

New records of phytoseiid mites from Mauritius Island (Acari: Mesostigmata)

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Original research

ABSTRACT

Mauritius is one of the three main islands constituting Mascareignes Archipelago, with La Réunion and Rodrigues. So far, fourteen mite species of the family Phytoseiidae had been reported from this island. We report in this paper the results of a survey conducted at the end of 2018 in Mauritius Island, in which 12 additional species were firstly recorded.

Keywords survey; collection; predators; taxonomy; systematics

Introduction

Mites of the family Phytoseiidae are known for their predatory behaviors on phytophagous mites and small insects on cultivated plants and wild vegetation. Several species are used for the control of pest organisms in agricultural open fields and above all protected crops all around the world (McMurtry and Croft 1997; McMurtry *et al.* 2013). This family is widespread around the world, present on all inhabited continents and consists presently of 2,521 valid species of 94 genera belonging to three sub-families (Demite *et al.* 2020).

Biodiversity surveys in poorly investigated areas is still an urgent need and might resulted in the discovery of additional species potentially useful for biological control as well as having more information on the biodiversity of these areas (Kreiter *et al.* 2018a, b, c, 2020a, b, c).

Most of the Indian Ocean constitutes one of the world's biodiversity hotspots, a concept defined by Myers (1988) in order to identify the most immediately important areas for biodiversity conservation. The characteristics of these hotspots are to 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, Mauritius is one of the three main islands constituting Mascareignes Archipelago, together with La Réunion and Rodrigues.

Only three phytoseiid species had been reported from this island for a long time (Moutia 1958, Schicha 1984, Demite *et al.* 2020), namely *Amblyseius caudatus* Berlese, *Euseius ovalis* (Evans) and *Phytoseius coheni* Swirski and Shechter. Kreiter *et al.* (2018a) had reported the occurrence of four additional species, namely *Paraphytoseius orientalis* (Narayanan, Kaur and Ghai), *Phytoseiulus persimilis* Athias-Henriot, *Scapulaseius reptans* (Blommers) and *Typhlodromips culmulus* (van der Merwe). Ferragut and Baumann (2019) had added eight additional species to these seven previous ones: *Scapulaseius asiaticus* (Evans), *Amblyseius largoensis* (Muma), *A. passiflorae* Blommers, *A. tamatavensis* Blommers, *Transeius pungi* Ferragut, *Phytoseius haroldi* Ueckermann and Kreiter, *P. crinitus* Swirski and Shechter and *Typhlodromus (Anthoseius) recurvitremus* Ferragut, bringing the number of recorded species for the Mauritius' fauna to 15.

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The objective of this paper is to present the phytoseiid mites species reported in a new survey conducted in October and November 2018 in Mauritius.

Materials and methods

The survey took place in Mauritius at the end of October and beginning of November 2018. Plant inhabiting mites were collected from cultivated and wild plants in several locations of the island. Mites were directly collected on leaves with a fine brush or by beating the plants and collecting the mites in a black plastic rectangular saucer 45 x 30 cm (Ref. STR 45, BHR, 71370 Saint-Germain-du-Plain, France), depending on the plant investigated:

- large leaves of shrubs and trees with the direct collection method or by beating;
- very small leaves or spiny shrubs and trees with the beating method;
- and herbaceous plants with a brush.

Collected mites were then transferred with a brush into small plastic vials containing 1.5 ml of 70% ethanol. Mites were then all mounted on glass slides using Hoyer's medium and all identified using a phase and interferential contrast microscope (DMLB, Leica Microsystems SAS, Nanterre, France). Characters of specimens were measured using a graded ocular micrometre (Leica, see above).

Chant and McMurtry's (1994, 2007) concepts of the taxonomy of the family Phytoseiidae and the world catalogue database of Demite *et al.* (2014, 2020) were used for identification and for distribution and information on descriptions and re-descriptions, respectively. The setal nomenclature system adopted was that of Lindquist and Evans (1965) and Lindquist (1994) as adapted by Rowell *et al.* (1978) and Chant and Yoshida-Shaul (1992) for the dorsum and by Chant and Yoshida-Shaul (1991) for the venter. The notation for solenostomes and poroids is based on Athias-Henriot (1975). 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 micrometres (µm) and presented with the mean in bold followed by the range in parenthesis.

Specimens of each species are deposited in the mite collections of Montpellier SupAgro conserved in UMR CBGP INRA/IRD/CIRAD/SupAgro/University of Montpellier.

Specimens collected in fields in Mauritius within these surveys were all identified and only very few single males or immatures collected during this study are not taken into account.

The following abbreviations are used in this paper for morphological characters: **dsl** = dorsal shield length just under *j1* to just below *J5*; **dsw** = dorsal shield width at the level of *s4*; **Z4 ser.**, **Z5 ser.** = *Z4*, *Z5* serrated (if *Z4* and *Z5* without ser. = not serrated); **gensl** = genital shield length; **gensw post. cor.** = genital shield width posteriorly; **lisl** = Largest inguinal sigilla (= "metapodal plate") length; **lisw** = Largest inguinal sigilla (= "metapodal plate") width; **sisl** = smallest inguinal sigilla (= "metapodal plate") length; **sisw** = smallest inguinal sigilla (= "metapodal plate") width; **vsl** = ventrianal shield length; **gv3 - gv3** = distance between solenostomes *gv3* on the ventrianal shield; **vsw ZV2 & vsw anus** = ventrianal shield width at *ZV2* level and at paranal setae level; **scl.** = calyx length; **scw** = calyx widest width; **Fdl** = fixed digit length; **Mdl** = movable digit length; **Nb teeth Fd** = number of teeth on the fixed digit; **Nb teeth Md** = number of teeth on the movable digit; **Shaft** = length of the shaft of spermatodactyl; **toe** = length of the toe; **BCA** = Biological control agent; **aasl** = altitude above sea level.

The following abbreviations are used in this paper 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.

Results and discussion

We have collected a total of 22 species, 21 being presented thereafter (a new species will be described in a following paper).

Subfamily Amblyseiinae Muma

Amblyseiinae Muma 1961: 273.

Tribe Neoseiulini Chant & McMurtry

Neoseiulini Chant & McMurtry 2003a: 6

Genus *Neoseiulus* Hughes

Neoseiulus Hughes 1948: 141.

Neoseiulus houstoni Schicha

Neoseiulus houstoni, Schicha 1987: 111; Chant & McMurtry 2003a: 23; Moraes *et al.* 2004: 123.

Neoseiulus recifensis Gondim Jr. & Moraes 2001: 77 (synonymy according to Kreiter *et al.* 2020c).

Neoseiulus barreti Kreiter in Furtado *et al.* 2005: 135 (synonymy according to Kreiter *et al.* 2020c).

This species belongs to the *cucumeris* species group of *Neoseiulus*. It was collected on *Vigna unguiculata* (L.) Walpers in Queensland, Australia and described by Schicha (1987). Then described a long time after under two different species names, *N. recifensis* Gondim Jr and Moraes and *N. barreti* Kreiter. Kreiter *et al.* (2020c) had put those two species as junior synonyms of *N. houstoni* and described for the first time the male of *N. houstoni*. Biology of this species remains totally unknown and it is the first record from Mauritius.

World distribution: Australia, Brazil, Reunion Island.

Specimens examined: 2 ♀♀ in total. **Pamplemousse**, Botanical Garden (altitude above sea level = aasl 41 m, lat. 20°06'24" S, long. 57°34'49" E), 1 ♀ on *Acacia glauca* Willdenow (Fabaceae), 3/XI/2018; **Bel Ombre**, Resorts (aasl 11 m, lat. 20°06'24" S, long. 57°34'49" E), 1 ♀ on *Thespesia populneoides* (L.) Solander ex Corrêa (Malvaceae), 5/XI/2018.

Remarks: morphological and morphometric characters and all measurements fit well measurements in Kreiter *et al.* (2020c). This species was described from Australia, but recorded also in Brazil and was first mentioned in the Indian Ocean from La Réunion Island, an Island distant of only 225 km from Mauritius. Several species were shared by the two Islands and probably by many others.

Tribe Kampimodromini Kolodochka

Kampimodromini Kolodochka 1998: 59; Chant & McMurtry 2003b: 189, 2006: 137, 2007: 33.

Subtribe Paraphytoseiina Chant & McMurtry

Paraphytoseiina Chant & McMurtry 2003b: 211.

Genus *Paraphytoseius* Swirskii & Shechter

Paraphytoseius Swirski & Shechter 1961: 113; Moraes *et al.* 1986: 104, 2004: 160; Chant & McMurtry 2003b: 216, 2007: 49.

***Paraphytoseius horrifer* (Pritchard & Baker)**

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

Amblyseius horrifer, Meyer & Rodrigues 1966: 30.

Amblyseius (*Paraphytoseius*)* *horrifer*, van der Merwe 1968: 169.

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

Paraphytoseius horrifer, Moraes *et al.* 1986: 105, 2004: 152; Beard 2001: 84; Chant & McMurtry 2003a: 37, 2007: 53.

In our specimens of this genus, setae *S5* are absent. So accordingly, with Chant and McMurtry (2003b) all specimens belong to the *orientalis* species group. Accordingly, with these previous authors, and with Moraes *et al.* (2007), we consider that *P. horrifer* and *P. orientalis* are different valid species. Our specimens with longer setae *s4*, *Z4*, *Z5*, and lacking a distinctly short, thick, spatulate macroseta on genu I belongs to the former species. *Paraphytoseius horrifer* is widely distributed in Sub-Saharan Africa and Madagascar. Its biology remains totally unknown and it is the first record from Mauritius.

World distribution: Benin, DR Congo, Ghana, India, Kenya, La Réunion Island, Madagascar Island, Malawi, Mozambique, Senegal, South Africa, Uganda.

Specimens examined: 10 ♀♀ in total. **Curepipe**, Anderson street (aasl 540 m, lat. 20°19'11" S, long. 57°31'52" E), 1 ♀ on *Litsea monopetala* (Roxburgh) Person and 1 ♀ on *Litsea glutinosa* (Loureiro) C.B. Robinson (Lauraceae), 27/X/2018; **Côte d'Or**, Bridge (aasl 443 m, lat. 20°15'26" S, long. 57°32'21" E), 1 ♀ on *Tristemma mauritianum* J.F. Gmelin (Melastomataceae), 28/X/2018; **Curepipe**, Botanical Garden (aasl 540 m, lat. 20°19'28" S, long. 57°30'50" E), 6 ♀♀ on *Rubus alceifolius* Poiret (Rosaceae) and 1 ♀ on *Clidemia hirta* (L.) D. Don (Melastomataceae), 29/X/2018.

