

***Iolaea amazonica* spec. nov., another pyramidellid (Gastropoda, Heterobranchia)
from the Miocene Pebas Formation of Western Amazonia (Peru)**

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Iolaea amazonica spec. nov. is described from the Miocene Pebas Formation of Peruvian Amazonia. This species adds to three other pyramidellids, two mesogastropod species and two bivalve species that represent (restricted) marginal marine intervals in the late Middle to early Late Miocene of Western Amazonia.

Key words: Gastropoda, Pyramidellidae, *Iolaea*, systematics, Miocene, Amazonia, Pebas Formation.

INTRODUCTION

The Miocene Pebas Formation of Western Amazonia contains a variety of endemic gastropods, bivalves and ostracodes (Nuttall, 1990; Wesselingh et al., 2002). High levels of endemism have hampered palaeosalinity estimates in the past (see e.g. Vonhof et al., 1998, 2003), but combined isotope and faunal evidence argues for predominantly freshwater conditions during deposition of the Pebas Formation (Wesselingh et al., 2002; Vonhof et al., 2003). In a few of the studied outcrops, however, evidence for marine influence was found in the form of Foraminifera (Hoorn, 1994), barnacles, bivalves and gastropods (Vonhof et al., 1998; Van Aartsen & Wesselingh, 2000; Vermeij & Wesselingh, 2002; Wesselingh et al., 2002). Of the gastropods, Van Aartsen & Wesselingh (2000) reported three species of pyramidellids, which they assigned to *Odostomia* Fleming, 1817. While processing additional samples, a fourth pyramidellid species was encountered, new to the Pebas fauna and new to science. That species is described in this article.

The second author collected the samples in the Peruvian department of Loreto during fieldwork in 1996. Co-ordinates are estimates from the maps (see Wesselingh et al., 2002, for details) and were found to be slightly inaccurate when compared with GPS co-ordinates. All samples are from the Pebas Formation, *Grimsdalea* interval zone (Hoorn, 1993), indicating a late Middle to early Late Miocene (late Serravallian to early Tortonian) age: Porvenir IV, Left bank (W-bank) Amazon River, 300 m N of the south end of the outcrop zone at the village of Porvenir (73°23'W, 4°14'S), sample 707 (6.ix.1996); Nuevo Horizonte II, road cutting (E-side) Iquitos-Nauta road, km 40, 200 m S of village (73°25'W, 4°05'S), sample 365 (16.ix.1996); Nuevo Horizonte III, road cutting (W-side) Iquitos-Nauta road, km 38, c. 2 km N of village (73°26'W, 4°02'S), sample 367a (16.ix.1996).

The shells are deposited the Division of Cainozoic Mollusca, Nationaal Natuurhistorisch Museum Naturalis, Leiden, The Netherlands (formerly Rijksmuseum van Geologie en Mineralogie), abbreviated RGM, and in the collections of the INGEMMET, San Borja, Lima, Peru. The number of specimens is indicated behind the bar.

Abbreviations used in shell descriptions: H, height; W, width; Hap, height of aperture.

SYSTEMATICS

Iolaea amazonica spec. nov. (figs 1-3)

Type material. – Holotype: Porvenir IV, level F707 (RGM 456800; fig. 1). Paratypes: type locality (RGM 456801/1 [fig. 2], RGM 456802/14; INGEMMET without number/1 [fig. 3]; Nuevo Horizonte II, level F365 (RGM 456803/1); Nuevo Horizonte III, level 367a (RGM 456804/2).

Diagnosis. – Shell nearly cylindrical, with four pronounced spiral ribs and conspicuously thickened, sinuate growthlines.

Description. – Shell with four teleoconch whorls. The embryonic whorls are intorted and cannot be detected at the apex. The teleoconch whorls increase only very slowly in size and are separated by a markedly incised suture. There are four spiral ribs of about equal strength which start immediately after the end of the embryonic whorls, which are smooth. The spirals are about as broad as the interspaces and both these as well as the ribs themselves are crossed by many thickened growthlines. These growthlines are not straight but have an inverted-S shape. At the base of the shell there are three more spirals.

The aperture is relatively small, its height is approximately 1/3 of the shell height. A sinus is located at the adapical side of the outer lip corresponding with the first spiral rib, which may be a little less strong than the other three. The outer lip is not much rounded and smooth inside. The columella has a pronounced tooth. There is no umbilicus but in younger shells a slight umbilical chink is present.

Because of the intorted embryonic whorls, the thickened, sinuate growthlines as well as a small but conspicuous tooth we place this new species in the genus *Iolaea* A. Adams, 1867.

