E. O. Honev.  

Martinique.  

("Chuett" Voyage)  

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Continuation of "Clute's Voyage"
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Martinique.

Leaving Pointe à Pitre, Guadeloupe, in the afternoon of Tuesday, 2 February, by the Quebec Line Steamer "Parima", I arrived at Fort de France, Martinique, late in the afternoon of the following day, after a brief stop early that morning at Roseau, Dominica. At Fort de France, I was met by Mr. J. O. Schney, the genial and efficient local manager for the American Trading Co., who took me and my baggage ashore and helped me through the custom house. As at Guadeloupe, the formalities of the douane were rendered nil.
by the letter of introduction and recommendation to the counsels of the governors of the French West Indian departments, which had been courteously supplied to the American Museum for me by M. Jusse... and French ambassador to the United States. Hence there was little delay in establishing myself comfortably at the Grand Hotel de l'Europe — grander alas in name than it is in fact, though it is the best hotel in Martinique — for the short stay that it was necessary for me to make in the city. Since the destruction of St. Pierre in 1902, Fort de France has been the political capital...
as well as the commercial center of the colony, and it has prospered accordingly, having increased in both wealth and population (statistics?).

At the time of my visit, there were still nerves on account of the European war and were fearful of an attack by the cruiser "Carlsruhe," for it was not known then that the vessel had been destroyed by the English. No vessels were allowed to remain at anchor at night in the outer and principal harbor, but all were obliged to proceed at 6 o'clock to the inner harbor behind the protection of the guns of the old Fort St. Louis.
and were not allowed to return to their usual anchorages until after six o'clock the following morning. No lights were allowed to burn along the waterfront or along the streets leading away from the bay. A monster searchlight had been installed on Pointe des Negrès, where it could sweep the sea approach to the city, and a military guard was on watch there day and night, but the light had not been connected with the electric power plant of Fort de France and therefore its utility and protective qualities were not obvious.

On my arrival at Fort de
France, I found letters awaiting me from Messrs. E. Benezin and Louis des Grottes of Basse Pointe showing that all arrangements had been made for assisting me in my work on Mr. Pélé.

Without the help of the hospitable plantation owners and managers, it would be hard to make geological excursions in Martinique. M. Benezin was to be my principal host, and I found that he had arranged for an automobile to take me to his home at the Pécore plantation near the town of Basse Pointe and forty miles by road from Fort de France. I had Thursday on my hands in the city, but I had many things to do and the lat-
The part of the afternoon was pleasant. I spent an automobile ride with Roger Bunting, upon my host, over some of the hills west of town, which are composed of old lava flows and deposits of volcanic ash. On our way back we stopped at Bellevue, the official residence of the governor of the colony, to allow me to pay my respects and present my letter of introduction to that official. The governor, Mr. Z., received me with characteristic cordial courtesy and seemed much interested in learning of the American Museum and the work which has been done under its auspices in Martinique and other islands of the West Indies.

Friday morning, 5 March,
before sunrise I left Fort de France for Pécoué with M. André Papin du Pont in his automobile. We were fortunate in having good weather and the ride was beautiful and interesting. We reached the heights north of Fort de la city in time to see the sun come up from out of the Atlantic ocean horizon and flood with light the broad zone of rich low land that stretches across the island above the Leid of Fort de France Bay. This region is occupied by great fertile sugar cane plantations, dotted here and there with villages and the factories where the cane is transformed into sugar and rum, the staple products of Martinique.
The automobile has arrived in earnest in Martinique. Seven years ago there was but one on the island—this belonging to M. Fernand Clerc, the planter, whose name was made known to the American public by the writings of George Kennan, Angelo Steilprin and other writers in their descriptions of the eruptions of La Montagne Pelée and consequent events in the dreadful days of 1902 after the tragic destruction of the city of St. Pierre. Now there are at least one hundred fifty cars in the colony and their number is rapidly increasing. They are mostly of Ameri-
can manufacture. The advent of the automobile has revolutionized transportation in Martinique and rendered almost all parts of the island easy of access by the excellent roads which are characteristic of French possessions. The route from Fort de France to Basse Pointe passes over the mountains through the villages of (name and describe villages especially Gros Morne) especially Gros Morne, the pineapple industry, market town. Sea level is reached again at Trinité, a town of inhabitants which possesses the principal and practically the only harbor on the windward side of the island. Caravelle Penin-
sula throws its slender arm 100 miles eastward from the island just south of Trinité harbor, receiving its name from Caravelle Island a mile or two off its point, which in the afternoon sun looks like a cat boat under sail southbound southward. South of this peninsula numerous coral reefs fringe the coast and under navigation dangerous, even to boats of light draught. North of the peninsula coral reefs are lacking, except off Trinité harbor itself.

North of Trinité the route colonial skirts the sea coast as far as Bois-Pointe, miles, leaving it only to cut off some promontory or cross a stream.
Beautiful views abound, a fine \textit{lie} in which the surf driven in by the tradewinds from the broad Atlantic always forms a picturesque fea-
ture.

Ste Marie.

Domain is the terminus of the daily automobile buses and mail service from Fort de France. Beyond this village the mail is carried in the old-fashioned way by mule-drawn vehicles. Here the abrupt nature of the coast forces the road inland a short distance and it runs for miles through sugar cane estates. The northeastern por-
tion of the island, lying on the lower slopes of Mt. Pele (to
use the shorter appellation of
the great volcanic current in (Martinique), being second in importance in the production of sugar and rum to the region already mentioned as lying east of the harbor of Fort de France.

Our enjoyable ride ended in mid-afternoon at the Habitation Pécorel, when a most hospitable greeting awaited me from M. E. Bengelin and his genial wife. On telephoning over to Basse Pointe, he learned that my heavy baggage and camping outfit had arrived there safely. One of the Pécorel ox carts soon brought it to the plantation. I had sent it from Fort de France the day before in a pirogue, or open sailing freight boat, belonging
to Mr. Robert Dormoy, the store keeper at Basse Pointe. Later in the afternoon Mr. Bengevin drove over to the village with me. Some of the great floods incident to the eruptions of 1902 swept down the Basse Pointe river and did much damage, hence the subsequent growth of the town has been on the platem above the sea cliffs well if out of danger from sim- ilar occurrences. The point at the river's mouth which was extended yards into the sea by the floods has not lost much of its form by action of waves and current since 1908. The little harbor which was filled from it in
1902 and 1903 has not yet been cleared of débris since then, so that loading and unloading boats here is still a serious matter and can be done only during the calmest of weather. A steam winch has been installed on the beach which hauls the empty surf boats which are used as lighters up from the surf and lets the loaded ones down into it. A stout cable runs from a post in front of the winch to a secure anchorage beyond the surf. The boatmen pull the lighters through the breakers by pulling on means of this rope. As may readily be supposed, this is a slow and expensive method of load-

ing a vessel, since only three

hogsheads of sugar can be taken

over in the boat at one time.

Rum is loaded in a different

and even more picturesque fash
dion. The casks are rolled down

the beach to the water's edge where

each is seized by a man, naked

except for a breech cloth, who

skillfully swims through the

breaking surf, pushing the
cask before him. After that

difficult feat is accomplished,

be-ho it is easy for him to make

rest of the journey to the vessel

with the rum. Sometimes a heavy tear
er tears the cask from the swim-

ner's grasp, when he has trouble

dough with his hands to recover
control of his charge.
Soon after sunrise on 1/6 Saturday, 6 March, a cabrouet or oxcart drawn by two yoke of fine oxen stood by the door of my rooms at Pérouse ready to receive my camp outfit for the first stage of the journey up the great mountain (21, 75, 73). It did not take long to load my boxes and rolls and send the cart on its way. Directly after breakfast Mr. Bengelin’s sixteen year old son Roger followed the cart, he on horseback and I on a fine little riding mule. We soon overtook the slow-going cart and rode into Morse together into the little negro village of Morse Balai about ten o’clock. Morse Balai (21, 74 A)
consists of 15\(\frac{2}{3}\) to 20 huts of 1\(\frac{1}{2}\)
thatch housing a population
of 900 people. It lies on a gentle
slope 1,600 feet above the sea,
miles from the coast and
miles from the summit of
the volcano. The region was de-
vastated, the cabins destroyed
and persons lost their lives
here in the on 30 August, 1902,
in the culminating and last
great outburst of Mt. Pele's Ter-
rible Series. Now the country
looks as if it never had been
ravaged by the volcano's fury.
In fact, the whole eastern and
northeastern side of the moun-
tain shows complete restora-
tion of vegetation and the nature
has already obliterated all
obvious traces of the havoc brought by the eruption clouds. The dead forest trees which were still to be seen here and there in 1908 have fallen and their rotten trunks where still existent have been covered with new vegetation. The soil on the lower slopes of the mountain was not carried away or covered deeply with ash, hence new trees and tree ferns have grown up and enough large trees were spared destruction so that the forests now present much the same appearance as before 1902.

At Monte Balai we left all semblance of a road and followed cart paths on up -
ward through pastures and woodland to a point about 1200 feet above the sea, beyond which the cart could not go. Here the porters, eight men and two women, whom Mr. Bengel had engaged in advance of me, took my luggage from the cart and started merrily off up the mountain with the parcels on their heads.

An important point important to remember in preparing for camp work in regions like the Lesser Antilles is to pack the outfit in parcels none of which shall weigh more than 75 pounds. Sixty pounds indeed is a fair limit to place on the load which demands
is to carry up a steep mountain\footnote{120} terrain slope with any degree of ease or cheerfulness. The two women seemed to carry their charges up Mt. Pelé with no more trouble than the men had with theirs. No favoritism was shown in the distribution of the loads, and all received the same rate of pay – 2 two francs each. This was double the wage received for a day's labor in the cane fields and the task took the porters less than a half-day's time, hence they were well satisfied with their remuneration.

Roger and I rode up to the Plateau à Selle, which is
no "plateau" at all but is merely a flat area a few feet square in the trail which by that time is following the crest of a ridge. The so-called plateau is about 2550 feet above the sea and receives its name from the fact that it is highest point to which one can ride by this route. Sending back our animals there we at 11:30 a.m. began the toilsome ascent of the cone and in an hour later stood on the old summit plateau of the mountain 4050 feet above the sea. Before the eruptions of 1902 began this plateau contained a small shallow lake called the Lac des Palmistes from the low trees that surrounded it.
The lake is stated to have been scarcely two meters (about seven feet) deep in the rainy season (verify from Lacroix) and to have been approximately 100 meters in diameter. The lake basin was filled up and the surface topography of the plateau entirely changed by the accumulated bed layers of ash deposited on it by the eruptions. There is no area now where a hand could collect. [Dee, Pan. of plateau: 21, 76+77 or 21, 80 A + B = 80, A = The whole mountain including the new cone was free from cloud and mist and presented a beautiful scene in the strong light of the
the tropical sun. Looking down the east side of the mountain from the head of the trail, one could readily note some of the changes that have taken place in the last thirteen years. The eruption clouds of 1902 laid waste the upper slopes of the mountain above a line about 800 feet above the sea. (Verify. The line would be below Mount Balai) toward the east and southeast, Mount Balai and Ajoupa Bonillon being included within the devastated area. Toward the northeast and northwest more was wrought, because the advance of the lower destructive portion of the eruption clouds
was checked and directed 124 eastward and westward by the high rocky rampart, known as the Morne du Macouba, which stretches entirely across the northern portion of the summit of Mt. Pelé, extending beyond the present crater, and its eastern rim rises from 75 to 100 feet above the eastern rim of the crater, while the western part of the ridge is more than 400 feet above the western rim of the crater, partly through increase in its own height but mainly through decrease in the altitude of the crater rim above the sea. The Morne du Macouba is part of a larger crater rim antecedent to the present crater, 12
is essentially a Somma ring, as known to geologists and is a record of the ancient activity of the volcanos when the northern portion of Martinique was built up above the sea from the bottom of the sea.

Toward the east and southeast the Plateau à Selle, 2550 feet above the sea, seems to be at the upper limit of trees on the ridges. Here they have attained a height of 3 or 4 meters (10 to 14 feet). In the ravines however they extend 300 or 400 feet higher up the mountain. Tree ferns of gradually diminishing height extend up the ravines to within about 100 feet of the level of the plateau, or
about 3900 feet above the sea, I found a tree fern, apparently about three years old, growing near the top of the inner slope of the crater rim about 200 yards north of Monte LaCroix, and many little tree ferns a year or more old are growing on the outer slope of the northern part of the crater rim. The upper 1800 feet of the old cone showed, in 1905, only a tuft of coarse grass here and there, forcing its way through the new ash or growing on a bare spot of old ash, now practically the whole surface is covered with grass, moss, lichens, ferns and other plants. A hundred feet below the summit of the trail
I passed a flourishing bog. In 1908 veget-
tation was scarcely beginning
to re-establish itself on
the Lac des Palmistes basin.
Then the larger waterways
and the crevices in the brecc-
crust bombs and other places
which were favorable to the
retention of moisture sustain-
ed a few small mosses and
lichens, ferns, and a single little
clump of raspberry bushes
was growing at the head of the
tail from Basse Pointe. The
thick coat of new ash over the
plateau was still essentially
a barren waste. Decompo-
sition however, has advanced
rapidly in the finely com-
minutes ash and the whole 128
surface is covered with a carpet
of lichens, mosses, ferns and
grasses, while raspberry bushes
are scattered thickly everywhere.

The advent of the tree fern has been
already noted in a preceding paragraph
and the wild "pineapple" is be-
ing to be noticeable appear.

My porters began arriving on the
plateau soon after Roger and me
and followed us to the place which
I had selected for the site of my
camp. This was on a little knoll
rising three or four feet above the
middle of the plateau, about
75 yards southwest of my camp
site in 1908, 35 yards from the
nearest part of the crater rim
and 100 yards from the iron
cross on the top of the remains of Mme. Lacroix. I found my former camp site to be in the condition in which I left it seven years before, except for the growth of moss and grass on the old surface of gravelly ash. The bombs which had been used for anchoring the ropes of the tents were still in place, but the cracks in them were filled with moss. A broad-crust bomb of almost the structure of furnace which was apparently fresh when used fell apart under the first blow of my hammer and showed that enough moisture had penetrated it in the seven years to affect much decomposition throughout its mass, changing its original gray color to rusty red, brown and
and brownish yellow.