Remarks: morphological and morphometric characters and all measurements fit well measurements in Kreiter *et al.* (2020b, c). This species was described from Africa (Pritchard and Baker 1962), but recorded also in Vietnam (Kreiter *et al.* 2020b) and was first mentioned in the Indian Ocean from La Réunion Island by Kreiter *et al.* (2020c), an Island distant of only 225 km from Mauritius with several species shared by the two Islands (this study and Kreiter *et al.* 2020c).

***Paraphytoseius orientalis* (Narayanan, Kaur & Ghai)**

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

Paraphytoseius orientalis, Moraes *et al.* 1986: 105, 2004: 162; Chant & McMurtry 2003b: 220, 2007: 53.

Amblyseius ipomeai Narayanan, Kaur & Ghai 1960: 394 (synonymy according to El-Banhawy 1984).

Paraphytoseius multidentatus Swirski & Shechter 1961: 114 (synonymy according to Matthyse & Denmark 1981 in Denmark *et al.* 1999).

Paraphytoseius narayanani Ehara 1967: 67 (synonymy according to Ehara & Ghai, in Ehara 1967).

This species belongs to the genus *Paraphytoseius* and to the *orientalis* species group (Chant and McMurtry 2003b). Our specimens with relatively shorter setae *s4*, *Z4* and *Z5*, having a distinctly short, thick, spatulate macroseta on genu I is belonging to the species *P. orientalis*. It is widely distributed in tropical and subtropical areas in South America, Africa and Asia. It belongs to a genus included in the large polyphagous generalist group named type III phytoseiid mites (McMurtry and Croft 1997; McMurtry *et al.* 2013). Navasero and Navasero (2016) had studied the life history of *P. orientalis* on the broad mite (*Polyphagotarsonemus latus*) (Banks) as prey and reported high predation rates on the eggs of *P. latus*, suggesting good potential for the control of this pest. *Paraphytoseius orientalis* had been collected before in Mauritius (Kreiter *et al.* 2018a; Ferragut and Baumann 2019).

World distribution: Argentina, Brazil, Burundi, India, Japan, Kenya, La Réunion Island, Madagascar Island, Martinique Island, Mauritius Island, Mozambique, Rwanda.

Specimens examined: 20 ♀♀ and 3 ♂♂ in total. **Rivière des Anguilles**, Bridge (aasl 158 m, lat. 20°28'49" S, long. 57°33'37" E), 1 ♀ on *Solanum mauritianum* Scopoli (Solanaceae), 31/X/2018; **Réserve Nationale de Pétrins**, Chemin de Maccabée (aasl 676 m, lat. 20°29'26" S, long. 57°33'31" E), 19 ♀♀ and 3 ♂♂ on *Urena lobata* L. (Malvaceae), 6/XI/2018.

Remarks: this species was reported before by Kreiter *et al.* (2018a), but with only one female collected. Ferragut and Baumann (2019) had also reported *P. orientalis*, but with a lot of specimens. Morphological and morphometric characters and all measurements fit well measurements in Ferragut and Baumann (2019) and Kreiter *et al.* (2020b, c). This species was described from Asia (Narayanan *et al.* 1960) and recently recorded from Vietnam (Kreiter *et al.* 2020b), and also in La Réunion Island (Kreiter *et al.* 2020c). It seems more common than *P. horrifera* in Mauritius Island.

Tribe Typhlodromipsini Chant & McMurtry

Typhlodromipsini Chant & McMurtry 2005c: 318.

Genus *Scapulaseius* Karg & Oomen-Kalsbeek

Scapulaseius Karg & Oomen-Kalsbeek 1987: 132; Chant & McMurtry 2005c: 331, 2007: 65.

Scapulaseius asiaticus (Evans)

Typhlodromus asiaticus Evans 1953: 461.

Typhlodromus (*Amblyseius*) *asiaticus*, Chant 1959: 80.

Amblyseius (*Typhlodromopsis*) *asiaticus*, Muma 1961: 289.

Amblyseius (*Amblyseius*) *asiaticus*, Ehara 1966: 20; Ehara & Bhandhufalck 1977: 58.

Amblyseius asiaticus, Carmona 1968: 280; Gupta, 1975: 32.

Amblyseius (*Neoseiulus*) *asiaticus*, Ehara 2002: 127.

Typhlodromips asiaticus, Moraes *et al.* 2004: 207.

Scapulaseius asiaticus, Chant & McMurtry 2005b: 335, 2007: 67.

Scapulaseius linearis Corpuz & Rimando 1966: 125 (synonymy according to Schicha & Corpuz-Raros 1992).

Scapulaseius siaki Ehara & Lee 1971: 64 (synonymy according to Ehara & Bhandhufalck 1977).

Species of this genus 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. asiaticus* remains totally unknown. This species had been collected before in Mauritius (Kreiter *et al.* 2018a; Ferragut and Baumann 2019).

World distribution: Angola, China, Cyprus, Hong Kong, India, Indonesia, Malaysia, Philippines, Singapore, Sri Lanka, Thailand, Vietnam.

Specimens examined: 27 ♀♀ and 5 ♂♂ in total. **Côte d'Or**, Village (aasl 443 m, lat. 20°15'26" S, long. 57°32'21" E), 2 ♀♀ on *Clibadium surinamense* L. (Asteraceae), 28/X/2018; **Curepipe**, Trou aux cerfs (aasl 593 m, lat. 20°19'04" S, long. 57°30'47" E), 1 ♀ on *Rubus apetalus* Poiré (Rosaceae), 29/X/2018; **Mare aux Vacoas** (aasl 572 m, lat. 20°21'40" S, long. 57°29'59" E), 11 ♀♀ on *Tibouchina heteromalla* Cogniaux (Melastomataceae) and 2 ♀♀ on *Litsea monoptera* (Roxburgh) Pers. (Lauraceae), 30/X/2018; **Quartier Militaire** (aasl 472 m, lat. 20°19'11" S, long. 57°36'05" E), 1 ♀ on *Clidemia hirta* (L.) D. Don (Melastomataceae), 1/XI/2018; **Curepipe**, Bld Pasteur (aasl 510 m, lat. 20°19'21" S, long. 57°31'45" E), 1 ♀ on *Ageratum conyzoides* L. (Asteraceae), 4/XI/2018; **Curepipe**, Anderson street (aasl 560 m, lat. 20°19'11" S, long. 57°31'52" E), 5 ♀♀ and 3 ♂♂ on *Erigeron canadensis* (L.) Cronquist (Asteraceae) and 3 ♀♀ and 2 ♂♂ on *Sonchus oleraceus* L. (Asteraceae), 4/XI/2018; **Mare**

aux Vacoas (aasl 581 m, lat. 20°22'05" S, long. 57°29'31" E), 1 ♀♀ on *Ludwigia octovalvis* (Jacquemin) P.H.Raven (Onagraceae), 5/XI/2018.

Remarks: *Scapulaseius asiaticus* was described by Evans (1953) under the name *Typhlodromus asiaticus* from specimens collected in Java island, Indonesia. The closely related *Scapulaseius reptans* (Blommers) was described by Blommers in 1974 from Madagascar in Tamatave from specimens collected on *Psidium guajava* L.

Character measurements of 12 of the 27 females (Table 1) and of the five males (Table 2) collected in Mauritius agree very well with those obtained from specimens of *S. asiaticus* or *S. reptans*. We consider so far that our specimens can be anyone of the two species and that examination of the specimens collected in this study can lead to anyone of the two species. Consequently, the morphometrics strongly suggest synonymy.

There are however some discrepancies between our measurements and observations and previous descriptions of the two species. In the two descriptions:

- dorsal shield is reticulated in the description of *S. reptans* in the anterior lateral margins and on all the posterior part of the dorsal shield except the centre. This was not illustrated in the original description of *S. asiaticus* by Evans (1953), but was illustrated by Ehara and Bhandhufalck (1977) and by Ferragut and Baumann (2019);
- Ehara and Bhandhufalck (1977) pointed out that the seta *R1* is inserted on a lateral projection of the dorsal shield, trait taken back also by Ferragut and Baumann (2019). *Scapulaseius reptans* is morphologically very close to *S. asiaticus*, but with setae *R1* located off the dorsal shield in the description of Blommers (1974). Taking this trait into consideration as an apomorphic character, Chant and McMurtry (2005c) placed the two species within different groups, *S. asiaticus* in the *asiaticus* species group characterized by having *R1* on the dorsal shield and *S. reptans* in the *ficilocus* species group with species bearing *R1* on the lateral integument. However, in *S. asiaticus* the position of this seta is variable even among individuals of the same population. Ehara and Bhandhufalck (1977) were the first to mention this variability. Ferragut and Baumann (2019) had examined 19 females from Mauritius: eleven females (58%) have both *R1* setae on the dorsal shield, four females (26%) have one setae of the pair on a lateral projection of the shield and the other on the soft integument, and three females (16%) have both setae *R1* on the lateral integument. If the majority of specimens have both or one seta on the dorsal shield, 16% is not a negligible proportion;
- a peculiar trait in *S. asiaticus* not mentioned by previous authors and especially by Blommers (1974) for *S. reptans* is the position of the dorsal solenostome *gd3*. Ferragut and Baumann (2019) stated that while in females of the family Phytoseiidae, this pore-like structure is usually placed on the peritremal plate, in *S. asiaticus*, it is on the lateral integument, between the peritremal and dorsal shields, posterior to setae *r3* and close to the margin of dorsal shield.

Our examination of the material collected in Mauritius (this study) and Vietnam (Kreiter *et al.* 2020b) and identified as *S. asiaticus* and of the material collected in Mauritius (Kreiter *et al.* 2018a) and in La Réunion (Kreiter *et al.* 2020c) and identified as *S. reptans* along with the original descriptions of *S. asiaticus* and *S. reptans* shows:

- Re-examination of our specimens from La Réunion (Kreiter *et al.* 2020c) and of Mauritius (Kreiter *et al.* 2018a) show that the dorsal shields of the two species present exactly the same reticulation as drawn by Blommers (1974) for the description of *S. reptans* and in Ehara and Bhandhufalck (1977) for the redescription of *S. asiaticus*;
- In our 27 specimens females of Mauritius (this study), we have 21 females out of 27 (77.8%) with *R1* on the dorsal shield, four females / 27 (14.8%) with one of these setae on and the other one off shield and two females / 27 (7.4%) with setae *R1* both off shield,

compared to 58, 26 and 16% for Ferragut and Baumann (2019), respectively. In specimens from Vietnam (Kreiter *et al.* 2020b), we had four females out of seven (57.1%) with *RI* on the dorsal shield, only one female / seven (14.3%) with one of these setae on and the other one off shield and two females / seven (28.6%) with setae *RI* both off shield. In the two specimens from Maurice (Kreiter *et al.* 2018a), both specimens have *RI* on the dorsal shield. And in the two female specimens from La Réunion (Kreiter *et al.* 2020c), one specimen has both *RI* on the dorsal shield, but the other specimens have one seta on and the other one off the dorsal shield.

