SOUTHERN REGION.

General Features.

The igneous rocks of the southern part of the Republic are more uniform than those of the northern and central regions. So far as known, all are of extrusive origin or are parts of minor intrusive bodies associated with eruptions of lava. With the exception of small areas of andesitic rocks near Baradères the lavas are predominantly basalts. The largest area of these basaltic rocks is in the Massif de la Selle, where they are exposed on the crest of the major anticlinal arch. Smaller areas are exposed farther west, where the overlying Tertiary limestones have been removed by erosion.

With the possible exception of a minor occurrence of basalt that may be of Miocene age, a Cretaceous period of igneous activity is the only one that has been recognized in the southern region. The small zone of andesitic rocks near Baradères may not belong to the main period of basaltic eruptions, but as the andesites also underlie the upper Eocene limestone, the two periods of eruption probably were separated by only a relatively short interval.

Late Cretaceous Basaltic Rocks.

DISTRIBUTION AND STRUCTURAL RELATIONS.

Basaltic rocks, probably of late Cretaceous age, constitute most of the basement on which the Tertiary limestones were deposited in the southern part of the Republic. Their surface distribution is entirely dependent on later erosion. At many places the basalts are exposed only in small patches beneath the cover of Tertiary sediments. A number of the larger exposures are shown on the geologic map (Pl. I). Descriptions of the distribution and structural relations in the larger areas examined during the reconnaissance are given below.

Massif de la Selle.—In the Massif de la Selle the overlying upper Eocene limestone has been removed over an area from 500 to 600 square kilometers in extent. The major structure of the area is that of an eroded anticlinal arch, although this structure is modified by more or less extensive faulting. The northern boundary of the area, near Furcy, which is marked by a conspicuous scarp of limestone, appears to be a high-angle thrust fault. (See Fig. 20, *A*, p. 322.) At the southern boundary, along the Grande Rivière de Jacmel, the contact is also marked by a fault, upturned basal beds of Eocene limestone being in contact with massive basalt. (See Fig. 20, *B*.) The faulting at this locality appears to be normal. The basal beds of the upper Eocene limestone are clearly exposed along the Grande Rivière de Jacmel below the boundary between the basalt and the limestone. Near Furcy the upper part of the series is in contact with the basalt. The southeastern boundary of the area was not seen, except

from a distance, but it appears to be irregular, owing to high limestone ranges that jut into the area of basalt. At the southern boundary of the Léogane Plain, near the Rivière des Citronniers, basaltic agglomerate and breccia pass under the alluvial deposits. Farther east, along the Rivière Momance, the basaltic breccia and limestone seem to be in fault contact.

A small area of basalt is exposed on the south coast, on the west side of the small stream at Guillaumone. This basalt clearly underlies the upper Eocene limestone. An exposure on the slope leading down to the coast shows that the limestone was deposited on an irregular surface of the basalt.

A larger area of basalt lies back of the plain at Cayes de Jacmel. Impure tuffaceous limestones are interbedded with the basalts south of Étang Bossier. There is no basis for the supposition that Étang Bossier is a crater lake.

Near the base of the basalts in the Massif de la Selle are interbedded impure tuffaceous limestones and shaly rocks of marine origin, giving evidence of contemporaneous volcanic activity during their deposition. (See p. 95.) Patches of older sheared metamorphic limestones are engulfed in the basalts at several localities. (See p. 92.) Both the basalts and their associated tuffs and limestones are intricately folded.

Except for thin local beds or lenses the basalts are remarkably free from interbedded tuffs or other pyroclastic débris, although in the valley of the Rivière des Citronniers there are exposures of coarse volcanic breccias and tuffs, which appear to be of considerable extent and thickness. Whether these rocks are at the top or the bottom of the eruptive series was not definitely determined, although they probably are near the top.

The generalized sections in Figure 20, *A* and *B*, show the relations of the basalts and the associated limestones in the Massif de la Selle.

Étang de Miragoane.—Basalts are exposed in the depression occupied by the Étang de Miragoane. Along the road at the north side of the lake the basalts are overlain unconformably by basal beds of the upper Eocene limestone, consisting of fine conglomerates or sandstones and dark slates. The south side of the basin was not explored, but it consists of a straight and rather steep mountain front, the lower slopes of which may possibly be of volcanic rocks but the crest is composed of limestone. This mountain wall may be flank of an eroded anticline, the crest of which passes through the center of the depression occupied by the Étang de Miragoane.

