E. O. Hovey.

Martinique.

1915.

("Cluett" Voyage)

Martinique - pp. 1-134
Continuation of "Cluett Voyage"
after p. 134 of the Martinique article

Martinique.

Leaving Pointe à Pitre, Guadeloupe, in the afternoon of Tuesday, 2 ~~February~~ March, 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. D. Schnegg, the genial and efficient local manager for the American Trading Co., who took me and my baggage ashore, and kept me through the custom house. As at Guadeloupe, the formalities of the douane were rendered nil

by the letter of ~~into~~ introduc- 12
tion and recommendation
to the ~~courtesies of the~~ governors
of the French West Indian de-
partments which had been cour-
teously supplied to the American
Museum for me by M. Jusse-
rand, 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, the ~~was~~ people were still nervous on account of the European war and were fearful of an attack by the German Cruiser "Carlsruhe", for it was not known then that the vessel had been destroyed by the English. ~~Ha~~ 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 water front or along the streets leading away from the bay. A monster search light had been installed on Pointe des Negres, 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 5
me from Messrs. E. Benzelin and
Louis des Grottes of Basse Pointe
showing that all arrangements
had been made for assisting
me in my work on Mt. Pelé.
Without the help of the hospita-
ble plantation owners and
managers, it would be hard
to make geological excursions
in Martinique. M. Benzelin
was to be my principal host,
and I found that he had arranged
for an automobile to take me to his
home at the Pécoul 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 at-

ter part of the afternoon was pleasantly spent in an automobile ride with Roger Bensalim, a son of my host, over ~~the~~ 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, M. ?, 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 Pécoul with M. ~~Andre~~ 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 d.~~ the 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 head 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 - that belonging to M. Fernand Clerc, the planter whose name was made known to the american public by ~~the writings of~~ George Kennan, Angelo Heilprin 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 amer-

ican manufacture. The ad- 19
vent of the automobile has re-
volutionized transportation
in Martinique and rendered
almost all parts of the island
easy of access ~~by~~ over the excellent
roads which are characteristic
of French possessions. The
route from Fort de France to
Basse Pointe passes over the moun-
tains through the villages of
(Name and describe villages
especially Gros Morne
pineapple industry. Market women)
Sea level is reached again
at Trinité a town of 00000
inhabitants which possesses
the principal and prac-
tically the only harbor on
the windward side of the
island. Caravelle Penin-

sula throws its slender arm
00 miles eastward from the island
just south of Trinité harbor, re-
ceiving its name from Caravelle
Island a mile or two off its point,
which in the afternoon sun looks
like a cat boat under sail ~~south~~
bound southward. South of
this peninsula numerous coral
reefs fringe the coast and
render 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 colo-
niale skirts the sea coast as far
as ~~Bosse Pointe~~ Longagin, miles, leaving
it only to cut off some pro-
montory or cross a stream.

Beautiful views abound, ~~a fis~~ in which the surf driven in by the tradewinds from the broad Atlantic always forms a picturesque feature.

Ste Marie.

Lorrain is the terminus of the daily automobile ~~bus~~ 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 portion of the island, lying mostly on the lower slopes of Mt. Pelé (to use the shorter appelation of

the great volcano current in (12
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 Pécoul, where
a most hospitable greeting awaited
me from M. E. Benzelin and
his genial wife. On telephoning
over to Basse Pointe, he learned
that my heavy baggage and camp-
ing outfit had arrived there
safely. One of the Pécoul oxx
carts soon brought it to the
plantation. I had dispatched it
from Fort de France the day
before in a pirogue, or open
sailing freight boat, belonging

to M. Robert Dormoy, the store keeper at Basse Pointe. Later in the afternoon M. Benzelin 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 plateau above the sea cliffs well out of danger from similar occurrences. The point at the river's mouth which was extended yards into the sea by the floods has not lost much of its front by action of waves and current since 1908. The little harbor which was filled from it in (by material

1902 and 1903 has not 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 (21, 69, 13) runs from a post in front of the winch to a secure anchorage beyond the surf. The boatmen drag the boats through the breakers by pulling on this rope. As may readily be supposed, this is a slow and expensive method of load-

ing a vessel, since only three 15
hogsheads of sugar can be taken
out in the boat at one time.
Rum is loaded in a different
and even more picturesque fash-
ion. The casks are rolled down
the beach to the water's edge where
each is seized by a man, naked
except for a breechcloth, who
skilfully swims through the
breaking surf, pushing the
cask before him. After that
difficult feat is accomplished,
~~he ha~~ it is easy for him to make
rest of the journey to the vessel
with the rum. Sometimes a heavy break-
er tears the cask from the swim-
mer's grasp, when he has trouble
enough on his hands to recover
control of his charge. 1908 photo

Soon after sunrise on Saturday, 6 March, a cabrouet or oxcart drawn by two yoke of fine oxen stood by the door of my rooms at Péconl 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 M. Benglin'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 Morne~~ together into the little negro village of Morne Balai about ten o'clock. Morne Balai (21, 74 A or 75 A)

consists of 15 or 20 huts of 17
thatch housing a population
of 000 people. It lies on a gentle
slope 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. Pelé'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 ~~has~~ nature
has already obliterated all

obvious traces of the havoc wrought by the ~~eruption~~ 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 Morne Balai we left all semblance of a road and followed cart paths on up-

ward through pastures and woodland to a point about ~~2300~~ 1200 feet above the sea, beyond which the cart could not go. Here the porters, eight men and two women, whom ~~~~ M. Benzelin had engaged for me in advance at Morne Balai, took my luggage from the cart [Dec. 1908] and started merrily off up the mountain with the parcels on their heads. ~~Be important~~ It A 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 a man

is to carry up a steep mountain 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~~ was double the wages received for a day's labor in the cane fields and the task took the porters less than ½ 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 ~~the~~ its name from the fact that it is highest point to which one can ride by this route. Sending back our animals thence at 11:30 we 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 ~~beds~~ layers of ash deposited on it by the eruptions. There is no area now where a bowl could collect. [Ill. 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 123
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 ~~the~~ waste the upper slopes of the mountain above a line about 800 feet above the sea (Verify. The line would be below Morne Balai) ~~=~~ toward the east and southeast, Morne Balai and Ajoupa Bouillon being ~~not~~ included within the devastated area. Toward the northeast and north less havoc was wrought, because the advance of the lower, more destructive portion of the eruption clouds

was checked and diverted (24
eastward and westward by the
high rocky rampart, known
as the Morne du Macouba, which
stretches entirely across the nor-
thern portion of the summit of
Mt. Pelé, extending east and west beyond the
present crater. Its eastern
part 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 an-
tedating the present crater. It

is essentially a Somma ring as known to geologists and is a record of the ancient activity of the volcano, 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 regained a height of ~~3~~ 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 3800 feet above the sea, ~~and~~ I found a tree fern apparently ~~about~~ three years old growing near the top of the inner slope of the crater rim about ~~100~~ 200 yards north of Morne 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 1000 feet of the old cone showed, in 1908, only a tuft of coarse grass here and there ~~upon~~ 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 begon. ia in full bloom. In 1908 vegetation was scarcely beginning to ~~esta~~ re-establish itself on the Lac des Palmistes basin. Then the larger waterways and the crevices in the bread-crust bombs and other places which were favorable to the retention of moisture sustained a few small lichens, mosses and ferns, and a single little clump of raspberry bushes was growing at the head of the trail from Basse Pointe. The thick coat of new ash over the plateau was still essentially a barren waste. Decomposition, however, has advanced rapidly in the finely com-

minuted ash and the whole 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 beginning 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 (29
of Morne Lacroix. I found my
former camp site to be ~~the~~ 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 and rocks 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 bread-crust bomb of almost
the structure of pumice 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 effect much decompo-
sition ~~to~~ 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 Précoul, 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 (31
while Léon is not so for-
tunate. Léon's sole lan-
guage is the patois of the
island and he can scarcely
understand French - at
least my French - and Ger-
ma had often 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 morning task was going
a thousand feet or more down
the cone to a small spring and
"heading" up from there a five-
gallon demi-john of water. On
the fourth day however, visitors
from Morne Rouge showed us

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 Macouba 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 Balai for bread and other supplies. We remained in camp eleven days, on all but two of which Jerma accompanied 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 ~~time~~ 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°.7) and camp was too cool for Roger and the negroes - three (the liking of) days of this life sufficed

for Roger and he walked back to Précomé on Tuesday.

