J. Insect Biodivers. Syst. 10 (3), 683–692

https://jibs.modares.ac.ir

OPEN ACCESS

Tarbiat Modares University Press | Research Article | https://doi.org/10.61186/jibs.10.3.683 | **ISSN**: 2423-8112

Entomological Society of Iran | Faunistic | *https://zoobank.org/urn:lsid:zoobank.org:D7F94B48-1A40-4BE7-8116-9C8CA08113EC*

New record of *Leptus* (*Leptus*) *molochinus* and *Solistrus mitrae* (Trombidiformes: Erythraeidae and Neothrombiidae) from Iran

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ABSTRACT. *Leptus* (*Leptus*) *molochinus* (C. L. Koch, 1837) (Trombidiformes: Erythraeidae) was collected as an ectoparasite on *Ophion* sp. (Hymenoptera: Ichneumonidae), *Paederus fuscipes* Curtis, 1826 (Coleoptera: Staphylinidae), *Cicadella viridis* (L. 1758) (Hemiptera: Cicadellidae), *Peritrechus* sp. (Hemiptera: Lygaeidae); the ectoparasitic mite, *Solistrus mitrae* Saboori, Ueckermann & van Harten, 2008 was also found on an undetermined ant species (Hymenoptera: Formicidae) from Guilan province, Iran. Additional morphometric data for *L.* (*L.*) *molochinus* larvae are provided. *Solistrus mitrae* is reported for the second time in the world. *Ophion* sp. (Hymenoptera: Ichneumonidae), *P. fuscipes* (Coleoptera: Staphylinidae), *C. viridis* (Hemiptera: Cicadellidae) and *Peritrechus* sp. (Hemiptera: Lygaeidae) are recorded as new host taxa for *L.* (*L.*) *molochinus* and unknown ant species is new host for *S. mitrae*.

Keywords: Ectoparasite, Guilan, mite, new host association, Prostigmata

Received: 22 March, 2024

Accepted: 13 June, 2024

Published: 03 July, 2024

Subject Editor: Javad Noei

Citation: Hakimitabar, M., Hajizadeh, J., Hosseini, R. & Fadaei, E. (2024) New record of *Leptus* (*Leptus*) *molochinus* and *Solistrus mitrae* (Trombidiformes: Erythraeidae and Neothrombiidae) from Iran. *Journal of Insect Biodiversity and Systematics*, 10 (3), 683–692.

INTRODUCTION

Leptus Latreille, 1796 is a genus of parasitic mites belonging to the family Erythraeidae. The larvae feed on the hemolymph of their hosts, which can include a wide range of animals such as insects and spiders. The genus *Leptus* is known for its distinctive appearance, with a large, bloated body and long, spindly legs. *Leptus* mites are found in various habitats worldwide, including forests, grasslands, and deserts. Research on *Leptus* and other erythraeid mites has focused on their biology, behaviour, and ecological roles. For example, studies have explored their feeding strategies, reproductive biology, and interactions with other arthropods in their ecosystems. Additionally, researchers have investigated the potential use of *Leptus* mites in the biological control of pest species (Walter & Krantz, 2009a; Ribeiro et al., 2015; Zhang, 2018). Two hundred and thirty-five species were identified and divided into eight groups, and 40 subgroups which among them only 15 species recorded from Iran (Saboori et al., 2020, 2024; Bassini–Silva et al., 2020; Haitlinger & Šundić, 2020; Hakimitabar et al., 2020, 2021, 2024; Haitlinger

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et al., 2020a, 2020b; Xu et al., 2022a, 2022b; Khoobdel & Pakarpour Rayeni, 2023; Kapankaya et al., 2023; Kiany et al., 2024). *Leptus molochinus* was described based on postlarval forms by C.L. Koch (1837) as *Rhyncholophus molochinus*. Then, Łaydanowicz and Mąkol (2010) redescribed postlarval forms and larvae of this species. There are 17 genera (with 10 monotypic genera) in the family Neothrombiidae Feider, 1959. All genera just described based on the larval stage, but *Neothrombium* Oudemans, 1909 is based on both larval and post-larval stages (Noei, 2020). Only four species, *Neosilphitrombium tenebrionidum* Saboori, Hajiqanbar & Hakimitabar, 2011, *Neothrombium neglectum* (Bruyant, 1909), *Southcottella nematii* Saboori, 2002 and *Razgthrombium ganjii* Noei, 2020 were collected from Iran (Mąkol & Wohltmann, 2012).

The purpose of this article is to provide additional metric data on larvae and introduce new host taxa for *L.* (*L.*) *molochinus* and *S. mitrae* based on specimens collected from Guilan province, northern Iran.

