

ARTICULO

THE DEPOSITIONAL ENVIRONMENT OF THE MENE GRANDE FORMATION

(EL AMBIENTE DEPOSICIONAL DE LA FORMACION MENE GRANDE)

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The following report grew out of some paleontological work done for the AVGMP Maracaibo Basin Eocene Nomenclature Committee. In particular, it represents an appendix to the paper on the Pauji and Mene Grande formations by W. M. Walton (1966). The first stage of the paleontological study dealt with the planktonic foraminifera only in order to help solve the still unsatisfactory state of the age determination of the Mene Grande Formation. Walton (op. cit.) gave a clear account of the conflicting views and stated that the Mene Grande Formation should correctly be considered upper Middle Eocene.

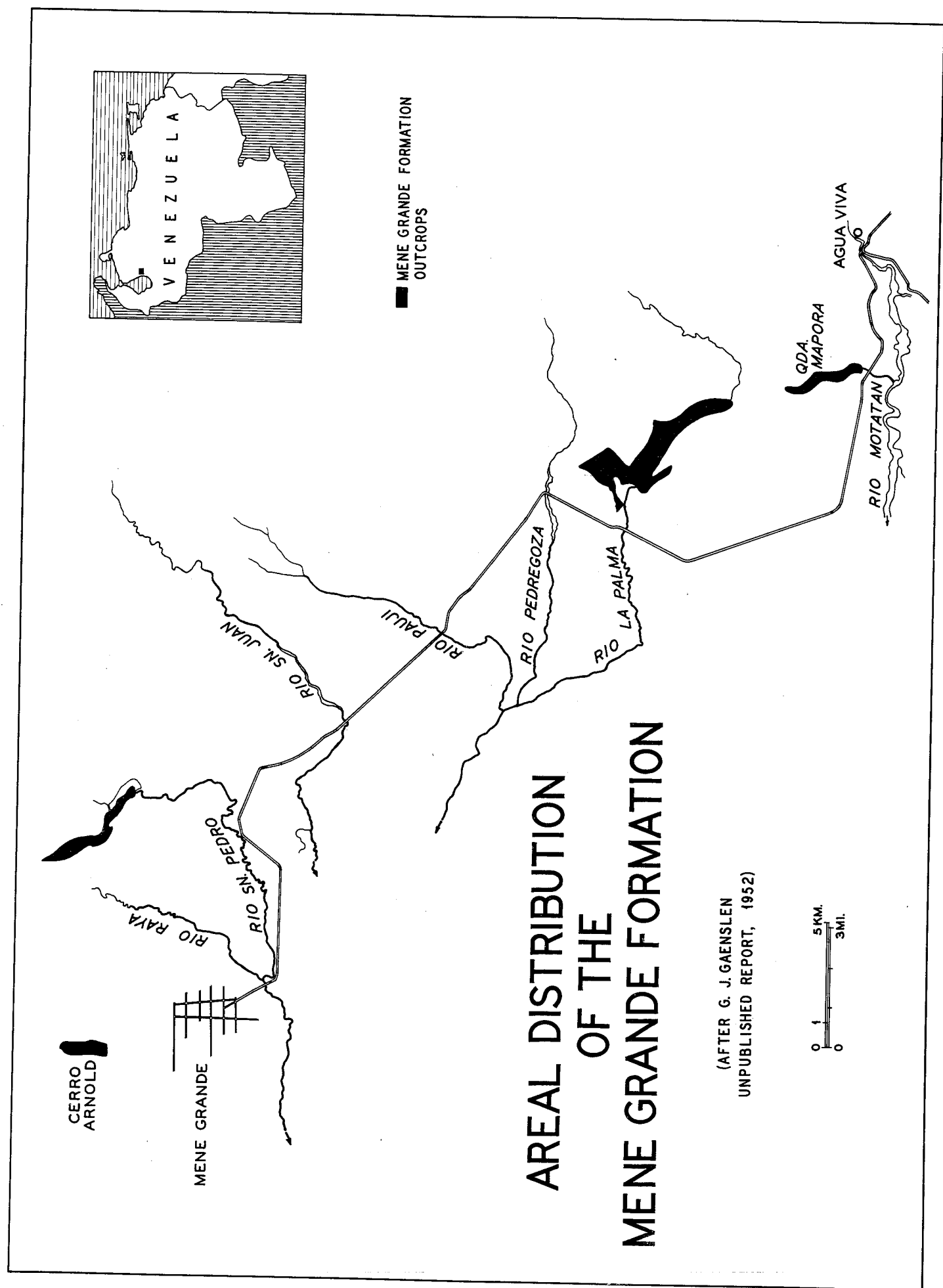
At the expense of being somewhat repetitious a few remarks must be added here. From Walton's description it seems that the upper Middle Eocene age is based solely on the larger foraminifera occurring in the Mene Grande Formation. However, this age determination is strongly supported and, one might say, conclusively demonstrated by the rich planktonic faunas which are also present in the formation.

