The survey was conducted in September 2017 on cultivated plants of two locations. Mites were directly collected from leaves and transferred to vials with 70 % ethanol, and later mounted on microscope slides in Hoyer's medium. They were examined under a phase and DIC (differential interference contrast) microscope (DMLB, Leica Microsystemes SAS, Nanterre, France). Measurements were done using a graded eyepiece.

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Chant and McMurtry's (1994, 2007) concepts of Phytoseiidae taxonomy and the world catalogue database of Demite *et al.* (2018) were used for faunistical and biogeographical aspects. The chaetotaxy terminology used followed that proposed by Lindquist and Evans (1965) as adapted by Rowell *et al.* (1978) for Phytoseiidae for dorsal and by Chant and Yoshida-Shaul (1991) for ventral idiosomal setae, respectively.

Numbers of teeth on the fixed and movable cheliceral digits do not include the respective apical teeth. Setae not referred to in the Results section should be considered as absent.

All measurements are given in micrometers and presented as the mean in bold followed by the range in parentheses. All mites collected were measured. They were deposited in the mite reference collection of Montpellier SupAgro conserved in UMR CBGP INRA/ IRD/ CIRAD/ SupAgro/ Université de Montpellier.

The following abbreviations are used in this paper for morphological characters: **dsl** = length of dorsal shield; **dsw** = width of dorsal shield; **lisl** = length of largest inguinal sigilla (= primary metapodal plate); **lisw** = width of largest inguinal sigilla; **sisl** = length of smallest inguinal sigilla (= secondary or accessory metapodal plate); **vsl** = length of ventrianal shield; **vsw ZV2** and **vsw anus** = width of ventrianal shield at ZV2 level and at anus level; **scl** = length of spermathecal cervix; **scw** = diameter of spermathecal cervix; **fdl** = length of fixed cheliceral digit; **mdl** = length of movable cheliceral digit; **Nb. pairs pores st.** = number of pairs of pores on the sternogenital shield of the male; **Shaft of spermatod.** = length of the shaft of the spermatodactyl. The following abbreviations are used for institutions: **CBGP** = Centre de Biologie pour la Gestion des Populations; **CIRAD** = Centre International de Recherche Agronomique pour le Développement; **INRA** = Institut National de la Recherche Agronomique; **IRD** = Institut de Recherche pour le Développement; **MSA** = Montpellier SupAgro, France; **UMR** = Unité Mixte de Recherche; **UPR** = Unité Propre de Recherche.

Results and discussion

All collected phytoseiid species belong to the subfamily Amblyseiinae are identified as follows.

Subfamily Amblyseiinae Muma

Amblyseiinae Muma, 1961: 273.

Tribe Kampimodromini Kolodochka

Kampimodromini Kolodochka, 1998: 59.

Subtribe Paraphytoseiina Chant & McMurtry 2003

Paraphytoseiina Chant & McMurtry, 2003: 211.

Genus *Paraphytoseius* Swirski and Shechter

Paraphytoseius Swirski & Shechter, 1961: 113.

Amblyseius (*Paraphytoseius*) Ehara, 1967: 77.

Amblyseius (*Ptenoseius*) Pritchard & Baker, 1962: 295.

Proprioseius (*Paraphytoseius*) Karg, 1983: 302.

Ptenoseius Schuster & Pritchard, 1963: 198.

Paraphytoseius orientalis (Narayanan, Kaur & Ghai)

Typhlodromus (*Amblyseius*) *orientalis* Narayanan, Kaur & Ghai, 1960: 394.

Paraphytoseius orientalis Chant & McMurtry, 2003: 220; Moraes *et al.*, 2004: 162.

Paraphytoseius ipomeai El-Banhawy, 1984: 126 (synonym according to Chant & McMurtry 2003).

Paraphytoseius multidentatus Swirski & Shechter, 1961: 114; McMurtry & Moraes, 1984: 27; Moraes *et al.*, 1986: 104 (synonymy according to Chant & McMurtry 2003).

