SURVEY OF THE GEOLOGY OF HAITI

GUIDE TO THE FIELD EXCURSIONS IN HAITI

OF THE

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By

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up during present sea stand. Note the nineteenth century charm still preserved in the numerous gingerbread buildings (figure 29).

EXCURSION TWO: JACMEL - PAILLANT

The Southern Peninsula is crossed once more to reach Carrefour Dufort.

HERE THE LOG IS BASED ON DISTANCE FROM CARREFOUR DUFORT, WHICH IS 37 KMS west of PORT-AU-PRINCE.

As we turn left to move westward along the northern side of the Southern Peninsula observe hills of Miocene - Pliocene limestones as discussed in Stop 3. Note disturbance in Middle Miocene rocks and faults scarp related to the prolongation of the Momance-Riviere Froide Fault in this area.

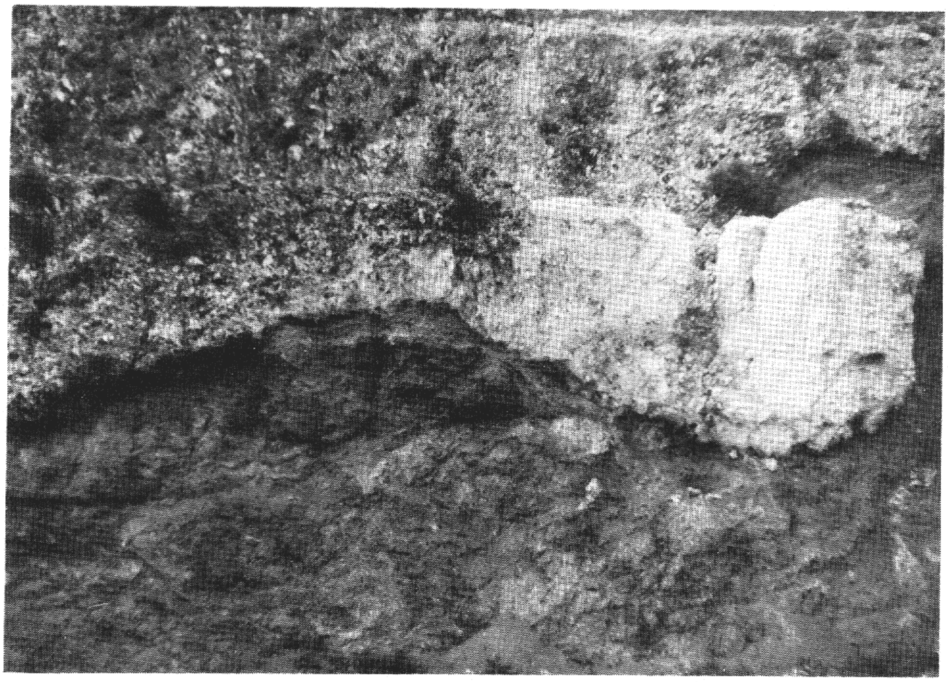
8.0 km. Crushed Miocene limestone and marl, much similar to the facies previously observed on the southern side of the Peninsula (see section of road log after Stop 10).

10.6 km. Carrefour Fauché. Northern extremity of the Jacmel Fauché depression. South of here, clastic deposits rich in coral fragments occur within the depression (figure 2-3). These rocks are part of the Rivière Gauche Formation (figure 19). Scarce planktonic foraminifera found in this lithofacies are not diagnostic of a very precise age, but suggest a late Miocene _Globorotalia menardii_ Zone for the oldest exposed rocks. The predominately coralline beds are remarkably rich in delicate branching taxa (_Porites_, and possibly _Acropora cervicornis_) in the younger levels. The absence of wave resistant forms such as _Acropora palmata_ at these levels may indicate an age older than latest Pliocene, for the top of the formation because the later species is not reported in the Caribbean until that time (Frost, 1972). This lithofacies was deposited in a marine channel that filled the trough of the Jacmel-Fauché depression until probably the latest Pliocene to Pleistocene. Intermittent tectonic disturbances along the fault-bounded trough appear to have caused sporadic slumps of huge quantities of reef rubble into the basin which was receiving large amount of clastics from the rivers and basin edge rock fall. These facies of the Riviere Gauche Formation are much reminiscent of the lithofacies of the Arroyo Blanco Formation (Bermudez) in the Azua Basin, near Fondo Negro, Dominican Republic.

