



Original article (Orijinal araştırma)

First adult (female) description of *Abrolophus bochkovi* Hakimitabar, Saboori & Fadaei, 2020 (Trombidiformes: Erythraeidae)

Abrolophus bochkovi Hakimitabar, Saboori & Fadaei, 2020 (Trombidiformes: Erythraeidae) ergininin (dişi) ilk kez tanımlanması

İbrahim KARAKURT^{1*} 

Alireza SABOORİ^{2,3} 

Abstract

In this study, the post-larval (female) stage of *Abrolophus bochkovi* Hakimitabar, Saboori & Fadaei, 2020, previously known only from the larval stage, is described for the first time through experimental laboratory rearing. Larval specimens from Türkiye and Iran were compared to confirm the species identification. In addition, detailed drawings, photographs, and morphometric data are provided for the female of this species. With this contribution, the number of *Abrolophus* species described from both larval and post-larval stages increases to four. The present study was conducted at Erzincan Binali Yıldırım University between 2023 and 2025.

Keywords: Abrolophinae, experimental rearing, new record, Prostigmata, Parasitengona, systematics

Öz

Bu çalışmada, yalnızca larva evresinden bilinen *Abrolophus bochkovi* Hakimitabar, Saboori & Fadaei, 2020 türünün, laboratuvarında yetiştirme deneyi ile larva sonrası (dişi) formu doğrulandı ve tanımlandı. Bu türün hem Türkiye hem de İran'daki larva örnekleri doğrulama amacıyla karşılaştırılmıştır. Ayrıca bu türün dişisine ait çizimler, fotoğraflar ve ölçüler verilmiştir. Bu çalışma, bu cinsin hem larva hem de post-larva dönemlerinden tanımlanan tür sayısını dörde çıkarmıştır. Mevcut çalışma 2023-2025 yılları arasında Erzincan Binali Yıldırım Üniversitesi'nde yürütülmüştür.

Anahtar sözcükler: Abrolophinae, deneysel yetiştirme, yeni kayıt, Prostigmata, Parasitengona, sistematik

¹ Erzincan Binali Yıldırım University, Vocational School of Health Services, Department of Home Care, 24100, Erzincan, Türkiye

² University of Tehran, Faculty of Agriculture, Department of Plant Protection, Jalal Afshar Zoological Museum, 31587-77871, Karaj, Iran

³ Aydın Adnan Menderes University, Faculty of Agriculture, Department of Plant Protection, 09970, Aydın, Türkiye

* Corresponding author (Sorumlu yazar) e-mail: ibrahim.karakurt@erzincan.edu.tr

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Introduction

The genus *Abrolophus* Berlese, 1891 (Trombidiformes: Erythraeidae), distributed worldwide except Antarctica, is currently represented by 131 species. Of these, 73 species are known only from post-larval stages and 55 species only from larval stages, while larval and post-larval stages have been correlated in only three species: *Abrolophus norvegicus* (Thor, 1900), *Abrolophus quisquiliarus* (Hermann, 1804), and *Abrolophus welbourni* Yao, Snider & Snider, 2000 (Wohltmann & Mağkol, 2012; Mağkol & Wohltmann, 2012, 2013; Seeman et al., 2024; Sevsay et al., 2024). This highlights the limited morphological correspondence between larval and post-larval instars of *Abrolophus*. Indeed, the separate examination of larval and post-larval specimens in systematic studies remains an ongoing challenge in the classification of terrestrial Parasitengona mites (Mağkol & Sevsay, 2011; Karakurt et al., 2022; Seeman et al., 2024).

