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## THE MAGDALENA VALLEY OF COLOMBIA: A GEOGRAPHICAL RECONNAISSANCE

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The Magdalena River, which rises on the slopes of Papas Peak, at the junction of the Cordillera Central and the Cordillera Oriental of the northern Andes, flows northward through the heart of Colombia to the Caribbean Sea, to form the country's leading highway (Fig. 1). From its source, the river winds its way through 1,000 miles of jungle to Barranquilla, the principal Colombian port on the Caribbean. The Valley extends some seventy-five kilometers laterally, terminating in the foothills of the Central and Oriental Cordilleras.

### The Physical Environment

The terrain of the Magdalena Valley is unusual, being covered with small hillocks which rise at angles of from 30° to 80°, to heights of from 30 to 300 feet. These interesting surface features on the flat flood plain of the old age river (with a fall of only 1 foot in 3,000 feet) may be explained by the fact that the run-off from the heavy rainfall (over 120 inches a year, has little preference as to direction of wash, hence forms a chaotic arrangement of rivulets. Due to the extremely dense vegetation, erosion has been greater at the base of the hills than at the top, thus forming elevations with steep sides and narrow crests.

The seasonal distribution of rainfall in the Magdalena Valley is as follows: January, February, March, dry; April, May, June, wet; July, August, September, dry; and October, November, and December, wet again. These conditions are not fixed, but vary slightly from year to year.

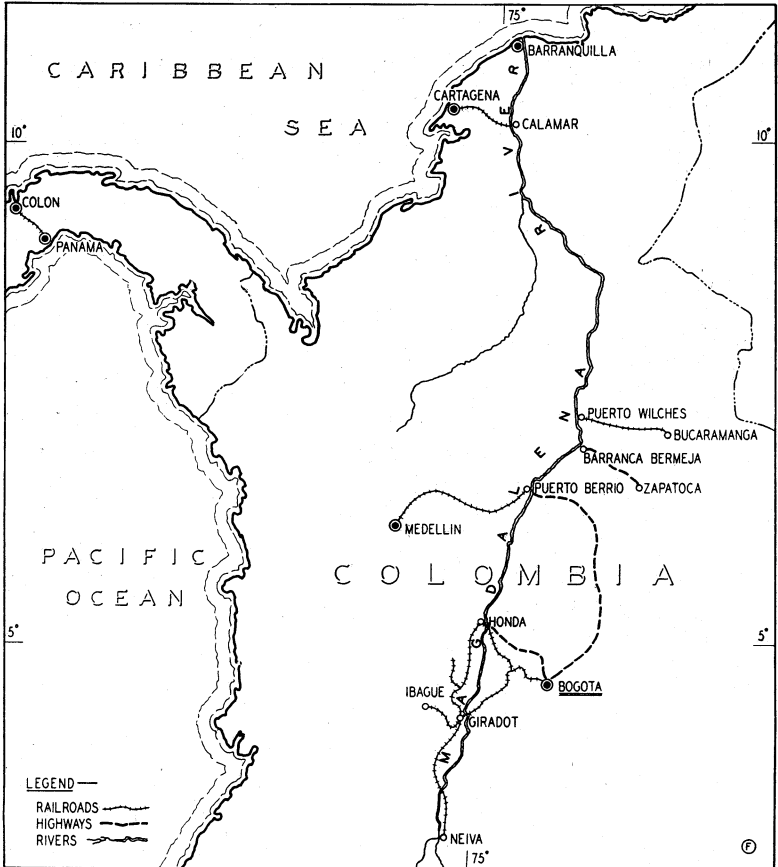


Fig. 1. The Magdalena Valley of Colombia.

The mean temperature in the shade is about  $85^{\circ}$  throughout the year. In the jungle, the thermometer seldom rises above  $75^{\circ}$  and may drop as low as  $65^{\circ}$  during the night. The low nocturnal temperatures are due to the relatively cool mountain breezes descending from the Cordilleras. The wet seasons, which are generally cooler than the dry, are not periods of continual rain, but of showers, with rainless intervals between. During the wet seasons the rain usually falls between 1 a.m. and 6 a.m. The camp rain gauge at

Barranca Bermeja has recorded falls of from 1 inch to 3 inches within the space of two hours.

The entire valley is covered to a depth of from one to five feet with a gray, spongy loam, which is accruing from the generations of decaying vegetation. Beneath this usually lies a sandy clay containing hematite, limonite, and other ferric minerals. Odd gravel deposits have also been noted along the river, varying in thickness from 10 to 30 feet, and seldom extending laterally more than 500 feet. The deposits do not lens into the silts, but end in abrupt banks, as if they were originally the gravel filled beds of old age rivers. Such locations are the sites of many of the river villages.