Vicinity of Asile Valley.—Basaltic rocks associated in part with limestones, probably of upper Cretaceous age, are exposed along the Grande Rivière des Nippes and the Rivière Serpent. The structural relations of these limestones to the basalts indicate that they were deposited at the time of the earlier eruptions.

Pillow structure in basalt exposed north of the Grande-Rivière des Nippes on the trail to Anse-à-Veau shows that some of the flows were

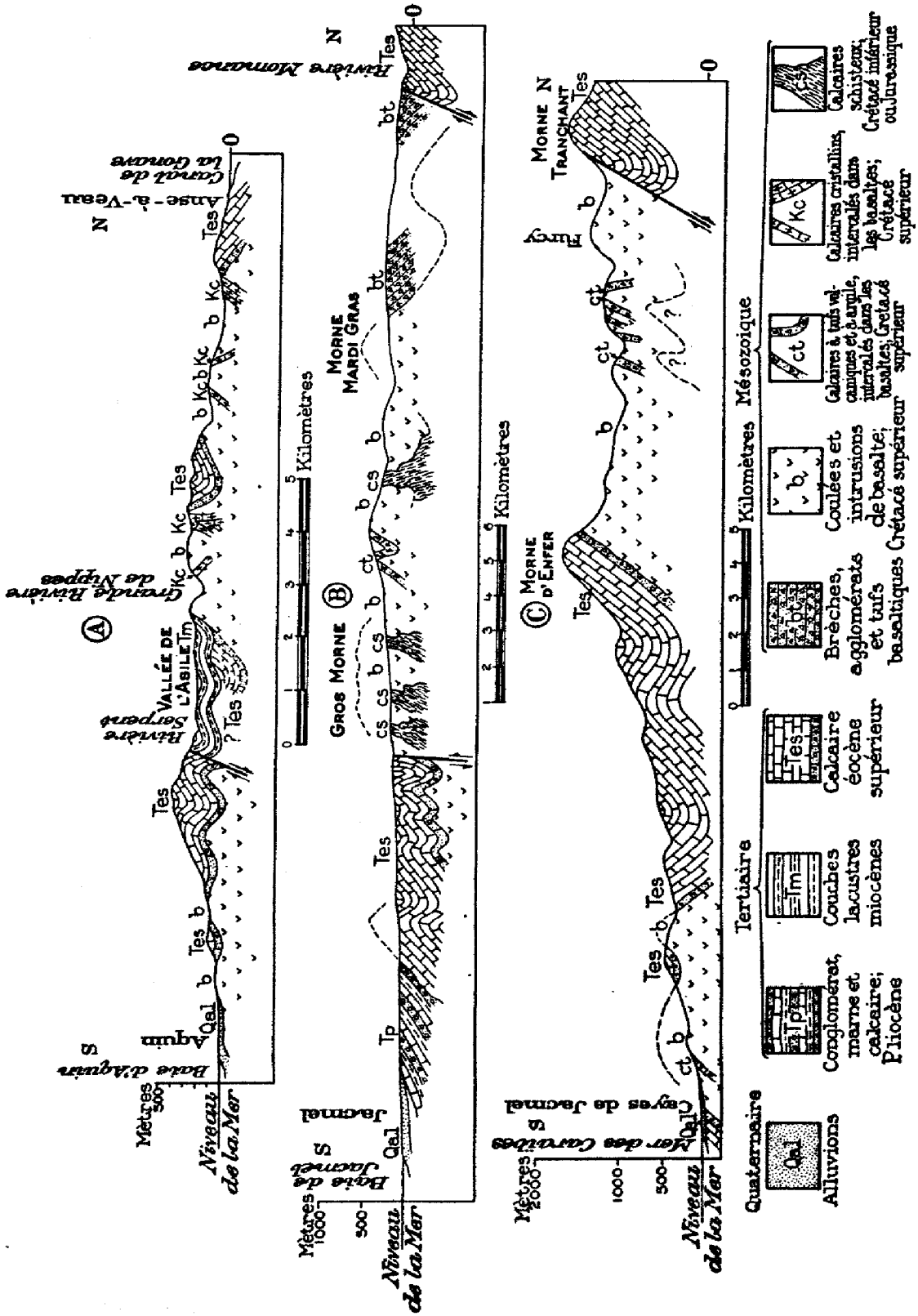

FIGURE 20.—Generalized sections across the Southern Peninsula showing the relations of the basaltic lavas and the sedimentary rocks.

