



How features of the hinge plate aid in discriminating among three *Yoldiella* (Pelecypoda, Protobranchia) species from the Campos Basin, Brazil

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Abstract

Subjectivity is a common problem in most taxonomic studies that deal with gradual changes in shape. An example is the systematics of the genus *Yoldiella*, which has been a matter of debate for over 40 years. However, hinge plate features have never been examined as a significant diagnostic feature in descriptions of *Yoldiella* species. We tested how hinge plate characters perform in discriminating among three species of this genus from the Campos Basin, Brazil. We tested the efficacy of traditional shell shape features alone, and contrasted this with a general analysis that included the hinge plate features; and also with an analysis based solely on the hinge plate. Some information on the hinge plate is used here for the first time, such as the distance between the highest teeth to the umbo and the distance between the highest teeth to the margin. The hinge plate analysis and a general analysis, including both shell shape and hinge plate variables, were more effective (87.5% of cases assigned correctly) than the analysis that included only shell shape variables (73.3% cases assigned correctly). The variables related to the highest teeth and the width of the hinge teeth stood out as major contributors in discriminating among these three species.

Key words: Deep-sea, Yoldiidae, morphometry

Introduction

The systematics of the genus *Yoldiella* has been a focus of intense debate for the past 40 years (Knudsen 1970; Warén 1978; Warén 1989; Allen *et al.* 1995; Ockelmann and Warén 1998; La Perna 2004; La Perna 2008; Killeen and Turner 2009; Benaïm and Absalão 2011). Problems of subjectivity among taxonomists in the perception of what constitutes a species, what are the most informative diagnostic features, has led to many uncertainties that account for much of the problem in the identification and description of the species of *Yoldiella* Verrill & Bush, 1897.

In spite of the undoubted importance of conchological traits for taxonomy, not uncommonly, traditional definitions are based only on shell outlines and fail to establish clear boundaries among different taxa, even at the genus level (Benaïm 2010, in thesis).

The hinge plate is a conchological feature that is traditionally used in general descriptions of species of *Yoldiella*. Still, most studies do not give proper emphasis to this feature, and use it only subjectively, by means of descriptors such as ‘thin’ or ‘thick’ (Kilburn 1994) and ‘weak’ or ‘strong’ (Allen *et al.* 1995). In an exception, Warén (1989) used it to distinguish between *Yoldiella* and *Ledella*, and among some species of *Yoldiella*, in a more objective way: “Length of hinge less/more than 0.63”, and when discriminating between *Y. nana* and *Y. solidula* Warén, 1989 “the thickness of the hinge is about 1/12 of the height of the shell in *Y. nana*, while in *solidula* the corresponding value is 1/18”.

Morphometrical analysis of the shell is a commonly used taxonomic tool in assessing local or regional conchological variations in mollusks (Branch and Marsh 1978; Lam and Calow 1988; Kilgour *et al.* 1990; Absalão and De Paula 2004; Absalão and Santos 2004; Caetano and Absalão 2005; Caetano *et al.* 2010). Many studies have focused on morphometric analyses to determine patterns in bivalve shells (Ubutaka 2003; Oliveira and Morales 2010), the relationship of shell form to life habits (Stanley 1970), to discriminate different populations (Rabarts and