Paraphytoseius narayanami Ehara & Ghai *in* Ehara, 1967: 77 (synonym according to Chant & McMurtry 2003).

Paraphytoseius parabilis Chaudhri, 1967: 266 (synonym according to Matthysse & Denmark 1981).

Paraphytoseius santurcensis De Leon, 1965: 130 (synonym according to Chant & McMurtry 2003).

Paraphytoseius seychellensis Schicha & Corpuz-Raros, 1985: 71 (synonym according to Chant

Table 1 Comparison of measurements of a adult female *Paraphytoseius orientalis* collected in this study with those in previous studies (localities followed by the number of specimens measured between brackets).

Characters	Mauritius (1)	Kenya (5)	Various Countries (5)	Paratype (1)
Dsl	290	250	291 (280–304)	306
Dsw	-	150	159 (149–168)	165
j1	38	40	32 (29–37)	36
j3	83	80	83 (72–90)	81
j4	5	2–3	3 (2–3)	4
j5	-	2–3	3 (2–3)	5
j6	-	2–3	6 (5–6)	6
J5	-	9	4 (3–5)	5
z2	8	9	9 (8–10)	9
z4	10	5	9 (8–10)	11
z5	-	3	5	3
Z1	8	6	7 (6–8)	8
Z4	70	83	72 (67–77)	71
Z5	93	138	96 (90–101)	94
s4	125	127	117 (110–126)	118
r3	55	46	42 (38–46)	45
R1	33	39	28 (26–30)	25
St1-St1	-	-	-	-
St1-St3	65	65	64 (61–66)	66
St2-St2	-	60	65 (62–67)	66
St2-St3	35	-	-	-
St5-St5	-	96	82 (80–85)	79
Lisl	-	-	-	-
Lsiw	-	-	-	-
Sisl	-	-	-	-
Vsl	113	100	99	97
vsw ZV2	-	55	61 (56–64)	52
vsw anus	-	-	59 (56–62)	55
JV5	25	70	-	-
SgeI	8	-	8	6
SgeII	13	10	12 (11–13)	13
SgeIII	-	-	13 (11–14)	13
StiIII	-	-	13 (11–14)	14
SgeIV	30	28	28 (24–32)	25
StiIV	38	40	34 (33–37)	35
SbtIV	45	40	41 (40–42)	43
StiIV	48	-	38 (35–40)	36
Scl	4	5	3	-
Scw	6	-	13 (13–14)	-
Fdl	25	-	26	-
Nb teeth Fd	7	8–9	7–8	-
Mdl	28	-	28	-
Nb teeth Md	2	2	2	-

Sources of measurements - Kenya: El-Banhawy & Knapp (2011); Various countries (Burundi 1, Kenya 2, Rwanda 2) in Africa: Moraes *et al.* (2007); paratype collected in Hong Kong: Moraes *et al.* (2007). -: not provided.

& McMurtry 2003).

Specimens examined — Chamouny (20°28'55.99"S, 57°27'58.00"E, alt. 128 m), 1 ♀ on an unknown host plant, 21-IX-2017.

Previous Records — Widely distributed in all the tropical area of Africa, South America and South-East Asia.

Remarks — Measurements of most setae of the single female collected (Table 1) agree with measurements provided in the literature, except for the longer *r3*, *R1*, ventrianal shield, and macrosetae of telotarsus IV. It also has shorter *JV5* and *Sew* than reported for Kenyan specimens. This species belongs to a genus included in the great polyphagous generalist group named type III among phytoseiid mites (McMurtry and Croft 1997; McMurtry *et al.* 2013). Navasero and Navasero (2016) have studied the life history of *P. orientalis* on the broad mite as prey [*Polyphagotarsonemus latus* (Banks)]. The authors reported high predation rates of this predator on eggs of that prey, suggesting its potential for the control of this pest.

