



Meio Sobrado. Single on raised
masonry.
Sobradinho - 1 room above
Sobrado - 2 stories

Volume 3d.

Survey of the

Upper San Fran^{co}.

by the

Commissão Hydraul^{ca}.

1879.

Saturday - Nov. 8th League 182 1

At Little island de José Maria

a.m.

5.55

Start -

6.00

a.m. opp. head of little island - a split is-
land behind it. and the main land ^{is} ~~is~~ ^{is} ~~is~~

There is still a bar running up along the
island toward the L.B.; but very much
smaller than the bar on the map -

6.05

We run to mid river - and then up.

6.10

Opp. lower side of Outlet of the Miradouro

island Channel. It is a wide opening

just as shown on map, and my im-

pression is that this steamer can run

through there; but I will not, at present,

appear to doubt the statements of the Pilot,

who says that there is no sufficient

channel now at the outlet, and that

all the boats come the other way.

The mouth of this outlet from point

to point is about 150 meters.

6.19

We are now heading for the L.B. side

from mid river

[The Miradouro island Channel

makes a very peculiar junction with

the river - pointing up stream.]

6.25

We are about 200 meters from L.B. still

inclining toward it -

The upper end of the bar now on L.B. side

ends nearly opp. the outlet of the Miradouro

channel. The steamer ran directly over where the bar

appears on map, with 3 meters water now.

6.28

about 100 meters from L.B. running up.

Bar in mid river 200 meters to left. ^{for soundings}

We are much closer to L.B. than Halfedling

there is a small island do Povo, on map, which

appears now only as a "bar" - just above mentioned.

There is a larger I. do Povo, farther up, in sight.

very windy.

6.35

We now head more toward mid river - Swift water

6.38

150 meters from L.B. Low flats - running to some

moderate sand hills - the tailing out of the

larger sand hills of yesterday

6.42

Opp. lower pt. Ilha do Povo - 300 m. to left

L.B. nearly 200 meters to our right

6.46

a bar between us and L.B. it is only 200 meters long

seen by the logget bush that it is of ^{low} ~~low~~ ^{low} ~~low~~

also toward the island. our channel is 3 to 4 meters.

2¹ Saturday Nov. 8th I. 181. Lower end

- 6.52 Opp. lower end I. 181.
6.58 only 20 meters from L.B. loam clay - var. bank - cuts. Channel 3 to 4 meters
[There must be a large volume of water running down the other side of the island, and through the Muradours arm, or there would be greater depth here.]
7.05 35 meters from L.B.
7.10 Snag - 20m. to left - 200 m. from I.B. up - mid riv. inclining some toward upper pt. I. do Povo.
7.17 Opp. assembled pop. on island (about 50 persons) 150 meters off. We still incline toward island.
7.20 50 meters from island (about 50 meters below head).
7.22 30 " " island. - 7.24 begin to incline away - but on return + follow I. near Upper end Ilha do Povo. * meters to an off.
The island slopes off at upper end the same way from the map - It has cut away -
7.31 Opp. Esh upper end Ilha do Povo. It is cutting the island do Canabrada - now has its lower point 100 meters below the upper end of the island do Povo. The Canabrada Id. must have extended downward as the do Povo is, and has been cutting away at its head. much water runs down between the two islands
7.47 We turn sharp to left around pt. of island which has been cutting in cutting - it is only 60 meters wide to bar in other island on our right.
7.49 We leave this island on our left + steer across toward another in an arm which here branches.
7.50 It is a narrow, curved channel - hard to turn to right - [Strong wind both ways] Channel 50 meters wide + very crooked.
7.53 Around our first curve - begin curve to left
7.55 60 meters wide - coming to left, under and rather easier course - curve to left
7.57 About around left curve - Straighten now (for 300 meters or so) 55 meters wide about.
[We are running 6 miles an hour]
The current is with us

Saturday Nov. 8. I. 180 13

- 8.00 Begin curve to right - Short - then straight 60 meters wide. Run straight
8.04 Now at a wide place turn sharp to Rt. 150 meters wide (4.4)
8.06 170 " " (3.33)
[We have run much faster than usual for the last 15 minutes.] 8.08 200 meters wide
8.08 A fine looking run here - 3.3.3.44.
8.10 Some good houses, and people, on our Rt. a little below opp. Xique Xique.
[We have come to Xique Xique - distinctly higher earlier than I calculated in field]
8.12 Opp. lower end of Xique Xique. I fear that the map - along here is far out of the way.
XIQUE XIQUE.
8.14 We stop at lower end of town, nearly opposite the Church. Breakfast.

After breakfast I went on with my letters to Sr. Plenio - and on to Mr Kriger - having previously written to Addie, Col. Farrus + J. W. Roberts. All the gentlemen went on shore immediately after breakfast to do the town.
After a while, just as I had finished my correspondence and as I was about to call our boat to take me to shore, it came off full with nearly all (if not all) the principal men of the place. The Commandant - or Jonote Coronel of the troops (70 men) here came and seemed to be the spokesman, a very pleasant gentleman. I remained with them in pleasant chat for a time then with their Cor. being permission to visit on shore and in Co. with Sr. Lisboa did the town. It looks dilapidated - and the Church and other buildings have bullet marks; but the physical damage to the buildings is trifling compared with the moral injury from the feud that has been in blast here for a year or so; growing out of politics. It is an insignificant place so far as commerce goes; but it has to and does suffer on a limestone basis, elevated above the floods; but it is in an awkward place, out of the ordinary track of navigation.

4 *W. M. E.* *Comandador* *Lizim Lizique Nov 8. 1879*

Sen. Dr. Luiz Plinio d' Oliveira
Secretaria do Comercio
Corte.

We arrived here this morning about 8 o'clock, and after paying our respects to the place, we will proceed on our way to the Barra Grande. We have wood enough to carry us there, having stopped a day near the iron ore region to lay in a stock of wood.

There is abundance of good iron ore, but no fuel to smelt it.

The navigation has been good, all the way about league 222, where the enclosed letter (duplicate) was written.

There is a larger area of low land which admits of cultivation, but which is not cultivated; and the rains have caused the sertao to look more green, and more pleasing to the eye.

The river is gradually rising, but is still low enough to give us a correct view of its low water condition.

Our steamer does not make the time upona as having been made on her former trip; but we are enabled to make a much better examination than we could without her aid, and down stream she will save us much time.

We came in to Lizim Lizique more readily than I had supposed we could, judging from the map, and from what the pilot had said. Still this place appears to be somewhat off of the main track of navigation.

We understood that the mail leaves here direct for Bahia, every 5 days; but unless it is to start within two days, it will answer as well to mail letters at Barra Grande, as the mail comes from there to Lizim Lizique.

I am gratified in feeling able

Saturday Nov 8. Lizim Lizique

to say, that ever since we left the rock ob-
scurities behind, I find the navigation
for steamers better than I had anticipated.

I think I had better stop indicating
dates when we may arrive at given places,
and merely say, that we will get up stream
as far as possible, we all we can, and return
when we can.

I have the honor to remain
with the highest respect
Your obedient
W. M. E. Eng. in
Chief

W. M. E.

Lizim Lizique, Nov. 8. 1879

Dr.

Royaldo Von Kruger
Eng. en chef

Esada de ferro Paulo Offensio.

We arrived here this morning - came in to send mail.

You will perceive from the date that we do not
steam up the river as rapidly as I had hoped.

I will stop designating dates when we
hope to arrive at given places - and say that
we will get along as well as we can.

The other gentlemen join me in kind
regards to yourself and your staff.

I have the honor to remain
my respect fully yours
W. M. E. Eng. in
Chief

Mailed letter to Col. C. C. James, ^{which was}
written several days ago - enclosing one
to Addie - written about the 5th or 6th.
Also a long one to my old friend Solomon
W. Roberts, dated about the 5th or 6th,
giving him a pretty full account of the river.

I said nothing about Lizim Lizique in any
of my letters, excepting in my letter to Dr. Plinio,
I stated that we had come in to it, more readily
than I had anticipated.

I made no reference to its appearance, outside
or inside - or to its feuds, or its politics, or anything.

6) Saturday Nov. 8th 1879, Riquezique.

- We arrived here at 8^o.14 a.m. - and at ^[1/2 meter least sounding, coming in.]
- 11.45 We start - after being bothered by the wind for a quarter of an hour - more or less. We go at first the same route upon which we came in.
- 11.47 Opp. horns on left B. which are opp. lower end of Riquezique - This channel here 250 meters wide. We run down near mid-channel - 6 M. anchor.
- 11.55 Now down opp. water opening on our left at head of a little island - We pass to the Rt. sweep by the long arm opening - 80 meters wide. And
- 11.58 Then turn sharp to left - where we came in - in arm 70 meters wide - and now we go against the current - 3 miles instead of 6. We are in the same narrow channel that we entered by - going now 3 miles an hour.
- 12.02 At a bend, now to the left - 70 meters wide. Channel widens to 80 meters at this bend.
- 12.07 Straighten - for 200 meters length - preparing to curving to the right -
- 12.10 Curve to right - begins. 50 meters wide. + 60
- 12.12 on curve 70 meters wide. This is a long sweep longer than I supposed when we came in at double our present velocity. It is part of a reversed curve. The tangent between ~~to~~ ^{why my stars are. Really not tangent}
- 12.19 Long curve to right ends - at a true 50 meters ^{with}
- 12.19 Curve to left begins. 12.20 ^{we go very slow -} Rather on a stretch ^{curve} going now on 2 miles an hour - Curves against us.
- 12.23 on same curve to left. 80 meters wide. Opp. St. Anna do Meraduro
- 12.26 Opp. Point on our Rt. where the channel runs off curve to our right - the one we did not come up.
- 12.27 Now on the other side of said channel close to head of Island do Gato - The head of which is only a third the length shown on map.
- 12.25 Opp. the corner of said island do Gato, where we turned sharp around as we came in this morning. This point we now leave, and leave at According to map there is an island / Cana braba just after passing do Gato! but there is nothing but a large area of water. The head of the (or gan) island is more than a mile below here. Coming up this morning I called that head "La do Iovo"

Saturday Nov 8 - 1880 + 1879. 7

- 12.35 We are fairly out in what is now the main river - in three fourths of an hour from Riquezique. We have made about 3 miles.
- 12.40 Now we are running up 60 meters from R. B. River 1500 ^{or more} feet wide to sandy shore. On map the shore on L. B. side is shown as an immense sand bar - but the water channel shown at that time was not over 1000 ft. ^{gentle} Sand falls (80 to 100 ft high) bound the river on the L. B. side. 2 1/2 2 1/2 3 1/2 4 - 3 1/2 ft. On the R. B. side - the land is flat 10 ft above present water - wooded, and in places cleared and cultivated - sandy loam.
- I. 179
- 12.46 opp. where thin pt. of a bar. 800 ft. from R. B. From the appearance of the gentle on the flat land on R. B. the floods do not remain long upon it.
- 12.52 opp. head of sand head of island on L. B. side.
- 12.53 opp. High water channel on R. B. side - now cultivated but see some water 1/3 mile up. This is shown on Halford's map - as the lower pt. of Ilha do Bairburral - and his navigated channel, with 20 palms soundings, must have been when the cultivation is now.
- 12.58 along near said island - 1300 ft. on to L. B. sandy shore. There are bars on map in front of this island, which are not here. We run within 30 to 40 meters of the island. A settlement opp. on L. B. a mile ^{from here} ~~some dist.~~ This island Bairburral, is very fine for cultivation, and it is considerably cultivated
- I. 179.
- 1.10 Now the sand hills on L. B. are steeper in their front, with only a few, isolated tufts of bushes - not trees, and the sand bank along the river shore, is higher than in how seen it for some time. River 1400 ft. wide. Sand - Sand - Sand - falls the river on the L. B. side.
- #
- 1.17 Sand on R. B. side now only 6 to 8 ft. ab. river.
- 1.20 Islands right ahead - water opens beyond left. and we must turn and leave a broad island on our right - into a wide channel - 350 meters at the beginning.
- 1.24 Point of said Broad island - lower end 200 meters to Rt. R. B. 50 meters to left - This is a handsome channel curving to the right [this differs greatly from map] 230 meters to broad, but low, sandy island.
- 1.27
- 1.30 Opp. a narrow channel on right, 50 meters wide, which passes another island - not so sandy - and higher; it has some large trees on it 1/4 mile from its lower end. The aggregate river is very wide here, and probably the flood height is low.
- 1.34 Channel continues curve gentle, to right, 280 meters. Cultivation, and houses, marked - on island 10 to 12 ft. above the water. R. B. side 7 to 9 ft high (wampout on both sides)

81 Saturday NOV-8 - about I. - 179.

- 1.45 An channel is 200 meters now. a little swift opp. where a low part of island on Rt. begins, but opp. the celvada.
- 1.47 The higher part obviously to the Rt. almost like a levee. Any where the I would call it a levee. Corn looks well. 7 ft high. Channel is now widening - islands cuts - but a bar begins on toward R.B. which narrows the channel a 100 meters, and saves the depth - 200 meters. Splendid *Mandioca* on island! 5 to 6 ft high. There are pine, any where. Some loam with sand.
- 1.57 That levee like bank ceases around here to the river. It has a very artificial aspect; but probably the river did it all.
- 2.00 As the bar increases on R.B. side the island cuts. It is quite clayey along here, and the crops of *Mandioca* and corn to some come, look well. This is a good daylight channel.
- 2.01 Island ^{now} does not cut.
- 2.04 Opp. a water opening on island - the water flows in this way - forming another island
- 2.04 It comes in nearly square, 30 to 40 meters wide. There is nothing of the kind on the map.
- 2.07 Our channel is now to be named by a bar which begins here in the upper island. It narrows it to 100 meters. R.B. Shore cuts 10m. $10\frac{3}{4}$ m. $10\frac{3}{4}$ m. - Now are in in the deepest part which is a little closer to R.B. - we go 30 to 40 meters out - $2\frac{1}{2}$ m. current in the
- 2.12 Swiftest part - we run in about 4 meters now. We go slow - $2\frac{1}{2}$ m. per hour along here. The island is getting away from us, to the Rt. So in the bar. Clay bank on R.B. side stands plain - but they cut and cave.
- 2.15 Current here for that is - 3 miles an hour.
- 2.19 Opp. upper end of that upper island (and also of the bar) which is a thinned $\frac{1}{2}$ to the Rt. River now widens out and is obviously shallow over a large area about said island and bar.
- 2.20 We leave the R.B. just where it has ceased to cut - a very extensive bar now appearing running out from R.B. shore. This bar is now on our left, as we run - we now square on, then down - in $1\frac{1}{2}$ to 2 meters as yet - in fact we head down toward the island opp. the head of which we passed at 2.19. The bar on our left continues out, and is within 250 meters of said head of island. ^{12 ft high} Head of island 40 meters to our Rt. It is nearly pure sand - our soundings - 4 - 4.4 - This evidently a new channel. I cannot apply Halsted's Map along where we have been

Saturday Nov 8 I. - 178.