We set up one tent at once for the protection of my instruments and camp equipage, and none too soon for we had scarcely put the things under cover before a light shower of rain swept over the plateau. Then the porters were paid off, and soon after one o’clock they started back down the mountain, chatting merrily among themselves and bantering jokes back and forth as is the custom with the light-hearted negroes of Martinique. Two negroes from Péone, Jerma and Léon, remained with me as camp men. Jerma is very intelligent and has education enough to enable him to read and
write without difficulty. While Léon is not so fortunate, Léon's sole language is the patois of the island and he can scarcely understand French. At least my French — quite jerky — Ma had to act as interpreter between us. The water supply for camp purposes is a serious matter on the Lac des Palmistes plateau and for the first few days, Léon's chief task was going a thousand feet or more down the cone to a small spring and "leading" up from there a five-gallon demi-john of water. On the fourth day however, visitors from Morn Rouge showed up.
a good spring concealed in the gullies forming the headwater drainage of the Prêcheur River on the northwest slope of the low divide extending from Morne Lacroix to Morne du Ma-couba and bounding the summit plateau on the north. The spring was scarcely 500 yards from camp over a comparatively level route and was a great discovery for us, but Léon still had to make almost daily excursions down the mountain as far as Morne Dalai for bread and other supplies. We remained in camp eleven days, on all but two of which Jemma ac-

companyed me on excursions all about the summit and
the new cone. On those two days we were kept in our tents by downpouring rain, the like of which is known only in the tropics. During most of my stay on the mountain, however, the weather was fine, the summit and even the cone being free from cloud for hours at a stretch. The nights were usually clear. On the grass- and moss-covered plateau the days were never too hot for comfort, but on the bare rock surface of the cone the heat was intense. The nights in camp were cool and delightful, except during the storm. The night temperatures ranged from 15° to 18°C (59° to 64° F) at camp and was too cool for Roger and the negroes. True
the first day, Roger and I took
a walk along the northern rim
of the crater and down into the
valley or valley between the
base of the new cone and the inner
wall of the enlarged old crater.

The Rivière du Prêcheur takes its
headwaters in the valley between
the northern rim of the old crater
and the Morne du Macombé,
and the Script of the mountain
descends by a series of falls and
flows northwestward to the sea through
a deep, narrow gorge the walls
of which decrease in height near
small streams. It does not reach sea in dry season.

The fury of the eruption
along the Prêcheur
clouds did not extend beyond
about one thousand feet below
the crater rim, but the trade
winds wafted fine ash over the
region for months destroying the vegetation for the time being and rendering the village of Le Pré chain uninhabitable. This added desolation to the destruction wrought by the floods which descended the river valley after the slopes of the watershed had been denuded of their trees vegetation. Even in 1908, four years after the rain of ash had ceased to fall upon the region, vegetation was reasserting itself only in the spots mainly ravines which had been protected from receiving much of the new material and which were favorable for the retention of moisture.

Now much of the new ash has been washed off the slopes ex- posing the old fertile soil and
decomposition has advanced far enough in the material to make it support plant life. The northwestern sector of the old devastated area of the volcano is now, therefore, a scene of beauty, verdure coating all the slopes of the Pré-chanc River valley from the crater rim to the sea, though the forests have not yet been revived on the upper reaches.

The trail from the Lac des Palmistes plateau to the summit of the new cone descends into the rainforest from the bottom of a notch midway in the northern face of Mont Pelé. The feature of Mont Pelé which is of paramount interest is of course the new cone which was built up within the former crater.
of the volcanos by the eruptions of 1902-1903. This year I had three fine days on its summit, spent one afternoon in the rainure at its eastern and southern base and made the east circuit of the entire crater rim. Besides observing the cone closely, from 880 on the north, east and south sides, from the summit plateau (Lac des Palmistes plateau) and crater rim and on the west side from the Rivière Blanche region. By contrast with 1908 conditions in 1908 and before two features stand out with particular prominence: the fumaroles, while still almost as numerous as they were seven years ago, are far less active than they were then and their temperatures have fallen.
greatly; the eastern half of the cone is covered with a dense matting of moss and here and there even present a patch of grass, while the western half is almost completely barren. The difference in vegetation is assignable to the tradewinds, which discharge the principal portion of their burden of moisture on the eastern slopes of mountain and cone. The eastern and south-eastern western sides of the mountain are comparatively much hotter and dryer than the eastern, and therefore the decomposition of the new ash proceeds more slowly and the return of vegetation is less rapid on the slopes which face the Caribbean Sea than on those opposing the Atlantic Ocean. Furthermore the
southwestern sector of the de-

vastated area, which has been
called the "zone of annihilation." (1)


Int., C.R., p. 1904

not only received the greatest quan-
tity of ash in the eruption of 1902-
1903, but also suffered the great-
est denudation and destruction
of the old plant-bearing soil
by the furious blasts of the explo-

sive eruption clouds, the "nuées
denses" and "nuées ardentes"
of Lacroix. (2) On this area the

2) Lacroix, A.: La Montagne Pelée

et ses éruptions, p. 1906

old altered ash of the mountain
retains more moisture and
therefore is regaining its set
covering of vegetation more
rapidly than the dry, porous deposits of new material, but even this old ash along the Rivière Blanche and between that river valley and the Rivière Sèche was so thoroughly demineralized by soil that the recovery of vegetation is proceeding slowly.

The trail from the Lac des Pal- mistes plateau to the summit of the new cone follows close to the edge of the old crater and descends into the rainure from the bottom of a thint-foot notch midway of its northern rim. The de-
cent is very steep over loosely con-
solidated old ash, but the rainure is shallow here, its bottom being only about 90 feet below the bot-
tom of the notch in the rim. For
about 300 yards west of the trail the bottom of the rainiure is filled with a wilderness of great blocks three to ten yards cube which have rolled down from the top of the cone during its disintegration. We may begin our study of the cone by traversing the rainiure and circling the base of the new structure, turning first to the east from the trail.

[Quote description given in personal diary, for part to exit beside the gorge of the Riv. Blanche]

At the south side of the rainiure near where it debouches into the gorge of the Rivière Blanche is the point on the old rim which Geo E. Curtis and I reached
24 June, 1908, on our first ascent from St. Pierre of the southwest side of the volcano. We stood there in the atmospheric cloud and the drive of dust from the crater listening to the crashing noise of the explosions in the new cone and trying to determine what was going on within the crater.

As I stood in the cauldron this year (1915) and recalled that I even tried to enter the gorge along the bluff, I marvelled at my temerity and realized as never before the danger of our position. We were near the source of the devastating eruption blasts: a single misstep or slip would have precipitated me into the cauldron, from which there
would have been no possible escape or rescue.

Jemima and I turned northward here to cross the head of the slide into the gorge of the Blancke. The slope of the cone is steep, and 35° to 37°; most of the rocks are but loosely held in place, being nearly at the point of rest, and we were obliged to pick our way with care. At first we followed the trails of the wild goats which frequent the cone at night, but these disappeared at less than one-third the distance across the slope each step leading to vantage points where the free animals could sleep in safety.

After the goat paths failed us, we picked our way with great care over the treacherous rocks,
across steep-sided gullies three to six feet deep and around the lower ends of the short lava flows which are more numerous on this side of the cone here than elsewhere on the cone. [Refer again to flows.]

Midway in this part of our tour I sat for a time on a rock central to the avenue formed by the gorge of the Rivière Blanche, a point which for twelve years—since my second visit to the volcano—I had desired to attain. According to my aneroid barometer I was 3,600 feet above the sea. The crown of the gorge was 35° west of south of west, the ruins of St. Pierre lay in a direction 20° farther south, the roughly triangular
area which has been called the zone of annihilation long spread out before me, the apex being the crater within which rose the cone on whose side of which I was sitting. I realized even more clearly than before the sequence of events in the history of the eruption and the cause of the sudden destruction of the city of St. Pierre. I pictured to myself the beautiful old, hot-place crater of la Montagne Pelée as it existed before April, 1902, when the activity which soon proved so disastrous began. It was a great beautiful, hot-place depression similar to the present craters of Mt. on the island of
and was about two-thirds of a mile across, with nearly vertical walls composed mostly of consolidated ash. These sloped in at their bottom to form the source, in the lowest part of which lay the small pool or lake of yellowish water called L'Etang Sec. Trees, vines, ferns, vines, grasses and mosses covered the bottom and sides of the pool with a coat of tropical verdure. The western, northern, eastern, and southeastern walls of the pool were entire and rose from 1600 to 2000 feet above the level of L'Etang Sec, whose position
is given as having been 1900 feet above the sea. Morne La-Croix formed a buttress of solid lava, projecting 400 or 500 feet into the pit from its northeastern side. The top of the morne was 400 feet above the crater rim near the old Lac des Palmistes and lowered 2,500 feet over L'Etang Sec, at the base of its vertical precipees. An iron cross stood on its summit, a landmark to the people of Martinique and the goal of many pilgrimages. Morne La-Croix seems to me to have been the volcanic plug which marked the termination of what was perhaps the last eruption in the upbuilding of the mountain. Probably the "old crater" which...
existed before the recent eruption took place, was formed by a violent explosive eruption that occurred subsequently.

The southwestern side of the great pot, between Petit Bonhomme, a prominent peak of lava, was breached nearly if not quite to the level of the sea by a V-shaped cleft with steep sides. The northern side of the cleft was formed fronted by alternating beds of solid lava and consolidated ash above which stood the prominent culminating peak of the sunken caldera called Petit Bonhomme, or in the creole dialect Ti Bolhomme, which stood close about 150 feet above the crater rim to its north. The southern side
of the cleft showed at least two masses of old flow or intrusive lava in the consolidated ash.

The gorge of the Rivière Blanche headed in the bottom of this cleft and took the discharge from Étang Sec when that pool overfloved. The descent into the Blanche from the bottom of the cleft was probably by a precipice or series of precipices totaling 600 to 1000 feet of sudden drop, similar to those which characterize the headwaters of the Claire, the Prêcheur, and other rivers which have their sources high on the mountain. The active renewal of activity in the crater of Mt. Pelé began to be noted in March, 1902, and was causing anxiety in the minds of
some of the inhabitants of the island by the last of April, but the first devastating event did not take place till 3 May. Then the basin of the L’Etang sec which had become filled with boiling volcanic mud discharged its contents through the cleft in the same crater rim into the gorge of the Rivière Blanche. The initial precipitous descent gave the flood a high initial velocity when it reached the bottom of the gorge that sent it tearing to the sea. The mixture of ash, stones and water overwhelmed the Guérin sugar and rum estate and its mill with a 50-75 foot layer of debris which consolidated into a true breccia or agglomerate that...
stands today as a solid mass surrounded by the unconsolidated ash, bombs and blocks brought down by countless later outbursts of the volcano.

By the morning of 8 May, 1902, the conduit of Mt. Pelé was fairly opened (in the crater of Mt. Pelé) and there occurred the tremendous explosion which devastated the “zone of annihilation” and destroyed the city of St. Pierre with its 27,000 inmates. The eruptive column of molten lava super-saturated with water vapor rose in the volcano’s conduit in a greatly compressed condition. On reaching the bottom of the crater, pressure was suddenly relieved and the mass expanded with explosive
violence. The high walls of the crater prevented full expansion to break the escape through the cleft on the southwest side. There may have been some on account of the suddenness of the explosion; the air over the mountain may have exercised some cushioning and retarding effect upon upward expansion, but this seems negligible. It is impossible to state say that the conduit was not inclined toward the cleft, but such inclination seems improbable from the later history of the eruption.

The presence of the cleft and the configuration of the crater seem to account fully for the phenomena observed - the eruption cloud burst
through the cleft and rolled down the mountain, its high initial velocity being increased by the descent over the nearly uniform slopes which stretch to the sea in the southwest sector of the Mt. Pelée mass. The density of the cloud of lava-saturated steam keeps it to the ground, while the continual expanding of the steam caused comminution of the lava and spreading and rising of the cloud. The high precipices stretching nearly due west from Petit Bonhomme along the north side of the Blanche and Claire rivers checked the expansion toward the north, but on the south there were no such opposing cliffs.
restrict the furious advance of the cloud. A fan-shaped zone of annihilation was with its apex at the crater was devastated by this explosion. St. Pierre was lay scarcely within the southern boundary of the zone, the limit of destruction lying only a few hundred yards beyond the tops of the bluffs which rise immediately behind the city.

The great outburst of 20 May, which often is spoken of as the second eruption, is comparable in violence with that of 8 May. The rising new cone was then scarcely visible from the sea and was probably only a few score yards high. Hence conditions in the crater were practically
the same as they were on the morning of the destruction of the city and the cloud expanded its fury over the same fan-shaped zone as before, leveling many walls in St. Pierre which were left standing after the first outbreak. After 20 May (How about 24 May?) the activity of the volcano was less violently explosive than before and a great cone was rapidly built up within the crater. By the middle of June, the top of this cone was apparently 20 or 30 yards above the rim of the crater on the Lac des Palmistes (eastern and highest) side and still rising. Hence the great explosion of 31 August, which was the
east of the great outbursts of 156
first rank was not confined or
directed by the crater walls and
it extended its force radially in
all directions. The advance of
the eruption cloud toward the north
was checked by the rampart of
the Morne du Maconba. Toward
the east and south it rolled unim-
pered down the mountain over-
whelming Morne Balai, Ajoupa,
Bouillon and Morne Rouge,
taking 2,000 lives as its toll.
Likewise
Toward the west its advance was
not checked, but no inhabitants
were left there to meet its fury,
and its strength was gone be-
fore it reached the almost des-
erted village of le Pâcham.
All this and more came into
BK 21, 1998
mind as I sat on that rock. I looked down the 500 feet [300] into the gorge of the Rivière Blanche. The slope was one of 37° from the horizontal and it was easy to comprehend the initial velocity which those heavy eruption clouds acquired when they started from the crater and later when their origin was at or near the top of the cone. [Insert profiles showing growth and disintegration of the cone and shrine. Two perhaps these would be more germane to the description of the cone itself.]

Plan and No. 2. - S.W. sec. tion of old crater would be good here. [Feb. 21, 1935]
Reluctantly leaving this point, Jemna and I slowly completed our crossing of this part of the cone slope to the base of Petit Bonhomme. The route was too rough and steep and bordered by too many gullies to be passed satisfactorily, but I estimated the distance across the cliff at the level of the base of Petit Bonhomme to be 275 between 275 and 300 yards. [Ill. Br.21, 9913.]

Petit Bonhomme is a fringy andesitic scarp, the top of which has been said to be about 150 feet above the crater rim on which it stands at the northern side of the old cleft. It seems to rest upon consolidated ash.
and therefore it is to be explained as the remains of a short season’s lava flow of an ancient eruption like the isolated flows which characterize the southwestern portion of the new cone as a result of the recent activity of the volcano. The eruption which formed this pinnacle must have antedated the explosion which made the great crater that existed prior to 1902, like that of which Mont La-Croix is a record.

