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Morphological abnormalities in mites of the genera *Zercon* and *Prozercon* (Acari: Gamasina) collected near caves: preliminary results

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Abstract: Eleven mites of the genera *Zercon* C. L. Koch, 1836 and *Prozercon* Sellnick, 1943 with various morphological deviations (changes in chaetotaxy) are described. The mites were collected from the natural environment, near limestone caves in the Kraków-Częstochowa Upland (Wyżyna Krakowsko–Częstochowska) in southern Poland.

Keywords: anomaly, chaetotaxy, *Zercon*, *Prozercon*

INTRODUCTION

Morphological abnormalities in various mites and tickshave been observed under laboratory and natural conditions. They concern various anomalies (Kharadov 2002), e.g. variation in the arrangement and number of setae, irregular shield shape, or leg atrophy. These abnormalities may concern the whole mite body (general anomalies) or particular organs (local anomalies) (Żukowski 1962; Kiełczewski & Wiśniewski 1966, 1977, 1979, 1980; Siuda 1986; Buczek et al. 1991; Buczek 1994, 2004; Skorupski 1995; Solarz 1996; Gwiazdowicz 2000; Madej et al. 2004; Adamski et al. 2008; Głowska & Skoracki 2009).

In most mite taxa, patterns of chaetotaxy are an important tool in identification at the species level, and therefore considerable deviations in chaetotaxy may potentially lead to wrong conclusions regarding species characteristics and classification. Presence vs. absence and number of setae can be used to compare species. The knowledge of various kinds of anomalies may help during faunistic and taxonomical studies, so any materials about changes in morphology are worthy of publication (Skorupski 1995).

In the present report we describe morphological anomalies involving chaetotaxy in zerconid mites collected in the natural environment.

MATERIALS AND METHODS

Acarological investigations were carried out between 26 April and 18 June 2008 in 4 representative plots in the Kraków–Częstochowa Upland (Wyżyna Krakowsko-Częstochowska) in southern Poland: 3 plots in beech forest on a calcareous hill in the Jaroszowiec village and a plot in Sokole Góry Nature Reserve near Olsztyn in Jurassic Landscape Parks. The plots were situated in front of 4 caves: pod Porzeczką (Under a Currant Cave), Lodowa (Ice Cave), Schronisko koło Jaskini Lodowej (Shelter Cave near Ice Cave) and Jaskinia pod Sokolą Górą. The forest in the immediate vicinity ofthe caves was dominated by beech. In total, 65 soil samples were taken randomly but always at a distance of 1 m from the cave entrances. Humidity may be lower there than in the cave interior, partly because ambient humidity is usually lower, and partly because the cave temperature differs from ambient temperature (Sullivan & Moore 1978).

Extraction in Tullgren funnels lasted 7 days. Mites were collected in 70% ethanol and mounted on slides in Faure's liquid. All specimens were identified using the key of Błaszak (1974).The idiosomal and ventral chaetotaxy nomenclature follows Błaszak (1974).