The valley is covered by a dense mass of vegetation consisting of palmeche and platanos, both being large tree-like ferns. There is also an abundance of valuable wood ranging in hardness from balsa, to ebony and lignum vitae, and containing such trees as cedro, roble, purple heart, and ceiba. Trees of this type are cut into logs and floated to Barranquilla for export. Mahogany being cheap, about 6 cents a board foot, is used for such rough items as tool boxes, ox carts, and flooring for native houses. As the foot hills of the Cordilleras are approached, vegetation becomes less dense and thins into tall grass savannas.

### **The Inhabitants**

The people of the valley are for the most part mestizos, mixtures of Spanish-Indian, Spanish-negro, or Indian-negro. They are crude, unskilled laborers, ninety-five per cent of them being illiterate. Within 100 kilometers of the river, primitive people may be found, who scarcely know that the Spaniards have gone. Such villages are reached by mule trail. Sanitation is almost unknown, and the census shows that over 90 per cent of all the inhabitants are diseased. As a result, the mestizos are poor laborers and physically able to do very little work. Fortunately they are protected by the government from exploitation by the Whites, there being few reasons why they may be discharged from work.

### **The Petroleum Industry**

Colombia's largest oil field is located at El Centro, 30 kilometers east of Barranca Bermeja. The petroleum industry

was pioneered by the Tropical Oil Company in 1919. El Centro field trends east and west a distance of 20 kilometers and contains about 8000 wells. Although new deep tests are being made, there are at present only three producing oil sands, all of Tertiary age. The structure of the field is that of a faulted anticline.

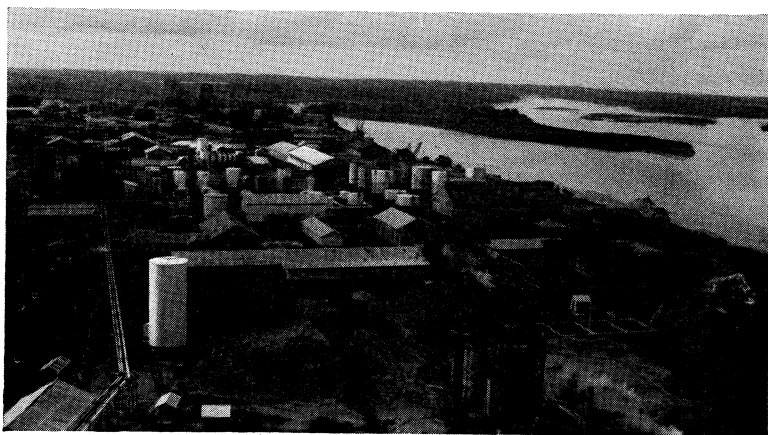


Fig. 2. The Tropical Oil Company Refinery, Barranca Bermeja, Colombia.

The refinery (Fig. 2) located at the river port of Barranca Bermeja, represents an expenditure of \$7,000,000, and rivals those of Texas. The principal products of the refinery are gasoline, kerosene, motor oils and greases, fuel oil for the river boats, and asphalt. As this refinery supplies most of the oil products of the country, its capacity is constantly being increased. The camp of the Tropical Oil Company is a model town with moving pictures, swimming pool, golf course, and tennis courts. About 3000 Canadians and Americans are housed in modern, insect-proof brick homes.

All export oil (about 20,000,000 barrels annually) is conveyed to the coast through the Andean Pipeline Company's pipe, constructed at a cost of \$25,000,000. This pipeline, which extends from El Centro to Cartagena, requires eight booster stations to lift the oil over the Cordillera Central.

### Transportation

River transportation is carried on with the old Mississippi type of paddle-wheel steam boats (Fig. 3), in fact two of the old Mississippi boats are still in service on the Magdalena. The boats are built in the States, and towed across the Caribbean by freighters. A weekly schedule is maintained between Barranquilla and Honda, the time required to ascend the stream being more than twice that for the down stream voyage, due to the fact that the river flows toward the Caribbean at the rate of about six miles per hour. The best schedule is greatly affected by the fluctuations of the river, which is approximately eight feet deeper during the rainy season than in the dry season, when numerous sand bars present an added hazard.

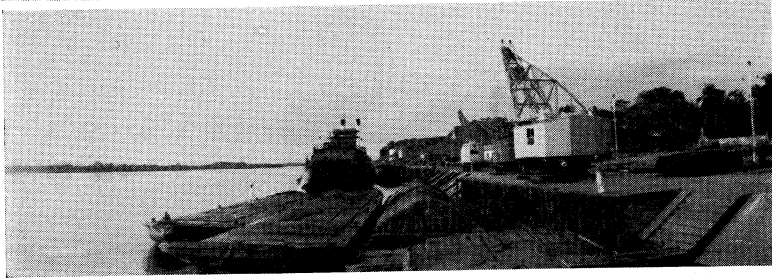
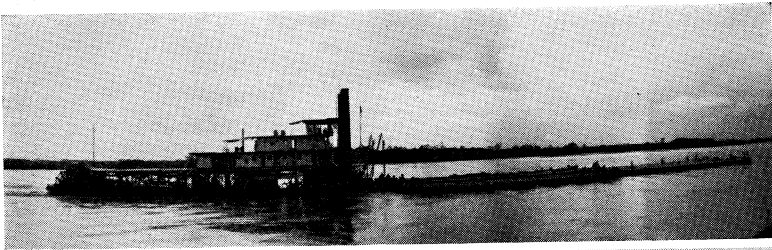