Tribe Phytoseiulini Chant & McMurtry

Phytoseiulini Chant & McMurtry, 2006: 7.

Genus *Phytoseiulus* Evans

Phytoseiulus Evans, 1952: 397.

Phytoseiulus persimilis Athias-Henriot

Phytoseiulus persimilis Athias-Henriot, 1957: 347; Moraes *et al.*, 1986: 109; Moraes *et al.*, 2004: 169; Chant & McMurtry, 2006: 20; 2007: 55. *Phytoseiulus riegeli* Dosse, 1958: 48 (synonymy according to Chant, 1959: 109).

Typhlodromus persimilis, Hirschmann, 1962: 75.

Phytoseiulus (*Phytoseiulus*) *persimilis*, Wainstein, 1962: 17.

Phytoseiulus tardi (Lombardini, 1959): 166 (synonymy according to Kennett & Caltagirone, 1968: 571).

Specimens examined — Cascavelle (20°17'12.98"S, 57°24'25.99"E, alt. 135 m), 14 ♀♀ + 4 ♂♂ + 5 immatures on *Solanum lycopersicum* L., 28-IX-2017.

Previous Records — Widely distributed in Africa, Australia, Europe, especially Mediterranean countries, South America, and Asia, probably after largely distributed commercial uses in the world, dispersion in the environment in at least some locations and establishment of this species.

Remarks — (tables 2 & 3) — Measurements of the 14 adult females collected in this work (Table 2) agree very well with measurements of the literature, especially with those of Ueckermann *et al.* (2007) obtained with a great number of specimens (29) from various African countries.

Macrosetae on basitarsus of leg IV are not serrated but macrosetae of genu and tibia are serrated and there is no pre-anal macrosetae on the ventrianal shield. These are key characters of *P. persimilis* in comparison to the closely related species *Phytoseiulus macropilis* (Banks) (Okassa *et al.* 2010).

Only few measurements of adult males are available in the literature and consequently measurements of the four males found in Mauritius are of great interest.

Four males and 14 females in a collected population with a sex ratio of nearly 4 females to one male is not exceptional for that species (Laing 1968).

Phytoseiulus persimilis is a Mediterranean / subtropical predatory mite that is a type I species, i.e. a specialist predator of the *urticae* species group of the genus *Tetranychus* (McMurtry and Croft 1997; McMurtry *et al.* 2013). Considerable research has been conducted on this predator-prey interaction (see review by Kostianen and Hoy 1996), and numerous

Table 2 Comparison of measurements of adult females of *Phytoseiulus persimilis* collected in this study with those in previous studies (localities followed by the number of specimens measured between brackets).