Systematic studies on the genus *Abrolophus* in Türkiye are limited. The genus was first recorded from Türkiye by Fain & Çobanoğlu (1998), who described *Abrolophus viburnicolus* (as *Hauptmannia viburnicola*) based on larval specimens. Haitlinger (2010) subsequently reported the larval stage of *Abrolophus silesiacus* (Haitlinger, 1986). Later, Karakurt (2023) recorded the post-larval stages of *Abrolophus artemisiae* (Schrank, 1803), *Abrolophus miniatus* (Hermann, 1804), *Abrolophus rhopalicus* (Koch, 1837), and *Abrolophus strojnji* Gabryš, 1992, as well as the larval stage of *Abrolophus quisquiliarus* (Hermann, 1804). Two additional larval species, *Abrolophus balkanicus* Haitlinger & Šundić, 2015, and *Abrolophus poljankus* Haitlinger & Šundić, 2021, were reported by Çobanoğlu et al. (2023). More recently, *Abrolophus boleticolus* Sevsay, Özyürek, Balcı & Ozman-Sullivan, 2024, was described from Türkiye based on larval specimens (Sevsay et al., 2024). To date, a total of ten species of *Abrolophus* have been recorded from Türkiye (Erman et al., 2024), six of which are known only from larval stages, while the remaining four are known from post-larval stages.

Abrolophus bochkovi Hakimitabar, Saboori & Fadaei, 2020 was first described by Hakimitabar et al. (2020) from Iran, based solely on larval specimens. Barbar et al. (2023) later recorded it from Syria.

In this study, the relationship between the larval and post-larval instars of *A. bochkovi* was confirmed by the identifying larvae reared from females.

Materials and Methods

Active post-larval instars were hand-collected from moss-covered, humid soil surfaces in the vicinity of the Fırat (Euphrates) River in Kemaliye, Erzincan Province, Türkiye, on 25 November 2023. Four ovigerous females collected in the field were placed individually in glass vials (25 × 35 mm) containing a mixture of charcoal and plaster of Paris (1:9). After oviposition, the females were transferred to 70% ethanol. Larvae were obtained by experimentally rearing females collected from their natural habitat. Eggs were maintained in glass vials under controlled laboratory conditions (22-24°C). To maintain adequate humidity, 1-2 ml of distilled water was added to the substratum every three days.

Specimens were mounted on microscope slides in Hoyer's medium (Walter & Krantz, 2009). An Olympus BX63 microscope (Olympus Corporation, Tokyo, Japan) was used for measurements, photography, and drawings.

Morphological terminology follows Wohltmann & Mağkol (2012) for adult (female) instars and Hakimitabar et al. (2020) for larvae, with all measurements expressed in micrometres (µm).

The type specimens of *Abrolophus bochkovi* Hakimitabar, Saboori & Fadaei, 2020 from Iran were re-examined for comparative purposes.

The materials were deposited in Biology Laboratory of Erzincan Binali Yıldırım University, Türkiye. The present study was conducted at Erzincan Binali Yıldırım University between 2023 and 2025.

Results

Trombidiformes Reuter, 1909

Erythraeidae Robineau-Desvoidy, 1828

Abrolophus bochkovi Hakimitabar, Saboori & Fadaei, 2020

Larva. The species *Abrolophus bochkovi* was first described by Hakimitabar et al. (2020) from Iran, based only on the larval form. The same authors (2020) included this larval species in a group characterized by comb-like setae on the palpal tarsus. According to Hakimitabar et al. (2020), the diagnostic characteristics of this species include: "Ti III < 85; palpal femur with a projection; palpal tibial claw entire and without a subterminal denticle; cheliceral bases with longitudinal striations." See Hakimitabar et al. (2020) for details.

Diagnosis. Adult, female. Palp trochanter with 1-3 setulose setae. Tibial claw characterized by the presence of a small basal tooth. Scutum clearly detectable and overreaching the crista metopica laterally, anteriorly and posteriorly. ASens with setules in its distal third. Posterior sensillary area oval in shape, with a relatively long posterior process. PSens similar in shape to ASens but longer. Dorsal setae setiform, of various lengths (20-50). Linear distance between the eye plates 190-210.

Description. Adult, female. Morphological measurement values provided in Table 1. Idiosoma (Figure 1 a) length 880-1237, width 508-590. Body orange color when alive.

