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## Survey of museum beetle (*Dermestes* sp.) damage to the scorpion collection in the Health Faculty of Kashan University of Medical Sciences

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### ABSTRACT

The result showed that all the drawers containing the scorpion preservation boxes were found damaged by *Dermestes* sp. Totally, 210 *Dermestes* larvae were collected. On a average 15 larvae were collected from each drawer. The length of the mature larva was 10-12 mm. The larvae were oval shaped with bodies covered heavily by strands of hair. The incurred damages to the collections were huge because of lack of supervision.

**Key words :** Collection, *Dermestes*, museum beetle, pest, scorpion.

### INTRODUCTION

Collecting the arthropoda and preserving them in collection boxes is very important for scientific studies. Therefore, natural history collections such as these collections are valuable biologic sources (de L Brooke, 2000; Lane, 1996; Shaffer *et al.*, 1998). These collections preserve the identified species recognized in different places and times (Ponder *et al.*, 2001). Since insects cannot be identified without exact studying of their morphologic properties, most entomologists create insects' collections for preserving them. A lot of collections are in natural history museums and universities and experts preserve and study them. Some university courses require students' activity for collecting small collections. All over the world, biologists have extracted ecologic, morphologic, phylogenic, variety and biographic data from the museum samples for decades. Recently, these samples have been repeatedly used for DNA extraction for molecular phylogenetics, population genetic and genetic studies (Espeland *et al.*, 2010; Payne and Sorenson, 2002; Roy *et al.*, 1994; Thomas, 1994; Wandeler *et al.*, 2007). Due to the problems concerning collecting the fresh biologic materials from different areas, extinction of species

and habitat fatality, it is predicted that natural history collections such as entomology museums will be considered more (Margulies *et al.*, 2006). Special attention is paid to the study of scorpion's ecobiology in the world. These animals live long life. Since they mostly live in the dry and tropical areas, to keep water and stay away from straight light, they usually live in available holes or their own drilled nests. So, preservation and collecting them in museums is very important (Dehghani and Kamiabi, 2017; Dehghani *et al.*, 2017a; Dehghani *et al.*, 2007; Gefen and Ar, 2006; Warburg, 2012). Scorpions are venomous animals which among the important arthropoda like mosquitoes, flies, bees and solpugids, have a different reproduction system, lifestyle and life span (Dehghani, 2017). In Iran, they are expanded from the North to the South and from the East to the West (Dehghani *et al.*, 2017b; Jalali and Rahim, 2014; Dehghani *et al.*, 2018; Yousef Mogaddam *et al.*, 2017). In the South and the Southwest, they have more frequency and species variety. Scorpion sting is one of the main medical problems of tropical and semi-tropical countries (Kassiri *et al.*, 2015; Kassiri *et al.*, 2014; Shahbazzadeh *et al.*, 2009; Yousef Mogaddam *et al.*, 2016) which causes a wide range of complications such as intensive dermal reactions up to creating nervous, cardiovascular, respiratory problems and sometimes death. This problem imposes heavy economical and psychological burden

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to the society (Mirakabbadi *et al.*, 2007; Pourkhalili *et al.*, 2015; Sanaei-Zadeh *et al.*, 2017). More than 2230 species of scorpions have been recognized in the world (Prendini, 2011; Rein-Ove, 2014; Santibáñez-López *et al.*, 2015) among which some are dangerous and deadly species. 64 scorpion species have been identified in Iran 4 of which are dangerous. *Androctonus crassicauda* and *Hemiscorpius lepturus* are considered as the most dangerous scorpions in Iran in terms of bite frequency and their related complications (Dehghani and Arani, 2015; Dehghani *et al.*, 2009; Ghafourian *et al.*, 2016; Motevalli Haghi and Dehghani, 2017). Scorpion sting has been an old problem which has a special place in the old medical documents. Scorpions sting many Iranians every year specially in the South, Southwest and central areas (Dehghani and Arani, 2015; Dehghani *et al.*, 2012a; Dehghani *et al.*, 2016c; Dehghani *et al.*, 2010; Nejati *et al.*, 2017).

Scorpions are one of the arthropoda which have medical importance in Iran. Their preservation and collection in insects' museum is very important because of their training values and further studies by new methods. Therefore, this study surveys the amount of the incurred damages to the collected species of the scorpion collection.

## MATERIALS AND METHODS

This study was cross-sectional descriptive and sampling was non-haphazard and simple. Studied entomology collections included all the arthropoda with medical and non-medical importance. The non-medical part included samples of insects like grasshoppers, beetles, butterflies, crickets and other species which were used in training general entomology. Medical arthropoda collection were generally and all the collection boxes containing scorpion samples were specially inspected. The amount of incurred damages to the arthropoda was evaluated. The beetles' larva samples were collected and put in a 70% ethyl alcohol which had number and label of basic data and were identified by using stereo microscope. Data received from studying and identification of samples and also the collections were collected, recorded and presented with statistics and pictures.