Characters	Mauritius (14)	Various countries (29)	Various countries (?)	Types (3)
Dsl	349 (325–375)	339 (316–369)	322 (314–330)	300–330
Dsw	217 (178–245)	227 (196–256)	224 (215–232)	-
j1	25 (20–28)	26 (22–32)	28 (25–32)	25–35
j3	42 (37–50)	42 (31–51)	42 (38–46)	45–55
j4	46 (43–50)	52 (39–72)	50 (48–52)	45–55
j5	65 (55–75)	77 (62–92)	69 (65–74)	65–70
j6	145 (128–155)	150 (114–161)	152 (145–160)	145–160
J5	5 (4–6)	5 (4–8)	6 (5–6)	5
z2	14 (13–18)	12 (7–16)	12 (10–13)	10–15
z4	57 (53–63)	58 (39–68)	61 (57–65)	45–55
z5	11 (8–13)	10 (7–15)	9 (8–12)	10–15
Z1	105 (95–115)	107 (94–124)	110 (105–115)	80–90
Z4	129 (122–139)	135 (119–152)	134 (131–138)	115–125
Z5	121 (110–128)	125 (113–137)	126 (120–132)	115–125
s4	165 (150–180)	163 (114–183)	165 (159–172)	145–160
S5	33 (25–40)	29 (20–37)	32 (25–38)	25–35
r3	24 (23–25)	24 (17–29)	23 (21–26)	-
R1	26 (25–31)	29 (22–33)	28 (25–32)	-
St1-St1	53 (45–58)	54 (47–61)	-	-
St1-St3	71 (60–78)	74 (67–82)	-	73
St2-St2	79 (75–88)	80 (69–91)	-	-
St2-St3	33 (30–35)	33 (28–37)	-	32
St3-St3	90 (80–98)	94 (83–104)	-	93
St4-St4	101 (90–115)	99 (82–120)	-	-
St5-St5	82 (75–88)	86 (76–82)	-	86
Lisl	41 (35–50)	-	-	-
Lsiw	4 (3–5)	-	-	-
Sisl	18 (13–20)	-	-	-
Vsl	76 (50–88)	81 (69–90)	93 (89–98)	-
vsw anus	76 (63–88)	77 (63–93)	-	-
JV5	46 (43–50)	45 (32–62)	40 (35–44)	-
SgeIV	84 (75–95)	83 (69–94)	84 (80–91)	90
StiIV	43 (30–50)	44 (38–48)	45 (40–48)	50
StiV	134 (125–140)	123 (108–132)	126 (110–135)	125
Scl	31 (25–38)	-	-	-
Scw	9 (7–13)	-	-	-
Fdl	26 (25–33)	-	-	-
Nb teeth Fd	6	-	-	-
Mdl	26 (25–30)	-	-	-
Nb teeth Fd	3	-	-	-

Sources of measurements - Various countries (Spain 7, Italy 4, Syngenta Bioline rearings 11, Tunisia 7) in Europe and Northern Africa: Okassa *et al.* (2010); various countries (Sicily, Italy; Valparaiso, Chile; California, USA and Sydney, Australia) in the world: Takahashi and Chant (1993); type material collected in Algeria: Athias-Henriot (1957). -: not provided.

biological control programs have used *P. persimilis* against *T. urticae* on a wide range of ornamental and vegetable crops. *Phytoseiulus persimilis* was the first greenhouse biological control agents available commercially and it is one of the most successful biological control agents. It can also be used in temperate climates on open-field crops such as strawberries. Optimum conditions are 20-27 °C and relative humidity of 60-90 %. Cooler or warmer temperatures may have a negative effect on reproduction, development and efficiency of this predatory mite. This species is present in Mauritius probably because of its commercial introduction and uses in vegetable and ornamental greenhouses, dispersion of some specimens released and establishment in the environment. This species is actually reared and sold in La Réunion and commercialised in Mascareignes since a long time (Quilici, personal communication).

Table 3 Comparison of measurements of adult males of *Phytoseiulus persimilis* collected in this study with those in previous studies (localities followed by the number of specimens measured between brackets).

Characters	Mauritius (3)	Various countries (?)	Types (1)
Dsl	293 (263–325)	-	265
Dsw	215 (200–250)	-	-
j1	21 (20–25)	-	-
j3	42 (40–45)	-	-
j4	51 (50–55)	-	-
j5	60 (53–68)	-	-
j6	111 (105–113)	-	95–105
J5	5	-	-
z2	19 (18–20)	-	-
z4	58 (54–63)	-	-
z5	12 (10–13)	-	-
Z1	79 (75–85)	-	-
Z4	99 (83–116)	-	95–105
Z5	81 (75–88)	-	95–105
s4	122 (113–130)	-	95–105
S5	32 (30–35)	-	-
r3	20	-	-
R1	28 (25–30)	-	-
St1-St1	53 (50–54)	-	50–55
St1-St5	128	-	-
St2-St2	67 (65–70)	-	70
St2-St3	35 (33–37)	-	-
St3-St3	69 (68–70)	-	70
St4-St4	62 (60–63)	-	60–65
St5-St5	51 (48–54)	-	50–55
Nb. pairs pores st. sh	3	-	-
Vsl	129 (110–150)	122 (118–128)	120
vsw ZV2	137 (110–163)	125 (113–139)	-
vsw anus	75	-	-
JV5	42 (40–43)	-	-
SgeIV	62 (58–65)	-	70
StiIV	35 (33–35)	-	-
StiV	97 (92–100)	-	90
Fdl	20	-	-
Nb teeth Fd	-	-	-
Mdl	21 (20–23)	-	-
Nb teeth Md	-	-	-
Schaft of spermatod.	23 (20–25)	34 (32–36)	-