The sides of Petit Brouhomme still show the grooving and polishing which was done by the sand blast action of the hundreds of numerous emp.
tion clouds which passed over 160
it in 1901 and 1903. The sand blast
action of the same clouds on the wall of the pinnacle
below the pinnacle on the Rivière Blanche side has been observed somewhat by twelve
years of weathering, but the grooves and heavier scratches remain distinct.

For about 100 yards north of Petit Bonhomme the old crater rim consists of solid andesite
resting, apparently, on the older tuff. It therefore is flow lava and may be part of the flow that left
the pinnacle of Petit Bonhomme. The rim is scarcely recognizable here and for the next 360
yards has been entirely obliterated by the debris forming the
new cone. For 250 yards of this part of the circuit the slope of the new cone is practically continuous with that of the exterior of the old crater rim. Some of the new material, in fact, swept over the old rim and down into the gorges where there collect some of the headwaters of the Claire, Canoville and Pâchene rivers.

About 460 yards north of Petit Bonhomme, the old rim becomes distinct again, and the rainure takes form, gradually increasing in depth and breadth. The bottom of the rainure remains at an almost constant level around the northern side of the cone as
far as the base of Morne Lacoix. [62]
Here it descends rapidly, trail, which is near the middle
of the northern slope. The rim
rises irregularly, dropping nearly
to the level of the bottom of the rainure
as the northwest overlooking Le Pêcheur,
until it is 125 feet (40 meters) above
the rainure just east of the point
where the trail descends into that
depression. Then the rim rises
about 110 feet
very evenly eastward and south-
ward for about 780 yards to Morne
Lacoix, [269] [63]

The bottom of the rainure keeps pace
with this rise, as far as the base
of Morne Lacoix, where the large
blocks which have fallen from that
rock buttress since the eruption
ceased reduce the depth of the
little valley by 25 or 30 feet. 163
South of Mome Lacroix the rim descends gradually to the south-
eastern angle of the old crater above the "Salon", where it is 175 feet
below the base of the mome. The
insert on p. 62. The top of the
mome, where the iron cross has been
erected, is about 20 feet higher
and is the culminating point
of the rim.

Rainure deepens more rapidly
than the rim descends and its
bottom midway between the
Mome and the Salon was measured
by line found by measuring line
to be 200 feet below the edge of
the rim. In the southeastern
quarter of the crater, the rainure
has its broadest and deepest deve-
velopment, beneath the Saloon
and near it on the north and west.

Just west of the Saloon the rim rises
about 50 feet, making the caveline
at least 250 feet deep. Then the
rim descends toward the west
more rapidly than the bottom of
the caveline, so that the valley
disappears in the southwestern
quarter of the crater at the
descent of the cone-slope of
the new cone into the gorge
of the Rivière Blanche.

From the foregoing descrip-
tion it is evident that the
new cone is eccentric with-
in the old crater and that the
axis of its new conduit is
somewhat northwest of the
center of the old depression. Furthermore, the condition of the present walls of the old crater, which form the exterior slopes of the caumere, shows that the crater is larger than it was before May 1902. Some of the enlargement may have been caused by explosive blowing out of the wall material by the eruptive clouds, but a highly important and perhaps the most effective factor in the process has been undermining and consequent landslides of unstable material. The latter feature is evident at the Salam and elsewhere where the ascent have been arrested in their descent and form terraces platforms at the
below the edge of the rim.  

The remains of Mme Lacroix  
now rise about 70 feet above the  
present  
general level of the Lac des Pal-  
mistes plateau and forms about  
115 feet of the horizontal extent  
of the rim.  The surface of the  
plateau was much changed in its  
topography by the bed of new ash  
deposited on it by the recent erup-  
tion.  The general effect was to  
increase its elevation above the  
sea and give it a more or less  
uniform gradual slope away  
from the crater toward the  
est.  Banked against the east  
side of the mound, the new ash  
ris

like a snow drift; the top of which  
is now about 20 feet below the sum-  
mmit of the rock mass.  This drift

masks the abrupt craggy slope which, according to well informed Martiniquans, formerly marked the beginning of the ascent of the pinnacle. Five hundred feet south of Mome Lacroix the vertical section given by the outer wall of the ravine shows 22 feet of new ash lying on the old ash of the former plateau. Five hundred feet farther south a shallow ravine in old plateau gathered about 45 feet of the new debris. At the salon, about 1500 feet from the Mome, the coat of new ash on the old rim is from two to five feet thick. Westward from the salon the new ash is now thinner or absent. On the east side of along the southern rim of the crater...
On the eastern side of the feature, a gully discharging into the Rivière Talaise in line with the 22-foot thickness at the rim gave me a good cross section of the deposits. Here the new ash measured about ten feet in thickness at the brink of the present plateau, rapidly diminishing down-hill to five feet at a distance of 20 feet from the brink and to nothing 20 feet further down. One may safely conclude, it seems, that the deposit of new ash averages about 15 feet in thickness over the surface of the old plateau; though it probably is somewhat thicker over the obliterated basin of the former...
Lac des Palmistes, that pool 169 being said to have been six or seven feet (two meters) deep in its deepest parts.

The water divide between the drainage of the Falaise and Basse Pointe rivers on the east and the Prêcheur river on the west extends northeastward from Morne Lacroix to the eastern end of the Morne du Macouba. No gullies were found in this where the thickness of the new deposit could be measured or estimated about 200 yards west of this divide, near the spring which was the source of our fresh water supply, the section given by the ravine showed a thin bed four foot bed of gravelly new wash lying
on the old material. The line of demarcation between the new and old ash is not so pronounced here as it is at the head of the caldera, but the deposit evidently is thinner and oxidation has advanced more rapidly. The eruption clouds did not throw so much material northward as they did in other directions.

According to the old maps of Martinique, the summit of Mt. Pelée (i.e., the top of Morne Sarcroix) was stated to have been 4,440 feet above the sea, before the 1902 eruption began. Joanneau as the Lac des Palmistes became plateau was about 4,000 feet by as measured above the sea, the former Morne rose about
440 feet above the old sun. I
snit plateau and the surface
of the little lake. Descriptions
that I have had from residents
on the island and some poor
photographs that I have seen
indicate that the rock buttress
very steeply (45° or 50°)
rose almost precipitously
from the plateau, though its
eastern side was not hard to
climb. The 2,500-foot descent
from its summit to L'Etang
See in the bottom of the old
crater must have been prac-
tically vertical: allowing 50°
for the average eastern slope, the
more must probably pro-
jected 600 feet southwestward
from the present morne into
the old crater. Since the
The student was to form a place as the necessary account of the writing, which he could use or omit.

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continue, speak a little more.

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But than 2. 50 for each and 50

ten destroyed a new one not

The common, the usual only

to 50 or 60 feet from the river

mean now and moreover. 73
undermined the old rock buttress and allowed it to fall into the crater, before it was blown out in fragments. Some of these broken masses may have been thrown out onto the top and sides of the mountain, but no one has been able to locate no loose block has been surely recognized as having been part of the old Momo Lacroix, though a fifteen foot fragment which J. C. Curtis and I saw in June, 1902, on the eastern slope of the remains of the mome may well have been one. It was angular and cracked but showed no indications of recent fusion, though it lay upon new ash. At the time when I saw it, no
gin, except that it was thrown out by the eruption, occurred to me, but I am inclined to think now that it was from the old buttress. Later deposits of ash have covered the mass and hidden it from sight. Another great block that may have formed part of the former mome is the thirty foot fragment which Mr. Curtis and I saw near the sea on the plain between the Blanche and Seche rivers in the same month. If this were originally part of Mome Lacroix, it must have fallen into the sea thing top of the new conduit.
and then thrown out to the southwest by the outburst of 30 May or 1 June. The block was still hot (or warm) when we saw it. It need not have been thrown through the air as far as its final resting place, more probably it was thrown off and fell onto the upper portion of the divide between the rivers and rolled the rest of the way. It too is now nearly or quite covered by later ash. It seems probable that the fragments of Mose La Gross which were thrown bodily out of the crater without re-fusion were cast up by the first or second great explosion because the new cone in the bottom of the crater was
It would seem impossible for any fragments of the Morné to fall into a place from which they could be thrown out of the crater after the new cone had formed to a considerable height — 200 feet or more — above the level of the old L‘Estang Sec. Before 18 June, 1902, the top of the new cone was about above the level of the Lac des Palmistes plateau, or more than 2,000 feet above its base.
Morne La serio got such a shattering or such an opening of old fissures during the eruption that its disintegration has continued at a comparatively rapid rate to the present time, and there is now a great pile of fragments in the ravine at its base which have fallen from its face since the eruptive activity of the volcano and the upbuilding of the cone ceased in the autumn of 1903.

Scientific interest in the Mt. Pele’ eruption of 1902-1903 centered in the cone and its surrounding spine or obelisk which grew up within the old crater of the volcano as a result of the new activity of...
The volcano—Professor Landes went up to the Habitation Perinelle, high on the southwestern slope of the mountain, on 4 May, 1902, the day after the destruction of the Usine Guérin by the first great mud flow that descended the gorge of the Rivière Blanche. Hence he gained a view of the interior of the crater, which, though not complete, would have enabled him to see a cone that one then attained appreciable size on the site of L’Étang-Sec. An account of these observations which was published in the St. Pierre newspaper Les Colonies, 7 May, 1902, contains no mention of such a feature as a new cone.
Although a view of the crater from his vantage point could not have been complete, he could certainly have seen a cone of appreciable size, had one then been existent on the site of L'Eau Stang Sec, and he would have been sure to mention it as a strange phenomenon. On the contrary, he says that there had been no change in the mountain.

No scientific observer was at or near St. Pierre and Mt. Pelé from 8 to 20 May, inclusive, the dates of the first and second great explosions, hence no record has been preserved of the appearance of the crater during that period. On 21 May,
The American geologists, J. C. Russell, R. T. Hill, J. A. Jagger, Jr., J. C. Curtis and myself, who arrived at Martinique that day on the American government relief ship "Dixie" made an excursion along the west coast of the island on the U. S. naval tugboat "Potomac", stopping at St. Pierre and cruising near shore northward beyond the mouth of the Rivière Blanche. The summit of Pelé was practically clear of atmospheric clouds and the interior of the crater was visible through the shifting columns and clouds of volcanic steam. We clearly distinguished and through our
field glasses studied an ash [cf. 1902 notes] cone which was a prominent feature of the crater [look at my A.J.S. article and use illus. from 1902 photos]. We estimated the height of this cone above the bottom of the crater to be about 300 feet (100 meters).

The growth of the cone was rapid, if one can judge by the drawing of the outburst of 24 May as published in McClure's Magazine for August (?), 1902, and the description of that explosion given by Angelo Heilprin. The top of Mount Pelée...
the cone had then nearly or quite reached the level of the southern part of the crater rim. On 18 June, when G. C. Curtis and I were on the eastern rim, (Lac des Palmistes Plateau) the new cone rose 100 or more feet higher than our position. When the spine reached its maximum development in April, 1903, its apex was 5,300 feet above the sea. This marked the greatest development that the cone would have attained, as nearly as one can determine reliably, had not the explosions which left the spine
standing prevented sym.

metrical growth. This means the

formation of a mountain 3400

above the base of the old crater.

feet high. Then the spine dis-

integrated in the latter part of

1903 and the early months of

1904, its fragments fell for the

most part on the top of the

cone, finally leaving in

the shape which it now

presents. At 2 o'clock in the

morning of 1st September, 1904

Mr. L. Guinoiseau, in charge of French

volcano observatory on the island, and

Mssrs. S. Bengulin and Chancellor,

planters, were at the Salon in

the rim of the old crater, when

75 meters of the top of the spine

fell off with tremendous noise,

great volumes of dust and a
Brilliant display of "fire". The 184 fragments of the spine fell onto the top of the new cone, not into the rainure. [See whether Lacassine mentions this incident in La Montagne Pelée et ses Eruptions]

Oral communication from M. E. Benzélici.

Although the major portion of the spine fell upon the cone, some of its fragments apparently rolled down into the rainure. I did not find any there that seemed to show the exterior of the spine, but near the middle of the top there are some great blocks which most probably originated in the spine and now present part of its exterior surface. They each show one smoothed and striated surface of glassy
The face which the spine presented to the last. This face was grooved as seen in March, 1903, was grooved and appeared to be smooth, as if it had been subjected to friction.

[Look up in shine of Mt Pele in A.J.S. & also in C.R. Congrés Int. (5) IX] [Have thin sections made and insert descriptions of them]

The present cone can be ascended from any side without serious difficulty, but the trail commonly followed leads up the northern slope, where the top of the cone rises 750 or 800 feet by aneroid measurement above the bottom of the caldera or about 600 or 550 feet above the level of the Lac des Palmistes plateau.
The summit of the moon twin is now about 4600 feet above the sea, according to these uncorrected, uncorrected aerial observations. The sides of the cone are composed for the greater part of debris of all sizes from fragments possessing like fine sand to masses 25 or 30 feet across. The latter being in the ravine on the north side. Here and there a great out of ledge rock protrudes through the fragmental material. Viewed from the east (Lac des Palmistes plateau) the cone is low and broad, with a uniform slope at the height of about 34° and a double slope at the left changing from about 34° in the lower part to about 10° above. The upper slope joining the right landslope in a point at the apex.
of the mountain within the section formerly occupied by the
spire or obelisk. In general the
new structure within the old
crater resulting of which exists with
in the old crater as a result of the
eruptive activity and subsequent
disintegration may be described
right
as a cone with sides sloping
at angles of from 34° to 37° truncated
troughly by an approximate
plane sloping 10° to 12° from the
horizontal. The highest point
being within the area formerly
occupied by the famous spire or obelisk. Perhaps it would be
better to describe the top of it
as cone as being truncated by two
approximate planes, one sloping up
from the southeast at an angle
of about 12° and the other from 18°
the northwest at about 15° and
meeting as a ridge running north
southwestward from the highest
point within the area of the base of
the spire. The ridge itself declines gently
3° to 5°, toward the southwest and is not
continuous, being much indented in
the middle and southwestern part of its
profile. Viewed from a distance
the truncated top of the cone looks
like a smooth plateau, but in reality
the truncating plane surfaces are
only approximately plane, as much
as they are smooth composed of many
hollows, ridges and pinnacles. None
are forceful prominent. Four of the points
on the top of the cone are which is
prominent: on the northeast, the sum-
particular.

rim formed by the remains of the spire;
one
overlooking LePiché on the north edge. One on the...
one on the southeast overlooking 189
the Salon and Moret Rouge, and
one on the west above Petit Bonhomme
and the Rivière Blanche. These points,
as well as much of the remainder of
the upper portion of the cone, are
composed of "solid" or bedgelava as
distinguished from the débris of an-
gular fragments forming the major
parts of the slopes and even the top.
On the southwest side of the cone
near its top and overlooking
the gorge of the Rivière Blanche
there are several short tongues of lava
nesting on angular débris. These
are flows or streams which
were too viscous to descend more
than a few (100+ yards even on
the 37° slope of the débris, but the
were not viscous enough to maintain
themselves as domes or spires above their vents. These short flows are particularly interesting from the fact that all the principal observers of the eruption of 1902-1903 have stated their belief that no flows were formed during that period of activity. (Verify)

The remains of the great spine consist of a double ridge stretching from north-east to south-west across the eastern half of the top of the cone and forming the culminating part of the mountain. This ridge is covered with angular blocks resulting from the disintegration of the spine.