After establishing camp on 34
the first day, Roger and I took
a walk along the northern rim
of the crater and down into the
rainure or valley between the ~~new~~
base of the new cone and the inner
wall of the enlarged old crater.
The Rivière du Prêcheur ~~takes~~ has
its headwaters in the gently sloping valley between
the northern rim of the old crater
and the Morne du Macouba,
descends by a series of falls and the upper slopes of the mountain
flows northwestward ~~to the sea~~ through
a deep, narrow gorge the walls
of which decrease in height near the ~~sea~~
sea. The fury of the eruption Small stream. Does not reach sea in dry season.
clouds did not extend beyond along the Prêcheur
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 Puy there uninhabitable. This added desolation to the destruction wrought by the floods which descended the river valley after the upper 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 exposing 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 Prêcheur 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 ~~does~~ descends into the caldera from the bottom of a notch midway in the northern

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 volcano 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 several other days from ~~all~~ on the north, east and southsides from the summit plateau (Lac des Palmistes plateau) and crater rim and later on the west side from the Riviere Blanche region. By contrast with ~~1908 a~~ conditions in 1908 and before two features stand out with particular prominence: the fumaroles, while still almost as numerous as they were ~~in~~ 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 presents a patch of grass, while the western half is almost completely barren. ¶ The difference in vegetation is assignable to the trade winds, which discharge the principal portion of their burden of moisture on the East-north-eastern slopes of mountain and cone. The western and southwestern sides of the mountain are ~~much~~ hotter and comparatively 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]

1) Hovey, E.O.: ~~IX Int. Geol.~~ Cong. Géol. 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]. In this area the

2) Lacroix, A.: La Montagne Pelée
et ses eruptions pp. etc 1906

old altered ash of the mountain
retains more moisture and
therefore is regaining its ~~ve~~
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 Sêche was so thoroughly denuded of soil that the ~~recovery~~ return of vegetation is proceeding slowly.

The trail from the Lac des Palmistes 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 thirty-five foot notch midway of its northern rim. The descent is very steep over loosely consolidated old ash, but the rainure is shallow here, its bottom being only about 90 feet below the bottom of the notch in the rim. For

about 300 yards west of the (41
trail the bottom of the rainure 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 well begin
our study of the cone by traversing
the rainure and circling the
base of the new structure, turn-
~~[Quote description~~
ing 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 rainure
near where it debouches into the
gorge of the Rivière Blanche is
the point on the old rim which
Geo C. Curtis and I reached

24 June, 1908, on our first as-
cent ~~from St. Pierre~~ of the south-
west side of the volcano. We stood
there in the atmospheric cloud
and the drive of dust from the cra-
ter 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 caisson this
year (1915) and recalled that I
even tried to enter the gorge along
the bluff, I marveled at my
temerity and realized as
never before the danger of our
position. We were near the source
of the devastating eruption blasts:
~~and~~ a single misstep or slip
would have precipitated me into
the caisson, from which there

would have been no possibility of escape or rescue.

[Dec 21, 1893 [4]]

Jenna and I turned northward here to cross the head of the slide into the gorge of the Blanche. The slope of the cone is steep, 35° to 37°, and most of the rocks are but loosely & held in place, being nearly at the angle 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 set leading to vantage points where the waterfall 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 144
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.]
938 Midway in this part of our
tour I sat for a time on a
rock central to the avenue form-
ed by the gorge of the Rivière
Blanche, a point which for
twelve years - since my second
visit to the volcano - I had de-
sired to attain. According to
my aneroid barometer I was
3600 feet above the sea. The course
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 lay spread out before me, the apex being the crater within which rose the cone on ~~whose~~ the 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 pot-like~~ 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, pot-like depression similar to the present craters of Mt. on the island of

X

band
Mt. Misery of St. Kitts, but 46
even more like those of Mt.
of Nevis and Mt.
of Montserrat. Pelé's pot
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 saucer in the lowest
part of which lay the small
pool or lake of yellowish water
called L'Étang Sec. Trees, ~~vines~~
ferns, vines, grasses and mosses
covered the bottom and sides
of the pot with a coat of tropical
verdure. The western, nor-
thern, eastern and southeast-
ern walls of the pot were en-
tire and ~~were~~ rose from 1600 to
2000 feet above the level of
L'Étang Sec, whose position
(Verify figures)

is given as having been 1900 feet above the sea. Morne Lacroix formed a buttress of solid lava projecting 400 or 500 feet into the plot from its northeastern side. The top of the morne was 400 feet above the crater rim near the old Lac des Palmistes and towered 2500 feet over L'Etang Sec, at the base of its vertical precipices. An iron cross stood on its summit, a land mark to the people of Martinique and the goal of many pilgrimages. Morne Lacroix seems to me to be the remains of the volcanic "plug" which marked the termination of what was perhaps the last eruption in the upbuilding of the mountain. Probably the "old crater," as it

existed before the recent eruption took place, was formed by a violent explosive eruption that occurred subsequently.) 148

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 L'Etang Sec by a V-shaped cleft with steep sides. The northern side of the cleft was formed ~~mostly by by alternating beds of solid lava and~~ consolidated ash above which stood ~~the~~ prominent ~~culminating~~ rock pinnacle called Petit Bonhomme, or in the creole dialect Ti Bonhomme, ~~which stood~~ rising 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 L'Étang Sec when that pool overflowed. The descent to the Blanche from the bottom of the cleft was probably by a 600 – 1000 feet 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 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 ~~sim~~ 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 débris which consolidated into a tuff 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 ~~cloud~~ column of molten lava supersaturated with water vapor rose in 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 ~~ward the~~ except through the cleft on the southwest side. ~~How may have been otherwise~~ 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 (53
down the mountain, its high in-
itial velocity being increased by
~~the~~ its descent over the nearly uni-
form slopes which stretch to the
sea in the southwest sector of ~~the~~
Mt. Pelée mass. The density of
the ~~a~~ cloud of lava-saturated steam
kept it to the ground, while the
continual expanding of the steam
caused increasing comminution of the lava
and spreading and rising of the
cloud. The high precipices
~~ex~~ stretching nearly due west
from Petit Bonhomme along
the north side of the Blanche and
Claire rivers checked the ex-
pansion toward the north, but
on the south there were no
such opposing cliffs to

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 ~~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 expended 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 ~~than it~~ 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

last of the ~~great~~ outbursts of first rank was not confined or directed by the crater walls and it expended its force radially in all directions. The advance of the eruption cloud ~~toward~~ toward the north was checked by the rampart of the Morne du Macouba. Toward the east and south it rolled unimpeded down the mountain overwhelming Morne Balai, Ajoupa Bouillon and Morne Rouge, taking 2000 lives as its toll. Toward the west likewise its advance was not checked, but no inhabitants were left there to meet its fury, and its strength was gone before it reached the almost deserted village of Le Prêcheur.

All this and more came into

mind as I sat on that rock (57
looking down the ~~gor~~ cone 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 spine. Tho'
perhaps there would be more
germane to the descrip-
tion of the cone itself.
Plan and N.E. – S.W. sec-
tion of old crater wld be
good here.] [Dec. 21, '97 B]

Reluctantly leaving this point, 58
Jenna and I slowly completed our crossing of this part of the cone slope to the base of Petit Bonhomme. The route was too rough & steep and ~~unbroken~~ was intersected by too many gullies to be paced satisfactorily, but I estimated the distance across the old V-shaped cleft at the level of the base of Petit Bonhomme to be ~~275~~ between 275 and 300 yards. [Ill. Bk 21, 99 B.]
Petit Bonhomme is a pinnacle of andesitic lava the top of which ~~rising~~ as has been said, ~~abo~~ is 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 ~~lasting~~ 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 Mome Lacroix is a record,

The sides of Petit Bonhomme still show ~~very distinctly perfectly~~ the grooving and polishing which was done by the sand blast action of the ~~hundreds of~~ numerous erup-

tion clouds which passed over it in 1902 and 1903. The sand blast action of the same clouds on the wall of ~~[illegible]~~ tuff below the pinnacle on the Rivière Blanche side has been obscured somewhat by twelve years of weathering, but the grooves and heavier scratches ~~are~~ 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 rainmm is scarcely recognizable here and for the next 360 yards has been entirely obliterated by the débris 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, Canonville and Prêcheur rivers. [Ill., Pl. 21, 99 A] 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

for as the ~~base of Morne Lacroix.~~ ~~Here it descends rapidly~~ trail, ~~up the~~ which is near the middle of the northern slope. The rim rises irregularly, dropping nearly to the level of the bottom of the rainure at the northwest overlooking Le Prêcheur, until it is 125 feet (40 metres) above the rainure just east of the point where the trail descends into that depression. Then the rim rises very evenly eastward and southward for about 780 yards to the base of Morne Lacroix, ~~which it passes~~ [See p. 63 for insert]. The bottom of the rainure keeps pace with this rise as far as the base of Morne Lacroix, where the ~~det~~ blocks which have fallen from that rock buttress since the eruption ceased reduce the depth of the

little valley by ~~40~~ ~~25 or 30~~ about 40 feet. 163
South of Morne Lacroix the rim descends gradually to the southeastern angle of the old crater above the "Salon", where it is 175 feet below the base of the morne. The

Insert on p. 62. The top of the morne, 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 ~~was~~ midway between the Morne and the Salon was ~~measured by line~~ found by measuring line to be 200 feet below the edge of the rim. ~~At~~ In the southeastern quarter of the crater, the rainure

has its broadest and deepest development, beneath the Salon and near it on the north and west. Just west of the Salon the rim rises about 50 feet, making the rainure at least 250 feet deep. There the rim descends toward the west more rapidly than the bottom of the rainure, so that the valley disappears in the southwestern quarter of the crater at the descent of the ~~new cone~~ slope of the new cone into the gorge of the Rivière Blanche.

