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# FOSSIL TINTINNIDS IN VENEZUELA

by:

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A B S T R A C T

**Neocomian and Aptian tintinnids from exotic blocks in the Guárico flysch of north central Venezuela are described. Stratigraphical and paleogeographical implications derived from the presence of these fossils are briefly considered.**

First reports concerning fossil tintinnids in Venezuela –or on the Southamerican continent for that matter– were published in 1962 by P. J. BERMÚDEZ and D. RODRÍGUEZ who described and illustrated these microfossils from dense, grey, aphanitic limestones forming large boulders and blocks in a conglomerate at the base of the Oligo-Miocene Casupal Formation in southeastern Falcon State (Fig. 1).

The purpose of the present paper is to draw attention to recently discovered fossil tintinnids from localities in the San Juan de Los Morros - Ortiz area in Guárico State (Fig. 1) and to discuss their meaning for the Lower Cretaceous stratigraphy of Venezuela.

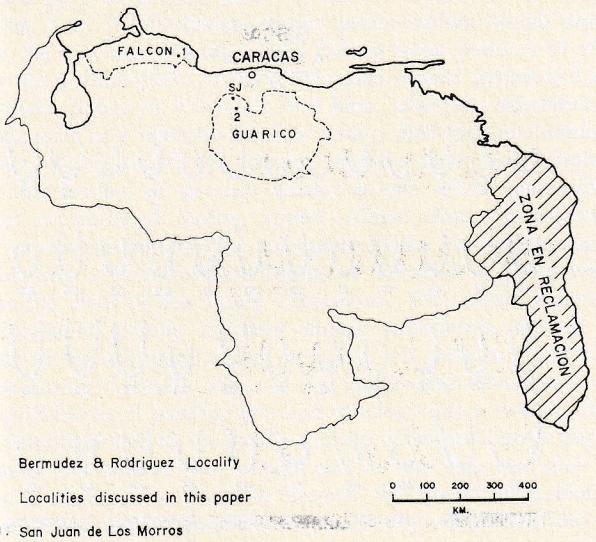



Figure 1

Significantly, the newly found microfossils occur in so-called exotic blocks in the Paleocene - Lower Eocene Guárico flysch. Aided by a paper by PEIRSON, SALVADOR and STAINFORTH (1966), summing up our present knowledge and interpretation of the immensely complex stratigraphical and structural relationships of the

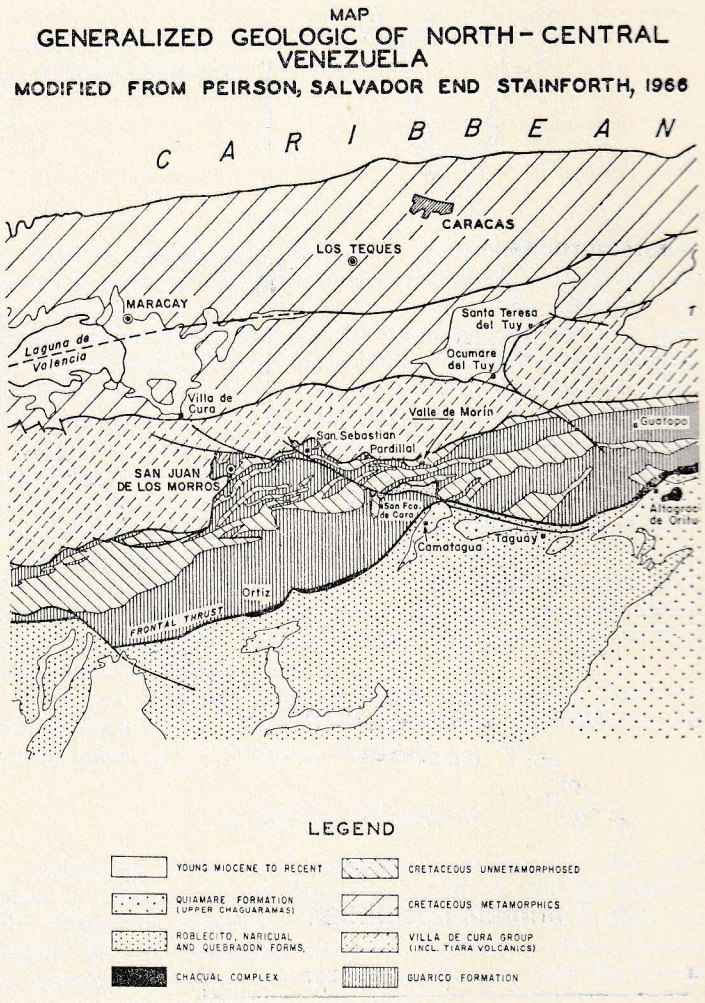



Figure 2

(1) Creole Petroleum Corporation.

