Acarological Studies
Vol 8 (2): e1968202
doi: 10.47121/acarolstud.1968202

RESEARCH ARTICLE

First record of *Syringophiloidus glandarii* (Fritsch) in Türkiye, with an updated overview of the quill mites (Acari: Syringophilidae) of Türkiye

Gökhan EREN[1,5], Ergün BACAK[2], Sercan BİLGİN[2], Ömer Faruk SÜLEK[3], Arif Cemal ÖZSEMİR[4]

[1]*Department of Aquatic Animal Health, Mediterranean Fisheries Research Production and Training Institute, General Directorate of Agricultural Research and Policies, Antalya, Türkiye*
[2]*Vocational School of Forestry, Istanbul University-Cerrahpaşa, İstanbul, Türkiye*
[3]*Political Science and Public Administration, Faculty of Economics and Administrative Sciences, Ondokuz Mayıs University, Samsun, Türkiye*
[4]*Bafra Vocational School, Ondokuz Mayıs University, Samsun, Türkiye*
[5]Corresponding author: gokhaneren54@gmail.com

Received: 10 June 2026 Accepted: 20 September 2026 Available online: 17 October 2026

ABSTRACT: Quill mites (Acari: Syringophilidae) are obligatory and permanent ectoparasites of birds inhabiting the inner part of the quill (calamus) of various types of feathers. These mites spend their entire life cycle inside the feather quills and are widely distributed among various bird groups. Currently, the family Syringophilidae comprises hundreds of species reported from numerous avian orders worldwide, and recent taxonomic studies have demonstrated that the biodiversity of this group is considerably higher than previously assumed. In the present study, quill mites recovered from the calamus of contour feathers of the Eurasian Jay (*Garrulus glandarius* Linnaeus) and the Eurasian Magpie (*Pica pica* Linnaeus) were examined, resulting in the first record of *Syringophiloidus glandarii* (Fritsch) in Türkiye. The present record increases the number of syringophilid mite species known from Türkiye to 10, representing seven genera. In addition, an updated checklist of the Syringophilidae species reported from Türkiye is provided. The present findings not only expand the known geographical distribution of *S. glandarii* but also contribute to the knowledge of the quill mite fauna of Türkiye. Furthermore, the available data indicate that the fauna of quill mites in Türkiye remains insufficiently investigated. Detailed studies focusing on different bird orders and geographical regions are expected to reveal new records of species, host associations, and distributions.

Keywords: Cheyletoidea, checklist, Corvidae, *Garrulus glandarius*, *Pica pica*
Zoobank: https://zoobank.org/6437A177-555C-4A0E-9A4D-221DD0C1568C

INTRODUCTION

Members of the family Syringophilidae (Acariformes: Prostigmata), known as quill mites, comprise obligate and permanent ectoparasites that inhabit the interior of the calamus (quill) of avian feathers (Glowska et al., 2015). These mites spend their entire life cycle within the feather quill and feed by piercing the quill wall with their long, stylet-like chelicerae and ingesting host tissue fluids (Kethley, 1971). Owing to their feeding behaviour and mode of transmission, syringophilid mites are considered parasites that may adversely affect the condition and welfare of their avian hosts (Skoracki, 2011). Transmission of syringophilid mites occurs when adult females migrate from old feathers to newly developing feathers during moult, and may also be transmitted vertically from parents to nestlings through direct contact in the nest (Kethley, 1971; Casto, 1974). Nevertheless, current knowledge regarding their pathogenicity remains limited. Although they are generally not observed to cause severe health deterioration in birds (Skoracki, 2011), infestations have been associated with clinical signs such as pruritus, feather damage, and feather-plucking behaviour in affected hosts (Principato et al., 2005). Furthermore, the detection of *Anaplasma phagocytophilum* DNA in syringophilid mites suggests that these parasites may also play a role in the circulation of avian pathogens (Skoracki et al., 2006).