- solenostomes *gv3* are on integument in all our specimens from Mauritius (this study), from Vietnam (Kreiter *et al.* 2020b), but also on those from Mauritius (Kreiter *et al.* 2018a) and La Réunion (Kreiter *et al.* 2020c) previously identified as *S. reptans*.

Given this variability in *S. asiaticus*, we agree with Ferragut and Baumann (2019) that the taxonomic status of *S. reptans* is uncertain, because the holotype used to describe the latter species could represent, in fact, a female of *S. asiaticus* with setae *RI* outside their most common position. Setal measurements and other morphological features of the specimens collected in Mauritius agree well with both, with those of the original description and subsequent redescrptions of *S. asiaticus* by Ehara and Bhandhufalck (1977), Moraes *et al.* (2004), Oliveira *et al.* (2012), Karmakar and Bhowmik (2018) and Ferragut and Baumann (2019); as well as with the morphological data provided in the original description of *S. reptans*, and the redescrptions given by Kreiter *et al.* (2018a, 2020c).

Considering all this information, we can conclude that our specimens from Mauritius (this study and Kreiter *et al.* 2018a) and from La Réunion (Kreiter *et al.* 2020c) must be all identified as *S. asiaticus*. Previous specimens collected in La Réunion Island (Kreiter *et al.* 2020c) and in Mauritius Island (Kreiter *et al.* 2018a) and previously identified as *S. reptans* are consequently belonging all to *S. asiaticus*. Consequently, this is the third report of that species in Mauritius Island after Kreiter *et al.* (2018a) and Ferragut and Baumann (2019).

Unfortunately, the confinement during the Covid-19 pandemic has not given us the possibility to borrow type materials of both species in order to compare specimens of the two species. Despite this fact, we strongly suspect just like Ferragut and Baumann (2019) that *S. reptans* is a junior synonym of *S. asiaticus*.

Tribe Amblyseiini Muma

Amblyseiinae Muma 1961: 273..

Amblyseiini Muma, Wainstein 1962: 26.

Subtribe Amblyseiina Muma

Amblyseiina Muma, Chant & McMurtry 2004: 179.

Genus Amblyseius Berlese

Amblyseius Berlese 1914: 143.

Amblyseius haleakalus Prasad

Amblyseius haleakalus Prasad 1968: 1516; Moraes *et al.* 1986: 14, 2004: 27; Denmark & Muma 1989: 97; Chant & McMurtry 2004: 199, 2007: 78; Denmark & Evans 2011: 75.

This species belongs to the *obtusus* species group as seta *z4* is minute and female ventral shield is not vase-shaped or divided. It belongs to the *andersoni* species subgroup as the spermatheca has a differentiated atrium, a calyx not dotted or annulated, not swollen basally and calyx dish-, cup-, bell- or V-shaped. The biology is totally unknown.

World distribution: Hawaii.

Table 1 Character measurements of adult females of *Scapulaseius asiaticus* collected in this study compared to previously published character measurements of adult females of *Scapulaseius asiaticus* and *S. reptans* (localities followed by the number of specimens measured between brackets).

Characters	<i>Scapulaseius asiaticus</i>				<i>Scapulaseius reptans</i>		
	Mauritius 1 (12) (this study)	Original description	Mauritius 2 (9)	Vietnam (7)	Original description	La Réunion (2)	Mauritius (2)
Dsl	310 (293 – 325)	300 – 325	311 (304 – 315)	306 (293 – 313)	290	321 (308 – 335)	303 – 305
Dsw at s4 level	174 (145 – 205)	180 – 195	191 (182 – 199)	179 (170 – 188)	190	210 (198 – 223)	185 – 188
Perit. reaching gd on dorsal shield	j1 7	j1 7	j1 7	j1 7	j1 7	j1 7	j1 7
j1	23 (18 – 25)	16 – 18	22 (20 – 24)	21 (18 – 23)	21	23 (20 – 25)	23
j3	22 (20 – 23)	16 – 18	17 (15 – 20)	14 (13 – 15)	15	25	20 – 23
j4	8 (8 – 9)	8 – 9	5	8	8	10	8
j5	8 (8 – 9)	8 – 9	5	8 (6 – 8)	7	9 (8 – 10)	8
j6	11 (9 – 13)	8 – 9	8 (7 – 9)	9 (8 – 10)	10	13 (13 – 13)	10
J2	13 (10 – 15)	8 – 9	9 (7 – 9)	9 (8 – 10)	10	13 (13 – 13)	8 – 9
J5	8 (8 – 10)	8 – 9	8 (7 – 8)	8 (8 – 9)	7	9 (8 – 10)	8
r3	19 (18 – 20)	16 – 18	14 (13 – 14)	13 (13 – 15)	15	23 (18 – 28)	18
R1	13 (11 – 15)	16 – 18	11 (10 – 12)	10 (9 – 13)	15	14 (13 – 15)	13
s4	27 (25 – 31)	16 – 18	23 (22 – 25)	18 (16 – 20)	25	33	28
S2	22 (19 – 26)	16 – 18	18 (15 – 20)	15 (13 – 18)	18	24 (23 – 25)	22 – 25
S4	19 (16 – 20)	16 – 18	15 (13 – 17)	12 (10 – 13)	15	20	18 – 23
S5	17 (15 – 20)	16 – 18	14 (13 – 15)	13 (10 – 15)	14	20 (18 – 23)	18 – 20
z2	18 (15 – 20)	–	15 (13 – 16)	12 (10 – 15)	16	21 (20 – 23)	18 – 20
z4	20 (18 – 23)	–	18 (16 – 19)	13 (10 – 15)	16	25 (25 – 25)	23
z5	10 (8 – 12)	–	7 (6 – 9)	8 (7 – 10)	18	10	8
Z1	12 (9 – 13)	–	9 (8 – 9)	10 (7 – 13)	10	13	10
Z4 ser. or not	54 (49 – 58) ser.	44 ser.	47 (44 – 52) ser.	50 (47 – 55) ser.	48 ser.	61 (60 – 63) ser.	56 – 63 ser.
Z5 ser. or not	77 (74 – 84) ser.	73 ser.	73 (65 – 77) ser.	77 (75 – 80) ser.	70 ser.	79 (75 – 83) ser.	72 – 75 ser.
st1-st1	51 (48 – 53)	–	–	50 (48 – 50)	–	50	50
st2-st2	59 (55 – 63)	–	57 (55 – 60)	58 (55 – 60)	–	60 (58 – 63)	60
st3-st3	64 (58 – 70)	–	–	61 (55 – 65)	–	66 (63 – 70)	65
st1-st3	55 (53 – 56)	–	53 (52 – 54)	53 (50 – 55)	–	56 (55 – 58)	53 – 56
st4-st4	60 (50 – 70)	–	–	65 (56 – 83)	–	79 (73 – 85)	65 – 78
Gensl	112 (100 – 125)	–	98 (96 – 101)	101 (90 – 113)	–	105 – 108	100 – 105
st5-st5	60 (55 – 64)	–	61 (55 – 65)	59 (55 – 63)	–	61 (60 – 63)	60
Gensw post. corn.	78 (60 – 83)	–	71 (60 – 74)	69 (65 – 80)	–	70 – 78	78
Lisl	18 (15 – 20)	–	–	16 (13 – 18)	–	20 (18 – 23)	18 – 23
Lisw	3 (2 – 4)	–	–	3 (2 – 5)	–	5	4 – 5
Sisl	10 (8 – 13)	–	–	10	–	11 (10 – 13)	10 – 13
Vsl	103 (93 – 115)	105	99 (95 – 101)	102 (95 – 110)	98	115 (115 – 115)	98 – 100
Vsw ZV2	85 (78 – 90)	116	81 (77 – 84)	82 (78 – 90)	78	81 (78 – 85)	85 – 87
Vsw anus	70 (60 – 74)	–	67 (61 – 74)	64 (50 – 73)	–	75 (75 – 75)	68 – 70
gv3 – gv3	22 (20 – 25)	–	20 (16 – 23)	–	–	–	–
JV5 ser. or not	30 (28 – 35) not	–	26 (22 – 28) not	23 (20 – 25) not	24 not	34 (33 – 35) not	28 not
SgeI	25 (20 – 30)	–	18 (16 – 19)	16 (15 – 20)	–	24 (23 – 25)	23
SgeII	17 (13 – 20)	–	12 (10 – 13)	12 (10 – 15)	–	15	13 – 15
SgeIII	17 (13 – 25)	–	15 (13 – 17)	17 (15 – 19)	–	19 (18 – 20)	18
StiIII	17 (13 – 23)	–	–	15 (13 – 18)	–	18 (15 – 20)	18
SgeIV	29 (25 – 33)	–	26 (24 – 29)	28 (25 – 30)	27	31 (30 – 33)	28
StiIV	24 (22 – 25)	–	20 (18 – 23)	22 (20 – 24)	20	28 (28 – 28)	23 – 25
StIV	53 (48 – 58)	–	49 (44 – 53)	50 (48 – 50)	50	59 (55 – 63)	50 – 53
ScI	28 (25 – 33)	–	33 (29 – 34)	30 (28 – 35)	45	30	30 – 35
Scw	2	–	–	5 (4 – 6)	2	10	2
Fdl, No teeth	24 (23 – 25), 9	–	26 (24 – 27), 9	25 (23 – 28), 9	26, 8	28 (25 – 30), 10	25, 9
Mdl, No teeth	25 (23 – 28), 3	18	27 (25 – 29), 2-3	25 (23 – 28), 3	26, 3	23 (20 – 25), 3	25, 3

Sources of measurements. *Scapulaseius asiaticus* – Original description Indonesia: Evans (1953); Mauritius 2: Ferragut & Baumann (2019); Vietnam: Kreiter *et al.* (2020b); *S. reptans* – Original description Madagascar: Blommers (1974); Mauritius: Kreiter *et al.* (2018a); – : not provided.

Specimens examined: 8 ♀♀ and 1 ♂ in total. **Curepipe**, Anderson street (aasl 560 m, lat. 20°19'11" S, long. 57°31'52" E), 8 ♀♀ and 1 ♂ on *Araucaria columnaris* (Forster) Hook (Araucariaceae), 4/XI/2018.

Remarks: this is the first mention of this species from Indian Ocean and in an area outside the land from which the species was described, Hawaii. The measurements of specimens collected in Mauritius Island (Table 3) are very close to those obtained from specimens of Hawaii by Prasad (1968) in the original description and by Denmark and Muma (1989) in the only available redescription of the type material, except for general slightly shorter dimensions

Table 2 Character measurements of adult males of *Scapulaseius* collected in this study compared to previously published character measurements of adult males of *Scapulaseius asiaticus* and *S. reptans* (localities followed by the number of specimens measured between brackets).