From the foregoing description it is evident that the new cone is excentric within the old crater and that the axis of the 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 ramure, 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 Salon and elsewhere where the slips have been arrested in their descent and form ~~terraces~~ platforms or steps

below the edge of the rim.

The remains of Morne Lacroix now rise about 70 feet above the present general level of the Lac des Palmistes 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 eruption. 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 east. Banked against the east side of the Morne, the new ash rises like a snow drift the top of which is now about 20 feet below the summit 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 Morne Lacroix the vertical section given by the ~~wa~~ outer wall of the ravine shows 22 feet by measure 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 débris. At the Salon, about 1500 feet from the Morne, the coat of new ash on the old rim is from ~~two to~~ not more than 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 old crater

On the eastern side of the ~~plateau~~ Lac des Palmistes plateau a gully discharging into the Rivière Falaise in line with the 22 foot thickness at the aim 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 farther 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 summit plateau (A), 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 Bosse
Pointe rivers on the east and the
Prêcheur river on the west ex-
tends 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 ~~thick~~ ~~bed~~ ~~of~~ ~~ash~~ four
bed of gravelly new ash lying

on the old material. The line (70
of demarkation between the new
and old ash is not so pronounced
~~in the~~ here as it is at the head of
the Falaise, but the deposit evi-
dently is thinner and oxidation
has advanced more rapidly.
The eruption clouds did not
throw so much material north-
ward as they did in other direc-
tions.

according to the old maps of Martinique,
the summit of Mt. Pelé
(i.e. the top of Morne Lacroix)
~~is stated to have been~~ was × 4440 feet
above the sea, before the 1902 e-
ruption began. Inasmuch as
the Lac des Palmistes ~~basin~~
plateau ~~is 4000~~ was about 4000
feet by ~~aneroid~~ measurement above the sea,
the former morne rose about

440 feet above the old summit 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 rose ~~almost precipitously~~ very steeply (45° or 50°) from the plateau, though its eastern side was not hard to climb. The 2500-foot descent from its summit to L'Etang Sec in the bottom of the old crater must have been practically vertical. Allowing 50° for the average eastern slope, the morne ~~must~~ probably projected 600 feet southwestward from the present morne into the old crater. Since the

Morne Nouy juts out ~~about~~ for 50 or 60 feet from the rim into the rainure, the recent eruption destroyed a rock mass not less than 2500 feet high and 550 feet in diameter, ~~probably ejecting~~ it. ~~in a shower of fragments onto the top and sides of the mountain~~ volcano. This estimate does not take into account the unknown extent of the old plug below the level of the bottom of the former crater, much if not all of which was, or may have been, fused by the ascending heat of the revivified volcano. The renewed activity of the conduit ~~seems to have~~ centered west or southwest of the base of ~~the~~ Morne Lacroix and probably

undermined the old rock buttress and allowed it to fall into the crater, ~~before its was blown out.~~ débris in fragments. Some of these broken masses may have been thrown out onto the top and sides of the mountain, but ~~none~~ ~~has been surely~~ no loose block has been described as having been part of the old Morne Lacroix, though a fifteen foot fragment which G. C. Curtis and I saw in June, 1902, on the eastern slope of the remains of the Morne may well have been one. It was angular and cracked, but showed no indications of recent fusion, ~~As the~~ though it lay upon new ash. At the time when I saw it, no

~~adequate~~ explanation of its origin, except that it had been 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 morne is the thirty foot ~~mass~~ fragment which Mr. Curtis and I saw near the sea on the plain between the Blanche and Sèche rivers in the same month.[1] If this was originally part of Morne Lacroix, it must have fallen into the seething top of the new conduit

[1] Hovey, E.O., Prelim. Rept &c Bull. Am. Mus. Nat. Hist. 1902

and then been thrown out to the
southwest by the outburst of 8 May,
or that of
20 May ~~or 5 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~~
~~ca~~ 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 is
probable therefore that the fragments of
Morne Lacroix which were
thrown bodily out of the crater
without re-fusion were cast up
by the first or second great ex-
plosion, because the new cone
in the bottom of the crater was

already ~~high enough to be~~ visible from the sea on 21 May.[1]

[1] Hovey, E.O.: Op. cit. p. (?)

It would seem impossible for any fragments of the Morne to have fallen 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'Etang Sec. Before 18 June, 1902, the top of the new cone was ~~of or~~ above the level of the Lac des Palmistes plateau, or more than 2000 feet above its base.

and ~~must~~ was then estimated to be ~~have been 250~~ or about 300 feet high. [Look up Hovey, Récroix re for reference]

Morne Lacroix 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 ~~its~~ fragments in the rainmc at its base which have fallen from its face since the ~~eruptive~~ explosive activity of the volcano and the upbuilding of the cone ceased in the autumn of 1903.

Scientific interest in the Mt. Pelé eruption of 1902-1903 centered in the ~~new~~ cone and its surmounting 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 of the Corps' Lycée at St. Pierre 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, and ~~which~~, ~~though not complete, would have enabled him to see a cone had one then attained appreciable size on the site of L'Etang Sec~~. He ~~a~~ account of his observations ~~which~~ was published in the St. Pierre newspaper Les Colonies, 7 May, 1902. This contains no mention of ~~such a feature~~ a new cone ~~with~~

[Verify]

although ~~the~~ the 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'Etang 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.

[Verify]

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, I. C. Russell, R. T. Hill, T. A. Jaggar, Jr., D. 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 tug boat "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 (81
and lava [cf. 1902 notes]
cone which was a prominent
feature of the crater. [Look up
my A. J. S. article and use
illustr. 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 at this period was rapid,
~~if one can~~ judging by the draw-
ing of the outburst of 24 May
by as published
in McClure's Magazine for
August (?), 1902, and the descrip-
tion of that explosion given by
Angelo Heilprin. The top of

Mount Pelée. Phlead-
The Tower of 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, (Las des Palmistes plateau) the new cone ~~rose about~~ stood 100 or more feet higher than our position. When the spine reached its maximum development in April, 1903, its apex was 5300 feet above the sea. This

Lacroix, A.: La Montagne Pelée et ses Eruptions, p.

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 symmetrical growth - This means the formation of a mountain 3400 feet high, above its base in the bottom of the old crater. When the spine disintegrated 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 ~~the~~ it in the shape which it now presents. At 2 o'clock in the morning of — September, 1904, (37) M. L. Spinoisean, in charge of French volcano observatory on the island, and Mssrs. S. Benzelin and Chancelle, 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 fragments of the spine fell onto the top of the new cone, ~~not into the rainure~~. [See whether Lacroix mentions this incident in La Montagne Pelée et ses Eruptions]

C. Oral communication from M. E. Benzelin.

although the major portion of the spine fell upon the cone, some of its fragments ~~apparent~~ rolled down into the rainure. I did not find any there that seemed definitely to show the exterior of the spine, but near the middle of the top of the cone 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

texture, Evidently a parts of 185
the face which the spine presented
to the east. 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 & O.H. on spine of Mt Pele
in A.J.S. & also in C.R.
Congrès Int. Géol IX] [Have
thin sections made and
insert descriptions of them]

The present cone can be ascended
from any side without serious dif-
ficulty, but the trail commonly fol-
lowed leads up the northern slope,
where the top of the cone rises 750 or
~~to about~~ 800 feet by aneroid measurement
above the bottom of the caldera.
~~or~~ about ~~600~~ 550 feet above the level
of the Lac des Palmistes plateau

The summit of the mountain is now about 4600 feet above the sea, according to these ~~uncor-~~ uncheckked aneroid readings. The sides of the cone are composed for the greater part of débris of all sizes from fragments forming like fine sand (8-10 meters) to masses 25 or 30 feet across, the latter being in the cairnes on the north side. Here and there a great rib 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 right of about 34° and a double slope at the left changing from about 34° in the lower part to about 40° above, the upper slope joining the right hand slope in a point at the apex

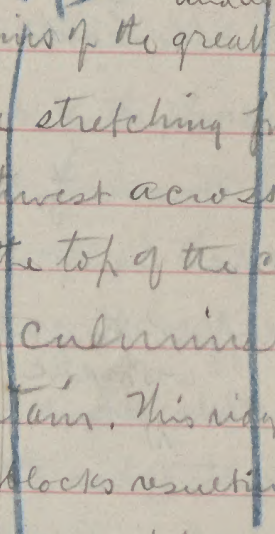
of the mountain within the section formerly occupied by the spine or obelisk. In general the new structure ~~within the old crater resulting~~ of which exists within the old crater as a result of the eruptive activity and subsequent disintegration of the new lava may be described as a right cone with sides sloping at angles of from 34° to 37° which is truncated roughly by an approximate plane sloping 10° to 12° from the horizontal toward the southwest, the highest point being within the area formerly occupied by the famous spine or obelisk. Perhaps it would be better to describe the ~~top of the~~ cone as being truncated by two approximate planes, one sloping up from the southeast at an angle

of about 12° and the other from 188
the northwest at about 15° and
meeting as a ridge ~~running~~
~~southeastward from~~ the highest
point of which is within the area of the base of
the spine at the northeastern edge of the cone. The ridge itself declines gently,
3° to 5°, toward the southwest and is not
continuous, being much indented in
the middle and southwestern parts of its
profile. Viewed from a distance
the ~~truncated~~ top of the cone looks
like a smooth plateau, but in reality
the truncating ~~planes~~ surfaces are
only approximately plane, inasmuch
as they are ~~shaped~~ composed of many
hollows, ridges and pinnacles. ~~There~~
91
~~are four prominent~~ Four of ~~the~~ points
on the top of the cone one which is
are particularly prominent: on the northeast the sum-
mit formed by the remains of the spine,
one overlooking La Prêcheur
On the north edge, ~~one on the~~
A

one on the southeast overlooking the Salon and Morne Rouge, and one on the west above Petit Bonhomme and the Rivière Blanche. These points, as well as much of the remainder of the surface of the upper portion of the cone, are composed of "solid" or ledge lava as distinguished from the débris of angular fragments forming the major part of its slopes and even its 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 resting on angular débris. These are flows or streams which were too viscid to descend more than a few (100±) yards even on the 37° slope of the débris, but they were not viscid enough to maintain

themselves as domes or spines above their vents. These short flows are particularly interesting from the fact that all the principal observers of the eruptions of 1902-1903 have stated their belief that no flows were formed during that period of activity. (Verify)

