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## Revision of Scissurellidae, Anatomidae and Fissurellidae (Gastropoda: Vetigastropoda) from the Plio-Pleistocene of the Philippines

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### Abstract

The taxonomy, paleo-ecology and biogeography of the highly diverse “Cabarruyan” fauna are explored further. Eight species of three vetigastropod families are discussed here, one of which is described as new: *Zeidora geigeri* nov. spec. The other seven species were previously described from Recent material and three of these are also known from other fossil deposits. Most of the species still occur around the Philippines today.

**Key words:** Fossil, new species, taxonomy, Indo-West Pacific, Cabarruyan

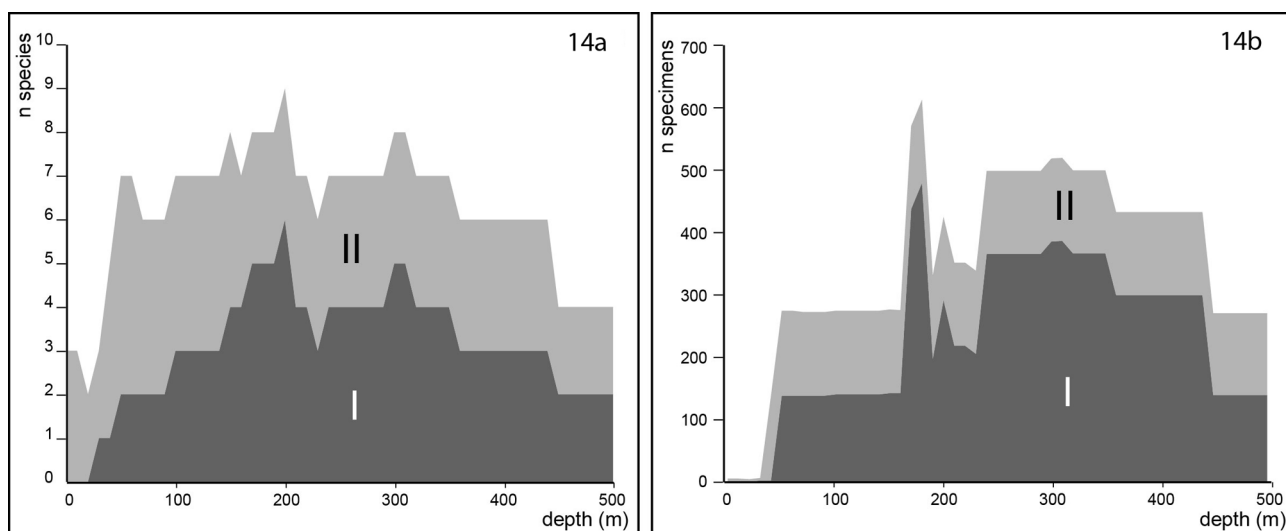
### Introduction

The Indo-West Pacific is well-known for its richness in marine biodiversity. The fossil record of this region can elucidate the antiquity of this marine hotspot and the context of its origin (Renema *et al.* 2008). The highly diverse “Cabarruyan” fauna from the Plio-Pleistocene of the Pangasinan province, the Philippines, is well suited to shed light on the diversification of the marine fauna of the area.

This paper continues the taxonomic investigation of the “Cabarruyan” fauna. The holoplanktonic gastropods (Pterotracheoidea, Janthinoidea, Thecosomata and Gymnosomata) of this fauna were previously treated in Janssen (2007) and the vetigastropod families Colloniidae, Seguenziidae, Calliotropidae, Calliostomatidae, Trochidae, Solariellidae and Turbinidae were covered in Helwerda *et al.* (2014). The Vetigastropoda are explored further here, focusing on Scissurellidae, Anatomidae and Fissurellidae.

The study of Scissurellidae and Anatomidae has been simplified greatly by the publication of the “Monograph of the little slit-shells” by Geiger (2012). The Fissurellidae have not been revised recently and large numbers of species from the Indo-Malayan Archipelago are not well-studied. They are also treated here, because they appear to be closely related to Anatomidae, whereas Scissurellidae and Anatomidae do not form a monophyletic group (Geiger & Thacker 2005; Kano 2008; Geiger 2012).

The shells of these families also share a couple of similarities: they have a slit, notch or hole and lack nacre. Scissurellidae are distributed from northern temperate waters to Antarctica in all oceans and they occur from the Jurassic to the Recent. Anatomidae are distributed from the Arctic to Antarctica throughout all oceans and they occur from the Paleocene to the Recent (Geiger 2012). Fissurellidae are also cosmopolitan and they have a long fossil record, they occur from the Triassic onwards (Aktipis *et al.* 2011). Scissurellidae are more abundant than Anatomidae in shallow water (< 75 m), whereas the reverse is true in deeper waters (Geiger 2012). This fits the idea that Scissurellidae prefer hard bottom and Anatomidae soft bottom substrates. Fissurellidae live exclusively on hard substrates and they occur from the intertidal zone to the abyssal plain, e.g. *Manganeosepta hessleri* McLean & Geiger, 1998 was found at 4500 m deep (McLean & Geiger 1998). Most of them feed on sponges and detritus, but some feed on algae or are carnivorous or foraminiferivorous (references in Aktipis *et al.* 2011). Feeding preferences of Scissurellidae and Anatomidae are not well known, but there are indications that they are micrograzers and that they feed on bacterial biofilms (Geiger 2012).



**FIGURE 14.** Cumulative depth ranges of species present in the studied fauna. ‘I’ refers to depth ranges of species discussed in Helwerda *et al.* (2014), ‘II’ refers to depth ranges of species discussed in the current paper. (a) Species-based cumulative depth ranges. (b) Specimen-based cumulative depth ranges.

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