Persian Journal of Acarology, 2016, Vol. 5, No. 1, pp. 85–88.

Correspondence

New rodents' hosts of sucking lice, fleas (Insecta: Anoplura, Siphonaptera) and hard ticks (Acari: Ixodida) from Iran

Kordiyeh Hamidi[1], Leila Nourani[1] and Gholamhossein Moravvej[2]*

1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran; E-mail: kordiyeh.hamidi@yahoo.com; Le.nourani90@gmail.com
2 Department of Plant Protection, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran; E-mail: Moravej@ferdowsi.um.ac.ir

* Corresponding author

Rodents, as the most common mammal species around the world, are indicated as one of the main health problems to humans, especially in the populated areas. Since most of the rodent species are considered as suitable reservoirs for many zoonotic diseases and serious pathogens, their ectoparasitic fauna has become of special interest (Nava *et al.* 2003). With respect to the fact that Mashhad is one of the most densely populated cities in Iran, this investigation was carried out in various locations of Mashhad, Khorasan Razavi Province, Iran including public sites, parks, farms, industrial constructions, excavation areas (e.g. sandy, rocky) from April 2013 to December 2014. Rodents were trapped using custom-made mesh live-traps and snap traps with various bait materials and identification of them was made following the methods described by Corbet (1978). Ectoparasites collections and preparation was done based on procedures described by Hamidi *et al.* (2015) and Moravvej *et al.* (2015). Ectoparasites were identified using valid taxonomic keys (e.g. for Mallophaga (Korytkowski 2002), Siphonaptera (Acosta and Morrone 2003) and ticks (Baker 1999). All specimens were deposited in the collection of the Department of Plant Protection, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran.

A total of 197 individuals of rodents were captured, which represented 10 species belonging to the 3 families of: Muridae (*Apodemus witherbyi, Mus musculus, Nesokia indica, Rattus norvegicus, Meriones libycus, Meriones persicus,* and *Tatera indica*), Cricetidae (*Cricetulus migratorius* and *Microtus transcaspicus*) and Sciuridae (*Spermophilus fulvus*). A total of 783 individuals of ectoparasite were collected representing 6 species, 7 genera, 5 families and 3 orders (Table 1). Four new rodent hosts were identified for seven ectoparasitic species. The ectoparasites included 2 species of sucking lice (Anoplura), 2 species of hard ticks (Ixodida) and 3 species of fleas (Siphonaptera). The Persian Jird, *Meriones persicus*, was recorded as a new host for *Polyplax asiatica*, *Haemaphysalis punctata*, *Ixodes trianguliceps* and *Xenopsylla cheopis.* This is the first record of *Hoplopleura captiosa*, *Nosopsyllus fasciatus*, and *Xenopsylla cheopis* on the short-tailed nesokia, *Nesokia indica*. Furthermore, *Ctenophthalmus* sp. and *Nosopsyllus fasciatus* were recorded on the brown rat *Rattus norvegicus* and the yellow ground squirrel *Spermophilus fulvus*, respectively. These are all new records of rodent hosts for sucking lice, hard ticks and fleas from Iran which were not found by previous researchers (e.g. Durden and Musser 1994; Wall and

Shearer 1997; Shayan & Rafinejad 2006; Hanafi-Bojd *et al.* 2007; Durden 2008; Rasouli *et al.* 2011; Pakdad *et al*. 2012; Shirazi *et al*. 2013; Hamidi *et al.* 2015; Moravvej *et al.* 2015a, b).

Table 1. Ectoparasites and their associated rodent hosts and the new host reports from Mashhad and vicinity, Iran.