Characters	<i>Scapulaseius asiaticus</i>				<i>Scapulaseius reptans</i>		
	Mauritius (5) (this study)	India (6)	Thailand 1 (?)	Thailand 2 (1)	La Réunion (1)	Madagascar (3)	Mauritius (1)
Dsl	250 (245 – 258)	277 (275 – 280)	240	237	250	250	255
Dsw	137 (133 – 143)	184 (183 – 185)	160	175	150	170	175
j1	20 (18 – 22)	18 (16 – 20)	17	17	15	16	18
j3	19 (18 – 20)	25 (25 – 26)	18	16	20	20	25
j4	8 (8 – 9)	8 (6 – 9)	7	7	10	7	10
j5	8	9 (8 – 10)	7	8	8	8	10
j6	9 (8 – 9)	10 (10 – 11)	8	8	10	8	10
J2	10 (10 – 11)	12 (10 – 14)	9	10	13	8	10
J5	7 (6 – 8)	7 (5 – 9)	6	7	5	3	6
r3	16 (15 – 18)	14 (13 – 15)	13	15	15	14	15
R1	13 (12 – 14)	10 (9 – 11)	12	10	13	13	13
s4	23 (20 – 26)	18 (16 – 20)	20	20	28	20	25
S2	20 (18 – 23)	11 (10 – 12)	15	15	20	20	10
S4	18 (14 – 20)	11 (10 – 12)	13	13	20	15	10
S5	16 (13 – 18)	8 (8 – 9)	12	12	18	13	9
z2	16 (15 – 18)	10 (8 – 12)	13	13	23	16	13
z4	19 (18 – 19)	13 (12 – 14)	16	15	20	16	13
z5	8 (7 – 9)	8 (6 – 10)	8	9	8	6	10
Z1	10 (9 – 10)	12 (12 – 13)	10	10	10	9	13
Z4	38 (35 – 40)	33 (30 – 35)	34	35	40	20	33
Z5	54 (53 – 55)	55 (53 – 57)	47	50	58	35	50
st1-st1	44 (43 – 45)	–	–	–	30	–	47
st2-st2	49 (48 – 50)	–	–	–	53	–	53
st3-st3	47 (43 – 48)	–	–	–	50	–	55
st1-st5	101 (100 – 103)	–	–	–	78	–	105
st4-st4	35 (30 – 38)	–	–	–	38	–	40
st5-st5	32 (30 – 35)	–	–	–	38	–	35
Vsl	107 (100 – 113)	112 (110 – 113)	–	104	100	105	113
Vsw ZV2	113 (108 – 120)	112 (110 – 113)	–	140	133	–	135
Vsw anus	53 (48 – 60)	54 (53 – 55)	–	–	75	–	60
JV5	19 (18 – 20)	–	19	–	18	17	20
SgeI	19 (18 – 20)	–	–	15	25	–	25
SgeII	13	–	–	8	15	–	20
SgeIII	16 (15 – 18)	–	–	12	18	–	25
StiIII	17 (15 – 18)	–	–	–	–	–	20
SgeIV	21 (18 – 23)	33 (30 – 35)	19	21	25	19	35
StiIV	20 (18 – 21)	27 (26 – 28)	17	19	23	15	20
StIV	45 (43 – 48)	40 (38 – 43)	44	42	45	45	48
Fdl	20 (18 – 20)	–	–	19	20	–	20
No teeth Fd	8	–	–	–	8	8	8
Mdl	20 (18 – 22)	–	–	21	23	–	23
No teeth Md	1	–	1	–	1	1	1
Shaft	16 (15 – 17)	15 (15 – 16)	–	14	15	15	17

Sources of measurements – *Scapulaseius asiaticus* – India: Karmakar & Bhowmik (2018); Thailand 1: Ehara & Bhandhufalck (1977); Thailand 1: Oliveira et al. (2012) – *Scapulaseius reptans* – La Réunion: Kreiter et al. (2020c); Madagascar: Blommers (1974); Mauritius: Kreiter et al. (2018a); – : not provided.

of characters and especially of setae *j3* and *s4* and of the macroseta *StIV* and lower number of teeth in both movable and fixed digits of the chelicera.

The male of *A. haleakalus* is unknown and the description of the single male specimen collected will be provided in another article (Kreiter and Abo-Shnaf, in progress).

***Amblyseius herbicolus* (Chant)**

Typhlodromus (Amblyseius) herbicolus Chant 1959: 84.

Amblyseius (Amblyseius) herbicolus, Muma 1961: 287.

Typhlodromus herbicolus, Hirschmann 1962: 23.

Amblyseius herbicolus, Moraes *et al.* 1986: 14, 1989: 79, 2004: 27; Chant & McMurtry 2004: 208, 2007: 78.

Amblyseius impactus Chaudhri 1968: 553 (synonymy according to Daneshvar & Denmark 1982; Denmark & Muma 1989).

Typhlodromus (Amblyseius) amitae Bhattacharyya 1968: 677 (synonymy according to Denmark & Muma 1989).

Amblyseius deleoni Muma & Denmark 1970: 68 (synonymy according to Daneshvar & Denmark 1982; Denmark & Muma 1989).

Amblyseius giganticus Gupta 1981: 33 (synonymy according to Gupta 1986).

Amblyseius (Amblyseius) thermophilus Karg 1991: 12 (synonymy according to El-Banhawy & Knapp 2011).

Table 3 Character measurements of adult females of *Amblyseius haleakalus* collected in this study and those reported in previous studies (localities followed by the number of specimens measured between brackets).

Characters	Mauritius (8, this study)	Hawaii 1 (?) Original description	Hawaii 2 (?) Measurements of types	Characters	Mauritius (8, this study)	Hawaii 1 (?) Original description	Hawaii 2 (?) Measurements of types
Dsl	371 (343 – 398)	351 – 417	351 – 417	Gensl	126 (125 – 128)	–	–
Dsw at <i>s4</i> level	244 (220 – 260)	252 – 285	245	<i>st5-st5</i>	75	–	–
<i>j1</i>	37 (30 – 40)	42	31 – 42	<i>Gensw post. corn.</i>	87 (85 – 88)	–	–
<i>j3</i>	41 (38 – 44)	47	47	Lisl	30 (28 – 33)	–	–
<i>j4</i>	5 (5 – 6)	7	5 – 7	Lisw	6 (5 – 8)	–	–
<i>j5</i>	5 (5 – 6)	7	5	Sisl	19 (15 – 20)	–	–
<i>j6</i>	8 (5 – 8)	8	5	Sisw	2	–	–
<i>J2</i>	8 (8 – 9)	9	6 – 8	Vsl	130 (125 – 135)	–	–
<i>J5</i>	8 (6 – 9)	7	7 – 11	Vsw ZV2	89 (88 – 90)	–	–
<i>r3</i>	12 (10 – 15)	14	14 – 20	Vsw anus	85 (80 – 95)	–	–
<i>R1</i>	9 (8 – 10)	12	12	<i>gv3 – gv3</i>	20	–	–
<i>s4</i>	101 (98 – 103)	108	108 – 115	<i>JV5</i>	79 (76 – 83)	–	–
<i>S2</i>	11 (10 – 13)	14	12 – 14	<i>SgeI</i>	39 (35 – 40)	–	–
<i>S4</i>	12 (10 – 13)	14	11 – 14	<i>SgeII</i>	36 (33 – 39)	–	–
<i>S5</i>	10 (8 – 12)	14	12 – 14	<i>SgeIII</i>	47 (43 – 53)	–	–
<i>z2</i>	9 (8 – 10)	13	10 – 13	<i>StIII</i>	36 (32 – 38)	–	–
<i>z4</i>	10 (10 – 11)	13	11 – 13	<i>SgeIV</i>	115 (110 – 120)	124	110 – 124
<i>z5</i>	6 (6 – 7)	7	5	<i>StIV</i>	88 (83 – 93)	86	81 – 86
<i>Z1</i>	9 (8 – 10)	11	11	<i>StIV</i>	78 (71 – 83)	95	91 – 95
<i>Z4</i>	128 (120 – 138)	138	138	Scl	12 (10 – 14)	–	11
<i>Z5</i>	306 (300 – 320)	313	257 – 313	Scw	9 (8 – 10)	–	–
<i>st1-st1</i>	68 (65 – 68)	–	–	Fdl, No teeth	39 (35 – 41), 12	–, 16	–, 15 – 16
<i>st2-st2</i>	79 (75 – 80)	–	–	Mdl, No teeth	43 (40 – 44), 4-5	–, 4	–, 4
<i>st3-st3</i>	86 (80 – 90)	–	–				
<i>st1-st3</i>	71 (70 – 75)	–	–				
<i>st4-st4</i>	86 (80 – 90)	–	–				

Sources of measurements – Hawaii 1: Prasad (1968), original description; Hawaii 2: Denmark & Muma (1989); – : not provided.

This species belongs to the *largoensis* species group as setae *J2* and *Z1* are present, setae *s4* are minute and the ventrianal shield of the female is vase-shaped. It belongs to the *largoensis* species subgroup as setae *Z4* are long, spermatheca has the calyx elongate and the female ventrianal shield is entire (Chant and McMurtry 2004). *Amblyseius herbicolus* is widespread in all tropical and subtropical regions of the world. It is the second most abundant phytoseiid mites on *Coffea arabica* L. in Brazil, associated with *Brevipalpus phoenicis* (Geijskes), vector of the coffee ring spot virus and it was found to be an efficient predator (Reis *et al.* 2007). *Amblyseius herbicolus* is also found associated with the broad mite, *P. latus* in crops such as chili pepper (*Capsicum annuum* L.) in Brazil and has also a good potential for controlling the pest. Rodriguez-Cruz *et al.* (2013) had studied biological, reproductive and life table parameters of *A. herbicolus* on three different diets: broad mites, castor bean pollen (*Ricinus communis* L.) and sun hemp pollen (*Crotalaria juncea* L.). The predator was able to develop and reproduce on all these three diets. However, its intrinsic growth rate was higher on broad mites and castor bean pollen. Feeding on alternative food such as pollen can facilitate the predator's mass rearing and maintain its population on crops when prey is absent or scarce. Many polyphagous generalist phytoseiid mites are important natural enemies because they can feed on plant provided pollen and various prey species, and thus persist in crops even in the absence of target pests (McMurtry *et al.* 2013). Hence, populations of these predators can be established in a crop by providing alternative food, thus increasing biological control. Alternative food affects *P. latus* control on chilli pepper plants by predatory mites (Duarte *et al.* 2015). *Amblyseius herbicolus* had high oviposition and population growth rates when fed with cattail pollen (*Typha latifolia* L.), chilli pepper pollen and bee-collected pollen, and a low rate on the alternative prey (*Tetranychus urticae* Koch). Supplementing pepper plants with pollen resulted in better control of broad mite populations (Duarte *et al.* 2015). Release of *A. herbicolus* on young plants with weekly addition of honeybee pollen or cattail pollen until plants produce flowers seems a viable strategy to sustain populations of this predator (Duarte *et al.* 2015). *Amblyseius herbicolus* was previously recorded in Comoros Archipelago (Kreiter *et al.* 2018b) and in La Réunion (Quilici *et al.* 1997, 2000; Kreiter *et al.* 2020c), but this is the first mention from Mauritius despite the fact that with 115 female specimens collected, this is one of the more common species.