13.0 km. "Tapion de Petit Goave" can be seen to the right, and in background are the mountains of Durissy toward the axis of the Peninsula, where rocks of the Dumisseau complex crop out extensively.

14.9 km. Entrance to the city of Grand Goâve, and bridge crossing river of same name.

FIGURE 28



a

Slope wash of limestone breccia filling erosional gully on Dumisseau complex, near Etang de Miragoane, Southern Peninsula of Haiti.

Andesitic agglomerate intercalated with eupelagic chalk of latest Middle Eocene age (possibly earliest Late Eocene, see text). Puilboreau Mountain, northern Haiti.

b

18.0 km. Foothills of the Tapion of Petit Goâve. The road follows the southwestern flank of this mountain which is a small horst bounded by northwestern striking faults. Note breccia all along the road which practically follows the strike of the southwestern fault.

18.8 km. Folded conglomerate.

21.0 km. View of the Bay of Petit Goâve.

23 - 24 km. Limestone breccia and fault scarp fanglomerate.

29.3 km. Entrance to the city of Petit Goâve. Dumisseau complex crops out on southside of road.

32.1 km. Brecciated shallow-water Eocene limestones. Brecciation here is related to the Trans-Xaragua fault system which crosses this area (figure 3) of the Peninsula diagonally.

32.3 km. Outcrop of the Dumisseau complex which is overlain by fault-scarp fanglomerate. Note nonconformity on south side of road.

35.0 km. Vialet depression, a minor pull-apart zone asociated with the Trans-Xaragua fault. A fault scarp can be seen on the north side of the road (limestone cliff to the right) transecting the mountain. This fault-bounded mountain stood as a nearly separate island during the Pleistocene when most of the present depression was part of a marine gulf which occupied most of the present low-land areas associated with the fault.

41.0 km. Limestone debris that filled erosional channels on the deeply weathered rocks of the Dumisseau complex (figure 28A).

41.9 km. Pillow basalt in Dummisseau complex.

46.5 km. Oliver. Intensely folded and faulted chert intercalated with basalt of the Dumisseau complex. Note fault scarp on northern side of road.

47.9 km. From this area westward view of the Etang de Miragoâne. Note limestones in igneous rock just before crossing bridge over outlet channel of the lake. An igneous intrusion also occurs near the road. It is related to later magmatic activities along the fault line.

At Carrefour Desruisseaux you observe cliffs with rugged topography which consist of Pleistocene reefs. They extend southwestward to Fond des Nègres. They are also found west of the city of Miragoâne about 2 kilometres north of Carrefour Desruisseaux.

The presence of the Pleistocene reefs around the Plateau de Rochelois and Massif du Bonnet Carré (figure 4) are evidence for the extension of the marine gulf over this area during the Pleistocene.