MATERIAL AND METHODS

The insect hosts of mite specimens were collected by the light trap in Rasht, Guilan province, northern Iran, from May to September 2021. Attachment sites of mites on the insect's body were different. They were attached to different parts of the insect's body such as the head, thorax, leg and abdomen. The installation site of the light trap was located close to the rice fields and adjacent to the water stream in the University of Guilan campus (37°11′44″N, 49°38′30″E, 28 m A.S.L.). Insect hosts were mounted according to relevant scientific methods (Trplehorn & Johnson, 2005). Insect hosts were identified by comparison of collected specimens with the identified specimens available in the collection of the Natural History Museum of Guilan University and using relevant taxonomic literature (Gauld, 1973 – Ichneumonidae (Hymenoptera); Coiffait, 1982 – Staphylinidae (Coleoptera); Péricart, 1999 – Lygaeidae (Hemiptera); Nikbakhtzadeh et al., 2012 – *Paederus* (Staphylinidae); Amiri et al., 2016 – Ophioninae (Ichneumonidae); Mozaffarian, 2018 – Cicadellidae (Hemiptera)). Mites were detached from their insect's hosts and preserved in 75% ethanol, cleared in Nesbitt's fluid and mounted on microscope slides using Hoyer's medium (Walter & Krantz, 2009b) (Fig. 1). Measurements (given in micrometers) were made using BX51 Olympus® microscope equipped with a drawing tube and magnification changer. A Wild® stereomicroscope (Switzerland) equipped with a Canon® camera (EOS Kiss X5; Japan) was used for taking insect photos. The terminology and abbreviations follow Wohltmann et al. (2006), Saboori et al. (2009) for *Leptus molochinus* and Robaux (1974) for *S. mitrae*. Three Slide-mounted specimens of *L.* (*L.*) *molochinus* (ARS–20240319-1a–1c) are deposited in the Acarological Collection, Jalal Afshar Zoological Museum, Faculty of Agriculture, University of Tehran, Karaj, Iran and four slide-mounted specimens (ARS–20240319-1d–1g) of *L.* (*L.*) *molochinus* and *S. mitrae* (ARS–20241220-1a) are deposited in the Acarology Laboratory, Department of Plant Protection, Faculty of Agricultural Sciences at University of Guilan, Rasht, Iran.

RESULTS

Taxonomic hierarchy

Superfamily Erythraeoidea Robineau–Desvoidy, 1828

Family Erythraeidae Robineau–Desvoidy, 1828

Subfamily Leptinae Billberg, 1820

***Leptus* (*Leptus*) *molochinus* (C. L. Koch, 1837)** (Fig. 1)

Material examined. 2 Larvae (ARS–20240319-1a & 1b), ectoparasite on *Ophion* sp. (Hym.: Ichneumonidae), campus of University of Guilan, Rasht, Guilan province (37°11'44"N, 49°38'30"E, 28 m A.S.L.), 30-VII-2021, leg.: Jalil Hajizadeh; 3 Larvae (ARS–20240319-1c, 1e & 1f), ectoparasite on *Paederus fuscipes* (Fabricius, 1775) (Col.: Staphylinidae), campus of University of Guilan, Rasht, Guilan province (37°11'44"N, 49°38'30"E, 28 m A.S.L.), 6-VIII-2021, leg.: Jalil Hajizadeh; 1 Larva (ARS–20240319-1d), ectoparasite on *Cicadella viridis* (L., 1758) (Hemi.: Cicadellidae), campus of University of Guilan, Rasht,

