

Teratology of abdominal tergites
and sternites in
Neobisium carpaticum Beier
(Neobisiidae, Pseudoscorpiones)

by B. P. M. CURCIC and R. N. DIMITRIJEVIC *

Résumé

Une étude a été faite de la variabilité accidentelle et tératologique de la structure des sclérites abdominaux dans le développement des différents stades postembryonnaires de l'espèce *Neobisium carpaticum* BEIER (Pseudoscorpiones, Neobisiidae).

Introduction

Within the pseudoscorpion family Neobisiidae, anomalies of abdominal tergites and sternites have been registered to date for the following species: *Neobisium erythroductylum* (L. KOCH 1873), *N. maritimum* (LEACH, 1817), *N. muscorum* (LEACH 1817), *N. carpaticum* BEIER 1934, *N. sylvaticum* (C. L. KOCH 1835), *N. cephalonicum* (DADAY 1888), *N. fuscimanum* C. L. KOCH 1843, *N. macroductylum* (DADAY 1888), and *Roncus lubricus* L. KOCH 1873 (PEDDER 965; CURCIC & DIMITRIJEVIC 1982, 1983, 1984, 1985; CURCIC & al.; 1981, 1983).

In this paper we aim firstly (i) to express qualitatively and quantitatively the phenomenon of accidental and teratological variation in the structure of the abdominal sclerites in the species *N. carpaticum* (ii) to analyse the frequency of certain aberrations depending on the particular developmental stage, and (iii) to analyse the possible factors affecting the origin and genesis of different abnormalities in the abdominal sclerites (tergites and sternites).

Materials and methods

A total of 4,629 specimens of *N. carpaticum* from Topcider park, near Belgrade (2,102 males, 1,212 females, 935 tritonymphs, 310 deutonymphs, and 70 protonymphs), and 831

* Institute of Zoology, Faculty of Science, University of Beograd, Studentski trg 16, 11000 Beograd, Yugoslavia

specimens of the same species from Mt. Avala, near Belgrade, Yugoslavia (467 males, 98 females, 207 tritonymphs, 43 deutonymphs, and 16 protonymphs) were examined.

Specimens of *N. carpaticum* were collected by sieving leaf-litter of mixed oak and beech forest over a period extending from March 1982 to March 1983.

The nomenclature for anomalies of the abdominal sclerites in insects made by BALAZUC (1948) was used in this paper.

Results and discussion

A total of 65 abnormal specimens were found in Topcider Park (39 males, 18 females, and 8 tritonymphs), and some additional 19 abnormal Pseudoscorpions were found at Mt. Avala (11 males, 3 females, and 5 tritonymphs). The result of the analysis of teratological variability in the structure of the abdominal sclerites of this pseudoscorpion species are as follows:

In *N. carpaticum*, tergal and sternal abnormalities have been found in 1.40 p.c. (Topcider Park) to 2.16 p.c. (Mt. Avala) of the population sample studied; in males, abnormalities have been in 1.85 p.c. (Topcider Park) to 2.35 p.c. (Mt. Avala) of the males studied; in females, in 1.48 p.c. (Topcider Park) to 2.04 p.c. (Mt. Avala); in tritonymphs, in 0.85 p.c. (Topcider Park) to 2.41 p.c. (Mt. Avala) of the tritonymphs studied. In deutonymphs and protonymphs, no abdominal deficiencies were noted at all.

The following aberrations have been observed: atrophy, sclerite enlargement, symphysomery, helicomery, as well as different combinations of these anomalies.

In males, the most frequent aberration is tergite atrophy (observed in 41.67 - 51.29 p.c. of the aberrant males), symphysomery and sclerite enlargement being significantly less frequent (33.33 - 50.00 p.c. and 8.33 - 15.38 p.c. respectively). In females, tergite atrophy and symphysomery are the most frequent deficiencies, while other abnormalities have not been observed at all.

Tritonymphs are characterised by a high percentage of tergal atrophy (50.00 - 80.00 p.c. of the aberrant tritonymphs), and by less frequent phenomena of tergite enlargement (20.00 - 25.00 p.c.) and symphysomery (0.00 - 12.50 p.c. of the aberrant tritonymphs).

Sternal anomalies are represented by symphysomery and atrophy (Topcider Park), and by atrophy, symphysomery, sternite enlargement and helicomery (Mt. Avala). It is pertinent to note that sternal anomalies have been noted in males (Topcider Park) and in females only (Mt. Avala).

In males (Topcider Park), sternal atrophy is present in 71.43 p.c. of all sternal aberrations and symphysomery in 28.57 p.c. of the seven pseudoscorpion specimens with sternal anomalies. In females (Mt. Avala), all the above-mentioned sternite abnormalities are noted each in 25 p.c. of the two abnormal specimens studied.

It is evident that the tergal abnormalities (noted in 75 specimens) are much more frequent than those affecting the sternites (9 specimens only).