During the period of maximum development the great spine, which presented the appearance of an isolated obelisk when viewed from the coast,
east, presented the appearance of an isolated obelisk, but when viewed from the south it was seen to be connected with a ridge extending westward from a point about half the height of its eastern face and giving a profile like that of a cathedral or church with a spire rising at the end of its gable. The eastern face of the spire curved strongly back from its base where exposed to its apex. The western face was nearly or quite vertical near the apex, curving westward at the base to join the ridge, but this sloping lower portion was probably composed of débris from the upper part. The spire itself entirely disappeared by disintegration some years ago. A large proportion of its fragments...
lie upon the top and sides of the cathedral ridge above described; The remainder have rolled down the slopes of the cone into the ravine, leaving small, jagged pinnacles of rock assembled, the stump and roots of a vast forest tree where the spine once stood.

The "cathedral" ridge, which now forms the highest part of the mountain, is double on top. The eastern portion which has axis of the eastern portion runs from northeast - southwest in direction, while that of the western portion lies about northwest - southsouthwest. The two parts are separated by a valley thirty to fifty feet deep, which is in touch with the upper side of the gorge. The western half extends south.
west beyond the western end of the eastern half and presents a convex, almost polished surface to the west. This would be the counterpart of the original convex eastern face of the spine, and probably [insert outline drawings showing several stages in the growth and disintegration of the spine and the ridge. From east and from south—consult my photos and sketches of Lacroix and see further pp. 113 et seq. of this book] part of the upswelling dome of which that spine was a residue left by numerous comparatively minor explosions of volcanic activity. V.\* Strong branching.
fissure crossed the southwestern end of the western and steam issues gently from it. The temperature a foot (130 cm) below the surface was 92.5°C. It was not practicable to introduce the thermometer far then into the fissure. This is the fissure which gave me a temperature of 490°C (verified) by pyrometer determination in May, 1908, the electric couple being about 3 feet (1 meter) below the surface. The debris lying upon the southeastern half of the double ridge conceals the fissure in its rock mass and the steam water vapor rising at several places is low in temperature. The degree was not determined but the vapor was not too hot for me to bear his hand in it. [Dec. 22, 74 + 487878]
as the southwest base of 195
the double ridge. There is an irregularly shaped depression which is surrounded by a loosely consolidated bed of ash, and blocks of ash lie on its walls. It seems that this may well have been one of the great centers of repeated explosions during the great eruption. No steam now rises from its bottom, but there are some vents in its sides.

North Peak is a dome whose general shape has not been obscured by destructive explosions, though great blocks have fallen from its northern side and rolled down to the bottom of the ravine. Steam [ill-21, 22, 24] issues from many crenicles in the rock, giving temperatures of 95°, 96° and 98°
Southeast Peak, and Cone 196
near the crown of the cone
overlooking the Rivière Blanche and West Peak forms which seem to be the jagged masses remaining after the disintegration of masses of viscous lava that exuded like the domes without forming flows - above mentioned. Some of them seem to have flowed a short distance, as already described for Ledges on the slope. Cone slope above the Blanche.

[71. 22, 91.3; 21, 91.8; 22, 6 A]

Steam still issues more or less copiously at many points on the sides and top of the cone, but the temperatures observed were all below 100°C. Half way up the north slope 83°C was obtained; in the crevices of the North Peak, 77°, 95°, 96° and 98°; in Cathedral ridge 92.5°; in southwest side of cone.
above Rivière Blanch 94° and 95° 197
The chief areas of active steaming are in and at the east base of the North Peak, the southeast quarter of the cone overlooking the Saloon, and the southwest quarter overlooking the gorge of the Blanche. There is area of gentle discharge in the wall of the old crater a quarter of a mile (400 meters) northwest of Monse Lacroix. Sulfur in small quantities and a white salt (Comp ?) are depositing here.
Another extrusive area is on the rim at the west, where the new cone has filled the old crater to the top leaving no caldera. Under a large block, the discharge has formed sulfur, and the white salt more abundantly than at any other vent.
The most conspicuous discharge of steam takes place at the east-based North Peak on the brow of the cone, but neither here nor elsewhere is the force of the rising vapor sufficient to make a noise louder than a low hissing.

The area of furnaces on the little plateau between the Rivière Blanche and its northern branch, the Rivière Claire, shows a decrease of temperature like that observed in those of the cone. The Blanche-Claire furnaces are arranged along a line which is essentially radial to the many of the subordinate craters, parallel to the cone, and averaging about 1000 feet in altitude above the sea by aneroid measurement. The furnaces are close to the edge of the group of the
River Claire and the northeastern end of the line is approximately 100 feet (30 meters) higher than the southwestern. The temperature vents decrease in temperature from above downward, the most northeastern one giving a reading (3/3) of 128.5°C, while as the most southwestern gave 51.5°C. These extreme vents are about one-fourth mile (400 meters) apart. In 1908 the temperatures of the corresponding vents were 490°C and 100°C respectively. There is very little steam rising from this line of fumaroles. The persistence of high temperature in this line of fumaroles is particularly interesting on account of the support that it gives to the theory advanced by Lacroix and Stoney that these
vents are the outlets of a fissure or system of fissures directly connected with the center of igneous activity under Pele and concerned with the recent eruptions [in 1908] drawing a cross-section of Pele try to include these Rivière Claire fumaroles [i.e. 22, 13 13] there seems to be no activity shown at the locus of the steam vents that were observed in 1908 in the new bed of the Rivière Blanche west of Mount Lérand, the bed of the Riv. Sèche or the Riv. Falaise. All of these were temporary fumaroles arising from the accumulations of hot water thrown out from the crater. The Rivière Blanche locality could be identified by the reddened rocks now cold, but others are apparently washed away.
The southwestern slopes of Mt. Pelé are still comparatively barren of vegetation, particularly on their lower portions. The difference between the coarse grass growing in the fine New ash even in the filling of the gorge of the Rivière Blanche and on the middle slopes from the Sibele to the Claire, a many-flowed terrestrial orchid with stiff stalk 2-3 feet high bearing white or purple flowers is abundant. On the denuded surfaces of old tuff grass is more luxuriant and bushes and small trees are reappearing. There seems to be no regular order of advance of the new vegetation in its restoration. The return is goo.
by local conditions of detention of moisture and consequent partial decomposition of the ash. The deposit of new ash being usually lightly compacted together, they are porous and allow even the most copious showers or storms to drain rapidly and completely away. The intense heat of the afternoon sun hastens the drying out of the beds and retards plant growth.

Erosion has advanced rapidly in many parts of the dry southwestern sector of the mountain, and the torrents have cut some deep channels into the plateau between the Sèche and the Blanche rivers and elsewhere, their position being determined by the new topog.
safety of the surface of new 1/103 ash which has been superimposed upon the surface of the ground which existed obtained before the eruption began. In June, 1902, a new gorge was observed which was just beginning to cut its way back from the Rivière Sèche toward the Rivière Blanche about one mile (1.6 km) from the sea. [Ded. Storey, E. D., Prelim Rep., Bull. A. M. N. H., vol. 1, 1902.]

from first series of photos] This has eaten its way through the bold edge of the cliff bordering the Sèche, forming a cañon 100 or more feet (30+ meters) wide where it joins the main stream, and 250 -300 feet (80-100 meters) deep where it cuts down across the edge of the plateau.
The river, now drains the area 1104
south and east of Monse Lémand,
up to the very edge of the gorge of
the Rivière Blanche itself. The Rivière
Claire, which was a northern
branch of the Rivière Blanche,
is now independent of that stream,
meeting that stream about a mile
(1.6 km) (verify from old map)
from the sea, now has its in-
dependent bed all the way to
the sea and taking some of its
drainage from the bed of new
ash that still occupies most
of the old gorge of the Blanche.
In March, 1915, the midst
of the dry season, water was flowing
throughout the whole course of the
Rivière Roxelane in the northern
flank of St. Pierre, it came
within about a half mile (1 km) of the sea, none was observed in the Rivière Sèche 2 miles (3.2 km) from its mouth, the whole course of the Rivière Blanche was dry, water came down the upper reaches of the Rivière Claire but sank into the sand, no water was seen in the course of the Rivière Canonnville (name O.K.?).

It is evident that enormous quantities of ash have been washed off the slopes and out through the gorges by floods, especially during the rainy seasons. At other times, particularly in the dry seasons, when showers are light and heavy rains infrequent, the work of the streams in the gorges is constructive,
building up the beds with fine material washed off the drainage areas. A measure of the filling was noted in the bed of the Sèche near the mouth of the new northerm branch already mentioned. Here the bed is about ten feet (three meters) above the level occupied in June 1902. But this new soft material must be washed out by every flood and replaced in the intervals between torrential rains, so that changes of level are frequent. The sweeping of torrents down the streams has cut strongly into the banks of new ash, widening the gorges season after season and in many places restoring the boundaries as they were before.
May 1902. In the gorge of 1107 the Rivière Blanche the number of large rounded or sub-angular and angular blocks of solid lava is immense. In many places they completely fill the bottom from wall to wall with a rough pavement, but usually it is not difficult to find a path way of fine stream-deposited ash winding tortuously among the boulders. [Ill. 22, 12 A or B].

The abundance of boulders in the new ash filling the old gorge of the Blanche is shown in every section exposed by the drainage channels as well as by the surface of the new plane from the cone to the sea [Ill. 22, 11 A x 17 A or B]. The last now
present an appearance strongly in contrast with that which it had in June, 1907, when the boulders were almost or quite hidden buried in fine ash and volcanic dust [etc. from 1st series, rising block from Mrs. Bull's article] or in May (2) 1908, when the finest ash had been largely washed away. The ash-filling of the gorge of Mt. Blanche is so porous that the water sinks readily through it and active action is carried forward only by the heavier rains with their copious run off.

During the dry season there is enough flouage of dust and fine ash from the walls of the
goes to be reckoned with as long
and expect of erosion. Numerous
many dust and sand cones build
up along the margins of the
channels supplying loose
material to be carried away
by floods. These are caused
by the loosening effect of the sun's
rays, which dry the particles, and
the variations of temperature which
loosen them so that fall by grav-
ity or are carried away by the
wind. [Doc. 22, 23 A]

A needle or pillar rises in the
northern part of the top of the cone
to which Lacroix has called
particular attention [Ref. to Lac
Montpelier et ses Éruptions]
[Doc. 22, 3 B]. The pillar
looks as if it had been built up of
This appearance may be due to the splitting or splitting of the masses in place. Some of the layers are more fractured than others. [Why does this pillar stand up as it does?]

[What is its origin?] [Ill, p 21+]

The North Peak of the cone is a

[97. 21, 92 A; 22, 1 A, B; 22, 2 A, B]

the remains of a dome of lava similar to but much smaller than the one concerned in the formation of the big spine. The Peak is an

[Note. In discussing the dome of the big spine be sure to use material on 127 or BK II.]

irregular

otheroid, it being a ridge which the

extends in a nearly east-west direction and is approximately 100 yards long. The top rises
125 feet (40 meters) by aneroid (111 measurement above the neighboring edge of the cone, and about 60 feet (20 meters) above the adjoining flat part of the top of the cone to the south. The south and west sides of the Peak are convex in shape, the north and east sides are lower and jagged. The great angular masses of lava [Dec. 21, 1898 (B) A] lying in the bottom of the ravine on the north side of the cone evidently originated in the dome of the North Peak. Apparently explosions comparatively moderate occurred in the northern half during or after its formation and dislodged a considerable portion of its mass, judging
from the grooved nature of the Peak and the assembly of enormous angular blocks of lava which cover the bottom of the calms beneath the Peak. ([Ill. 21, 98 A+B]) The main portion of the void is similar in history to the famous Kean opine. The void is traversed by great fissures trending generally N 50° E - S 50° W and the larger fractures trending generally N 50° E - S 50° W, and there being no system discernible in the development of one another. Two main breaks divide the Peak into three parts, the most western of which is the highest. Vapor rises from most if not all the cracks. Temperatures
from 950 to 980° C were observed. Very little the most
copious discharge of steam or
from the whole cone, as has been
mentioned already under the
discussion of fumaroles, takes place
at the east base of the Peak.
stones and dense cloud of vapour made it
didn't seem not practicable to get the temperature here, but the dis-
charge was so gentle and opaque
though abundant, that it seem-
ed reasonable to consider it prob-
able that the mercury would not
have indicated stood as high as 100° C.
probably was no longer higher than
at the danger noted just mentioned.

[Note on Cathedral Ridge. cf. 1934. J.m.
the study of my notes and photos 21,928
+ 864+3 suggest the thought that
the northwestern front of the present]
double dome forming the top of the new cone may not have been a part of the visible (1903) base of the spire. Furthermore, my recollection of a photo taken from the Lucedes Palmists basin in 1903 [cf. second series] is that a rounded boss of rock showed at the right (N.) of the base of the obelisk which must (or may) have been the northeastern end of the ridge now under consideration, separated by a shallow valley from the spire-dome. Carefully drawn plans and sections will probably show that this ridge was an upswelling butticular dome the top of which was separate from the upper part of the spire-dome. This supposition would account for the valley still separating the two culminating ridges, but
otherwise the valley is hard to un-
derstand. A similar but deeper
valley (125-150 feet) separates the N.-W. side of cathedral Ridge from the dome of North
Peak. On the west the drop from
the southwestern end of the ridge is
sudden and about 150 feet to near
the center of the cone. The Northwest
arm face of this end of the ridge is Convex (Fig 22, 4B + 7A) and
is of smooth, striated or grooved rock
(Note 6k 2, 127) like that of the
south and west sides of the present
North Peak and the northeast (east!) face of the great spine of 1903. The
southeast part of this portion of Cathe-
dral Ridge, to keep my name for the present,
facing the actual spine-dome is rough
and jagged. [cf. He 22, 7A + 6B]
Apparently this was caused by
explosions during the later 1916

and of the active eruption. The western part of the top of the cone indicates the existence there of still another upswelling dome of lava (see photo 27, 213). Hence we may consider that there were at least four and possibly five

section of these domes: Sphine-dome, N.W. 1/4 East Ridge, North Peak, West top of cone, Southeast Peak and probably the southwestern summit, though this last is more ridgy and shows some short flows (Note 34k 2, 2.58). The

silex of lava characterizing the southern half of the upper part of the new cone are extrusions of viscous lava which are similar in origin to the domes, but are more thoroughly fractured and discol.
are connected with or pro-
duced into the short flows al-
read mentioned. Southeast-
Peak and West Peak are to be
classified as ribs rather than domes.
The southwestern top of the cone
is probably best considered to
be a dome with directly con-
necting ribs and flows.

