

VENEZUELAN STRATIGRAPHY.

CARLOTTA J. MAURY.

The following synthesis and correlation of Venezuelan stratigraphy is based on faunal affinities. It is in part proven, in part tentative and suggestive. Its object is to clear up as far as possible the extremely chaotic state of Venezuelan stratigraphy. The authorities for identification and correlation are given following the subdivisions.

RECENT.

STILL FORMING.—Alluvium of the Orinoco delta and of Lake Maracaibo.

QUATERNARY.

VARIOUS HORIZONS.—Coastal shell beds of Cumana; Peninsula of Araya; Cabagua Island; and Cabo Blanco.

Interior raised shell terraces, as that near Guanoco, containing recent marine species.

Llanos formation of the Orinoco.

MIOCENE.

UPPER.—Yabalito beds with *Arca patricia*, 15 miles SW. of Urumaco, State of Falcon, western Venezuela. Equivalent to the *Arca patricia* horizon of Todd's road, Trinidad; of the Botanic Station, Tobago Island; and of the Cerros de Sal, Dominican Republic.

Identification Guppy, 1913, correlation Maury, 1924.

MIDDLE.—Cumana beds, back from the coast, with *Arca tolepis* and *A. cumanensis* Dall. Probably equivalent to the Cartagena beds of Colombia; the Isthmian Gatun; the Brasso of Trinidad; the Bowden of Jamaica; and the Gurabo of the Dominican Republic.

Correlation Guppy, 1886, Maury, 1917, 1924.

Also fossiliferous beds of eastern Zulia.

Correlation, Maury, 1922.

LOWER.—Los Quiros beds of eastern Zulia, east of Lake Maracaibo. Equivalent to the Manzanilla beds of Trinidad; the Cercado formation, Dominican Republic; and the Uscari formation.

Correlation, Maury, 1922, 1924.

EOCENE.

UPPER.—Rio San Pedro beds, State of Trujillo, with *Lepidocyclina* (*Helicolepidina*) *spiralis* and *Orthophragmina georgiana*, and the La Palma, Lake Maracaibo, *Lepidocyclina* and *Orthophragmina* beds. Equivalent to the Ocala limestone of Florida with *Orthophragmina georgiana*; and to the Bontour Point, Trinidad, beds with *Lepidocyclina* (*Helicolepidina*) *spiralis*. Jacksonian Eocene of the Gulf States, Priabonian of Europe.

Correlation and identification, Tobler, 1922. Equivalent also to the Farallon Rock and San Fernando beds with *Serpula clymenioides* and *Ranina porifera*, referred by Guppy to Eocene, and by Harris and by Woodring to the Jacksonian, 1924.

The Soldado Rock, in the Boca de Serpiente, forameniferal horizon, bed No. 6, Maury 1912, also belongs in the Jacksonian.

MIDDLE.—

LOWER.—Isla Margarita, eastern Venezuela, and Isla Taos, Golfo de Venezuela, beds with *Venericardia planicosta*, smooth variety exactly like that of the basal Eocene horizon of Soldado Rock, Boca de Serpiente, bed No. 2, with which these Island deposits for this and other reasons are judged synchronous.

Identification and correlation Maury, 1912, 1915; and Maury and Harris, 1924.

The Eocene mapped by Jahn, 1921, on Tortuga Island is probably of the same age as that on Margarita. The outcrops west and southwest of Maturin, and an Eocene-Cretaceous contact at Aragua de Maturin may also be basal Eocene, but are seemingly unfossiliferous.

TERTIARY—CRETACEOUS.

INDETERMINATE.—Cerro de Oro beds, unfossiliferous except for a single fern frond of the genus *Pecopteris*.

Identification Steinmann, Correlation Sievers, 1889, Tertiary; 1893, Tertiary or Cretaceous, or both.

UPPER CRETACEOUS.

SANTONIAN.—Hato Nuevo beds, western Zulia, in the Sierra of the Perijá region, west of Lake Maracaibo, with *Ostrea hippopodium* Nils., which is characteristic of Santonian and other Lower Senonian formations of Europe and North Africa.

Correlation and identification, Gerhardt, 1898.

Rubio beds, southwestern Táchira, between Caña and Amarillo, near the town of Rubio, with *Mortoniceras texanum* Roemer, an index fossil of the Lower Senonian, *Gauthiericeras*

margæ Schl., a European index fossil of the Lower Senonian, and *Lenticeras andii* Gabb, also in the Lower Senonian, of Peru.

Identification and correlation, Gerhardt, 1898.

CONIACIAN OR EMSCHERIAN.—

TURONIAN.—Hurupu beds, near Guanoco, State of Sucre, eastern Venezuela, with *Inoceramus plicatus* (d'Orbigny) Karsten = *Inoceramus labiatus* Schloth., typical of the Benton throughout the Plains and Rocky Mountain region of North America; also in northern Mexico and in the Turonian of Europe. Quoted from the Emscherian of Peru.

Correlation Maury, 1912.

Also the *Inoceramus plicatus* beds of Cumanocoa, Cocollar, Guachero, St. Augustin, Periquito, and of Barbacoas.

This Turonian horizon is equivalent to the Turonian of Brazil, Maury, Monografia 4, Serviço Geologico do Brasil (in press).

CENOMANIAN.—The Cumanocoa and Bergantin beds, State of Sucre, eastern Venezuela, with Rudistids probably belong here, along with the Cenomanian Rudistid beds of Pointe-à-Pierre, Trinidad (Harris, 1922); and the Rudistid beds of Jamaica and Porto Rico of early Upper Cretaceous age. Karsten, 1886, found masses of Hippurites at Cumanocoa, and Rudistids have lately been found by Millard between El Pilar and Cumanocoa.

Tentative correlation Maury, 1924.

LOWER CRETACEOUS.

ALBIAN (GAULT).—

APTIAN.—Manaure beds, western Zulia, in the Sierra of the Perijá region, west of Lake Maracaibo, with *Exogyra boussignaulti* d'Orbigny, characteristic of the Urgo-Aptian of France, Spain, Algeria, Syria, Texas, California, and Colombia in the Bogotá beds.

Identification and correlation Gerhardt, 1898.

Possibly the Bourdonnes beds, State of Sucre, eastern Venezuela, with *Trigonia* cf. *boussignaulti* d'Orb. belong here. *Trigonia boussignaulti* is a Bogotá, Colombia, Aptian species, but the Bourdonnes shell could not be positively identified with it. Etheridge's, 1860, tentative identification led Wall to think this horizon might be Neocomian, but it requires investigation, as Wall said, in 1860.

The above is of necessity but a coup d'oeil of the present status of Venezuelan stratigraphy. If space permitted, one would like to review the splendid work of the old explorers, Humboldt, who on his first voyage, in 1799, landed in Venezuela and remained there

eighteen months; Boussignault, who a quarter of a century after Humboldt, in 1821-1833, with Acosta explored the wildernesses of Colombia, Acosta dying in the valley of the Magdalena; Karsten, who spent twelve years in Venezuela, Colombia and Ecuador, 1844-47, and 1848-1856; and Sievers, first exploration in 1889, when he found the Cerro de Oro beds, and his second journey, 1892-1893. And one would also like to give in detail the brilliant results of the older paleontologists, Von Buch, d'Orbigny, Steinmann and Gerhardt.

Cornell University,
Ithaca, N. Y.