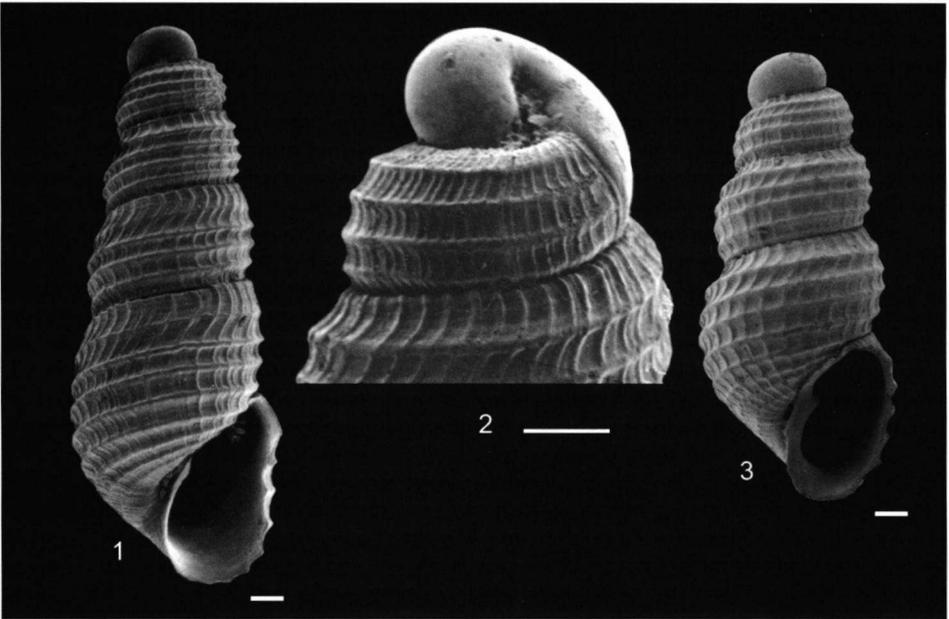
Dimensions. – Holotype (fig. 1): H 1.80 mm, W 0.65 mm, Hap 0.60 mm; INGEMMET n.n. (paratype, fig. 3): H 1.40 mm, W 0.63 mm, Hap 0.53 mm. Other paratypes: H 1.50-1.80 mm, W 0.55-0.65 mm.

Etymology. – Named after the Amazon.

Differentiation. – *Iolaea amazonica* spec. nov. does not resemble extant species known from the Pacific coast of America. The three species mentioned by Skoglund (1972: 122), viz. *I. amianta* (Dall & Bartsch, 1907), *I. delicatula* (Carpenter, 1864) and *I. eucosmia* (Dall & Bartsch, 1909), all are bigger and more conical. *Iolaea eucosmia* is the most slender of the three, but it is still less slender than *I. amazonica* spec. nov. and moreover has only three spiral ribs instead of four on the teleoconch whorls of the spire.

No species of *Iolaea* have been mentioned from the Caribbean coasts or the Atlantic coast of South America. Neither do authors working on fossil faunas, like Jung (1969) for the Pliocene of Trinidad or Weisbord (1962) for late cenozoic gastropods from Venezuela, mention any species which could be compared with *I. amazonica* spec. nov.

From the coasts of Suriname and Brazil, *Miralda robertsoni* is described by Van Regteren Altena (1975: 75, 76, fig. 30a, b). This species undoubtedly belongs to *Iolaea* and has a certain affinity with *Iolaea amazonica* spec. nov. It too shows a rather cylindrical shape but is relatively broader. However, it has only three spiral ribs and a less well developed tooth



Figs 1-3. *Iolaea amazonica* spec. nov., from Porvenir IV, Loreto, Peru, level F707. 1, RGM 456800 (holotype); 2, RGM 456801 (paratype); 3, INGEMMET (paratype). Scalebar 100 μ m.

on the columella.

Iolaea scitula (A. Adams, 1860), the type-species of *Iolaea*, was recently figured by Hori, in Okutani (2000: 729, pl. 363 fig. 165). Another Japanese species showing even more similarities to the new species, viz. *Iolaea neofelixoides* (Nomura, 1936), has been found in the East Mediterranean and is figured by Van Aartsen & Recevik (1998: 13, 14, fig. 4). This species is nearly twice as big as *Iolaea amazonica* spec. nov. and has only three spiral ribs, contrary to *Iolaea amazonica* spec. nov. which has four.

Remarks. – *Iolaea amazonica* spec. nov. has been encountered in samples containing a variety of Pebasian endemic cochliopine snail- and pachydontine bivalve species, but also other indicators of marine influence, such as *Odostomia nuttalli* van Aartsen & Wesselingh, 2000, *O. cotuhensis* Van Aartsen & Wesselingh, 2000, *O. spec.*, *Thais woodwardi* (Roxo, 1924), *Nassarius reductus* Vermeij & Wesselingh, 2002, *Panamicorbula* spec. and *Macoma* spec. (see Vonhof et al., 1998). These samples are all located within the *Grimsdalea* interval zone (Hoorn, 1993) indicating a late Early to early Late Miocene age (ca 10-12 Ma). These (peri) marine taxa have not been found in other intervals within the Pebas Formation.

ACKNOWLEDGEMENTS

We thank W. Renema (NNM, Leiden) for SEM photographs, and E. Gittenberger for critically reading the manuscript.

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