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NOTAS GEOLOGICAS

AN OUTLINE ON THE JURASSIC IN COLOMBIA

*Jairo Mojica**

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INTRODUCTION

The main objective of this summary is to provide information about the more important advances achieved during last ten years in Jurassic studies in Colombia, and to present the corresponding bibliographic references.

It is not intended to undertake a complete review of papers as well known to the geologic community as those by Renz (in Trumpy 1943), Nelson (1957), Hubach (1957), Burgl (1960, 1964), Cediel (1968, 1969), and Barrero (1969).

GEOGRAPHIC DISTRIBUTION (Fig. 1)

Outcrops of the Jurassic from Colombia appear in a wide belt, which comprises areas of the Eastern Cordillera (including the Serranía de Perijá) and, to a lesser extent, of the Central Cordillera. There are also Jurassic units on the Península de La Guajira and the Sierra Nevada de Santa Marta.

Little is known about the conditions during the Jurassic in the region to the west of the Central Cordillera. Until now, there are no elements known from this realm which could be assigned with assurance to the Jurassic, although "paleopacific" oceanic domain is postulated in paleogeographic and paleotectonic reconstructions (see Bürgl 1961,

* Universidad Nacional de Colombia, Bogotá.

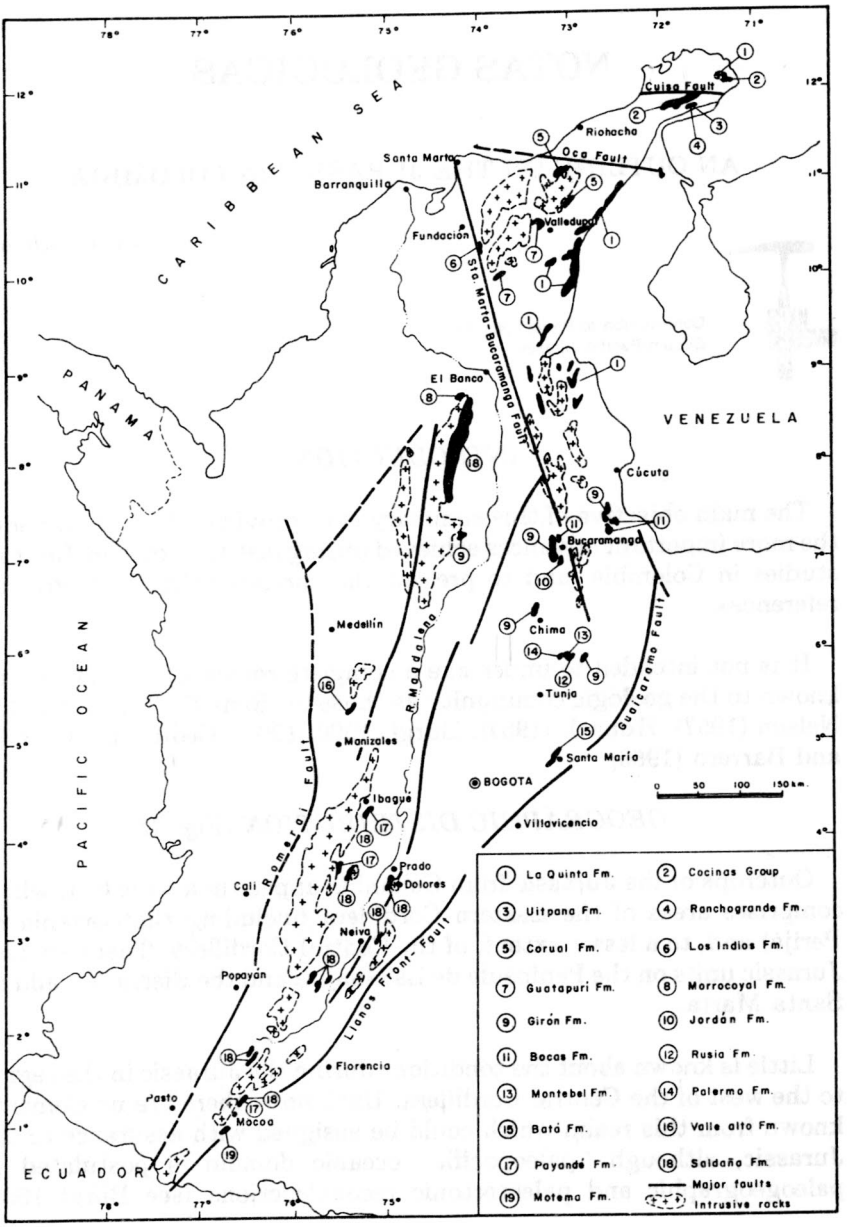

Fig. 1 Distribution of the principal Triassic-Jurassic Units in Colombia.