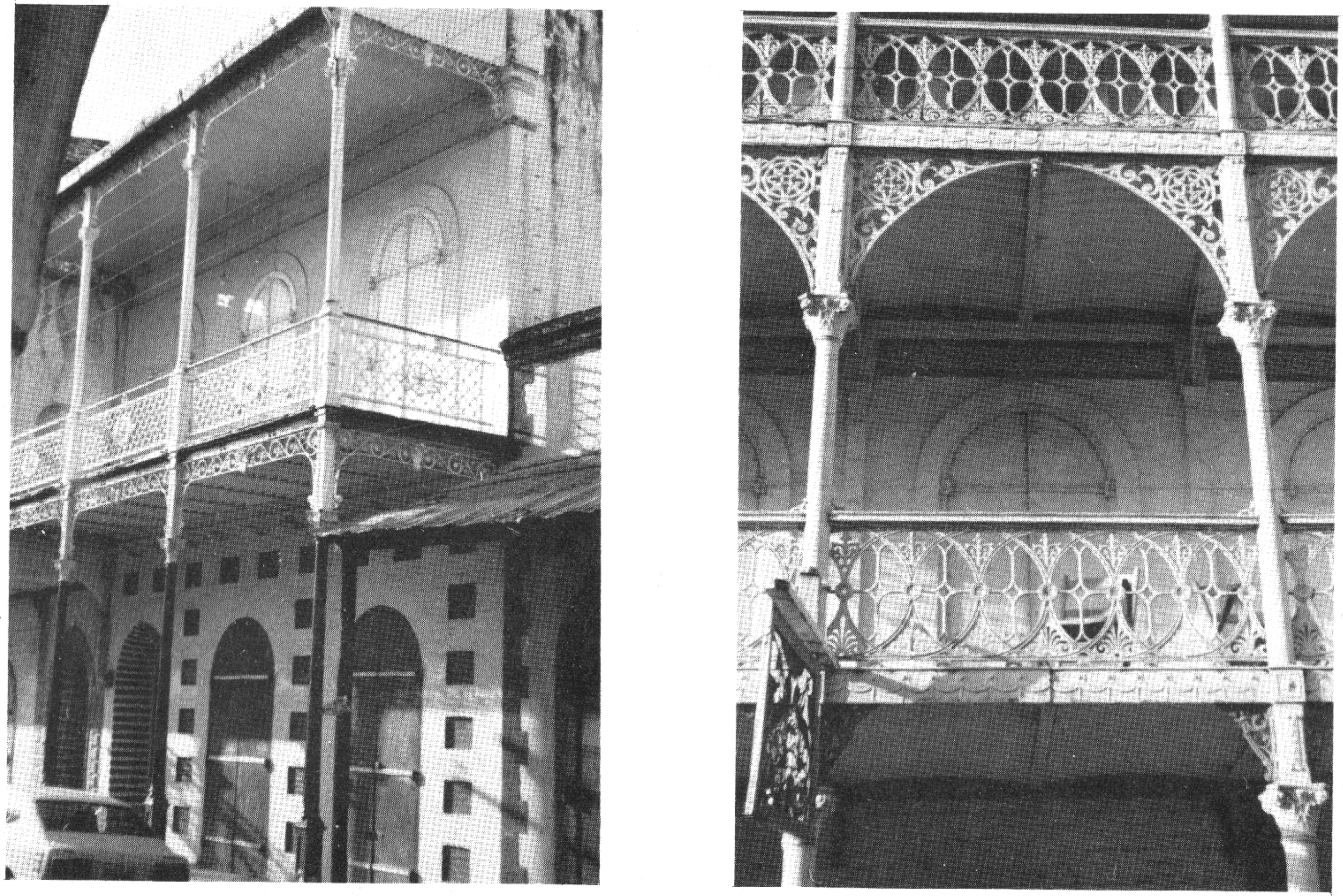


FIGURE 29 Examples of residential and commercial (ground level floor) houses adorned with fanciful ironwork balconies, built at the turn of the century. Jacmel, Southern Peninsula of Haiti.

Near Miragoane the reefs developed over a basement of the Dumisseau complex south and east of the city, whereas they overlie Oligocene to Miocene Pelagic limestone and chalk facies west of the city. Pillow basalts of the Dumisseau complex can also be observed on the west side of the road from Carrefour Desruisseaux to Miragoâne. Many outcrops of Oligocene chalk occur in windows underneath the reefs between Miragoâne and the loading facilities of the Reynolds Haitian Mines Company west of the city.