In the current taxonomic framework, the family is classified into two subfamilies, Syringophilinae and Picobiinae (Johnston and Kethley, 1973; Skoracki et al., 2016a). Members of the Syringophilinae are typically found within the quills of primaries, secondaries, tertials, rectrices, and wing covert feathers, but may occasionally occur in body feathers, whereas members of the Picobiinae predominantly inhabit the quills of body feathers (Glowska et al., 2015). In addition, most quill mites are characterised by a high degree of host specificity, being typically associated with either a single host species (monoxenous parasites) or a group of closely related host species (oligoxenous) (Skoracki, 2011). Studies conducted to date have shown that the family Syringophilidae comprises more than 400 described species across 63 genera, associated with birds from 27 avian orders (Glowska et al., 2015; Zmudzinski et al., 2023). Nevertheless, the currently recognised diversity is believed to represent only a small fraction of the actual species richness of the family, and considering the vast diversity of potential avian hosts, it has been estimated that Syringophilidae may comprise at least 5,000 species worldwide (Johnston and Kethley, 1973).

DergiPark AKADEMİK

In this study, quill mites recovered from feather samples of the Eurasian Jay (*Garrulus glandarius* Linnaeus) and the Eurasian Magpie (*Pica pica* Linnaeus) were examined, resulting in the first record of *Syringophiloidus glandarii* (Fritsch) from Türkiye. Additionally, all Syringophilidae species reported from Türkiye to date were compiled, and an updated checklist is provided.

MATERIALS AND METHODS

Contour feather samples examined in the present study were obtained from a Eurasian Magpie (*Pica pica*) during a bird ringing study conducted on 28 April 2025 at the Avcılar Campus of İstanbul University-Cerrahpaşa, located on the southwestern shore of Küçükçekmece Lake, İstanbul, Türkiye (40°59′46.2″N, 28°43′43.1″E), and from a road-killed Eurasian Jay (*Garrulus glandarius*) collected on 22 May 2026 from a highway in Demre, Antalya, Türkiye (36°15′18.95″N, 30°01′49.37″E). Subsequently, the collected feather samples were examined under a stereo microscope (Nikon SMZ 745T, Tokyo, Japan). The quill of the contour feather was longitudinally opened using a scalpel, and mite specimens were carefully extracted with the aid of a fine needle. A total of 40 specimens of *Syringophiloidus glandarii* were recovered from the contour feather quills of two corvid host species, including 13 specimens from two contour feathers of *Pica pica* and 27 specimens from five contour feathers of *Garrulus glandarius*. Of these, four females and three males from each host species were selected for detailed morphological examination and photomicrography. The collected mites from the quill of the contour feather were mounted on microscope slides in Hoyer's medium. Species identification was carried out under a light microscope (Olympus CX23, Tokyo, Japan) using diagnostic characters and taxonomic keys provided by Skoracki et al. (2022). Microphotographs of the examined specimens were also obtained using the same microscope's integrated camera. Additionally, the examined mite slides have been deposited in the personal collection of the first author and in the parasitological collection of the Mediterranean Fisheries Research, Production and Training Institute (Antalya, Türkiye).

For the preparation of the checklist, published records of Syringophilidae from Türkiye were systematically searched and compiled using major academic search engines and bibliographic databases, including Web of Science, Scopus, PubMed, ScienceDirect, SpringerLink, JSTOR, Google Scholar, and ULAKBIM TR Index. Searches were conducted using combinations of relevant keywords, including "Syringophilidae," "quill mites," "Turkey," and "Türkiye". Mite species names were updated according to current taxonomic and nomenclatural treatments (Skoracki, 2011; Skoracki et al., 2020; Zmudzinski et al., 2023), whereas avian host names were updated based on Avibase – The World Bird Database (Lepage, 2026) and the relevant literature (Knox et al., 2002). Synonyms were treated under their currently accepted names, while records whose identification could not be verified were considered doubtful and excluded from the total number of confirmed species. The total number of Syringophilidae species known from Türkiye was calculated based on confirmed published records, including the new record reported in the present study.

RESULTS AND DISCUSSION

Microscopic examination of the quill mite specimens revealed the presence of *Syringophiloidus glandarii* (Fritsch), representing the first record of this species in Türkiye (Fig. 1). This finding also constitutes, to the best of our knowledge, the second worldwide record of *S. glandarii* from the Eurasian Magpie (*Pica pica*), following the previous report from Japan (Skoracki, 2004).