Sources of measurements - Various countries (Sicily, Italy; Valparaiso, Chile; California, USA and Sydney, Australia) in the world: Takahashi and Chant (1993); type material collected in Algeria: Athias-Henriot (1957). -: not provided.

Table 4 Comparison of measurements of adult females of *Scapulaseius reptans* collected in this study with those in previous studies (localities followed by the number of specimens measured between brackets).

Characters	Mauritius (2)	Madagascar (5)
Dsl	303–305	290
Dsw	185–188	190
<i>j1</i>	23	21
<i>j3</i>	20–23	15
<i>j4</i>	8	8
<i>j5</i>	8	7
<i>j6</i>	10	10
<i>J2</i>	8–9	10
<i>J5</i>	8	7
<i>z2</i>	18–20	16
<i>z4</i>	23	16
<i>z5</i>	8	18
<i>Z1</i>	10	10
<i>Z4</i>	56–53	48
<i>Z5</i>	72–75	70
<i>s4</i>	28	25
<i>S2</i>	22–25	18
<i>S4</i>	18–23	15
<i>S5</i>	18–20	14
<i>r3</i>	18	15
<i>R1</i>	13	15
<i>St1-St1</i>	50	-
<i>St1-St3</i>	53–56	-
<i>St2-St2</i>	60	-
<i>St2-St3</i>	20–22	-
<i>St3-St3</i>	65	-
<i>St4-St4</i>	65–78	-
<i>St5-St5</i>	60	-
<i>Lisl</i>	18–23	-
<i>Lsiw</i>	4–5	-
<i>Sisl</i>	10–13	-
<i>Vsl</i>	98–100	98
<i>vsw ZV2</i>	85–87	78
<i>vsw anus</i>	68–70	-
<i>JV5</i>	28	24
<i>SgeI</i>	23	-
<i>SgeII</i>	13–15	-
<i>SgeIII</i>	18	-
<i>STiIII</i>	18	-
<i>SgeIV</i>	28	27
<i>StiIV</i>	23–25	20
<i>StIV</i>	50–53	50
<i>Scl</i>	30–35	45
<i>Scw</i>	2	2
<i>Fdl</i>	25	26
Nb teeth Fd	9	8
Mdl	25	26
Nb teeth Md	3	3

Sources of measurements - Madagascar: Blommers (1974). -: not provided.

Tribe Typhlodromipsini Chant & McMurtry

Typhlodromipsini Chant & McMurtry, 2005: 318.

Genus *Scapulaseius* Karg & Oomen-Kalsbeek

Scapulaseius Karg & Oomen-Kalsbeek, 1987: 132.

Amblyseius (*Scapulaseius*) Karg & Oomen-Kalsbeek, 1987: 132.

newsami group of *Typhlodromus* (*Amblyseius*), Chant, 1959: 95.

markwelli species group of *Amblyseius*, Schicha, 1987: 25.

japonicus species group of *Amblyseius*, Schicha, 1987: 26.

oguroi species group of *Amblyseius*, Wu & Ou, 1999: 103.

Scapulaseius, Chant & McMurtry, 2005: 331.

Scapulaseius reptans (Blommers)

Amblyseius (*Amblyseius*) *reptans* Blommers, 1974: 145.

Typhlodromips reptans, Moraes *et al.*, 1986: 146; Moraes *et al.*, 2004: 222.