9

- running for an hour or more, or here.
- 2.31 We are now out to the far upper corner of said upper island - 50 meters to our right. and look down and up the river another sand bar and island directly in our front.
- 2.33 We continue our course across - $3\frac{1}{3}$ $2\frac{1}{2}$ $2\frac{1}{2}$ $2\frac{1}{2}$ Begin to cease up (2) when 250 meters yet off from Sandy island in our front - $2\frac{1}{2}$ $2\frac{1}{2}$
- 2.34 200 meters off - $2\frac{1}{2}$ $2\frac{1}{2}$ Sand bar on our left.
- 2.35 100 " " $2\frac{3}{4}$ $2\frac{3}{4}$ " now 300 meters off -
- 2.36 70 " " 3 $2\frac{3}{4}$ $2\frac{3}{4}$ Now on our up.
- # No change coming down the river which I think of turning over to that island and square across channel. And perhaps for barges not going to Liquezique, it may not be necessary. We will see on our return.
- 2.42 3 Major passing down 250 meters to our left. We are within 30 to 35 meters of the sandy island.
- 2.44 Some trees now appear on the island.
- 2.45 We incline a little away - to go outside of a slender tree that sticks up (4.4.4) Then we head back toward the Concan, adding island. Or possibly all this from 2:33 P.M. may refer to the main L.B.
- 2.50 Suddenly anchor. The word is, that they put too much water in the boiler - and they stopped to let some out.
- 3.33 Start again. I must arrange the fore gang notes so as to fit them to Halsted's map - as nearly as I can.
- Piranhas - upon whom has devolved looking after the water in the boiler - in consequence of the Engineer speaking to him - a second time, it seems about the danger of blowing up - declines to act in that capacity - and Manuel, his cousin, head fireman, said he would not undertake to manage it alone. In the dilemma, our Chief Water Antonio, is willing to do the same work, and I authorize Sr. Amarante to so arrange. Liquezique, has probably had a little voice in the matter of the difficulty.
- 3.42 Head of island 200 meters to our right. a little bar this side of the head of HYCATU
- 3.43 around. No Channel here.

10 Saturday Nov. 8 League 178
Aground on Shoal.

3.43 P.M. - Aground
in 3/4 meter and less, muddy sand -
a bad place; the wind blowing
hard on, and being equally strong
on both sides, and what little cur-
rent there is being up stream. It is
an eddy (once a channel) now easily
filling up. I learn from the Pilot
that a Pilot in Riquezique told him
that this channel was open. Henrique
Confirms this.

I am anxious; on account of the
circumstances of the situation.

We went to work, and tried to back
out with steam, and the Canoe men
out under the bow heaving on her.

We then put out the kedge anchor,
about 200 feet astern, brought the
rope to the Capstan (over the Ham-
we could not do it any other way) and
heaved on it, with the Canoe men
at the bow, engines off, of the
steamer ^{in masts} and put on steam; but no
motion. By this time it was nearly
dark.

We then concluded to lighten the steam-
er first by taking out all the wood.
This was my Adrian because it had
taken a long distance amud to a bar
where we would have a chance to pick
it up. This took them till bed time.
Meanwhile we pumped and bailed out
the bidge water.

I decided that the rope from
the kedge should be drawn taut, and
left till daylight.

Considerable wood had yet to
be put off, when all hands retired;
but I did not know it. I thought
there was very little. The steamer
is fast in the middle - just free
at the bow and stem; but in Co's maner.

Sunday - Nov 9. Aground, 11
and Afloat

I had the old Indian L. 178
who is sick with an intermittent fever (at
first pleuring) in my cabin last night. He
was badly fixed in the crowd on the bow,
for a sick man.

At daylight, I awoke; ^{and arose;} ^{even}
after the men roused and went to work,
finishing the camping out of the wood
which occupied several hours.

The Engineer (Machinista) then in-
quired whether I could take the water out
of the boiler (as Henrique urged) or try first
with the steam to help?

I said try first with the steam to
help; but before the steam was up, the
men at the bow, ^{with shovels,} and men pulling at
the kedge rope braved the steamer down,
clear of the shoal; at 10 1/2 A.M. was the
first motion. It was 11:25 before the
Engineer had steam enough to do any
thing.

I feel greatly relieved, as I am
Confidant that this spot is shoaling up.

We now must go over to where our
wood is piled on the bar, and get the
wood on board again.

11.29 start for the wood pile.
1 We run amud to the proper channel toward
R. B. side through 4 to 5 meters - and anchor
11.37 abou in 3 meters - abou a snuff. nearly opp
our wood pile - distant about 200 meters, on
point of bar. Take in our wood - ^{your} by boat.

2.45 Start, on our regular Course in a good main
Channel 3 meters deep - Stiff Current - 21 man hour. I.
Oblique across toward R. B. Channel 1500 ft. to Sand bar
(Champrona R.B.)

2.51 Within 20 meters of R. B. 3, 3. (Sandy loam - cut) Sertao
not welliked along here - 2.55 - we go out to 30 meters
from shoal - what for I can't see. (4) The sun glaze
on the watery things just as it did yesterday after-
noon. 2:57 we are obliqueing away off
point to keep channel. The shore cuts not down this.

3.00 Yes, it is shallow to our left - and also to our right. I can
see the rips. Bar no difficulty about
2 mile crims. ^{Sand} 31 the channel, unless from
sun glaze.

Head of Island
HYCATU.
HARDAGROUND.
the sun was shining on the water in the face of the Pilot.

12] Sunday, Nov. 9. L. 178.

3.11 Opp. Cluster of houses on R.B. a small channel, then a long narrow bar in front of said houses. I think there is still a good canoe channel along the R.B. shore, where Halford's channel was.

3.13 2 1/2%. 2 1/2%. About L. 177 - lower end

3.16 near mia rivi - 3. (3° 18' - 2%, 250 M. from L.B.) -
3.21 200 M. from L.B. (4%) Wooded flat on L.B. in front of the sand hills, which are behind, 100 ft high, continuous
3.25 about opp. here the L.B. banks begin to cut + loose loam and clay, up toward Point - (highway) Channel is now here - 3.26 - within 40 m. of bank - most from -
3.27 most part of bar on R.B. side opp. here. Stiff cement 2 M. not over 400 meters wide here - to bar.

Mocambo do Vento

3.35 Opp. Point Areia Branca. Sandy pt. 35 to 40 ft high. Bank is cutting below all along, and at the point strong current continues - a dozen houses here.

The point is clay - mostly sand blown over it. They make tiles here. It looks like good clay. At least 70 men, women + children were employed in knots in the high bank to see the steam pass. In the mountain of hills behind it a Stacolumite. I cannot see the mountain.

3.40 Opp. a Cove in the clay bank around about the point - which is also slowly cutting, cement 2 1/4 M. (Mocambo)

3.42 Opp. lower pt. of an island, suggesting the L.B. shore just above the clay cove - River 2000 ft wide. We incline over toward the R.B. toward a point.

3.45 about opp. point not far from R.B. - then up along my deep channel 10 to 12 meters near the R.B. shore. Ilha de Garrota,

Deep channel. I. 176 1000 ft wide only

4.16 Opp. a little water notch on R.B. close to shore

4.26 - We incline away to 100 meters from shore - apparently to run outside of island 1/2 a mile ahead, the lower pt. of which is only 100 meters from R.B. from where we turned off - the R.B. shore is just cutting.

4.30 Now near mid river, steering toward L.B. There is Ilha dos Bois on the map. High water. There is a smaller island back of here on map on the Opp. or L.B. side of the river.

4.36 Opp. lower end of Ilha dos Bois - are now about 250 meters only from L.B. River about 2000 ft wide

4.44 70 meters from L.B. - sloping sand banks. A bar puts out from R.B. side (Ilha dos Bois) and comes within 250 meters of the Pt. on L.B. side - 14 m.

4.50 Sounding net in the deepest place. The sounder was fixing the line and missed the narrowest

4.55 place.

Much clay L.B. side.

Deep channel.

Sunday Nov. 9. L. 175 5 P.M. 13

5.00 about at Lower end L. 175. Riv. - 1500 ft.

5.09 Opp. a sort of blind upper end of island on R.B. side, 150 meters from L.B. Approaching Carnaubal on L.B.

5.16 Opp. Carnaubal - one large, hatched house with a pretty bank of loam + clay, and whitish material looks like sand or rhyolite a little back from river bank - a number of Rond-some Carnaubal trees -

Clay banks. Very white clay - in river bank a short distance above Carnaubal. It has carved some but the talus remains, almost like rocks. It is next neighbor to rock, 1 foot + dark soil on top. (clay below)

5.20 a curious notch, just above the clay point. a grove of palms - Carnaubal - along here. The trees come right to edge of vertical bank upon which the river operates - a strong current all along here from the Concar clay shore.

5.25 We incline away from the Concar clay shore through a 3 to 3 1/2 meter channel

Palm Grove - on a large scale along here!

5.37 Opp. Point on L.B. clay face, Palms on top - 250 M., 350 M. from R.B. to Shamp. Riv. (600 meters or over)

5.39 heading mid river - (5° 40' mid river) inclining toward R.B. side.

5.42 Opp. lower pt. of Ilha do Porto Alegre - 2 1/2 miles current - The town of Porto Alegre 1/4 mile above, on L.B.

5.45 I. 174

The river is calm - smooth - a rare thing and wide - 1/2 mile, or more. It is nearly dusk - Our watches are too slow.

5.48 20 meters from R.B. bank sandy loam.

5.50 Anchor - Majestic Stream - !

REPORT
a good steamboat navigation from League 182 - and into and out of Riquisiqui to League 174. Nov 9th Rio time it is 6:15 - That is more like it. I set my watch to that.
We stop on the R.B. 1/2 mile below town of Porto Alegre on L.B. side

500 ft and 200 ft

14) Monday, Nov-10th (along deep channel)

- Ilha da Amoro [L. 174, Iavorana] ^{off}
- 5.38 Start along R. B. Shore (young fellows family to see him)
- 5.54 Opp. lower pt. of bar 250 M. fr. R.B.
- 6.02 Opp. Upper buildings of Porto Alegre. which I see across island Porto Alegre.
- 6.06 Jatoba on R.B. Clutch of horses. doz. or 30. Porto Alegre in oblique toward mid river. Bar, 300 m. times all along east side of I. do P. Alegre.
- 6.12 Opp. tail of H.W. Island do Cabore, R.B. mid Riv. Head of island Porto Alegre is merged into the sand bar, indistinguishably.
- 6.15 Opp. up. end of said sand bar as in oblique appears to be main L.B. above here. 250 M.
- 6.17 opp. Bar on R.B. side. Pop. 30 ascribed on bar. 1000ft. off - we are near L.B. side in Concave.
- 6.20 Opp. Bar in mid river - lower pt. which narrows the channel to 250 meters - makes fine nav.
- 6.21 Opp. up. end of apparent island on R.B. side from looking nav. 1/2 league ahead.
- # I think that the bar on R.B. is that along the
- 6.25 I. da Batalha. River now widens along here.
- 6.27 Loam and clay bank on L.B. cuts - for 200 meters
- # The Halfed Channel was on the R.B. of river.
- 6.31 Opp. where clay loam bk. stops cutting. Riv. 1200ft. Here there is a notch in L.B. as though this might be upper pt. of an island. There is a little water behind it and the main land is grazed in below - no doubt it is a high water channel. It may be the cut. up. pt. of P. Alegre Id.
- 6.32 In here oblique toward R.B. side
- 6.36 Opp. lower pt. of bar toward L.B. (not on map) Still heading to R.B. side which is sandy, cutting.
- 6.38 River 1800ft wide. 50 meters from R.B. cutting bank. I suppose this to be Ilha da Batalha, and that we are on I. 173 old bar cut away.
- 6.40 Opp. up. end of small bar on L.B. above referred to
- 6.41 Oblique away from R.B. side. Heading to strike below a white spot on L.B.
- 6.46 Bar along L.B. shore - not large.
- 6.47 Opp. apparent head of Ilha da Batalha, but it has been cutting, and may be very different from what it was in Halfed's time. - Heading for white spot in L.B. River 3/4 mile wide (chunks) Run 1/4 mile wide run up.
- 6.54 Opp. White Clay Point on L.B. - 30 meters off. we now in good channel along concave - not cutting River opp. 3/4 mile wide. 4, 4, 4
- 6.56 Opp. Clutch of horses - modern - and where there is a low place like a H.W. water in the banks. Not on Halfed's map. [No land marks]

Monday - Nov. 10. On L. 173. 15

- 7.04 Opp. lower pt. of island 1500ft. to left. Run near L.B.
- 7.08 Heading out toward mid channel only 1000ft. now. Hand some river 1/2 league ahead, nearly straight.
- 7.18 Running 100 meters from island 200 meters fr. L.B.
- 7.16 Opp. a Cove in island - low spot when river runs deep is high water. Some eddy water then none. [No large trees appear. This may be a new island where the Coroa Alta of Halfed, was.] 7, 19 m. R.
- I think, though that we are on L. 172, and above Halfed's Coroa Alta. all along the L.B. side are serras - not cultivated. Not does this part of the island show any cultivation; brush, large.
- 7.23 mid R. no - 800ft to island 400ft to L.B. little Concave.
- 7.24 Opp. grove of Palms - 100 meters back from L.B. side. Clay bank along L.B. Large bar begins on island side, extending up stream 1/2 mile above head of island. Point on L.B. 3/5 mile
- 7.28 Opp. head of island - buried in the sand bar. Opp. Point on L.B. a house (thatched) on Pt. We head oblique toward L.B. opp. upper end of large sand bar, when it merges into the low sandy shore on L.B. side. This may all be part of an island. It is, certainly, in high water. 300 or 400 meters over to any large trees.
- 7.44 Yes - opp. head of real island, on R.B. side, 100 meters to our left. But there is only a very small quantity of water running there now -
- 7.44 also opp. lower end of bar on L.B. side. Uncultivated lands on both sides clear.
- 7.50 Opp. upper end of bar on L.B. River 2000ft. On L. 172.
- 7.52 Heading toward lower pt. of island Canudos to run on Pt. or west side of it. The lower pt. of this island is now near mid river - River 2200ft - nearest L.B. shore.
- 7.56 opp. lower pt. of Canudos island. a large bar puts out from island embarking channel to 200 meters in front of Os Canudos on L.B. Clay banks along L.B. some with cement with it in places.
- 8.03 Opp. Os Canudos. Hard clay peninsula Point - running meters from pt. 100 meters from bar. Deep. Pop. 40. in knots on bank. but it must be much more. There are 30 to 50 houses - all thatched. (13m.) Clay banks all around and about Os Canudos.
- 8.09 Opp. upper end of bar fronting Os Canudos.
- 8.10 Grove of Palms on R.B. above - River 1/2 mile wide. according to map this is opp. island Os Canudos

16] Monday - Nov. 10. League 172.

8.13 Running up a little swift 2.2, 2 3/4 sanding 3.2
River very wide - but narrow some above.
8.15 Beautiful, clear, lake-like river ahead. ^{smooth}
The shores are tame - but away in the distance directly ahead a high range of blue mountains bounds the scene. The mountains are at least 20 miles off.

P.S. The head of Canudos island don't appear!

8.15 It is the point I see a mile ahead, then it looks much farther up than the map shows. A little cultivation along here - both sides.

8.21 Opp. ^{high} clay point on L.B. River 1500 ft. (4, 4, 4 1/2) 500 ft from R.B. 900 ft from clay pt. Time River!

8.33 Opp. clay point ^(not from point) on L.B. with Palm grove behind and a bar in front - a long narrow bar, not from shore

8.35 Opp. Point on R.B. (about 1/2 mile) but the land still bends around to left - curving, curving - We oblique from near this Point on toward L.B.

It looks like the lower end of Il. da Sambaiba 1/2 mile ahead, to our left - SAMBAIBA and the Point in the main R.B. Sambaiba

The Alfed channel is in between R.B. and the island Sambaiba; but as near the other channel between the island and the town of Sambaiba - which is scattered along the I.B.

8.45 Opp. lower end of Island - 40 miles from L.B. Hard clay vertical bank - 2 houses just here - more houses above - rather below the town.

on League 171 - on 1/2 way up.