The faunas discussed here were extracted from samples collected by Creole geologists G.J. Gaenslen (1956) and H. B. Patrick (1963) in the outcrop areas outlined on the accompanying map. Most samples examined were obtained from the type-locality of the Mene Grande Formation (Cerro Arnold) and the Rio San Pedro, whereas considerably less material was available from the Rio La Palma and the Quebrada Mapora. Examination of the rich planktonic faunas contained in these samples brings out two points immediately:

1. The planktonic assemblages of the Mene Grande Formation are essentially the same as those of the underlying Pauji Formation.
2. The upper Middle Eocene age of the Mene Grande Formation is indicated by the presence of such forms (among many others) as:

- Globigerapsis index
- Globigerina senni
- Globorotalia centralis
- Globorotalia crassata
- Globorotalia spinuloinflata
- Pseudohastigerina micra
- Globorotaloides suteri
- Truncorotaloides rohri
- Globorotalia lehneri
- Hantkenina cf. dumblei

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(AFTER G. J. GAENSLER UNPUBLISHED REPORT, 1952)

While studying these rich planktonic faunas the equally prolific benthonic assemblages of the Paují and Mene Grande formations were dealt with in a routine manner only. But soon it became evident that a more detailed examination would be needed in order to find an answer to the puzzling problems posed by the nature of these benthonic assemblages, particularly those of the Mene Grande Formation, which have always been thought of as indices of returning shallow water conditions after the deposition of the Paují Formation that took place in relatively deep water (outer neritic to middle bathyal).

A study of the Mene Grande type-section (Cerro Arnold) and the Mene Grande Formation in the Río San Pedro shows that the benthonic foraminifera are principally the same as those in the underlying Paují Formation, just as in the case of the planktonics. However, there are some important differences:

1. Larger foraminifera, mostly Lepidocyclina, Helicolepidina, Discocyclina, Pseudophragmina and Nummulites occur in the Mene Grande Formation.
2. Complex ("labyrinthic") large arenaceous foraminifera appear at periodic intervals and in greater numbers than in the underlying Paují Formation.
3. Radiolaria are frequently present in the Mene Grande Formation, especially in the samples from the type section.

It is important to note that the larger foraminifera occur together with other benthonics, the latter indicating environmental depths (outer neritic to middle bathyal) that do not provide suitable living conditions for the life of the above mentioned larger foraminifera. Also many tests of the larger forms have a worn and broken appearance. This is particularly well demonstrated in the case of the so-called "limestones" which form part of the sedimentary sequence of the Mene Grande Formation. Thin sections show beyond doubt that those "limestones" are in fact calcareous sandstones, in which the calcareous portion is made up of fragments of larger foraminifera, smaller benthonics, planktonics and also Radiolaria. In this writer's opinion the resemblance of these calcareous sandstones to the coarse bioclastic sediments, which usually occur at the base of graded bedding sequences in the Alpine flysch, cannot be denied.

It would therefore seem that the larger foraminifera as well as algae and some molluscs were removed from their original shallow and clear water environment and dumped into deeper water. This must have happened just before consolidation of the sediments, of which these organisms originally formed part, took place. Turbidity currents almost certainly accounted for the transportation of these shallow water forms.

Most unfortunately, the writer has never had a chance to observe the Mene Grande Formation in an outcrop. However, pertinent information was available in Creole reports by G. J. Gaenslen and H. B. Patrick. Lithological descriptions and particularly photographs and close-ups by the former (Figs. 1, 2) show clearly the typical cyclical and also graded bedding of the Mene Grande Formation. Further proof of the turbidite nature of this formation seems to lie in the cyclic occurrence of the complexly built larger arenaceous foraminifera such as Cyclammina, Textulariella and others, which apparently thrive best in a muddy water environment, which in this case must have been provided by repeated phases of turbidity.