Guárico flysch, it might be useful to briefly glance at the geological picture of the area under discussion. A modified version of one of their maps (Fig. 2) is reproduced here which shows the Guárico flysch belt which extends some 350 km in a southwestern to northeasterly direction.

As mentioned above the tintinnids are found in blocks thought to have slumped into a trough where flysch sediments were accumulating. Great numbers of such blocks have been encountered in the Guárico flysch, varying in size from the well-known morros to small boulders and pebbles. The upper age limit of these blocks is probably Paleocene and none have been found to date whose age is demonstrably older than Aptian.

*A. Parapara - Rio Paya*

The first locality to be mentioned here lies about 4.5 km east southeast of Parapara, on a small ridge 300 m south of the Río Paya (Fig. 3). Irregularly distributed about the ridge and apparently embedded in the flysch are numerous blocks, most of them being Middle and Upper Cretaceous in age and belonging to such formations as El Cantil, Querecual and San Antonio.

Samples were taken from a fair sized block of a dense grey, fossiliferous limestone. Upon closer examination in thin sections the sediments turned out to be chiefly a coral –algal reef limestone, carrying macro– and also microfossils in abundance. The following are the most frequent and conspicuous organisms observed:

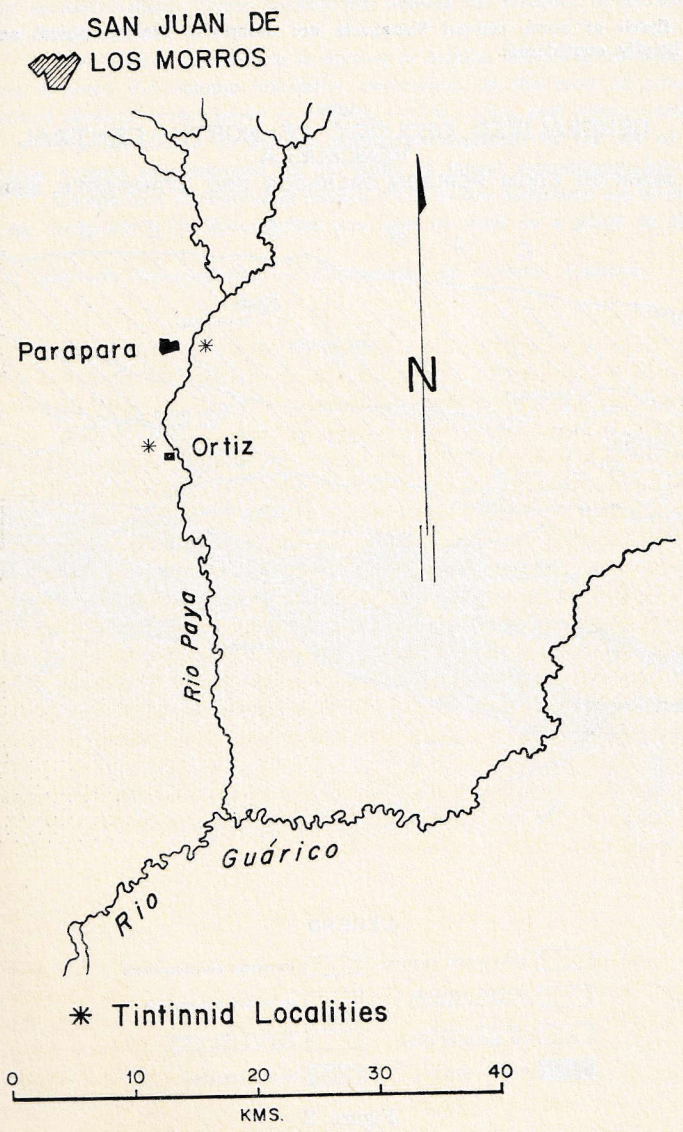



FIGURA 3

Algae:

Cyanophycean nodules, *Cayeuia* sp., *Halimeda* sp., *Clypeina* sp., *Acicularia* sp., *Linoporella* sp., *Palaeodasycladus* sp., *Macroporella* sp.