To the west of Carrefour Desruisseaux, on the road to Cayes, more outcrops of the Dumisseau Complex also include pillow basalts. Biohermal coralline limestones are well developed up to Fond-des-Nègres (Figure 12). It is probable that the marine gulf isolated the portion of the Southern Peninsula west of the Vallée de Fond-des-Nègres (figure 4) to Vieux-Bourg d' Aquin, from the eastern portion wich was then an extension of the island formed by the La Selle-Baoruco block.

After crossing the city of Miragoâne the road proceeds westward along the steep coast bordered by mangrove swamps. About a kilometer west of Miragoâne observe a large karst spring underneath the coralline limestones. The water from this spring is brackish (salinity is about 10.5 parts per thousand, Woodring et al., 1924) suggesting it comes also from the Oligocene chalk which is slightly salty in this area.

ROAD LOG IS HERE BASED ON DISTANCES FROM THE JUNCTION OF THE ROAD TO PAILLANT WITH THE MAIN ROAD. (BAUXITE DRYING AND LOADING FACILITIES OF THE REYNOLDS HAITIAN MINES).

1.2 km. Note extensive karst topography developed on the Pleistocene coralline limestones of raised reef terraces. Most of these coralline rocks are of the back-reef environment and unconformably overlie the Oligocene series.

2.9 km. Calcareous breccia related to dislocation along subsidiary faults of the Trans-Xaragua fault system (figure 3).

3.2 km. Thinnly bedded foraminiferal limestones and chalk of a facies analogous to the Neiba Formation in the Dominican Republic, as previously mentioned. Occasional chert stringers are present at scattered intervals. The series is remarkably rich in Chilogumbelina which are here of large size, as compared to the usually small size of this group exhibited elsewhere. These rocks are of Early Oligocene age, possibly latest Eocene in the lowest part of the section.

Farther up hill toward Paillant observe gradual change of the Neiba type of facies into the Jérémie Formation type of facies.

3.5 km. STOP 11. About 12 meter high cliff of very white chalk with intercalation of irregularly shaped coarse biocalcarenite lenses