8.48 Clay bank continues on L.B. river 1500 ft. Clay has some iron cement mixed in places.

8.53 Opp. several more houses (after a gap, in houses) houses continue - [not less than 40 houses along]

8.55 Houses SAMBAIBA ^{Thatched} Houses. Clay banks in front Breakfast.

High 3 Watch. The time of my watch - I have to set it to

9.40 on good road - on I. 170.

9.43 at upper end of Island month of Channel (on R.B.) Cloud with Sand - no name.

9.45 A little swift. River 2000 ft wide. We are heading toward L.B. toward Lagoa da 2.2.2. 2 1/4 2 1/2 on oblique asp, 3.3 1/2 3 3/4, 4. Hard vertical clay banks, partly cemented, on L.B.

Monday - Nov. 10. I. 170

17

9.55 Opp. 1st house - Lagoa da Onca (clay bk.) (about 8 houses in all)

9.57 Opp. principal house - plaster tiled. much iron cement in clay - front bank - stands just like a rock - hard point 5, 5, 5 - (80 miles out River 2000 ft or over)

10.02 Opp. another cemented clay bluff - on L.B. full of little caves washed by the river. a dilapidated house behind.

This is a very marked cemented clay bluff! 10.03 I notice that above here these clay bluffs occur at intervals for a mile up. Time Navigation Clear river.

10.06 House with tile roof on L.B. - clay bk. in front. # There are not as many houses along this last mile as shown on Map

Opp. a point with 2 kind of palms Cemented clay bluff - House White - Red Tiles. several other buildings tiled & several thatched, but dilapidated

10.15 Aoreia on L.B. one family seems to be left here - plaster in front of house - sitting under a tree gazing at steamer. The nicest fence seen - [fence] at L. to River

The feature - along this portion of the river on the L.B. side - is Cemented clay bluff at intervals. 10.25 (2 large barcas off to the left) near a bar.

10.25 I. 169. somewhere about here 10.30 Just here the river banks are stable on both sides. Low country - all around here - Blue mountains in the distance across R.B. 15 to 20 miles away - these scrub forest in front are still visible - but not much more distinct than they were a league back. (Yes, now they are 10.35) the River.

10.40 Opp. Casaseira, on R.B. 1/2 mile across. we are within 100 meters of L.B. sand bank (large) Steering toward Ilha da Jurema - we now aim to run to the left of the Island. The old channel was on the right - going up.

10.46 Opp. lower pt. of Ilha da Jurema. 50 meters to our Rt. as we go up - The island is cutting some on this side - the R.B. side - Channel here 1200 ft wide.

Monday - Nov 10 - League 169.

Ilha da Jurema.

When we get toward upper end of this island the VILLA should be in full view.

The church was seen several miles back.

The vegetation on these low flat lands looks very green and abundant.

The bushes come down to the low water line.

This is a splendid channel about 800 ft wide.

4 meters deep - Banks nearly permanent -

Clay bank on R. B. side - and much clay in

bank on island side are green with bushes

Island curves ^{convex} gracefully around to right.

R. B. Concave -

11.00 Island cultivated - R. B. not.

It is much as it was in Halford's time, excepting that all the lower part of the bar along the island has disappeared - or else it was put too far down on the map.

11.17 Opp. point of island. Where formerly was the

channel is now only a lagoon - and outside

of it a new island - and the channel

now is on the R. B. side, where the large bar

shown in the map was in Halford's time.

Clay bank on R. B. side, but it has cut, and it

is still slowly cutting - no bar can stay here

in this current. Channel now 1000 ft deep.

VILLA IN SIGHT.

The new is bounded all around to the right

and in front, by high, distant mountains.

This is a beautiful channel!

11.24 Whistle for the VILLA - now in sight

11.30 Opposite head of Ilha da Jurema.

An immense bar above the island on the

L. B. side. appears to run from the ^{new} head ^{at sea}

obliquely up to the L. B. shore, nearly a mile.

Opp.

12.05 Opp. lower end of VILLA. cemented clay

12.11 Church -

12.15 Stop - in front of Casa - with steps.

VILLA DA BARRADO R. Grande

Monday - Nov 10

Villa da Barra do Rio Grande.

Soon after anchoring, we went on shore. As we landed we met by a very polite little gentleman, who tendered his services to accompany and show us any where to. He proved to be the Port Master, and told us that the mail had started yesterday. My letters mailed at Piquetique are all right; but those who mail here lose 5 days.

This gentleman took us to a store and introduced us; then upon our inquiring for the Judge, he proposed his services to take us there. On the way Mr. Castro discerned that he is queer! The judge, a fine looking very large, portly gentleman, rec. us kindly in his house, and opened all for the night; but I saw distinctly that he valued the Port Master, truly. The P.M. was a bore. As then viewed the Churches - One old one and one new one - The new one has all the main walls finished and the roof - and so it stands for want of money to finish it 5000 dollars - should finish it and make a fine Church. It is quite large.

We were then walked through the Villa; we were joined by the Tenente Coronel - who looks like Henry Jathans - only he is a little taller. He was very polite and sensible. He took us through the Hospital. There are only a few patients but the stench was sickening in the room where they were, although it has several open windows. There is a garden attached with quite a variety of trees orange, tamarind fig, palms, castor oil tree, etc. - but it is not kept in any order. We then walked thro' the residue of the town, which has some good houses, and good looking small stores.

20) VILLA da Barra do Rio Grande

Monday, Nov. 10th

There is a large area of land lying between the Rio Grande and the Rio São Francisco - low, subject to overflow, which I should think could be cultivated. The Rio Grande is navigable for large barcas for 140 leagues - and for smaller much farther; and some of its tributaries are also navigable. There are sugar plantations up the Rio Grande.

If there was a cheap outlet to the Ocean, people might then have an inducement to cultivate more than they now do. Without that facility for transportation, the business of the entire valley from here to Jatobá might be considered as at its climax.

That is to say, the people raise enough to support themselves, the Officers of the General & Provincial governments and the Padres; with a little surplus. And whether there should be 10,000 more or 10,000 less inhabitants, would make no practical difference to the Empire or to the world.

But with an improved river and a proper system of Steamboating, and a railroad (economically managed) around the Paulo Affonso Falls, an impetus might be given that would result in considerable production for shipment.

There is a certain amount of trade - largely salt and rapadura, which keeps a number of barcas running; but Rio Grande, like the other towns I have seen, has a few well off, and many very poor.

There are the walls of a Church and the walls of a Theatre, as they have been for years, showing that there was here at a former day more life than there is now. There is certainly a considerable population here

Villa da Barra do Rio Grande 21

Umo Ex^{mo} Sen. Dr. Luiz Plinio, d'Alveira
Secretaria do Ministro
Corte. Rio Grande, Nov. 11 1879.

We arrived here yesterday, about mid day, and propose to leave at noon to day.

The navigation is excellent from Dique-digue to this place. The Channels have changed considerably since Hatfeld's survey; but they are every where of ample width and depth for our steamers, which now draw about one metro. It needs only a pilot who is acquainted with the changes. Our Pilot has not been along this part of the river for several years, yet he has only once missed the Channel, which did no harm beyond the annoyance of delay. He is considered to be one of the two best pilots on the river, up to Jamariá.

There is considerable business here, compared with the business generally at the towns along the river; chiefly rapadura and salt.

There is also a large population; but like the other towns I have seen along this river, there are a few well off, and many very poor.

As far as we have come, up the valley, it may be said, that the people along the Margins of the river raise enough to support themselves, the Officers of the towns, etc; with a little surplus; and whether there should be ten thousand more or ten thousand less of a population along the river, it would make little practical difference to the Empire, or to the world, as the river now is. But with an improved navigation, and a railway around the Paulo Affonso Falls, economically managed, an impetus might be

22] given that would result in my old
more production for shipment. ^{It is to be}
transportation, to a coast market.
The only thing that can ^{be} ~~agreement~~
the production and general business
of the valley, as far as I have ever seen it.

There is a certain amount of trade,
largely salt and rapadura, which keeps
a number of Boarcas running; but
even when, I see signs that there
has been more prosperity in days
past than there is now.

Gentlemen living in the valley say
that as soon as there is a little extra
production of any article the price im-
mediately falls so low that the producer
is little benefited. This ^{is} must continue
to be the case till they have cheaper
transportation - cheap enough to enable
them to ship their products out of the valley.

As we advance up the ^{river} valley we
find the area of cultivable ground in-
creasing, and the vegetation shows
that there have been rains; but still
the Sertao on the hill slopes continues,
and these are some wonderful ^{and hills}

We are now 112 leagues below
Jamugna, and unless we make much
better ^{speed} than we have made to this
place, it will be the latter part of Nov.
when we reach there. We have been
two weeks getting up 70 leagues - or only
~~making~~ ^{that} 5 leagues a day.

Should steamboating on this ^{river} ~~be~~
be of any use in the business of this
river. It must be something ^{of} quite very
different. But I need not dwell upon
this now.

^{of the} ~~The~~ One trouble that we have is wood-
ing. The time lost in cutting and getting it
on board is fully one-fourth, if not a third of
our ^{useful} time.

We have but little grain yet, but we must
expect more soon. That will not help us, but
we will do the best we can. I have the honor to
remain with the highest respect
Your ^{most} obedt
Eng in chd W. Milnor Roberts

Tuesday, Nov. 11th Villa da Bana do 23
Rio Grande

Wrote to Col. O. C. James - enclosing letter
to A. de G. this date - written this morning.

It rained a little last evening; but
it is clear this morning.

2.14 Start + flood down - opp. Church 2.17.

2.19 Opp. Day Point. 2.21 Stop floating

I see a heavy boat where the S.F. + the R.C. seem to
#2.21 must just below the Day Point -

We may call this place, from lower end of Villa,
all the people who can find shade are gazing.
We start for the broad channel - we run almost
due S., and in order to put it on the map we
run right thro. the island ^{map} S. L. A. T. A. N. J. A. L. which
is entirely differently shaped -
there is no island as low down as the junction
point of the Rio Grande and the old arm of
Halford's channel. It is totally different.
There is a bar cross ^{run} with water - and, above
that the remnant of an island.

2.33 We are over to the sand heap shore R.B.
I look back and see nothing but water a part
of the lower part of the valley - all below the
Point above mentioned.

The new Church shows its fine proportions, very
well from this point of view, and the valley
in general has a pleasing, healthy aspect.
Houses interspersed with trees. Again in distance

2.35 We incline off toward mid noon 250 M. to Pt.

2.40 Going up mid noon - island now 250 M. to Pt. R.B.

2.42 Sailing toward Pt. on R.B. (but the map shows a big
bar -
on the L.B. side now instead of a distinct island head
there is now a low sand bar, apparently new to
the shore above. ^{Probably some water may go down}
whichever said bar - but it must be a small amount, if ^{any}.

2.47 Our course is now toward the lower part of an island
directly ahead - NOT like any thing on the map, which
is a mixture of sand bar, Ilha do Camoleiro,
Sand bar, and Ilha da Madeira, ^{Serra}, said island

2.51 Now we turn to the Pt. enclosing to run off to the Pt. of A.

2.52 Opp. Pt. on R.B. which point is the head of an
island instead of being R.B. - very wide channel
^{was} ~~was~~ done on the other side of said island.

24) Tuesday - Nov - 11th above Villa de Barra

- 2.55 Opp. the open water which runs down behind the island which I had thought R.B. between
- 2.56 that and another island above now on the left which is much cultivated with many pipes and a number of little thatched houses & shelters - less than 60 people.
- 2.56 I look back on L.B. and see no sign of water joining down there behind the bar, which fits snug to the land, as I thought.
- 3.00 We are now in a fine channel 300 meters wide between Island* and L.B. *It is not now an island*
- 3.02 Opp. upper end of cultivation on Island, above which it is just only a sand bar head.
- Look back - City still in full view mainly over the land as is near Pt. opp. City.
- 3.04 Opp. Clay bank near edge of water - outside of regular river bank - almost like mine - Have almost
- 3.05 Half a ton this "Taud".
- 3.10 Madeira Secca 1/2 doz. houses - nice country all up to the point above a few yards, 20 ft. - above the water now.
- [P.S. The "sand bar head" of island above now seems to be continuous to the R.B. side a mile above.]
- 3.14 Clay bank of River now in front of Madeira Secca. This may be Halford's "Taud". (Clay + cement) River here is 1500 ft. wide - Clay all along.
- 3.19 Opp. a small clay point - Still there are houses - ^{stands like rock.}
- 3.21 Opp. a clay ledge ^{stands like rock.} square out from shore 150 ft. out. too much houses 100 meters above - 1200 m. above above that a nice sloping bank.
- 3.23 We are using now 150 m. from L.B.
- 3.26 New Church still in full view back but pt. of land ^{decayed} ~~is~~ soon hidden. It comes out near
- 3.35 Opp. upper end of aforesaid "island head sand bar" which runs to land - but this land may be an island, there is a point ab. unknown soon. The mid channel only 250 to 300 meters wide - so the point above must be that of an island. NO, it is only a sudden notch in a Camp bank.
- 3.43 Opp. side carrying point - river now widens to 400 meters to a bar on L.B. side River between banks 500 meters.
- 3.45 Opp. Houses on L.B. - I think Cocicão The bank on the R.B. is now pure sand - nearly plain it cuts away like sugar - I think he runs directly over where Halford's Island do Meio was - opp. Cocicão - I see no sign of such island. The R.B. shore is now cutting all along here - and a bar is forming in front
- 3.50 of L.B. - 4.4, 4 1/2, 4 1/2 30 meters from R.B.

Tuesday - Nov - 11th I. 166 dawn out. 125

- 3.59 The bar from L.B. projects far out - Two thirds of distance across the river, leaving only about 300 meters to the sandy R.B. bank - It is this bar that is causing the cutting in the Concave then along here; and it must go on, including said projecting bar the river is now 900 meters wide - just here.
- 4.00 - We run within 30 meters of shore - Knif edge
- 4.03 Opp. Point on R.B. where it stops cutting - Water cuts in here, as if after all - the R.B. may be an island - It is certainly an island appears to begin immediately above said knif edge point. The upper one is a little island - and back it is a big island - if not now, at least when the River is a little higher.
- 4.06 Upper end of little island. Bar on L.B. is now 1500 ft. off - ^{I do JUA}
- 4.08 off in front - (Villa in full view, yet, 4.10)
- I look up channel on R.B. side of island ahead and see that it seems to the Pt. about 100 m. wide ^{low.} All the land and islands on the R.B. side are
- 4.14 Opp. JUA - on L.B. a number of respectable looking houses - Thatched roofs - I do not see as many as shown on MAP - but there are here - ^{now see many houses scattered all along.}
- 4.17 Opp. lower pt. of Ilha do JUA. In a fine river. We are now steering toward a Red bank on L.B. # JUA extends for a mile along L.B.
- 4.26 Opp. a Red bank (Point) House - Palms & other trees - ^{clay bank the red} River here only 300 meters to island. ~~500 YYY~~ 60 meters from Red Bank. Clay bank continues above Red Bank with many pleasant looking trees - and few houses - 13, 13, 13 m.
- 4.30 River begins to widen - island side shows off - L.B. side cuts - study in hard clay. 12, 12.
- 4.34 Opp. head of JUA Island - apparently. We are heading
- 4.36 ^{at new} ~~old~~ River Dinner Bell. I. 165
- a fine river all the way - from 4.36 to 5.10 - 12 miles.
- 5.10 Opp. a clay (readish in top) with a nice white horse with red tile roof. Hycati. - I think L.B.
- 5.20 Opp. lower end Jatoba - L.B. - We are now over to the R.B. **Gamelleira Tree.**
- 5.22 Opp. a remarkably grand old tree R.B. ^{50 meters} ~~on shore~~

26] Tuesday - Nov 11th on L. 165.