Species of the genus *Syringophiloidus* are distinguished based on a combination of morphological characters, including the structure of the peritremes, morphology and relative lengths of idiosomal setae (e.g., *vi*, *ve*, *sci*, *sce*, d_1, and d_2), arrangement and ornamentation of the idiosomal shields, number and arrangement of anal and paragenital setae (pg_1, pg_2, and pg_3), and number of tines on the fan-like setae (p' and p'') on legs III and IV (Skoracki, 2004). Species-level identification in the family Syringophilidae is largely based on female morphology, as the vast majority of species have been described based on female characters (Glowska et al., 2023). In females of *S. glandarii*, important diagnostic characters include two chambers in each medial branch and 9-10 chambers in each lateral branch of the peritremes, a length ratio of setae *vi*:*ve*:*sci* of 1:2.4-2.7:4.5-5, and fan-like setae p' and p'' of legs III and IV bearing 8-10 tines (Skoracki, 2004; Skoracki et al., 2022).

Studies on quill mites in Türkiye remain very limited. Although the first records date back to the 1960s, this group was largely neglected thereafter. Since the 2000s, only a few additional records, mainly by European and Russian researchers, have been published, and, together with the present study, the known quill mite fauna of Türkiye currently comprises only 10 species (Table 1). However, a critical review of the published records revealed several taxonomic and nomenclatural issues that affect the interpretation of the quill mite fauna of Türkiye. Merdivenci (1963) reported *Syringophilus columbae* Heller from rock pigeons (*Columba livia*). However, this species is currently regarded as a synonym of *Syringophilus bipectinatus* Heller (Skoracki, 2011), which has been reported from *Gallus gallus domesticus*, *Ptilopachus petrosus*, and *Alectoris rufa*. To date, five quill mite species have been recorded from rock pigeons: *Columbiphilus khushalkhani* Kivganov and Sharafat, *Gunabopicobia zumpti* (Lawrence), *Meitingsunes columbicus* Skoracki, *Meitingsunes zenadourae* (Clark), and *Peristerophila columbae* (Hirst) (Skoracki, 2011). Nevertheless, because Merdivenci (1963) did not provide any illustrations and no voucher specimens are currently available, the identity of the reported species cannot be verified. Therefore, this record should be considered doubtful until additional material becomes available. In addition to the doubtful record discussed above, several previously published records required nomenclatural updates to reflect current taxonomic knowledge. *Peristerophila meropis* was originally described as *Castosyringophilus meropis* (Skoracki et al., 2017); however, Skoracki et al. (2020) subsequently

synonymised the genus *Castosyringophilus* with *Peristerophila* based on evidence of female dimorphism, and the species was consequently transferred to the genus *Peristerophila*. Similarly, Skoracki and OConnor (2010) reported the host species as *Phoenicopterus ruber* from Türkiye; however, taxonomic revisions recognised the Greater Flamingo occurring in Türkiye as a distinct species, *Phoenicopterus roseus* (Knox et al., 2002). These taxonomic and nomenclatural changes were taken into account in the present overview of the quill mite fauna of Türkiye.

Table 1. Updated overview of quill mites (Acari: Syringophilidae) recorded from birds in Türkiye.

Quill mite species	Host		References
	Species	Order-Family	
***Chenophila* Kethley**			
Chenophila marmaronetta	*Marmaronetta angustirostris*	Anseriformes: Anatidae	Zmudzinski and Unsoeld (2017)
***Syringophiloidus* Kethley**			
Syringophiloidus glandarii	*Garrulus glandarius* *Pica pica*	Passeriformes: Corvidae	Present study
***Syringophilopsis* Kethley**			
Syringophilopsis borini	*Sylvia borin*	Passeriformes: Sylviidae	Skoracki (2011)
***Syringophilus* Heller**			
Syringophilus bipectinatus	*Gallus gallus domesticus*	Galliformes: Phasianidae	Merdivenci (1961)
	Meleagris gallopavo	Galliformes: Phasianidae	Merdivenci (1961)
***Peristerophila* Kethley**			
Peristerophila columbae	*Columba livia*	Columbiformes: Columbidae	Bochkov and Mironov (1998)
Peristerophila meropis	*Merops apiaster*	Coraciiformes: Meropidae	Skoracki et al. (2017)
***Picobia* Haller**			
Picobia cetti	*Cettia cetti*	Passeriformes: Cettiidae	Skoracki (2011)
Picobia currucae	*Curruca nisoria*	Passeriformes: Sylviidae	Skoracki (2011)
***Stibarokris* Kethley**			
Stibarokris brevisetosus	*Plegadis falcinellus*	Pelecaniformes: Threskiornithidae	Skoracki et al. (2016b)
Stibarokris phoeniconaias	*Phoenicopterus roseus*	Phoenicopteriformes: Phoenicopteridae	Zmudzinski et al. (2016)

Table 2. Global checklist of corvid hosts and distributional records of *S. glandarii*.

