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***Leptopsylla algira costai* (Siphonaptera: Leptopsyllidae): New host and new geographical record**Ali Yousefi^{1*}, Mohammad Naser Ghorbani², Sadegh Salehi-Guilandeh³¹Young Researchers and Elites Club, Science and Research Branch, Islamic Azad University, Tehran, Iran²Department of Microbiology, Science and Research Branch, Islamic Azad University, Tehran, Iran³Department of Pathobiology, School of Veterinary Science, Bu-Ali Sina University, Hamedan, Iran

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ABSTRACT

Objective: To access the emerging ectoparasites associated with shrews in Hamedan Province of Iran.**Methods:** We have captured bicoloured white-toothed shrews [*Crocidura leucodon* (*C. leucodon*)] using the live traps in April 2014. Ectoparasites collected by brushing the skins were removed and preserved in 70% ethanol containing 5% glycerin, and subsequently they were sent to the parasitology laboratory and processed. The fleas isolated from infested specimen were cleared in 10% aqueous potassium hydroxide, dehydrated in ethanol, cleared in xylene, mounted in Canada balsam and identified using reliable keys.**Results:** In general, eight fleas (one male, seven females) were collected from *C. leucodon* in Hamedan Province, Western Iran. The fleas were identified as *Leptopsylla algira costai* Smit, 1955.**Conclusions:** Fleas are medically important because they transmit a wide variety of diseases to their hosts. In addition, this article reports *Leptopsylla algira costai* for the first time in new host (*C. leucodon*) and new geographical region (Iran).**1. Introduction**

The order Siphonaptera comprises 2500 species and subspecies in 239 genera. Adult fleas are obligatory parasites of warm-blooded vertebrates and 94% of the known species occur on mammals, while the remaining 6% were on birds. Fleas are important as vectors of disease organisms, including murine typhus and plague, and intermediate host for helminth parasites of man and animals[1].

Several studies in Iran have been conducted in which ectoparasites of small mammals were reported, but the ectoparasites of shrews in Iran are unknown. Previous research findings of Siphonaptera reported three species of *Leptopsylla* genus in Iran including *Leptopsylla segnis*, *Leptopsylla aethiopicus aethiopicus* and *Leptopsylla taschenbergi taschenbergi*[2-4]. This paper is the first report of *Leptopsylla algira costai* (*L. a. costai*) of the flea fauna of Iran from new host *Crocidura leucodon* (*C. leucodon*).

2. Materials and methods

The collection of shrews (*C. leucodon*) was done using live traps

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in April 2014. We observed *C. leucodon* which were infested with fleas during the study on ectoparasites in shrews in Razan Plain (Hamadan Province) located in the west of Iran (35°21' N, 49°04' E). Eight fleas (1 male, 7 females) were collected by brushing the skin and preserved in 70% ethanol containing 5% glycerin, and subsequently cleared in 10% aqueous potassium hydroxide then rinsed several times in distilled water to remove all traces of clear solution. The specimens were then dehydrated in increasing concentrations of ethanol, cleared in xylene and mounted in Canada balsam and the fleas were identified using the keys of Hopkins and Rothschild[5].

3. Results

The infested shrew was identified as *C. leucodon* using the keys of small mammals. Eight fleas (1 male, 7 females) were collected by brushing the skin and identified with aid of Hopkins and Rothschild keys[5]. Characters used to identify *L. a. costai* Smit, 1955 were described as follows. In *Leptopsylla* genus, the genal comb were usually composed of three or four spines, but in two species *Leptopsylla sexdentata* and *Leptopsylla putoraki*, their genal combs were composed of five or six spines. In our finding, *Leptopsylla* had three spines in the genal comb in the male (Figure 1A) and female (Figure 1B). Morphological characteristics of male specimens were as follows: without a dorsal process of any significance between the groups of antepygial setae on the left and right sides, antepygial bristles of each side were divided into two groups by a sinus which

was narrow (Figure 2A); processes of male clasper were relatively short and their tips were not darkened by sclerotization; fixed process broadened apically; apex of movable process was strongly truncated (Figure 2B). In females, the upper seta of the lower pair of antepygial setae on each side was about half as long as the lower seta and sinus of antepygial bristles was broad (Figure 3A), and sinus of the seventh sternite was much narrower, usually about as wide as deep (Figure 3B).

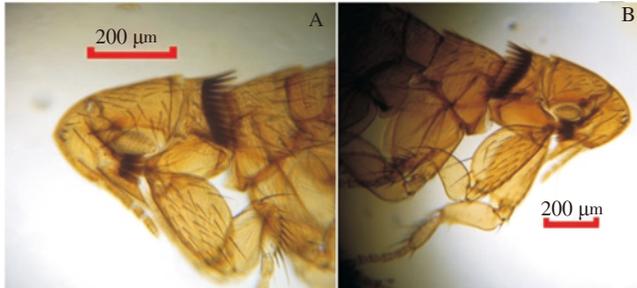


Figure 1. *L. a. costai* from *C. leucodon*.

A: Anterior end of a male; B: Anterior end of a female.

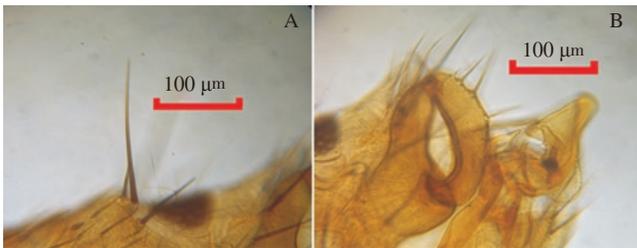


Figure 2. Male *L. a. costai* from *C. leucodon*.