Scapulaseius reptans, Chant & McMurtry, 2005: 335; Chant & McMurtry, 2007: 68.

Specimens examined — Chamouny (20°28'55.99"S, 57°27'58.00"E, alt. 128 m), 2 ?? and 1 ? on an unknown host plant, 21-IX-2017.

Previous Records — La Réunion, Madagascar.

Remarks — Measurements of collected females are consistently longer than reported for the type specimens (Table 4). Measurements of the only male specimen collected (Table 5) are more variable in comparison with the type specimens. In Mauritius specimen, setae *s4*, *Z4*, *Z5* and macrosetae *SgeIV* are longer but setae *z2*, *z4*, *S2*, *S4*, and *S5* are shorter than type specimens. The rest of the measurements however agree well with the original description of Blommers (1974) and with our own measurements of females and males collected in La Réunion Island (Quilici *et al.* 2000 and Kreiter *et al.* in prep.).

Species of this genus *Scapulaseius* are supposed to be of type III (McMurtry and Croft 1997; McMurtry *et al.* 2013), i.e. a polyphagous generalist predator. However, the biology of *S. reptans* remains totally unknown.

Genus *Typhlodromips* De Leon

Typhlodromips De Leon, 1965: 23; Moraes *et al.*, 2004: 205 (in part); Chant & McMurtry, 2005: 323. *Amblyseius* (*Typhlodromips*), Wainstein, 1983: 313.

Typhlodromips culmulus (Van der Merwe)

Amblyseius (*Amblyseius*) *culmulus* Van der Merwe, 1968: 132; Ueckermann & Loots, 1988: 157.

Typhlodromips culmulus, Moraes *et al.*, 1986: 139; 2004: 210; Chant & McMurtry, 2005: 327; 2007: 61.

Specimens examined — Chamouny (20°28'55.99"S, 57°27'58.00"E, alt. 128 m), 1 ? on an unknown host plant, 21-IX-2017.

Previous Records — Kenya, Lesotho, South Africa.

Remarks — Measurements of the single adult female collected (Table 6) agree with those of the literature, except for the shorter *Z4*, *JV5*, macrosetae *SgeII* and *StiIV*.

Species of this genus are supposed to belong to the type III (McMurtry and Croft 1997; McMurtry *et al.* 2013), i.e. a polyphagous generalist predator. However, the biology of *T. culmulus* remains totally unknown.

Table 5 Comparison of measurements of one adult male of *Scapulaseius reptans* collected in this study with those in previous study (localities followed by the number of specimens measured between brackets).

Characters	Mauritius (1)	Madagascar (3)
Dsl	255	250
Dsw	175	170
j1	18	16
j3	25	20
j4	10	7
j5	10	8
j6	10	8
J2	10	8
J5	6	3
z2	13	16
z4	13	16
z5	10	6
Z1	13	9
Z4	33	20
Z5	50	35
s4	25	20
S2	10	20
S4	10	15
S5	9	13
r3	15	14
R1	13	13
St1-St1	47	-
St1-St5	105	-
St2-St2	53	-
St2-St3	25	-
St3-St3	55	-
St4-St4	40	-
St5-St5	35	-
Vsl	113	105
vsw ZV2	135	-
vsw anus	60	-
JV5	20	17
SgeI	25	-
SgeII	20	-
SgeIII	25	-
StiIII	20	-
SgeIV	35	19
StiIV	20	15
StIV	48	45
Fdl	20	-
Nb teeth Fd	8	8
Mdl	23	-
Nb teeth Md	1	1
Shaft	17	15

Sources of measurements - Madagascar: Blommers (1974). -: not provided.