## RESULTS AND DISCUSSION

The results of the study showed that all the drawers containing the insect preservation boxes had

naphthalene pellets or crystals which were in the bottom corner of the drawers. Naphthalene pellets are known as inhibitors and can protect the insects inside the box from the pests. 210 beetle larvae were collected from the insects' collection boxes and were put in 70% ethyl alcohol. The average was 15 larvae for each drawer. The length of the mature larvae was 10-12 mm. The larvae were oval shape and their bodies were heavily covered by strands of hair (Fig. 1). When the drawers were opened, 80 to 100% damage had been incurred to all the drawers (Figs. 2-3). Around each damaged sample, 3 to 5 *Dermestes* larva shells were seen (Fig. 4). Except one or two samples which were partially damaged, others were not usable at all. All the drawers had naphthalene pellets. The larvae were identified by the keys belonged to *Dermestes* species. Insects' collection such as Culicidae mosquitos and all kinds of flies were 100% destroyed and there was nothing left of them.

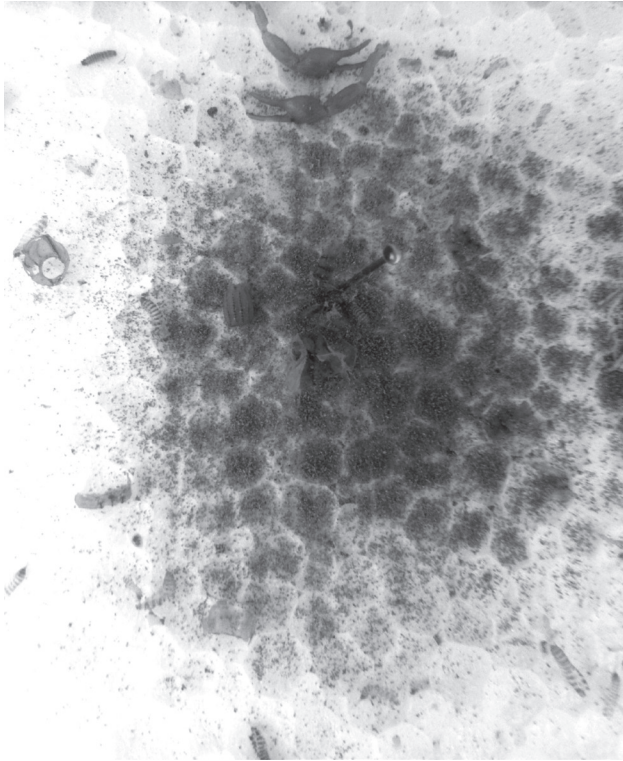
The beetle larvae feed on different organic matters such as compost organic matters (Dehghani *et al.*, 2016b). Considering the importance of preserving the entomology museums, different



Fig. 1. Collected larva from the damaged insect collection boxes



Fig. 2. The amount and type of the damages of *Dermestes* larva in the scorpion collection



**Fig. 3.** A completely damaged scorpion in the collection



**Fig. 4.** *Dermestes* larva shells around a montage scorpion in the collection

methods have been developed for eliminating these pests. Fumigation is very effective in eliminating these pests. Traps (Ackery *et al.*, 1999), heating (Ackery *et al.*, 2005; Ackery *et al.*, 2004) or freezing the contaminated samples (Bergh *et al.*, 2006) and changing the museum's air are some other controlling methods (Gilberg, 1989; Rust *et al.*, 1996; Valentin, 1993; Zarrintab *et al.*, 2016). Many insecticides are used in the collections to eliminate the pests, although using them has been reduced but are still used in some of them. Cyanides and mineral compounds are some of these materials (Dehghani *et al.*, 2016a; Zarrintab *et al.*, 2016). Many studies have been done about the insecticides' effects in elimination of entomology museum pests (Dehghani *et al.*, 2012b; Linnie and Keatinge, 2000; Mostafaii *et al.*, 2017; Williams *et al.*, 1989). Rats, as urban pests, can use the dried insects and arthropoda because they are rich in protein as a source of food. Since rats are in the faculty's labs and all the floors, they can be a threat to the insects' collection (Dehghani *et al.*, 2012c). The other pests of entomology museums are growth of fungi and yeast which can impose major damages. Therefore, using fungicides becomes important (Ahmad *et al.*, 2009; Moghadam *et al.*, 2010) of course, cool weather can reduce the damages of these microorganisms.

The amount of the damages incurred to the insects' collection in Kashan university of Medical Sciences labs was so huge that repellents and insecticides applied inside the collection boxes had lost their repellency and killing properties, boxes were in a warm place and the entomology experts had no supervision on the preservation situation of the collection boxes. It is recommended that the boxes are always kept closed and repellents or killing materials should be changed under the expert's supervision once in a while.

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