The blocks of lava which were
scattered over the plateau between
the Blanche and Côte rivers
by its eruptions, particularly by that
of 5 June and 31 August, 1902,
are of course as much in evidence
as ever. Some of them have been
partly buried by sand which has
been drifted or washed against them,
and all show the effects of weath-
ering. Some disintegration has
caused by the diurnal or yearly seasonal changes of temperature.

The greatest of all these ejected blocks lies at an elevation of about 1000 feet (300 meters) above the sea and is about 60 by 40 by 20 feet (20 x 13 x 6.5 meters) in dimensions. It forms a little peak by itself whose top commands a wide view of the old zone of annihilation of the volcano.

At the northern base of this mass there are several angular fragments 2 to 3 feet across which have fallen from it in the process of breaking through the strata due to temperature changes. Part of these changes

strains arose during the cooling of the mass after its arrival at its present resting place, others through the influence of the rays of the sun.
Even the finest of the new ash and dust has not all been removed from the surface of the old stuff of the mountain. Tongues and lenses of it have been left by the water flowing down the slopes. The bed was from 1.5 to 3 feet (5 to 1 meter) thick and often the finest dust formed a sort of cement binding the rest together. But the bond is weak in the beds which were deposited in a dry state, whereas the material which issued from the crater as mud or paste is solidifiable in a firm agglomerate, in having set rapidly after reaching a position of rest. Such beds of the agglomerate resist disintegration as well as to appear as do the to a considerable degree.
parable in fact to that present.170
ed by the dense lave itself, though
the more porous nature of the
material permits more thorough
infiltration of water and
consequently more rapid chemical
alteration in the approximating
solid in the lava.

The blast grooving and scouring
on the eastern end of Morné Lénard
and other surfaces facing the
crater and bordering the Rivière
Blanche are still discernible.

The larger grooves are very plain,
but the smaller lines of scouring
are growing faint. The surface
of Morné Lénard looks like that
of a well worn macadamized
roadway. Here and there are
small tufts on its boundaries of grass, ferns
and hard terrestrial orchids.

Nearer the top of the hill the grass is more abundant and there are some clumps of bushes or small trees. Even the blest grooving of the cliffs on the south east side of the Rivière Sèche is still traceable through the coating of new vegetation. (cf. old reports)

The slopes of the Petite Savane which were completely denuded of soil by the eruption clouds and débris and then planed down by the avalanches of new ash (cf. Ettam "grooving = produced by other than glacial action" in A. J. S. or Mrs. Bull) are as barren don't seem to regain their fertility much if any more rapidly than do the surface.
of new ash. The restoration or 1/22nd
return of fertility and vegetation is governed by the amount of
water falling upon and retained by the beds,

lying

The sector of the mountain within the "zone of devastation" but
eastward of the "zone of annihilation" received a coat of new ash of varying
thickness, depending partly upon its topography. Here the old vegetation was completely destroyed
or removed from the surface by the eruptions, but the old soil was not disturbed except by subsequent rains. In fact, the new
layer protected the old from erosion. Hence the region rapidly regained a covering of vegetation and many
of the old fields, plantation, fields
have been restored to culti-

vation. Breadfruit trees 8-10
inches (20-25 cm) in diameter
near the ground were observed which
have grown since the eruption
period. Bamboo thickets are
numerous and as luxuriant
as of old. In most instances,
apparently, a layer of ash not
more than 10 inches (25 cm) thick
has been proved to be more
beneficial than injurious to
the soil. Such a layer was readily
flown under and mixed
with the old soil, lightening it
and adding new elements of
fertility to it. Beside the Ulmine
Petit Reduit on the plains of the
Rivière Boislane, which was
within the border of the zone
of annihilation, cultivation 1/24
of sugar cane has been assumed
successfully in fields which
were covered at first with an
ash bed of new ash which was
30 inches (75 cm) thick in some
places. Planters told me that
they thought that nearly the
whole of the Plaine de la Consola-
tion could now be reclaimed,
though the work would be slow
in the southwestern part
near the Fort Quarter of St.
Pierre, which lay in the
midst of the zone of annihila-
tion.

The city of St. Pierre in most
of its area is more ruinous &
deserted in appearance than
it was in 1908, though Ruin
Victor Hugo and Place Bertin show signs of the
usurcation of the place.
Twenty-five or thirty buildings
have been erected and are be-
ing used as dwellings, stores,
some old shops have been converted to
warehouses and the like. Daily
steamers service with Fort de
France is maintained, and
daily mail and passenger ser-
vice with Dominica on the windward
side of the island is carried on
by automobile bus. At the
time of my visit (March 1915),
Place Bertin was congested
with barrels of rum and hogs-
heads of sugar awaiting ship-
mens to France, service be-
ing interrupted by the war
in Europe. The major flot.
ion of the city, area, how ever, has been much flattened by the falling of the walls of the old build-
ings and by the action of the rain and wind. Trees, grass
and bushes cover the ground and trees are growing on some
of which are sentinels of the camp

Most of the big trees that lived through the eruption were so badly
burned and bruised that they died afterwards, but some of them sur-

vived and are now flourishing.

The ruins of the bank have been
made over into the government and
a police station and jail. Those
of the hospital are occupied as
a dwelling.

The site of St. Pierre is the nat-
ural outlet for the produce of suc-
large and important plantations. Its roadstead offers good anchorage and moorage for vessels and the city will probably be slowly built up again, though it is not likely to regain any measure of its former prosperity and appearance before the Plaine de la Consolation and the western slopes of Mt Pelé have been restored to their former fertility and cultivation, which will require many years some generations in fact to accomplish.

The site of the former city seems not to be in danger of another visitation like that of May 1902, because the configuration of the volcano does not favor the localizing of a blast as it did.
then. This was shown by the great outburst of 31 August 1902, when Monce Rouge and Agoupa Bonillon were destroyed without the eruption cloud did not cross the Royalane River in St. Pierre.

So little is known of the history of the activity of the volcano Pelé that no prognostications can be made. At the time of the discovery of Martinique by Columbus in 1502 (date?) the Caribs called the mountain the "Mountain of Fire" and would not live on its flanks or even within St. Pierre was afterwards built. They knew there was therefore as an active volcano,
though no traditions have been preserved as from which the approximate dates of pre-Columbian eruptions can be conjectured. The French name "La montagne Pelée", which may be translated "Bald Mountain," is very old and seems to refer to an older Spanish name which may have been derived from or suggested by the appearance of the volcano at the time of Columbus's visit. Look up the old Spanish records and see whether this theory can be held. Cf. 1894 also in C.R. IX Congr. Jour. The present barrenness of the mountain would amply justify the application of the name.
Whether the name indicates, 1850
that an eruption may have de-
nuded the mountain of its art
of vegetation within a few years
before the discovery by Colon or not, there is no
record of any eruption in the
 succeeding four centuries,
except a slight outburst mid-
way of the west flanks of the old
cone in 1857 [Look this up
in Lacroix + elsewhere]
The activity volcano was re-
garded as being completely
extinct and was so classi-
ified in the lists of the volcanos
of the world. The activity
which began to be manifest
early in the year 1902 [How
about anything in 1901?]
culminated in the severe 1831
at great explosions within
the period from May to Au-
gust inclusive of that year
and then began to decline
in force. The decline has
continued until now the
vent is scarcely more active
than that of the Grande Soufrière
of Guadeloupe or the Boiling
Lake of Dominica, except
for the one fumarole in the wes-
term area on the border of the Riv-
Claire which shows a tem-
perature of 128½° C.
The contemporaneity of the
eruptions of Mt. Pelé and the
Sougriève of St. Vincent in
1902, the latter occurring one
one day apart, suggest a sym.
party or connection between vents, but Pelée remained quiet during the great eruption of the Soufrière which took place in 1803-17—wasn't there one in the 18th century? Look up the history. (Devote some attention to the geology of the rest of the island using notes of 1906 as well as of 1915 and the old dissertation.) (Look up D. C. Worcester's account of eruption of Tabaco, P.D., in Nat. Geogr. Mag. Also of Camiguin, P.D., which referred to by Hobbs in Earth Features and thinning, 1896-97. Also look up history of Jorullo, Mex., in Humboldt elsewhere.)
and the Krauchen of Jen.
many other domes of siliceous lava noted by Judd and others. Good bibliography in Hobbs, ibid. p. 146-148]

[Note. Have we not been laying too much stress on
the spectacular profile of
Pelé as an originally column-
lar feature rather than as the
remains of a dome? Due
to confining attention too
much to the acicular profile
presented by its appearance
from the S. and N. E. [Hobbs
cites Pratt on the eruption
of Taal in his bibliography]
Hobbs gives the Pelé profile
as a "character profile" on
p. 146 of his book.]

[Note:}
Discuss the chimney formed by the shell of the core beneath the telt line. In this connection of Hobbs, p. 135, 137, 138, consider the Quaternary elevation of the Caribbees with reference to volcanic eruptions in the islands.

[Cluett voyage follows]
"Cluett Voyage" continued

During Saturday night the wind decreased considerably and early Sunday morning, 19 September, preparations for our own departure were begun. At 7 o'clock Peter and his estimative wife Nevrana arrived with last writer's mail for the Crocken Land men, some narwhal tusks as souvenirs for them and me and a fine tooolelah as a birthday present for me, since he thought that my old Alaskan deerskin parka was not a sufficiently dignified garment for the head of the Museum party. About 8 o'clock Captain Pickels began to leave the "Cluett's" anchors, whose cables were much twisted, and a half hour later the "In-
and we were joyously starting out of North Star Bay our minds filled with thoughts of home and home friends. Rounding Cape Stel shortly after noon the diminishing wind became dead ahead and we made slow progress, beating our way among scattered icebergs. Then ensued three days of almost continuously beautiful weather, but there was little or no wind and what there was was variable and usually contrary. Coming across Melville Bay on our way in, we encountered some light northerly winds, but now that we needed breezes from that direction we found no gain from them. Every night a half inch or more of strong young ice formed.
and it scarcely melted during the day, and the nights now were rapidly growing longer. This greatly impeded our progress, the more so as the captain was saving the engine for emergency work dodging bergs and taking advantage of leads crossing the dreadful Melville Bay.

The sunset of Wednesday the 22nd was one of the most magnificent that we had had, and the deep rose red of the afterglow bathed the snow-capped cliffs and mountains with an Alpenglühnen whose rich hues would have delighted the heart of a Swiss guide. The engineer with Allen's help had spent several hours at work on the engine and had gotten it running as well by mid afternoon that the captain
decided to try it's help to get us east Cape York, and we chugged ahead for four or five hours. We threaded a devious course among ice bergs and floes until we reached an open lane near the coast, where we made several miles of real progress. At 10 o'clock we reached another vast field of fan ice and made fast to a big cake, it being too dark for it to safely trying to make our way among the floes. We were now nearly off Cape York and had covered about 75 miles of our homeward journey in more than three and one-half days of travel. But the low fog in the near distance and the smell which was wafting the vessel, led the expert in board the "Chiett" to say that much open water lay only a few miles ahead of us.
and that we should surely be able to force our way into it the following day, provided no storm prevented us. In fact, water could be seen from the masthead. We got the storm in full strength that night, however, as the sailors prophesied, when they saw the bright parhelia (sun dogs) near the western horizon in the afternoon. About midnight a southerly gale struck us with the suddenness and violence of a thunderclap. The mate said that "the wind fell on us in clumps." For some hours our mooring held, but about sunrise the wind tore us loose and started us back up the coast. Captain Pickels tried to get into the lee of a big grounded iceberg where he could lie safely, but the crank shaft of the engine bent and the plan had to be given
up. At 7 o'clock we were 136
scudding along under bare poles,
the captain offering only a bit of
the foresail or a piece of the main
sail, when otherwise he could not
dodge a dangerous mass of ice.
We went along the coast at an
exciting and dangerous rate of
speed. We could not dodge
all the ice bergs and ice and
we struck hard blows on some
of them latter. The captain was
making for Parker Snow Bay as
a harbor of refuge, but before he
could reach the point a big
crake struck our mudder and
broke its east iron head band, an-
other tore the bobstay loose from
its lower fastening and a
third stove in a flume amid-
ships. Fortunately, an open hole was not made and the dent was above the water line. When the bobstay broke loose, Second Mate Norman did some quick work, jumping to the ice case which had done the damage, securing a line to the swaying end of the chain and getting back on board again before the vessel had swung away from the case.

Soon after ten o'clock, we sounded Parker Snow Point and slid into its lee of the lofty vertical cliff, and the gale blew harmlessly out well above our mast. Captain Pickels hoisted the mainsail and started the engine to work its way along to a safe anchorage, but the engine died again and hopelessly in a few
minutes. At the same mo-
ment Captain Corner sounded and
got only twelve fathoms, when a
much greater depth was expected.
Captain Pickett instantly shouted
"Let go," and the port anchor shot
down from the bow and brought
the vessel to a halt, scarcely fifty
yards from the wall of rock. Late in
the afternoon the captain tried to
work the schooner out far enough
from the cliff to let go the starboard
anchor too and lie where he could
swing in safety for the night, but
the engine refused to work him
and he had to let the vessel
drop back against the cliff,
where he moored her to the roosts.
just as if it were a wharf against
which she was lying. The position
was full of possible dangers, but there was really no opportunity for choice in the emergency, and we and the vessel were safe from being pounded to pieces, as long as we could hold our ground. But we were in constant fear lest a fragment of rock be loosened from the cliff and dash down upon us. The precipice of ancient granitic rock towered eight or nine hundred feet almost vertically above our heads and then sloped more gradually to the altitude of 1500 feet above the sea which has been assigned to the mountain forming this promontory. [Ill. "Cliff" lying against c]
During the following night the gale decreased in violence and the rain changed to wet heavy snow. By eight o'clock in the morning the sky began to clear and we were feeling comparatively cheerful, when a fan of ice about 75 feet across and rising about three feet above the surface of the water (having therefore a draft of about 21 feet) swung in against us, making the vessel's fenders crunch with a frightful splintering sound against the cliff and adding to our appreciation of the dangerous character of our position. The momentum of a big ice-pan or an iceberg seems well-nigh irresistible.
and terror of the ice is a fear. (141

ing that grows upon one with experience
and observation. After reconnoiter-
ing the bay on a small boat, Captain
Pickels early in the afternoon ordered
the set and proceeded to the head
of the bay, where he anchored in light
fathoms of water to await a favora-
ble opportunity for pushing on
continual or returning to North
Star Bay for the winter. Little did
we think that the "Cluett"
would not be able to leave Par-
more than

Ken Snow Bay until after ten
long, weary months had elapsed.