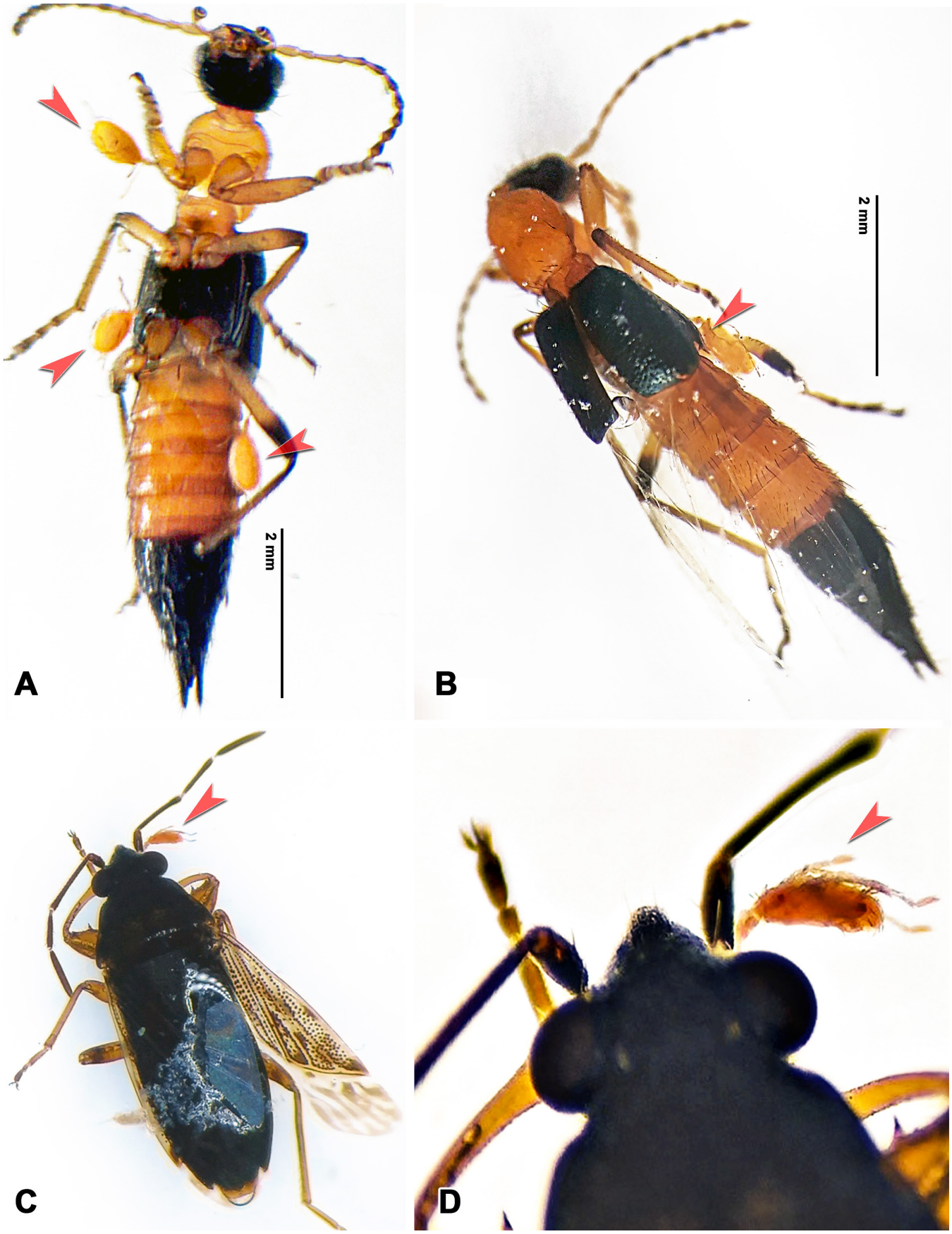

Figure 1. *Leptus* (*Leptus*) *molochinus* (C. L. Koch, 1837) attached to the body of host insects. **A–B.** *Paederus fuscipes* Curtis, 1826 (Coleoptera: Staphylinidae); **C–D.** *Peritrechus* sp. (Hemiptera: Lygaeidae).

Guilan province (37°11'44"N, 49°38'30"E, 28 m A.S.L.), 28-V-2021, leg.: Jalil Hajizadeh; 1 Larva (ARS–20240319-1g) ectoparasite on *Peritrechus* sp. (Hem.: Lygaeidae), campus of University of Guilan, Rasht, Guilan province (37°11'44"N, 49°38'30"E, 28 m A.S.L.), 12-VI-2021, leg.: Jalil Hajizadeh; all specimens collected by the light trap (see Table 1).

Distribution. Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Great Britain, Greenland, Hungary, Iceland, Luxembourg, Macedonia, Mongolia, Norway, Poland, San Marino, Spain, Sweden, Switzerland, The Netherlands (Mąkol & Wohltmann, 2012; Saboori et al., 2020) and Iran (**New record**).

Diagnosis. **Larva**. This species belongs to *phalangii* species group and *molochinus* species subgroup. Based on Saboori et al. (2020), abnormalities in the number of setae are common in the reared specimens. So, in Łaydanowicz and Mąkol (2010) leg chaetotaxy is cited and can be seen abnormalities. In this study, Leg setal formula of all specimens as follows: Leg I: Ta– 1ω, 1ε, 2ζ, 28n; Ti– 2φ, 1κ, 14n; Ge– 1σ, 1κ, 8n; TFe– 5n; BFe– 2n; Tr– 1n; Cx– 1n; Leg II: Ta– 1ω, 1ε, 2ζ, 26n; Ti–2φ, 15n; Ge– 1σ, 1κ, 8n; TFe– 5n; BFe– 2n; Tr– 1n, Cx– 1n; Leg III: Ta– 1ζ, 26n; Ti– 1φ, 15n; Ge– 8n; TFe– 5n; BFe– 1n; Tr– 1n; Cx– 1n. The number of palptarsal setae including solenidion and eupathidium 8 (fPp= 0–B–BB–BBB–6Bωζ) (see table 1 in Saboori et al., 2020), but the original paper stated 7 (NNBBBωζ).

Superfamily Trombidioidea Leach, 1815

Family Neothrombiidae Feider, 1959

Solistrus mitrae **Saboori, Ueckermann & van Harten, 2008** (Fig. 2)

Diagnosis. see Saboori et al. (2008).

Material examined. 1 Larva (ARS–20241220-1a), ectoparasite on an unknown ant species (Hym.: Formicidae) by the light trap in Saravan Forest Park, Rasht, Guilan province (37°05'48.1"N 49°38'46.4"E, 72 m A.S.L), 26-VII-2021, leg.: Jalil Hajizadeh.