Table 1. Morphometric data for females *Abrolophus bochkovi* Hakimitabar, Saboori & Fadaei, 2020

Characters (n=4)	Values (µm)	Characters (n=4)	Values (µm)	Characters (n=4)	Values (µm)
L	275-315	Palp Ta (L)	30-40	LEG II	537-601
W	70-110	Palp Ta (W)	20-28	Cx III	103-110
SBp-post	55-60	Cx I	110-116	Tr III	55-75
ASens	48-68	Tr I	67-80	BaFe III	55-75
SBa	16-20	BaFe I	110-140	TeFe III	77-103
PSens	70-90	TeFe I	140-170	Ge III	112-130
SBp	14-16	Ge I	157-188	Ti III	111-125
ISD	140-160	Ti I	130-165	Ta III	64-73
DS	20-50	Ta I	133-170	Ta III (H)	30-40
VS	15-51	Ta I (H)	60-75	LEG III	584-687
Dig. Fix. (L)	370-465	LEG I	854-1023	Cx IV	135-150
Palp Tr (L)	30-42	Cx II	110-118	Tr IV	70-88
Palp Tr (W)	25-32	Tr II	47-60	BaFe IV	80-100
Palp Fe (L)	80-97	BaFe II	48-70	TeFe IV	138-165
Palp Fe (W)	40-57	TeFe II	71-82	Ge IV	162-195
Palp Ge (L)	50-60	Ge II	90-112	Ti IV	165-185
Palp Ge (W)	35-50	Ti II	87-105	Ta IV	72-87
Palp Ti (L)	25-30	Ta II	67-74	Ta IV (H)	32-40
Palp Ti (W)	23-30	Ta II (H)	34-39	LEG IV	824-951
Odontus	20-28				