Geyer 1973 and 1979, Barrero 1979, Mojica 1982), in spite of several authors which, some years ago, atributed the Dagua Group to the Jurassic; lastly, Etayo et. al. (1982), based on the fossil record, have assigned this Group to the Upper Cretaceous.

Furthermore, the oil wells in the Subandean basins or Colombia's Llanos Orientales show scarce records of the Jurassic, restricted to the piedmont of the Eastern Cordillera, mainly to the Putumayo Basin region (Fm. Motema).

LITHOLOGY AND STRATIGRAPHY

When we refer to the Jurassic in Colombia, many times we mean lithologic units which are not only Jurassic but also partially of Triassic or Cretacic age. This is due to the predominance of continental units (Girón, Jordán, Saldaña, Motema; La Mojana, Montebel, Guatapurí, Corual, La Quinta, and Ranchogrande Formations) made up of effusive and pyroclastic rocks and red beds with little or no fossil content; therefore it is very difficult to date these rocks. Dating is mostly done based on stratigraphic position abode and below Paleozoic, Triassic or Cretacic fossiliferous beds. This is the reason for the common use of terms like Triassic-Jurassic, Jura-Triassic, Jura-Cretacic, Infra-Cretacic.

About 90% of outcroping Jurassic rocks known in Colombia belong to continental volcanic and red beds facies with some dark rock units also of continental origin, which at several localities may exceed 3000 m in thickness.

Marine Jurassic with identified fauna (see Geyer 1973), is restricted to local outcrops of Liassic (Batá and Morrocoyal Formations) and Middle to Upper Jurassic units (Kuisa, Uipana, Jipi, Kajú and Valle Alto Formations). Besides these, there are elements of Jurassic-Cretaceous age as determined by their stratigraphic position or fossiliferous content, such as the Arcabuco Sandstone (see Ingeominas 1983), the Buenavista Breccias (Dorado, in preparation) and the upper part of the Valle Alto Formation.

During the last decade a better dating of terrestrial formations has been possible thanks to new fossil findings. Presence of *Glossopteris branneri* and *Classopollis* sp. (Remy et al. 1975) indicate a Lower Jurassic age for the Bocas Formation (considered before as Paleozoic or Triassic) and according to Rabe (1974) restrict the age of the overlying Jordán and Girón Formations, to the Middle and Upper Jurassic. The

identification of *Ginkgo sp. cf. lamariensis* (Mojica et al. 1978a) within rocks of the Cuche Formation, close to the locality of Floresta, (Boyacá), suggests a Rhaetic-Liassic age for it. Mojica & Macía (1982) found footprints identified by Baird (written communication, Julio 1982) as *Batrachopus sp. cf. gracilis*, within red beds intercalated with volcanic rocks of the Saldaña Formation in the Prado-Dolores region. According to Baird this is a Liassic ichnofossil characteristic of the Sinemurian of North America.

Progress achieved during the last ten years also includes the discovery of the following hitherto unknown outcrops of the Jurassic.

a. Valle Alto Formation (González 1976; Huber 1982). This is a marine-paralic sequence of the Central Cordillera in the vecinity of San Félix (Northern Caldas), which is marked by the presence of bivalves (*Trigonia* sp.) and ammonites (*Substeuroceras* sp.) in its upper levels.

b. Extensive zones of volcano-sedimentary rocks along the Eastern margin of the Serranía de San Lucas. According to Bogotá & Aluja (1981) these rocks represent the Middle to Upper Jurassic, but in our opinion they should correspond to the Lower to Middle Jurassic.

c. The so-called Buenavista Breccias (sensu Renzoni 1968) which after Dorado (in preparation) constitute the base of the Mesozoic West of Villavicencio and contain in their middle and upper levels an abundant Titonian-Berriasian ammonite fauna. Upwards they change gradually to black pelitic sediments forming the base of the Caqueza Group.

This observation suggests that during a large interval of the Trias-Jurassic the Eastern Cordillera in this part of the country was emergent above sea level, because the Buenavista Breccias rest unconformably either on Upper Paleozoic sediments or on metamorphic rocks of the Pre-Devonian Quetame Group.