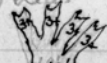
5.25^h Stop on R.B. side. Pilot says there is no good place to stop for a League - So we
5.30 Anchor - for the night, opp. Jatoba.

— Report —

Good navigation all the way from Villa da Barra - on L. 168 - to this place on L. 165. Something over 3 leagues.

I hear the first "Amvil bird" this evening.

It rained - but only a few drops!

Camelleira Tree.  each trunk 1 m. Spread Trees 120 ft.

Wednesday Nov. 12. Jatoba 165

5.55 Start - on R.B. 250 m. above the big tree. We put out toward L.B. oblique.

[River rose since last eve. ³ over 5 inches. I presume that we will see no more low water at the Villa da Barra - mouth of

Rio Grande, the Judge thought it now about 34 inches. 4 palmos, yesterday - above low stage. In order to arrive at approximate low water quantity we must deduct 34 inches from depth - reduce the width some what and also the rate of current.]

The ^{near straight,} concave cutting side, in hard clay, ^{cutting but little.} bank is on L.B. or Jatoba side. We strike channel on L.B. side at upper end of Jatoba - upper end of hard clay bk. River is about 2500 ft. wide here.

6.07 opp. ^{now in center} bay in mid river, with grass - nearly covered with water.

Majestic Shearn, above -

6.12 In L.B. channel 40 mds. from shore, opp. upper end of high, hard clay bank - and upper part of Jatoba. Strong current.

Wednesday Nov 12. L. 165. 27

6.15 opp. foot of I^a de Prepece. close on L.B. Some water behind it at this foot. Prepece is behind the island.

6.17 we steer oblique to left. toward mid-river.

L. 164 - just below I^a de Prepece

6.21 mid river - ^{new} bar on R.B. cut off 150 m. width. This bar at upper end is 6 feet above low water. The bar along the island Prepece, on map, is ^{1/2 m. N}

6.32 opp. upper end new bar on R.B. - we now steer ^{as if to run} from mid river toward channel on L. B. ^{1/2 m. N} the W. side of I. de Maria d Araujo. This island is much more obtuse than the map shows.

6.36 Steering direct for Pt. of island, to run on R.B. or East side of island.

6.37 opp. foot head of I^a de Prepece. very small, ^{channel}


6.40 opp. Pt. I^a de Maria d Araujo. ^{below Pt.} bar ^{island} The island is cutting on E. side at lower end. Channel to R.B. 1200 ft. widening some above. We run parallel with island 30 to 40 m. off.


6.45 now indensing away to left. # The immense bar (on map) on R.B. side, ^{below} this island up to I. 163 - is invisible. It may be under water, in part there yet.

6.50 near mid river - steering up. River 1400 ft. ^{the above map} [P.S. a part of what was bar has become ^{growth upon it} land, with]

6.55 Heading for R.B. I. 163 ^{80 M. from Shore} Tile roots.

7.03 opp. Iaz. do Angical on R.B. a nice situation on a winding point: ^{just} opp. lower end I^a do Angical ^{which approx} laps I^a de Maria d Araujo ^{an odd tree} ^{bar looking} ^{pale greenish yellow}

Pilot says - Tree - "Angico Branco" 

7.07 opp. - a handsome large lone tree - 

7.10 we now run ^{channel on} along concave R.B. clay - ^{little} ^{cut a} little sand bar island, ^{roughly in ch.} just below head of I^a do Angical. R.B. is now straight.

7.16 opp. head of I^a do Angical. Fine river for 1/2 League above island.

28) Wed. Nov. 12. I. 163. Angical

7.19 now incline quad. away fr. R.B. low. mid-R. Fine River ahead!

7.23 Opp. Angical - 150 M. from R.B. calm.

7.30 Mid-R. steering for L.B. Riv. 2000 ft wide. clear.

7.40 Opp. second nice house, ²White, tile roof, on R.B. we are 250 ^{meters} from L.B. running up; but just here began ^{Tapera} oblique toward R.B. Tapera. Tapera.

The river makes a heavy Concave to the East above here - we run nearly parallel with R.B. 200 meters out, about where a large bar is on MAP. Bar not visible. a curved bar in mid R. to the R.B.

I. 162. 7.50 we are running duddy, over where bar is on MAP. 7.53 opp. Malafome in the bend, R.B. 100 M off

Grand Serras 2 leagues on an Rt. } Serro do Brejo or Itacutiara. } 7.57 opp. low pt. of - not an island - but a small stream comes in 1/4 mile above - and it appears to be back water, up to and above it. The mandioca this is a fine piece of land - but the river is cutting the land away - and it is only 3 to 5 ft. above present water

8.05 We are away from R.B. steering for Pt on I.B. Bars on R.B. side as on Map. As we approach the said Point the river becomes ^{Beautiful River!} ^{like beautiful.}

8.25 Opp. what I called the "Point" I.B. 150 M. out. Handsome Concave bend above Point.

8.30 River 1500 ft. not cutting now on either side. The L.B. along here - woods - not cultivated.

8.34 In mid-R. 1600 ft. wide. all clear.

8.37 mid R. I. 161. Riv. 2000 ft. wide. Beautiful River!

No bars appear on L.B. when shown on Map. Opposite Itacutiara - a bar shown above Point on R.B. side - opp.

8.46 Opp. Itacutiara on L.B. + Point on R.B. Some houses also on R.B. above Point.

Wed. Nov. 12 - I. 161. Itacutiara 29

8.53 Opp. Low end I. da Itacutiara. on L.B. River below island 2000 ft. We run on the L.B. side of Island. 1000 ft. wide at start.

8.56 House ^{at end of main} of part of Itacutiara. upper part. 50 miles from L.B. shore - 30 or more miles.

8.58 Opp. hard clay point at water edge whitish - about three houses behind. Good cement here. 800.

9.07 Opp. Point on R.B.

9.13 Opp. Riacho da Itacutiara. a bar is yet above this on L.B. BREAKFAST. good chicken 800ft.

9.30 Opp. up. end Bar on L.B. I. 160

9.31 Opp. up. end I. da Itacutiara no cultivation along L.B. side, here - R.B. side. ^{R.B. side} ^{no on N} We pass frequent, light, fresh drift-stuff to day

on I. 160

9.40 River 1600 ft. wide. We 700 ft. to L.B. incline ^{to mid River} Two from ^{the} Serra Pelada ^{ahead} ^{in I. 157}

They appear to be a mile or more apart, and the one to the left appears considerably more distant. I think they are not in the map.

9.45 Heading for R.B. side. We are now about opp. the ends of the Chain of Mountains Itacutiara. I think these at least 1000 feet ab. River - partly rocky - partly covered with small trees which are now tolerably green. The tops of the high points are rounded - not sharp.

9.50 The bars on Map - in this vicinity - are gone off ^{1200 ft} ^{mid R.}

9.56 Heading for L.B. shore - but at once turn up.

10.10 Opp. Point on R.B. 100 M. to left.

10.13 Opp. House - about Point - on R.B.

10.14 Opp. tail of bacia I. (H.W.I.) Caraiabas on L.B. clear We run parallel with R.B. 10° 15' incline away. [2000 ft. - Beautiful River ahead - 1/2 league!]

10.18 - about I. 159!

10.40 Approaching L.B. side - small bar just below here on L.B. side - submerged now -

10.41 within 25 meters of L.B. side - we passed duddy over where bar was in Halsted's time.

30] Wed. Nov. 12. I. 159. I. da Picada.

- 10.48 within 40 meters of L. B. sandy bank - Cutting only a short dis. below Pt. of Island - opp. L. B. side
- 10.46 Opp. Lower end of I. da Picada.
- 10.50 Mid R. - (1600 ft) Clear for a mile ahead, apparently. Shores intact along here. Woods, on L. B.
- 11.01 Opp. notch, up stream (rather fluid) on L. B. side. It seems like the tail of a (newly) sand bar. Wet corals with young growth. About $\frac{1}{2}$ a mile it projects out as a plain sand bar $\frac{1}{3}$ way across river.
- 11.10 We are at the island - opp. the projecting sand bar - river named to 800 ft - cuts an island - with deep channel.

11.15 I. 158, about.

- 11.19 Opp. here island ceases to cut. L. B. woods. We begin to head away toward L. B. shore for our wooding place. Riv 1500 ft. here.
- 11.29 Opp. notch. or upper end I. da Picada and Lower end of I. do Timbo. I. dos Sebastões behind do Timbo Ia

11.30 We are near L. B. bank - holding up $\frac{5}{8}$ m. a short dis. below Timbo.

We stop here to cut and load wood

3 large loaded barcas pass down soon after we stop - from Salgrado.

I. 158

Thursday Nov. 13. at Timbo

on Left Bank about a league below Torrinha - do Comendador Ant^o Banani

We have now about 5000 sticks on board

The river has been rising rapidly all the time. It raised about 5 inches betⁿ noon of the 12th and morning of the 14th - and about 5 inches more to the evening of 13th.

Canoe-load of fishes
Curried - at one haul.
Sauté - price

Friday - Nov. 14 - Timbo I. 158 (3)

Our starting is delayed this morning by bad management of the engineer. My impression is that he started the fire in pretty good time, and then let it go out

There seems to be some new mode of delay - nearly every day. Paciencia.

Top-bank about 18 ft. above present water. # 3 1/2 hours lost - by absence of Piranhas!

9.20 Start from lower end of Timbo. (Clay + loam bank) (Map)

9.25 The river current is about 1 1/2 m. along here, now Riv. to I. da Timbo - 1000 ft. upper end Timbo.

9.35 Opp. Upper end of I. da Picada - then an open 400 ~~500~~ ft wide through which river - leaving the I. do Timbo on Rt. This open is shown too low down in map by 1/2 a mile or 3/4 mile.

9.42 Just through said opening - into the main river - no island now on the other side as shown in map.

9.52 Opp. upper end of I. da Timbo - as it is now I. 157 - about here -

9.57 Opp. lower end small island to left (on map) we are striking our forward Torrinha - (see map) The Fazenda of Comendador Ant^o Mariani an imposing looking place.

10.00 Opp. upper end of said small island on Rt.

I. 157

This is a very marked point - a rocks back bone rid ge - just behind the Fazenda buildings. Top is down to the river - it descends some the other way and again rises to the height of 800 feet. It looks like I. do Obtermite.

The buildings are most of them elevated above the flood range - the two knolls are united. On the map, Halfeld gives merely the name of the place, and two faint knobs, sharp hills.

P.S. A chronic fault in Halfeld's map is showing separate knolls when there are continuous channels.

32 Friday Nov. 14

L. 157

Torrinha

10.20 Opp. Point and main building - along one storied tiled, white building - glass window base of building 45 to 50 ft. above low water. Probably 40 other buildings in all - thatched several tiled. at least 60 people gazing. Washermen to the front - as usual. 100 meters to our Rt.

N.B. The foreground of every town is - Washermen.

10.25 Uncultivated shores - Both sides - 2000 ft. A splendid river - Steering toward R.B. very distant blue mountain range bounds the horizon directly up river - about S.E.W.

10.35 Opp. notch in R.B. which may be ^{upper} end of I^a do Aracapa - ^{island without name - channel is about closed.}

10.38 After being near R.B. we oblique toward foot of an island on L.B. (Rocado - ^{on map} - see below).

10.49 (I think) opp. I^a do Aracapa, Rio blind and indefinite. I suppose it is no longer an island. ^(I think) Aracapa.

10.52 Opp. upper end of said (blind) island. We are now heading up river -

Opp. Aracapa - R.B. (one house) Here Cultivation begins in R.B. - turns on L.B.

11.02 Opp. foot of I^a do Rocado - we run outside to the left of - 100 meters off - Cultivated Id. Stands 10 to 15 ft. above present water. ^(20 ft. high) # main-land not cult^d here, on either side

11.06 = L. 156

11.10 - now woods on island - Rocado. 1/2 mile wide

11.15 Some part cult^d on Island - part woods -

11.19 opp. black polished rocks on R.B. edge of water. Mount - 300 ft. high behind - rocky - wooded PARA - of Map has 20 houses - this about mouth.

11.25 Opp. a small inlet on R.B.

PARA There are 50 houses here now - with new tile roofs - the others thatched. The town is a town somewhat higher ^{up} than the map, and the 300 ft. mountain right behind the town.

11.28 a string of black polished rocks and washer-women along shore - opp. here.

11.31 opp. - many black rocks or stones people along shores

Friday - Nov. 14 -

L. 156 Para 33

PARA is rather prettily situated under the high or rocky Mount 300 ft. high.

11.32 - Opp. the mouth of the Rio Paraguirim apparently 20 meters wide; but I could not see it very distinctly. Many people gazing.

11.37 - Woods on R.B. - we are 50 meters from R.B.

11.45 on map, the Channel is on ^(Rocado) island side but now there is a sand bar there; and the channel is on R.B. side - and begins to cut a little. The 3 sand bars shown along here on map on L. 156, have I think disappeared; - though the river is very muddy to day - and a little roughened by the wind - 50 meters from shore

11.56 120 meters out, I think we have run directly over ^{of net trap} one of the bars marked on map - The sand bar on the island side continues nearly up to head of island - Rocado.

12. Near mid river - heading up river - 1600 ft. way

12.08 Opp. head of I^a do Rocado. This is a blind - we leave it 100 meters on our right - A sand bar runs from head of island to the L.B. shore closing that channel - even now with the river up, 4 ft. one foot more we will put water through that channel.

In Halford's time there was water gutter L.B. and the bar indicated this way, and left water all around head of Island Rocado.

12.15 = L. 155

no cult^d at this side

12.22 Mid River - running up river - Opp. head of Island on L.B. side - that marsh head of Rocado

12.36 Opp. a marked Point of Rocks - pulling down into the water on L.B. side. Toca of MAP. Rocky about 50 feet high - Itacolumite by no houses - I think that Toca has gone away. Rock stands at 80° dip west, ^{local} Com. N.W. - about. Black polished rocks near water edge - Stones, debris. This is one of the most peculiar points I have seen on the river. The islands da Toca and one behind it are ^{cut off} ^{cultivated} - L.B.

Toca seems to have disappeared

present. Maricao. Comenda do

34] Friday NOV-14 I. 155.

a strong encave on I. B. about Toca. The island opp. (a little above) this rocky point is well cultivated, with a number of thatched houses. Think Toca has remind to the Id.

12.54 Opp. head of Ilha do Toca.

and also below a bar now, in the river, opp. head of Island - 200 meters from it on the I. B. side of island.

We run between said bar ^{close to} and head of Island. There is a wide channel between the island and the R. B. side, and mud water good down it. This will help to reduce the rate of cutting on the head of the island. We run right in it against a 2 mile current.

This will eat this island away like sugar. It will also form a bar on the I. B. side below. There is a wide channel between the island and the R. B. side, and mud water good down it. This will help to reduce the rate of cutting on the head of the island.

12.58 We are heading for the R. B. - which is here partly cultivated - part woods. I. B. side all woods. The river is 3/4 mile wide

On the Map is an immense bar on the R. B. side a mile above the Ilha do Toca - as I now make it we are running directly on said bar.

1.05 We are now heading away from R. B. ^{Mud River} side, toward

I. 154 - about.

1.23 There is a heavy sand bar all along opp. here on the R. B. side, which heads up off toward the Encave L. B. which is not cutting. Swift water 2 1/2 to 3 m. an hour - now - 900 ft. vs. Current is parallel with the shore - mud River.