Taxonomic characteristics of ectoparasite				Previously reported host	New host report ¥
Order	**Family**	**Genus**	**Species**		
Anoplura	Hoplopleuridae Ewing	*Hoplopleura* Enderlein	*H. captiosa* Johnson	*Rattus norvegicus* (Hanafi-Bojd *et al.* 2007)	*Nesokia indica*
	Polyplacidae Fahrenholz	*Polyplax* Enderlein	*P. asiatica* Ferris	**Rattus norvegicus* (Rasouli *et al.* 2011) **Rattus rattus* (Solanki *et al.* 2013) **Sciurus anomalus* (Shirazi *et al.* 2013)	*Meriones persicus*
Ixodida	Ixodidae Koch	*Haemaphysalis* Koch	*H. punctata* Canestrini and Fanzago	**Calomyscus bailwardi,*Meriones persicus*, **Microtus socialis,* **Rattus rattus* (Shayan & Rafinejad 2006)	*Meriones persicus*
		Ixodes Latreille	*I. hexagonus* Birula	**Rattus norvegicus* (Solanki *et al.* 2013) **Rattus rattus* (Solanki *et al.* 2013)	*Meriones persicus*
Siphonaptera	Hystrichopsyll-idae	*Ctenophthalmus* Kolenati	unknown	**Mus musculus* (Abivardi 2001) **Rattus norvegicus* (Stanko *et al.* 2002)	*Rattus norvegicus*
	Ceratophyllidae Dampf	*Nosopsyllus* Jordan,	*N. fasciatus* (Bosc)	*Apodemus flavicollis, Microtus socialis, Microtus arvalis* (Stanko *et al.* 2002) *Apodemus urartensis, Meriones persicus, Mus musculus (*Shayan & Rafinejad 2006) *Rattus norvegicus* (Pakdad *et al.* 2012)	*Spermophilus fulvus Nesokia indica*
	Pulicidae Stephens, 1829	*Xenopsylla* Glinkiewicz 1907	*X. cheopis* (Rothschild, 1903)	*Rattus norvegicus, Rattus rattus (*Soliman *et al.* 2001; Solanki *et al.* 2013)	*Nesokia indica Meriones persicus*

* Reported as the host of unspecified ectoparasite species

¥ A total of 197 rodents were captured and examined for ectoparasites.

Rodent diversity and their ectoparasitic fauna seem to become of special concern. Various studies have showed that rodents have a key role in the transmission of many serious zoonotic diseases including bubonic plague, Chagas' disease, Lassa fever, leishmaniasis, leptospirosis, murine typhus, Omsk hemorrhagic fever, plague, rat-bite fever, salmonellosis and tularemia (e.g. Bell *et al.* 1988; Abel *et al.* 2000). The

association of rodents and their ectoparasites with human habitation and also the impact of environmental factors such as topography and vegetation on the rodent-ectoparasite relationship (Soliman *et al.* 2001), are considered as important issues for further epidemiological and zoonotic investigations. These researches may ascertain the role of rodents and their ectoparasites' affinity in the life cycle of emerging new infections. These are more crucial in poorly studied host species and also in regions where rodent-borne diseases are more prevalent. This research was a part of project funded by Research Council of Ferdowsi University of Mashhad, Iran (grant ID 2/38879).

References

Abel, I.S., Almeida-Junior, D.E., Fonseca, A.H., Soares, C.O., & Ishikawa, M.M. (2000) *Borrelia* sp. in naturally infected *Didelphis aurita* (Wied, 1826) (Marsupialia: Didelphidae). Brazilian archive Biology and Technology 43: 307– 312.

Bell, J.C., Plamer, S.R. & Payne, J.M. (1988) The zoonosis: infection transmitted from animal to man. Edward Arnold Press, London, UK, 241pp.

Abivardi, C. (2001) *Iranian Entomology - An introduction:* Volume 1: *Faunal Studies*, pp. 1–444; Vol. 2: *Applied Entomology*, pp. 445–1033. - Springer, Berlin, Heidelberg, New York.

Acosta, R. & Morrone, J.J. (2003) Clave ilustrada para la identificación de los taxones supra específicos de Siphonaptera de México. *Acta Zoologica*, 89: 39–53.

Baker, A.S. (1999) *Mites and Ticks of Domestic Animals*. The Stationery Office, London, 240 pp.

Corbet, G.B. (1978) *The mammals of the Palearctic region: A taxonomic review*. British Museum (Natural History), London, 354 pp.