The remains of the great spine and its cathedral ridge consist of a ridge stretching from north east to southwest 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 ~~north~~

east and northeast, presented the appearance
of an isolated obelisk, but when
viewed from the south it was seen
to be connected with a ridge ex-
tending westward from a point a-
bout half the height of its eastern
face and giving a profile like that
of a cathedral or church with a
spire rising at one 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 slop-
ing lower portion was probably com-
posed 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 ~~outer~~ slopes of the cone into the rainure, leaving small, jagged pinnacles of rock ~~to~~ resembling 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 lies~~ axis of the eastern portion ~~runs from~~ is about northeast - southwest in direction, while that of the western portion lies about northnortheast - southsouthwest. The two parts are separated by a valley thirty to fifty feet deep, which is in line with the axis of the Upper Pine River gorge. The western half extends south.

west beyond the western
end of the southern eastern half and pre-
sents a ~~grooved~~ convex almost
polished rock surface to the west.
This would be the counterpart
~~complement~~ of the original convex eastern
face of the spine and probably was
[Insert outline drawings
showing several stages in
the growth and disintegra-
tion of the spine and the
ridge. From east and
from south. Compile my
photos + sketches + Lacroix.
and see further pp. 113 ff of this book
part of the upswelling dome of
which that spine was a residue
left by numerous comparatively
minor explosions of volcanic ac-
tivity[1]. ¶ A strong branching

[1] Hovey Ed. C.R. IX Congr. Géol. Int. p.

fissure crosses the southwestern (94
end of the north western and steam
issues gently from it. The temperature
a foot (30 cm) below the surface was
92°.5 C. It was not practicable to
introduce the thermometer far-
ther into the fissure. This is the
fissure which gave me a temperature
of 490° C (Verify), by pyrometer de-
termination, in May, 1908, the elec-
tric couple being about 3 feet (1 meter)
below the surface. The débris lying
upon the southeastern half of the
double ridge conceals the fissures
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 one to bear his hand
in it. [Dec. 22, 74 + 4B 7B]

at the southwest base of [95
the double ridge. There is an irregularly shaped depression which is surrounded by a loosely consolidated breccia 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.

See further p. 110 BB

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-22, 21, 92 A, 1 A] issues from many crevices in the rock, giving temperatures of 95°, 96° and 98° C

Southeast Peak, ~~and the~~ some pin- 196
nacles near the brow of the cone
overlooking the Rivière Blanche and
West Peak forms which seem to be the
jagged ~~masses~~ remains after the
disintegration of masses of rocid
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 the lava on the~~
~~slope cone slope above the Blanche.~~
[Ill. 22, 9B; 21, 9 B; 22, 6A]

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°, 91°,
96° and 98°; in Cathedral ridge
92°.5; in southwest side of cone

above Rivière Blanche 94° and 95°. [97]
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 Salon, and the southwest quarter overlooking the gorge of the Blanche. There is area of gentle discharge in the northeastern wall of the old crater a quarter of a mile (400 meters ±) northwest of Morne Lacroix. ~~Com~~ Sulphur in small quantities and a white salt (Comp?) are depositing here. Another extra-cone area is on the rim at the west, where the new cone has filled the old crater to the top, leaving no rainure. Under a large block ~~[illegible]~~ the discharge has formed crystals of sulphur and the white salt more abundantly than at any other vent

The most copious discharge of steam takes place at the east base of 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~~ fumaroles on the little plateau between the Rivière Blanche and its northern branch the Rivière Claire show a decrease of temperature like that observed in those of the cone itself. The Blanche-Claire fumaroles are arranged along a line which is essentially radial to the cone, tho many of the subordinate cracks are parallel to cone. ~~a~~ It averages about 1000 feet (300 meters) in altitude above the sea by aneroid measurement. The fumaroles are close to the edge of the gorge of the

Riviere Claire and the northeastern
end of the line, that nearest the cone, is approximately 100
feet (30 meters) higher than the south-
western. The ~~temperature~~ vents
decrease consequently in temperature from above
downward, the most northeastern one
giving a reading (3/3) of 128°.5C, where-
as the most southwestern gave 51°.5C
These extreme vents are about one-
fourth mile (400 meters) apart. In
1908 the temperatures of the ~~ex-~~
~~pounding~~ vents were 490°C (hypsometer) and
100°C respectively (verify). There
~~is~~ is very little steam rising
from this line of fumaroles.
The persistence of high tempera-
ture in this line of fumaroles is particularly interesting
on account of the support that
it gives to the theory advanced
by Lacroix and Hovey that these

X refs X

vents are the outlets of a fissure or system of fissures directly connected with the center of igneous activity under Pelé and concerned with the recent eruptions [In ~~detail~~ drawing a cross section of Pelé try to include these Rivière Claire fumaroles] [Ill. 22, 13 B]

There ~~seems to be no~~ is 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 Morne Lénard, the bed of the Riv. Sèche or the Riv. Falaise. All of these were temporary fumaroles arising from the accumulations of hot new ash thrown out from the crater. The Rivière Blanche localities 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 is growing in the fine new ash even in the filling of the gorge of the Rivière Blanche and on the middle slopes from the Crête to the Claire a ~~an~~ a many-flowered 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 gov-

by local conditions of retention of moisture and consequent partial decomposition of the ash. The deposits of new ash being usually lightly compacted together, they are porous and allow the water from 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 new channels into the plateau between the Sêche and the Blanche rivers and elsewhere, their position being determined by the ~~new~~ topog

capping of the surface layer of new 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.[1] [See

[1] Hovey, E.O., Prelim Rept., Bull. A.M.N.H. vol. p. 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 across the edge of the pla-

tain. It now drains the area south and east of Morne Léonard, 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 independent bed all the way to the sea and taking some of the 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 part of St. Pierre, it came

within about a half mile (1 km) of the sea, none was observed in the Rivière Sèche 2 miles (2.4 km) from its mouth, the whole course of the Rivière Blanche was dry, water came down the upper reaches of the Rivière Claire but all sank into the sand, no water was seen in the course of the Rivière Canonville (name O.K.?). 105

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 comparatively 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 northern 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 new gorge of the Rivière Blanche the number of large rounded, ~~or~~ subangular and angular blocks of solid lava is immense. In many places they completely fill the bottom from wall to wall with a rough pavement, ~~at~~ but usually it is not difficult to find a pathway of fine stream-deposited ash winding tortuously among the bowlders. [Ill. 22, 12 A or B] The abundance of bowlders 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 & 17 A or B] The last row

presents an appearance strongly in contrast with that which it had in June, 1902, when the bowlders were almost or quite ~~hidden~~ buried in fine ash and volcanic dust [Ill. from 1st series, rising block from Mrs. Bull article.] or in May (?), 1908, when the finest ash had been largely washed away. The ash-filling of the gorge of the Blanche is so porous that the water sinks readily through it and active erosion is carried forward only by the heavier rains with their copious run-off.

During the dry season there is enough flowage of dust and fine ash from the walls of the

gorges to be reckoned with as [109]
a ~~type~~ form of erosion. ~~Numerous~~
Many dust and sand cones build
up along the margins of the
channels supplying much loose
material to be carried away
by ~~the~~ 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 they fall by gravi-
ty or are carried away by the
wind. [Ill. 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 La
Montpelée et ses Eruptions]
[Ill. 22, 3 B.] The pillar
looks as if it had been built up of

loose blocks like a stone wall /110
This appearance may be due to the
rifting or splitting of the mass in
place. Some of the layers are more
fractured than others [Why does
this pillar stand up as it does?
What is its origin?] II, p 21 & C
The North Peak of the cone is a
[Ill. 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 ma-
terial on p. 2 of Bk II.] irregular Rad.
~~spheroid~~ (~~the long axis of which~~) ~~it~~
~~extends in a nearly east-west di-
rection and is~~ approximately
across
1000 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
~~mass~~ flat part of the top of the cone
to the south. The south and
west sides of the Peak are con-
vex in shape, the north and
east sides are lower and jagged.
The great angular masses of lava
[Dec. 21, 1905 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 its northern half during
or after its formation and
dislodged a considerable por-
tion of its mass, judging

from the jagged nature of the
Peak and the assemblage of
enormous angular blocks of
lava ~~which cover~~ filling the bottom
of the rainure beneath the Peak.
[Ill. 21, 98 A+B] The re-
maining portion of the ovoid is
similar in history to the famous
great spine. The ovoid is
traversed by ~~great~~ many fissures, ~~trend-~~
~~ing A generally, N 5° E – S 5° W~~
the larger fractures trending
generally N ~~[illegible]~~ – S ~~[illegible]~~, and
there being no system discernible
in the development of the others.
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 95° to 98°C were ob-
tained. ~~Very little~~ The most
copious discharge of steam ~~on~~
from the whole cone, as has been
mentioned already under the
discussion of fumaroles, takes place
at the east base of the Peak. The loose
~~stones and dense cloud of vapor made it~~
~~did 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 ~~better~~ higher than
at the dryer vents just mentioned.