A: Antepygial setae; B: Posterior end with paramere and clasper detail.

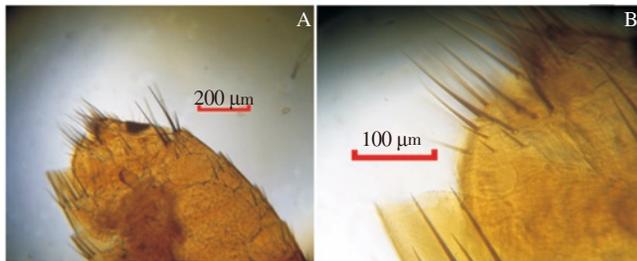


Figure 3. Female *L. a. costai* from *C. leucodon*.

A: Antepygial setae; B: Sinus of sternite VII.

4. Discussion

Leptopsylla is one genus of the family Leptopsyllidae and has nine species, including *Leptopsylla algira*, which also has ten subspecies, namely, *Leptopsylla algira agadirensis* Hastriter and Tipton, 1975, *Leptopsylla algira algira* Jordan and Rothschild, 1912, *Leptopsylla algira popovi* (*L. a. popovi*) Wagner and Argyropulo, 1934, *Leptopsylla algira serveti* Beaucournu and Launay, 1978, *Leptopsylla algira scopoli* Brelih and Petrov, 1979, *Leptopsylla algira moroccana* Grenier, 1957, *Leptopsylla algira tuggurtensis* Smit, 1955, *Leptopsylla algira vogeli* Beaucournu, 1990, *L. a. costai* Smit, 1955 and *Leptopsylla algira atlantidis* Beaucournu, 1993[5,6].

This genus occurs in mammalian species and normally is present in the palearctic region, except *Leptopsylla segnis* which is known as a cosmopolitan flea[5].

This subspecies is nearest related to *L. a. popovi* and differs from it in the male by the more slender fixed process of the clasper and the very obtuse apex of the movable process. The female differs

from *L. a. popovi* by having a deeper sinus in the posterior margin of the seventh sternite, while the lobe above the sinus is more sharply pointed[7].

In fact, most *L. a. costai* have been reported from Israel and only one report is available from Turkey[8]. All previous records of this subspecies have been described in *Mus musculus*[7] and have been recorded also in *Crocidura suaveolens*[9], *Rattus rattus*, *Meriones shawi* and *Meriones tristrami*[10,11], *Gerbillus gerbillus* from Israel[12] and in *Crocidura* sp. from Turkey[8].

These data provide new information on new hosts and new geographical distribution of *L. a. costai* in the World. The study underlined the necessity of further investigation about the parasitological study in various microclimates to prepare a comprehensive list of Siphonaptera fauna and understanding of their possible role in disease transmission in Iran.

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgments

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References

- [1] Dobler G, Pfeffer M. Fleas as parasites of the family Canidae. *Parasit Vectors* 2011; **4**: 139.
- [2] Asmar M, Piazak N, Karimi Y. [*An illustrated key for flea of Iran*]. Tehran: Pasteur Institute of Iran; 1979. Persian.
- [3] Darvishi MM, Youssefi MR, Changizi E, Lima RR, Rahimi MT. A new flea from Iran. *Asian Pac J Trop Dis* 2014; **4**: 85-7.
- [4] Yousefi A, Chaechi Nosrati MR, Karimi A, Naisi S. *Leptopsylla taschenbergi taschenbergi* (Siphonaptera: Leptopsyllidae), new flea from Iran. *Asian Pac J Trop Dis* 2015; **5**(8): 606-7.
- [5] Hopkins GHE, Rothschild M. *An illustrated catalogue of the Rothschild collection of fleas (Siphonaptera) in the British Museum (Natural History)*. Vol 5. Leptopsyllidae and Ancistropsyllidae. London: Trustees of the British Museum (Natural History); 1971, p. 93-173.
- [6] Catalogue of Life. The species 2000 & ITIS catalogue of life, 2015 annual checklist. Leiden: Catalogue of Life; 2015. [Online] Available from: <http://www.catalogueoflife.org/annual-checklist/2015/info/about> [Accessed on 19th July, 2016]
- [7] Smit FGAM. A new flea from Palestine. *Proc R Entomol Soc London* 1955; **24**(11-12): 201-4.
- [8] Aktas M, Hasbenli A. Contributions to the flea fauna of Turkey II. Leptopsyllidae (Siphonaptera). *Turk Entomol Derg* 1995; **19**(1): 65-8.
- [9] Theodor O. A survey of the parasites of wild mammals and birds in Israel. Jerusalem: Israel Academy of Sciences and Humanities; 1967, p. 1-50.
- [10] Lewis RE, Lewis JH. An annotated checklist of the fleas (Siphonaptera) of the Middle East. *Fauna Saudi Arabia* 1990; **11**: 251-76.
- [11] Lewis RE. The Ceratophyllidae: currently accepted valid taxa (Insecta: Siphonaptera). *Thesis Zoologicae* 1990; **13**: 267.
- [12] Krasnov B, Shenbrot G, Khokhlova I, Medvedev S, Vatschenok V. Habitat dependence of a parasite-host relationship: flea (Siphonaptera) assemblages in two gerbil species of the Negev Desert. *J Med Entomol* 1998; **35**: 303-13.