Foraminifera:

*Textularia* spp., Valvulinidae, *Pseudocyclammina* cf. *hedbergi*, *Choffatella decipiens*, miliolids, *Nautiloculina* sp., *Lenticulina* sp.

Stromatoporoidea:

Scleractinia: mostly solitary corals.
Annelida: worn tubes

Gastropoda:

Pelecypoda: some fragments with rudistid shell structure
Echinoidea: spines and fragments

The tintinnids occurring in this limestone are illustrated in Fig. 4 (Nros. 1-46). Taking into account possible mis-identifications based on random sections and also because of the state of preservation (REMANE, 1962, 1964) it would seem that most of these specimens are probably *Tintinnopsella carpathica*, certainly Nrs 38 - 46 must be allocated to that species. In addition, some of the remaining tests apparently indicate the presence of the following taxa:

*Calpionellites darderi* (Nrs. 12, 13)
*Calpionellites simplex* (Nrs. 34, 35 36)
*Calpionellopsis oblonga* (Nrs. 3, 5, 20, 22, 25)

An up to date compilation of the range of fossil tintinnids in the Tethyan region and in the western hemisphere was recently published by REMANE (1969) whose data for the species listed above are given in Fig. 5. These species, taken together, point to Berriasian - Hauterivian, or Neocomian age in Venezuelan usage.

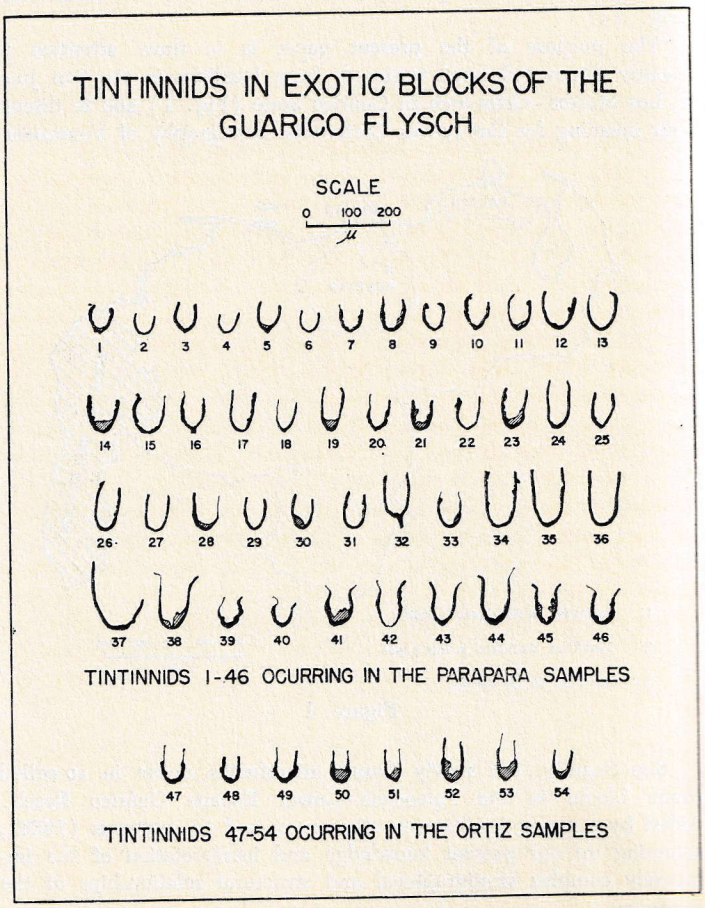



Figure 4

This age determination creates an interesting problem involving provenance and correlation of these blocks. Fig. 5 shows some 12 stratigraphic rock units in the Neocomian of Venezuela, most of them being metamorphics which are either barren or contain rare fossils of little biostratigraphic value. Therefore, the age of these rocks has to be inferred from their stratigraphic position and it is quite impossible to relate directly the blocks carrying fossil tintinnids with any of them.

On the other hand, well documented occurrences of Lower Cretaceous tintinnids have been reported in the western hemisphere from Cuba (Broennimann, 1953; Furrazola - Bermúdez, 1965), Mexico (Bonet, 1956; Trejo, 1960), and the United States (Eicher, 1965). Closer to Venezuela unaltered and well dated (by ammonites) limestones of Neocomian age are known from the Colombian sector of the Guajira Peninsula. However, to this writer's knowledge, those rocks have never been examined for tintinnids.

