



Early Pliocene Gastropods of Southern Pacific Coast of Mexico: Taxonomy and Paleogeography

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Abstract

Gastropods mollusk from Punta Maldonado Formation (Pliocene age) were collected and identified. The studied area is located in the Southern Pacific Coast of Mexico precisely in the Panamic Malacological Province. The taxonomy of the malacofauna are revised, the distribution in the Recent Age are analyzed and their precise location over time are recorded. Forty-nine species belonging to thirty-two genera are identified, from them three species: *Conasprella armiger* (Crosse, 1858), *Solenosteira cf. dalli* (Brown & Pilsbry, 1911) and *Crepidula convexa* Say, 1822 are part of the recent Caribbean Malacological Province while *Enaeta barnesii* (Gray, 1825) has not been previously registered for the Guerrero Coast. The distribution of the gastropods during the Pliocene shows the relics of the fauna before the closure of the Isthmus of Panama.

Keywords

Marine gastropods • Early pliocene • Pacific ocean
Punta Maldonado • Guerrero Mexico

1 Introduction

The patterns of the circulation between the Pacific Ocean and the Gulf of Mexico have been drastically modified during the Cenozoic Era and the current distribution of mollusc associations reflects these changes.

During the Pliocene, there was a reconfiguration of the ocean gateways. The formation of the Isthmus of Panama produced modern patterns of the oceanic Pacific and the Atlantic circulation. It was a pivotal event that was a turning

point in the pale circulatory model driving global oceanic reorganization. It influenced the biogeography of both marine and continental fauna [1].

The purpose of this paper is to communicate the presence of marine gastropods in the Pacific coast of Southern Mexico during the Early Pliocene age, their taxonomy and biogeography. This study contributes to the understanding of the conformation of the current malacological provinces. A province is a large and continuous portion of water in which the oceanographic parameters are sufficiently similar and because of which it is inhabited by specific mollusk species [2].

Shallow water mollusk associations are sensitive to many variables with a temperature being the most important for the purposes of regional analyses. The thermal gradients are the ones that fundamentally determine the disposition of the malacological provinces nowadays. The available evidence indicates that the same happened in the past [3].

Punta Maldonado Formation in Guerrero State is actually included in the “Panamic Province”. However, the hypothesis that is proposed is that during the Pliocene there were some remains of the “Caribbean Province”.

2 Materials and Methods

Punta Maldonado Formation is named for the nearest village. It is located in the southern part of Guerrero State in the Costa Chica Region, Guerrero State, Pacific coast of Mexico. Lithologically, it is composed of sandstone and siltstone with an early age of the Pliocene (Piazian) between 5.3 and 3.6 Ma [4]. Member VI contains abundant fossil remains including foraminifera, ostracoda, mollusks (gastropods, bivalves and scaphopodes), fish otoliths and fragments of vertebrates. Gastropods are so well preserved to the point that many of them retain some of their original coloration.

Gastropods mollusk were collected and identified. Their taxonomy was revised. Their classification is in agreement with Bouchet and Rocroi [5] and WoRMS [6].

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The distribution process in the Recent was analyzed. Their precise location over time was recorded.