World distribution: Argentina, Australia, Azores, Benin, Brazil, Burundi, Canary Islands, China, Colombia, Grande Comore Island, Costa Rica, Dominican Republic, Dr Congo, El Salvador, Ghana, Guadeloupe Island, Guatemala, Hawaii, Honduras, India, Iran, Kenya, Les Saintes Island, La Réunion Island, Madagascar Island, Malawi, Malaysia, Martinique Island, New Caledonia Island, Papua New Guinea, Peru, Philippines, Portugal, Puerto Rico, Rwanda, Senegal, Singapore, South Africa, Spain, Taiwan, Thailand, Turkey, USA, Venezuela, West Indies.

Specimens examined: 116 ♀♀ and 3 im. in total. **Curepipe**, Anderson street (aasl 560 m, lat. 20°19'11" S, long. 57°31'52" E), 1 ♀ on *Codiaeum variegatum* (L.) Jussieu (Euphorbiaceae) and 8 ♀♀ on *Cleome viscosa* L. (Cleomaceae), 27/X/2018; **Curepipe**, La Marie (aasl 600 m, lat. 20°19'02" S, long. 57°31'36" E), 4 ♀♀ on *Clidemia hirta* (L.) D. Don (Melastomataceae), 27/X/2020; **Curepipe**, Usine à thé (aasl 557 m, lat. 20°18'54" S, long. 57°31'29" E), 1 ♀ on *Antigonon leptopus* Hooker and Arnott (Polygonaceae) and 2 ♀♀ on *Hibiscus genevii* Bojer ex Hook. (Malvaceae), 27/X/2020; **Curepipe**, Botanical Garden (aasl 540 m, lat. 20°19'28" S, long. 57°30'50" E), 11 ♀♀ on *C. hirta*, 6 ♀♀ on *Syzygium jambos* (L.) Alston (Myrtaceae), 2 ♀♀ on *Impatiens flaccida* Arnott (Balsaminaceae), 1 ♀ on *Vernicia montana* Loureiro (Euphorbiaceae) and 1 ♀ on *Pachira glabra* Aublet (Malvaceae), 29/X/2018; **Curepipe**, Trou aux cerfs (aasl 593 m, lat. 20°19'04" S, long. 57°30'47" E), 1 ♀ and 2 im. on *Pinus massoniana* D. Don in Lambert (Pinaceae), 29/X/2018; **Mare aux Vacoas** (aasl 572 m, lat. 20°21'40" S, long. 57°29'59" E), 1 ♀ on *Litsea monopetala* (Roxburgh) Person (Lauraceae), 30/X/2018; **Mare aux Vacoas** (aasl 589 m, lat. 20°22'36" S, long. 57°29'10" E), 4 ♀♀ on *Cyathea excelsa* Swartz (Cyatheaceae), 30/X/2018; **Piton Grand Bassin**, Carrefour Chamarel (aasl 665 m, lat. 20°24'30" S, long. 57°28'24" E), 1 ♀ on *Callistemon citrinus*

(William Curtis) Homer Collar Skeels (Myrtaceae), 1 ♀ on *Boehmeria penduliflora* Weddell ex D.G.Long (Urticaceae) and 1 ♀ on *Pinus eliottii* Engelm (Pinaceae), 30/X/2018; **Bassin Blanc** (aasl 665 m, lat. 20°24'30" S, long. 57°28'24" E), 16 ♀♀ on *C. hirta*, 30/X/2018; **Nouvelle-France** (aasl 442 m, lat. 20°22'34" S, long. 57°35'58" E), 7 ♀♀ on *Camelia sinensis* (L.) Kuntze (Theaceae), 31/X/2018; **Quartier Militaire** (aasl 472 m, lat. 20°19'11" S, long. 57°36'05" E), 1 ♀ on *C. hirta*, 1/XI/2018; **Curepipe**, Morcellement de Séneville (aasl 534 m, lat. 20°19'05" S, long. 57°32'17" E), 6 ♀♀ on *Ocimum gratissimum* L. (Lamiaceae), 2 ♀♀ on *Brillantaisia owariensis* Beauvois (Acanthaceae) and 1 ♀ on *Persea americana* Miller (Lauraceae), 2/XI/2018; **Curepipe**, Bld Pasteur (aasl 510 m, lat. 20°19'21" S, long. 57°31'45" E), 2 ♀♀ on *Acalypha hispida* Burman (Euphobiaceae), 8 ♀♀ on *Ageratum conyzoides* L. (Asteraceae), 2 ♀♀ on *Strobilanthes hamiltonianus* (Steudel) Bosser et Heine (Acanthaceae), 8 ♀♀ on *Duranta erecta* L. (Verbenaceae) and 1 ♀ on *Terminalia mantaly* Perrier (Combretaceae), 4/XI/2018; **Curepipe**, Domaine Les Aubineaux (aasl 560 m, lat. 20°19'21" S, long. 57°31'45" E), 1 ♀ on *S. jambos*, 4 ♀♀ and 1 im. on *Thumbergia* sp. (Acanthaceae) and 10 ♀♀ on *Cupressus sempervirens* L. (Cupressaceae), 4/XI/2018; **Mare aux Vacoas** (aasl 581 m, lat. 20°21'05" S, long. 57°29'31" E), 1 ♀ on *Ludwigia octovalvis* (Jacquemin) P.H.Raven (Onagraceae), 30/X/2018.

Remarks: this species was reported before by Kreiter *et al.* (2018b) in the Grande Comore Island of the Comoros Archipelago in the Indian Ocean with two females collected. Curiously, Ferragut and Baumann (2019) had not reported it from Mauritius in their study despite the fact that it seems to be the more common species in Mauritius Island and at least the more numerous species after our study. It is interesting to notice that, despite the large number of female specimens, no male was collected just like in La Réunion Island (Kreiter *et al.* 2020c).

Amblyseius herbicolus was also recently reported from Vietnam (Kreiter *et al.* 2020b) and La Réunion Island (Kreiter *et al.* 2020c). Morphological and morphometric characters and all measurements fit well previous measurements in Kreiter *et al.* (2018b, 2020b, c).

***Amblyseius largoensis* (Muma)**

Amblyseius largoensis Muma 1955: 266.

Typhlodromus (*Amblyseius*) *largoensis*, Chant 1959: 96.

Amblyseius (*Amblyseius*) *largoensis*, Muma 1961: 287.

Typhlodromus largoensis, Hirschmann 1962: 2.

Amblyseius (*Amblyseius*) *largoensis*, Ehara 1966: 22.

Amblyseius largoensis, Swirski & Golan 1967: 225; Moraes *et al.* 1986: 17, 2004: 33; Chant & McMurtry 2004: 208, 2007: 78.

Amblyseius magnolia Muma 1961: 289 (synonymy according to Denmark & Evans 2011).

Amblyseius sakalava Blommers 1976: 96 (synonymy according to Ueckermann & Loots 1988).

Amblyseius amtalaensis Gupta 1977: 53 (synonymy according to Gupta 1986).

This species belongs also to the *largoensis* species group and the *largoensis* species subgroup (see for the previous species).

It is widespread in all tropical and subtropical regions of the world and was the most abundant species collected by Moraes *et al.* (2000) in French Caribbean Islands and a potential BCA of *Raoiella indica* Hirst in La Réunion Island (Moraes *et al.* 2012).

Using morphometric analyses of 36 characters, molecular analyses and crossing tests, Navia *et al.* (2014) studied specimens collected in Brazil, La Réunion Island and Trinidad and Tobago to determine whether *A. largoensis* populations from different geographic origins belong to the same taxonomic entity. Though differences in the lengths of some setae were observed, molecular analyses and crossing experiments indicated that populations from Indian Ocean and America were conspecific. *Amblyseius largoensis* was previously recorded from Mauritius by Ferragut and Baumann (2019) and so this is the second record of that species.

World distribution: this species is widely distributed in the tropical and subtropical regions of Africa, America, Asia and the Pacific Islands.

Specimens examined: 7 ♀♀ in total. **Pamplemousse**, Botanical Garden (aasl 41 m, lat. 20°06'24" S, long. 57°34'49" E), 3 ♀♀ on *Mangifera indica* L. (Anacardiaceae), 3 ♀♀ on *Psiadia viscosa* (Asteraceae) and 1 ♀ on *Hyophorbe lagenicaulis* (L.H. Bailey) H.E. Moore (Arecaceae), 3/XI/2018.

Remarks: morphological and morphometric characters and all measurements fit well values given by Zannou *et al.* (2007) for specimens from Africa, Navia *et al.* (2014) for specimens from Brazil, La Réunion and Trinidad and Tobago, and Ferragut and Baumann (2019) for specimens from Mauritius.

***Amblyseius neolargoensis* van der Merwe**

Amblyseius (*Amblyseius*) *neolargoensis* van der Merwe 1965: 59.

Amblyseius neolargoensis, Moraes *et al.* 1986: 23, 2004: 41; Chant & McMurty 2004: 208, 2007: 80; Zannou *et al.* 2007: 20.

Amblyseius vazimba Blommers & Chazeau 1974: 312 (synonymy according to Ueckermann & Loots 1988).

This species also belongs to the *largoensis* species group and the *largoensis* species subgroup (see above for *A. largoensis*). Its biology is totally unknown. It is the first mention of *Amblyseius neolargoensis* from Mauritius.

World distribution: Cape Verde, Hawaii, Mozambique, La Réunion Island, South Africa, Zimbabwe.

Specimens examined: a single ♀ collected in Mauritius during the survey. **Nouvelle-France** (aasl 442 m, lat. 20°22'34" S, long. 57°35'58" E), 1 ♀ on *Camelia sinensis* (L.) Kuntze (Theaceae), 31/X/2018.

Remarks: morphological and morphometric characters and all measurements fit well measurement values given by van der Merwe (1965) for specimens from South Africa and Zannou *et al.* (2007) for specimens from South Africa and Mozambique.

***Amblyseius passiflorae* Blommers**

Amblyseius passiflorae Blommers 1974: 145; Moraes *et al.* 1986: 27, 2004: 46; Denmark and Muma 1989: 49; Chant & McMurty 2004: 210, 2007: 80.

This species belongs to the *largoensis* species group and the *arcus* species subgroup as the spermatheca is dish-, cup- or bell-shaped and to the *vasiformis* species complex as seta Z5 is very long. Its biology is totally unknown.