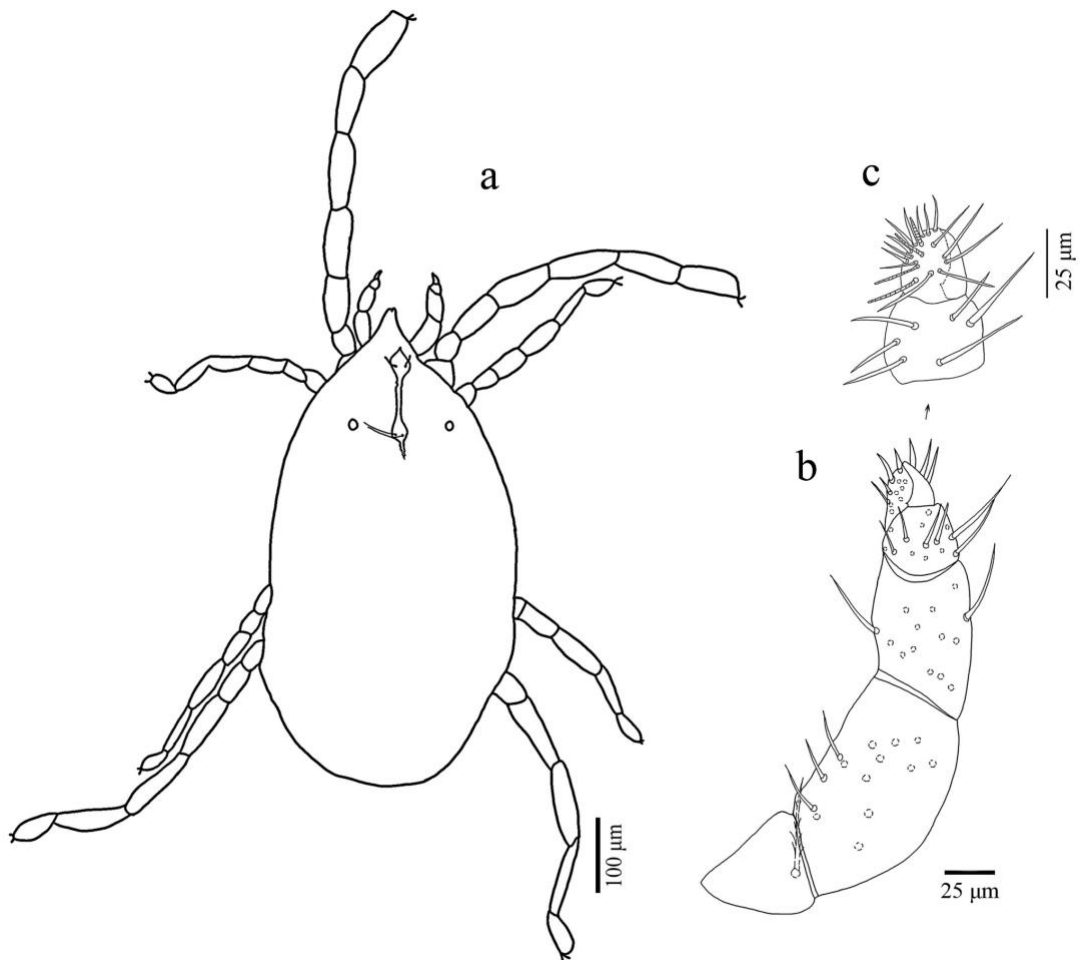


Figure 1. *Abrolophus bochkovi* Hakimitabar, Saboori & Fadaei, 2020, female: a) Habitus, dorsal view, setae omitted except for ASens and PSens, b) Palp (dorsal view), c) Palp tibia and tarsus (ventral view).

Gnathosoma. Chelicera typical of erythraeid type. Palp (Figure 1 b) relatively strong. Palp trochanter short and with 1-3 setulose seta. Palp femur, genu and tibia with numerous smooth setae. Hook-shaped odontus with a small basal tooth. The palp tarsus bears numerous smooth setae, 12-14 eupathidia and 5-6 solenidia (Figure 1 c).

Idiosoma. Scutum present and punctate, extending beyond the crista metopica laterally, anteriorly, and posteriorly. Anterior part of the crista metopica not available. Anterior sensillary area triangular anteriorly, with two setulose setae and one non-sensillary AL seta. ASens with setules in its distal third. Posterior sensillary area oval in shape, with a relatively long posterior process. PSens similar in shape to ASens but longer. A pair of punctate ocular plates (diameter 30-35) bearing a single lens (diameter 18-22) positioned laterally at a level slightly above the base of PSens (Figure 2 a).

Dorsal setae (Figure 2 b) setiform and of various lengths (20-50). The stems of the dorsal setae slightly narrowed apically and sparsely covered with short setules. Ventral setae (15-51) (Figure 2 c) similar to dorsal ones but thinner.

Genital opening (Figure 2 d) surrounded by a pair of sclerites (genital plates): epivalves bearing 6-8 short barbed setae (16-25), and centrovalves bearing 22-26 setae similar to those of the epivalves, placed at the level of coxa IV.