Hosts	Locations	References
Corvus albicollis	Kenya/Tanzania	Skoracki et al. (2025)
Corvus brachyrhynchos	USA	Zmudzinski et al. (2023)
Corvus cornix	Bosnia and Herzegovina, Denmark, Egypt, France and Romania	Skoracki et al. (2025)
Corvus coronoides	Indonesia	Skoracki et al. (2025)
Corvus enca	Indonesia	Skoracki et al. (2025)
Corvus frugilegus	China and Kazakhstan	Skoracki and Bochkov (2010), Skoracki et al. (2025)
Corvus macrorhynchos	Indonesia, Nepal, and Thailand	Skoracki et al. (2025)
Corvus monedula	Kazakhstan	Skoracki and Bochkov (2010)
Corvus orru	Papua New Guinea	Skoracki et al. (2025)
Corvus ruficollis	Egypt	Skoracki et al. (2025)
Corvus splendens	Bangladesh and Nepal	Skoracki et al. (2025)
Cyanocitta stelleri	USA	Skoracki (2004)
Garrulus glandarius	China, England, France, Germany, North Macedonia, Spain, Russia, Tunisia and Türkiye	Fritsch (1958), Bochkov (2001), Skoracki et al. (2022), Zmudzinski et al. (2023), Present study
Pica pica	Japan and Türkiye	Skoracki (2004), Present study

The genus *Syringophiloidus* Kethley comprises small- to medium-sized quill mites (600-925 µm in length) parasitising the quills of various feather types, including great coverts, secondaries, and tail feathers, in a wide range of avian hosts (Skoracki, 2004). Currently, the genus includes 47 known species, mainly associated with passeriform birds (Zmudzinski et al., 2023). In the present study, *Syringophiloidus glandarii*, detected from the Eura-

sian Jay (*G. glandarius*) and Eurasian Magpie (*P. pica*), and reported here as a new record for Türkiye (Table 1), has previously been reported worldwide from several members of the family Corvidae (Table 2). *Syringophiloidus glandarii* appears to be mainly associated with corvids, having been reported predominantly from members of the family Corvidae, including *Garrulus*, *Corvus*, *Cyanocitta*, and *Pica* (Table 2). This pattern suggests an oligoxenous host specificity within closely related passeriform hosts. The detection of *S. glandarii* on the Eurasian Magpie in Türkiye is therefore not unexpected, given the widespread distribution of this host species and previous records of the mite from other corvids across Europe, Asia, Africa, and North America (Zmudzinski et al., 2023). Nevertheless, the present finding represents the first confirmed record of this species in Türkiye and further expands its known geographical distribution.

