

New Records of Three Larval Species of Erythraeidae (Acari: Trombidiformes) in a Citrus Orchard in Latakia, Syria

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Abstract

Most larvae of *Erythraeidae* are considered as parasites of various insect species, and their adults seem to be effective generalist predators of several agricultural pests. Studies of this fauna is limited in Syria. The present study aimed to identify mite species of *Erythraeidae* in a pesticide-free citrus orchard in Latakia governorate/Syria. Surveys were carried out three times in 2016 and 2017. Three *Erythraeid* species were collected, and all belong to the genus *Erythraeus*: *Erythraeus* (*Erythraeus*) *phalangoides*, *Erythraeus* (*Erythraeus*) *adanaensis* and *Erythraeus* (*Zaracarus*) *didonae*. This is the first report of these species in Syria. Morphological remarks of each species were collected and provided.

Keywords: Acari, Erythraeidae, *Erythraeus*, larva, Syria

Introduction

Recent advances in knowledge of mite fauna in Syrian agro-ecosystems are took place. Actually, the number of reported species from Syria increased from about 15 species in 2012 to more than 80 species in 2017 (Zriki *et al.*, 2015; Barbar, 2016, 2017; Zeity, 2017; Barbar and Ueckermann, 2017), and more species still to be discovered. The family *Erythraeidae* presently comprises more than 300 nominal species (Gerson *et al.*, 2009; Krantz and Walter, 2009). Most larvae of these mites are parasites of various arthropods, but adults have been shown to be effective generalist predators of several agricultural pests including insects and spider mites (Zhang, 2003; Gerson *et al.*, 2009). The knowledge of this mite fauna in Syria is poor. Up to date, only two species belong to the genus *Leptus* Latreille associated with Tenebrionidae (Coleoptera) are known: *Leptus horiacus* Haitlinger and *Leptus tammuzi* Haitlinger (Haitlinger, 1994). The aim of the present work was to identify *Erythraeid* mite species which are existed in the environment of a citrus orchard in Latakia Governorate/Syria.

Materials and Methods

Erythraeidae mites were surveyed three times on several weed species, cultivated crops and from soil litter of a citrus lemon orchard [*Citrus limon* (L.) Burm] at Al-ya'robiyah (35° 30' 24"N/35° 48' 33" E.) in Latakia Governorate/Syria, during 2016 and 2017. Collected mites were mounted on slides in Hoyer's medium, and dried in an oven at 40°C for one week. Mites were identified using keys proposed in the papers of Southcott (1961, 1995), Lafuente and Zhang (1998), Mahmoudi *et al.* (2014), and Šundić *et al.*, (2015). Specimens were compared with original descriptions or re-descriptions of corresponding or related species. All measurements of morphological characters of collected specimens are given in micrometers (µm). The terminology and abbreviations follow Haitlinger (1999, 2013). The specimens were deposited in the Arthropod Collection of the Department of Plant Protection, Faculty of Agriculture, Al-Baath University, Homs, Syria.

Results and Discussion

The results of identifications showed the presence of five *Erythraeidae* larvae, all are related to the genus *Erythraeus*: Four larvae belong to the subgenus *Erythraeus* (*Erythraeus*) and one larva belongs to the subgenus *Erythraeus* (*Zaracarus*) (Southcott, 1961, 1995; Lafuente and Zhang, 1998).

Erythraeus (*Erythraeus*) *phalangoides* (De Geer, 1778)

Three larvae of this species attached to unidentified aphids (Hemiptera: Sternorrhyncha) associated to *Cirsium arvense* L. were collected in 30-III-2017 (Figure 1). This is the first record of this species from Syria. It was considered as senior synonym of *Erythraeus adrastus* (Southcott) (Stålstedt *et al.*, 2016). As all species of the subgenus *Erythraeus*, anterior sensillae of scutum (ASE) without strong cuticular structures at their bases and setae were not enlarged near bases (Figure 2a). This species has two setae on basifemora I–III (Figure 2b) and Ti III < 300 µm. Pupal and leg chaetotaxies of Syrian specimens agree with larvae described by Southcott (1961) and to those re-described by Stålstedt *et al.*, (2016). Measurements of morphological characteristics of Syrian specimens (two larvae were measured) are close to those of Stålstedt *et al.*, (2016) (Table 1) except for a few small morphological differences namely: (1) Number of dorsal setae is 30–32 in Syrian specimens but 34–36 setae in the re-description of Stålstedt *et al.*, (2016); (2) Tibiae I–III in Syrian specimens are slightly longer than those in the re-description of Stålstedt *et al.*, (2016). Larvae of this species parasitize aphids but deutonymphs and adults were observed to feed on adult ants (Stålstedt *et al.*, 2016).



