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Article

On the Pterotrigoniidae (Bivalvia, Trigoniida): their biogeography, evolution, classification and relationships

Michael R. Cooper

With 7 figures

Abstract: Current interpretation of the predominantly Cretaceous trigoniid bivalve subfamily Pterotrigoniinae is reviewed. 238 species are analyzed and three lineages identified which evolved in parallel throughout the Late Tithonian–Maastrichtian and provide the basis for subfamilial discrimination. Evolutionary relationships are discussed. The subfamily Linotrigoniinae is reduced to a tribe within Pterotrigoniinae, and the tribe Scabrotrigoniini is elevated to subfamily rank to include its Early Cretaceous progenitors. These two subfamilies are the basis of the family Pterotrigoniidae, whose origin is inferred to lie in Megatrigoniidae close to *Anditrigonia*. The new subfamily Oistotrigoniinae is introduced for the third lineage which evolved in parallel with Pterotrigoniidae. It is cryptogenic, although an origin in Myophorellinae has been suggested. Among Pterotrigoniinae 95 species are assigned to 12 genera, 6 of which are new. Scabrotrigoniinae comprise 88 species assigned to 13 genera, 8 of which are new. Within Oistotrigoniinae n. subfam. 41 species are assigned to 6 genera, 5 of which are new.

Key words: Bivalvia, Trigoniida, Pterotrigoniidae, palaeobiogeography, phylogeny, classification, generic diagnoses, new taxa.

1. Introduction

For most of the last 250 years biological classification has been "… a scheme for arranging together those living objects which are most alike, and for separating those which are most unlike" (Darwin 1859: 372). However, Darwin (1859: 378) appreciated that, in order to be natural, "…the arrangement of the groups in each class … must be strictly genealogical". This guidance, a profound truism, has been overlooked by very many taxonomists who continue to group like with like (Linnean taxonomy).

Stated simply a natural classification is one which accurately replicates the evolutionary history of the group, not one air-brushed to satisfy the notions of the taxonomist concerned. The goal of Darwinian (phylogenetic) taxonomy therefore is to identify the branches of the evolutionary tree and to reproduce these in an appropriate classification. It is a search for evolutionary lineages, groups with "... propinquity of descent" (Darwin 1859: 372). Classifications not strictly rooted in genealogy are convenient fiction (Dawkins 2004; van Deemter 2010).

As currently perceived the genus *Pterotrigonia* comprises at least 181 species. The phylogenetic implication of this grouping is that every species is equally different from the next, and each evolved independently from the same common ancestor. However even a cursory analysis of the species involved shows this is not true; many are closer than others, and the finer details of the evolutionary tree have been obfuscated by taxonomic lumping.

Pterotrigoniid diversity is an indication of narrow environmental tolerance and evolutionary plasticity. Adapted to a relatively narrow tract of the littoral, and thus to similar environmental conditions, convergence is

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