[Note on Cathedral Ridge. Cf. ##93ff. Fur-
ther study of my notes and photos 21, 92B
+ 86A+B suggest the thought that
the northwestern portion 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 spine. Furthermore, my recollection of a photo taken from the Cuedes Palmistes 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 spine-dome. Carefully drawn plans and sections will probably show that ~~that~~ this ridge was an upswelling ~~part~~ dome the top of which was separate from the upper part of the spine-dome. This supposition would account for the valley still separating the two culminating ridges, but

otherwise the valley is hard to understand. A similar but deeper (125'-150 feet) valley separates the N.W. ½ 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 northwestern face of this end of the ridge is convex (Ill 22, 4B+7A) and is of smooth, striated or grooved rock (Note bk 2, p. 27) 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 Cathedral Ridge, to keep my name for the present, facing the actual spine-dome is rough and jagged. [cf. Ill 22, 7A+6B] Apparently this was caused by

explosions during the later period of the active eruption. 116

The western part of the top of the cone indicates the existence there of still another upswelling dome of lava (See Photo 22, 23) Hence we may consider that there were at least ~~four~~ five and possibly six of these domes: Spine-dome, N.W. ½ Cath. 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 Bk 2, p. 58). The ribs of lava characterizing the southern half of the upper part of the new cone are exudations of viscous lava which are similar in origin to the domes, but are more thoroughly fractured and disintegrated and some of them are

are connected with or pro- [117]
duced into the short flows al-
ready 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 Seche rivers
by the eruptions, particularly by those
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 118
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 com-
mands 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 up
through the strains due to temper-
ature 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 ~~& dust~~ has not all been removed from the surface of the old tuff 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 (½ 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 ~~solidfie~~ a firm agglomerate, it having set rapidly after reaching a position of rest. ~~Such~~ Beds of the agglomerate resist disintegration ~~as well as~~ apparently as does the tuff to a considerable degree, com-

parable in fact to that present. (120
ed by the dense lava itself, though
the more porous nature of the
material permits ~~the~~ more tho-
rough infiltration of water and
consequently ~~the~~ more rapid chemical
alteration in the agglomeratic than
in the ~~a~~ solid lava.

The blast grooving and scouring
on the eastern end of Morne 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 Morne Lénard looks like that
of a well worn macadamized
roadway. Here and there one sees
on it ~~bunches~~ small tufts of grass, ferns

and hardy terrestrial orchids (121
Near the top of the hill the grass
is more abundant and there are
some clumps of bushes or small
trees. Even the blast grooving
of the more distant cliffs on the south east side
of the Rivière Sèche is still trace-
able through its coating of new
vegetation. (Cf old reports)

The slopes of the Petite Savanne
which were completely denuded
of soil by the eruption clouds
and débris and then planed
down by the avalanches of new
ash (Cf Eott on "grooving &c
produced by other than glacial
action" in A.J.S. or Mrs Bull)
are as barren do not seem to have re-
gained their fertility much if any
more rapidly than do the surfaces

if new ash. The rate of restoration or return of ~~vegeto~~ fertility and vegetation is governed by the amount of water falling upon and retained by the beds.

The southern sector of the mountain lying 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 ~~field~~ plantation fields

have been restored to culti- 123
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 ~~was~~ has ~~been~~ proved to be more ~~than~~ beneficial than injurious to the soil. Such a layer was readily plowed under and mixed with the old soil, lightening it and adding new elements of fertility to it. ~~Beside~~ At the ruins Petit Reduit on the plain of the Rivière Roxelane, which was within the border of the zone

of annihilation, cultivation 124
of sugar cane has been resumed successfully in fields which were covered at first with a ~~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 Consolation could now be reclaimed, though the work would be slow in the ~~east~~ southwestern part near the Fort Quartier of St. Pierre, which lay in the midst of the zone of annihilation.

The city of St. Pierre in most of its area is more ruinous & deserted in appearance than it was in 1906, though Rue

Victor Hugo and Place Bertin show ~~not~~ signs of the resuscitation of the place. Twenty five or thirty buildings have been erected and are being ~~be~~ used as dwellings, stores, warehouses and the like. Some old bldgs have been roofed over and used. Daily steamer service with Fort de France is maintained, and daily mail and passenger service with Lorrain 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 hogsheads of sugar awaiting shipment to France, service being interrupted by the war in Europe. The major por-

tion of the city's area, however, has been much flattened by the falling of the walls of the old buildings and by the action of the rain and wind. Thick grass and bushes cover the ground and many trees are growing, ~~on some of which are survivors of the eruption.~~ Most of the large trees that lived through the eruption were so badly burned and bruised that they died afterwards, but a few of them survived and are now flourishing. The ruins of the bank have been made over into ~~the gendarmerie and~~ a police station and jail. Those of the hospital are occupied as a dwelling.

The site of St. Pierre is the natural outlet for the produce of sev-

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 /128
great outburst of 31 August, 1902,
when Morne Rouge and Ajoupa
Bouillon were destroyed ~~without~~
~~the~~ whereas the eruption cloud did
not cross the Roxelane River in
St. Pierre.

So little is known of the history
of the activity of ~~the volcano~~ Pelé
that no prognostications ~~can~~
regarding the future can be safely
made. At the time of the discov-
ery 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 where
St. Pierre was afterwards built.
They knew ~~the~~ the mountain
therefore as an active volcano,

though no traditions have been preserved ~~ass~~ 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. Eot also in C.R. IX Cong Géol Int.] The present barrenness of the mountain would amply justify the application of the name.

Whether the name indicates that an eruption may have denuded the mountain of its coat of vegetation within a few years before the discovery of the island by Cabot or not, there is no record of any eruption in the succeeding four centuries, except a slight outburst midway of the west flanks of the old cone in 1857 [Look this up in Lacroix + elsewhere] The activity volcano was regarded as being completely extinct and was so classified in the lists of the volcanoes of the world. The activity which began to be manifest early in the year 1902 [How about anything in 1901?)

culminated in ~~the~~ several great explosions within the period from May to August 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 western area on the border of the Riviere Claire which shows a temperature of 128½° C. /131

The contemporaneity of the eruptions of Mt. Pelé and the Soufrière of St. Vincent in 1902, the first great outburst occurring one day apart, suggest a sym-

pathy or connection between vents, but Pelé remained quiet during the great eruptions of the Soufrière which took place in 1803 & 17- (was it 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 Taal, P.I., in Nat. Geogr. Mag. Also of Camiguin, P.I., wh. is referred to by Hobbs in Earth Features and their Meaning, pp 96+97. Also look up history of Jorullo, Mex., in Humboldt + elsewhere

and the Kuppen of Germany, the puys of France, & other domes of siliceous lava noted by Judd & others. Good bibliography in Hobbs, ~~ibid~~ op. cit., pp. 146-148.]

[Note - Have we not been laying too much stress on the spectacular spine of Pelé as an originally columnar 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 E. & N.E.] [Hobbs cites Pratt on the eruption of Jorullo in his bibliography.] [Hobbs gives the Pelé spine as a "character profile" on p. 146 of his book.] [Note.

Discuss the chimneys formed by the shell of the core beneath the Pelé domes & their cores. [In this connection Cf Hobbs, op cit, pp 135, 137, 138. — Consider the Quaternary elevation of the Caribbees with reference to volcanic eruptions in the islands.]

[Clutt voyage follows]

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 Eskimo wife~~ Nevrana arrived with last winter's mail for the Crocker Land men, some narwhal tusks as souvenirs for them and me and a fine kooletah 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 heave the "Cluett's" anchors, whose cables were much twisted, and a half hour later the "In-

gerfis" took her final departure, (132
and we were joyously starting out
of North Star Bay our minds filled
with thoughts of home and home
friends. ¶ Rounding Cape Athol
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 up, we encoun-
tered ~~strong~~ some light northerly winds, but
now that we needed breezes from
that direction we could not get
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 dreaded Melville Bay.

The sunset of Wednesday the 22d 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 Alpenglüken 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 to running so well by mid afternoon that the captain

decided to try its help to get us past 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 pan 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 swell which was swaying the vessel, led the experts on 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 mast head.