Figure 1. Larvae of *Erythraeus* (*Erythraeus*) *phalangoides* attached to unidentified species of aphids on leaves of *Cirsium arvense*, Latakia/Syria.

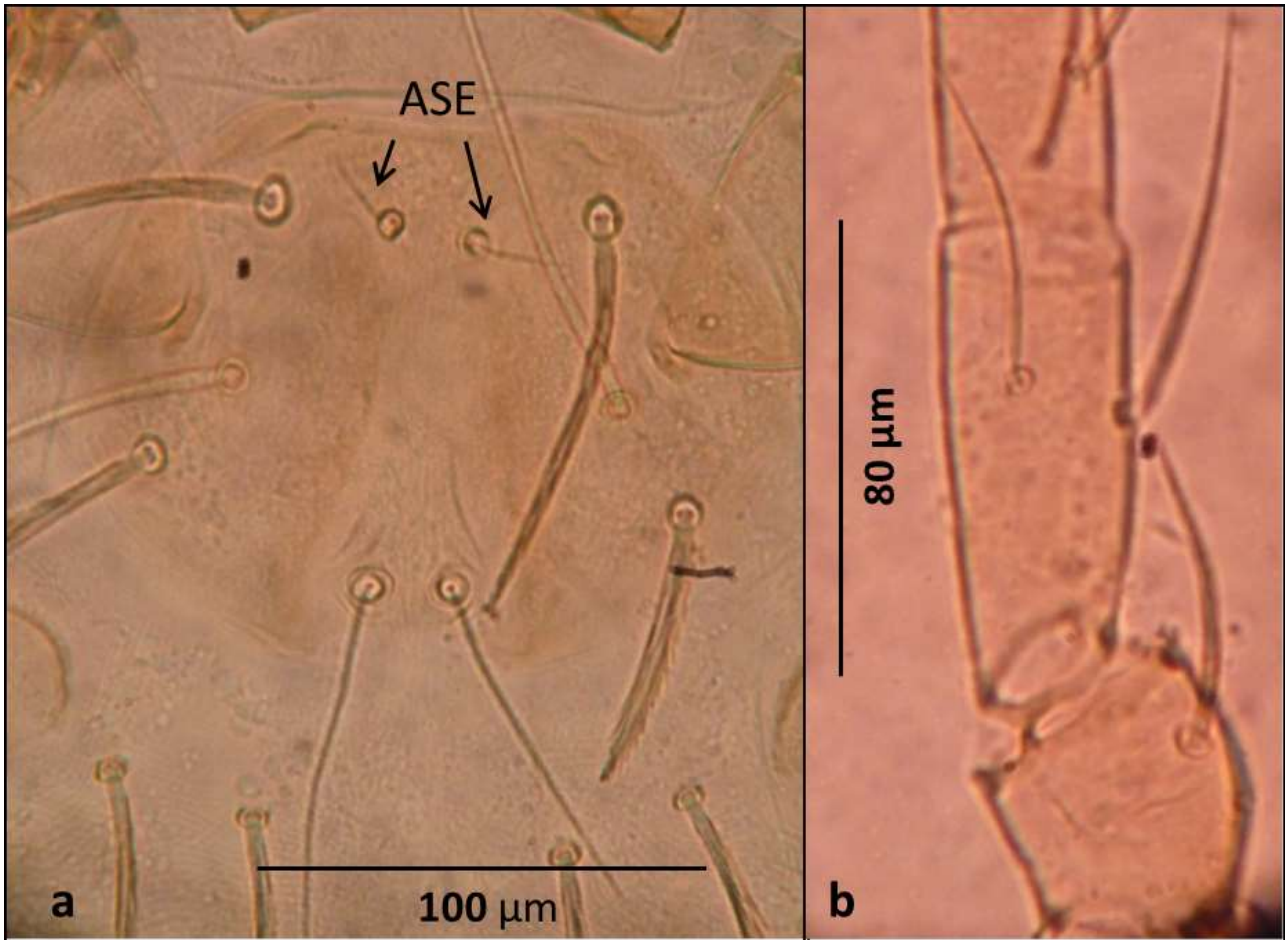


Figure 2. Larva of *Erythraeus (Erythraeus) phalangoides*: Scutum (a); Basifemur I (b).