It was previously only known from the type series (five females and one male) (Blommers 1974). The original description was rather complete, providing comprehensive information on female and male morphology. Ferragut and Baumann (2019) had added information on dorsal adenotaxy and poroidotaxy. *Amblyseius passiflorae* was collected by the latter authors and was thus already recorded from Mauritius.

World distribution: Madagascar, Mauritius.

Specimens examined: 63 ♀♀ and 1 ♂ in total. **Brittania** (aasl 442 m, lat. 20°27'01" S, long. 57°33'42" E), 17 ♀♀ on *Cryptomeria japonica* (L. f.) D. Don (Taxodiaceae) and 3 ♀♀ on *Allamanda cathartica* L. (Apocynaceae), 31/X/2018; **Rivière des Anguilles**, Bridge (aasl 158 m, lat. 20°28'49" S, long. 57°33'37" E), 6 ♀♀ on *Mangifera indica* L. (Anacardiaceae) and 4 ♀♀ on *Asplenium nitens* Swartz (Aspleniaceae), 31/X/2018; **Le Val**, close to the river (aasl 153 m, lat. 20°22'29" S, long. 57°35'12" E), 5 ♀♀ on *Euphorbia pulcherima* Willdenow ex Klotzsch (Euphorbiaceae) and 3 ♀♀ on *Callistemon citrinus* (William Curtis) Homer Collar Skeels (Myrtaceae), 1/XI/2018; **Quartier militaire** (aasl 472 m, lat. 20°15'11" S, long. 57°34'32" E), 15 ♀♀ on *C. japonica*, 1/XI/2018; **Pamplemousse**, Botanical Garden (aasl 41 m, lat. 20°06'24" S, long. 57°34'49" E), 1 ♀ on *Artocarpus heterophyllus* Lamarck (Moraceae), 1 ♀ on *Hyophorbe lagenicaulis* (L.H. Bailey) H.E. Moore (Arecaceae), 5 ♀♀ and 1 ♂ on *Acalypha hispida* Burman (Euphorbiaceae) and 1 ♀ on *Saraca indica* L. (Fabaceae),

3/XI/2018; **Curepipe**, Bld Pasteur (aasl 510 m, lat. 20°19'21" S, long. 57°31'45" E), 1 ♀ on *Sphaeropteris cooperi* (Hooker ex F. Mueller) R.M. Tryon (Cyatheaaceae) and 1 ♀ on *Ixora coccinea* L. (Rubiaceae), 4/XI/2018.

Remarks: morphological and morphometric characters and all measurements of our specimens fit well values in Blommers (1974) and Ferragut and Baumann (2019). This species is the third most collected species in our study and probably one of the three more common species with *A. herbicolus* and *E. ovaloides*.

Amblyseius tamatavensis Blommers

Amblyseius tamatavensis Blommers 1974: 144; Moraes *et al.* 1986: 31, 2004: 52; Denmark & Muma 1989: 13; Chant & McMurtry 2004: 203, 2007: 81; Ehara & Amano 2004: 17.

Amblyseius (Amblyseius) tamatavensis, Ehara 2002: 33; Ehara & Amano 2002: 322.

Amblyseius maai Tseng 1976: 123 (synonymy according to Denmark & Muma 1989).

Amblyseius aegyptiacus Denmark & Matthysse in Matthysse & Denmark 1981: 343 (synonymy according to Denmark & Muma 1989)

This species belongs to the *obtusus* species group as setae *J2* and *Z1* are present, setae *z4* are minute and the female ventrianal shield is not vase-shaped or divided. It belongs to the *aerialis* species subgroup (46 species) as the calyx of the spermatheca is tubular (Chant and McMurtry 2004).

It seems to fit the functional type III-b (generalist predators living on glabrous leaves) group defined by McMurtry *et al.* (2013). Cavalcante *et al.* (2017) reported this species as a promising natural enemy of *Bemisia tabaci* (Gennadius). Experimental releases of this predator on caged plants in a screenhouse caused the reduction of the density of *B. tabaci* on pepper plants by up to 60-80% (Massaro and Moraes 2019). It can be easily produced in large numbers (Massaro *et al.* 2018) when fed with astigmatine mites, which could allow the mass production for augmentative biological control. This species is reported in tropical areas from over 20 countries around the world (Africa, Asia, America and Oceania). It was recently recorded from La Réunion since previous studies (Quilici *et al.* 2000).

World distribution: this species was described from Madagascar, but is actually widely distributed in the tropical and subtropical regions of Africa, America, Asia and the Pacific Islands.

Specimens examined: 7 ♀♀ in total. **Nouvelle-France** (aasl 442 m, lat. 20°22'34" S, long. 57°35'58" E), 4 ♀♀ on *Camelia sinensis* (L.) Kuntze (Theaceae), 31/X/2018; **Riambel**, Sea Front (aasl 11m, lat. 20°31'15" S, long. 57°30'45" E), 2 ♀♀ on *Musa paradisiaca* L. (Musaceae), 31/X/2018; **Curepipe**, Anderson street (aasl 560 m, lat. 20°19'11" S, long. 57°31'52" E), 1 ♀ on *Sonchus oleraceus* L. (Asteraceae), 4/XI/2018.

Remarks: this species was described from Madagascar (Blommers 1974), then mentioned in the Indian Ocean from La Réunion Island (Quilici *et al.* 2000) and recently from Mauritius (Ferragut and Baumann 2019). Morphological and morphometric characters and all measurements of our specimens fit well measurements in Blommers (1974), Ferragut and Baumann (2019) and Kreiter *et al.* (2020c).

Tribe Euseiini Chant & McMurtry

Euseiini Chant & McMurtry 2005b: 191.

Subtribe Typhlodromalina Chant & McMurtry

Typhlodromalina Chant & McMurtry 2005b: 195.

Genus Typhlodromalus Muma

Amblyseius (Typhlodromalus) Muma 1961: 288; *Typhlodromalus* De Leon 1966: 87.

***Typhlodromalus spinosus* (Meyer & Rodrigues)**

Amblyseius spinosus Meyer & Rodrigues 1966: 30; Moraes *et al.* 1986: 31.

Kampimodromus spinosus, Quilici *et al.* 2000: 100.

Typhlodromalus spinosus, Moraes *et al.* 2004: 204; Chant & McMurtry 2005a: 199, 2007: 111.

This species belongs to the *athiasae* species group as setae *J1* and *S5* are absent. This species group contains six species (Chant and McMurtry 2005b, Moraes *et al.* 2006).

Typhlodromalus spinosus was collected from Eastern, Western, but mainly Southern Africa and La Réunion (Demite *et al.* 2020). The rapid multiplication of this species on the western flower thrips (WFT), *Frankliniella occidentalis* Pergande, was confirmed and clear evidence that *T. spinosus* predaes on WFT under laboratory and field conditions, but not on *T. urticae* (Mwangi *et al.* 2015). This species seems abundant in low vegetation as it was found in high populations in a study of companion plants in citrus orchard (Le Bellec *et al.* unpub. data).

This species has never been record from Guadeloupe or Martinique in similar studies, but it is interesting to notice that in those islands, another *Typhlodromalus* was collected, *T. peregrinus* (Muma) (Mailloux *et al.* 2010; Kreiter *et al.* 2013, 2018c). *Typhlodromalus spinosus* was recorded in low numbers from La Réunion by Quilici *et al.* (2000) and in high numbers by Kreiter *et al.* (2020c). This is the first mention of this species from Mauritius Island.

World distribution: Benin, Burundi Dr Congo, Kenya, Malawi, Mozambique, La Réunion Island.

Specimens examined: 3 ♀♀ in total. **Côte d'Or**, Village (aasl 443 m, lat. 20°15'26" S, long. 57°32'21" E), 1 ♀ on *Clibadium surinamense* L. (Asteraceae), 28/X/2018; **Le Val**, close to the river (aasl 157 m, lat. 20°22'47" S, long. 55°36'18" E), 1 ♀ on *Callistemon citrinus* (William Curtis) Homer Collar Skeels (Myrtaceae), 1/XI/2018; **Curepipe**, Bld Pasteur (aasl 510 m, lat. 20°19'21" S, long. 57°31'45" E), 1 ♀ on *C. citrinus*, 4/XI/2018.

Remarks: this species was described from Mozambique (Meyer and Rodrigues 1966), then mentioned in the Indian Ocean from La Réunion Island (Quilici *et al.* 2000; Kreiter *et al.* 2020c). Morphological and morphometric characters and all measurements of our specimens fit well measurements in Kreiter *et al.* (2020c).

Subtribe Euseiina Chant & McMurtry

Euseiina Chant & McMurtry 2005b: 209.

Genus *Euseius* Wainstein

Amblyseius (*Amblyseius*) section *Euseius* Wainstein 1962: 15; *Euseius* De Leon 1966: 86.

***Euseius gallicus* Kreiter & Tixier**

Euseius gallicus Kreiter and Tixier in Tixier *et al.* 2010: 242.

This species was described from Southern France (Tixier *et al.* 2010). It had also been recorded from Tunisia, Belgium, Germany, the Netherlands, and Turkey (Kreiter *et al.* 2010; Döker *et al.* 2014) and recently from Slovenia (Kreiter *et al.* 2020a).

Unlike most phytoseiid species, which are classified as generalist predators of small insects and mites (type III), *Euseius* species are pollen-feeding generalist predators (type IV) (McMurtry and Croft 1997; McMurtry *et al.* 2013). Type III phytoseiids also feed on pollen, but prefer or show better performance on insect or mite prey. Type IV predatory mites have their highest reproductive capacity when feeding on pollen, and populations in the field often increase significantly when the crop or the surrounding vegetation is flowering (McMurtry *et al.* 2013).

Recently, *E. gallicus* had shown potential as a biocontrol agent for thrips and whiteflies in roses when *Typha* sp. (cattail) pollen was supplied as an additional food source (Biobest 2013; Wackers 2013). Provision of pollen as a supplementary food source can improve biological control of whiteflies and thrips by type III phytoseiids (van Rijn and Sabelis 1993; Nomikou *et al.* 2010), and control works excellently in crops where pollen is naturally available (Calvo *et al.* 2012). The populations of *Euseius* species can grow faster than the populations of type III phytoseiids when pollen is provided as a food source.

This is the first report of this species from Mauritius, but also the first mention from the Indian Ocean, very far from the European area where the species was originally described and recorded.

World distribution: Belgium, France, Germany, Italy, The Netherlands, Slovenia, Tunisia, Turkey.

Specimens examined: a single ♀ collected in Mauritius during the survey. **Mare aux Vacoas** (aasl 572 m, lat. 20°21'40" S, long. 57°29'59" E), 1 ♀ on *Tibouchina heteromalla* Cogniaux (Melastomataceae), 30/X/2018.