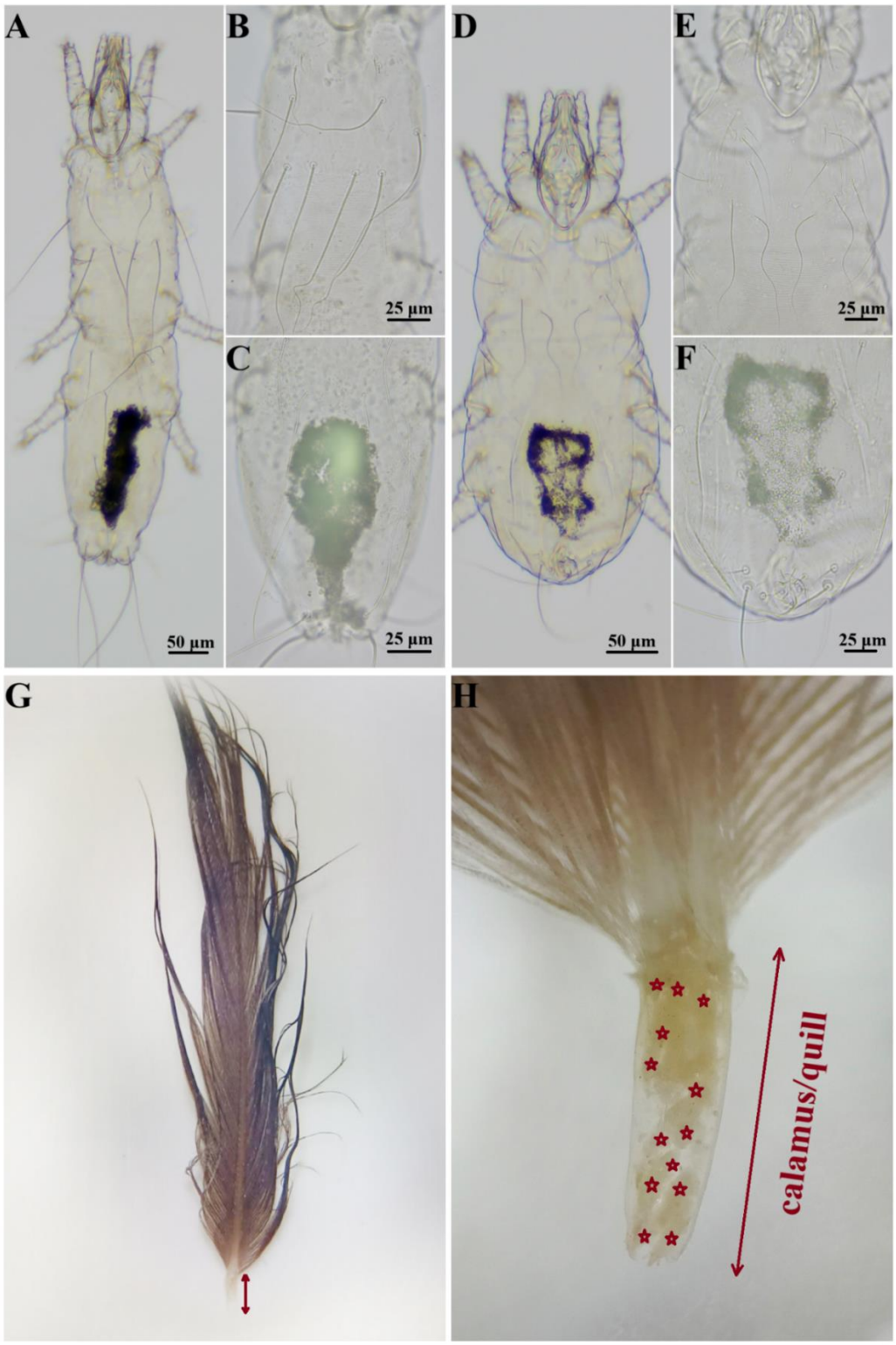


Figure 1. *Syringophiloidus glandarii* (Fritsch) from *Pica pica*. (A-C) Female: dorsal view, anterior body region, and posterior body region. (D-F) Male: dorsal view, anterior body region, and posterior body region. (G) Contour feather (arrow indicating the calamus). (H) Higher-magnification view of the calamus showing *S. glandarii* specimens (red stars).

CONCLUSION

Despite the wide distribution and ecological diversity of birds in Türkiye, the syringophilid fauna of the country remains poorly investigated. Considering the high host specificity and microhabitat specialisation of quill mites, many additional species are likely to occur on different avian taxa distributed throughout the region. Future investigations focusing on underexplored bird groups and geographical regions will probably reveal numerous new host-parasite associations and additional distributional records.

Authors' contributions

Gökhan Eren: Conceptualization, methodology, investigation, formal analysis, identification of parasite specimens, writing - original draft preparation, writing - review and editing, visualization. **Ergün Bacak:** Conceptualization, methodology, investigation, formal analysis, material collection, writing - original draft preparation, writing - review and editing, visualization, project administration, supervision. **Sercan Bilgin:** Methodology, material collection, writing - review and editing. **Ömer Faruk Sülek:** Methodology, material collection, writing - review and editing. **Arif Cemal Özsemir:** Conceptualization, methodology, investigation, formal analysis, material collection, writing - original draft preparation, writing - review and editing, visualization.

