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Mites and ticks (Acari) in Shanxi Province, China: an annotated checklist

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Abstract

This paper reviews the research on mites and ticks in Shanxi Province before 1 January 2015. We provided a checklist of 189 species belonging to 4 orders—Ixodida: 24 species in 2 families and 9 genera; Mesostigmata: 74 species in 12 families and 34 genera; Sarcoptiformes: 17 species in 10 families and 14 genera and Trombidiformes: 74 species in 15 families and 47 genera. Information on the host/habitat and distribution is given for each species. Historical mistakes in records are corrected and the classification of the known species is updated.

Key words: Ixodida, Mesostigmata, Sarcoptiformes, Trombidiformes, checklist, China

Introduction

Shanxi Province (Fig. 1) is located on a plateau in North China, covering about 156,698 square kilometres (34°34′N to 40°43′N, 110°14′E to 114°34′E). It has a typical continental climate—21°C to 26°C in July and below 0°C in January. Morphological, biological and taxonomic research on Acari in the province remain in its early stage, especially in taxonomy. Many families have not even been touched. There are only 189 species, which is about 3.5% the number of species found in China.

Modern acarological research in Shanxi can be traced back to the 1950s when Chinese science started to develop. The early studies were focused on survey, diagnosis and taxonomy, and control of economically important pest mites and ticks. The first study on mites was conducted by Wang & Liu (1953) who reported the spider mite *Tetranychus urticae* (as *Tetranychus bimaculatus*) on cotton with notes on its distribution, biology and host association. The development of the study of ticks was mainly contributed by Huang (1979), Tian (1980; 1983;1987; 1988; 1989a, b, c), Wang *et al*. (1985), Guan & Tian (1990), Yang *et al*. (1997) and Liu *et al*. (2005), who published papers on survey, biology and seasonal population dynamics of various species. Studies on Mesostigmata mainly concerned the taxonomy of Gamasida, and were published by Teng & Pan (1964), Teng (1980), Tian (1984, 1989d), Tian & Gu (1991, 1992), Gu & Tian (1992), Zhang & Zhang (2000), Bai & Ma (2009, 2013, 2014) and Bai *et al*. (2012). Studies on Sarcoptiformes started in the late 1970s. The majority of the publications were about taxonomic investigation (Liu *et al*. 2009; Xie 2011; Xie & Yang 2011; Niedbała *et al*. 2012). Less than a dozen species within the cohort Astigmata were recorded (Institute of Zootechnics and Veterinary Science of Shanxi 1977; Shen 1984a; Zhang 1990; Shen 1992; Zhang *et al*. 1995; Liu *et al*. 1996; Liu *et al*.1997; Yang *et al*. 1997; Shi & Shi 2003; Wang *et al*. 2010; Shi 2011; Xie *et al*. 2012). Trombidiformes was the most studied order probably because of the economically important families such as Tetranychidae, Eriophyidae and Trombidiidae. More than half the publications of this order were focused on the taxonomy, biology, ecology and control of Tetranychidae (Wang & Liu 1953; Li 1960; Ma & Yuan 1975; Qian & Yuan 1980; Wang *et al*. 1981; Ma *et al*. 1984; Jing *et al*. 1992; Song *et al*. 1996; Cheng 1999; Cao *et al*. 2003a, b; Wang *et al*. 2003; Liu *et al*. 2004; Li *et al*. 2007; Shi *et al*. 2007). The second most studied family was Trombidiidae (Dong *et al*. 1991; Zhang *et al*. 1993, 1994, 1995, 1996, 1997). Other publications were mainly on Eriophyidae (Xue *et al*. 2009; Xie & Wang 2013), Stigmaeidae (Wang 1981a; Fan & Chen 2000), Tarsonemidae (Fan & Li 2014), Tenuipalpidae (Qian *et al*. 1980) and Trombiculidae (Tian *et al*. 1993; Wen *et al.* 1996; Zhang *et al.* 1999).

The state of knowledge of a few economically important groups has been reviewed. Tian listed 11 species of ticks (Tian 1980) and 41 gamasid mites in 19 genera and 7 families (Tian 1984). Wang *et al.* (2010) listed 18 species of mites in eight families. The most comprehensive list was made in 2010 in an internet database, Shanxi Natural Sci-Tech Resources Sharing Platform, which compiled 22 species of ticks and 80 species of mites (Institute of Agricultural Resources and Economics). To summarise the previous studies and set a foundation for the future researches we reviewed the published records and provide an annotated checklist based on the current classification system. We give corrections to the wrongly used scientific names and taxonomic system.