Remarks: morphological and morphometric characters and all measurements of our specimens fit well measurements in Tixier *et al.* (2010) and Döker *et al.* (2014).

***Euseius hima* (Pritchard & Baker)**

Amblyseius (*Amblyseius*) *hima* Pritchard & Baker 1962: 257; Blommers 1976: 89.

Euseius hima, Moraes *et al.* 1986: 46, 2004: 71; Quilici *et al.* 2000: 99; Chant & McMurtry 2005b: 215, 2007: 121.

This species was recorded from several countries of Sub-Saharan Africa, but also from Madagascar, India (Demite *et al.* 2020) and La Réunion (Quilici *et al.* 2000; Kreiter *et al.* 2020c). All details of collections were provided in those papers. Its biology remains totally unknown. This is the first report of *E. hima* from Mauritius.

World distribution: Cameroon, Equatorial Guinea, La Réunion Island, Madagascar Island.

Specimens examined: 4 ♀♀ and 1 ♂ in total. **Morne-Brabant** (aasl 249 m, lat. 20°22'05" S, long. 57°29'31" E), 4 ♀♀ and 1 ♂ on *Lantana camara* L. (Verbenaceae), 5/XI/2018.

Remarks: measurements of specimens collected and identified were published only in Kreiter *et al.* (2020c). Morphological and morphometric characters and all measurements of our specimens fit well measurements in Kreiter *et al.* (2020c).

***Euseius ovaloides* (Blommers)**

Amblyseius (*Amblyseius*) *ovaloides* Blommers 1974: 147.

Euseius ovaloides Moraes *et al.* 1986: 51, 2004: 78; Chant & McMurtry 2005a: 215, 2007: 121.

This species was described by Blommers (1974) from specimens collected on *Citrus hystrix* and *Persea americana* in Madagascar. Like all *Euseius* species, it belongs to the type IV (pollinivorous generalist predators) of McMurtry and Croft (1997) and McMurtry *et al.* (2013). The species had been occasionally recorded from Madagascar (Blommers 1974), Papua-New Guinea (Schicha and Gutierrez 1985), Seychelles (Schicha 1987), La Réunion Island, (Quilici *et al.* 1997, 2000), Guadeloupe, Martinique and Marie-Galante (Moraes *et al.* 2000; Kreiter *et al.* 2006) on various plants, though its biology remains unknown. It is suspected to be a poor predator of tetranychid mites (Gutierrez and Etienne 1986), but can be considered as a potentially good predator of thrips and of whiteflies. This is one of the more common species on La Réunion Island. This is the first mention of *E. ovaloides* from Mauritius.

World distribution: Guadeloupe, Madagascar Island, Marie-Galante, Martinique, Papua New Guinea, La Réunion Island, Seychelles Archipelago.

Specimens examined: 83 ♀♀, 7 ♂♂ and 1 im. in total. **Curepipe**, Anderson street (aasl 560 m, lat. 20°19'11" S, long. 57°31'52" E), 21 ♀♀ on *Codiaeum variegatum* (L.)

Jussieu (Euphorbiaceae), 27/X/2018; **Curepipe**, Botanical Garden (aasl 540 m, lat. 20°19'28" S, long. 57°30'50" E), 1 ♀ + 1 ♂ on *Cinnamomum camphora* (L.) Presl (Lauraceae), and on *Vernicia montana* Loureiro (Euphorbiaceae), 29/X/2018; **Curepipe**, Trou aux cerfs (aasl 593 m, lat. 20°19'04" S, long. 57°30'47" E), 1 ♀ on *Solanum mauritianum* Scopoli (Rosaceae), 29/X/2018; **Baie du Cap** (aasl 55 m, lat. 20°29'11" S, long. 57°22'43" E), 8 ♀♀ + 1 ♂ on *Terminalia cattapa* L. (Combretaceae), 31/X/2018; **Mahébourg**, Pointe des Régates (aasl 2 m, lat. 20°24'15" S, long. 57°42'35" E), 1 ♀ on *T. cattapa*, 31/X/2018; **Riambel**, Sea Front (aasl 11m, lat. 20°31'15" S, long. 57°30'45" E), 5 ♀♀ on *Carica papaya* L. (Caricaceae), 2 ♀♀ on *Musa paradisiaca* L. (Musaceae) and 2 ♀♀ on *Pithecellobium dulce* (Roxburgh) Benthham (Mimosaceae), 31/X/2018; **Mare d'Albert** (aasl 160 m, lat. 20°25'13" S, long. 57°38'16" E), 7 ♀♀ on *C. papaya* and 3 ♀♀ on *Litchi sinensis* Sonnerat (Sapindaceae), 1/XI/2018; **Anse aux petits sables** (aasl 2 m, lat. 20°24'15" S, long. 57°42'35" E), 2 ♀♀ on *Ricinus communis* L. (Euphorbiaceae), 1/XI/2018; **Belle Rive** (aasl 158 m, lat. 20°19'24" S, long. 57°42'08" E), 4 ♀♀ on *Acalypha hispida* Burman (Euphorbiaceae), 1/XI/2018; **Pamplemousse**, Botanical Garden (aasl 41 m, lat. 20°06'24" S, long. 57°34'49" E), 1 ♀ + 1 ♂ on *Terminalia arjuna* (Roxburgh) Wight et Arnott (Combretaceae), 1 ♂ on *Acacia glauca* (L.) Moench (Fabaceae) and 2 ♀♀ on *Saraca indica* (Roxburgh) Willdenow (Fabaceae), 3/XI/2018; **Curepipe**, Bld Pasteur (aasl 510 m, lat. 20°19'21" S, long. 57°31'45" E), 4 ♀♀ on *Sphaeropteris cooperi* (Hooker ex F. Mueller) R.M. Tryon (Cyatheaceae), 1 ♀ on *Psidium guajava* L. (Myrtaceae), 7 ♀♀ + 1 ♂ on *Hibiscus rosa-sinensis* L. (Malvaceae), 3 ♀♀ on *Ageratum conyzoides* L. (Asteraceae), 1 ♀ on *Duranta erecta* L. (Verbenaceae) and 5 ♀♀ on *Terminalia mantaly* Perrier (Combretaceae), 4/XI/2018; **Réduit**, Sugar reasearch institute (aasl 273 m, lat. 20°14'48" S, long. 57°21'25" E), 2 ♀♀ + 2 ♂♂ + 1 im. on *Acalypha wilkesiana* Müller Argoviensis (Euphorbiaceae), 6/XI/2018.

Remarks: this species was recently reported from Vietnam (Kreiter *et al.* 2020b). Morphological and morphometric characters and all measurements of our specimens fit well measurements in Kreiter *et al.* (2020b). *Euseius ovaloides* is the second most collected species in our study after *A. herbicolus* and probably one of the three more common species with *A. herbicolus* and *A. passiflorae*.

Subfamily Phytoseiinae Berlese

Phytoseiini Berlese 1913: 3; Phytoseiinae Vitzthum 1941: 767.

Genus *Phytoseius* Ribaga

Phytoseius Ribaga 1904: 177.

Phytoseius coheni Swirski & Shechter

Phytoseius (*Dubininellus*) *macropilis coheni* Swirski & Shechter 1961: 104.

Phytoseius (*Phytoseius*) *macropilis coheni*, Ehara 1966: 26.

Phytoseius (*Dubininellus*) *coheni*, Swirski & Golan 1967: 226; Wu 1997: 153.

Phytoseius (*Phytoseius*) *coheni*, Moraes *et al.* 1986: 219.

Phytoseius coheni, Moraes *et al.* 2004: 235; Chant & McMurtry 2007: 129.

Phytoseius hawaiiensis Prasad 1968: 1460 (synonymy according to Denmark & Evans 2011).

Phytoseius huangi Ehara 1970: 62 (synonymy according to Ehara 2002).

Phytoseius jianfengensis Chen, Chu & Zhou 1980: 15 (synonymy according to Wu 1997).

This species belongs to the *horridus* species group as setae *J2* and *RI* are absent (Chant and McMurtry 1994). It was described from Hong-Kong by Swirski and Shechter (1961) collected on a wide range of plants and very common on citrus. Although species of the genus *Phytoseius* are considered to belong to the type III (polyphagous generalist predators) of McMurtry and Croft (1997) and McMurtry *et al.* (2013), its specific biology is totally unknown.

World distribution: Australia, China, Hawaii, Hong-Kong, India, Indonesia, Japan, Malaysia, Mauritius, Papua New Guinea, Philippines, Singapore, Tahiti, Taiwan, Thailand, USA.

Specimens examined: 4 ♀♀ and 1 ♂ in total. **Curepipe**, Bld Pasteur (aasl 510 m, lat. 20°19'21" S, long. 57°31'45" E), 4 ♀♀ and 1 ♂ on *Sphaeropteris cooperi* (Hooker ex F. Mueller) R.M. Tryon (Cyatheaceae), 4/XI/2018.

Remarks: This species was first reported from Mauritius by Schicha (1984) under the junior synonym name *P. hawaiiensis*. Ferragut and Baumann (2019) recovered the species. Kreiter *et al.* (2020b) had recently reported this species from Vietnam. Morphological and morphometric characters and all measurements of our specimens fit well measurements in Kreiter *et al.* (2020b).

***Phytoseius crinitus* Swirski & Shechter**

Phytoseius (*Dubininellus*) *crinitus* Swirski & Shechter 1961: 102; Amitai & Swirski 1966: 21; Denmark 1966: 66; Swirski & Amitai 1966: 11; Moraes *et al.* 1986: 220.

Phytoseius crinitus, Moraes *et al.* 2004: 236; Chant & McMurtry 2007: 129.

This species belongs to the *horridus* species group (Chant and McMurtry 1994). It was recorded in several countries of Asia, in Burundi, Madagascar (Demite *et al.* 2020) and La Réunion (Quilici *et al.* 2000). The biology of *P. crinitus* remains totally unknown.

World distribution: Burundi, China, Hong Kong, India, Indonesia, Japan, Madagascar Island, Philippines, La Réunion Island, Singapore, Taiwan.

Specimens examined: 21 ♀♀ in total. **Curepipe**, Anderson street (aasl 560 m, lat. 20°19'11" S, long. 57°31'52" E), 13 ♀♀ on *Litsea glutinosa* (Loureiro) Robinson (Lauraceae), 27/X/2018; **Curepipe**, Botanical Garden (aasl 540 m, lat. 20°19'28" S, long. 57°30'50" E), 1 ♀ on *Vernicia montana* Loureiro (Euphorbiaceae), 29/X/2018; **Nouvelle-France** (aasl 442 m, lat. 20°22'34" S, long. 57°35'58" E), 1 ♀ on *Camelia sinensis* (L.) Kuntze (Theaceae), 31/X/2018; **Belle Rive** (aasl 158 m, lat. 20°19'24" S, long. 57°42'08" E), 1 ♀ on *Acalypha hispida* Burman (Euphorbiaceae), 1/XI/2018; **Baie du Cap**, sea front (aasl 158 m, lat. 20°30'14" S, long. 57°23'02" E), 3 ♀♀ on *Casuarina equisetifolia* L. (Casuarinaceae), 5/XI/2018; **Morne-Brabant** (aasl 249 m, lat. 20°22'05" S, long. 57°29'31" E), 2 ♀♀ on *Chromolaena odorata* (L.) R.M. King and H. Robinson (Asteraceae), 5/XI/2018.

