



## Two new species and one new record of larvae of the family Johnstonianidae (Acari: Prostigmata) from Iran with a key to species of the genus *Diplothrombium*

JAVAD NOEI<sup>1,3,4</sup>, ALIREZA SABOORI<sup>2</sup> & JALIL HAJIZADEH<sup>1</sup>

<sup>1</sup>Department of Plant Protection, Faculty of Agricultural Sciences, University of Guilan, P.O. Box 41635-1314, Rasht, Iran. E-mails: [noei.javad@birjand.ac.ir](mailto:noei.javad@birjand.ac.ir), [noei.javad@gmail.com](mailto:noei.javad@gmail.com), [hajizadeh@guilan.ac.ir](mailto:hajizadeh@guilan.ac.ir)

<sup>2</sup>Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran. E-mail: [saboori@ut.ac.ir](mailto:saboori@ut.ac.ir)

<sup>3</sup>Department of Plant Protection, Faculty of Agricultural Sciences, University of Birjand, Birjand, Iran

<sup>4</sup>Corresponding author

### Abstract

*Diplothrombium sahragardi* sp. nov. and *Diplothrombium ostovani* sp. nov. (Acari: Johnstonianidae) collected from soil samples (off host) in a forest near Asalem city (Iran) are described. Another species of this family *Johnstoniana parva* Wendt, Wohltmann, Eggers and Otto, 1994 is reported for the first time from Iran. A larva-based key to *Diplothrombium* is provided.

**Key words:** Trombidiformes, Parasitengona, *Diplothrombium*, *Johnstoniana*

### Introduction

The superfamily Trombiculoidea (Acari: Prostigmata) is a large and diverse group that includes seven families: Johnstonianidae Thor, 1935, Trombiculidae Ewing, 1929, Leeuwenhoekiidae Womersley, 1944, Walchiidae Ewing, 1946, Audyanidae Southcott, 1987, Neotrombidiidae Feider, 1955, and Trombellidae Thor, 1935 (Zhang *et al.* 2011). Welbourn (1991) placed the family Johnstonianidae in Trombiculoidea and recognized the subfamilies Johnstonianinae Thor, 1935 and Charadracarinae Newell, 1960 an arrangement that was not accepted by Wohltmann *et al.* (2004), who followed earlier authors in including the Johnstonianidae in the Trombidioidea. The systematic status of Johnstonianidae was discussed by Wohltmann *et al.* (2004). The subfamily Johnstonianinae comprises eight genera including *Centrotrombidium* Kramer, 1896, *Crossothrombium* Womersley, 1939, *Diplothrombium* Berlese, 1910, *Hirstithrombium* Oudemans (sensu Thor & Willmann 1947) 1940, *Johnstoniana* George, 1909, *Marcandreella* Feider, 1957, *Newellia* André, 1962, and *Paraplothrombium* Robaux, 1968 (Mağol & Wohltmann 2012). The genus *Diplothrombium* includes 16 species which among them nine species are based on larvae or adults and larvae (Mağol & Wohltmann 2012, 2013) as follows: *D. cascadenense* Newell, 1957, *D. monoense* Newell, 1957, *D. newelli* Robaux, 1977 from North America and *D. creticum* Wohltmann *et al.*, 2004, *D. longipalpe* (Berlese, 1887), *D. ludwinae* Haitlinger, 1993, *D. moldavicum* Feider, 1959, *D. rackae* Wohltmann *et al.*, 2004, and *D. zbigniewi* Haitlinger, 2001 from Europe (Newell 1957; Feider 1959; Robaux 1977; Haitlinger 1993, 2001; Wohltmann *et al.* 2004).

In this paper, the family Johnstonianidae is recorded for the first time from Iran and two new species of *Diplothrombium* from soil samples (off host) in a forest are described. In addition, *Johnstoniana parva* Wendt, Wohltmann, Eggers and Otto, 1994 is reported for the first time from Iran.

### Material and methods

Twenty specimens were extracted with a Berlese funnel, cleared in Nesbitt's fluid and mounted on a microscopic

## Acknowledgements

The project was partly supported by the Department of Plant Protection, College of Agricultural Sciences, University of Guilan, Rasht, Iran and partly from "Center of Excellence of Biological Control of Pests", the Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran which are greatly appreciated.

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