***Erythraeus (Erythraeus) adanaensis* (Saboori and Çobanoğlu, 2010)**

One larva of this species was collected from leaves of eggplant *Solanum melongena* L. in 25-VI-2016. This is the first record of this species in Syria. It is originated from unknown host in Turkey (Saboori and Çobanoğlu, 2010). Anterior sensilla of scutum without strong cuticular structures at their bases and setae AL not enlarged near bases (Figure 3a). This species has three setae on basifemora I–III (Figure 3b), Ti III < 302 µm, Ti I–III each with 15 normal setae and ASE < 40 µm (i.e. Šundić *et al.*, 2015). Measurements of morphological characteristics and pulpal and leg chaetotaxies of Syrian specimen agree with specimens described by Saboori and Çobanoğlu (2010) except for a few small morphological differences presented in Table (1).

Table 1. Metric data of Syrian larvae of *Erythraeus* compared with the original description or re-description of corresponding species (differences in measurements are in bold)

Character	<i>E. (E.) phalangoides</i>		<i>E. (E.) adanaensis</i>		<i>E. (Z.) didonae</i>	
	Syrian specimens (n=2)	Redescription of Stålstedt <i>et al.</i> (2016) (n=26)	Syrian specimen (n=1)	Saboori and Çobanoğlu (2010) (n=1-2)	Syrian specimen (n=1)	Haitlinger (2000) (n=1)
W	140-138	124-173	120	108-124	170	160
L	110-112	85-116	78	-	110	112
AW	65-63	64-89	40	52-54	52	56
PW	105-105	100-127	84	99-101	120	126
AA	16-15	-	10	9-10	32	-
SB	18-20	14-24	13	12-15	18	16
ISD	70-60	63-75	50	43-50	63	60
AP	60-55	-	42	37-49	55	52
AL	82-80	65-95	75	62-77	173	150
PL	55-62	50-74	62	54-72	57? broken	76
ASE	15-35	14-32	20	20-24	27	26
PSE	75-65	60-81	66	62-72	70	80
GL	200-175	-	155	111-136	188	156
DS	(40-55)-(27-52)	25-60	50-63	59-69	48-70	56-76
fD	30-32	34-36	32	~37	29	26
PsFd	35-50	40-50	55	47-48	50	46
PsGd	65-72	60-80	46	42-52	68	68
Ia	118-118	71-104	44	42-45	100	82
3a	43-42	28-38	32	27-42	48	44
Ib	90-92	80-100	95	72-99	110	94
2b	43-45	25-38	43	32-42	38? broken	36
3b	43-45	28-40	47	40-49	42	54
Ta I	110-112	88-115	125	131-136	123	116
Ti I	162-168	98-141	188	186-190	162	162
Ge I	112-124	82-110	135	136-139	125	122
Tf I	77-78	54-72	95	91-99	88	80
Bf I	82-85	65-84	100	91-111	88	86
Tr I	36-54	42-58	50	48-52	55	60
Cx I	60-62	53-80	55	67-69	73	72
Ta II	100-102	80-107	120	123-129	115	110
Ti II	150-156	97-131	190	186-188	168	162
Ge II	100-102	70-96	117	111-138	122	114
Tf II	75-78	54-75	95	92-93	82	80
Bf II	70-75	56-78	90	87-104	80	86
Tr II	50-50	47-60	45	50-55	50	62
Cx II	85-80	65-91	62	72-74	75	84
Ta III	125-115	90-124	128	136-146	137	136
Ti III	222-232	145-200	287	272-280	258	244
Ge III	105-105	80-119	135	139-153	133	134
Tf III	98-92	71-98	112	111-119	102	104
Bf III	77-92	74-95	110	111-123	100	110
Tr III	52-54	48-62	40	48-50	48	64
Cx III	72-81	61-89	75	82	88	86
PaFe (L)	63-62	50-81	50	-	86	-
PaGe (L)	25-25	22-41	25	-	25	-
PaTi (L)	40-36	30-49	25	-	55	-