1.30 Some of the Valve packing is burnt and requires fixing. We stop, and anchor ^{on the bar side of} Mud River to allow engineer to fix it. we may be opp. the bar of I. 154 ^{surrounding}. I get no land marks along shore to designate just when we are at about 153 3/4

Friday, Nov. 14 - League 154. 35

2.09 Star - after fixing Valve ^{lost 39 minutes} packing. Good.
2.13 Opp. "Tana" (clay) I. B. Stop - again -
2.15 Start - very slow - something out of Sats in my strong current here. Just a little way above the Tana, in anchor again - at 2.18 - [Tana "Good" too soon.]

The residue of the day was consumed in fixing the machinery - which is certainly very poor. I believe that the engineer does about the best he can with it under all the circumstances.

Good Navigation this far.

Saturday, Nov 15, - on I. 154 -

5.27 ^{Roll call - 3+ A.M.} Just Sunrise, by my watch.

Sr. Lisboa reports - water rose 2 inches since yesterday afternoon - say 12 hours - Morning, calm, and pleasant. Current rate of river here -

* The islands and bars, and in some cases, the main shores are so changed that it is difficult to follow the Map.

our rate seems to be 1 league an hour.

5.40 Start ^{slowly at first} - nearly as good as I had hoped.

6.02 We are at the R. B. ^{Shore bank all sand - cuts} run, parallel 40 meters off. 20 or more feet deep, gaining - then widens out a little.

6.12 opp. Riacho das Canoas on I. B. ^{I. 153} perhaps 20 hours - all thatched - ex. one tiled.

6.15 Foot of sand - spit at tail of I. do Riacho das Canoas, close on I. B. above the Town. The details are so far as I can judge about as shown on Halford's map - Riv. here 1/2 M. wide.

6.35 Upper end (now) of I. do Riacho das Canoas. We are 250 meters from R. B. shore - running up.

36 Saturday - Nov. 15. I. 153.

- 6.37 ^{1200 ft. wide} (Alfonca) settlement (4 houses) on I. B. ^{river above} near ^{head} of I. do Riacho das Canoas
- 6.39 Near mid Riv. - 2000 ft. wide - lower part
- 6.50 Opp. Riachão, a hamlet, on R. B. It extends up.

On the opp. or L. B. side the place looks as if it might represent the upper end of the Island Riacho das Canoas, of Halford's map. But this is a mile below the I. da Fazenda da Barra, in reality - whereas on his map it is not over $\frac{1}{2}$ mile. Beautiful River.

It is like a basin or dome lake, with distant blue mountains bordering the river in front. The island da Fazenda da Barra presents a very oblique end - spreading out very broad, filling the middle of the plain.

- 7.03 From here up the R. B. shore or bank is cutting, slowly, a moor here, along here - part of Riachão. (Upper end of Riachão) (Clayey loam)

Possibly the extreme point of the I. do Riacho das Canoas may be opp. here. It is blind. We are within 30 miles of R. B. shore or clayey loam. Riv. appears to be at a stand along here, judging from the horizontal line of excavation in the clayey loam steep bank.

- 7.08 Opp. Extreme up. end of Riachão, last house. (18 minutes opp. Riachão).

Skimming toward Pt. of Island $\frac{1}{2}$ mile above.

- 7.11 Opp. another "last house". Cultivation, only in a few isolated spots on L. B. side, this morning - and much the same on R. B. side.

- 7.22 Opp. Lower end I. da Faz. da Barra. ^(Below island Riv. 2000 ft.) cultivated. (widest river on I. B.) We take I. B. side. Channel 1400 ft wide, at first - narrows above. Several houses in lower part of island.

7.28 I. 152.

- 7.30 near mid - ^{33m 8.2m} inclining toward L. B. ^{m 4 4 4 m}
- 7.40 Opp. Point ^{on I. B.} The bar (on map) is not visible. It may be submerged. River 1000 ft. here $\frac{1}{2}$ mile distant, now. clay bl. cult. some.

Saturday - Nov 15. I. 152. 37

- 7.45 Along I. Faz. da Barra. ^{5.5 5.5 m on I. B. side} No show of cultivation in sight. Woods, Sertão.
- 7.50 Riv. 1600 ft. wide - $3 - 3\frac{1}{4} - 3\frac{1}{2}$ ft. Channel. Riv. ^{now} ^{some} ^{in this} channel; looks beautiful. ^{above}

[I. 152 is along one on the map - 153 a short one.]

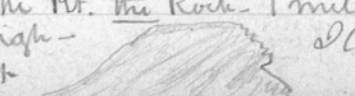
- 8.08 Head of I. Faz. da Barra. We reach the head quicker than I expected from the map - 46 minutes long (about right). The bar (large) shown on R. B. side does not show - it may be submerged. Riv. ab. Id. about 2000 ft. Fine $\frac{1}{2}$ in. ^{ahead} ^{island}
- 8.15 Wind begins - from the South - down Riv.; against us
- 8.40 R. B. shore ^{converges} ^{current} to the left. ^{may be} ^{island}

I. 151.

I believe that in ^{paradise} the lower end of Island do Sabonete - white I was writing on another ^{Paper} ^{island} ^{now} we are along that island now.

- 9.20 Bar on left (or R. B.) woods on L. B.
- 9.27 Opp. pt. of land on I. B. a concave ^{another pt.} ^{to} ^{island} ^{to} ^{R. B.} ^{River} ^{2500 ft.} We are inclining over toward R. B. -
- 9.35 a number of hills or mounds on R. B. low banks - cultivated. woods on L. B.
- 9.40 a high bare Rock - bears S. S. W. - across L. B. side [marked "Itacoluniti" on map - it is a very marked rock, isolated - feet high, showing stratification - dip - color brownish at a distance]

9.50 about I. 150.

- 9.55 We incline off from R. B. toward L. B. A sand bar island in mid riv. (on map) not now visible. I think it is gone.
- 10.15 In riv. - nearest to L. B. opp. where "Vazante" is on map; but it is washed away.
- 10.21 Opp. to the Pt. the Rock - 1 mile from the riv. 200 ft high - bears West  Itacoluniti -

[38] Saturday Nov 15. I. 150.

10.35 Opp. Lower end I^a das Caraiabas.

10.38 I. 149.

10.40 Opp. Upper end I^a das Caraiabas.

10.46 Opp. a snag 80 meters from shore R.B. Tim Rivier.

10.55 Sand bank (R.B.) is cutting like organ - Rivier is 7/8 of a mile wide - with bar toward the L.B. side and R.B. side now cutting -

11.02 Some clay in the bank now - makes it cut slow -
11.07 a Pau Mulatto tree - in edge (whitish body - milky) -
The rain will soon wash it away -
Another beautiful tree above



An enormous bar has formed on the L.B. side. It has forced the channel over to the R.B. when it is now cutting.

Low lands on both sides - that is low enough to be covered in high floods.

11.15 Woods on both sides of river.

11.25 Within 250 meters of I. B. Steu Obique toward it - Rivier now 1/2 mile wide.

11.35 We now turn after being near I. B. and head over toward R.B. toward Caraiabas on R.B. a small hamlet.

11.50 I. 148.

11.50 - opp. Caraiabas. 4 or 5 houses (thatched. came 25 years ago)

11.52 Opp. Lower end of I^a da Boa Vista. This island has grown down stream at least a fourth mile to nearly opp. - upper end of the hamlet of Caraiabas.

We run the new channel, between R.B. and Island of Boa Vista - 700 ft. within a wider river on the L.B. side.

12. noon Clay banks along here slide do not cut easily. No cultivation on R.B. [some on lower end of island] Plenty of Turima (wood) along here

Shaded to 1/2 inch 6.4.

Saturday Nov 15th I. 148. [39]

12.20 Opp. Hamlet of Boa Vista - half dozen thatched houses - It has not improved in 25 years since Halfeld's day. Clay banks in front save it from being washed away. It stands a little below opp. head of Island. Pop. garung - negro predominating.

[Strange! how such miserable places should continue for a quarter of a century, or more.]

12.30 Opp. head of Boa Vista Island. Channel widens out ahead of island. * I think that this island has lengthened at both ends.

12.31 Opp. Barra da Tussara - dry several feet above present river - Cultivated patches. River very wide above island. (300 ft.) but much encumbered with sand bars, now visible above the water, on the L.B. side. Opp. and for a third of a mile above island.

12.37 Opp. Lower pt. of I^a da Sussuaranda. a pretty Canal, 30 meters wide - with graceful curves. We now head from near foot of this island on obliquely toward the L.B. to avoid bar projecting into river outside of island.

A large bar on map, below As tres Ilhas, has disappeared, in part. We run across where it is marked on maps. The lower part has cut away. The face of the current has cut it into a different shape.

12.54 no cultivation in L.B. (150 M. to Pt.) a little cultivation in islands - opp. 250 M. to left.

12.56 - # I. 147.

1.00 Opp. head of Island - then sand close channel between that and the next island behind, or it may now be main land. We now run directly up (or nearly in the general course of the river), which is rare; we are now of the turn obliquing from one side to the other. It is warm.

1.05 The R.B. shore, thick clay with trees - but it is only in pasture. The L.B. side is a low wood. The proportion of cultivation is much less today than usual.

A fine range of mountains 3 leagues off on L.B. ditto (another) on R.B. & Car Land intervening on both sides. Irrigate here.

1.10 wind began again.

40) Saturday Nov. 15. I. 147.

1.15 Opp. Faz. Grande ^{lower end} on I. B. ^{to 10} 8 houses - one main, a small one, with tile roofs

The Ilha da Faz. Grande is opp. on the R. B. Shore. The I. da Imburana seems to have clung in with the other - and with the Tres Ilhas too.

This side of the I. Faz. Grande is nearly pure sand, and it is cutting away now like Sugar with the rising river. It is on a Concave, and as the Channel now seems to be directed against it, it may soon cut rapidly.

1.25 We are now opp. The upper end of Fazenda Grande place on L. B. side. There is no sign of a good house -

1.27 We are running 40 meters from R. B. (Grilana) shore. The island is cutting less on the upper 1/4 mile.

1.27 Then we oblique away [wind ripples the water] off a storm ahead, over the Mountain 2 or 3 leagues.

1.40 The upper end of Ilha Fazenda Grande # I have failed to see. I think it has merged into the main land - [mid River]

1.45 Opp. Lower end I. do Piripiri - on R. B. side. Map shows sand filled in between island and main R. B. [I could not see water] This island has hut, and is cultivated. The large bar (on map) below island, is not visible.

1.52 = I. 146. 100 meters from L. B.

1.54 opp. a house on I. B. Houses on map - scattered all along here. The slopes are not cultivated along the river here. The cultivation appears to be back. The ground seems to be lower away from the river bank. River here 1200 ft. wide.

This place - of straggling houses is called Batentes on Piripiri. It is about opp. upper end of the island - but it is scattered along for a mile, or more.

The upper part of the island is a conglomeration of white sand, and green bushes. There is much clay in the I. B. bank. It stands well.

The extreme pt. of Ilha Grande is 1/3 m. above Hamlet.

Saturday, Nov. 15. I. 146 [41]

2.15 There must be more moisture along here than there is on the lower end of River - or they could not raise products on top of the bank - as they do here. The bank appears to be above ordinary floods, but not above a high flood. There is much clay in the soil.

The upper end of the I. Piripiri - is L. It probably bears little resemblance to its shape when Halford's map was made.

I indicate this opp. from here - though it is all white sand behind it - extending up to a point on R. B. 1/2 mile farther.

2.20 [Only in a flood is there an island] steep clay banks - cutting now, on L. B. no cultivation along here.

2.27 [There is a splendid Mountain scene viewed from here, in mid river - Coona with green - in front two ranges 600 to 800 feet high - and behind, showing thro in the depression, and one open space a range 1000 ft. high - very regular on top.]

We are now heading for the sandy Pt. on R. B. 2.37 30 meters from R. B. - sand banks - when the river runs across in floods.

2.55 Opposite Point on R. B. now head for L. B.

2.59 = I. 145.

We run obliquely from Pt. on R. B. toward the foot of the Serrote do Iriramauro. [It is a summit] a little cultivation just above the Serrote on flat.

3.08 Opp. Lower part of ^{at present} insular bar on our left - a fine amphitheatre of mountains behind the Serrote, which itself is rocks and trees.

3.12 Opp. lower end of Serrote - 150 M. from L. B. cliff 12m

3.15 Opp. highest part 300 ft. about.

3.20 Opp. upper end of foot of Serrote - Black, polished rocks strewn along river edge.

An open partly cultivated flat, between the foot of the Serrote and the Mt. 1/4 mile wide. On R. B. side opp. sand bars.

42) Saturday NOV. 15, I. 145.


3.33 about opp. across the flat range of the foot of the Mtⁿ 13 minutes passing in front of flat.

3.35 opp. high part of Mtⁿ end 700 to 800 ft high.

3.39 opp. grand natural amphitheatre in the Mtⁿ (1/2 M)

3.41 Then comes opp. the end of another Mtⁿ or another view end of the same. All of them covered with handsome, green, healthy looking woods - far ahead of the Serra down the valley. The vegetation is fine here.

3.42 In front up the river is a beautiful landscape, the horizon being mountains of various shapes. We strike across toward R. B.

1st view - up river - 4 miles distant 

all covered with timber
3.50 Plying along on R. B. side - 30 M. from shore.

The mountain as our night of league and a half off - behind these from Mtⁿ upland to abn (no comparison with the sketch) is quite different in appearance. It is higher, and more of a chain; but it exposes larger area of bare surfaces - and a much thinner vegetation - some patches of dark foliage, some bare pinkish red spots. It has with scattered trees. Evidently a different formation from those near to this part of the river.

4.00 I. 144.

4.05 we are now heading away from R. B. no cultivation on either side of River, in sight.

4.12 opp. foot of I^a das Abobaras.

Bano Alto

4.35 opp. head of I. das Abobaras.

^{Hamel}
Barro Alto is above head of Island with sand bars and other islands, on the R. B. side not clearly to be made out.

Saturday Nov-15-I. 144. 43

4.52 We are running in the Channel between the R. B. and the islands - first the I. do Barra Alto - and next the Mangabeira.

4.56 Now the width reduced to 1/2 mile (on I. B)

most curious topography!

2^d view up River in the blue do 6 miles mountain-



(water) all covered with low trees - green. Looking up river 2 miles off 5. P.M. none of them are less than 500 to 500 ft high and the distant one are more than 1000 ft high.

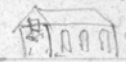
5.05 Heading off toward I. B. make per- scription show in right water left

I suppose that we have passed the

5.05 I. 143

5.15 High, clear white sand bars, with bushes, intervene between us and the large island do Siba ou da Boa Vista, which is

on our right - now heading for the R. B. shore to stop for the night -

Antunes Nery 

5.39 anchored in front of Rogado - nearly

opp. head of I. do Siba ou da Boa Vista

about at lower end of I. 142.

Having run $11\frac{2}{3}$ leagues = our best days work. = $39\frac{3}{4}$ say 40 miles.

All good navigation - with a good Ohio

river steamer I could have run the whole distance in 4 hours - instead of 12.

Nothing whatever is to be done along here by the Government - except, it may be to put on the first proper steamer.

Sunday Nov 16, ROCADO

Lower end I. 142. R.B.

New House - arched windows.