Distribution. Yemen and Iran (**New record**).

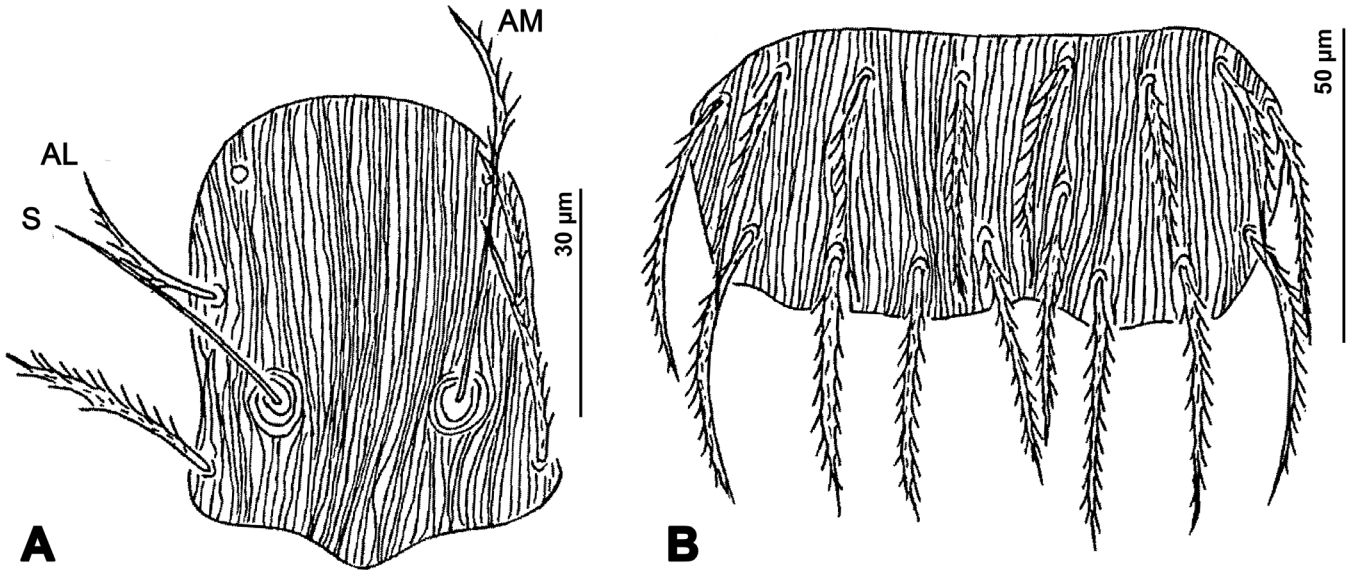

Figure 2. *Solistrus mitrae* Saboori, Ueckermann & van Harten, 2008 (larva). **A.** Scutum; **B.** Scutellum.

Table 1. Metric data and hosts for *Leptus* (*Leptus*) *molochinus* larvae, 1a–1g, the present study, Iran; from Poland (Łaydanowicz & Mąkol, 2010) and from Poland, Netherlands and Sweden (Southcott, 1992).