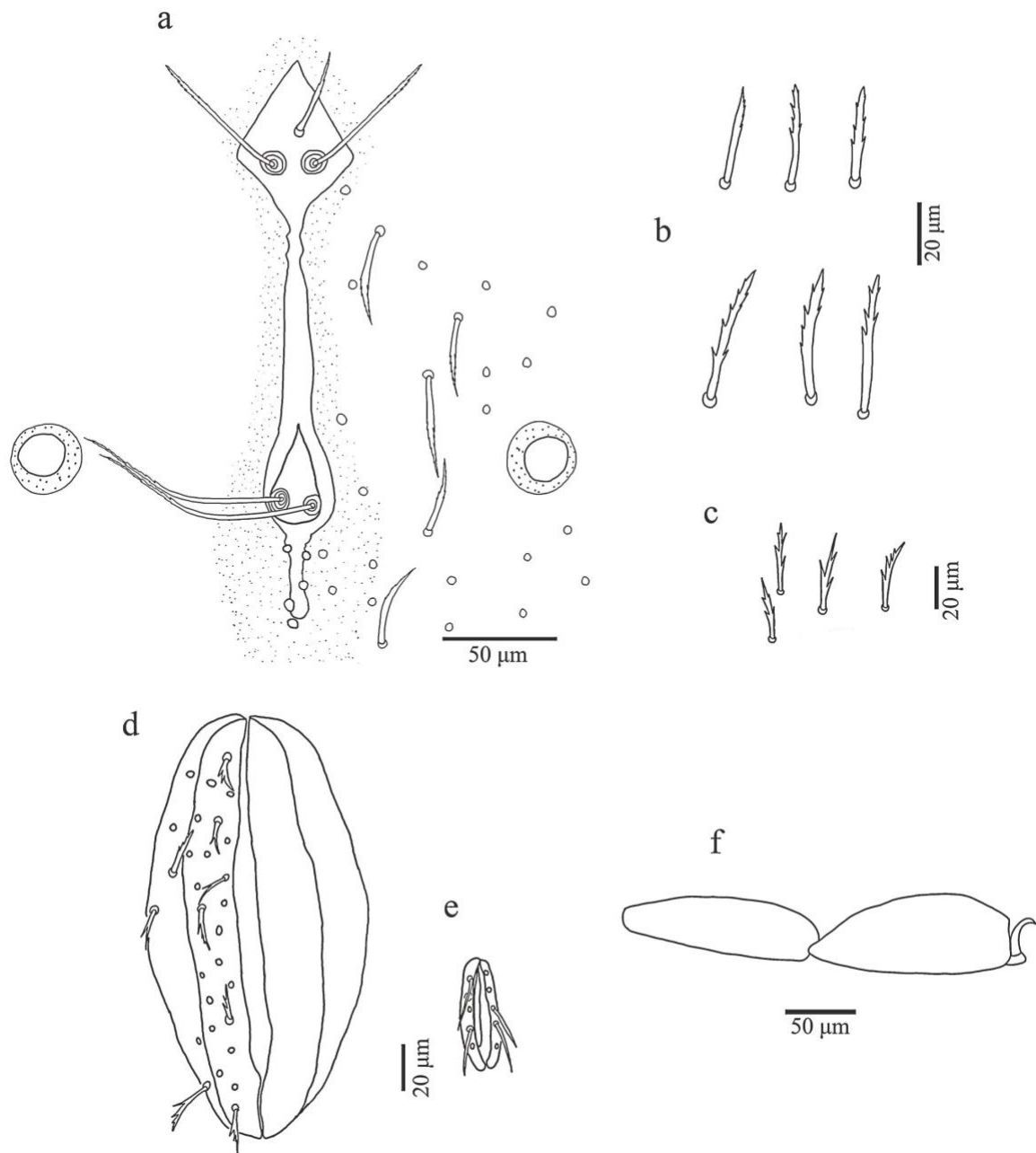


Figure 2. *Abrolophus bochkovi* Hakimitabar, Saboori & Fadaei, 2020, female: a) Crista region, b) Dorsal setae, c) Ventral setae, d) Genital opening, e) Anal opening, f) Tibia and Tarsus I.

Anal opening (Figure 2 e) notably smaller than the genital opening, surrounded by a pair of anal valves. External valves characterized by stronger sclerotization and bearing 3-5 pairs of short (20-35), smooth setae.

Legs. Leg IV notably longer than the other legs, with leg II the shortest. Tarsi I-IV terminated in paired claws. Tibiae II-IV markedly longer than tarsi II-IV, while tibia I and tarsus I almost equal in length (Figure 2 f).

Material examined. Erzincan: Kemaliye, N 39°13'50", E 38°33'56" 875 m a.s.l., 25.11.2023, 4 ♀, 25 larvae.

Distribution. Iran, Syria (Hakimitabar et al., 2020; Barbar et al., 2023) and Türkiye (present study).

Biology. Four female specimens collected exhibited oviposition behavior. Oviposition occurred on 1 and 2 December 2023, i.e. 6-7 days after collection. Females laid approximately 30 light orange-colored eggs in a cluster. Following oviposition, the eggs reached the prelarval stage after 6-9 days. Larval emergence occurred 20-22 days post-oviposition.

Discussion

All examined larvae were obtained by experimental rearing from field-collected females. The larval species of the genus *Abrolophus* Berlese, 1891 (Trombidiformes: Erythraeidae) are divided into two major groups based on the presence or absence of comb-like setae on the palpal tarsus (Yao et al., 2000; Saboori et al., 2012). Comb-like setae were observed on the palpal tarsus of the examined larval specimens. Examination of other morphological features, particularly the scutum and cheliceral structures (Figures 3 a-b), revealed that the larval specimens belong to the species *Abrolophus bochkovi* Hakimitabar, Saboori & Fadaei, 2020.