All authors have read and agreed to the published version of the manuscript.

Statement of ethics approval

Bird ringing and ectoparasite sampling were conducted under official permission granted by the General Directorate of Nature Conservation and National Parks, Ministry of Agriculture and Forestry, Republic of Türkiye (Permit No: E-21264211-288.04-17467040). No additional ethical approval was required for the Eurasian Jay (*G. glandarius*) because the specimen was obtained from a road-killed bird.

Funding

This study was not supported by any foundation.

Conflict of interest

There is no conflict of interest.

Acknowledgements

We sincerely thank the University of California, Los Angeles (UCLA) and Koç University İşbank Center for Infectious Diseases (KUISCID) for their valuable support and contributions to the successful conduct of this study.

REFERENCES

Bochkov, A.V. 2001. On the taxonomy of mites of the genus *Syringophiloidus* Kethley, 1970 (Acari: Syringophilidae) of European part of Russia. Parasitologya, 35: 149-153.

Bochkov, A.V. and Mironov, S.V. 1998. Quill mites of the family Syringophilidae Lavoipierre, 1953 (Acariformes: Prostigmata) parasitic on birds (Aves) of the fauna of the former USSR. Acarina, 6: 3-16.

Casto, S.D. 1974. Entry and exit of syringophilid mites (Acarina: Syringophilidae) from the lumen of the quill. The Wilson Bulletin, 86 (3): 272-278.

Fritsch, W. 1958. Die Milbengattung *Syringophilus* Heller, 1880 (Subordo Trombidiformes, Fam. Myobiidae Megnin, 1877). Zoologische Jahrbücher Systematik, 86: 227-234.

Glowska, E., Chrzanowski, M. and Kaszewska, K. 2015. Checklist of the quill mites (Acariformes: Syringophilidae) of the World. Zootaxa, 3968 (1): 1-81. doi: 10.11646/zootaxa.3968.1.1

Glowska, E., Laniecka, I., Ostrowska, K., Gebhard, C.A., Olechnowicz, J. and Dabert, M. 2023. Evaluation of genetic diversity in quill mites of the genus *Syringophiloidus* Kethley, 1970 (Prostigmata: Syringophilidae) with six new-to-science species. Animals, 13: 3877. doi: 10.3390/ani13243877

Johnston, D.E. and Kethley, J.B. 1973. A numerical phenetic study of the quill mites of the family Syringophilidae (Acari). The Journal of Parasitology, 59: 520-530. doi: 10.2307/3278787

Kethley, J.B. 1971. Population regulation in quill mites (Acarina: Syringophilidae). Ecology, 52 (6): 1113-1118. doi: 10.2307/1933821

Knox, A.G., Collinson, M., Helbig, A.J., Parkin, D.T. and Sangster, G. 2002. Taxonomic recommendations for British birds. Ibis, 144 (4): 707-710. doi: 10.1046/j.1474-919X.2002.00110.x

Lepage, D. 2026. Avibase - The World Bird Database. Available from https://avibase.bsc-eoc.org (Last accessed: 19 August 2026).

Merdivenci, A. 1961. *Syringophilus bipectinatus* (Heller, 1880) in domestic turkey and fowl in Turkey. Türk Veteriner Hekimleri Derneği Dergisi, 31 (178-179): 284-288. [In Turkish]

Merdivenci, A. 1963. Incidens of parasites of pigeons (*Columba livia*) in İstanbul. Türk Biyoloji Dergisi, 33: 81-86. [In Turkish]

Principato, M., Lisi, F., Moretta, I., Samra, N. and Puccetti, F. 2005. The alterations of plumage of parasitic origin. Italian Journal of Animal Science, 4: 296-299. doi: 10.4081/ijas.2005.296

Skoracki, M. 2004. A review of quill mites of the genus *Syringophiloidus* Kethley, 1970 parasitizing quills of passeriform birds, with descriptions of four new spe-

cies (Acari: Prostigmata: Syringophilidae). Genus, 15 (2): 281-300.