Cool, cloudy morning, some wind
blowing ^{Strong (on starboard q.)} from - S.S.W. by S. ^{last night} River fell $\frac{1}{2}$ ft. ^{French}
(Winds may have made the difference)

Mountain view - before, on our right, and behind.

5.45 AM Start - and run 100 m. off up R.B. side.

River a pale, chocolate - make pretty dress.

5.55 Opp. Est. up end bar at head of I. do Sibo

6.00 The curious, mended mants interlapped
with each other, ^{now to our right} ^{pinkish} ^{pink P. D.}
on the L.B. side. ^{also schist - specimens}

6.03 Buildings still dot the R.B. side; ^{Part of Rocado.}
Barra do Pachaim, on L.B. opp. head of ^R
Small island, ^{same name.} We head for L.B. side to Mid

6.06 On the Mountain half mile ahead - there is
a curious, marked contrast between ^{dark green}
foliage and pale light green, ^{which} ^{like} grass
touching with frost - ^{River 1600ft}
On the Mountain on L.B. side, the shade is all ^{dark green}

6.14 The large bar on L.B. on map - is not visible:
In fact we run over part of the place when shown

6.16 within 100 meters of L.B. - heading to Point

6.23 " 50 " " L.B. Directly over where

6.25 The bar is shown -
When nearly up to Point on L.B. we

6.29 head off oblique toward mid river.
Seven pt. of island is now only a little
way above said pt. Channel 200ft. lower part
The island Caximbo has lengthened down

6.31 opp. lower foot of Mountain ^{two shades of green.}
on R.B. side. ^{1/4} mile back of river.

6.32 Island Caximbo is cultivated.

Sunday - Nov. 16 -

6.40 Opp. Upper foot of Mountain - two shades of
green - on R.B. side - $\frac{1}{3}$ mile from River -
This mountain is $\frac{1}{2}$ mile long - nearly para-
llel with river - on map it is a dot, nearly.

6.46 Opp. Upper end I. do Caximbo
Sand bar ^{new} from the head oblique
ceeps, fills channel to another island, nearer
to L.B. (no name) Pichaim - on L.B.
Saw grounds on R.B. now, for a league or
more to the Mountain which now appear

6.55 - I. 141.

7.02 (no name)
Upper end of island, now connected with
the island Caximbo, by sand bar ^{above.}
There is water behind instead of sand, as on map.

7.03 ^{opp.} the striking object, Morro da Imagem
on L.B. is a huge mass of rock - of a
reddish tinge $\frac{1}{2}$ mile back from the
river bearing its up stream head 300ft
above the plain. Thin patches of ground on it.
There is another mass nearly or quite as
high & half mile behind it connected
at the base - of very similar character.

clear river now for half a mile up -
we start to pass on the old channel on
L.B. side of the LARGE ISLAND
Pedra Grande

7.10 Opp. a point on R.B. called Ponta da Ilha
da Pedra Grande. - we are near I.B.

7.15 Opp. lower end I. do PEDRA GRAND.
Channel 1000ft. here.

7.18 Opp. decided Point on L.B. above ft. of I'd.
The bars (on map) near lower end of island are
in fact we run within 40 meters of island a
half mile above lower end. Channel about 1000ft.
No cultivation is near. SERRA FURADA
Fine Mountain Range on L.B. side.
range about 10° S. of E & 10° N of W. are 1000ft.

46 Sunday - Nov. 16. I. Pedra Grande

7.33 Opp. lower end of an island in this channel, over to the L.B. side. On map there is a combination of large sand bar and three small islands. The sand bars are not now visible.

7.36 we now head away from Pedra Grande I. to Rt.

[See, above, projecting bars from P.G.I., which force the channel over to the islands on L.B. side. When the water ushers, and is forced over to the P.G.I., on the channel we are forming] It is something like the map.

7.44 The river is cutting some new ^{low} sandy island at its head, 80 meters to our Rt. Water now running down behind this island through a channel about 100 meters wide at this stage much water runs through.

7.48 Opp. foot of another island 200 meters above the first island - some water behind that - ~~not~~ ^{4 to 9 ft d. from water, second huts.} This second island is partly cultivated on.

7.48 - I. 140

7.53 Opp. the large bar projecting from Pedra Grande I

7.57 Opp. a break or "open" ^(not a hole) in the island - water comes thro' from the other side. Island cultivated also above the "open".

8.01 1/2 Opp. up. end of this island - 200 meters to our Rt. - which is the end. Considerable water now running down behind this upper island. The wind is lighter. Cloudy - with rain - squalls on our Rt. We head away from island toward I. P.G. Channel about as on map - Clear river - to the eye.

8.10 Opp. respectable looking ^{and some small houses,} thatched house on L.B. on a good bank - 15 ft above present water - or more.

8.13 We keep nearer to I. Pedra Grande than map shows ^{channel} but just here we evidence a little away, toward Mid-River.

8.15 This part of the Island curves to the left - Island sandy. (Clayey banks all along on L.B. side.)

8.18 No cultivation now in view,

on Sunday - Nov. 16. I. Pedra Grande. 47

I. 140 Channel here 1000 feet wide - Grand Nav -

8.20 Our course inclines toward L.B.

P.S. The Serrote da Pedra Grande of the Map is a mountain range ^{300 to} 400 ft high. The island, Pedra Grande, intervenes and prevents us from seeing the R.B. side and the base of this range.

8.25 We are within 80 meters of L.B. running nearly parallel ^{100 meters into this} with its clayey vertical bank - in ^{channel.} old ~~new~~ ^{now farther out than old channel.}

8.34 Opp. lower end of little island this side of I. Pedra Grande. no cult. in view. woods on both sides. [Spots of rain]. The upper end of said little island is merged into highlands.

8.56 Opp. head of I. PEDRA GRANDE. The sand bar projects 250 meters farther up.

9.00 I. 139

9.13 Capoeirinha - Point on R.B. Itacolumite - on Map.

9.24 Opp. pretty "petite" island in Mid River

Bom Jardim is now in full view - about 1/2 league above, on R.B. side.

Beautiful view along here 2500 ft wide. There is a long sweeping Concave, near the apex of which stands Bom Jardim. It presents a pretty appearance - though tame, and no Chapel in sight. ^(all green) ^{pretty little island}

9.35 No cultivation now in view, on either side. The bank on R.B. side stands about 45° with little tufts, only, of vegetation. The L.B. side rises, & bushes to the top.

9.40 Opp. a small reef, at water edge R.B. black rocks on map - marked "Recifes."

9.46 opp. Riocho - dry on R.B. below Tam - Curioso Mountain - with "green and yellow" patches - a mile back of Tam -

We approach Bom Jardim - obliquely, from Mid River.

9.53 Some rocks on ^{a little} shore ab. lower end of town -

9.55 Anchor at Bom Jardim, I. 138

St. Antunes Nery (of the archd. wedding) was the first to come on board - then 1/2 doz. others.

L. 138. Bom Jardim.

We all went and did the Town. It has two and a half streets (or vacant spaces between rows of the very usual houses). The highest parts are not covered by the floods.

There may be 90 houses - and a little chapel; and a nice gentlemanly school-master - friend of our Secretary, Chico. Women seem to pre-dominate.

There is a reef, or little bluff of sand-stone rock at the upper end of the Town - edge of water.

The people look better than their houses, or their town. It is beautifully situated; commanding a view of the splendid river for two leagues below, and nearly a league ^{above}.

The ground behind the town is still a little higher; so that it is an excellent situation for a large town; but what is to make it a large town? ^{the answer is} no.

Doctor ^{is} building a nice new house on the opp. or L.B. side of the river.

(The judgment or guess of the people here is that the river has risen about 7 Palms = 5 ft. - above extreme low water; which is my impression.)

Good bye, Jardim!

11.25 Start on Calm river - ^{two hundred of} see the people on the banks ^{see} oblique into the broad river (2000 ft. wide)

11.28 opp. the little chapel.

11.28^{1/2} on the rock ledge or low bluff

11.32 In mid river, opp. the Doctor's new house ^{"Passage"}

They fire rockets - we respond with the dipping of the flag, and three whistles.

The Doctor has a charming situation, and a nice looking house.

We are cultivating across the bend - abt on old Channel. See cultivation on top of the bank on L.B. side.

11.37 ^{above town} Island on R.B. side, is well cultivated. It is longer and wider than it was when Map was made. The large bar on map is not now visible. It may be submerged, but ^{I think it is gone into island.}

After turning point, on L.B. our course is nearly straight in toward R.B. - inclining up stream.

11.50 near mid-river ^{no cultⁿ on either side.} Flat - med. height ^{land} ^{High fogs cover it.}

The Mt. ⁿ on L.B. side, an blue, 2 leagues away - on R.B. side, one to one and a half leagues ^{off}.

N.B. The same long range of blue mountain above referred to on an on Rt. on L.B. is also directly ahead - and continues on along way to the left of the point or place ahead in the Mt. ⁿ

12.06 heading for lower end of island ahead - abt the run to the Rt. or L.B. side of island.

The lower end of this island is more rounding and broader than appears on map.

No bars are visible near lower end of island

12.13 opp. lower end Ilha do Barreiro. ^{cultivated.}

12.18 L. 137. ^{main lands not cultivated.}

Barreiro - opp. clay bank on L.B. ^{houses} about the same as 25 years ago - a number of ditto on the island. Elevation on map - about the same.

On the L.B. the houses look forlorn - tumble down; but in high floods I suppose they desert the island and flee - to the higher main land. [Channel 1200 ft. wide.]

12.25 I see the range of blue Mountains - ahead and to the right and left - which I could not do if they were situated as shown on Map - ^{I think that must be another range on the river's outlet.}

12.35 This channel is 1000 ft. ^(under below) wide, ^{woods} about this on island - much cultivation on island below this. heading for upper point of island. [Island, sand & loam]

12.46 opp. upper end of Ilha do Barreiro. ^{40m. off only.} Island has of late years cut some on L.B. side toward head. ^[Bank plants, I see no more.] At the extreme up. end of island there is cultivation - at least. The head of the island is cutting badly - the current striking obliquely across from the R.B. side. ^{cut to an edge}

12.50 a large bar opp. on R.B. side - causes the island to cut worse on the R.B. side than on the side in van.

A fine clear river for half a league ahead, up to lower end of Ilha do Sacco

1.02 River here not over 1400 ft. to Bar on L.B. side we are about in the old channel.

50] Sunday - Nov. 16 - I. 137.

1.12 River 1000 ft wide, between I. B. and S. Bar on R. B.

1.18 I now see the far end of the Long Mountain range ahead - or else it then bends off to the right - fifteen miles or about here - bearing almost due South - perhaps S. 5° W.

According to the map - that would strike the range about 15 miles above here - and the map does show a bend there to the Rt.]

1.23 - I. 136

1.24 Opp. Lower point of Ilha do Sacco.

We take the I. B. side - within 40 meters of ^{Island} the old channel is on the R. B. side.

1.26 Channel now - 700 ft wide. Island cultivated - and ^{L. B.} cutting on this side. No cultivation on L. B.

1.28 above here island shows no cutting, at this time. ^{Subject to cut}

1.32 River 800 feet here. I. B. is a long, gentle ^{concave} curve.

1.38 The island is not exactly parallel; but nearly. A bar projects from the island above here. Which throws the current to the I. B. The bank is clayey - or it would have cut much more. It cuts slowly. ^{900 ft.} There are a good many people in the island.

1.46 Bar puts out from island, and marks river to 600 ft. This bar does not appear on the map; but there is a projection from which reaches width of river. No cultivation on L. B. the whole length of island.

1.58 not far below it, we head inclining towards head of Isld. In fact we now parallel to its oblique upper end.

2.00 opp. up. end Ilha do Sacco. on L. B. side now running parallel with up. end 40 meters off in the channel, current cuts some along head of island. It seems to have done most of its cutting; but it is still going on at this time. Cultivated to top. up. end.

A fresh tree in the river - see the cutting below it, some. Lower part sand - upper half clayey loam - The cut head of this island is nearly half a mile ^{long}.

2.12 Opp. R. B. side head of Island do Sacco.

50 meters out from it as we are bearing -

We ran 12 minutes along parallel with the cut head of the island. It is a full half mile.

We now head toward R. B. ^{an immense flock of white birds}

Sunday - Nov. 16 - Sacco do Militao. 57

2.15 opp. Sacco do Militao - on L. B. side a bar in front of this town or hamlet of ^{hamlet} 12 or 14 which extends about the town for half a mile or more.

2.18 Looking down (back) the R. B. side of the Island I see a large bar on the R. B. side of the river - occupying one fourth of its channel ^{more}. It appears on the map - and makes deep water near the island.

2.20 The river appears clear above here for a league. No cultivation in view - either side. ^{with} 2000 ft.

2.27 I. 135. ^[were 15 minutes from one side to the other at head of island]

2.40 Within 40 meters of R. B. running parallel now. River seems to be nearly normal for a mile or so. Last season it cut some on R. B. side here.

2.50 Opp. lower pt. of what is marked on map as Coroã da Vargem. It is a low sandy piece of land - covered with bushes, and last season it cut some.

3.07 opp. Inguasha clay property point (70 meters from it) on I. B. It looks, and stands, the current, like rock - It projects at least 40 meters out from where the top ^{readable} clay has been washed away by the river. Layers of hard clay show under the red clayey earth all along for half a mile above this point up to the RIACHO - Hamlet.

3.19 opp. ^{scattered} 6 (marked) houses, on L. B. I believe this is the lower part of RIACHO. ^{The same as on the map - about.}

3.22 opp. the Riacho in the bank - ^{scattered} ^{three} with tile roof. Hard clay. ^{with} ^{keeper another here.}

3.25 - - - I. 134.

3.28 we are heading away from the I. B. about like the old channel. We pass nearly parallel with the upper end of the Coroã da Vargem of the Map. The extreme up. portion has a hut on it, and a trace of cultivation. We leave it 200 meters on our left, as we go.

52] Sunday Nov. 16. I. 134.

3.37 Opp. foot of a newish island on L. B. side - This is probably the tailing out of what appears on Map as Coroá da Serra Branca - Since become an island, ^{on main land} there is water behind at this level, ^{and}

3.40 Opp. about what I would call the extreme upper end of the Map - Coroá da Vargem. where it merges into the main R. B. We now incline off from the Concan Shore on the R. B. side. This Concan has probably cut in considerably in 25 years.

3.50 The bank in this Concan on R. B. side is cutting fast - although it is clay & loam mixed with sand. The river is 2000 ft. or more, wide - while the map shows only 1500 - in the narrow place.
(4 P.M. Dinner Bell)

4.10 Opp. Melanças - a fur house.

4.20 I. 133

Plain sailing up a good river between the Coroá da Serra Branca of the Map and the R. B. shore. - a wide, splendid navigation.

4.41 Opp. lower part of a grass or weed covered bar - on our left - 100 meters from R. B. only the weeds in spots grow out of water. This seems to be the tail of a very large bar. [No cultivation on either side along here]

The foregoing bar appears to continue up to the foot of Ilha da Serra Branca.


Yes, the bar just shown at water surface. Please

4.48 Opp. a tile roof house on L. B. side - in a pretty N. There may be some little cultivation there. This is Serra Branca a clay ledge at the water edge, front.

4.52 Opp. lower end ^{of} Ilha da Serra Branca. The lower end is cultivated. Willow bushes at the water edge. No cultivation on L. B. We run close to Island. Same on Map.

I. 133 Sunday - Nov. 16 - I. da Serra Branca 153

5.00 The river between Island and L. B., 1000 ft. wide. Willows at water side continue to hide the island. Some large trees on the island.