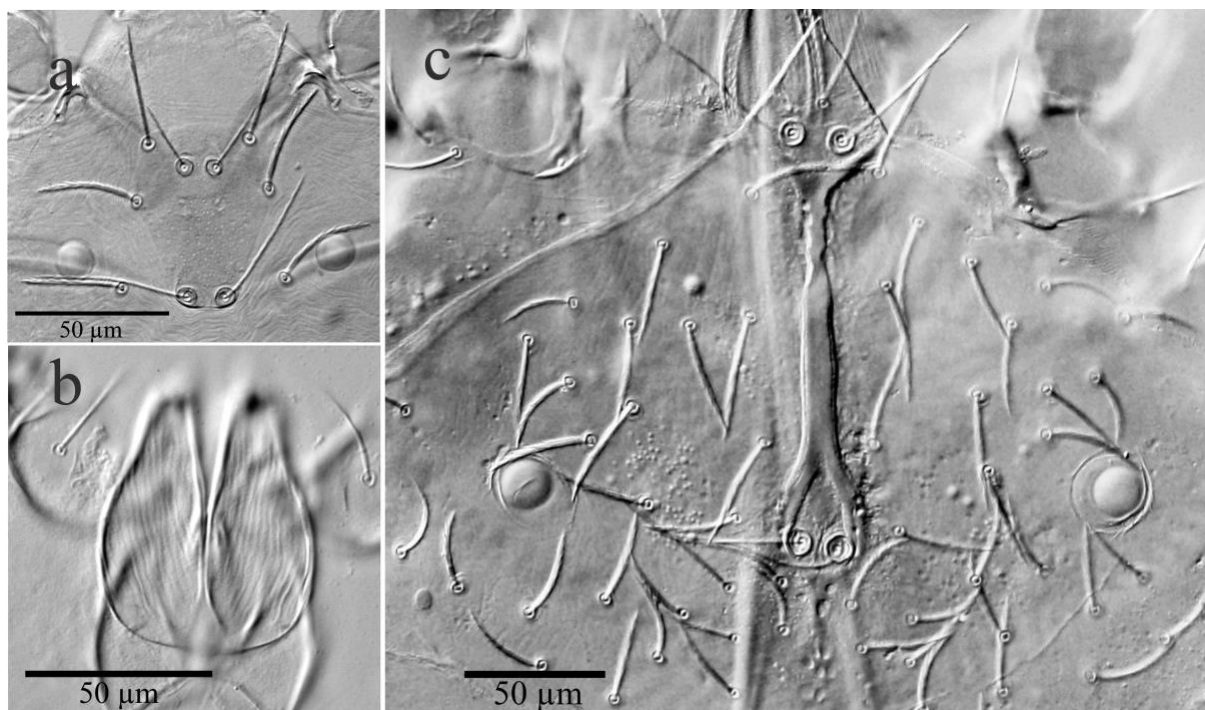


Figure 3. Photomicrographs of *Abrolophus bochkovi* Hakimitabar, Saboori & Fadaei, 2020, larva, a) Scutum, b) Chelicerae, dorsal view; Photomicrographs of *Abrolophus bochkovi*, female, c) Crista region.

The present study reveals substantial overlap between the metric data of the examined larvae and those reported for *A. bochkovi* from Iran (Table 2). Examination and comparison of the type specimens of *A. bochkovi* with the present material further support this conclusion. These findings indicate that both larval samples represent the same species.

Gabryś (2016) categorized the active post-larval specimens of the *Abrolophus* species recorded from Poland into two distinct groups, based on the structural characteristics of the anal opening, with the exception of *Abrolophus tardus* (Halbert, 1915): ‘*norvegicus-passerinii-strojnyi*’ group (anal opening without setae) and ‘*quisquiliarus-miniatus-crassitarsus-rhopalicus-artemisiae*’ group (anal opening with setae) (op. cit., Figures 54-55). *Abrolophus bochkovi* should be considered as a member of the latter group, as its anal opening structure is well sclerotised and bears setae. Morphologically, *A. bochkovi* resembles *Abrolophus quisquiliarus* (Hermann, 1804). However, the posterior process of the crista in *A. bochkovi* is long (Figure 3 c), whereas it is very short in *A. quisquiliarus*.