A, Section from Aquin through the Asile Valley to Anse-à-Veau. *B*, Section from Jacmel to the Rivière Momance, southeast of the Léogane Plain. *C*, Section from Cayes de Jacmel to Morne Tranchant.

submarine and included fossiliferous calcareous mud similar to that which forms the more massive limestones. (See Plate VIII, *B*, and p. 96.) At other places the lavas have overflowed or buried more indurated calcareous deposits. The contacts at some places are parallel to the bedding planes of the limestones. Figure 20, *C*, is a generalized section which shows diagrammatically the relations of the upper Cretaceous (?) sedimentary rocks to the basalts.

Vicinity of Aquin and St. Louis du Sud.—Basalts crop out in some parts of the Aquin Plain and along its borders, where they are overlain by upper Eocene limestone. A few low hills between Aquin and Vieux Bourg consist largely of basalt, but their sides are strewn with limestone float, which probably comes from a cap of upper Eocene limestone. A good exposure in a road cut about 8 or 9 kilometers west of Aquin shows basalt overlain by brownish and greenish shales and impure limestone. Farther west along the coast, near St. Louis du Sud, the basalts form the lower parts of the mountain ranges, which are capped with massive limestones, and also form many of the coastal hills. The lower alluvial valleys of some of the rivers, such as that of the Rivière du Mesle, are underlain by basalts, although the bed rock is concealed in places by river deposits. East of St. Louis du Sud many of the basalts show pillow structure and weather into ellipsoidal or round boulders, which strew the ground. Basalt underlying the basal beds of the upper Eocene limestone is exposed on the trail from Cavaillon to St.-Louis, near the crest of the hill 6 or 7 kilometers southeast of Cavaillon.

Western part of peninsula.—North of Port-à-Piment the basaltic rocks occupy an east-west troughlike valley that separates the limestone mountains near the coast from the outskirts of the main range of the Massif de la Hotte to the north. From Les Anglais to Tiburon the low basalt ranges skirt the coast and a higher limestone range, which adjoins them to the north. Between Tiburon and Anse d'Ainhault basalt is the predominating rock of the foothills and low ridges along the coast, although here and there spurs of limestone extend to the coast. Limestone crops out on the crests of the higher ranges to the east.

Sources Chaudes.—The interior valley at the Sources Chaudes is in basaltic rocks, which are apparently overlain along the northern border by basal shaly beds of the upper Eocene limestone. The hot springs issue from fissures in the basalt along the south side of the valley.

PETROGRAPHY AND CHEMICAL COMPOSITION.

Basalts.—The normal basalts are dark-gray to black rocks, less commonly brownish gray or brown because of alteration. In texture they generally are aphanitic, but contain a few phenocrysts of plagioclase, augite, or olivine. Some of the rocks, particularly those in the central part of the peninsula, are amygdaloidal, and pillow structure is common everywhere. The amygdules generally are filled with chloritic minerals, chalcedony,

calcite, or zeolites, and a few contain pyrite. The blocks of the pillow lavas vary from subangular to smoothly ellipsoidal in outline and range in diameter from 8 or 10 centimeters to a meter or more. The spaces between the blocks may be occupied by secondary minerals or, less commonly, by sediments (Pl. VIII, *B*). Some of the more altered purplish-brown lavas are amygdular and have a banding or eutaxitic structure.

The black lavas weather at the surface to a brownish gray or rusty brown, and have rusty-brown films along the joint cracks. The pillow lavas weather into round cobbles or boulders that may strew the ground. They disintegrate by spalling off parallel to the surface.

In thin section the dark-gray aphanitic lavas generally are porphyritic, containing phenocrysts of basic plagioclase and less commonly of diopside or augite in a groundmass of intergranular texture, consisting of granules of augite interstitial to a plexus of thin plagioclase laths. (See Pl. XXIII, *A*, p. 316.) Many lavas contain a few phenocrysts of olivine.