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 southeasterly gale struck us with the suddenness and violence of a thunderclap. The mate said that "the wind fell on us in chumps." 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 ice berg where he could lie safely, but the crank shaft of the engine bent, and the plans had to be given

up. At 7 o'clock we were scudding along under bare poles, the captain offering only a bit of the forestaysail or a piece of the mainsail, 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~~ pans and we struck hard blows on some of them ~~bergs~~. The captain was making for Parker Snow Bay as a harbor of refuge, but before he could ~~reach~~ round the point into safety, a big cake struck our rudder and broke its cast iron head band, another tore the bobstay loose from its lower fastening and a third stove in a plank 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 cake 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 cake.

Soon after ten o'clock, we rounded Parker Snow Point and slid into the lee of ~~the~~ its lofty vertical cliff, and the gale blew harmlessly out well above our masts. Captain Pickels hoisted the mainsail and ~~started~~ and called for power the ~~engine~~ to work his way along to a safe anchorage, but the engine died again and hopelessly in a few

minutes. At the same moment Captain Comer sounded and got only twelve fathoms of water, where a much greater depth was expected. Captain Pickels 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~~ run and he had to let the vessel drop back against the cliff, where he moored her to the rocks just as if it had been a wharf against which she was lying. The position

was full of possible dangers (139
to the vessel and to us, 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 the wind held where it
was, but we were in con-
stant fear lest a fragment
of rock ~~be~~ become 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 grad-
ually to the an altitude of 1500
feet above the sea which has
been assigned to the moun-
tain forming this promon-
tory. [Ill. "Cluett lying against cl.
(52 neg.)

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 pan 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 feel- (141
ing that grows upon one with experience
and observation. After a reconnoiter-
ing ~~trip in the~~ in the small boat, Captain
Pickels early in the afternoon ordered
sail set and proceeded to the head
of the Bay, where he anchored in eight
fathoms of water to await a favora-
ble opportunity for pushing on
southward or returning to North
Star Bay for the winter. Little did
we think then that the "Chuett"
would not be able to leave Par-
ker Snow Bay until after ten more than
long, weary months had elapsed passed by.
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 hove 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 yet get out, but my party ~~and I~~ with their experience in the region and I with none beyond the one

summer on the "Cluett" felt 1143
far otherwise. On the 29th we
hoisted sail and made an effort
to go around to North Star Bay,
which seemed to be a more desirable
place for wintering than Parker
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
one more effort to go around to
North Star Bay was made but when we drew
near the entrance to our bay, Cap-
tain Pickels from his masthead perch
saw the ice pack extending so solidly
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 of this, seeming most desirable in comparison with Parker Snow Bay as a place for spending the winter, on account of the ~~presence~~ more open character of the country and the presence of more people, the population there consisting of Peter Freuchen and four ~~four~~ or five families of Eskimos, perhaps thirty people in all, while that of Parker Snow Bay comprised but five persons,- Poodlak and Enetlak, his wife, and their three small children.

Poodlak was one of the party that Peary took with him on his "Farthest North" dash ~~in 1906~~ across the Polar ice in 1906, when the latitude of

83° xx' was attained. ~~On that excursion, which is known among the Eskimos and others as the "starvation trip".~~ Pudtlak ~~got snow blindness so badly that~~ he is now almost blind and he and his family have an exceptionally hard struggle for existence. ~~Another~~ The theory usually advanced to account for the man's ~~present~~ trouble is that his eyeballs were frozen on that famous journey, but Dr. Hunt of the Crocker Land Expedition staff states his opinion to be that it is a result of a severe case of snow blindness, which is one of the serious dangers to which travelers in the Arctic are exposed.

(which is known among the Eskimos as well as among others as the "starvation trip")

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
ern 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 a framework
of boards and scantling over the
after cabin and another forward
over the companionway leading
down into the forepeak, 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

that followed we were afraid lest the fierce blasts of the Arctic storms should tear our covering from its fastenings and carry it out across over the ice bound wastes of Baffin Bay. Some

Early in the evening of the 17 October we heard shouts on shore which informed us that Peter Freuchen and party had arrived from North Star Bay, coming over ~~deep before countless thick fans~~ of ice the ice cap. Captain Pickell sent a boat ashore and, an hour or more later, Peter, Freuchen and several Eskimos came on board. Peter had brought over with him nine sledges, having the intention of taking all our party, including Captain Comer, over to North Star Bay

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 the supply of provisions and fuel at North Star Bay were so meagre ~~of North Star Bay~~ that it would have been necessary to sledge over the mountains or around by the sea ice, when that should form, a large part of ~~all the food and~~ the coal that I had brought up in the "Claret" for the Crocker Land Ex. Expedition and the food which ~~I had~~ could not be landed ~~not been 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 "Elnett" was moved over to her winter quarters the inner bay filled up with small floes 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 slow, tedious process with much heavy lifting of kamatiks (sledges) over and around

the hummocks, but a heavy southeasterly gale drove the ice out again during the night of 9 October. Hence, when the permanent freezing over of the sea began on the fourteenth, no old ice lay within 2½ miles of the schooner except a few small scattered, grounded bergs. Early in the morning of the fifteenth the small boat went ashore for the last time, taking Peter and Green who wished to start for North Star Bay. ~~and having~~ Some difficulty was encountered in breaking a passage way to the shore through the young ice. Two days later some of the crew walked ashore on the ice, though the engineer came to grief when he essayed the journey. He was the first of the men to secure a fuel suit of sealskin, and he was proud of his outfit when he

came on deck clad in "netsl" (151
(the hooded shirtlike coat commonly
worn in moderately cold weather),
pants, "kamiks" (boots) and mittens,
but he broke through the ice as
he was leaving the vessel and got
a thorough ducking in the ice-
cold water, before he could clam-
ber 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 Crocker Land 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 even the thought of being caught in the ice for a year in the far North was appalling to me, and Captain Comer and the others of the "Cluett" party who had come away from home anticipating only a summer cruise. We had made no adequate preparations for a prolonged absence from our usual vocations, ~~a factor that was particularly hard in my own case~~. Not the

least distressing element in our detention was our utter inability to let our families and other 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 in 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 awfully long, but we usually got a cracker

or two or a slice of bread and 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 and one passenger 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, and a small amount of additional supplies procured in Boston, ~~but a barrel of the sugar intended for the northern cruise had been put ashore by mistake at St. An.~~

~~throng~~ and now there were the four Crocker Land Expedition men on board for the winter. ~~Hence~~ sixteen men were to live for at least eleven months upon provisions which were only expected to care for seven men for about 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 cook's use of supplies on the northward voyage had been inexcusably 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 (156
lightly
from ~~our minds~~ thought

The winter was now fairly begun and our ~~thoughts~~ minds were busily engaged upon plans for the best interests of the party. ~~The information that I had received respecting~~ the inadequacy of the food supply on board the "George B. Cluett" made it necessary to devise some way of separating the Crocker Land 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 Crocker Land Expedition men who were ~~to~~ planning to spend the third winter in the North would not make good the deficiency at Parker Snow Bay and North Star Bay. Furthermore, ~~to~~ ~~out~~

supplies at Etah had become depleted so far as to be meagre, though they would probably have carried the seven C.I. men through, and it looked scarcely feasible to bring any useful amount of food down from Etah by sledge over the intervening 230 statute miles of glacier and sea ice. It was evident that my party must be divided. There were six of us. It seemed to be my own duty to undertake the long, severe sledge journey across Melville Bay and southward along the coast to Holstensborg, at least 1200 miles distant by the route that would necessarily be followed. It was further decided that Captain Comer and Mr. Stoblaw should go to North Star Bay and that Messrs Green, Jauquary and Allen should

accompany me southward, our idea being to reach Upernivik or some other place where subsistence could be secured; while Captain Comer and Mr McClean should go to North Star Bay and live on the Expedition outfits that I had brought with me. Preliminary arrangements for the outfitting of our southbound party having been made with Peter, Green was dispatched from the ship on fifteenth October to go to North Star Bay and thence to Etah, as soon as the condition of the ice should make traveling safe, to inform Mr. MacMillan as to the predicament of the "Cluett" and her passengers and to invoke his aid in sending my party and me southward. Many skins and much work were required for our outfit, since it was determined that

each man must have two kooletahs or hooded shirt-coats of caribou skin, a pair of bearskin pants, four pairs of kamiks or seal hide boots each with its pair of rabbit (arctic hare) skin stockings, five pairs of sealskin mittens each with its inner mittens of blanket cloth, one pair of bearskin mittens, 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 kamik-puks or boots to draw on over my kamiks, a caribou skin muff for my hands and a loose

roll of foxtails to protect (160
my face against cold winds.
Part of this equipment was already
in hand, but much of it remain-
ed 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 Arc-
tic and weather, 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 uncertain-
ties of a journey that is al-
ways difficult under the best
of circumstances. Melville Bay

well deserves its reputation (161
as the bugbear of the American
arctic regions. Now 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. Three months would
soon pass away.