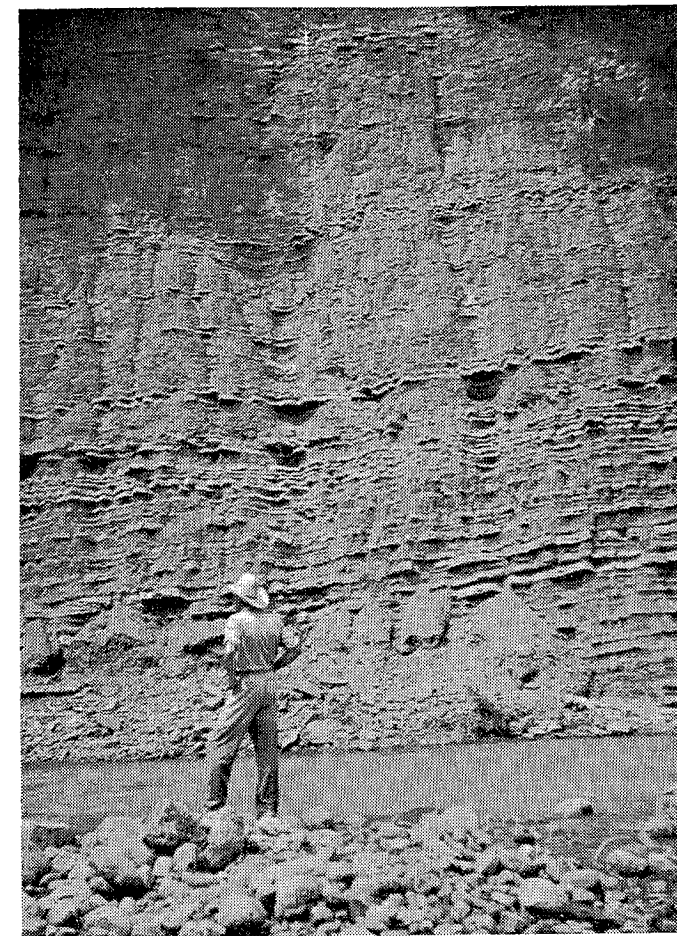


Fig. 1. The Mene Grande Formation on Río San Pedro.

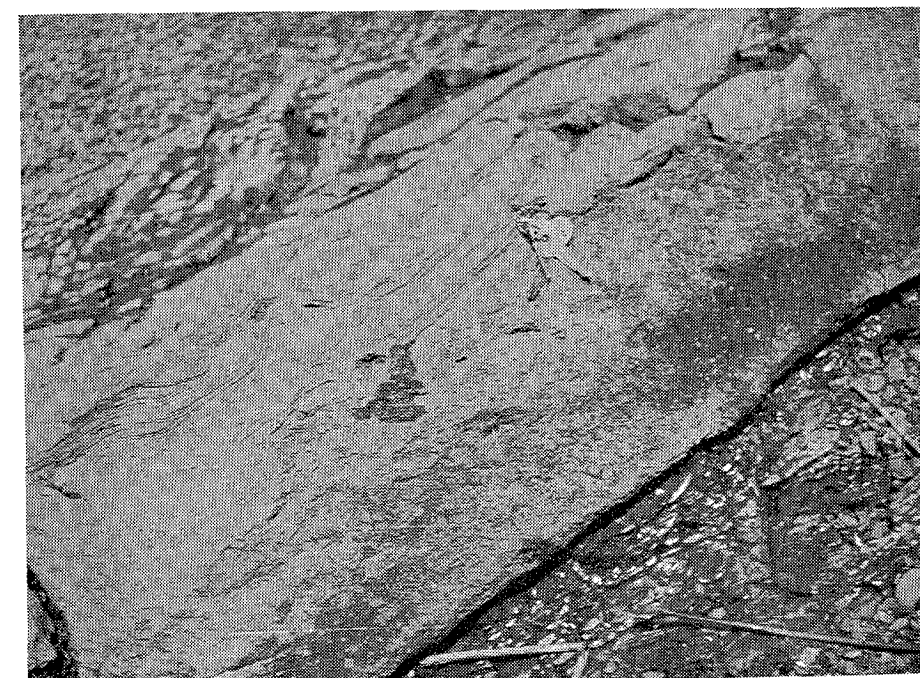


Fig. 2. Bed in the Mene Grande Formation on Río La Palma grading from sandstone at the top into orbitoidal calcareous sandstone at the bottom.

To recapitulate then, the Mene Grande Formation does not represent a shallow water end-phase of the deep water Pauji Formation, but was deposited at approximately the same depth or even slightly deeper than the latter and its sediments and faunal assemblages almost certainly point to a turbidity-type deposition.

The Mene Grande Formation is undoubtedly the result of the pre-Andean movements which affected in particular the eastern and southeastern rim of the Maracaibo Basin. These movements probably started in the late Middle Eocene right after the maximum extension of the Pauji sea. While certain areas emerged the sea might have temporarily deepened in other, rather limited areas, probably in the form of grabens which then received material from the emerging, shallowing sea bottom to the east and southeast. The present-day, somewhat linear configuration of the Mene Grande outcrops seems to bear out such an assumption.

REFERENCE

WALTON, W. M., 1966

The Pauji and Mene Grande formations
AVGMP, Bol. Inf., vol. 9, no. 12, p. 325-337.