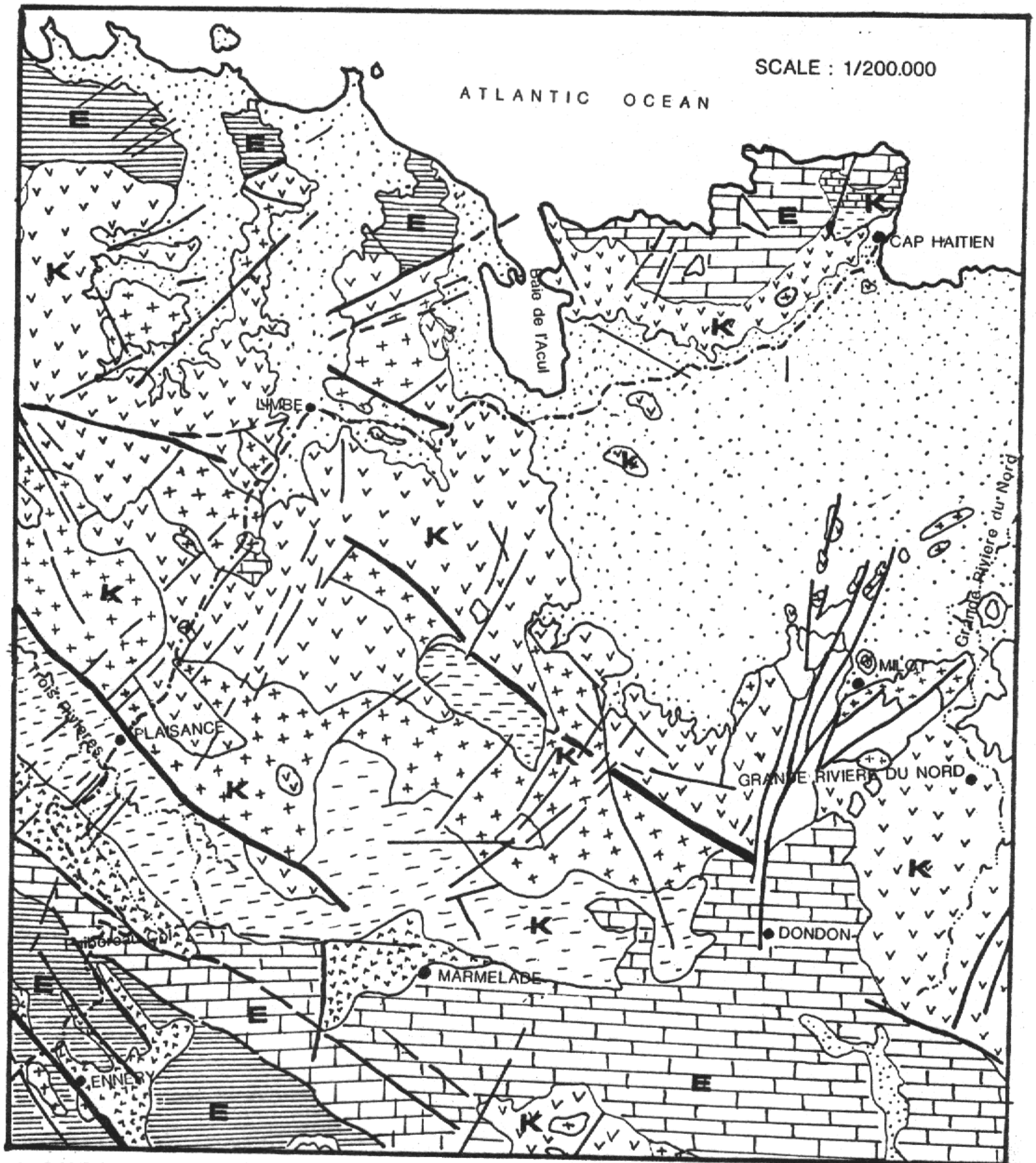


FIGURE 30 Geologic map of northern Haiti from Ennery to Cap Haitien (modified from U.N/D.M.R.E Provisional Geologic Map of Haiti)

K : Cretaceous E : Eocene

Main road — Rivers — Trois Rivieres Formation — Plaisance Formation Shallow-water limestone

Neiba/jeremie limestone and chalk facies — Igneous(basaltic)

Igneous(andesitic/rhyolitic) — Igneous(basaltic:Post-Cretaceous) — Alluvial and layers. This is again the Jérémie Formation type of facies. As mentioned in the discussion on the formations, here there are numerous coarse biogenic turbidites intercalated with the chalk. The chalk layers consist essentially of foraminiferal-nannaplankton biomicrites is dominated by the great abundance of Chilogumbelina. Other taxa include Globigerina rohri, Globorotalia opima, Globigerina ampliapertura and Globigerina aff. turgida, indicative of Middle Oligocene or earliest Late Oligocene age. The biocalcarenite layers include mostly shallow-water benthic foraminifera and associated neritic organisms.

The bioclastic layers are also often partly silicified, much in the same manner as will be observed in closely related but older facies at STOP 16. These intrabasinal biogenic turbidites evidently slumped into deep water from the edge of shallow bank with steep edge. Modern analogs can be examplified by present conditions prevailing over the Bahama bank area.

Large influx of neritic elements into the deep basin was partially controlled by changing dynamic conditions over the bank probably related to the reported world-wide sea level low during the late Oligocene (Vail et al., 1977).