Table 2. Morphometric comparison of larval of *Abrolophus bochkovi* Hakimitabar, Saboori & Fadaei, 2020

Characters (n=25)	In this study (µm)	Hakimitabar et al., 2020 (µm) (n=10)	Characters (n=25)	In this study (µm)	Hakimitabar et al., 2020 (µm) (n=10)
AW	30-35	30-42	Ta I	45-52	40-50
PW	40-45	42-50	LEG II	300-315	295-312
AA	10-12	10-12	Cx II	62-68	54-64
SB	10-11	10-12	Tr II	32-39	25-35
AP	17-25	20-25	BaFe II	30-35	30-35
AL	35-40	32-40	TeFe II	23-29	25-30
PL	32-38	30-37	Ge II	48-55	50-57
ASens	25-30	25-30	Ti II	55-64	57-62
PSens	45-55	45-54	Ta II	40-45	40-45
SD	57-63	57-62	LEG III	335-350	317-342
W	48-55	46-54	Cx III	57-65	52-62
ISD	40-45	40-47	Tr III	30-40	27-40
GL	95-105	92-103	BaFe III	32-38	32-37
1a	30-34	29-35	TeFe III	30-36	30-37
2a	26-32	27-34	Ge III	58-65	59-64
3a	22-27	22-27	Ti III	73-80	74-82
1b	32-36	32-39	Ta III	37-45	32-42
2b	24-28	22-28	IP	940-996	920-961
3b	28-33	30-37	as1	5-9	7-10
DS	22-45	24-50	as2	15-20	15-19
PDS	35-45	29-47	bs	28-34	28-34
LEG I	308-335	289-317	cs	20-25	15-22
Cx I	46-57	45-52	fD	46-48	46-48
Tr I	28-35	27-35	Intercoxalae I-II	4	4
BaFe I	34-40	30-37	Intercoxalae II-III	15-17	16
TeFe I	30-35	27-32	Setae behind coxae III	16-20	16-18*
Ge I	54-60	50-59	fV	36-40	36-38*
Ti I	56-64	57-62			

* n=9 for this values.

Gabryś (2001) redescribed *Abrolophus schweizeri* (Evans, 1952) based on a female specimen from England. *Abrolophus bochkovi* appears to be very closely related to *A. schweizeri*. The ASens is setulose in the distal third, whereas it is smooth in *A. schweizeri* (Gabryś, 2001). Furthermore, the O-O values (the linear distance between the eye plates) in *A. bochkovi* are in the range from 190-210, whereas these values are 124-126 in *A. schweizeri* according to Gabryś (2001) (op. cit. Table 2).

Thus, the relationship between the larval and post-larval instars of *A. bochkovi* is confirmed by the identification of larvae derived from females. This work brings the number of species described from both the larval and post-larval stages of this genus to four. As with the genus *Abrolophus*, the identification of species either superficially or only on the basis of larval or post-larval specimens has resulted in a complex taxonomy. Further molecular and/or experimental studies are needed to determine the correspondence between larval and post-larval stages and to reduce taxonomic complexity.