Lumber was lacking for the
construction of a house to cover
the vessel completely, but by com-
bining what Captain Pickels had
with some plank and scantling
which had been brought for possible
Expedition use, a frame work
was erected over the after cabin

and another was put up (162
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
extemporized. These frames
were covered with old sails, which
were battened down with pieces of board, 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. Oc-
casionally his basket load of
soup came hastily to grief by
reason of the fierce wind sweep-
ing across his path, but no se-
rious accident happened.

during the winter
Twice the wind got the best
of the boy, tore the door from his
grasp as he passed through and
gave us some minutes of anxiety
lest the old sparker should be
torn from its fastenings and
sent
go 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 stove 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
at New York
on board the schooner. When
the canvas house went into

place on 14 October, we began (164
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 in-
teresting to watch. When the surface
layer of the bay had a temperature
of about 30° F. and calm pre-
vailed ~~smooth~~, countless crystalline
blades or plates of ice would form, mak-
ing a very network two or three inches thick
with water imprisoned in the meshes
of the ice. 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 (16)
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 salty 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
it was not perfectly 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 that formed in leads

opened by wind or tide was harder and ~~formed~~ stronger. ~~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~~ seems to be 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 of snow from the land 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 every one 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 the high and low tide (167
~~water~~ marks ~~of the tide~~, and it is broad
or narrow according to the shelv-
ing or abrupt nature of the shore
At the head of Parker Snow Bay
there is a beach of gravel and pebbles
and there 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 left 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-~~
~~lands 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 Parker Snow 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, hares and ptarmigan were on the hills. Fox tracks were abundant on the

bay ice and we often caught sight of the graceful little animals, but our efforts at hunting and trapping were not very successful. Many a bullet was fired at ~~the~~ a blue steak on hill side or bay, but only two foxes were thus secured, and they came so close to the ship that they invited 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 up several ingenious devices for securing foxes, one of which was a spring gun that was supposed to shoot Reynard when he stepped on the release, but the fox could always

secure the bait without firing the cartridge or springing the trap. When a dog set off the gun, the contrivance was discontinued although it had done no execution. The engineer ~~chief~~ finally went into partnership with Poodlak, 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 walk. 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,~~ During the winter 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 kamiks or native seal skin boots of the crew. Though some oversight a supply of shot was not furnished with the guns, hence for several weeks missiles were improvised by cutting pig lead into little cubes

and rolling these into shape. The resulting pellets 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. Rifled 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 murres 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 consisting of a few seals gotten in October and an occasional piece of polar bear meat ~~and narwhal skin~~ or a seal brought in by visiting Eskimos. On one occasion Egingwah brought some meat and skin of the white whale from Cape York, which were novelties for us. Early in May the fresh meat problem was solved for us by the advent of the little auks or dovekies, which came by the myriad to nest amid the crevices of the rocks and talus slope 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 "highline" (1/4
man as usual, this time with
188 to his credit. The crowded
nature of the flocks may be judged
from the fact that the men often got
three or four birds at once
Once Ben got fifteen in his net
at one sweep but six of the birds
got away before he could secure
them. We ate the little auks
stewed, fried or baked, at
most of our breakfasts, dinners
and lunches for weeks and
strange to say did not tire
of them. The flesh is richer and more
delicate than that of the murre,
the sea pigeon, the adult eider
duck or the bunga master 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 exhausted. They looked very fine and comfortable when they blossomed out in their new netlis (sealskin hooded shirts), kahkliks (sealskin pants), kamiks (sealskin boots) and ehrkuttes (sealskin mittens). Peter was accompanied by Panikpuk, a benign looking middleaged Eskimo, who wears a closely fitting skull-

cap on account of baldness and resembles a Chinese mandarin in appearance. Panikpuk was one of Peary's men in the attempt to attain ~~dash for~~ the Pole made 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 party's terrifying dash over the thin ice that formed a precarious causeway two miles long across the Big Lead when they returned to land from the Polar Sea. We arranged 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 southerly 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. We came later to regard a rise in temperature as indicative of a coming strong wind.

Thanksgiving Day came with heavily overcast sky and thick atmosphere and with the wind still strong from the south-east. The Eskimos, however, who are shrewd judges of weather, said that the storm was nearly past, hence Peter and Panikpuk started for North Star Bay about noon and three other visitors, Eskimos, likewise departed. I rode 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, willing creatures. They like their work and make some remarkable journeys at a good rate of speed. The ship did not celebrate the day very elaborately, our dinner consisting of bean and turnip soup thickened with hard tack, baked seal meat, salt beef, "dehydro" potatoes, bread and butter, ~~and~~ molasses and tea. To these were added from our Expedition supplies canned salmon, peas, grapejuice and candy — It was somewhat hard for us to see much to be thankful for, perhaps, but we concluded that actually ~~had~~ many things even in our present cir-

cumstances, ~~that~~ were on the right 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 duff, made with prunes in place of raisins, to the standard bill of fare, while we had some beets, olives, candy and nuts from the Expedition stores. As a beverage we had some Danish "apfel most", an innocent kind of ~~boiled~~ cider 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. 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 kahpetaw, 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
frosting 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 mask 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 with which these Smith Sound Eskimos face the hoods of their upper garments. On 6. January Dr. Hunt and three Eskimos arrived from North Star Bay bringing a lot of our 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, Qeeu and Ooqeah Eskimos came in, but a

storm raged the next two days, confining all hands on board ship. In the midst of the storm, however, Tatiaq and Koloodenaq, 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 Eskimos do not like to travel in stormy weather.

Saturday morning the storm began to abate its force and by late afternoon the white men began to consider the advisability of starting that evening, but the Eskimos, 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-
tiks 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, Fah-
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
Kahmatiks, got away from
drawn by about 75 dogs,

the ship. It is 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 embraided and fastened to the bridle of the Kahmatik before getting under way, for the dogs at once begin to run back and forth braiding 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 were off, bringing up the rear of the procession. Green driving his own team was just ahead of us, while farther in advance were Tangguary riding with Tatiag and

Allen on the sledge with Inukeetoq (Peary's "Harrigan"). The other Eskimos of my party were Ah-e-yah-koq (Peary's "Pingasoot"), Koloodennaq and Nehitolahsoog. All the Eskimos proved themselves faithful and efficient helpers.

The ride to Cape York was very enjoyable, there being no wind and the ice being in good condition, the dogs in fine fettle and everybody in high spirits. ~~And~~ There was combined twilight and moonlight enough at first to enable one to see some of the interesting characteristics of the rugged Crimson cliffs ~~and their fourteen glaciers~~ as we passed along, but after three o'clock the nearly 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 views of them all. The most northwestern of the series, the one nearest to Parker Snow Point, is probably the largest and most important of them all. [Illust] 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 Dr. Elmer Ekblaw, the geologist of the Crocker Land Expedition.

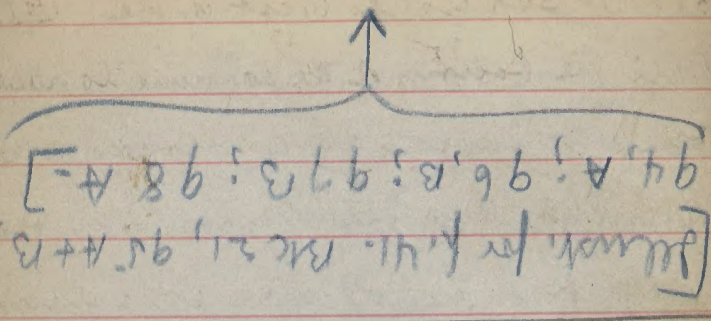
About 3 o'clock our procession halted for luncheon and to rest and untangle the dogs. A primus stove was lighted in the lee of an ice cake, coffee was soon made and a box of biscuit was broached. The Eskimos are lively and fond of games and doing stunts. Peter stood a biscuit up on one corner in the 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
merriment 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 Eskimos in the last exer-
cise. By four o'clock we
were underway 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 three igloos
comprising the little settlement

where Ahng-go-di-flo-ah-soq, Ahng-ma-lok-to, 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 children living in the three small, half-underground dwellings, my party of ten and four additional Eskimos who came with us visiting were divided among the igloos and made welcome. By special invitation I was quartered with Ahng-go-di-flo-ah-soq, and was given the

who is one of the most successful hunters in the tribe, although he is an old man, according to Eskimo standards, being about 58 years of age. Abundance of meat had been brought into the igloos in anticipation of our arrival, and shortly after reaching the igloo I was regaling myself on boiled loin of seal and some excellent coffee that Bah-li (Paulina), Ewik'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 nikkoo, which is the (193
lean meat of the narwhal that has
been dried in the sun and soaked
in the animal's oil. We contrib-
uted 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 dovekies (little auks) and
frozen ducks, but their state of
decomposition was ~~somewhat~~
more advanced than that of

the narwhal meat and (194
skin. The Eskimos thrive
on rotten meat, and a white man
learns to eat it rather than go
hungry. Peter assured me early
in my experience in the Arctic
that mook-ta, narwhal skin,
was delicious and nutty in
flavor, "like Roquefort cheese",
when it was somewhat aged,
and I must confess that even-
tually I came to share his o-
pinion to some extent.