Characters	1a	1b	1c	1d	1e	1f	1g	Range	Poland	Poland, Netherlands & Sweden
SD	90	88	83	86	89	81	78	78–90	88–111	91–109
W	93	93	97	98	100	90	90	90–100	94–112	92–107
AW	72	64	73	72	75	72	73	64–75	71–86	72–81
PW	83	84	82	90	91	84	88	82–91	81–100	84–98
AA	9	10	9	10	10	10	10	9–10	9–14	10–14
SB	12	15	13	12	12	12	12	12–15	11–17	14–18
ISD	58	62	56	57	63	60	55	55–63	58–75	58–69
AP	17	19	20	21	19	21	21	17–21	–	–
AL	43	40	41	42	43	40	42	40–43	42–55	40–53
PL	49	52	52	53	54	48	50	48–54	58–76	57–71
ASBM	10	10	9	12	13	12	11	9–13	–	–
ASBa	24	25	30	27	27	26	28	24–30	–	–
AAS	26	26	28	30	32	32	32	26–32	–	–
LX	20	22	16	22	21	18	20	16–22	–	–
ASens	35	37	27	35	27	37	34	27–37	38–50	36–48
PSens	66	62	66	79	70	74	68	62–79	57–78	55–73
GL	189	177	174	183	188	175	173	173–189	–	–
pHy	27	26	25	25	24	25	25	24–27	–	–
1a	25	27	22	27	25	21	21	19–27	32–40	24–36
1b	47	50	47	46	50	47	47	46–50	61–74	55–68
2a	25	30	24	28	27	27	22	22–28	32–42	29–43
2b	19	22	18	20	18	22	18	18–22	25–32	22–31
3b	32	37	35	37	–	32	31	26–37	32–42	30–39
DS	35–49	40–50	40–47	37–46	35–47	35–47	35–47	35–50	50–67	48–62
Ta I (L)	115	114	109	105	116	117	118	105–118	100–120	90–109
Ti I	128	119	118	117	124	115	119	119–126	90–107	85–106
Ge I	89	87	87	90	93	84	89	84–93	70–90	75–90
TFe I	63	59	68	58	64	57	62	57–68	45–57	–
BFe I	66	75	62	65	65	70	65	62–75	50–66	–
Tr I	48	52	40	43	49	50	41	37–52	35–46	–
Cx I	63	62	61	53	55	62	55	53–63	50–71	–
Leg I	572	568	545	531	566	555	549	531–572	463–538	500
Ta II (L)	100	99	111	102	102	99	105	99–111	94–111	82–97
Ti II	111	105	118	104	114	100	105	100–118	82–105	86–103
Ge II	74	73	90	77	83	72	80	72–90	65–85	70–79
TFe II	62	57	59	62	60	58	62	57–62	47–61	–
BFe II	63	64	62	62	62	58	65	58–65	47–62	–
Tr II	44	47	41	46	47	43	47	41–47	35–42	–
Cx II	72	73	63	65	67	78	72	63–78	75–90	–
Leg II	526	518	544	518	535	508	536	508–544	459–538	505
Ta III (L)	101	108	111	105	114	107	115	101–115	94–116	80–105
Ti III	151	143	142	149	153	136	144	136–153	105–134	107–133
Ge III	83	84	84	83	90	81	80	80–90	75–91	74–91
TFe III	74	72	62	68	70	67	68	62–74	58–69	–
BFe III	82	75	64	74	74	72	65	64–82	53–71	–
Tr III	53	49	43	49	55	53	45	43–55	38–48	–
Cx III	64	72	63	65	72	68	69	63–72	70–89	–
Leg III	608	603	569	593	628	584	586	569–628	509–593	550
IP	1706	1689	1658	1642	1729	1647	1671	1642–1729	1432–1654	1555
AW/ISD	1.24	1.03	1.3	1.26	1.19	1.2	1.33	1.03–1.33	1.01–1.29	1.07–1.28
Ti III/Ge III	1.82	1.7	1.69	1.8	1.7	1.68	1.8	1.68–1.82	1.38–1.62	1.35–1.58
Ti I/AW	1.78	1.86	1.62	1.63	1.65	1.6	1.63	1.6–1.86	1.14–1.39	1.16–1.36
Ti III/AW	2.1	2.23	1.95	2.07	2.04	1.89	1.97	1.89–2.23	1.35–1.71	1.47–1.72
Ti III/Ti I	1.18	1.2	1.2	1.27	1.23	1.18	1.21	1.18–1.27	1.14–1.34	1.15–1.36
SD/W	0.97	0.95	0.86	0.88	0.89	0.9	0.87	0.86–0.97	0.87–1.02	0.94–1.12
AL/PL	0.88	0.77	0.79	0.79	0.8	0.83	0.84	0.77–0.88	0.64–0.83	0.63–0.82
Hosts	*Ophion* sp. (Ichneumonidae)	*Ophion* sp. (Ichneumonidae)	*Paederus fuscipes* (Staphylinidae)	*Cicadella viridis* (Cicadellidae)	*Paederus fuscipes* (Staphylinidae)	*Paederus fuscipes* (Staphylinidae)	*Pertrechus* sp. (Lygaeidae)	–	Cicadellidae, Miridae, Anthicidae, Opiliones, Anystidae, Tetragnathidae*, Erythraeidae*	

* To see which species parasitized by *Leptus* (*Leptus*) *molochinus*, see Mąkol & Felska (2011) and Mąkol et al. (2012).

Table 2. Metric data of *Solistrus mitrae* larvae from Guilan province (present study) and Yemen (Saboori et al., 2008).

Characters	Present study	Yemen	Characters	Present study	Yemen
SD	60	61–69	***3b***	43	37–52
W	56	60–72	***Or*$_1$**	4	3–4
AW	46	54	***Sc***	7	6–7
PW	53	54–67	**Cx I**	57	48–50
AA	38	37–40	**Tr I**	29	22–25
SB	28	29–35	**Fe I**	42	32–42
ASB	36	31–39	**Ge I**	22	20
PSB	24	30	**Ti I**	35	30–34
MA	13	11–15	**Ta I (L)**	50	47–50
AP	21	25–27	**Leg I**	235	203–216
AL	24	25–32	**Cx II**	50	50–54
PL	31	50–52	**Tr II**	29	22–25
AM	36	27–35	**Fe II**	37	37–45
S	42	47–55	**Ge II**	20	17–20
LSS	99	101–111	**Ti II**	32	29–30
HS	49	42–47	**Ta II (L)**	50	45–50
SL	31–41	30–54	**Leg II**	218	207–220
MSA	14	–	**Cx III**	50	50–54
SA	15	–	**Tr III**	30	25–30
SP	15	–	**Fe III**	37	40–45
DS	41–50	37–54	**Ge III**	21	17–20
PDS	35–39	27–42	**Ti III**	35	30–35
1a	39	37–47	**Ta III (L)**	54	50–59
1b	35	37–40	**Leg III**	227	216–225
3a	28	30–31	**IP**	680	642–647

DISCUSSION

The result of this study showed that *Leptus* species are distributed in different regions of the world. Most species which collected from orders Orthoptera and Lepidoptera but the bodies of other arthropods should also be examined to find species of *Leptus*. Hence, we consider it important to further study this genus across other regions to gain a better understanding of the host spectrum and geographic distribution. *L.* (*L.*) *molochinus* surely can be found in additional regions, as it has already been collected from European countries, Macedonia and Iran, which have other countries.