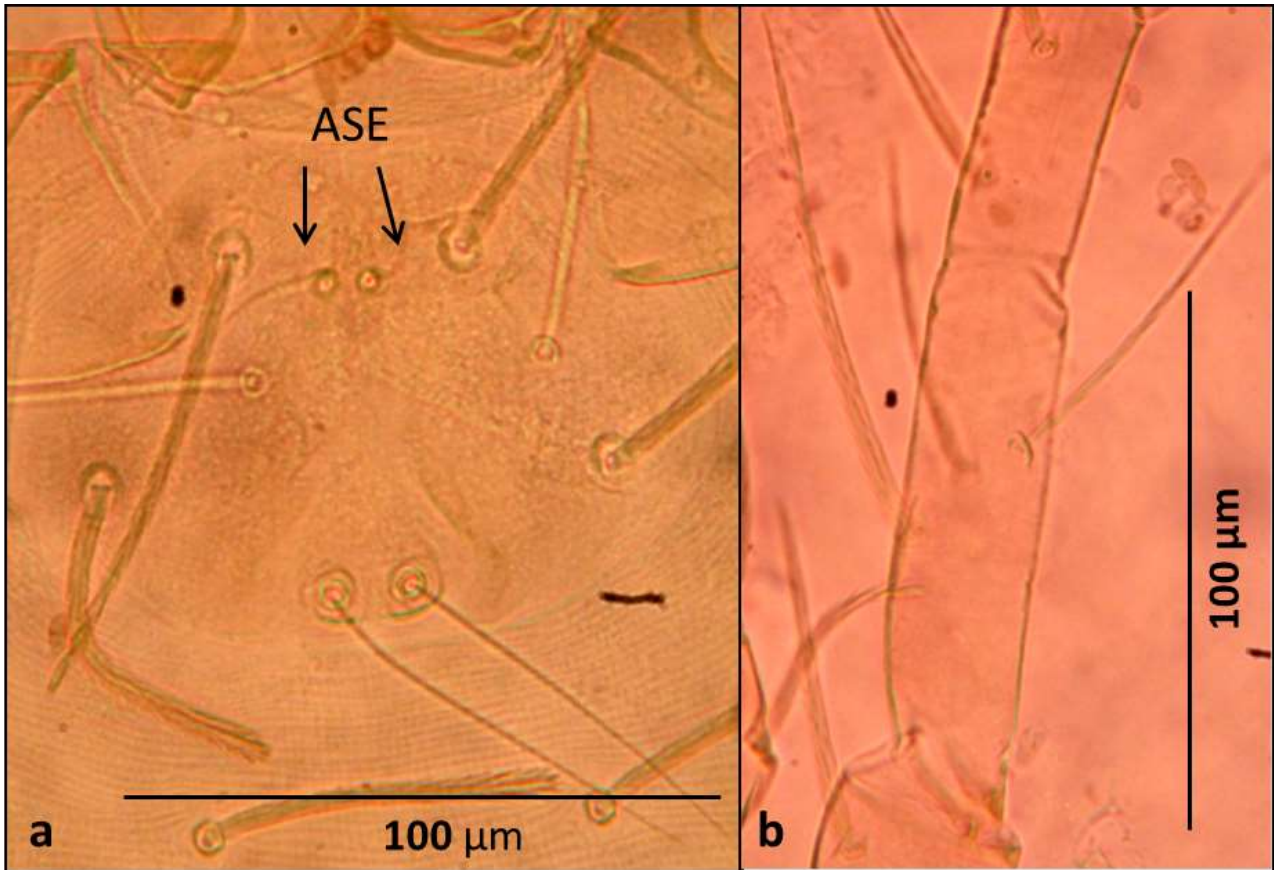


Figure 3. Larva of *Erythraeus (Erythraeus) adanaensis* : Scutum (a); Basifemur I (b).

***Erythraeus (Zaracarus) didonae* (Haitlinger, 2000)**

One larva of this species was collected from soil litter under citrus tree in 16-IV-2016. This is the first record of this species in Syria and the second international record (it was originated from Turkey, Haitlinger, 2000). Anterior sensilla of scutum with strong cuticular structures at their bases and setae AL slightly enlarged near bases (Figure 4a, b). This species has two setae on basifemora I–III, setae AL without swelling near bases (Figure 4c) and Ti II–III with 15 normal setae. Measurements of morphological characteristics and pupal and leg chaetotaxies of Syrian specimens agree with the larva described by Haitlinger (2000) except for few small morphological differences presented in Table (1).