Discussion

Until now, the only phytoseiid species reported from Mauritius (Demite *et al.* 2018) were: *Amblyseius caudatus* Berlese, associated with *Polyphagotarsonemus latus* (Banks) on chilli pepper (*Capsicum annuum* L.), with various eriophyid mites on sugarcane (*Saccharum officinarum* L.) and buffalograss (*Panicum maximum* Jacquemin), in undetermined localities (Moutia 1958); *Euseius ovalis* (Evans), associated with *Raoeilla indica* Hirst on coonut (*Cocos nucifera* L.), with *Tetranychus cucurbitae* Rahman and Sapra and *Tetranychus marianae* McGregor on eggplant (*Solanum melongena* L.) and *Solanum nigrum* L., and with *Eotetranychus* sp. on apple (*Malus domestica* L.), in undetermined localities (Moutia 1958); and *Phytoseius coheni*

Table 6 Comparison of measurements of an adult female of *Typhlodromips culmulus* collected in this study with those in previous studies (localities followed by the number of specimens measured between brackets).

Characters	Mauritius (1)	Kenya (2)	South Africa (1)	Types (2)
Dsl	313	300	355	334
Dsw	200	200	235	208
j1	18	18	21	19
j3	20	18	24	22
j4	10	9	11	9
j5	10	9	11	9
j6	10	10	11	13
J2	13	14	11	16
J5	10	7	11	9
z2	13	12	15	13
z4	13	12	15	13–14
z5	10	7	11	9
Z1	13	10	11	13–15
Z4	33	35	44	38–39
Z5	75	70	82	69–74
s4	28	25	38	30–32
S2	13	12	11	13
S4	10	8	11	9
S5	8	8	11	9
r3	15	15	19	16
R1	13	12	15	13
St1-St1	50	-	-	-
St1-St3	55	52	65	47
St2-St2	60	58	65	52–54
St2-St3	23	-	-	-
St3-St3	65	-	-	-
St4-St4	60	-	-	-
St5-St5	68	66	85	60–62
Lisl	-	-	-	-
Lsiw	-	-	-	-
Sisl	-	-	-	-
Vsl	113	105	115	110
vsw ZV2	85	82	90	82–85
vsw anus	63	-	-	79–82
JV5	33	36	39	-
SgeI	30	-	-	30–32
SgeII	18	28	33	25–28
SgeIII	30	28	33	28
StiIII	28	-	-	22–26
SgeIV	48	46	54	47–49
StiIV	30	40	45	41
StIV	58	55	66	63
Scl	-	2,5	3	2
Scw	-	14	12	-
Fdl	25	-	-	22–25
Nb teeth Fd	5–6	7	8	11–12
Mdl	25	-	-	25–26
Nb teeth Fd	3	3	3	3

Sources of measurements – Kenya: El-Banhawy & Knapp (2011); South Africa: Van der Merwe (1968); type material (the holotype and one paratype) collected in South Africa: Moraes *et al.* (2007a). -: not provided.

Swirski & Shechter, on *Cotoneaster* sp., in Curepipe (20°19'1.5"S, 57°31'35.5"E, alt. 561 m) (Schicha 1984). After a brief survey done in two locations, the number of species known from Mauritius Island increased to seven, of which six belong to Amblyseiinae (*A. caudatus*, *E. ovalis*, *P. orientalis*, *P. persimilis*, *S. reptans*, *T. culmulus*) and one to Phytoseiinae (*P. coheni*). No Typhlodrominae was found until now. Two of them are well-known biological control

agents, namely *P. persimilis* and *P. orientalis*, and may have great interest for agriculture of the island. The first species for the history of success in the control of *T. urticae*, and the second has apparently high potential for the control of *P. latus*. The biology of the two other species remains unknown and consequently their potential for biological control. Finding local species potentially useful for biological control purpose is particularly important nowadays because new regulations of many countries of the world makes more difficult the importation of macro-organisms for biological control purposes. Importation permits must be requested, but it is expensive and chances to obtain are generally very low in many countries (Kreiter *et al.* 2016). Hence, knowledge of the biodiversity, especially of efficient biological control agents becomes progressively more important, not only for conservation, but also for agricultural and economic reasons.

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