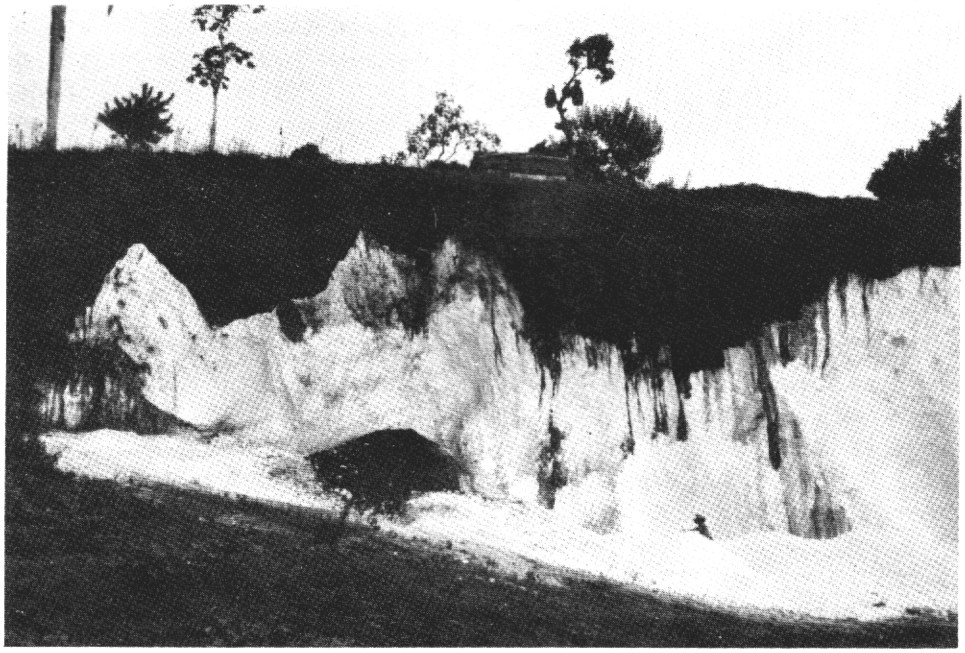
Note minor high angle transversal faults cutting the series as we proceed uphill toward Paillant located at the edge of the Plateau de Rochelois. This road climbs to an altitude of nearly a thousand meters in about 16 kilometers, which makes for one of the steepest haul grades in the world.

The bauxite mining area occurs immediately after the village of Paillant. Note sharp contrast between calcareous breccia and overlying Bauxitic soil all along roads crisscrossing the irregular surface of the Plateau (figure 31A). Pine forests grow over various reclaimed areas.

Like other bauxitic deposits in the Caribbean such as those in Jamaica and the Barahona Peninsula (figure 2) in the Dominican Republic, the bauxite of the Plateau de Rochelois occurs on a Karst terrane. In the Paillant area bauxite occurs as blanket and shallow pocket deposits of a few meters thick, and in places in deeper pockets 3 to 15 meters thick. The Reynolds Haitian Mines, a subsidiary of Reynolds Metals Co., is the sole mining company of the deposits. Mining started in 1956, and since shipments are processed at the company's alumina plant in Corpus Christi, Texas.