During the next two days Mr. Allen
joined the engineer and the second
mate in doing much work on
the engine, and on the 27th, the
weather seeming favorable, Captain
Pickels ordered the anchor hone 142 up, the sails set and the engine started in order to go out of the bay and inspect the ice. Within ten minutes, however, the engine stopped again and the Engineer came up on deck with the woeful announcement that the crank shaft had broken squarely in two! Sorrowfully we drifted back to the head of the bay and came to anchor again. The two sea captains did not even then, to outward appearances at any rate, give up hope of seeing home that fall. They kept saying that with a strong northerly wind we might get get out, but my party and I with their experience in the region and I with none beyond the one
summer on the "Cluett" fell the 11th of October and I tried to go around to North Star Bay, which seemed to be a more desirable place for wintering than Portage Snow Bay, but when we neared the ice at the entrance to the bay, no usable leads through it could be seen and we turned back once more to the our old anchorage. On the 5th of October we made another effort to go around to North Star Bay, but when we drew near the entrance to our bay Captain Pickels from his mast-head saw the ice pack extending so densely in every direction north, west and south that he decided that it was impracticable to go further.
Hence we put about again and sailed disconsolately back to the head of the bay. Even North Star Bay had risen in our estimation to a position seeming most desirable in comparison with Parker Snow Bay as a place for spending the winter, in account of the presence more of character of the country and the presence of more people, the popula-


tion here consisting of Peter Franck, and from five or six families of Eskimos, while that of Parker Snow Bay comprised but five persons, Poodlak and Enatliak his wife, and their three small children. Poodlak was one of the party that Peary took with him on his "Nares' North" dash in 1906 across the Polar Ice, when the latitude of
83° X was attained. On that expedition, which is known among the Eskimos and others as the "starvation trip," Pudlak got snow-blindness so badly that he is now almost blind and he and his family have an exceptionally hard struggle for existence.

Another theory advanced to account for the man's present trouble is that his eyeballs were frozen on that trip, which is known among the Eskimos as "starvation trip," but Dr. Keune of the Hokkaido Land Expedition staff states his opinion to be that it is a result of severe case of snow-blindness, which is one of the serious dangers to which travelers in the Arctic are exposed.

No further effort to get out of the bay was made, and six days later (11 October) the "Cluett" was
moved over into the northeast (146
em part of the bay and anchored
in six fathoms of water, 150 yards
from shore, at the place which
Captain Pickels had selected for
the winter berth of the vessel. Two
days later the crew began housing
in the ship, constructing frames
of boards and scantling over the
after cabin and another forward
over the companionway leading
down into the forecastle, where the
cook and his range and the quar-
ters of the crew were established
for the winter. These frames were
covered with old sails and the
makeshifts thus built thrown
together answered their purpose
very well, though on more than
one occasion during the long winter
Taking all our flaps, Captain Cook, one of the officers, went on board Peter Reid, brought water to the house, and when he arrived, Captain Chibbs, the iceman, said the ice had broken. While I was hearing about the Indian, the house was burnt down, and the ice came as a great storm. The next day we heard about the house that was burnt down, and the ship was in a very dangerous situation.
to live for the winter in his houses. The hospitality and generosity of Peter's proposition were boundless, but the difficulties entailed to all parties made it seem wise to us to decline the invitation with thanks. The sledges could have taken only our personal baggage in addition to ourselves and supply of provisions and fuel were so meager at North Star Bay that it would have been necessary to sledge over the mountains or around by the sea ice, when that almost certain to form, all the food and the coal that I had brought up on the "Claret" for the Crookshank Expedition and the food which I had could not be landed and kept able to land at North Star Bay when our schooner was there in the middle of September.
The enterprise seemed to be too difficult and complicated to carry through to the reasonable satisfaction of the parties concerned, hence our reluctant decision to remain on the vessel. Later events proved the wisdom of this course of action.

Some days before the "Chinatt" was moved over to her winter quarters the inner bay filled up with small pieces of thick sea ice and fragmentary ice bergs and the outlook for smooth surroundings during the winter was very dubious. Had the freeze up occurred then, walking would have been a difficult and laborious task and sledging a tedious and slow process with much heavy lifting of kettles (sledges) over and around
the kummocks, but a heavy

consteady gale drove the ice out
again during the night of 9 October.

Hence, when the freezing over of the
sea began on the fourteenth, no old
ice lay within 2 1/2 miles of the schoon-

er except a few small scattered

early in the morning

grounded bergs. On the fifteenth
the small boat went ashore for
the last time, taking Peter and

Queen who wished to start for North

Star Bay, and leaving some diffic-

culty in breaking a passage way

through the young ice. Two days
later some of the crew walked a
shore on the ice, though the engineer
came to grief when he essayed the
journey. He was the first of the men
to secure a full suit of sealskin, and
he was proud of his outfit when he
came on deck clad in "natel" (cold weather coat, helmet, "laminas", and mittens), but he broke through the ice as he was leaving the vessel and got a thorough drenching in the ice-cold water, before he could climb back with the aid of a rope which he fortunately had kept hold of. All winter long we had a beautiful smooth field of ice on which to take exercise and we could walk from two to four miles in almost any direction without encountering obstructions. A convenient little berg was a ground about one third of a mile from the ship which served as an excellent source of ice for melting.
into water for the use of the ship's company.

The necessity of spending a third winter in the Arctic was disappointing in the extreme to the Crozier and Expedition men, the more so because their hopes of return to their homes in the fall of 1915 had been revived by the final arrival of the "Cluett," but the even the thought of being caught in the ice for a year in the North was appalling to my mind and the others of the "Cluett" party who had come away from home anticipating only a summer cruise. We had made no adequate precautions for a prolonged absence from our usual vocations, a factor that was particularly hard in my own case.
least distressing element in our detention was our utter inability to let our families and friends know that we were safe and well and likewise comfortable for the time being. On 21 October the crew took up their living quarters on the forepeak and the cooking range was moved down there from the deck galley. The day was further marked by the inauguration of a two-meal-a-day programme, with breakfast served in the after cabin at 9 and 9:30 o'clock and dinner at 4 and 4:30. Two shifts being necessitated by the presence of the passengers. The winter was fairly begun. The interval between dinner and breakfast was sufficiently long, but we usually got a cracker
or two or a slice of bread and \(1.54\)
molasses in the evening and we
had to be content, for the alleged
two years' supply of provisions
for all hands had now dwindled
to the facts, which were that
only fifteen months' supply for
the regular crew, had been laid in
in New York in June. The regular
crew consisted of seven men. Five
passengers had been carried from
Boston to St. Anthony, Newfoundland,
two passengers and four additions
to the crew had been taken on at
Sydney for the arctic voyage. A
small amount of additional supplies
had been procured in Boston, but
a barrel of the sugar intended for
the northern cruise had been
put ashore by mistake at St. An.
Crocker Land Expedition men on board for the winter, making sixteen men to live for eleven months upon provisions which were only expected to care for seven men for the same time. To make matters worse, a barrel of the sugar intended for the Arctic cruise had been landed at St. Anthony by mistake and the coasters use of supplies on the northward voyage had been inexpensively wasteful.

The outlook for the comfort and health of the party was most discouraging, in fact it seemed certain that we should go hungry long before we could reach home or get relief. Nor was the prospect of a possible outbreak of scurvy...
among us to be dismissed. Last night,
from our minds thought.

The winter was now fairly begun
and our thoughts were busily en-
gaged upon plans for the best inter-
est of the party. The information that
I had received respecting the food
supply on board the "George B. Church"
made it necessary to devise some
way of separating the Crockenland
Expedition party from the schooner
party, since even the addition of
the few staples that I had brought
up with me for the use of the Crocken
Land Expedition men who were in
agreement planning to spend the
third winter in the North would
not make good the deficiency
at Parker Snow Bay and North
Star Bay. Furthermore, the snow
supplies at Elah had become so depleted as far as to be meager, though they would probably have carried the men through the winter and it looked scarcely feasible to bring any useful amount of food down from over the intervening 230 statute miles of glacier and sea ice. It was evident that my party must be divided. Some there were six or seven. It seemed to be my duty to undertake the long, severe sledge journey across Melville Bay and southward along the coast to Holstenborg, at least 1200 miles distant by the route that would necessarily be followed. It was further decided that Captain Cook and Mr. Ekblaw should go to North Star Bay and that Messrs. Green, Ifanquary and Allen should
Our ship being to reach Whaler's

ink or some other article with ink.

for the outfitting of our departure

North Star Bay, and hence to E.

she should make a trip to the

the "Clare" and her despatches

and to invoke his aid in all

work were assigned for our own.
each man must have two (89)
hooded shirt coats of caribou skin, a pair of bea
 pant, four pairs of kaminiks or seal hide boots each with its pair of rabbit (arctic hair) skin stockings, five pairs of sealskin mittens each with its inner mittens of blanket cloth, one pair of bea mitten, and a caribou skin sleeping bag with outer protecting bag of seal skin, besides sealskins and caribou skins to spread over the snow or ice under the sleeping bags. I, as the "old man" of the party, was to have in addition a pair of caribou skin kaminiks, pants or boots to draw on over my kaminiks, a caribou skin muffs for my hands and a loose
roll of foxtails to protect my face against cold winds. Part of this equipment was already in hand, but much of it remained to be made and many of the skins were still to be procured. We decided to start on the first quarter of the January moon, but things move slowly in the Arctic and weather, or ice, or rather the lack of it, and snow cause many delays, hence there was none too much time for preparation. Furthermore the party was to be exceptionally large and therefore unwieldy, adding greatly to the uncertainties of a journey that is always difficult under the best of circumstances. Melville Bay
well deserves its reputation (161) as the bugbear of the American Arctic regions. Their plans
for the disposition of the Crocker Land Expedition party having been made, there was nothing for us to do except make ourselves as comfortable as possible and possess our souls in patience for the time left us on board the schooner. These months would soon pass away.

Lumber was lacking for the construction of a house to cover the vessel completely, but by combining what Captain Pickels had with some planks and scantling which I had brought for possible Expedition use, a frame work was erected over the after cabin.
and another was put up over the bow of the vessel to protect the companionway leading down in the forecastle, where quarters for the cook and the crew were established. These frames were covered with old sails, which were fastened down, and the houses thus made answered their purpose very well during the ensuing winter, though the cabin boy and steward, Charlie Murphy, made many a cold trip across the open deck in caring for the meals served in the cabin. Occasionally his basket load of soup came partly to grief by reason of the fierce wind sweeping across his path, but no serious accident happened.
During the winter the wind got the best of the bay and tore the door from its fastenings and sent it sailing down the bay leaving us with no protection over the cabin, but we managed each time to get the door closed again before the sail got loose, and the danger was averted. Without that house, our little cabin store would scarcely have sufficed to keep our rooms warm enough for comfort, in spite of the large supply of excellent anthracite coal which had fortunately been taken on board the schooner. When the canvas house went into
place on 14 October, we began to burn kerosene lamps all day long and they burned continuously from that time until the house came off on 6 May, nearly seven months later.

The freezing of the sea and the formation of the ice foot were interesting to watch. When the upper layer of the bay had a temperature of about 30° F. and the water was bailed smooth, countless crystalline blades or plates would form, making a network two or three inches thick with water imprisoned in them. 

The light reflected from the edges of the crystals gave a beautiful sheen of prismatic colors to the surface of the sea. As freezing progressed, some of the salts con-

...
tained in the sea water were forced (165) to the upper surface of the layer of ice, where they crystallized in groups or rosettes. Even after the ice was six inches thick, the upper top remained wet and disagreeable to traverse, not becoming thoroughly frozen and dry until after the tempera-
ture of the air remained at about 15°F or lower. As we lay at anchor being frozen in, we found
that the sea ice when two or three inches thick was still mushy and
flexible and not strong enough
to walk or stand upon, and that
perfectly it was not rigid when it was six
inches thick, being very different
in texture from fresh-water ice.
Later in the season, when the weather
was colder, the ice formed in leads
opened by wind or tide was broken and formed. I do not know that this observation can be confirmed by the experience of others, but it seems to me that rapidly formed ice is harder and tougher than that which forms slowly.

The ice-foot has been defined by an eminent authority as the belt of ice that forms along the shore in arctic regions by the accumulation from the land of snow and the freezing of water, but this definition misses the facts of the case, as they were developed before our eyes at Parker Snow Bay and as they have been observed by everyone who has passed a winter in the Far North. The ice-foot is the shore belt of ice, but it is formed by the freezing of sea
water between high and low tide. The
water marks of the tide, and it is broad
or narrow according to the shelving
or abrupt nature of the shore.
At the head of Parker Snow Bay
there is a beach of gravel and pebbles
and then the ice-foot was twenty
to thirty feet wide. It began to form
by the freezing of the film of water
left on the stones by the receding
tide in calm weather, and each
successive tide added its quota
of ice and besides a deposit
of slush, the process proceeding
more rapidly as the intensity
of the cold increased. Where the
shore is so abrupt that the cliff de-
scends vertically below low-water
mark, as is the case with the head
landed on both sides of the entrance
to our bay the icefoot is an apron or shelf attached to the rock and is formed of successive films of ice on its edge, its width depending partly upon the severity of the season and its thickness determined by the maximum rise and fall of the tide. Along the bold headlands forming the entrance to our bay the icefoot shelf attained a width of two to five feet and a thickness of about six feet.