Ophion sp. (Hym.: Ichneumonidae), *P. fuscipes* (Col.: Staphylinidae), *C. viridis* (Hemi.: Cicadellidae) and *Peritrechus* sp. (Hemi: Lygaeidae) are recorded as new host taxa for this species. Also, *S. mitrae* was collected from Yemen for the first time and in this study, we collected it for the second time in the world, the result demonstrated this species can be distributed in other countries such as countries near the Persian Gulf and other regions in Iran, so it is expected to find more specimens in this regions. The shape of the scutum in the original description (Saboori et al., 2008) is not clear so we drew the scutum and scutellum of the new specimen in this paper.

AUTHOR'S CONTRIBUTION

The authors confirm their contribution to the paper as follows: M. Hakimitabar: Writing the original draft, editing and reviewing; J. Hajizadeh & R. Hosseini: Collecting the specimens and identification of the host insects; E. Fadaei: Making the measurements. The authors read and approved the final version of the manuscript.

FUNDING

This research received no specific grant from any funding agencies.

AVAILABILITY OF DATA AND MATERIAL

The specimens listed in this study are deposited in the Acarological Collection, Jalal Afshar Zoological Museum, Faculty of Agriculture, University of Tehran, Karaj, Iran, and in the Acarology Laboratory, Department of Plant Protection, Faculty of Agricultural Sciences at the University of Guilan, Rasht, Iran and are available from the curator, upon request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study only included plants and arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

ACKNOWLEDGMENTS

We are grateful to anonymous reviewers for their invaluable comments that helped improve this paper.

REFERENCES

Amiri, A., Talebi, A.A., Jussila, R., Rakhshani, E. & Hajiqanbar, H. (2016) Study of the subfamily Ophioninae (Hymenoptera: Ichneumonidae) in southern Iran. *Journal of Entomological Society of Iran*, 35 (4), 53–67.

Bassini-Silva, R., Jacinavicius, F.D.C., Bouzan, R.S., Iniesta, L.F.M., Campos De-Oliveira, E., Welbourn, C., Šundić, M., Ochoa, R., Brescovit, A.D. & Barros-Battesti, D.M. (2020) A new species of *Leptus* (*Leptus*) (Trombidiformes: Erythraeidae) and new records of *Leptus* (*Leptus*) *haitlingeri* Jacinavicius, Bassini-Silva & Welbourn, 2019 for Brazil. *International Journal of Acarology*, 46, 213–221. https://doi.org/10.1080/01647954.2020.1762732

Coiffait, H. (1982) Coléoptères Staphylinidae de la région Paléarctique Occidentale. IV. Sous famille Paederinae, tribu Paederini 1 (Paederi, Lathrobii). *Nouvelle Revue d'Entomologie*, 12 (suppl), 1–440.

Gauld, I.D. (1973) Notes on the British Ophionini (Hym; Ichneumonidae) including a provisional key to species. *Entomologist's Gazette,* 24, 55–65.55–65.

Haitlinger, R. & Šundić, M. (2020) Two new species of *Leptus* Latreille, 1796 (Trombidiformes: Erythraeidae) from the Canary Islands, parasitising Curculionidae (Insecta: Coleoptera), with new metrical data for some *Leptus* spp. *Systematic Parasitology*, 97, 835–846. https://doi.org/10.1007/s11230–020–09956–y

Haitlinger, R., Šundić, M., Ázara, L. & Bernardi, L.F.O. (2020a) A new species of larval *Leptus* (*Leptus*) (Trombidiformes: Erythraeidae) from Brazil with list of host–parasite associations between *Leptus* and arthropods in America. *Biologia*, 75, 1921–1930. https://doi.org/10.2478/s11756–020–00453–7

Haitlinger, R., Šundić, M. & Nkwala, A.L.D. (2020b) Description of *Leptus* (*Leptus*) *cameroonicus* sp. nov. and first record of *Charletonia braunsi* (Oudemans, 1910) from Cameroon (Trombidiformes: Erythraeidae), with new metric and meristic data for some African *Leptus*. *Systematic and Applied Acarology*, 25, 607–621. https://doi.org/10.11158/saa.25.4.2

Hakimitabar, M., Joharchi, O. & Jung, C. (2020) A new species of *Leptus*, the first erythraeid mite (Acari: Trombidiformes) from South Korea. *International Journal of Acarology*, 47, 155–159. https://doi.org/10.1080/01647954.2020.1747535

Hakimitabar, M., Saboori, A. & Fadaei, E. (2021) A new species of *Leptus* (Acari: Erythraeidae) from Iran. *Persian Journal of Acarology*, 10, 137–143.