The plagioclase phenocrysts are euhedral to subhedral prisms, generally from 0.2 to 2.0 millimeters in length, and comprise from 5 to 10 per cent of the rock volume. They differ in composition in different lavas but are either bytownite or labradorite when unaltered and are somewhat zonal. The more calcic plagioclase may have centers as calcic as Ab_{25} An_{75}, but most of the phenocrysts are calcic labradorite (Ab_{40} An_{60} to Ab_{35} An_{65}). The plagioclase may be partly in clusters of prisms. A few smaller phenocrysts of diopside or augite may be present, generally associated with the clusters of plagioclase.

Olivine is sparingly present as phenocrysts in many of the lavas but rarely comprises more than a small proportion of the rock. It generally is partly or completely altered to serpentine or iddingsite. Olivine or its alteration products comprise as much as 10 or 15 per cent of the rocks in only one or two specimens examined. Such rocks are olivine basalts.

The plagioclase of the groundmass is in thin subhedral to euhedral prisms, consisting mostly of labradorite (Ab_{40} An_{60}). They range in length from 0.05 to 0.5 millimeter. In many of the basalts the prisms are interlacing. In specimens containing a high percentage of augite or a partly glassy base, they may form only a very incomplete network. The plagioclase, including the phenocrysts, forms 30 to 45 per cent of the rock.

The pyroxene, which is the predominating constituent in most of the rocks, generally appears to be a variety of diopside but varies in different rocks ($\alpha=1.675$, $\beta=1.685$, $\gamma=1.70$–1.705). It is nearly colorless or slightly greenish to brownish, and except for a few scattered phenocrysts in some of the rocks is in small granules (0.05 millimeter) interstitial to the plagioclase. The diopside rarely occurs in grains large enough to inclose prisms of plagioclase. It forms 40 to 60 per cent of the rock.

Magnetite, probably titaniferous, occurs in small grains interstitial to the plagioclase or as larger grains of earlier crystallization. In some lavas

the iron ore is certainly largely ilmenite. The iron ores comprise from 5 to 10 or 12 per cent of the rock. A few grains of greenish to brownish accessory hornblende were noted in one rock.

Some rocks are coarser grained, containing pyroxene grains as much as a millimeter or more in diameter inclosing the plagioclase and producing a subophitic texture. The texture is in some places intersertal, with glass or alteration products occupying the spaces between the diopside or augite. A brownish to greenish micaceous mineral, resembling the serpentine that replaces some of the olivine, fills pores in the groundmass of some lavas.

A chemical analysis of a basalt from the Massif de la Selle, north of the Rivière Gosseline, and the average of a number of analyses of basalts for comparison are given in the following table:

Analysis of basalt from the Southern Peninsula of Haiti, and average analysis of basalt.

	1	2
SiO_2	48.97	48.78
Al_2O_3	14.90	15.85
Fe_2O_3	.96	5.37
FeO	10.27	6.34
MgO	7.09	6.03
CaO	11.72	8.91
Na_2O	2.06	3.18
K_2O	.33	1.63
H_2O+	1.35	1.76
H_2O-	.28	
TiO_2	2.05	1.39
P_2O_5	.24	.47
MnO	.15	.29
	100.37	

1. Basalt, Southern Peninsula of Haiti, Massif de la Selle north of the Rivière Gosseline, Republic of Haiti. H. S. Washington, analyst.

2. Average of 161 analyses of basalt. Daly, R. A., Igneous rocks and their origin, p. 27, 1914.

The mineral composition of the rock analyzed, as measured approximately by the Rosiwal method, and the norm, as calculated according to the quantitative classification, are as follows:

Approximate mineral composition and norm of basalt from the Southern Peninsula of Haiti.

Approximate mineral composition.		Norm.	
Labradorite	38.6	Orthoclase	1.84
Diopside	50.6	Albite	17.40
Olivine and serpentine	4.1	Anorthite	30.44
Ilmenite and magnetite	6.7	Diopside	21.51
		Hypersthene	20.60
		Olivine	1.09
		Ilmenite	3.88
		Magnetite	1.39
		Apatite	.57
		The rock is auvergnose (III.5.4.5).	

The basalt is notably high in lime and is rather high in titanium. The low ferric iron indicates that the iron ore is largely ilmenite.

