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ON SOME MORPHOLOGICAL ANOMALIES IN *EUPOLYBOTHRUS TRANSSYLVANICUS* (LATZEL, 1882) (CHILOPODA: LITHOBIOMORPHA).

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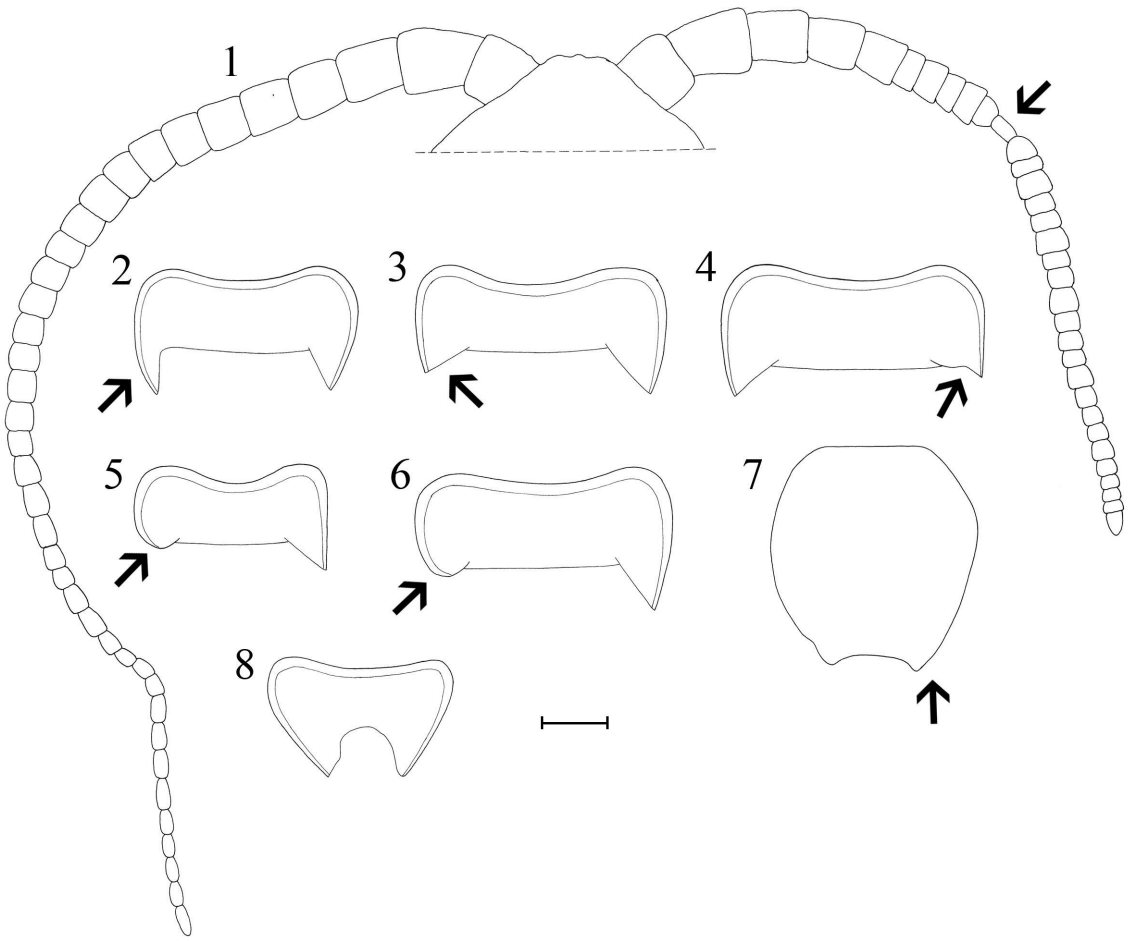
"Normal pattern" is a construct made after noticing a phenomenon occurring repeatedly in approximately the same way. Great deviations from the so-called "normal pattern" are termed abnormalities. Abnormalities can be intuitively viewed as very extreme values or "outliers" on a frequency-class plot (Ć u r č i ć et al., 2006). They can be related to genetic events such as gene mutations or chromosomal aneuploidies and translocations (malformations), as well as to exogenous factors such as certain chemicals, viruses, radiation, and hyperthermia (disruptions) (G i l b e r t, 2003).

When abnormalities affect structures of taxonomic importance, problems can arise in deciding whether the structures represent a character of taxonomic value. Usually, a thorough inspection of additional characters of the specimen, especially if malformation or disruption occurs in one member of paired



Figs. 1-8. Antennal and tergal anomalies in *Eupolybothrus transsylvanicus* (Latzel, 1882) from Košutnjak, Belgrade. Scale line = 1.00 mm.

structures, and a good acquaintance with the group under study are very useful for decision-making (Ćurčić et al., 2006).