References

- Barbar, Z., B. L. Parker & M. Skinner, 2023. New records of Erythraeidae mites (Acari: Trombidiformes) from Syria with additional morphological data on some species. *Persian Journal of Acarology*, 12 (2): 363-370.
- Çobanoğlu, S., M. Hakimitabar, E. Fadaei, F. Turgut & C. Cilbircioğlu, 2023. Reports of larval species of *Parasitengona* (Trombidiformes: Prostigmata) from Türkiye with new records. *Journal of Crop Protection*, 12 (4): 423-437.
- Erman, O., S. Doğan, N. Ayyıldız & M. Özkan, 2024. Checklist of the mites (Acari) of Türkiye. Third supplement. *Acarological Studies*, 6 (2): 81-111.
- Fain, A. & S. Çobanoğlu, 1998. Two new larval Erythraeidae (Acari) of the genus *Hauptmannia* Oudemans, 1910 from Turkey. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique*, 68 (1): 63-69.
- Gabryś, G., 2001. A redescription of *Abrolophus schweizeri* (Evans, 1952) comb. nov. (Acari: Parasitengona: Erythraeidae). *Annales Zoologici*, 51 (2): 227-231.
- Gabryś, G., 2016. A key to postlarval Erythraeidae (Acari, Actinotrichida) of Poland. *Annals of the Upper Silesian Museum (Bytom). Natural History [Rocznik Muzeum Górnośląskiego (Bytom)]*, 22 (1): 1-22.
- Haitlinger, R., 2010. New records of mites (Acari: Prostigmata: Erythraeidae, Trombidiidae) from Turkey, with descriptions of four new species. *Zeszyty Naukowe Uniwersytetu Przyrodniczego we Wrocławiu-Biologia i Hodowla Zwierząt*, 60 (577): 49-61.
- Hakimitabar, M., A. Saboori & E. Fadaei, 2020. New species of *Abrolophus* (Acari: Erythraeidae) from Iran with a key to species with a comb-like seta on the palpal tarsus. *Systematic and Applied Acarology*, 25 (12): 2300-2314.
- Karakurt, İ., 2023. New records of Erythraeoid mites (Acari: Erythraeidea) from northeastern Türkiye. *Türkiye Entomoloji Dergisi*, 47(1): 31-42.
- Karakurt, İ., A. Wohltmann, E. E. Pamuk & S. Sevsay, 2022. Correspondence of larval and postlarval instars in two species of the subgenus *Zaracarus* (Acari: Erythraeidae: *Erythraeus*) established with laboratory rearing. *Zootaxa*, 5150 (3): 357-380.
- Mağol, J. & A. Wohltmann, 2012. An annotated checklist of terrestrial *Parasitengona* (Actinotrichida: Prostigmata) of the world, excluding Trombiculidae and Walchiidae. *Annales Zoologici*, 62 (3): 359-562.
- Mağol, J. & A. Wohltmann, 2013. Corrections and additions to the checklist of terrestrial *Parasitengona* (Actinotrichida: Prostigmata) of the world, excluding Trombiculidae and Walchiidae. *Annales Zoologici*, 63 (1): 15-27.
- Mağol, J. & S. Sevsay, 2011. Notes on the genus *Dolichoerobium* (Acari: Prostigmata: Trombidiidae) with description of a new species. *Zootaxa*, 2971 (1): 1-16.
- Saboori, A., M. Šundić, V. Pešić & M. Hakimitabar, 2012. Two new species of *Abrolophus* (Acari: Erythraeidae) from Montenegro. *Zootaxa*, 3205 (1): 53-62.
- Seeman, O. D., J. J., Beard, Q. H. Fan & J. C. Otto, 2024. *Abrolophus* from Australasia, and the mysterious *Mypongia* (Trombidiformes: Parasitengona: Erythraeidae). *Zootaxa*, 5519 (2): 151-189.
- Sevsay, S., O. Ozyurek, Ç. Balci & S. K. Ozman-Sullivan, 2024. Two new larval species of *Abrolophus* and *Marantelophus* (Acari: Erythraeidae) from edible wild mushrooms in Türkiye. *Systematic & Applied Acarology*, 29 (6): 708-722.
- Walter, D. E. & G. W. Krantz, 2009. "Collecting, Rearing, and Preparing Specimens, 83-96". In: *A Manual of Acarology*, 3rd Edition (Eds. G. W. Krantz & D. E. Walter). Texas Tech University Press. Texas, USA, 807+viii pp.
- Wohltmann, A. & J. Mağol, 2012. Morphology and life cycle of *Abrolophus norvegicus* (Thor, 1900) with notes on *Abrolophus* spp. (Actinotrichida: Prostigmata: Erythraeidae). *Annales Zoologici*, 62 (1): 69-97.
- Yao, H., R. J. Snider & R. M. Snider, 2000. Larval and post-larval stages of a new *Abrolophus* species (Acari: Erythraeidae) from a deciduous forest in northern Michigan, USA. *Systematic and Applied Acarology*, 5 (1): 149-155.