As soon as the ice of the bay became strong enough for safe travel we all began to take long walks in every direction, thus breaking into the confinement and monotony of life on board ship. Blue and white foxes, laves and ptarmigan were on the hills. Fox tracks were abundant on the
bay ice and we often caught sight of the peacefule little ani-
mals, but our efforts at hunting and trapping were not very suc-
cessful. Many a bullet was fired at the blue streak on hill
side or bay, but only two foxes were thus secured and they came
so close to the ship that they in-
vited their own destruction. For
several nights after we were first
frozen in, foxes came prowling
around the cook's refuse heap,
but they soon learned that it
was a dangerous locality. The
chief engineer fixed several inqui-
ous devices for securing foxes, one of
which was a spring gun that was sup-
pores to shoot Raymond when he stepped
on release, but the fox could always
secure the bair without firing (179
the cartridge or springing the trap.
When a dog set off the gun, the con-
trivance was discontinued although
it had done no execution. The chief
finally went into partnership with
Poodland, after some steel traps had
been obtained from one of the Eskimos,
but even then his success was not much
better. One day the second mate took
a shot at a supposed fox on the ice
near the head of the bay, but it did not
move after he fired, though some of
the men watching from the vessel
declared that it did, and when he
ran up to the object he found that
it was my camera, which I had
left behind when I went ashore for a
week. Fortunately his marksmanship
was not perfect and the camera was
not injured. During the winter Captain Pickels obtained a shotgun from Peter. We had brought no shotguns with us, but during the winter Captain Pickels obtained one from Peter. After that reached the ship and the sun came back about thirty hares were gotten. Inasmuch as these weigh seven or eight pounds each, they formed a valuable as well as welcome addition to our restricted menu, while the skins were most useful in supplying stockings for the harriers or native seal skin boots of the crew. Through some oversight a supply of shot was not furnished with the gun; hence for several weeks missiles were improvised by cutting pig lead into little cubes...
and nailing these into shape. The resulting bullets were crude in shape, but they accomplished their purpose. We had brought no shotguns with us and there was no rifle for the crew to use, but Captain Pickels managed to get a shotgun and a rifle from Peter. Ammunition was scarce but the captain had powder and lead and a bullet mould that would fit the rifle, while coarse shot were manufactured in the forecastle by cutting the pig lead into little cubes and rolling these into crude spheres. The shotgun was useful in the spring getting murrels and sea pigeons off the edge of the ice or from their nesting places on the cliff. We did not have much fresh meat during
the winter, the supply con-
sisting of a few seals caught in
October and an occasional
piece of polar bear meat and
now and then or a seal brought
in by visiting Eskimos. On one
occasion Eagnukak brought some
meat and skin of the white whale
from Cape York, which novelties
were for us. Early in May the fresh
meat problem was solved for us
by the advent of the little auk
or doweries, which came by
the myriad to amid the cre-
veches and talus of the cliffs on
the northern side of the bay.
Some members of the crew became
very adept in catching these small
birds in long-handled nets. One
day they secured more than 600,
French Ben being "lightline" (L
man as usual, this time with
156 to his credit. The crowded
nature of the flocks may be judged
from the fact that the man often got
three or four birds at once.
Once Ben got fifteen in his net
as one swoop, but six of the birds
got away before he could secure
them. We ate the little ducks
stewed, fried, and baked, at
most of breakfasts, dinners
and luncheons for weeks and
strange to say died not one
of them. The flesh is more
delicate than that of the murre,
the sea fowl on the adult eider
duck or the bengomaster gull.
On 22 November, Peter arrived from North Star Bay bringing native made skin clothing for several members of the crew, who poor fellows were sorely in need of it, having come away from Sydney without any winter clothing and the captain's "slop chest" being exhaus ted. They looked very fine and comfortable when they blossomed out in their new sealskin hooded shirts, tarkikikse (seal skin pants), kamikos (seal skin boots) and chukut- tes (seal skin mittens). Peter was accompanied by Panikpak, a benign looking middle aged Eskimo, who wears a closely fitting skull.
cap on account of baldness. 
and resembles a Chinese mandarin in appearance. Panikpak was one of Peary's men in 1906 which is known among white men and Eskimos alike as the 'starvation trip'. On account of his lightness and agility at that time, Peary put him in the front on the part up terrifying dash over the thin ice that formed a precarious causeway across the Big Lead. When they returned to land from the Polar Sea, he narrated with Peter the details of our southward journey, learned what Eskimos were to be in the party and were informed
that work on our clothing had been started. Peter and Panikpuk's return to North Star Bay was delayed by a southly storm that began to rage the day after their arrival at the schooner. This storm was peculiar in that it was marked by a sudden and great rise in temperature. At 9 o'clock Tuesday morning, the 23°, the thermometer stood at -17° F, six hours later it was +18° and the next day it touched 30°.

Peter called the wind a regular "foehn" wind and said that two or three such periods of sudden warmth came every winter. He came to regard a rise in temperature as indicative of a coming strong wind.
Thanksgiving Day came (178) with heavily overcast sky and
thick atmosphere and with the
wind still strong from the south-
est. The Eskimos, however, who
are shrewd judges of weather, said
that the storm was nearly past,
Hence Peter and Panitkum
started for North Star Bay about
noon and three other visitors, Es-
kins, likewise departed. I
code out about two miles with
Peter, my first experience on
a dog-sledge. It seems that every
one who becomes accustomed to
riding behind a good team of
Eskimo dogs likes the means of
transportation and I thought
that I could see how one could
grow enamored of it. The
dogs are strong, intelligent, and mauling creatures. They like this work and make some remarkable journeys at a good rate of speed. The ship celebrated the day very elaborately, our dinner consisting of bean and turnip soup thickened with hard tack, baked salt meat, salt beef, "dehydrated" potatoes, bread and butter, and molasses and tea. To these were added from our Expedition supplies canned salmon, peas, grape juice and candy. It was somewhat hard for us to see much to be thankful for, perhaps, but we concluded that actually had many more things in our present cir-
circumstances, that very (180
the night side of the ledger.
Christmas came along in due
season and received more attention
than Thanksgiving Day on board
ship, the captain adding canned
tomatoes and corn and plum
stuff, made with prunes in place
of raisins, to the standard bill of
day, while we had boiled candy
and nuts from the Expedition store.
As a beverage we had some Danish
"apfel most", an innocent kind
of soda that Peter had given us
which tasted good when served very
cold. Santa Claus was not
in evidence and we concluded
that he had taken all his presents
south with him to warmer
latitudes.
As the year closed, the minds of my party and myself became fully occupied with our rapidly nearing start for the south and civilization, though we were concerned principally with the preparations for the arduous trip across Melville Bay in the moonlight and twilight in the low temperatures 45° to 55° below zero Fahrenheit, liable to be encountered there to the accompaniment of severe storms. Allen rigged up a mask to protect his face. It was an astounding affair, fashioned from sheepskin and made to be tucked in around the edge under the face roll of his tarpetau, or foxskin hooded shirt coat. It
was provided with holes in (182
front of the eyes and mouth, while
a proboscis six or eight inches
long depended from the nose open-
ing. But this grotesque device
did not prove very practical.
It kept the face warm, to be sure,
but got iced up rapidly through
freezing of the breath issuing from
the mouth opening and the pro-
boscis and the insensible per-
spiration coming out at the eye
openings. Allen finally dis-
carded the contrivance at Cape
York, without having worn it
even once on the trail. Many
kinds of face masks have been de-
vised and tried by white men
in the Arctic regions, but none
has been found practical. The
best face protector seems to be the roll of foxtails which the Smith Sound Eskimos face the hoods of their upper garment. On 6 January Dr. Hunt and three Eskimos arrived from North Star Bay bringing a lot of new clothing for the trip and assurances from Peter that the remainder was nearly done so that we should surely get started by the time that the moon would be giving adequate light for traveling. The temperature ranged from zero to twenty-two below, there was little or no wind and everything looked promising. On the 12th Peter, Green and several Eskimos came in, but a
Storm raged the next two days, confining all hands on board ship. In the midst of the storm, however, Tatian and Koloodenjay, two of the men who were to go with us, came in from North Star Bay, showing commendable persistence in keeping their word, for the skinos do not like to travel in stormy weather.

Saturday morning the storm began to abate its force and by late afternoon white men began to consider the advisability of starting that evening, but the skinos, who are wonderful judges of weather conditions said that the wind was still blowing hard outside the bay and that
it was not best to start be - (185)

fore morning. During the night
the men turned all the kahma-
tikes bottom side up and polished
the rust off from the runners and
made other preparations for the
morrow. Everybody on the
schooner was astir early on
Sunday, 16 January, loads
were apportioned and secured
in place. The day was clear,
cloudless and calm, the Tem-
perature was 15° below zero, Fe-
renheit, and conditions were
highly auspicious for the be-
ginning of our journey.
We had breakfast at seven
o'clock and by nine o'clock
the first of our fleet of seven
kahmatikes got away from
drawn by about 75 dogs,
the ship. It was a work of skill and patience to get the dogs into shape and one does not wait an instant after the long single traces are unbraid ed and fastened to the bridle of the kalmatic before getting under way, for the dogs at once begin to run back and forth, braid ing the traces again, if there is any delay. About ten o'clock Peter gave the usual kick to loosen the runners from the snow, and he and I went off, bringing up the rear of the procession. Been driving his own team was just ahead of us, while farther in advance were Tan-

quary, riding with Tating and
Allen on the ledge with (187)

Fracketop (Peanny's "Harrigan").
The other Estimino of my party
were ah-yak-yok (Peanny's "Pegasus"),
Koloodeenaq and Retkolahooq.
All the Estiminos proved them
selves faithful and efficient
helpers.

The ride to Cape York was
very enjoyable, the ice being
in good condition, the dogs in
fine fettle, and everybody in high
spirits, and there was com-
tined twilight and moonlight
at first
enough to enable one to see
some of the interesting charac-
teristics of the Crimson
cliffs and their fourteen
glaciers as we passed along,
but after three o'clock the full
Moon shining in a cloudless sky alone gave us the illumination needed for travel. Fourteen glaciers descend through the gorges and valleys that cut into the Crimson Cliffs between Parker Snow Point and Cape York, and for days on the northward voyage I had opportunity for examining them through field glasses from the deck of the "George B. Cluett". Now I was getting close view of them all. The most northwestern of the series, the one nearest to Parker Snow Point, probably the largest and most important of them all. [Illegible]

It projects at least one third of a mile into the sea, to which
It presents a bold front about a mile in extent. It contributes many icebergs to the North Water every summer. I propose for it the name "Ekblaw Glacier" in honor of W. E. Ekblaw, the geologist of the Crocker Land Expedition.

About 3 o'clock our procession halted for luncheon and to rest and untangle the dogs. At prime, store was lighted in the lee of an ice cake, coffee was soon made and a box of biscuit was broached. The Eskimos are lively and fond of games and doing stunts. Peter stood a biscuit up on one corner in the snow and lined up the men about ten paces distant. They then
more or less by turns, closed (190
their eyes and tried to walk up
to the biscuit and win it. Great
movement was aroused by
the wanderings of the contest-
ants. At last one of the men
was successful and joyfully,
munched the prize. They
played tag and tried walking
on their hands. Green excelled
all the Estirnos in the cart exer-
cise. By four o'clock we
were under way again and we
drove along at a rapid rate in the
brilliant moonlight, the twilight
having disappeared. By eight
o'clock we had rounded
the point of Cape York and
had reached the cluster of huts
comprising the little settlement
where Ahng-go-di-blo-ah-soy 191
Ahng-ma-lo-ke, E-ging-wag,
and E-wik and their families
were living this winter. We
had covered the distance of
about fifty miles from the
ship in nine hours of actual
travel.

The polar Eskimos are eminently
hospitable people and although there
were eight adults and seven chil-
dren living in the three small,
half-underground dwellings,
my party of ten and four addi-
tional Eskimos who came with
us visiting were divided a-
mong the igloos and made wel-
come. By special invitation
I was quartered with Ahng-go-di-
blo-ah-soy, and was given the
who is one of the most successful hunters in the tribe, although an old man, according to Eskimo standards, being about 55 years of age. Abundance of meat had been brought into the igloo in anticipation of my arrival, and shortly after reaching the igloo I was regaling myself on boiled loin of seal and some excellent coffee that Bah-ki (Paulina), Ewikt's South Greenland wife, had prepared. All the Eskimos are extravagantly fond of coffee, which they prefer to tea when they can get it. Besides the hot seal meat we had raw frozen Narwhal flesh, Narwhal skin
and nikkut, which is the lean meat of the narwhal that has been dried in the sun and soaked in the animal's oil. We contributed sugar and biscuit from our supplies, and had quite a feast that was very palatable to the white men who had been living on the ship's meagre and restricted diet for so many months.

In the other igloos there were frozen dovecies (little auk) and frozen ducks, but their state of decomposition was somewhat more advanced than that of
The manure some day will be

store-flavoured, and the

beer-flavoured with its two

children sleeping in a little
goat, and Peter and Al-

right forward seen adults and

him, I came to stay. We

and I much enjoy that here-

flavor, "like Popeye's cheese"

was delicious and nutty in

my experience in the Arctic.

to eat it in the "Flume".

when it was eaten. Drag

beet, Peter assumed me back.

in cotton wool and a black

shirt, The".
had the place of honor in the middle and passed a comfortable night, in spite of the attentions of the non-human dwellers almost invariably to be founds in an Eskimo habitation. The igloo is shaped like half an acorn including the cup and is about 14 feet in each of its extreme dimensions. It is about six and one-half feet high in the standing room. The atmosphere in the little cavern is, however, surprisingly good, ventilation being effected by means of the entrance way in the floor, the heap hole in the window, and a hole through the roof.

The next day had been decided upon in advance as a day of rest and dog-feeding hence we are
in no hurry about getting up. Anyhow, there are no regular hours for meals and no regular meals. An Eskimo eats when he is hungry, if there be anything to eat, otherwise he goes hungry. He sleeps when he is sleepy and can get a chance to sleep, either sitting up or lying down. It took a little time for me to get used to seeing the frozen section of marmalade in the middle of the little floor, with the people grouped around it, one person hacking it to pieces with a hatchet and everyone cutting off the mouthfuls as his own lips. But soon I too was playing my part at the game. Soon after
noon Dr. Tanquary and I started out for a walk. We put on our Iceland sweaters and wind proofs and went down to the Kaltmatiks for our blanket shirts. The temperature, as we learned later, was 35° below zero Fahrenheit, but there was little or no wind and I did not feel the cold severely. After I got my blanket shirt on I thought that I was all right, but we had walked scarcely one hundred yards before the cold gripped my chest like a band of steel and I was gasping for breath. With Tanquary's help I staggered across the ice foot and up to the entrance of the igloo. There we met Peter, who shouted to me...
"Why, sir, your nose is freezing," said the officer, 
and clapped his bare hand over the offending member.
I could stand no longer and 
the men helped me into the snow 
estep of the igloo, where I lay 
down on some hastily brought 
skins while others were thrown 
over me. A primus stove was 
lighted, stimulants and friction 
were applied to me and in a 
short time I began to "come back", 
but with an ominous feeling 
of discouragement regarding 
the trip upon which I had been 
backed with so much hope the 
preceding day.