The fact that the highest percentage of abdominal aberrations have been found in the male specimens (58.2 p.c. of all abnormal specimens) lend support to the view proposed by CURCIC et al. (1983) of the (male) sex-linked nature of the origin of abdominal

deficiencies, which will require further study.

In most cases, symphysomery (in both tritonymphs and adults) is limited to the central and posterior part of the abdomen. Sclerite atrophy was found primarily either on the anterior or posterior part of the abdomen. A direct correlation with the relative position of the atrophied sclerite is the appearance of the sclerite enlargement, which was also observed on either the front or posterior region of the abdomen. The rare cases of helicemery were restricted to the posterior part of the abdomen of *N. carpaticum*.

On the basis of the material analysed it is clear that the majority of abdominal anomalies occur during the transformation of tritonymphs into adults, fewer during the moulting of deutonymphs into tritonymphs. It seems probable that the main cause of most of the observed aberrations is a disturbance in the metamorphosis, i. e. some malfunction in the hormonal system. Furthermore, a certain number of anomalies may have developed as a result of some mechanical damage at an earlier stage of the postembryogenesis, the injury (damage) sustained until the adult stage.

One more item is worth mentioning. It has been noted that a fairly larger number of abnormal specimens were discovered at Mt. Avala, where the soil and humus are under extremely negative anthropogenic influence, unlike Topcider Park; it is therefore possible that the pollution of the milieu has a certain effect on the appearance of some anomalies in this case, particularly in the structure of the abdominal sclerite.

Bibliographie

- BALAZUC, J., 1948. - La tératologie des Coléoptères et expériences de transplantation sur *Tenebrio molitor* L. *Mus. Hist. Nat. Paris* 25: 1-293.
- CURCIC, B. P. M., 1977. - Uopredno-morfoloska obelzja - njihov znacaj i primena u klasifikaciji taksona porodice Neobisiidae (Pseudoscorpiones, Arachnida), Ph. D. Thesis, Belgrade University, 1-186.
- CURCIC, B. P. M., 1980. - Accidental and teratological changes in the family Neobisiidae (Pseudoscorpiones, Arachnida). *Bull. Br. arachnol. Soc.* 5: 9-15
- CURCIC, B. P. M., 1982. - Postembryonic development in the Neobisiidae (Pseudoscorpiones, Arachnida). *Monogr., DXLV, Serb. Acad. Sci. Arts, Belgrade* 56: 1-90.
- CURCIC, B. P. M. & R. N. DIMITRIJEVIC, 1982. - On abnormalities of abdominal segmentation in *Neobisium carpaticum* BEIER Neobisiidae, Pseudoscorpiones, Arachnida). *Revue arachnologique* 4: 143-150.
- CURCIC, B. P. M. & R. N. DIMITRIJEVIC, 1983. - Three more examples of abnormal segmentation of the abdomen in *Neobisium carpaticum* BEIER, 1934 (Arachnida: Pseudoscorpiones : Neobisiidae). *Proc. entomol. Soc. Washington* 85:363-365.
- CURCIC, B. P. M. & R. N. DIMITRIJEVIC, 1984. - Two more examples of sternal anomaly in *Neobisium carpaticum* BEIER and *Roncus lubricus* L. KOCH (Pseudoscorpiones, Arachnida). *Proc. X SIEEC, Budapest*: 283-285.
- CURCIC, B. P. M. & R. N. DIMITRIJEVIC, 1984. - An abnormal carapaco-abdominal junction in *Neobisium carpaticum* BEIER, 1934 (Neobisiidae, Pseudoscorpiones). *Arch.*

- sci. biol. Belgrade* 36: 9-10.
- CURCIC, B. P. M. & R. N. DIMITRIJEVIC, 1985. - Abdominal deficiencies in four species of the Neobisiidae (Pseudoscorpiones, Arachnida). *Revue arachnologique* 6: 91-98.
- CURCIC, B. P. M. & M. D. KRUNIC & M. M. BRAJKOVIC, 1981. - Further records of teratological changes in the Neobisiidae (Arachnida, Pseudoscorpiones). *Bull. Br. arachnol. Soc.* 5: 280-284.
- CURCIC, B. P. M., M. D., KRUNIC & M. M. BRAJKOVIC, 1983. - Tergal and sternal anomalies in *Neobisium* CHAMBERLIN, (Neobisiidae, Pseudoscorpiones, Arachnida). *J. Arachnol.* 11: 243-250.
- DIMITRIJEVIC, R. N., 1985. - Patomorfoloska analiza promena u segmentaciji abdomena kod nekih predstavnika porodice Neobisiidae (Pseudoscorpiones, Arachnida). M. S. Thesis, Belgrade University, 1-72.
- PEDDER, I. J., 1965. - Abnormal segmentation of the abdomen in six species of British pseudoscorpiones. *Entomol. (Lond.)* 98: 108-112.

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