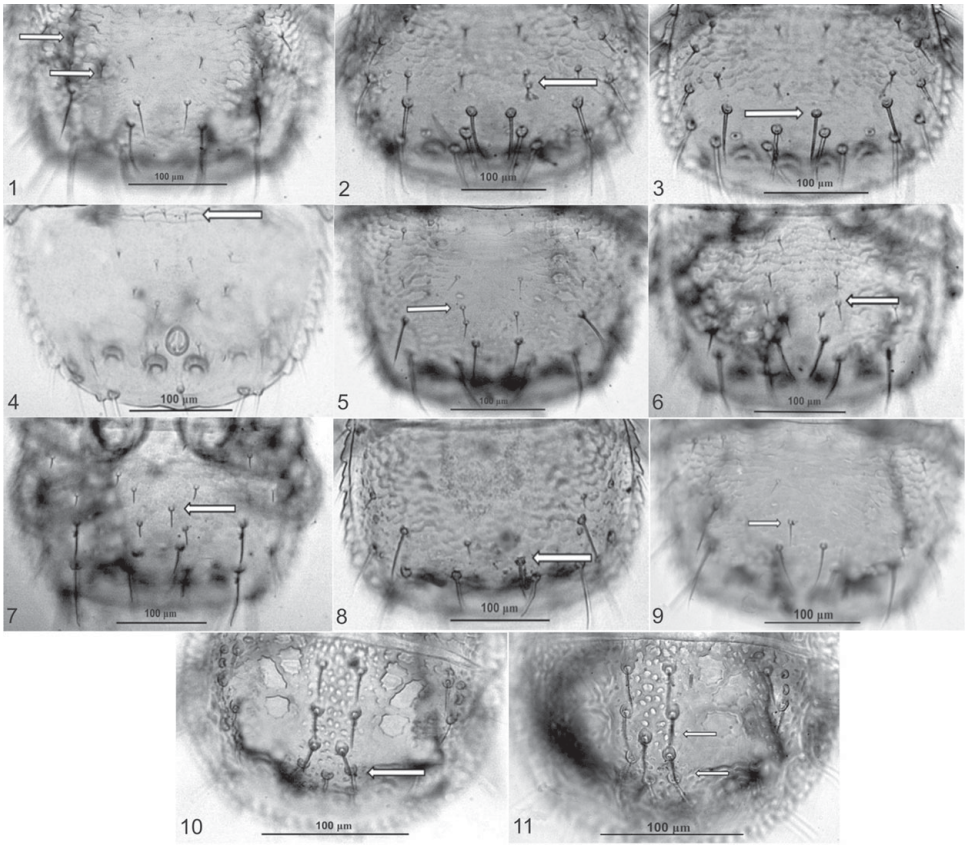
RESULTS

During faunistic investigations on mesostigmatid mites in Jurassic Landscape Parks, 1151 specimens of the family Zerconidae were collected, and 51 of them (4.44%) had various anomalies of chaetotaxy. In this preliminary report we describe only 11 mites of the genera *Zercon* C. L. Koch, 1836 and *Prozercon* Sellnick, 1943. Such changes were recorded in 4 females of *Z. triangularis* C. L. Koch, 1839, 4 females of *Z. peltatus peltatus* C. L. Koch, 1836, a female of *Z. fageticola* Halašková, 1969, and 2 females of *P. fimbriatus* (C. L. Koch, 1839). Differences in setal arrangement occurred between the right and left side of the same individual, resulting in asymmetry. Both additional and missing setae were observed. Figs. 1–11 present various asymmetric arrangements of idiosomal and ventral setae.

DISSCUSSION

Mites of the family Zerconidae belong to one of the best-studied mite groups of the order Mesostigmata in Poland (Błaszak 1974). Anomalies of setal arrangement were observed in this mite group also earlier. Previously recorded abnormalities concerned initially other mesostigmatid mites, mainly Digamasellidae (Kiełczewski&Wiśniewski 1966, 1977, 1979; Gwiazdowicz 2000). Similar anomalous chaetotaxy in zerconid mites has been previously described for *Zercon curiosus* and *Zercon* sp. (Skorupski 1995; Gwiazdowicz 2000).

Many authors have described abnormalities in mites, although most reports stated that mite deformations occur at relatively low frequencies in nature (Solarz 1995). The influence of habitat on morphology is particularly important for mites. Within the carst cave system there are several zones differing in habitat use and char-



Figs. 1–11. Morphological abnormalities of zerconic mites. *Zercon triangularis* C.L Koch, 1839: (1) additional setae in row Z and between Z and I; (2) row I with 2 additional setae; (3) single seta I3; (4) single seta Vi1. *Zercon peltatus peltatus* C. L. Koch, 1836: (5)row I with an additional seta; (6) row I with additional setae; (7) row I with additional setae; (8) single seta I4. (9)*Zercon fagetico-la* Halaškova, 1969, single seta I3. (10–11) *Prozercon fimbriatus* (C. L. Koch, 1839), an additional seta between setae in row I; single seta I4–I4 is typical of larvae

acteristics. The "entrance zone" is located immediately around the cave entrance and is most influenced by surface conditions. Differences in temperature and humidity make cave entrances discrete from the surface (Sullivan & Moore 1978). In this case, variability of these environmental factors appears to be the main cause of the development of morphological changes in zerconid mites. Głowska and Skoracki (2009) assume that one of the main causes of high variability of chaetotaxy in *Toro-troglamerulae* may be random environmental stresses.

Only a few studies have tried to quantify the number of anomalies as a possible indicator of pollution exposure (Solarz 1995; Tappio & Penttinen 2009). Tappio and Penttinen (2009) report that leg deformities of oribatid mites are a good indicator of spatial variation in soil pH.

The occurrence of such high numbers of morphological anomalies in adult zerconid mites is surprising, and we suggest future studies focus on elucidating its causes within this forested landscape.

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