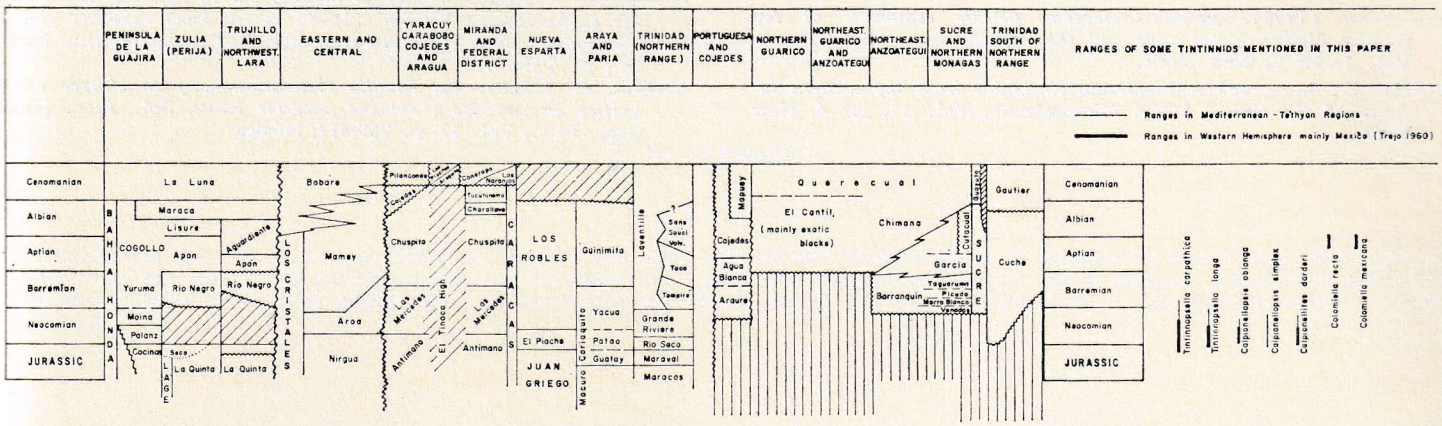
To this belt of Neocomian marine sedimentation which almost encircles the Caribbean, undoubtedly belong large portions of what are now the metamorphics of the Venezuelan coastal ranges and also the Northern Range of Trinidad. But here, after the deposition of these sediments in a relatively shallow water, shelf-type environment, subsidence, accompanied by volcanic activity must have removed them to the bottom of a deep, narrow trough where geosynclinal sediments accumulated during Aptian - Albian time. Subsequently, vertical movements initiated the emergence of the Venezuelan coastal ranges as well as the Northern Range of Trinidad, a phase which ended at the close of the Upper Cretaceous. Differential metamorphism, probably already incipient during subsidence, altered the sediments of the emergent ranges, however, not without permitting - -at least during the early stages of the uplift- the detachment and slumping of blocks of varying ages and lithology into a trough which opened simultaneously to the south. During Paleocene-Lower Eocene time, when the axis of this trough and its northern unstable rim migrated further to the south to become the site of deposition of the Guarico Formation, the blocks were finally embedded into the flysch.

*B. Corocito - Ortiz*

The second tintinnid locality of this report is known by the name of Corocito, a roadcross 1.2 km north of the northern outskirts of Ortiz, along the San Juan de Los Morros road. The outcrop exposes flysch sediments containing a variety of exotic blocks, most of them not exceeding head-size. The formations they represent are El Cantil, Querecual, San Antonio and also include phyllites. The tintinninds were found in concretion-like cobbles of siliceous grey limestone embedded in the flysch. Contrary to the reef limestone of Parapara this is clearly a pelagic sediment. In addition to the tintinnids these blocks carry *Planomalina* sp. or *Preaglobotruncana* sp., and also Radiolaria.

The tintinnids present (Fig. 4, Nrs. 47-56) are mainly *Colomiella mexicana* (Nrs. 47, 48 49 50, 52, 53) and possibly *Colomiella recta* (Nrs. 51, 54).

The genus *Colomiella* was first described in Mexico (Bonet, 1956) and later on was also observed in the Tethyan region (Bolze, Colom and Sigal, 1959). In the western hemisphere *Colomiella* is restricted to the Aptian.