Remarks: this species is the more numerous species of *Phytoseius* collected in the present study. This was also the case with Ferragut and Baumann (2019) along with *Phytoseius haroldi*. It was reported for the first time by these authors from Mauritius, but was already reported by Quilici *et al.* (2000) from Mascareignes Archipelago in La Réunion Island where Kreiter *et al.* (2020c) had recovered high numbers of the species. Morphological and morphometric characters and all measurements of our specimens fit well measurements in Kreiter *et al.* (2020c).

***Phytoseius duplus* Ueckermann & Loots**

Phytoseius (*Phytoseius*) *duplus* Ueckermann & Loots 1985: 37.

Phytoseius duplus, Moraes *et al.* 2004: 237; Chant & McMurtry 2007: 129.

This species belongs to the *horridus* species group. Its biology is unknown, this is the single report of that species since the original description and is the first report of that species from Mauritius Island.

World distribution: South Africa.

Specimens examined: 4 ♀♀ in total. **Plaisance** (aasl 55 m, lat. 20°25'59" S, long. 57°40'44" E), 4 ♀♀ on *Litsea monoptetala* (Roxburgh) Person (Lauraceae), 31/X/2018.

Remarks: this is the first mention of this species from Indian Ocean. The measurements of specimens collected in Mauritius Island (Table 4) are very close to those given by Ueckermann and Loots (1985) for two specimens in the original description, except for the shorter dimensions of the ventral shields (Table 4).

Phytoseius haroldi Ueckermann & Kreiter

Phytoseius haroldi Ueckermann & Kreiter in Kreiter *et al.* 2002: 339; Chant & McMurtry 2007: 129.

This species belongs to the *horridus* species group as setae *J2* and *R1* are absent (Chant and McMurtry 1994). It was described by Ueckermann and Kreiter in Kreiter *et al.* (2002). It was abundant on lower vegetation in a study of companion plants in citrus orchards in La Réunion Island (Kreiter *et al.* 2020c). It seems that this species prefers low plants, but despite this observation has to be confirmed, its biology remains totally unknown. This is the second report in Mauritius after recent report by Ferragut and Baumann (2019).

World distribution: La Réunion Island, Mauritius Island.

Specimens examined: 2 ♀♀ and 1 ♂ in total. **Plaisance** (aasl 55 m, lat. 20°25'59" S, long. 57°40'44" E), 2 ♀♀ on *Litsea monoptala* (Roxburgh) Person (Lauraceae), 31/X/2018; **Morne-Brabant** (aasl 249 m, lat. 20°22'05" S, long. 57°29'31" E), 1 ♂ on *Lantana camara* L. (Verbenaceae), 5/XI/2018.

Remarks: this species was described by Ueckermann and Kreiter in Kreiter *et al.* (2002) from La Réunion Island. Morphological and morphometric characters and all measurements of our specimens fit well measurements of the original description in Kreiter *et al.* (2002)

Table 4 Character measurements of adult females of *Phytoseius duplus* collected in this study and those reported in previous studies (localities followed by the number of specimens measured between brackets).

Characters	Mauritius (4, this study)	South Africa (2)	Characters	Mauritius (4, this study)	South Africa (2)
Dsl	288 (280 – 290)	280 – 315	gensl	102 (100 – 108)	–
Dsw	136 (125 – 142)	–	st5-st5	66 (63 – 68)	76 – 82
j1	25 (23 – 25)	22 – 25	gensw post. cor.	79 (73 – 85)	–
j3	18 (15 – 20)	22 – 25	Lisl	18 (15 – 20)	–
j4	5 (4 – 5)	9	Lisw	8	–
j5	5 (4 – 5)	9	Vsl	84 (80 – 90)	85 – 88
j6	5 (5 – 6)	9	Vsw ZV2	33 (30 – 35)	44 – 57
J5	5	9	Vsw anus	51 (40 – 55)	–
r3	39 (38 – 40)	35 – 41	JV5	34 (33 – 35)	32 – 38
s4	63 (60 – 65)	61 – 69	Scl	11 (8 – 15)	–
s6	77 (75 – 83)	76 – 88	Scw	10 (8 – 13)	–
z2	21 (20 – 25)	22 – 25	SgeIV	–	–
z3	32 (30 – 33)	28 – 38	StiIV	–	–
z4	15 (13 – 15)	16 – 22	StIV	–	–
z5	6	9	SttIV	19 (18 – 20)	19 – 22
Z4	77 (75 – 83)	79 – 91	Fdl	17 (15 – 18)	–
Z5	67 (63 – 70)	63	No teeth Fd	2	–
st1-st1	47 (45 – 48)	–	Mdl	17 (15 – 18)	–
st2-st2	56 (55 – 60)	69 – 76	No teeth Md	1	–
st3-st3	71 (60 – 75)	–			
st1-st3	50	60 – 63			
st4-st4	77 (58 – 88)	–			

Sources of measurements – South Africa: Ueckermann & Loots (1985); – : not provided.

concerning specimens from La Réunion Island, Ferragut and Baumann (2019) for specimens from Mauritius, and Kreiter *et al.* (2020c) for additional specimens from La Réunion Island.

Subfamily Typhlodrominae Wainstein

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

Genus *Typhlodromus* (*Anthoseius*) Scheuten

Typhlodromus (*Anthoseius*) De Leon 1959: 258; van der Merwe 1968: 20; Karg 1982: 194; Chant and McMurtry 1994: 250, 2007: 149.

Typhlodromus (*Anthoseius*) *lobatus* Zannou, Moraes & Oliveira

Typhlodromus (*Anthoseius*) *lobatus* Zannou, Moraes & Oliveira in Ueckermann *et al.* 2008: 59.

This species belongs to the large *rhenanus* species group (Chant and McMurtry 1994). Its biology is totally unknown and this is the first report of *T. (A.) lobatus* from Mauritius.

World distribution: Ghana.

Specimens examined: 2 ♀♀ and 1 ♂ in total. **Chamouny** (aasl 192 m, lat. 20°28'42" S, long. 57°29'11" E), 1 ♀ on *Cupressus sempervirens* L. (Cupressaceae), 31/X/2018; **Morne-Brabant** (aasl 249 m, lat. 20°22'05" S, long. 57°29'31" E), 1 ♀ and 1 ♂ on *Chromolaena odorata* (L.) R.M. King and H. Robinson (Asteraceae), 5/XI/2018.

Remarks: morphological and morphometric characters and all measurements of our specimens fit well measurements of the original description by Zannou, Moraes and Oliveira in Ueckermann *et al.* (2008) concerning specimens from Ghana, in Western Africa.

Typhlodromus (*Anthoseius*) *muliebris* van der Merwe

Typhlodromus (*Anthoseius*) *muliebris* van der Merwe 1968: 28; Moraes *et al.* 2004: 337; Chant & McMurtry 2007: 155; Ueckermann *et al.* 2008: 69.

Amblydromella muliebris, Moraes *et al.* 1986: 168.

Amblydromella (*Amblydromella*) *muliebris*, Denmark & Welbourn 2002: 308.

This species belongs to the large *rhenanus* species group (Chant and McMurtry 1994). It was described by van der Merwe (1968) from South Africa and then reported by El-Banhawy and Knapp (2011) from Kenya. The biology of this species is totally unknown. This is the first report of this species from Mauritius and from a country outside the Africa continent.

World distribution: Kenya, South Africa.

Specimens examined: 3 ♀♀ in total. **Chamouny** (aasl 192 m, lat. 20°28'42" S, long. 57°29'11" E), 3 ♀♀ on *Solanum torvum* Swartz (Solanaceae), 31/X/2018.

Remarks: morphological and morphometric characters and all measurements of our specimens fit well measurements of the original description by van der Merwe (1968) and new descriptions by Ueckermann *et al.* (2008) and El-Banhawy and Knapp (2011) concerning specimens from South Africa and Kenya, respectively.

Typhlodromus (*Anthoseius*) *recurvitremus* Ferragut

Typhlodromus (*Anthoseius*) *recurvitremus* Ferragut in Ferragut & Baumann 2019: 847-851.

As underlined by Ferragut and Baumann (2019), this species can hardly be accommodated in any of the species groups proposed by Chant and McMurtry (1994) for the subgenus *Typhlodromus* (*Anthoseius*). It seems most closely related to *Typhlodromus* (*Anthoseius*) *elaeis* Zannou, Moraes and Oliveira described from Cameroon (Ueckermann *et al.* 2008) which can be probably raised as a new species group for the subgenus *Typhlodromus* (*Anthoseius*)

including the two species (to be called *elaeis* species group). The biology of this species is totally unknown. This is the second report of *T. (A.) recurvitremus* from Mauritius.

World distribution: Mauritius.

Specimens examined: 4 ♀♀ and 2 ♂♂ in total. **Chamouny** (aasl 192 m, lat. 20°28'42" S, long. 57°29'11" E), 4 ♀♀ and 2 ♂♂ on *Agarista salicifolia* (Commerson ex Lam) G. Don (Ericaceae), 31/X/2018.

Remarks: morphological and morphometric characters and all measurements of our female and male specimens fit well measurements of the original description of Ferragut and Baumann (2019).

Conclusion

The results of an additional survey made in 2018 in Mauritius Island is presented in this paper. A total of 12 new records: nine Amblyseiinae, one Phytoseiinae and two Typhlodrominae, have been obtained, namely *Neoseiulus houstoni*, *Paraphytoseius horriifer*, *Amblyseius haleakalus*, *A. herbicolus*, *A. neolargoensis*, *Typhlodromalus spinosus*, *Euseius gallicus*, *E. hima*, *E. ovaloides*, *Phytoseius duplus*, *Typhlodromus (Anthoseius) lobatus* and *T. (A.) muliebris*.

The fauna of Mauritius after our study is composed of 27 species: 20 Amblyseiinae, four Phytoseiinae and three Typhlodrominae.

Among the 12 newly recorded species, at least 3 species (*A. herbicolus*, *E. gallicus* and *E. ovaloides*) are known as BCAs. In addition to the intrinsic value of phytoseiid mite biodiversity in tropical environments, demonstration of the natural occurrence of efficient BCAs in a developing country such as Mauritius is of great agricultural, commercial and strategic interests for the country.

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