Albitized or spilitic basalts.—Reddish-brown to gray lavas of amygdaloidal texture, in which the feldspars are largely albite, apparently of secondary and late magmatic origin, are found in the valley of the Rivière des Citronniers. The amygdules have a maximum diameter of 5 or 6 centimeters. They are filled with calcite, chlorite, or zeolites.

In thin section the rocks are porphyritic, containing phenocrysts of plagioclase and some of olivine in a groundmass of intergranular texture similar to that of the normal basalts. The plagioclase consists largely or entirely of albite. Their original texture and twinning lamallae are generally preserved, although in some rocks the plagioclase is recrystallized to a granular aggregate of albite. The olivine once present in some of the rocks is altered to iron oxides or chloritic minerals. The pyroxenes are rather fresh, although they may be partly replaced by chlorite. Chlorite and zeolites replace the plagioclase in some of the rocks.

The amygdules of the rocks consist of zeolites, chlorite, and calcite. The zeolites do not appear to correspond in optical properties to any described species. In some rocks zeolites (?) are the principal minerals in the amygdules. They form parallel or radial crystalline growths or hard fibrous growths resembling chalcedony. Some of the minerals are stained pinkish in places from impurities.

The optical properties of three minerals that are common in many of the lavas were determined as follows:

1. A colorless to translucent or whitish mineral forms parallel or radiating growths of prismatic plates. Fragments colorless. Optically +, 2V medium. Prismatic plates with Z normal to perfect cleavage and plates. Y is parallel to the prismatic cleavage and elongation. Crushed fragments tend to lie on a face that is normal to Z and that in convergent light shows an acute bisectrix.

$\alpha = 1.523 \pm 0.003$ $\beta = 1.524 \pm 0.003$ $\gamma = 1.536 \pm 0.003$.

2. Translucent to white or bluish fibrous platy mineral. Hardness 5 to 6. Fragments may be clouded with threadlike inclusions parallel to cleavage. Optically +, 2V large. Prismatic plates with Z normal to platy cleavage. X is parallel to fibers or prismatic cleavage. Crushed fragments tend to lie on a face that is normal to Z and that shows a positive bisectrix.

$\alpha = 1.508 \pm .003$. $\beta = 1.51 \pm .003$. $\gamma = 1.513 \pm .003$.

3. Whitish to bluish translucent mineral in tough fibrous growths. Hardness 6. Parallel fibers with parallel extinction and negative elongation. Birefringence very low ($.001 \pm$). $n = 1.52$ approximately.

Diabase porphyries.—Coarse-grained basaltic rocks containing large phenocrysts of plagioclase and some of augite were found at several places in the Massif de la Selle south of Furcy. The plagioclase phenocrysts,

consisting of labradorite and bytownite, range from a few millimeters to 1 centimeter in length and comprise 10 to 15 per cent of the rock. The phenocrysts are partly in starlike groups. The plagioclase phenocrysts in one of the specimens are considerably clouded with saussuritic aggregates and are replaced along cracks by chlorite. The texture of the groundmass of these rocks is subophitic. The grains of augite are about a millimeter in diameter and only partly wrap around the plagioclase in the groundmass. Besides platy titaniferous magnetite or ilmenite a few flakes of partly altered biotite occur as an accessory mineral. Pyrite is a secondary mineral in one specimen. Although the texture of these rocks is not typical of the coarse-grained diabases, they presumably are parts of minor intrusive bodies.

Basic augite andesites.—Rocks similar to the ordinary basalt in appearance and texture, but in which the plagioclase is predominantly andesine (Ab_{60} An_{40}), were found at a few places in the central part of the peninsula between Miragoane and Aquin. They contain no remnants of olivine and generally have some interstitial brown glassy base. The few specimens studied are considerably more altered than most of the basalts. Chlorite (delessite), calcite, and zeolites are abundant alteration products, replacing plagioclase and obscuring the texture of some of the rocks. Calcite and heulandite are associated in veinlets and replace the plagioclase. The plagioclase seems to be the first mineral to alter, the augite in some rocks remaining almost unaltered when the plagioclase is nearly destroyed.

ALTERATION.

