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Malformations in pseudoscorpions

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The purpose of this review is to enumerate and analyze all malformations in pseudoscorpions, known to date, and to evaluate their relative frequency and common occurrence, as well as the probable factors affecting their development and distribution.

Carapacal anomalies. Such anomalies are exceedingly rare in pseudoscorpions, these have been recorded only in *Neobisium carpaticum* Beier, *N. aff. fuscimanum* (C. L. Koch) (Neobisiidae) and in *Allochernes wideri* (C. L. Koch) (Chernetidae).

Abdominal anomalies. Sclerite aberrations are quite common in pseudoscorpions, these have been noted in 37 species and 17 genera, pertaining to Chthoniidae, Neobisiidae, Atemnidae, Garypidae, Olpiidae, Cheliferidae, and Chernetidae. The majority of different malformations are confined to adults, and they occur in 0,09–8,33% of the sample studied, depending on the instar, species, and locality. Altogether, 21 types of different sclerite anomalies were noted.

Cheliceral anomalies. Malformations of different cheliceral structures have been recorded in 10 species and 4 genera of the Neobisiidae, and in one species of the Cheliferidae. These affect mostly the structures of the flagellum, the number and position of the galeal setae, and the form and structure of the cheliceral fingers.

Pedipalpal anomalies. These aberrations have been reported in 11 species and three genera of the Neobisiidae, in 3 species and 3 genera of the Cheliferidae, in one species and genus of the Atemnidae, and in one species and genus of the Chernetidae. They are classified into several groups: size reduction of several pedipalpal podomeres, size reduction of the fixed or movable chelal fingers (or both), changes in the trichobothrial pattern, changes in chelal dentition, and fusion of some pedipalpal and pedal articles. The frequency of different anomalies varies from 0,005–0,47% of the wild populations.

Pedal anomalies. Abnormities of walking legs have been found in seven species and three genera of the Neobisiidae, and in two species and two genera of the Cheliferidae. Several types of anomalies affect the walking legs: the occurence of a false ("secondary") joint, the reduced size of pedal podomeres, the disturbed setation (and trichobothriotaxy), the changes in the form and structure of pedal articles, the omission of one or more podomeres, and the occurence of a supernumerary podomere.

Nematode-induced malformations. Records of nematode parasites of pseudoscorpions are rare and include findings of mermithids and other nematodes in four species and two genera of the Chthoniidae and in eight species and three genera of the Neobisiidae.

Teratological phenomena in pseudoscorpions, although not entirely restricted to individuals undergoing the maturation moult, occur most commonly at that time. However, it is supposed that some physical and chemical factors may also provoke a number of teratologies. Additionally, a slight disruption in the neurosecretory and endocrine system could also lead to localized abnormalities. However, the majority of malformations in pseudoscorpions are probably caused by the generic and other developmental factors affecting the early phases of the organogenesis.