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A peculiar case of intraspecific variability in the Chinese *Notholca dongtingensis* (Rotifera: Monogononta: Brachionidae)

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Abstract

We review the rare Chinese rotifer *Notholca dongtingensis* Zhuge, Kutikova & Sudzuki, 1998, including abundant material collected during the winter months of 2009–2011 in and around the man-made Dishui Lake Southeast of Shanghai, PR China. Both an SEM study of its trophi and an account of its intraspecific variability are provided. The latter consists in particular of a unique and previously unknown type of spine formation involving the anterolateral spines, a character previously considered morphologically constant and even diagnostic in *Notholca* and related genera. The observations indicate that phenotypic plasticity invoked by a plesiomorphic triggering mechanism is not *per se* connected to the type or position of structures developed, but may activate responses resulting in the formation of quite different, autapomorphic structures throughout monogonont Rotifera.

Key words: phenotypic plasticity, morphology, taxonomy, China

Introduction

Polymorphism is a well-documented phenomenon in rotifers. Wallace *et al.* (2006) recognize cyclomorphosis, dietary-induced polymorphism, predator-induced polymorphism, morphological variation in resting egg hatchlings and several additional cases of phenotypic variation as possible classes of polymorphism. The studies of Gilbert (1966; 1967) on predator-induced polymorphism involving formation of defensive spines on the stiff body wall (lorica) in *Brachionus* in particular have contributed significantly to our understanding of variation in rotifers. Recent studies (Gilbert 2009; 2011a) have further demonstrated that the phenotypic response to different environmental clues can be highly specific in *Keratella*, and concern both the caudal and, to a lesser extent, anterior spines. The prevalence of polymorphism has obfuscated rotifer taxonomy to a large extent. This is in particular the case in Brachionidae, in which examples of different classes of polymorphism abound. This certainly holds for the brachionid genus *Notholca*, of which several authors (e.g., Björklund 1972; Koste & Shiel 1987; Kutikova 1980; Pejler 1977; Ruttner-Kolisko 1974) have lamented that morphological variation is so extraordinarily great that the taxonomy of its members is hopelessly confused and chaotic.

In an attempt to address the unsatisfactory taxonomy of *Notholca*, Wallace & Colburn (1989) produced a cladistic and Nogrady & Wallace (1995), a numerical analysis of taxa within the genus. Both contributed a number of intriguing conclusions but cautioned that we are far from understanding the relevance of features, and taxonomy in general, of the group. Genus *Notholca* is peculiar amongst Brachionidae by the diversity of spines it exhibits: in addition to antero-dorsal spines, of which there can be four or six, there are middorsal (*N. cornuta* Carlin, 1943), movable (e.g., *Notholca bipalium* (Müller, 1786)) or fixed midlateral (e.g., *Notholca jasnitskii* Tikhomirov, 1927) spines and variably shaped posterior caudal processes. In *Brachionus* and *Keratella*, two closely related genera in Brachionidae, environmentally induced phenotypic plasticity has been demonstrated to cause certain spines to be completely absent or present. In *Notholca*, however, variability of lorica spines is considered fairly low, while phenotypic plasticity influencing overall body size, and size and shape of the caudal process has been hypothesized (Björklund 1972; Nogrady & Wallace 1995).