The only extensive alteration products in the basalts are chlorite, zeolites, calcite, and serpentine. The chlorite, calcite, and zeolites form amygdules or line vesicles and may fill the spaces or replace the basalts around the blocks in pillar lavas. In some places the rock is almost completely replaced by these minerals. The plagioclase is the first mineral attacked in alterations of this type. The zeolites are analcite, heulandite, and several unidentified or undescribed species found in the albitized basalts along the Rivière des Citronniers. (See p. 326.) Heulandite is widespread and generally is intergrown with or accompanies calcite. In a few places pyrite accompanies analcite and calcite in amygdules. The presence of these alteration products only in the amygdules of some rocks or between the blocks of pillow lava indicates that they were formed during or shortly after the period of volcanic activity. They were presumably deposited from aqueous solutions expelled by the solidification of the lavas themselves or from similar solutions of extraneous origin and from hot springs associated with the volcanic activity. The complete alteration of some lavas probably was due to their position near volcanic centers or near conduits bearing such solutions.

The alteration of olivine to serpentine or iddingsite appears to be of slightly different character. This alteration may have taken place in rock

that is otherwise quite fresh. It probably occurred during or soon after the solidification of the lavas and was assisted only by the presence of a small amount of expelled water.

Local albitization and formation of zeolites and other minerals (?) was noted in the reddish amygdular lavas from the valley of the Rivière des Citronniers and in reddish amygdular lava from the Grande Rivière de Nippes. There appears to be little doubt as to the secondary origin of the albite in some of these rocks, although the augite is unaltered.

The basaltic lavas weather to hematite-bearing soil.

ORIGIN OF THE LAVAS.

The uniformity of the basalts over the greater part of the southern region and the general lack of extensive pyroclastic deposits indicate that they were erupted principally through fissures. A few small dikes, however, cut the basaltic rocks.

The large deposits of agglomerate and tuff along the north side of the Massif de la Selle south and east of the Léogane Plain may have been formed during a late period in the volcanic activity, as they are not near the base of the basalt series. These deposits must have been formed by explosive eruptions from central vents or volcanoes. It may be of some significance that the amygdaloidal albitized or spilitic lavas are found in the vicinity of the fragmental deposits in the valley of Rivière des Citronniers. During periods of relative quiet between periods of explosive activity the molten lava in the volcanic necks or conduits would be under conditions more favorable for the concentration of the light constituents than during the relatively quick eruptions that produced the fissure type of rocks. The concentration in the upper part of the magma chambers of the volatile and alkaline constituents would produce alkaline magmas yielding highly gaseous vesicular and amygdaloidal lavas and would cause the local albitization either of the lavas themselves or of the rocks adjacent to the volcanic vent.

The association of the lavas with limestones north of the Asile Valley, the presence of pillow structure in many of them, and the interbedding of calcareous shales and limestones in the lavas of the Massif de la Selle all seem to indicate that the eruptions took place at or near sea level and were sometimes interrupted by the deposition of material derived from them on flood plains or in the sea. Some of the flows were undoubtedly submarine, possibly the greater part of those that show pillow structure. Some of the submarine flows may not have pillow structure.

The centers from which the eruptions of the southern region took place are not known and in all probability were not confined to the present outlines of the peninsula, which were largely determined in late Tertiary time. The agglomerates and tuffs in the northwestern part of the Massif de la Selle probably are close to later centers of explosive activity.

AGE OF THE LAVAS.

As the lavas in the Massif de la Selle at Étang Bossier are interbedded with limestones containing fragments of supposed upper Cretaceous mollusks, a part of the eruptive rocks at this locality is probably of late Cretaceous age. (See p. 95.) Pillow lavas east of the Asile Valley along the Grande Rivière de Nippes are also associated with limestones which are probably of the same age. (See Pl. VIII, *B*.) The lavas both in the Massif de la Selle and at other places in the Southern Peninsula contain interbedded marine deposits, indicating that the eruptions took place at or near sea level, probably for the most part during Cretaceous time. Between Jacmel and Léogane the basalts have buried sheared limestones, which may be lower Cretaceous or older.

The periods of greatest igneous activity were probably in upper and possibly late middle Cretaceous time. Probably the activity ceased during the folding that took place in most parts of the Republic in very late Cretaceous time. No evidence of contemporaneous activity was found in any part of the basal upper Eocene of the Southern Peninsula.