While I was sleeping off 
the effects of my collapse, the 
white men of my party held a
council of war and later (199 gave me their unanimous opin
ton as men of experience in
the Arctic that it would be wholly
unwise and more than probably
dangerous to myself as well as to
the success of the party’s journey
for me to persist in my attempt
to cross Melville Bay, where tem-
peratures of 50° and 55° below
zero were most likely to be encoun-
tered, to the accompaniment
and other adverse conditions
of severe storms. Here seemed
to be nothing for me to do but
acquiesce in their judgment
and abandon the trip, my age
of 53 and my apparent physical
condition as evidenced by my
collapse being facts that I
could not gainsay. Nature’s
laws are inexorable and cannot be infringed upon with impunity. My disappointment was keen and my feelings can be imagined better than they can be described, for I had been confident that I should be able to get as far as Upernivik at least.

It was decided to send word at once to the schooners for either Mr. Eeblew or Dr. Young to come down to Cape York to accompany me back to the vessel and at eight o'clock Monday evening Ewik and Kolodennaq were despatched to travel express to Parker Snow Bay on the errand. My companions refused to leave me
before one of the two men sent (201
for showed arrive, but the next
to day were bad as regards weather.
Hence no time was lost while the
letters were being written and the
changes in arrangements, except
that we rendered necessary by
my dropping out of the party.
Our Eskiimo messengers made
a quick round trip of 23 hours
and arrived again at the igloo
at 7 o’clock Tuesday evening
bringing Mr. Mcclure with them.
About 3 o’clock Thursday
afternoon, 19 January, the south
bound party got under way a
again in good shape in the bright
light of a moon only one day past
the full. They were Peter and
Green each driving his own kehik
title, Tanquary as passenger (201)
with Tatiang and Allin on Inn-
keetoog's Kahmatik, while four
of the Cape York men went along
as supporting parties, two to turn
back after one march and the
other two after two marches.
I rode on a little way with
Green, but the new snow was
soft and a foot deep making the
draft heavy for the dogs, and I
soon jumped off the Kahmatik,
bade farewell to all the men
and trudged disconsolately
back to the igloos. The tempe-
ture was 15 degrees below zero.

Chugqodloahssoq and
Ahnymalokto returned Friday
evening from their trip as the first
supporting party. On account of
hard travel due to soft snow. The first camp had been made only about thirty miles from Cape York, but all was well with the travelers. Saturday was a bad day, but the Eskimos said that Sunday would be good and that we should go to the schooner. Sure enough, Sunday came in fine, and at 9:30 o'clock we started Esbline riding with Ahngga, Malakto and I with Ahnggodi.

Fhoahs'ooq. The weather was clear and beautiful and daylight had come back to such an extent that only the first magnitude stars were visible at noon.

It was not cold, the temperature being only 70 below zero. We jogged along at an easy gait,
the dogs being somewhat jaded from their journey into Melville Bay two days before, there being an occasional stretch of soft snow to contend with and the Estimnos improving the opportunity offered to visit some of their fox traps along the Crimson Cliffs.

We drove on through the darkness till about seven o'clock, when we reached Suk-ten near the eastern side of Estbank's glacier and stopped to make tea and have a lunch. The Estimnos had built a wind break of snow blocks and soon had the furnaces stove mainly at work. There are three igloos here but they have not been occupied for some years.
The natives are a nomadic people and like to move about from one place to another according to the hunting and the dictates of their fancy. After luncheon we jogged slowly along the front of the glacier until we came to its northern corner, where we encountered the lead stretching off toward Croical Rock. Now it was twenty to forty feet wide and we turned seaward in search of a crossing. A half-mile out Chungmalokto spied a quadrangular cake of ice, two of whose corners were jammed against the opposite sides of the lead, so that it formed a good enough bridge. It was interesting to see the in-
intelligent behavior of the dogs. They
in dragging the ladders a-
cross the floor. Evidently they
were used to that kind of work.

By this time the moon had
risen above the crest of the
Crimson Cliffs, and we had
good light for the rest of our
journey. We reached the
"Cluett" about midnight—
and soon, discussing a luncheon
in her little cabin, Captain Pickles
having turned out from his bunk
and begun to prepare chocolate
as soon as he heard the hail of
the arriving party.

There is not much more to re-
late regarding the participation
of the "George B. Cluett" in the
relief of the Crocker Land Party.
tion party. The schooner (207) seemed very quiet after my return to her. Captain Croom had gone across the ice cap to North Star Bay with Peter the day after Christmas to stay till summer, and the day that Ekflaw came down to Cape York Dr. Hunt had started for a settlement on Inglesfield grief to care for an Estimino who had wounded his leg with a seal-killing iron. There was, therefore, no one on board besides his crew except Ekflaw and myself. I settled down to try to be content for the eight months of life in the Arctic that then seemed to be before me, while Ekflaw began making preparations to leave.
the vessel, for he was going to Utah to see Mac Millan before the latter started on his trip to Findlay Land, after which he was to return to North Star Bay for the opening and summer work in geology, botany and ornithology. I had to stay on the "Cluett" till the middle of May and then go over to North Star Bay, if conditions there were favorable, to await the arrival of the new relief steamer which we expected the Museum to send up for the expedition party and property. Captain Pickels had given me formal notice in December that he should sail direct for a port where the "Cluett"
could be repaired, as soon as the ice should release the vessel in the coming season. This information had been transmitted to the Museum in my messages to the Museum, since it necessitated the sending of another vessel to accomplish the task for which the "George B. Clum" had been chartered.

On 30 January Dr. Hunt came in from North Star Bay in company with two Eskimo youths. The ice being in exceptionally fine condition and their drags being in good form, they had made the journey 757 statute miles in eight hours. They were just in time, for a heavy snow storm averted all the following day. The doctor's report on my physical condition...
after making two care-
ful examinations of me, I
was not so favorable as I
had hoped that it would
be, and he gave me a series of
instructions to follow during
the remainder of my stay in
the Arctic. He said that I was
to regard myself as an inva-
ble, even though I did not feel
like one, for there was danger
of my heart giving out under
stress of cold weather or severe
exertion. This was a suffici-
ently distressing state of affairs
for a man to face who had for
many years done all that he
wished to and faced exposure
in many parts of the world.
Furthermore, the meagre and
poorly balanced diet of Carilford by the schooner was calculated to break down rather than build up ones bodily strength. Here were, however, for the time being, fewer external matters to worry me, since the departure of my party for the south. At Dr. Kent's request Captain Pickels gave me some canned mutton to use at my supplementary evening "mug-ups" and I had some things from our own Expedition supplies for the same purpose. Thus, with somewhat more to eat than before and with a rest of Dickens to read, much work being interdicted, I settled down for the rest of the winter trying to conserve my strength and
In 969, I, the one desired
of all eternity, found
the joy.
Therefore, in 969, I, though it
was cut out from that day on,
put your hand on, and shining
in the darkness. Glorifying you
right glad were I to mention
such things for 97 days over
other, the remaining Red
that first minute, and knew the
same thing for a year, that you
blew a shot at the tower in
which you have a holding this pump.

Dedicating an E. Totem,
the main canoe to our
water to from the days in
such a way and in such
good, snow-covered, in nineteen
November 21st.
first been visible at noon (213 of 13 February. We were in-
terested to note that high latitude
and cold influenced refraction
enough to advance the time of
appearance five days, just as
the same causes had retarded his
disappearance by four days in
the fall. The temperature at the
ship at 12:00 a.m. of 3 November, 1915
was 24°F. The day the sun dis-
appeared and was 14°F at noon
on 8 February when he reappear-
ed. Out at the entrance to
the bay the temperature was usu-
ally lower than it was at the
vessel. On one occasion I deter-
mined the difference to be al-
most 10°.
did not feel the great elevation of spirit at the return view of the sun, which has been described in glowing terms by several writers on Arctic experience, nor did anyone else on board ship seem to feel such uplift, though of course we all were glad to have the sun back again. Neither had we experienced or at any rate manifested the terrible depression of some which has been assigned to the period of darkness. We could not see that the Eskimos paid any devotional or reverential attention to the sun, or watched his return with tears running down their cheeks as one another relates—The winter is naturally
a period of much less ac-
tivity than the summer, but
it is by no means a season of
entire stagnation and hibernation.

The Eskimos are constantly trav-
ing up and down the coast by
dog team, particularly during
the periods of moonlight. We
had frequent visits from the natives,
seventy-four different members
of the tribe being at the schooner
at one time or another between
the end of September and the bi-

The whole tribe numbers 261 according to the
beginning of July. Some of them
came several times, so that we
had 167 visits from Eskimos in
that period; and we should
have had more, had not the
news been spread generally
up and down the coast that
both food and trading ma-
terial were scarce on board the
"Clunie". Even during the dark
period, the intervals between visits
seldom exceeded two days, except
during the dark of the moon. We
became very friendly with the
Cape York people and in fact
owed to them much of the
small supply of fresh meat
that we had between October
and May.

After several days of delay on
account of impassable leads
in the strait between Cape
Dudley, Digges and Cape Athol,
Seegloo and Npiritotolaha came
in on 15 February from North
Star Bay. The next day they
got away again on the return
journey, taking Esklawn (12-7) and his most important baggage with them. Esklawn had been waiting for them, all packed up, for more than a week and was glad to get away on his trip to Etah. Dr. Hunt remained on board the "Cluett" to care for my health and that of the crew, not leaving for North Star Bay till 23 April. After that date I was the only member of the Crocker Land Expedition party on board the schooner till the end of June, except for a twenty-eight hour visit from Esklawn at the middle of May. He came overland from North Star Bay then prepared to take me back with him, if
I insisted on going in full fulfillment of the plans which we had drawn up in the middle of the winter. But he reported conditions at North Star Bay as being hard and unfavorable for me and the journey across the ice cap too difficult, in Dr. Hunt's opinion, for me to undertake. Furthermore the two kalmatiks that were available were insufficient for the transportation of the baggage which it seemed essential to take, in addition to us two heavy white men as passengers. Hence, I decided to remain on board the "Cluett" and go home on her, if she broke out of Parker Snow Bay.
before the arrival of the expected relief steamer. Dr. Hunt had applied for permission to go home on the schooner, if she got our first, hence word was sent with Captain Pickels’s sanction, for him and Captain Comer to report on board by 1 July. On 30 June Captain Comer arrived alongside with his precious blue seaman’s chest on Egingwall’s kahmatle, bringing a letter from Dr. Hunt saying that he had finally decided to await the relief steamer at North Star Bay. The winter passed without the appearance of scurvy or other serious illness on board.
the vessel, except that one (337)
member of the crew was in
bad shape from digestive troubles
due to faulty teeth, and no
serious accident happened
to any member of the ship's
party. Though there were two
narrow escapes. In November
a rifle went off in the
cabin, while its owner finished
oilig it after cleaning the barrel.
He had been out hunting and
supposed that he had emptied
the magazine on coming on
board ship. But somehow one
cartridge had not been thrown
out and this was discharged
in some manner in handling
the weapon. The bullet passed
through the thin board partin-
tion of Eskhaw's cabin. (231)

Eskhaw was sitting at his writing desk, and had he not just
leaned back to compose his thoughts, he would have been shot through the heart.

Through that separating this room from Tanguary's cabin and buried itself in the oak
planking of the vessel. Eskhaw, As it was, his face and one hand
were slightly scratched by flying splinters of wood and one
sleeve of his sweater was blackened by the passing missile.

Tanguary was not in his room when the accident took place or he too would have had
a close shave. There was a very sober party in the cabin.
that evening as we thought of the narrowly avoided terrible consequences of one man's carelessness.

The other episode took place at the end of February. Second Mate Norman was out for a walk with Fiander and Taylor of the crew, and when they were on the Penonide Glacier seven or eight miles from the ship about one o'clock in the afternoon he proposed walking across country to the Danish station of North Star Bay. Fiander declined, but Taylor is young and did not like to "take a dare," so he and Norman went on, though they knew only the general direction in which they should go, never...
nothing of the country to be traversed or any trail across it, had no food with them and were most inadequately clothed, Norman's clothing being particularly ill-adapted to the task. The temperature at the ship at 4 o'clock p.m. was 14° below zero, Fahrenheit, and the sun was then setting. Fortunately there was no wind to contend with.

We were already getting anxious about the man, when Taylor staggered come on board at 6:40 o'clock, suffering from cold and fright and saying that he had left Norman about five miles from the ship in distress and hunger from the cold and unable to keep going more than a hundred
yards at a time without lying down to rest. The two men had crossed the glacier, which is about two miles wide where they were, and had begun the traverse of the rough land on the north side when Norman began to complain of numbness from cold and faintness from hunger. Taylor at last prevailed upon him to turn back and they went three quarters of the way across the glacier again when the sun went down. They stumbled on for two or three miles more and it became evident to Taylor that help must be obtained or Norman would perish.

Captain Pickels at once started rescue parties on the way with
lantens, ropes, and extra clothing, while Dr. Hunt went along with a prisoner, store, water, kettle and tea. Within ten minutes of the receipt of the news seven men were under way to Norman's relief, and Taylor and Mac Dougall followed as soon as the former had been warmed and fed. Shortly after eleven o'clock the men returned with the unconscious Norman on the sledge. An hour's hard work by the doctor and his assistant was required to restore the man to consciousness, when he was rolled into a bivouc to sleep off the effects of his experience. Fortunately for him he had gotten a new pair of rabbit
none skin stockings that day (2.26) and he was not bodily frostbitten, though the temperature was 17 degrees below zero when they brought him in.

Mate Davis and Fiander had found Norman on the land some 800 feet above the sea. They had no lantern and the night was moonless. They had gone almost as far as they dared to go, yelling as they went, when they heard a faint noise and discerned a dark object rising from the snow some yards away from the tent. They hurried to it and found it to be Norman, who was completely exhausted and almost unconscious. He had seen or heard them and was just able to utter
the faint call which attracted their attention. They managed to raise him and get one of his arms over a shoulder of each and began the rough descent to the sea. At first he tried to help himself along, but soon consciousness failed him and the two men dragged him along as well as they could for about a mile.

Then the snake went forward for more assistance, leaving Fiander with Norman. He met Dr. Hunt coming up the track from the sea. They two then took turns "backing" Norman down to the top of the little cliff at the edge of the sea, over which they lowered him by means of a rope, like a bale of hay, and bundled him.
onto the sledge for the two mile drag which still remained to reach the ship. It was a close call for the young man, and some weeks elapsed before he was able to get around again without suffering some reminders of what he had been through with on that ill-considered trip.
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followed by continuation of "Cluett Voyage"