Various abnormalities of body structure have been registered to date in natural populations of some centipede species (Balazuc and Schubart, 1962; Minelli and Pasqual, 1986; Ruiz, 1995; Santibańez and Ruiz, 1996; Kettle *et al*., 1999, 2000; Leśniewska, 2004). These abnormalities can be relegated to one of the following types: schistomely, "spiral segmentation" (= hélicomerie after Balazuc and Schubart, 1962), homeotic mutations of coxal glands, maxillae and gonopods, defective development of tergites, gynandromorphism and "double monster" (Minelli and Pasqual, 1986). The most frequently noted morphological anomalies in centipedes are schistomely and "spiral segmentation".

The centipedes analyzed in this study were collected by hand under stones or bark in a mixed oak forest in Košutnjak (Belgrade) during the period from April to October, 2002. The number of investigated specimens was 1128 (588 adults and 540 sub-adults). In this paper we describe eight specimens of *Eupolybothrus transsylvanicus* (Latzel, 1882) with morphological anomalies that represent 0.71% of all analyzed specimens. These eight specimens showed defective development of the right antenna and certain tergites. The discovery of these specimens was earlier briefly reported without detailed morphological analysis by Mitić (2005).

All specimens with morphological anomalies were dissected and mounted on microscope slides in gum-chloral medium (Swan's fluid). The observed deformations of antennae and tergites are presented in Figs. 1-8. These illustrations were drawn using a binocular microscope with objective magnification of 32x and with the aid of a demonstration screen. The remaining centipede material is preserved in 70% ethanol and housed in the collection of the Institute of Zoology, Faculty of Biology, University of Belgrade, Belgrade.

Previously described antenna deformations in centipedes mainly involve changes in length or number of segments and most often occur after damage and subsequent regeneration (Ruiz, 1995; Santibańez and Ruiz, 1996). Up to now, antenna branching (bifurcation) was found only in the geophilomorph species *Stigmatogaster subterraneus* (Shaw, 1794) (Leśniewska, 2004).

In a single female of *E. transsylvanicus* from Košutnjak, the right antenna was completely deformed and consisted of 33 segments. The morphological anomaly occurred distal to the basal five segments. Antennomeres VI-X were shorter, while antennomeres XII-XXXIII were wider than properly built segments; antennomere XI looked like a normal distal segment. The left antenna was normal and made of 39 antennomeres (Fig. 1). Antennomere number has taxonomic significance in lithobiomorphs (Lewis, 2000). In adult males and females of *E. transsylvanicus* from Košutnjak, the antennomere number varies from 39 to 46 (mainly between 41 and 43) (Mitić, 2005).

In natural populations of *E. transsylvanicus* from Košutnjak, morphological anomalies on tergites are more frequent than those occurring on antennae. In a single female of the analyzed species, the left triangular projection of T. (= tergite) 13 was slightly narrower than the normal right one (Fig. 2). Another case of abnormal tergite structure was recorded in an adult female with the left projection of T.9 shorter than the normal right one (Fig. 3). A similar phenomenon was recorded in another female having the right triangular projection of T.11 quite shorter than the left one (Fig. 4).

In a juvenile male and an adult female of this species, the right projections of T.11 (T.13) were more or less normal (Figs. 5-6). However, both left projections were vestigial, represented by small rounded caudo-lateral lobes. In a single female of *E. transsylvanicus*, the left half of T.13 was normal while the right tergal half possessed a more or less normal anterior margin (Fig. 7). Its lateral margin expanded outwardly toward the posterior edge; consequently, the right projection was elongated in comparison to the normal left one. Finally, abnormal shape and a smaller posterior border of T.13 were recorded in another adult female (Fig. 8).

To summarize, each centipede species possesses a specific body pattern. Species-specific distribution of different body structures produces a set of "normal" phenotypes. Morphological anomalies give rise to changes in the normal pattern. If individuals with absence, duplication or migration of some body structures attain elevated frequencies within natural populations (for instance, if more than 1% of specimens exhibit such phenotypes), this could be a manifestation of intraspecific polymorphism (Ćurčić et al., 2006). Elevated frequencies of deviations from the "normal" pattern could then be ascribed to certain environmental events or significant changes in the population structure of the species such as a population bottleneck, where inbreeding depression and genetic drift can be major factors in promoting such deviations.

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