Fig. 3. Stern-wheel steamer on the Magdalena River.  
Fig. 4. Magdalena River docks at Puerto Berrio, Colombia.

Mention should be made of the Scadta's (Sociedad Comercial Aleman de Transportes Aereo) contribution to the Valley. This German air line serves the entire Valley from Barranquilla to Giradot. Through its connection with the Pan American Airways, a biweekly mail and passenger service is maintained. From the Bogotá Plateau to Dallas is only a three-days journey by air. Prior to the coming of the Scadta,

the 1,000 kilometer trip from Barranquilla to Bogotá required the tedium of more than two weeks, by river boat, mule and railway. Today the journey is transformed into a pleasant three hour trip by plane. Although passenger rates are still somewhat higher than those of the States, air mail rates have been reduced recently.

The main line of flight is from Barranquilla to Palanquera, a distance of some 800 kilometers. Hydroplanes are used entirely, as the river serves as an ideal, and also the only, landing place. Five stops are made on this route, at El Banco, Puerto Wilches, Barranca Bermeja, Puerto Berrio, and Palanquero. Short lines are operated from Palanquero to the inland cities of Bogotá, Medellín, Bucaramanga, and Cali. For these services, land planes are used. At present, a new field is under construction at Barranca Bermeja, which will connect it with Medellín and Bucaramanga.

#### A Typical River Port

Puerto Berrio, the most important river port of the Magdalena, is situated about 800 kilometers upstream from Barranquilla. Its importance is due to the hinterland it serves, the state of Antioquia, the richest departamento in the Republic of Colombia. Puerto Berrio is a pueblo of some 2,500 inhabitants, housed in fifty or more tiled casas with their pink and blue roofs. Situated on a bluff overlooking the river and town is the Magdalena Hotel, the only inn along the river with accommodations for foreign tourists. Directly in front of the hotel stretches the 500-foot concrete dock with its three large travelling cranes and immense warehouse (Fig. 4).

Shipping, the only industry of importance in Puerto Berrio, is carried on by water, railway, highway, and air. Practically all commodities used by Medellín, (the capitol of Antioquia) and the 24 pueblos along the 187 kilometers of railway from Puerto Berrio, are supplied by this port. The principal materials transported by the railroad are cattle, automobiles, machinery, grain, wearing apparel, and petroleum products. Puerto Berrio also furnishes eastern and southern Santander (the departamento east of Antioquia) with similar commodities, by way of the truck lines oper-

ating over the National Highway between the port and Bogotá. This is a graveled, one way road, with traffic going to Bogotá three times weekly and to Puerto Berrio three times, there being no traffic on Sundays except by special permit. At present a new highway, between Medellín and Cartagena is planned. If this is constructed Puerto Berrio may decline into just another river village.

Until some new crop, suited to the climate of the region, is introduced, the Magdalena Valley, agriculturally, will remain a jungle, inhabited only by mestizos. However, practically the entire valley is at present under concessions to the major oil companies of the world. This presents a bright future, but the fields are as yet undeveloped. Valuable deposits of building stones also await capital for exploitation.

#### NOTE ON THE ORIGIN OF TIFFIN HOLE, IOWA

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In describing the crater-like depression a quarter of a mile south of Tiffin, Iowa, Professor C. C. Wylie emphasized the need for criteria to distinguish depressions caused by meteoritic explosions from those formed by other agencies.<sup>1</sup> He was able to show that this elliptical depression 100 ft. long, 75 ft. across, and about eight feet deep, is not a sink hole, buffalo wallow, artificial pond, or initial depression in glacial drift. Although the Tiffin "Crater" is situated on the flood plain of Clear Creek, 150 ft. distant, it was the opinion of hydraulic engineers that the hole could not have been formed by ordinary processes of stream flow and erosion. Professor Wylie considered the possibility of a meteoritic origin, but was unable to discover convincing field evidence to support this hypothesis.

The writers suggest that Tiffin Hole is a swirl pit formed during a past flood of Clear Creek. Particularly illuminating in this connection is R. F. Collins and Marshall Schalk's

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<sup>1</sup>Wylie, C. C., "A Peculiar Hole Near Tiffin, Iowa", *Popular Astronomy*, Vol. XLV (1937), pp. 445-449.