Night found seven adults and two
children sleeping in Ahng-go-di-bloo-
a-suk's little igloo, Peter and Al-
len being accommodated on the two
stove-lamp platforms at the sides of
the room and the rest of us on
the regular bed platform. I

had the place of honor in (195
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 peep 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 were

in no hurry about get- (196
ting 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 narwhal 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 mouth-
fuls at his own lips. But
soon I too was playing my
part at the game. Soon after

noon Dr. Tanquary and I (197
started out for a walk. We put
on our Iceland sweaters and wind-
proofs and went down to the Kah-
matiks for our blanket shirts.
The temperature, as we learned
later, was 35° below zero Fah-
renheit, 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 hand 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" and clapped his bare hand over the offending member. I could stand no longer, and the men helped me into the snow vestibule 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 "comeback", but with an ominous feeling of discouragement regarding the trip upon which I had embarked with so much hope the preceding day.

While I was sleeping off the effects of my collapse, the white men of my party Leld a

Council of war and later gave me their unanimous opinion 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 temperatures of 50° and 55° below zero were most likely to be encountered to the accompaniment of severe storms and other adverse conditions. There 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 (200
cannot be infringed upon with
impunity. My disappoint-
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 Uper-
nivik at least.

It was decided to send word
at once to the schooner for either
Mr. Ekblaw or Dr. Hunt to
come down to Cape York to
accompany me back to the
vessel and at eight o'clock
Monday evening Ewik and
Koloodenmaq were despatched
to travel express to Parker Snow
Bay on the errand. My com-
panions refused to leave me

before one of the two men sent for should arrive; but the next two days were bad as regards weather. Hence no travel time was lost while the letters were being written and the changes in arrangements effected that were rendered necessary by my dropping out of the party. Our Eskimo messengers made a quick round trip of 23 hours and arrived again at the igloos at 7 o'clock Tuesday evening bringing Mr. McClaw with them.

About 3 o'clock Thursday afternoon, 19 January, the south-bound party got under way again in good shape in the bright light of a moon only one day past the full. There were Peter and Green each driving his own Kahma-

tik, Tanquary as passenger (202
with Tatiaq and Allen on Inu-
keetoq'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 out 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 temper-
ature was 15° degrees below Zero.

Ahngqodibloo ahs'ooq and
Ahngmalokto returned Friday
evening from their trip as the first
supporting party. On account of

had 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. Surely enough Sunday came in fine, and at 9:30 o'clock we started Ekblaw riding with Ahng-malokto and I with Ahnggodi-bloodahs'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 7° 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 Eskimos 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-ker near the eastern side of Etcbland glacier and stopped to make tea and have a lunch. The Eskimos built a wind break of snow blocks and soon had the primus stove merrily at work. There are three igloos here, but they have not been occupied for some years.

The natives are a nomadic (205
people and like to move about
from one place to another ac-
cording to the hunting and
the dictates of their fancy.
After luncheon we jogged slowly
along the front of the glacier un-
til we came to its northern
corner, where we encountered
the lead stretching off toward
Conical Rock. Now it was twenty
to forty feet wide and we turned
seaward in search of a crossing.
A half-mile out Ahnginaloktō
spied a quadrangular cake of
ice two of whose corners were
jammed against the opposite
sides of the lead, so that it form-
ed a good enough bridge.
It was interesting to see the in-

telligent behavior of the dogs in dragging the Kahmatiks across the floe. 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 "Clnett" about midnight and soon were discussing a luncheon in her little cabin, Captain Pickels 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 relate regarding the participation of the "George B. Clnett" in the relief of the Crocker Land Expedi-

tion party. The schooner (207
seemed very quiet after my
return to her. Captain Comer
had gone across the ice cap to
North Star Bay with Peter the
day after Christmas to stay till
summer, and the day that
Ekblaw came down to Cape York
Dr. Hunt had started for a set-
tlement on Inglefield Gulf to
care for an Eskimo who had
wounded his leg with a seal-
killing iron. There was, therefore,
no one on board besides her crew
except Ekblaw and myself.
I settled down to try to be con-
tent for the eight months of life in
the Arctic that then seemed to lie
before me, while Ekblaw began
making preparations to leave

the vessel, for he was going soon to Etah to see Mac Millan before the latter should start on his trip to Findlay Land, after which he was to return to North Star Bay for the spring and summer work in geology, botany and ornithology. I was 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 (209.
the ice should release the vessel
in the coming season. This informa-
tion had been transmitted of course
in my messages to the Museum,
since it necessitated the send-
ing of another vessel to (Etah to
accom-
plish the task for which the "George
B. Church" had been chartered.

On 30 January Dr Hunt
came in from North Star Bay
in company with two Eski-
mo youths. The ice being in ex-
ceptionally fine condition and their
dogs being in good form, they had made
the journey of 57 statute miles in eight
hours. They were just in time, for
a heavy snow storm raged all
the following day. The doctor's
report on my physical condition

after making two careful examinations of me, 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 invalid, 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 sufficiently 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 af- (211
forded by the schooner was cal-
culated to break down rather
than build up ones bodily strength
There were, however, for the time
being, fewer external matters
to worry me, since the departure
of my party for the south. At
Dr. Hunt's request Captain
Pickels gave me some canned
mutton to use at my supple-
mentary 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
set of Dickens to read, much
work being interdicted, I settled
down for the rest of the winter, try-
ing to conserve my strength and

increase it. Fortunately (212
Parker Snow Bay is not a very
windy place and I was able
to get out nearly every day for
walks of from four to ten miles.

The sun came back to our
latitude on 8th February, Dr
Hunt and I seeing three-fourths
of his disc above the horizon at
noon from a point three and
one-half miles out from the
ship. The luminary had been
out of sight for 97 days and
right glad were we to witness
his return. According to the
nautical almanac and taking
our latitude from the chart as
being 76° 9' N.; though the
captain's observations put us
in 76° 20' N., the sun should

first been visible at noon of 13 February. We were interested 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 10 o'clock a.m. of 3 November, 1915, was 24° F. the day the sun disappeared and was −14° F at noon on 8 February when he reappeared. Out at the entrance to the bay the temperature was usually lower than it was at the vessel. On one occasion I determined the difference to be about 10°.

I must confess that I

did not feel the great elation (214
of spirit at the return view of the
sun, which has been described
in glowing terms by several
writers on Arctic experiences,
nor did any one 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 ter-
rible depression of soul which
has been assigned to the period
of darkness. We could not
see that the Eskimos paid any
devotional or reverential atten-
tion to the sun, or watched his
return with tears running down
their cheeks as one author re-
lates - The winter is naturally

a period of much less activity than the summer, but it is by no means a season of entire stagnation and hibernation. The Eskimos are constantly travelling 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 beginning of July. (The whole tribe numbers 261 according to 1913 M) 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- 216
terial were scarce on board the
"Cluett". 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 delay on
account of impassable leads
in the sea ice between Cape
Dudley Digges and Cape Athol,
Seegloo and Nehitolaho came
in on 15 February from North
Star Bay. The next day they
got away again on the return

journey, taking Ecklaw (217
and his most important
baggage with them. Ecklaw
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 Ex-
pedition party on board the
schooner till the end of June,
except for a twenty eight hour
visit from Ecklaw at the mid-
dle of May. He came overland
from North Star Bay then prepared
to take me back with him, if

I insisted on going in fulfilment 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 kahmatiks 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 out 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 Eginguah's kahmatik, 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 (230
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. 9th In Novem-
ber a rifle went off in the
cabin, ~~while~~ as its owner finished
oiling 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 parti-

tion of Ekblaw's cabin, (22
Ekblaw was sitting at his writing
shelf, 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 Jangaard's cabin
and buried itself in the outer
planking of the vessel. Ekblaw
As it was, his face and one hand
were slightly scratched by fly-
ing splinters of wood and powder grains and one
sleeve of his sweater was black-
ened by the passing missile.
Jangaard 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 averted 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 at the Petowik Glacier seven or eight miles from the ship about one o'clock in the afternoon he proposed walking across country to the Danish station at the head of North Star Bay. Fiander declined and returned to the schooner 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, knew

nothing of the country to be traversed or any trail across it, had no food with them and were ~~but~~ 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 men, when Taylor ~~staggered~~ came 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 from ~~the~~ cold and hunger and unable to keep going more than a ~~hundred~~ few

yards at a time without sitting or lying down to rest. (224
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 its 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 were half 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

lanterns, ropes, ~~and~~ extra clothing, and a small sledge, while Dr. Hunt went along with a primus stove, 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 MacDougall 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 assistants was required to restore the man to consciousness, when he was rolled into a bunk to sleep off the effects of his experience. Fortunately for him he had gotten a new pair of ~~rabbit~~

have skin stockings that day (2 26
and he was not badly frost
bitten, 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 ~~call~~ noise and
discerned a dark object rising
from the snow some yards away
from the trail. They hurried to it
and found it to be Norman, who
was completely exhausted and al-
most unconscious. He had seen or
heard them and was just able to utter

the faint call which attracted (227
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 con-
sciousness failed him and the
two men dragged him along as
well as they could for about a mile.
Then the mate went forward for
more assistance, leaving Flander
with Norman. He met Dr. Hunt
coming up the gulch 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 (228
mile drag which still remained
to ~~get~~ reach the ship. It was
a close call for the young man,
and some weeks elapsed before
he was able to get around freely again
without suffering some reminders
of what he had been through with
on that ill-considered tramp.

Martinique - pp. 119-134
Followed by continuation of
"Cluett Voyage"