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IV  
**MARINE MIOCENE AND RELATED DEPOSITS  
OF NORTH COLOMBIA**

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## INTRODUCTION

The marine Eocene deposits of northern Colombia have already been described in earlier papers<sup>1</sup> and therefore require only general notice here. For the most part they occupy a broad synclinal area between the north coast of Colombia and the spurs of the northern Andes lying to the south. In the midst of this general syncline which extends for more than 160 miles, there are pronounced anticlinal folds extending parallel with its axis and also with the coast.

On the southern border of this syncline the Eocene rocks outcrop in an irregular zone following the contours of the pre-existing ranges and spurs, while upon its northern limb they outcrop in disconnected areas along the Caribbean coast from the west flank of the Sierra Nevada de Santa Marta to the Gulf of Urabá. A large area of these rocks, for example, lies west of the Rio Magdalena, extending north from Arjona nearly to the sea, and to the southwest for an unknown distance. The "Arjona group" mentioned in a former paper<sup>2</sup> occupies this area. Farther to the southwest other areas of Eocene are found in the Coloso range, in the Cerro de Cispatá near Lórica, in the Cerros de las Palomas, and in other districts about the head of the Rio Sinú.

Wherever they are found the Eocene rocks are highly folded and are traversed by faults. In some cases they are much compressed and distorted, but they are sufficiently fossil bearing for identification.

## POST-EOCENE SEQUENCE

The Eocene deposits of Colombia are for the most part, especially in the central areas of the syncline, overlaid by a sequence of strata of great thickness. In some places these later beds overlap the borders of the trough and along its coastal side flank it for many miles. While the succeeding divisions of this sequence are largely the result of reconnaissance, and only qualitative study can be claimed for them, yet it is believed that the more important series are properly distinguished, and their position in the column is undoubtedly

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<sup>1</sup>Anderson, F. M., *Proc. Calif. Acad. Sci.*, Vol. 17, 1928, pp. 1-29.

<sup>2</sup>Anderson, F. M., *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 10, 1926, p. 387.

19. *Conus tuberculata* Anderson, new species

Plate 9, figures 4, 5

Shell of medium size, probable height of holotype (incomplete) 54 mm., width 3.4 mm., spire high, concavely turritid, earlier whorls coronated; last two or three whorls smooth, but slightly excavated above; sides of older specimens smooth, in younger shells the sides are adorned with minute spirally arranged beads, chiefly on the lower half of the shell; aperture narrow. The shoulders of the last whorl sharp and abrupt; lines of growth strongly curved.

This shell resembles *C. consobrinus* Sow., only in sculpture, but is relatively wider, has less strongly developed granulations on the sides. It also differs from *C. toroensis* Olsson in relative width and in form of spire.

*Holotype*: No. 4623, Mus. Calif. Acad. Sci., from Loc. 267, C. A. S., horizon M - N, near base of the Tuberá group, where it appears to belong, and where several fair-sized specimens were obtained: Miocene of Colombia.

20. *Conus crenospiratus* Anderson, new species

Plate 9, figures 6, 7

Shell small, height of holotype 17 mm., width 10 mm., with graceful outline, low spire and somewhat rounded sides; in size, form and sculpture it recalls *C. isomitratatus* Dall, from the Chipola beds of Florida; upper surface of the whorls flattened; sutures distinctly incised, but unlike Dall's species, the shoulders of the whorls are tuberculated, forming on the inner side of the suture a wavy, or crenulated line; body whorl ornamented by spiral lines, which become obsolete near the shoulder, but become stronger on the lower third of the whorl; spiral threads are here flattened, or slightly concave in section, having the appearance of being double.

*Holotype*: No. 4624, Mus. Calif. Acad. Sci., from Loc. 351, C. A. S., near Punta Pua, near the middle of the Tuberá group, Colombia; Miocene.

## PLATE 9

- Figs. 1, 2. *Phos tuberaënsis* Anderson, new species. Holotype No. 4621 (C. A. S. type coll.), rear and front views; Loc. 267, C. A. S., horizon P, Tuberá group, north slope of Tuberá mountain; p. 135.
- Fig. 3. *Phos tuberaënsis* Anderson, new species. Paratype No. 4622 (C. A. S. type coll.), Loc. 305, C. A. S., near Turbaco, 14 miles east of Cartagena; p. 135.
- Figs. 4, 5. *Conus tuberacola* Anderson, new species. Holotype No. 4623 (C. A. S. type coll.), front and top views; Loc. 267, C. A. S., horizon M - N, Tuberá group, west foot of Tuberá mountain; p. 112.
- Figs. 6, 7. *Conus crenospiratus* Anderson, new species. Holotype No. 4624 (C. A. S. type coll.), front and top views, X2; Loc. 351, C. A. S., horizon P, Tuberá group, near Punta Pua, 20 miles north of Cartagena; p. 112.
- Fig. 8. *Typhis siphonifera* Dall. Plesiotype No. 4625 (C. A. S. type coll.), X2; Loc. 325-A, C. A. S., horizon P, Tuberá group, near Cibarco, a few miles north of Usiacuri, Colombia; p. 138.
- Figs. 9, 10. *Orvula (Neosimnia) puana* Anderson, new species. Holotype No. 4626 (C. A. S. type coll.), front and rear views, X2; Loc. 351, C. A. S., horizon P, Tuberá group, near Punta Pua, north of Cartagena; p. 140.