Moreover, in the Payandé area of Tolima, the basal part of the Saldaña Formation (see Cediel & al, 1980; 1981), which consists in that area of dark volcanogenic siltstones with nodular limestone intercalations, has yielded ammonites (*Rhabdoderas* sp., *Sandlingites* sp. and other species to be determined: see Mojica et al. 1978b, Wiedmann & Mojica 1980, Geyer 1982) of Rhaetian age, thus indicating that the Saldaña Volcanism, which extends from Ecuador to Venezuela, started at the end of the Triassic and continued during Liassic times as

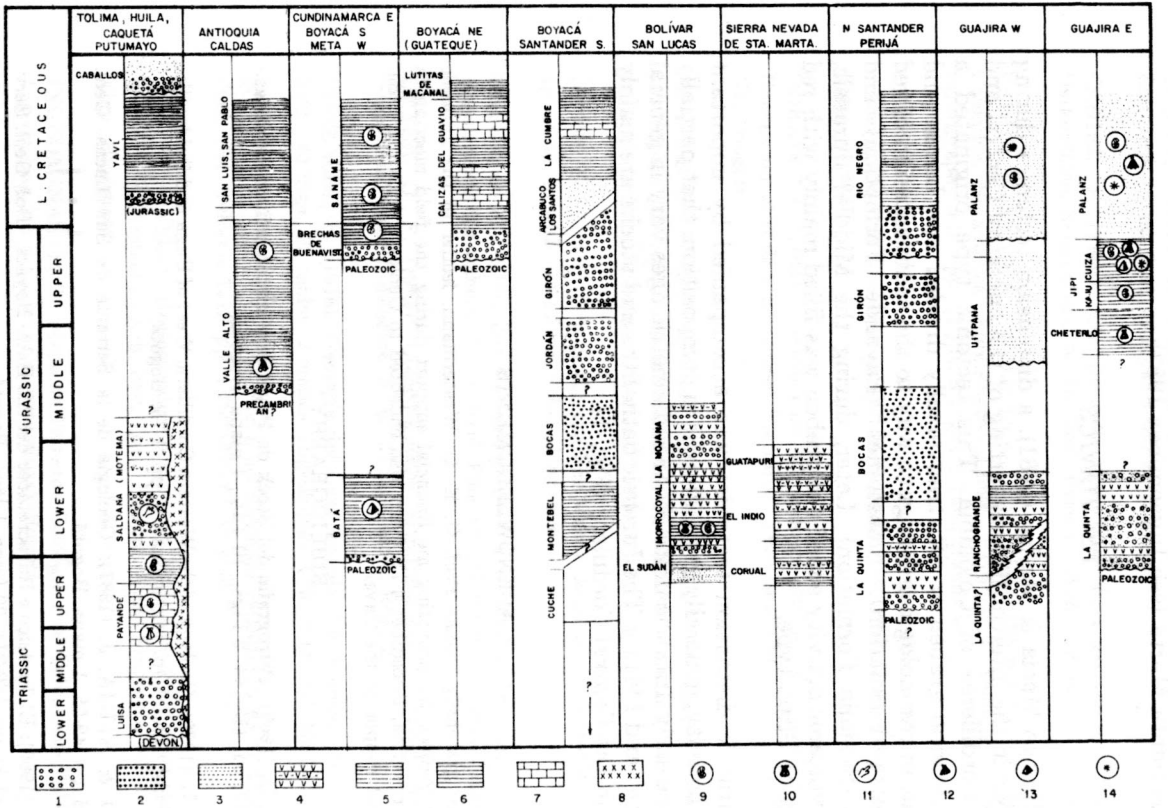

Fig. 2 Stratigraphical-lithological diagram of the pre-Cretaceous Mesozoic in Colombia. 1: Continental red beds; 2: Terrestrial gray facies; 3: Quartzitic sandstones, continental-marine; 4: Volcanics, mainly continental; 5: Paralic-fluviatile facies; 6: Shallow marine; 7: Marine limestones 8: Granodioritic intrusions; 9: Ammonites; 10: Bivalves; 11: Footprints; 12: Oysters; 13: Trigoniids; 14: Corals.

shown by the presence of ammonites of Sinemurian age in the also volcanogenic Morrocoyal Formation (see Geyer 1973) as well as by some radiometric age datings of K/Ar on volcanites of the Sierra Nevada de Santa Marta (see Ingeominas 1983).

TECTONICS

According to Macía & Mojica (1981), a distension tectonics during the Triassic in the intercordilleran setting of the ancestral Central and Oriental Cordilleras of Colombia. This tectonic type originated a supracontinental graben or rift, tranversally divided into basins and highs that, in chronologic order, gave way to the sedimentation of red beds (Luisa Formation), limestomes (Payandé Formation) and volcanics (Saldaña Formation). Later, during the Middle? Jurassic, after the volcanic activity ended the graben was filled mainly with red sediments of Girón type.

The Jurassic distension tectonics was accompanied by important intrusive activity, generally granodioritic in composition, that partially affected the early Jurassic units K/Ar radiometric ages vary in general between 187 and 146 m.y. The Jurassic batholiths and stocks are mainly localized in the Central Cordillera (Fig. 1).

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Jairo Mojica
Departamento de Geociencias
Universidad Nacional
Apartado 14490
Bogotá, Colombia