LOWER CRETACEOUS FORMATIONS IN VENEZUELA AND TRINIDAD

( Modified from Lexico Estratigrafico de Venezuela, 1970 )

Figure 5

Since non-metamorphic fossiliferous Aptian sediments are widespread in northern Venezuela correlation of these blocks should not pose any serious problems. However, the Aptian sediments are largely shallow water, platform-type carbonates and the only open sea deposits with planktonic foraminifera of possible Aptian affinities are known from the lower part of the Cutacual Formation in eastern Venezuela, an off-shore equivalent of the El Cantil limestone.

In Trinidad the upper part of the Cuche Formation (*Leupoldina protuberans* zone of Bolli, 1959) may be the time equivalent of the Aptian blocks in the Guarico flysch. Quite possibly the original site of deposition of these blocks was the geosynclinal trough described earlier, which formed during Middle Cretaceous time not too far from the present-day coast line of north central Venezuela. The presence of Radiolaria in the blocks supports the idea of contemporaneous and nearby volcanism which was stated above to have taken place during that time.

The final emplacement of the blocks in the Guarico flysch can be explained by the mechanism thought to be responsible for the transportation of the Parapara blocks.

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## BIBLIOGRAPHY


BERMUDEZ, P.J. y RODRIGUEZ, G. (1962).—*Notas sobre la presencia de Tintinidos o Calpionelas en Venezuela.* Bol. Inf. AVGMP, Vol. 5, Nº 2, Caracas.

BOLLI, H. M. (1959).—*Planktonic foraminifera from the Cretaceous of Trinidad, B.W.I.* Bull. Am. Paleont., Vol. 39, Nº 179, Ithaca.

BOLZE, J., COLOM, G. y SIGAL, J. (1959).—*Présence du genre Colomiella* BONET, 1956 *en Tunisie. Les Calphionelles post-néocomiennes.* Rev. Micropaléont., Vol. II, Nº 1, Paris.

BROENNIMANN, P. (1953).—*On the occurrence of calpionellids in Cuba.* Eclogae Geol. Helv., Vol. 46, p. 263-268, Basel.

CAMPBELL, A. S. (1964).—*Trintinnina.* In: *Treatise of Invert. Paleont., Part D (Protista 3).* Lawrence, Kansas.

COLOM, G. (1948).—*Fossil tintinnids: loricated Infusoria of the Order Oligotricha.* J. Paleont., Vol. 22, p. 233-263, Tulsa.

———— (1955).—*Jurassic-Cretaceous pelagic sediments of the western Mediterranean zone and the Atlantic area.* Micropaleont., Vol. 1, Nº 2, New York.

EICHER, D. L. (1965).—*Cretaceous tintinnids from the western interior of the United States.* Micropaleont., Vol. 11, Nº 4, New York.

FURRAZOLA - BERMUDEZ, G. (1965).—*Tres nuevas especies de Tintínidos del Jurásico Superior de Cuba.* Inst. Cub. Recursos Miner., Publ. Espec., Nº 2, La Habana.

LEXICO ESTRATIGRAFICO DE VENEZUELA (1970). (seg. Edit.).—*Ministerio de Minas e Hidrocarburos.* Bol. Geol., Publ. Esp. Nº 4, Caracas.

PEIRSON, A. L., SALVADOR, A. y STAINFORTH, R.M. (1966).—*The Guárico formation of north-central Venezuela.* Bol. Inf. AVGMP, Vol. 9, Nº 7, Caracas.

REMANE, J. (1962).—*Zur Calpionellen - Systematik.* N. Jb. Geol. Paleont. Mh. Nº 1, p. 8-24, Stuttgart.

———— (1964).—*Révision paléontologique de Titinopsella oblonga (CAD.) et des espèces avoisinantes (Note préliminaire).* Rev. Micropaléont., Vol. VII, Nº 1, Paris.

———— (1969a).—*Les possibilité actuelles pour une utilisation des calpionelles (Protozoa incertae sedis, ?Cilliata).* Proc. Ist Intern. Conf. Plankt. Microfoss., Vol. 2. p. 559-573, Genève.

———— (1969b).—*Nouvelles données sur la position taxonomique des Calpionellidea BONET* (1956) *et sur leurs rapports avec les Tintinnina actuels et les autres groupes de "Tintinnoïdiens" fossiles.* Id., p. 574-587.

TREJO, M. (1960).—*La Familia Nannoconidae y su alcance estratigráfico en América (Protozoa, incertae sedis).* Bol. Asoc. Mexic. Geol. Petr., Vol. 12, p. 259-314, México.