ANDESITES.

DISTRIBUTION, STRUCTURAL RELATIONS, AND AGE.

Andesitic lavas were found only west of Baradères, where they underlie the upper Eocene limestone unconformably, like the basalts east of the town. Their relations to these basalts are unknown, but they may be minor flows or intrusive bodies of the same age as the Cretaceous basaltic eruptions. So far as known they are not interbedded with basalts. They extend from the vicinity of the Rivière Salée eastward to the Rivière du Baradères. Small areas may extend along the west side of the Baie des Baradères.

PETROGRAPHY.

Hypersthene andesites.—Gray or brown rocks of fine-grained porphyritic texture containing abundant plagioclase phenocrysts as much as 1 millimeter in length and scattered smaller prisms of altered hypersthene make up part of the andesites. One specimen showed fine platy partings or sheeting planes about 4 millimeters apart, probably genetically related to the contraction of the rock after solidification.

In thin section the sheeted lava consists of plagioclase phenocrysts, mostly in euhedral prisms from 0.2 to 1 millimeter in length, comprising about 50 per cent of the rock, in a fine-grained semicrystalline base. The plagioclase phenocrysts range from labradorite (Ab_{40} An_{60}) in the more calcic ones to calcic andesine and are strongly zonal. They probably average a calcic andesine or sodic labradorite (Ab_{50} $An_{50}\pm$) in composition. Bastite pseudomorphs after hypersthene are less abundant as phenocrysts, a few of them a millimeter in length. The groundmass consists mainly of small plagioclase prisms and microlites, prisms and microlites

of bastite, and some light-colored glassy base. A small amount of magnetite and numerous small apatite prisms are scattered in the groundmass. The rock is notably low in dark constituents.

Hornblende andesites.—Light-gray to brownish-gray porphyritic rocks containing plagioclase and hornblende phenocrysts in a fine-grained to felsitic groundmass form another variety of the andesites. Some of these andesites weather into round boulders that spall off in concentric zones. These boulders are stained on the outside with brown iron oxides.

In a thin section of a rock collected west of the Rivière des Baradères, the plagioclase phenocrysts form euhedral to subhedral laths, from 2 to 5 millimeters in length, and comprise about 15 to 20 per cent of the rock. The more calcic ones have centers of labradorite (Ab_{40} An_{60}), but most are andesine. Some are strongly zoned, ranging in composition from andesine (Ab_{55} An_{45}) to oligoclase (Ab_{65} An_{35}). The hornblende phenocrysts, as much as 4 or 5 millimeters in length, generally are completely resorbed, leaving a skeleton of magnetite or a granular aggregate of magnetite, pyroxene, plagioclase, and calcite. There are two generations of plagioclase in the groundmass, the later generation of small laths showing a trachytic texture. The plagioclase is sodic andesine or oligoclase (Ab_{65} An_{35} to Ab_{70} An_{30}) in composition. Magnetite and small brownish prisms of apatite are accessory minerals.

Post-Eocene (?) Basaltic Rocks.

Basaltic rocks underlying Pleistocene marine deposits crop out at the base of a prominent sea cliff about 5 kilometers northwest of Chardonnières. A bed of gravel several meters thick, composed of cobbles of the underlying basalt and of limestone, lies at the base of the Pleistocene marine deposits. The basalt itself contains large blocks of white limestone resembling Eocene limestone and blocks of brown metamorphic limestone. The relations suggest that the basalt may overlie the upper Eocene limestone exposed a few hundred meters to the southeast along the coast. As the Eocene age of the limestone fragments in the basalt has not been established the suggestion that the basalt is younger than Eocene is only tentative. No exposures of basalt known to be younger than Eocene have been recognized south of the Cul-de-Sac Plain. The Oligocene and Miocene basalts in the Chaîne des Mateux and Montagnes du Trou d'Eau are entirely different from any basalts found in the Southern Peninsula.

The basalt in the cliff near Chardonnières is mottled from greenish gray to red or black by weathering. It is thickly veined with calcite, part of it in crystals 10 to 15 centimeters in length. The lava is an ordinary basalt or an augite-rich andesite, as the plagioclase is labradorite and calcic andesine. The rock contains considerable augite, so that it appears to correspond in mineral composition to the Cretaceous basalts.