Hakimitabar, M., Saboori, A. & Barahoei, H. (2024) A new species of *Leptus* (Trombidiformes: Erythraeidae) ectoparasite on scorpions (Scorpiones: Buthidae) from Iran. *International Journal of Acarology*. In press. https://doi.org/10.1080/01647954.2024.2366866

Kapankaya, A., Saboori, A. & Cakmak, I. (2023) A new species and two new records of the genus *Leptus* (Trombidiformes: Erythraeidae) from Türkiye. *International Journal of Acarology*, 49 (2), 128–140. https://doi.org/10.1080/01647954.2023.2208123

Khoobdel, M. & Pakarpour Rayeni, F. (2023) A new species of *Leptus* Bilberg (Acari: Erythraeidae) from Iran. *Journal of Agricultural Science and Technology*, 25, 239–247. https://doi.org/10.52547/jast.25.1.239

Kiany, N., Seiedy, M., Hakimitabar, M., Kiany, M. & Husemann, M. (2024) Two new species of *Leptus* (Trombidiformes: Erythraeidae) parasitizing acridid grasshoppers (Orthoptera: Caelifera: Acrididae) from the Zagros Mountains, Iran. *International Journal of Acarology*, 50, 287–299. https://doi.org/10.1080/01647954.2024.2316938

Łaydanowicz, J. & Mąkol, J. (2010) Correlation of heteromorphic life instars in terrestrial Parasitengona mites and its impact on taxonomy–the case of *Leptus molochinus* (CL Koch, 1837) and *Leptus ignotus* (Oudemans, 1903) (Acari: Trombidiformes: Prostigmata: Erythraeidae. *Journal of Natural History*, 44, 669–697. https://doi.org/10.1080/00222930903383560

Mąkol, J. & Felska, M. (2011) New records of spiders (Araneae) as hosts of terrestrial Parasitengona mites (Acari: Actinotrichida, Prostigmata). *Journal of Arachnology*, 39, 352–354. https://doi.org/10.1636/CP10-72.1

Mąkol, J. & Wohltmann, A. (2012) An annotated checklist of terrestrial Parasitengona (Actinotrichida: Prostigmata) of the world, excluding Trombiculidae and Walchiidae. *Annales Zoologici*, 62 (3), 359–562. https://doi.org/10.3161/000345412X656671

Mąkol, J., Kłosińska, A. & Łaydanowicz, J. (2012) Host–parasite interactions within terrestrial Parasitengona (Acari, Trombidiformes, Prostigmata). *International Journal of Acarology*, 38 (1), 18–22. https://doi.org/10.1080/01647954.2011.583276

Mozaffarian, F. (2018) An Identification key to the species of Auchenorrhyncha of Iranian fauna recorded as pests in orchards and a review on the pest status of the species. *Zootaxa*, 4420 (4), 475–501. https://doi.org/10.11646/zootaxa.4420.4.2

Nikbakhtzadeh, M.R., Naderi, M. & Safa, P. (2012) Faunal diversity of *Paederus* Fabricius (Coleoptera: Staphylinidae) in Iran. *Insecta Mundi*, 0267, 1–9.

Noei, J. (2020) A new genus and species of larval Neothrombiidae (Trombidiformes: Prostigmata) from Iran with a key to world genera. *Systematic and Applied Acarology*, 25 (5), 931–941. https://doi.org/10.11158/saa.25.5.13

Péricart, J. (1999) [1998] *Hemipteres Lygaeidae Euro-Mediterraneens*. Vol. 3. *Systematique: troisieme partie*. Faune de France. France et régions limitrophes. 84 A. Fédération Française des Sociétés de Sciences Naturelles, Paris, 487 p.

Robaux, P. (1974) Recherches sur le developement et la biologie des acariens 'Thrombidiidae'. *Memoires du Museum National d'Histoire Naturelle (Serie A Zoologie)*, 85, 1–186.

Ribeiro, G.T., de Oliveira, L.J. & de Moraes, G.J. (2015) Ectoparasitic mites (Acari: Erythraeidae) from Brazilian mammals. *Zoologia (Curitiba)*, 32 (4), 260–269.

Saboori, A., Ueckermann, E.A. & van Harten, A. (2008) A new genus of Neothrombiidae (Acari: Trombidioidea) from Yemen. *Zootaxa*, 925, 23–30. https://doi.org/10.11646/zootaxa.1925.1.3

Saboori, A., Khaustov, A.A., Hakimitabar, M. & Hajiqanbar, H. (2009) A new genus and species of larval Erythraeinae (Acari: Prostigmata: Erythraeidae) from Ukraine and the taxonomic state of *Zhangiella*. *Zootaxa*, 2203, 22–30. https://doi.org/10.11646/zootaxa.2203.1.2

Saboori, A., Hakimitabar, M., Khademi, N., Masoumi, H. & Katouzian, A.R. (2020) *Leptus* Latreille (Trombidiformes: Erythraeidae) of the world: revised classification and keys. *Persian Journal of Acarology*, 9, 1–57.