5.05 Steering toward a pyramidal Mt.  1 1/2 L. off

5.07 The island now curves gradually to left - much as on Map

5.15 Opp. the regular head of I. da Serra Branca. But it is a high sand bar clear over to another island the I. da Mandacari. which laps the I. da Serra Branca. and heads about as see MAP.

We are now heading nearly up river - East of old Chan. but as I unite the Pilot's old bar to the new one into the old channel or rather crosses it - perhaps now he is steering toward the R. B. shall - on no bridge channel. Magnificent River!

5.22 I. 132

5.25 About opp. old head of I. da Mandacari but now a long sand island and then a sharp ended bar extend above it - [5.29' opp. head of said bar.] Opp. bar ^{thru} cultivation on R. B. lot 1/4 mile front then no cultivation again, on either side of river.

* MANDACARI - 1 house (4 on map)

5.25 Fene Mountain - on both sides of river - with about 2 leagues off - approaching, theory, approx

5.28 Indipia Pilot that he could not at any place he thought convenient. He said he would like to run out another league - or the other league. So which I in no wise object.

"The scene ^{was} more beautiful far to my eye" - It is perfectly lovely. The sun just above the high Mountain on our right - shining and brilliantly up all the verdure of the Right bank shore - reflecting brightly on the light colored clay banks, the now Caern majestic sweeping by with its vast volume, with far distant Mountain in the dim distance beyond the glory lake like water surface, a handsome green island a third of a mile ahead. The variety of size, shape and color of the trees in the present sun-light is truly charming. Now the sun begins set behind the Mountain top. The lights are dimmed, and evening begins to throw her mantle over the scene. What a sudden change! The sun is barely below the Mountain, yet the entire valley feels his loss. 5.41 P.M.

54] Sunday - Nov. 16. I. 132.

5.45 Opp. Lower end of Island - no name - on L.B. side
They are nothing but sand bar islands. They remain.
The large bars - on the map - now toward the
R.B. are either gone or submerged. They are
gone - or else in new ^{or very near} vicinity.

6.00 Opp. Joazeiro - on I.B. 3 or 4 hours above
the upper of the two small islands. Some
Cultivation on L.B. ground is low.
We are now approaching Estre
on the R.B. side for a stopping place. The
Pilot takes us about this Hamlet

6.15 Stop-Engine

6.16 Anchor

I. 131

Report - splendid navigation,
all day!

Before dark, I must exclaim, once more,
"What a grand river, is here!"

RAINY. last night, and
this morning.

Monday Nov. 17. I. 131

7.37 Start on R.B. side - running nearly
parallel with the shore -

7.58 Opp. lower toe of Mt. on left bank
quite near river -

8.08 Opp. Marin ciro - on R.B. 3 or 4 ^{hours.}

8.20 Opp. upper toe of the first Mt. ^{which is} quite
near the river - R.B.

8.30 Opp. lower toe of 2^d Mt. near the River
I. 130. R.B.

8.34 Opp. Riixo - on R.B. Stony beach covered
with black stones.

8.46 Opp. toe of 2^d upper toe. Another Mt. ^{behind}
also

Monday - Nov 17 - on I. 130 [55]

8.47 the same place as the upper toe of
the 3^d Mt. along near the river.

8.52 Opp. New house - plastered with
tile roof - on R.B. side
Woods cleared off - along here -
The land nearly or quite as high
as the high flood.
Mountains all along on the L.B.
side of the river.

9.04 - a small spot of R.B. cultivation - 200 meters long

Finished letter to Addie & daughter Annie
and ^{write and} conclude a letter to Plinio ^{also} - met O.C. James

I. 129.

9.55 The range of waving, undulating mountains
which have been close to the river, now retire
to a mile or more inland.
And both shores continue with out cultivation -
The navigation is splendid!
Halfeld's map does not give a correct idea
of this range

which is somewhat like this sketch 500 ft. high

10.10 Opp. 2^{1/2} ^(on R.B.) houses, I suppose the "Barro" on I. 129

10.15 Opp. a clearing cult. $\frac{1}{4}$ mile long on I.B. side
on steep slope - and on top. Island only a little back.
There is a bar on that side, as on map - 129
Very small population along River on leagues 131, 130
scarcely any cultivation

10.30 70 meters from R.B. follows (about) map channel, ^{ounded on}
we are about $\frac{3}{4}$ mile below island. (do Urubu.)

10.33 A little cultivation here, on R.B. lower banks, ^{cut}
clay banks - cut some now. vertical. Riv. $\frac{1}{2}$ M. wide.

10.40 River is over 3000 ft. wide & widening, up.
Cultivation continues up stream along R.B.

10.45 Heading for pt. of island. [The Point on L.B. is
readily ^{my} ^{with} above opp. foot of island]

10.49 Opp. lower end - close to I. do URUBU
we run right on when bar is on map. ^{see} page 58.

Chung
Approa-

Urubiri - on board
Steamer P. Dantas
Nov 17 - 1879 -

Hearing that there is
a post office at Urubiri, where we will
arrive this morning, I take advantage
of the opportunity to continue my Corres-
pondence.

The navigation is perfectly good,
to this point, receiving no wind whatever
from the point where I last wrote.

In fact, it is a magnificent stream.

The Country improves as we advance.
The trees are larger, more abundant, and
well clothed with verdure.

The islands are numerous and
well cultivated, yielding similar products
to those farther down.

The banks of the main land are
not so generally cultivated as they are
down the valley; owing doubtless
to the fact that they are steeper, and
more subject to being cut away by floods.

The general Character and em-
ployments of the population continue
the same.

It has rained a little nearly every
night for some time, but last night it
rained hard, all night; and gave all
hands much trouble.

The roof of the
steamer is exceedingly leaky, and we have
yet succeeded only in part to cover the leaks.

It is raining now, as we move up the
river. This is the first wetting I have done
below deck, when the steamer has been in
motion. I mean my spots, to escape the
drips from the deck, or roof.

We made 23 leagues in two days,
which is probably as well as the steamer
can do, with stream.

A league an hour appears to be her
performance. I hope when returning, she
will run at least two leagues an hour.

We stopped an hour and a half
today at Bom Jardim. It is a pretty situa-
tion; but the means of building are of the
placid style, and there is no air of busi-
ness. Indeed it is an exceedingly dull place.

However, I have not undertaken in
my communications to Critique places, or to
attempt descriptions of them. I have intended
to confine my remarks mainly to the river,
and the general Character of the Valley. So
Camey, to give the general impression, as they
strike me, upon the main points.

Hereafter, I may make more particular
inquiries; after I shall have ascended
as far as we can get this steam.

I cannot expect to meet any Commu-
nications from Rio Janeiro, till my return to
Sao Paulo - which may not be till January;
depending upon the distance I can
get up the river.

I shall the honor to remain
with the highest respect
your excellent's
ob. ser.
M. M. R. Eng^lon

58] Monday Nov-17th I. 128, URUBU Island

10.55 Fourth mile above lower end Id. I. = 128.

We run the Channel between the island and R.B. side - some bounded by Halfed. We do this in order to get to Urubiz, which is on R.B. side, $1\frac{1}{2}$ leagues above foot of island - and $\frac{1}{2}$ league below the head of it. Channel at lower end about 800 ft wide.

[The Channel on L.B. side of island 1200 to 1800 ft]

11.08 This large island Urubu, is low, subject to yearly inundation and is all cultivated at the lower end, where it is only a short mile wide.

The R.B. side ^{of channel} is not cultivated - only the ^{island}

11.18 Opp. bar on R.B. side of Channel narrow 550 ft.

11.26 Above the bar Channel widens to 1000 ft. It has been and is now cutting on island - ^{all} from upper end of bar down.

11.30 We oblique over toward the R.B. - There is now a large bar on island side, above here, not shown on Map. We run near R.B.

11.37 Opp. large bar on island side - water now over bar and all 1200 ft wide

11.43 Furnace on R.B. bank.

11.45 Ruins of another Furnace. We are nearly to mid ^{800 ft} of it.

11.50 about I. 127 - Lower end of it.

11.54 near mid channel. Opp. a tile cov. H. bank.

I. 127.

Main R.B. clay banks cut some, concave.

12.00 Approaching Landing of Villa do Urubiz. Curious looking very shaly clay bank - not over 100 ft above present water. The Villa stands back on higher ground.

12.04 Channel ^{at} 200 ft wide - not over. arrive at the port. one banca in port.

12.05 Anchored - There were only a few persons at the Landing - The Villa is abt $\frac{1}{2}$ mile from river, on higher ground.

The river bank here is about 17 to 20 ft above low water - I judge. The water in great fresh flows to near the large crop in front of the Church. Halfed mark the bank 18 to 24 ft ab. low water.

Monday Nov-17th Urubiz. 59

Noon-past -

Soon after landing, we all walked toward the town, which is nearly half a mile from the river - met the Padre - a tall colored gentleman.

On our way in saw a number of the citizens going to the steamer by another route.

The Padre took us to the Church - 160 years old - dated quite recently they found in the church. A old one wooden slab, carved in it 1871 -

It was a fine church once; but nothing has been done to help its appearance for many years. There is another church or chapel here in use. Both are used.

There is also a large church building ruin - probably it is an unfinished structure, and not one that has been finished.


We found the place deserted - all the people of note had gone down to the steamer. The rain held up during the time of our visit.

We went to the P.O. The P.M. was away; but several females of the family informed us that the mail has left a day or two ago - and that it will come every ten days, when it arrives. The Coronel said it took 20 to 30 days to Bahia.

I concluded to carry my letters up the river to some other point. I had prepared letters to Sr. Plinio, Col. James, wife, and daughter Anne.

Later in met the Coronel - and some of the chief men of the place. I tried to bargain for wood to be ready on our return. They asked 10% per 1000 shaks. We finally offered 8% which is $\frac{3}{2}$ more than we paid below - but they stuck to the 10%

60) Monday, Nov-17 - Urubiu.

This place is larger than Bom Jardim, and has a few more of the better houses, several with glass.  my addition - small paras.

No pavements. Many of the town and the Churches are a few feet above the floods. In high flood a portion of the town, and all the flat land are inundated.

There are several stores, all small, having the usual articles suited to the population.

There was an unusual display of various colored dresses and shawls of the women, who crowded the bank in front of the steamer to see us start.

One elderly Indian lady, who came on horse back, a very respectable looking person, had on a pretty straw bonnet, yellow shawl, and white gloves, which looked like kid. She was standing on the bank when we arrived.

The Padre came from Bahia 28 years ago, and has never been back.

Just as we were ready and about to start - between 2 and 3 o'clock - the Pilot came and said he was sick; that he had not slept the night before, (on account of the rain trouble) and asked that we should stop till morning. So I said stop.

Thus far I have made it a rule not to appear to doubt the statements made to me by the Pilot and Engineer; although I have sometimes thought they might be a little dubious. It was raining then, and it continued to rain all the afternoon, evening, and all night.

It was a very bad night on account of the leaky roof, and nothing more could be done, all this time than we had done, by covering the roof with our tarpaulin + tent.

Tuesday, Nov-18 - Urubiu 61

RAINING.

Our stay has been prolonged here unintentionally.

There is a wood place 2 leagues below here - belonging to Col. There is another, on the opp. or L. B. side of the river 3 leagues above, but the wood is that the steamer cannot get to the place; there is still another, 7 leagues above and the engineer says he has wood enough to carry us there.

He says he must do some work to the machinery, but that he can manage to run the 7 leagues.

It is still raining, but the steamer is pretty well up; so that I hope we may soon depart from URUBU. 6.45 AM

Now comes another trouble, with Piranhas - he wants to stop here. I have ordered that he be paid off, and informed that he cannot go back with us on this steamer. This is the third or fourth time this foolish (useful) man has made trouble; but I will not allow him to stay.

[They come with their water jars all the way to the river for water. I saw no sign of a well in the town. Water arrangements, generally along the river are entirely primitive; and there is no town of sufficient importance to be able to support water works. The river water is as good as the water of the Mississippi - and it comparatively clear half the year.]

[Hides sell here for about 3% to 3½% an arroba, and a hide weighs from 1½ an arroba up to 3¼ - or so - hence is therefore 1½ to 1¾% for the smaller hides, and 2% 250 to 2% 750 each. Day about 2% 000 average hides.] Piranhas leaves us,

7.30 I am now informed that "we are waiting for a man who went on shore to get something for us." at 7.45 comes a man with bottles of something. Then comes a canoe load of fish.

62] Tuesday - Nov, 18 - I. 126^{1/2} Urubia.

Rain continues - but no hard.

7.50 Start at Cast. - She moves 3 miles an hour ^{a 2 1/2 M. can} against the ~~populaca~~ - pines, men and some ladies keep along on the bank, in the rain; up to the

7.57 Porto - clay bank - 15 ft a. water several buildings - 2 banana 1 apricot -

8.00 opp. Flood water cause canal outlet - then high water Canal comes across abend from S. Antonio.

8.08 Channel to island 800 ft - some cult^{low banks} on R.B.

8.20 opp. Ext. head of large island Urubia This whole island - perhaps 1500 acres, appears to be cultivated.

8.25 opp. Pernambuco I. B. Morro do Pernambuco just behind it - 500 to 600 ft high -

8.27 Rain hard! I. 126.

8.37 Opp. pt. on I. B. also opp. up. foot of Pernambuco

8.42 Opp. lower end of small island. This is a bar, on the map. It is 2 small islands now below the large one. Half a day ^{one} ~~time~~ in L. B. foot of Morro.

8.50 Opp. lower end I. dos Cavallos - Cultivated

8.58 Channel betⁿ R. B. and I. dos Cavallos - 1200 ft - Channel widens above -

9.05 Opp. ^{narrow} a bar in mid - ^{low pt. quit.} ~~not on map~~, R. B. is nearest R. B. side - 150 meters out

9.14 Opp. up. pt. of said bar - [Still rain some.]

9.15 I. 125. Below head of Island.

9.17 opp. head of I. dos Cavallos.

Ilha Secca overlaps at its ^{wide} lower end. There is now a mid channel ^{wide} bar between those two islands not on map. The bar on map, on the head of I. dos Cavallos, has cut away. There are now bars farther up on the island Sacca - not on map extending 2/3 length of island.

Tuesday - Nov. 18 - I. 125. Ilha 163 Sacca.

9.25 River 2000 ft wide. We are running within 50 meters of R. B. neither side opp. any cultivated.

9.47 Stop - anchor - on acct. of the heavy rain and also to give pilot and steerman Chama to eat breakfast. Stop. 26. The cabins look very badly.

10.13 Start -

I missed rising up. end Ilha Sacca. Opp. lower end in mid River which is in mid River.

10.25 Just below lower end Ilha da Mangal,

10.25 The lever handle jumped the track, brought the steamer to a stop, and frightened the crew. Some of the canoe men jumped aboard at the bow - but came off all right. Rain still.

10.33 Start again - near foot of I. da Mangal

10.34 Opp. lower end of Ilha da Mangal

Loc run up on the I. B. side - old channel.

There are bars below this island, over on the R. B. side, not shown on map. This island is cultivated. I. B. is not.

10.42 Channel betⁿ I. B. and ^{island and} about 800 ft - cult some on R. B. (clay & h.)

10.45 = I. 124. opp. Island, nearly mid way

10.47 opp. a bar that puts out from near mid length of Island not shown on map.

10.51 Above the bar, this channel widens to 1000 ft. House on island. One on map, another ^{is} there above. This is a nice island. It seems cultivated all over, nearly

11.08 Opp. head of Island da MANGAL, ^{1/2 I. long} 34 miles long a bar [not on map] now extends 150 meters ab. it. River above island 2400 ft. wide. Riv. curves to Rt.