Durden, L.A. & Musser, C.C. (1994) *The sucking lice (Insecta, Anoplura) of the world: A taxonomic checklist with records of mammalian hosts and geographic distributions.* Bulletin of the American Museum of Natural History, London, 478 pp.

Durden, L.A. (2008) Ectoparasites of commensal rodents in Sulawesi Utara, Indonesia, with notes on species of medical importance. *Medical and Veterinary Entomology*, 5: 1– 7.

Hamidi, K., Nourani, L. & Moravvej, G. (2015) The relationship of ectoparasite prevalence to the capturing season, locality and species of the murine rodent hosts in Iran. *Persian Journal of Acarology*, 4 (4): 409–423.

Hanafi-Bojd, A.A., Shahi, M., Baghaii, M., Shayeghi, M., Razmand, N. & Pakari, A. (2007) A study on rodent ectoparasites in Bandar Abbas: the main economic southern seaport of Iran. *Iranian Journal of Environmental Health Science and Engineering*, 4 (3): 173–176.

Korytkowski, C.A. (2002) *Guía de Estudio Sistemática de Insectos. Vicerrectoría de Investigación y Postgrado*. Universidad de Panamá, Panamá, 174 pp.

Moravvej, G., Hamidi, K., Nourani, L., & Bannazade, H. (2015) Occurrence of ectoparasitic arthropods (Siphonaptera, Acarina, and Anoplura) on rodents of Khorasan Razavi Province, northeast of Iran. *Asian Pacific Journal of Tropical Disease*, 5(9): 930–934.

Moravvej, G., Hamidi, K. & Nourani, L. (2015) Relationship between the sex and age of *Mus musculus* with ectoparasites prevalence in northeast of Iran. *Persian Journal of Acarology*, 5 (1): 51–62.

Nava, S., Lareschi, M. & Voglino, D. (2003) Interrelationship between ectoparasites and wild rodents in Buenos Aires Province, Argentina. *Memórias do Instituto Oswaldo Cruz*, 98: 45–49.

Pakdad, K., Ahmadi, N.A., Aminalroaya, R., Piazak, N. & Shahmehri, M. (2012) A study on rodent ectoparasites in the North district of Tehran, Iran during 2007–2009. *Journal of Paramedical Sciences*, 3: 27–31.

Rasouli, S., Tehrani, A., Hifian, H., Athayi, M., Ghafarzadeh, S., Pirbudaghi, H., Hoseini, E. & Ghasemzade, E. (2011) A report over the infection with the louse *Polyplax spinulosa* in typical rats belonging to the wistar strain kept in the laboratory animal breeding and keeping Center of Urmia University. *Global Veterinaria*, 6: 547–550.

Solanki, S.K. Chauhan, R., Rahman, A. & Solanki, K. (2013) Prevalence of ectoparasites in commensal rats in Dehradun, India. *International Journal of Current Microbiology and Applied Sciences*, 2: 38–41.

Shayan, A. & Rafinejad, J. (2006) Arthropod parasites of rodents in Khorram Abbad district, Lorestan Province of Iran. *Iranian Journal of Public Health*, 35: 70–76.

Shirazi, Sh., Bahadori, F., Mostafaei, T. & Ronaghi, H. (2013) First Report of *Polyplax* sp. in a Persian Squirrel (*Scuirus anomalus*) in Tabriz, Northwest of Iran. *Turkish Journal of Parasitology*, 37: 299–301.

Soliman, S., Main, A.J., Marzouk, A.S. & Montasser, A.A. (2001) Seasonal studies on commensal rats and their ectoparasites in a rural area of Egypt: the relationship of ectoparasites to the species, locality, and relative abundance of the host. *Journal of Parasitology*, 87: 545–553.

Stanko, M., Miklisova, D., de Bellocq, J.G. & Morand, S. (2002). Mammal density and patterns of ectoparasite species richness and abundance. *Oecologica*, 131: 289–295.

Wall, R. & Shearer, D. (1997) *Veterinary entomology: Arthropod ectoparasites of veterinary importance.* Springer, The Netherlands, 439 pp.

Received: 13 October 2015
Accepted: 25 December 2015
Published: 15 January 2016