Saboori, A., Halliday, B., Hakimitabar, M. & Cakmak I. (2024) A new species of *Leptus* (Trombidiformes: Erythraeidae) from Australia. *Biologia*, 9, 1809–1815. https://doi.org/10.1007/s11756-024-01672-y

Southcott, R.V. (1992) Revision of the larvae of *Leptus* Latreille (Acarina: Erythraeidae) of Europe and North America, with descriptions of post-larval instars. *Zoological Journal of the Linnean Society*, 105, 1–153. http://doi.org/10.1111/j.1096-3642.1992.tb01228.x

Trplehorn, C.A. & Johnson, N.F. (2005) *Borror and Delong's Introduction to the Study of Insects*. 7th Edition. Thomson Brooks/Cole, USA. 864 p.

Walter, D.E. & Krantz, G.W. (2009a) Ectoparasites. In: Krantz, G.W. & Walter, D.E. (eds) *A Manual of Acarology*. 3rd Edition. Texas Tech University Press, Texas, USA, pp. 483–516

Walter, D.E. & Krantz, G.W. (2009b) Collection, rearing and preparing specimens. In: Krantz, G.W. & Walter, D.E. (eds) *A Manual of Acarology*. 3rd Edition. Texas Tech University Press, Texas, USA, pp. 83–97.

Wohltmann, A., Gabryś, G. & Mąkol, J. (2006) Terrestrial Parasitengona inhabiting transient biotopes. In: Gerecke, R. (ed.) *Subwasserfauna Mitteleuropas.* Vol. 7/2–1. *Chelicerata, Acari I*. Spektrum Elsevier, München, pp. 158–240. https://doi.org/10.1007/978-3-662-55958-1_6

Xu, S.Y., Jin, D.C., Guo, J.J. & Yi, T.C. (2022a) Four new species of larval Erythraeoidea (Acari: Trombidiformes: Prostigmata) and three higher taxa new to China: genus *Hirstiosoma* and subfamily Hirstiosomatinae (Smarididae), and genus *Grandjeanella* (Erythraeidae: Abrolophinae). *Systematic and Applied Acarology*, 27, 1813–1840. https://doi.org/10.11158/saa.27.9.10

Xu, S.Y., Yi, T.C., Guo, J.J. & Jin, D.C. (2022b). Four new species of larval *Charletonia* and *Leptus* (Acari: Trombidiformes: Erythraeidae), with a checklist of the two genera and their hosts from China. *Insects*, 13, 1154. https://doi.org/10.3390/insects13121154

Zhang, Z.Q. (2018) Erythraeidae. Zhang, Z.Q. (ed) Animal biodiversity: An outline of higher–level classification and survey of taxonomic richness. *Zootaxa*, 3703 (1), 193–194.

گزارش جدید گونه‌های *Leptus* (*Leptus*) *molochinus* و *Solistrus mitrae* (Trombidiformes: Erythraeidae and Neothrombiidae) از ایران

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| **تاریخ دریافت:** ۰۳ فروردین ۱۴۰۳ | **تاریخ پذیرش:** ۲۴ خرداد ۱۴۰۳ | **تاریخ انتشار:** ۱۳ تیر ۱۴۰۳ |

چکیده: گونهٔ (Trombidiformes: Erythraeidae) *Leptus* (*Leptus*) *molochinus* (C. L. Koch, 1837) به صورت انگل خارجی از روی گونه‌های *Ophion* sp. (Hymenoptera: Ichneumonidae)، *Paederus fuscipes* Curtis, 1826 (Coleoptera: Staphylinidae)، *Cicadella viridis* (L. 1758) (Hemiptera: Cicadellidae) و *Peritrechus* sp. (Hemiptera: Lygaeidae) جمع‌آوری شد. همچنین گونهٔ *Solistrus mitrae* Saboori, Ueckermann & van Harten, 2008 نیز از روی یک گونه شناسایی نشده مورچه (Hymenoptera: Formicidae) از استان گیلان جداسازی و شناسایی شد. داده‌های مورفومتریک گونهٔ *L. (L.) molochinus* ارایه شد. کنهٔ *S. mitrae* برای دومین بار در جهان گزارش می‌شود. *Ophion* sp.، *P. fuscipes*، *C. viridis* و *Peritrechus* sp. به عنوان گونه‌های میزبان جدید برای *L.* (*L.*) *molochinus* و گونه شناسایی نشده مورچه میزبان جدید برای *S. mitrae* است.

واژگان کلیدی: انگل خارجی، گیلان، کنه، داده‌های جدید میزبانی، پیش‌استیگمایان