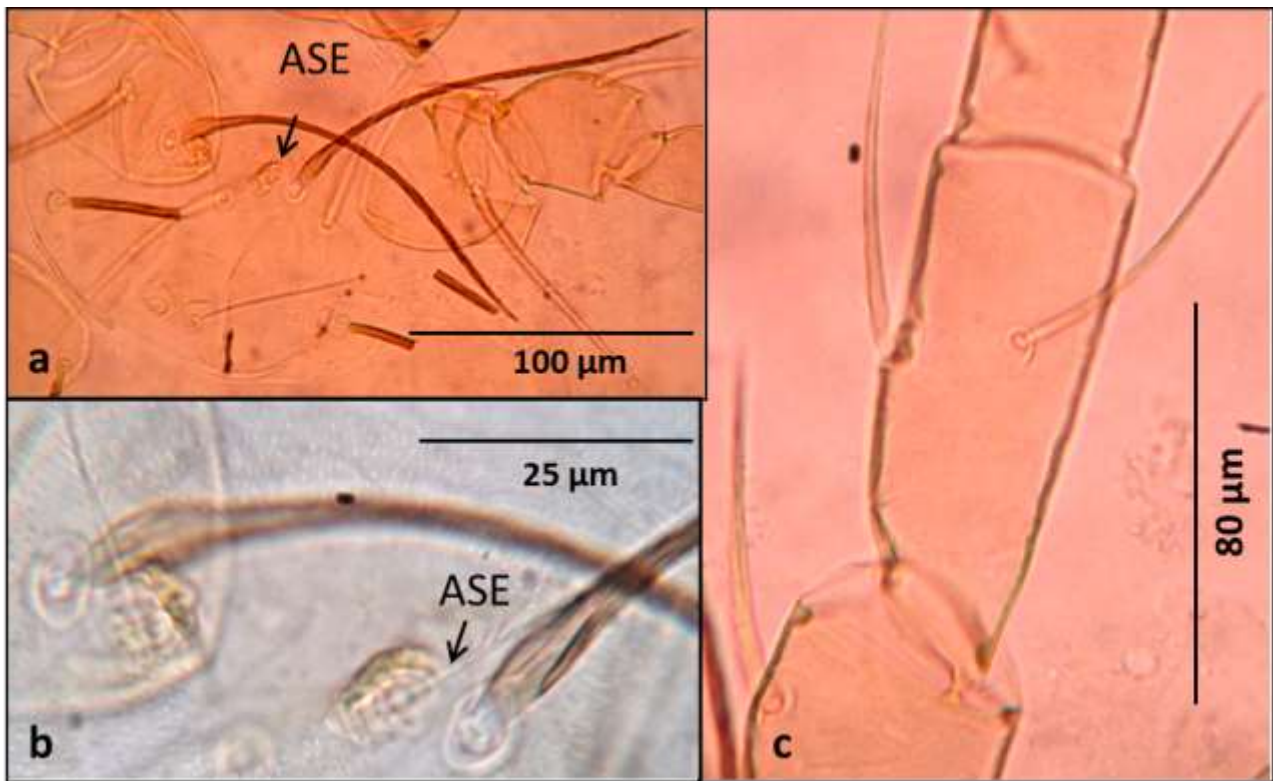


Figure 4. Larva of *Erythraeus (Zaracarus) didonae* : Scutum (a, b); Basifemur I (c).

In conclusion, three new records of erythraeid mites from Syria were presented in this paper. Further studies are required to identify mites of this family in other regions of Syria and to clarify their potential effects as beneficial mites in biological control of pests in Syrian agrosystems.

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تسجيل جديد لثلاثة أنواع في الطور اليرقي من فصيلة *Erythraeidae* (Acari: Trombidiformes) في بيئة بستان للحمضيات في اللاذقية، سورية

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الملخص

تعتبر أغلب يرقات فصيلة *Erythraeidae* طفيليات لأنواع مختلفة من الحشرات، وتعتبر البالغات مفترسات عامة فعالة للعديد من الآفات الزراعية. إن الدراسات المتعلقة بهذه الفصيلة محدودة في سورية. هدفت هذه الدراسة إلى تحديد أنواع *Erythraeidae* الموجودة في بيئة بستان حمضيات غير معاملة بمبيدات الآفات في محافظة اللاذقية بسورية. تم التقصي عن هذه الفصيلة بمعدل ثلاث مرات خلال العامين 2016 و 2017. جُمعت ثلاثة أنواع من هذه الفصيلة وكلها تنتمي إلى الجنس *Erythraeus*: *Erythraeus (Erythraeus) phalangoides*، *Erythraeus (Erythraeus) adanaensis*، و *Erythraeus (Zaracarus) didonae*. تعتبر هذه النتائج التسجيل الأول لهذه الأنواع في سورية. زوّدت النتائج ببعض الملاحظات المورفولوجية المتعلقة بكل نوع.

الكلمات المفتاحية: Acari، *Erythraeidae*، *Erythraeus*، يرقة، سورية.