Skoracki, M. 2011. Quill mites (Acari: Syringophilidae) of the Palaearctic region. Zootaxa, 2840: 1-414. doi: 10.11646/zootaxa.2840.1.1

Skoracki, M. and Bochkov, A.V. 2010. Syringophilid mites (Acari: Syringophilidae) of Kazakhstan. Zootaxa, 2546 (1): 52-68. doi: 10.11646/zootaxa.2546.1.3

Skoracki, M. and OConnor, B.M. 2010. New taxa of quill mites (Acari: Cheyletoidea: Syringophilidae). Zootaxa, 2341: 1-32. doi: 10.11646/zootaxa.2341.1.3

Skoracki, M., Michalik, J., Skotarczak, B., Rymaszewska, A., Sikora, B., Hofman, T., Wodecka, B. and Sawczuk, M. 2006. First detection of *Anaplasma phagocytophilum* in quill mites (Acari: Syringophilidae) parasitizing passerine birds in Poland. Microbes and Infection, 8: 303-307. doi: 10.1016/j.micinf.2005.06.029

Skoracki, M., Sikora, B. and Spicer, G.S. 2016a. A review of the subfamily Picobiinae Johnston and Kethley, 1973 (Acariformes: Prostigmata: Syringophilidae). Zootaxa, 4113 (1): 1-95. doi: 10.11646/zootaxa.4113.1.1

Skoracki, M., Zmudzinski, M., Unsoeld, M. and Sikora, B. 2016b. First records of the syringophilid mites (Acariformes: Prostigmata) parasitizing ibises and spoonbills (Pelecaniformes: Threskiornithidae), with description of four new species. Journal of Medical Entomology, 53 (6): 1312-1321. doi: 10.1093/jme/tjw126

Skoracki, M., Hromada, M. and Sikora, B. 2017. *Castosyringophilus meropis* sp. n. (Acariformes: Syringophilidae) – A new quill mite species parasitising the world population of *Merops apiaster* Linnaeus (Coraciiformes: Meropidae). Folia Parasitologica, 64: 024. doi: 10.14411/fp.2017.024

Skoracki, M., Hromada, M., Kaszewska, K. and Sikora, B. 2020. Females of the quill mite genera *Peristerophila* and *Castosyringophilus* (Acariformes: Syringophilidae) are two morphological forms: ontogenetic and population evidences. Systematic and Applied Acarology, 25 (10): 1803-1820. doi: 10.11158/saa.25.10.6

Skoracki, M., Unsoeld, M. and Sikora, B. 2022. Redescription of *Syringophilioidus glandarii* (Fritsch, 1958) with new records of hosts and localities (Acariformes, Syringophilidae). Spixiana, 45 (1): 39-44.

Skoracki, M., Haarder, S., Unsoeld, M., Nielsen, Ó.K., Hromada, M. and Sikora, B. 2025. Syringophilid mites parasitising the crows and the competitive exclusion principle. Scientific Reports, 15: 34436. doi: 10.1038/s41598-025-17527-8

Zmudzinski, M. and Unsoeld, M. 2017. A new species of the quill mite genus *Chenophila* Kethley, 1970 (Acariformes: Syringophilidae) from the Marbled Teal *Marmaronetta angustirostris* (Menetries) (Anseriformes: Anatidae) in Turkey. Acta Parasitologica, 62 (2): 477-481. doi: 10.1515/ap-2017-0056

Zmudzinski, M., Solarczyk, P. and Skoracki, M. 2016. A new species and new records of syringophilid mites (Acariformes: Prostigmata: Cheyletoidea) associated with aquatic birds. Annales Zoologici, 66 (3): 431-435. doi: 10.3161/00034541anz2016.66.3.009

Zmudzinski, M., Skoracki, M. and Sikora, B. 2023. An updated checklist of quill mites of the family Syringophilidae (Acariformes: Prostigmata). figshare, Dataset. doi: 10.6084/m9.figshare.16529574.v2

Edited by: Salih Doğan
Reviewed by: Three anonymous referees

Citation: Eren, G., Bacak, E., Bilgin, S., Sülek, Ö.F. and Özsemir, A.C. 2026. First record of *Syringophiloidus glandarii* (Fritsch) in Türkiye, with an updated overview of the quill mites (Acari: Syringophilidae) of Türkiye. Acarological Studies, 8 (2): e1968202.