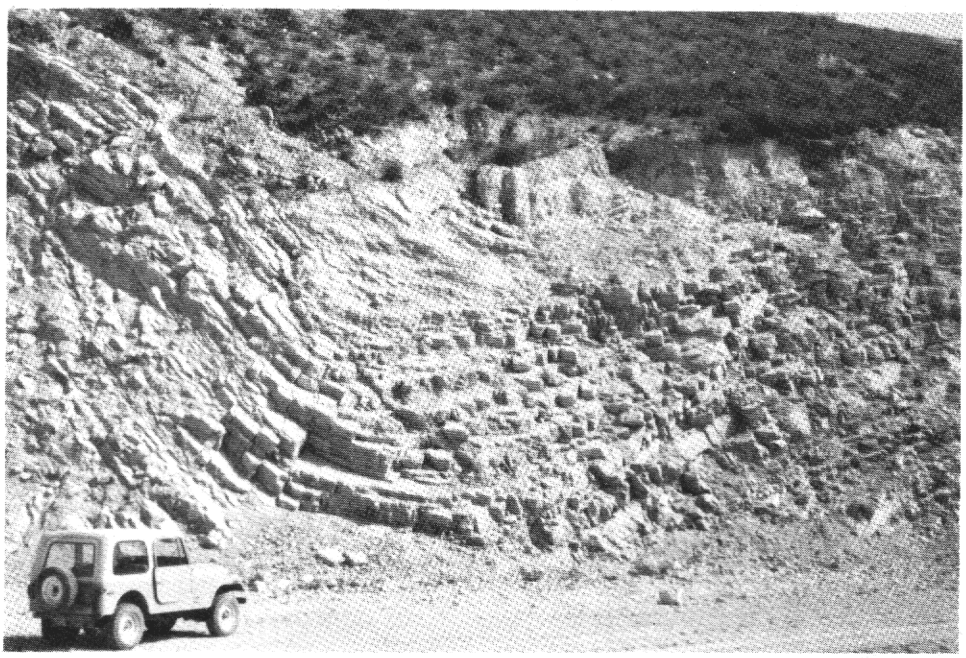
The bauxite here apparently derived from weathering of volcanogenic products and to a lesser extent from residues of the limestone substrate. Their predominately igneous origin is supported by several lignes of evidence: 1) high purity of the underlying limestones; 2) the bauxitic laterites always occur over the limestones without transition 3) their mainly gibbsite $Al(OH)_3$ composition.

FIGURE 31



a

Bauxite capping calcareous breccia. Plateau de Rochelois near Paillant, Southern Peninsula of Haiti.



b

Gently folded upper Miocene nerito-pelagic limestone at Source Matelas quarry, 30 kilometers north of Port-au-Prince, Haiti. (STOP 12)

The weathered igneous rocks at the origin of the bauxite may have derived in part from neighbouring rocks of the Dumisseau complex. It is also inferred that allochtonous ash products from volcanoes located north of the Cul-de-sac/Enriquillo graben may have provided the bulk of the parent material which accumulated over the area during Oligocene and Miocene times. The trade winds of these times may have been the primary factor controlling the distribution of the ashes over this area. Extensive laterites must have developed over the area as early as middle Miocene times because upper Miocene clastic deposits in the Peninsula also include red lateritic clays.

The average alumina (Al_2O_3) content of the bauxite of the Plateau de Rochelois is about 50 percent, silica (SiO_2) content is about 3.4 percent, and iron oxides 21 percent. Presently the bauxite of this Plateau is the only economic mineral being explored in Haiti. Other potentially exploitable deposits occur farther east in the La Selle Mountain (figures 3,4).

END OF EXCURSION 2   RETURN TO PORT-AU-PRINCE FOR OVERNIGHT STAY.

<u>EXCURSION THREE:</u> PORT-AU-PRINCE - CAP HAITIEN

ROAD LOG IS BASED ON DISTANCES GIVEN BY THE ROAD POSTS.

As we turn on Nationale one from the road adjacent to the international airport note yellowish-brown marl on the right side. This is part of the Delmas-Rivière Grise Formations which make up the hills of Port-au-Prince, as previously discussed.

We proceed across the fertile part of the southern edge of the Cul-de-Sac Plain, cross the bridge over Rivière Grise (also called Rivière du Cul-de-Sac) and continue northward. Note progressive change that takes place in the vegetation which becomes totally xerophytic in the northern part of the plain. This is due to the rain shadow effect of the Chaine des Matheux and Montagnes du Trou d'Eau (figure 4).

The Cul-de-Sac Plain is the western extension of the major pull-apart depression which divides Hispaniola into two distinct geologic provinces. The area was open marine during most of Cenozic time but became emergent during late Pleistocene due to a later episode of compression related to strike-slip motion along the northern Caribbean megashear (Maurrasse et al., 1982b). These late tectonic activities gave rise to high-angle reversed faults as well as minor thrust faults along both the northern and southern edges of the depression.

17.0 km. Pebbly mudstone of late Pleistocene to Holocene ages. Note low hills made up of fanglomerates which developed along the southwestern side of the Chaine des Matheux (Figures 3-4).