3 Results

Forty-nine species belonging to thirty-two genera of marine gastropods are identified from the silty member of the Punta Maldonado Formation: *Amaea brunneopicta* (Dall, 1908), *A. ferminiana* (Dall, 1908), *Architectonica nobilis* Röding, 1798, *Calyptraea mamillaris* Broderip, 1834, *Cancellaria darwini* Petit, 1970, *C. gemmulata* G. B. Sowerby I, 1832, *C. indentata* G. B. Sowerby I, 1832, *C. jayana* Keen, 1958, *Carinodrillia hexagona* (Sowerby I, 1834), *C. duplicata* (Sowerby I, 1834), *Conasprella arcuata* (Broderip & G. B. Sowerby I, 1829), *C. armiger* (Crosse, 1858), *Conus fergusonii* P. B. Sowerby II, 1873, *Crepidula convexa* Say, 1822, *Crucibulum lignarium* (Broderip, 1834), *C. monticulus* Berry, 1969, *Distorsio deccusata* (Valenciennes, 1832), *Enaeta barnesii* (Gray, 1825), *Epleura muriciformis* (Broderip, 1833), *Fusinus* sp., *Glyphostoma thalassoma* Dall, 1908, *Grandiconus* sp., *Hindsiclava hertleini* Emerson & Radwin, 1969, *H. militaris* (Reeve, 1843), *Hipponix pilosus* (Deshayes, 1832), *Knefastia olivacea* (Sowerby I, 1834), *Knefastia* sp., *Lottia acutapex* (S. S. Berry, 1960), *Miraclothurella mendozana* Shasky, 1971, *Natica broderipiana* Récluz, 1844, *Oliva* sp., *Olivella volutella* (Lamarck, 1811), *Pristiterebra tuberculosa* (Hinds, 1844), *P. glauca* (Hinds, 1844), *Polinices intemeratus* (Philippi, 1853), *Polystira nobilis* (Hinds, 1843), *P. picta* (Reeve, 1843), *Solenosteira cf dalli* (Brown & Pilsbry, 1911), *Stramonita biserialis* (Blainville, 1832), *Strombina fusinoidea* Dall, 1916, *Strombinoturris crockeri* Hertlein & A. M. Strong, 1951, *Subcancilla attenuata* (Broderip, 1836), *Terebra armillata* Hinds, 1844, *T. elata* Hinds, 1844, *T. lucana* Dall, 1908, *Trajana perideris* (Dall, 1910), *Triplofusus princeps* (G. B. Sowerby I, 1825), *Turritella leucostoma* Valenciennes, 1832 and *T. radula* Kiener, 1843.

4 Discussion

Despite the planktonic dispersal of the mollusk larvae, the marine gastropods species exemplify the biogeographic differentiation that occurred on both sides of the Central American isthmus [7, 8]. From the species identified, three have not been recorded for the Recent Epoch in the Pacific Coast. *Conasprella armiger* (Crosse, 1858), *Solenosteira cf dalli* (Brown & Pilsbry, 1911) and *Crepidula convexa* Say, 1822 are considered as marine gastropods from the Atlantic Ocean. *C. convexa* is a native species of the North-American Atlantic coast, from Canada to Quintana Roo (México) [9].

The present distribution of *C. convexa* in the Pacific coast is because of the Oyster farming. The introduction and settlement of this species are closely related to the American oysters (*Crassostrea virginica*, Gmelin, 1791) farming since the 1940's [10]. In the recent, they have spread worldwide throughout the northern hemisphere while the distribution of *C. armiger* in the present is from Florida (USA) to Surinam [11]. In the case of *S. dalli*, it is a species reported from the Miocene of Panama (Gatun Formation) [12].

The presence of *Enaeta barnesii* (Gray, 1825) is also remarkable because although it belongs to the Panamic Malacological Province, it has not been registered for the Guerrero Coast during the Recent (Flores-Garza *com. pers.*)

5 Conclusion

Forty-nine species belonging to thirty-two genera of marine gastropods are identified from the silty member of the Punta Maldonado Formation, Guerrero State, Mexico.

During the Pliocene, the gastropod fossil assemblage present in the South Pacific coast of Mexico (Punta Maldonado, Guerrero) still show affinities with the Caribbean Malacological Province because of the presence of the species *Solenosteira cf dalli*, *Conasprella armiger* and *Crepidula convexa*. It is the result of the uncomplete closure of the Isthmus of Panama and the planktonic dispersion of the larvae.

Acknowledgements This study was supported by SEP-PROMEP Project "Aplicación de los moluscos (bivalvos y gasterópodos) del Neógeno (Plioceno) como proxies para cuantificar los efectos a mediano plazo del cambio climático en las zonas costeras en Guerrero, México". We want to thanks to Dr. Rafael Flores-Garza, UAEM, UAGro and Dra. Martha Reguero Reza, ICMYL, UNAM for their help with the taxonomy.

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