11.15 a wealth of uncultivated evidence on left Bank

11.30 Opp. MANGAL on I. B. Clay (red at top, brown)

11.30 28 ft. above present water - high part, for an estimate. It is concluded that we can get wood here.

(64) Tuesday Nov. 18 - at I. 123 + 1/3

Conclude to make this wooding-place
MANGAL, on I. B.

The rain storm is from the S. East. It continues all day, so that there are but few dry spots left on the steamer. Many of the maps are soaking wet; but there is chance to dry them till it ceases raining.

Write a long letter to Cousin Bob. Halford - gives a chapel and 8 houses mangal has a fine situation.

Mangal has a perfect looking de Chapel, and three or four dilapidated looking houses. It never was much - it is now less.

Wed. Nov. 19. I. 123 1/2. Mangal.

Cloudy + cool + barometer rising - but it does not look settled.

River full abt. 2 inches

7.43 Start. Steering ^{obliquely} for pt. ab. on R.B. side.

8.03 100 meters from R.B. now inclining to mid river. Channel about 1400 ft. to 1600 ft. - varies some.

8.07 Opp. Point on R.B. The large bar on Map

8.15 on R.B. below this Point is gone [I. 123] along here.

8.17 opp. another Point on R.B. - no visible bar. Possibly at low water there may be a bar (small) but this bar has been cutting long after Halford's time. Also opp. Sang ^{naked} on I. B. side

The channel hugs the R.B. shore ab. this Point. It is cutting, very slowly, on this clay point, now woods.

8.20 no cultivation yet in sight - this morning. = about 8.15 I. 123.

8.30 Opp. when large bar is on Map, on I. B. This now submerged, excepting a strip of sand along shore. River including bar, 1600 ft. It is the way on map.

8.30 we are now near mid river. opp. bar on I. B. The R.B. shore along here is clay, ^{bluish} and although it has been cutting some, it is moderately ^{humid}. Pilot says we are now opp. island which must be the I. da Vasante Grande

Wed. Nov. 19 - I. 123 - I. da Vasante Grande. 65

8.43 opp. when the island is cutting - concave, the Channel is against it now - loam + sand

The bar opp. on R.B. side - I have not yet seen any cultivation on this island, or elsewhere today.

This island will probably cut away my map, now. The large bay extending above opp. point to be still there on R.B. side - though partly covered with granite

9.00 opp. up end I. da Vasante Grande

9.00 The dis. from head of island to the Point on I. B. is now at least 1/2 a mile. There is a bar at the head of the island, and the quantity of water at present flowing behind is small. Breakfast bell.

9.06 opp. point on I. B. I. 122.

9.15 Bar on I. B. largely submerged [a league long]

9.20 Opp. Foot of Tarquiland, de S. Antonio. The first cultivation seen to day.

9.35 Barrosa on I. B. Decayed in 25 years. 3 houses. One white, tile roof - on map 5 houses.

9.38 Foot of island toward I. B. side Cultivated I. do Barros. The lower end of the island do Barros is cultivated, but I see no op.

9.47 Appearance of Cultivation on either island, now. We are in the Channel between the two as on the map - 1000 ft. - some parts more.

9.57 opp. Lower end of bar toward S. Antonio Island. 1/2 mile. Not on map.

10.03 Opp. up end of said bar. I see a long spit bar projecting from the lower end - and if any remains it is now entirely submerged. The bar on Map against island is gone at lower end - and if any remains it is now entirely submerged.

I see a long spit bar projecting from the lower far head of Ilha do Barroso - nearly half way.

10.10 Steering now for (R.B.) or S. Antonio side. There has been cultivation, in spots along these islands, but there are no houses, and the places look deserted.

10.13 The head of Ilha do Barroso ^{here} bends off toward I. B. The actual up. point is some dis. up. See note below. Cultivation now on S. Antonio Id. but miserable ruins for houses.

10.17 S. Antonio is being cut. Loam and sand.

We get only less than 1000 ft. above sea level in Oct. 20 to 25

- 10.22 Opp. opening (about 15 meters wide) of the S. Antonio Channel
a small channel which makes the Island.
Very little water running at this stage of river.
This is head of S. Antonio.
- 10.28 Opp. the real head of Ilha do Barros. It
is above the head of
- 10.33 opp. up. end of bar on head of I. do Barros.
- 10.37 Opp. Piedade ^{I.B.} - 2 hours - one white ^{200 ft.} ~~island~~
Same as 25 years ago.
No cultivation visible - and I miss the
crowds of knots of gazers, we had below.
- 10.50 Conceição ^{low part} on I.B. about 10 scattered.
Very ordinary thatched houses - 2 with tele. roof.
Some cultivation on top of bank - Slopes steep
not cutting. Channel 1200 feet.
- 10.50 I. 120.
- 10.57 Opp. The point of Conceição -
We are running in close to L.B., directly
over where bar appears on map.
Appearance of iron ore lumps on L.B. point
along slope of bank - They are iron ore lumps
and probably a formation here, overlapped with
Clay - It looks somewhat like bog ore.
It extends 200 meters around this point
High clay bank. Continues. Cuts very slowly.
- 11.03 Opp. lower end of new green island.
- 11.04 Opp. a regular little Maclachlan at L.B. shore.
- 11.05 Opp. Viegas - 3 common human visible -
ditto the number 25 years ago.
- 11.10 Opp. up. end of little new green island.
The bar on R.B. side, on map, is still there, ^{visible}
- 11.14 Opp. where I.B. high ^{clay} bank suddenly drops
^{about} from 25 feet to about 18 feet above river. Nice woods.
The bar on map on L.B. shore along here is gone.
The channel is right over the place.
- 11.20 Opp. Lower end I. do Viegas. Though this
is nothing but a ^{low} sand bar with a thin growth.
The channel bet. this and L.B. is now 800 ft. wide
we run this channel. Map line is the other side.

- 11.25 Oh! I see fewer ^{on left} or six miles of glass water
up the river. On turning to map, I see it there!
We continue along near L.B. shore - I. do S. Barros
This former island now high sand bar extends much
farther up the river than map shows, and makes
river toward the R.B. side - but still leaving a
wide channel on the R.B. side.
It extends up to opp. the outlet of the
Riacho dos Cavallos on I.B. L. 119.
- 11.36 We leave L.B. side and steer between said
"island bar" and the outlet of Riacho dos Cavallos.
- 11.40 Opp. point of Riacho dos Cavallos - and also
Opp. upper end of Ilha do Viegas sand bar.
I believe that the main channel ^{at this point} is on R.B. side,
but this is my good; Mouquim circumvents.
- 11.45 Ilha da Marianna (on our Rt.) Intervening, is
a sand bar, island - of no account - like the others.
The low ground beyond on L.B. is somewhat
cultivated - cannot quite appear. None on R.B.
- 11.48 Quite a woods on R.B. 200 meters to our left.
- Beautiful River, ahead! I take like.
^{1/2 mile or more wide.}
- 11.58 Opp. head of Ilha da Marianna.
a sand bar, with growth, just above on L.B.
- 11.58 opp. point on R.B. - 200 meters to left -
We are now heading away from R.B.
Sand bar continues on L.B. side.
- 12.05 Opp. 1 1/2 hours on R.B. a little cultivation.
- 12.13 Opp. Sang. do Barrero - (as I take it to be.)
also opp. lower end of bar to our left in mid river.
This bar runs up obliquing toward R.B. for 1/2 miles
but it still leaves a channel and much water
flows through it now.
But I am uncertain as to when to place this
on the map.
- 12.25 Heading rather toward R.B.
- 12.36 Within 200 meters of R.B. still approaching.
- 12.40 " 30 " " R.B. running up; 8, 9, 9, 9 ^{on deep.}
- 12.43 Opp. tall tree with tamar vines hanging from limbs.
- 12.45 Inclining out from shore.
This shore, for a mile or more has shown a natural
grassy slope from edge of woods toward river "Ralvo".

(68) Wed. Nov. 19-

12.50 Bandeira seems to be lost. According to the map - my notes, and the steamer's running, we should have been at Bandeira a quarter of an hour ago.

1.12 Opp. lower end of bar running down from island

1.13 Opp. lower end of Bandeira. Nice situation. inclining toward upper end of Bandeira.

1.14 20 miles from shore - 5 miles deep.

1.17 Stop found up. end of Bandeira - parlor about wooding place, and anchor.

Every long league inland, ^{to this place} I. 118, after a parlor, ^{riding in much} ^{melancholy - we}

1.55 Start from upper end of Bandeira - on the channel behind the island Bandeira - where this pilot has not before run. It is from 5 to 7 miles deep, as far as we have seen in the start

2.00 over in the start

Note that the lower end of island is below the upper end of the Hamlet - which consists altogether of about ten houses, these are day banks on the R.B. side and they do not cut much.

The banks in the immediate front of Bandeira are quite pretty with a rounded slope, clothed with a sort of material grassy growth - Wood is not here.

Said to be wood at Sitio da Matto - on I. 116 - $2\frac{3}{4}$ leagues above here. We think we have wood enough to take us there, so we are on the way.

The bars shown on the map in this channel at the lower end of the island, are gone. We found from 4 to 5 meters all along there. 5. 5. nominal.

2.11 Channel is 200 meters wide. Banks seem

Bandeira Island is partially cultivated but I have not seen any huts, or people and the R.B. here is a room 2 above to children and a

2.17 on

Wed. Nov. 19 - Bandeira Island (69)

This is an elegant Channel now. I. 118. 2.19 opp. a small River - on R.B. It is widening as we approach head of island. 5.5.5.5^m

2.22 Here on the R.B. is sandy, it is cutting some new 900 feet wide - and still widening. along here.

2.25 Opp. head of high, solid part of island - some huts 500 feet wide. 5.5.5.5^m

Above this it is low, Cerrada with a useless growth forming a new head to an old island; though at the extreme upper end it is higher, and cultivated.

2.28 we are now inclining to the Rt. passing out of this new channel (new to our pilot) into the main river.

2.30 Opp. bottom head of island proper; but immediately above is a bar - a small water channel between the island and the bar. 20 meters wide.

2.33 Opp. upper pt. of this island bar - also opp. lower end of very large bar on R.B. This bar serves to contract the river and maintain a good depth in the Channel. $13\frac{1}{2}$ $3\frac{1}{2}$ where we ^{are} _{not in the channel.}

2.38 Woods on both sides of the river. No cult. in sight.

We have nearly lost the mountains - only a distant view of those in left behind us.

The Pilot says "No more Mountains, only some hills." This will tone down our scenery very much; but perhaps we shall see something else, of interest.

2.43 1000 feet between R.B. bar and L.B. $3\frac{3}{4}$ $3\frac{3}{4}$

There is a large bar on map on L.B. side which has disappeared. If any remains, it is now submerged.

2.46 I. 117.

2.48 narrowest place between bar and L.B. - 900 ft. It soon widens to 1000 ft. and more 2.55 Cultivation on R.B. side. low recently formed land. comparatively.

70 Wed. Nov. 19. on I. 117.

- 3.00 River is 1500 ft wide - R.B. side all sand low - recent formation small trees or bushes - on L.B. side the banks are high clayey and the trees are larger.
- 3.05 We are just below "Cachoeira" marked on map. Some rocks in the river; but there is at present a good channel on the R.B. side where we are running close to shore.
- 3.10 The rocks are marked ^{on map} as running diagonally across the stream, (at least up on R.B. side.) The course about N. N.E. + S.S.W. ^(Whichever they are) The rocks are all submerged now - only the current rips are visible - and they don't show much.

["As Garcia", of the map, with its one house, I did not see.]

- 3.20 No cult. on either side - but low trees on L.B.

On map - above the reef of rocks - it is marked "Poco", which means pool - and Hatfield had about 30 ft. depth overlying.

- 3.23 We incline toward L.B. - a large bar ^{crosses the channel over} above, on R.B.

[But little cultivation there far - to day.]

- 3.30 Opp. the middle lower pt. of large bar on R.B. side. It is shown on map as closing with the shore half a mile or more up - and it has that appearance even in the present stage of river. ^{Some 5 ft above low water, say.]}

- 3.34 There is a beach on L.B. side. It looks a little gravelly. There are certainly some stones. The beach is only about 200 miles long, where it merges into a clayey bank of steep slope.

- 3.36 River 1200 ft - but narrowing above from the bar.

- 3.45 about I. 116. ^{begins} near L.B.

River about 1000 ft wide - to bar.

- 3.48 12 1/2 meters, 11, deepest we found, as in row. ^[about 50 meters out, m.]

- 3.49 Opp. Hamm (Dica) on R.B. - behind the big bar.

- 3.53 Dinner bell - I think my watch stopped twice - for a few minutes.

Wed. Nov. 19. on I. 116. 71

- 4.00 my time - opp - upper end of the big bar along which in has been running.

- 4.13 P.M. - a small island on toward the R.B. side. It appears on map as a little bar.

- 4.18 - 4 3/4 - 4 1/2 - 4 3/4 - 4 1/2 - 4 - 4. 50 meters from L.B.

- 4.19 a tile hamm on L.B. - 100 meters back. ^{height of bushes}

We are approaching Sitio do Matto.

- 4.20 Opp. cultivation on L.B. on top - 18 feet at least above present water - A bar in mid river opp. here, and for some distance above - [3.5.5.]

- 4.22 Big lumps of clay along bank on L.B. 50 meters to right - whitish - 4-4-4-

- 4.28 more clay lumps

- 4.29 Foot of island - opp.

- 4.35 anchor down - at Sitio do Matto, ^{on L.B.}

Here we stop to get wood.

This appears to be quite a considerable place - numbering houses and other inhabitants.

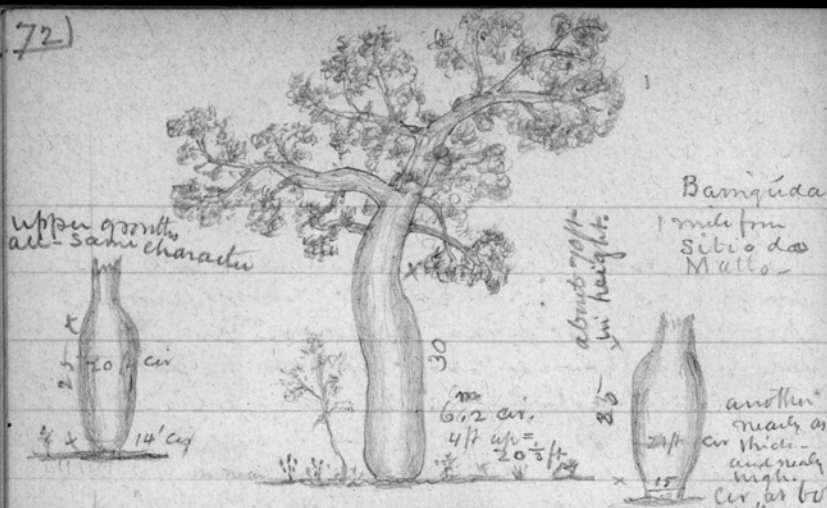
On the map, the foot of the island is rather above the town - or opp. - the very extreme upper end of the town as it then was; but now the foot of the island is below the lower end of the town.

There is also a bar now in mid river below the island, not shown on map.

The Pilot says it is too shallow to go across from the town to the island; but I am satisfied that at this time we will find not less than 2 meters all the way over.

Report. I. 115 3.

Good navigation to here. from last report place.



About 35 ft to the first limb - on the opp. side from this view - and 35 ft more. We saw 4 of these odd trees, within a small area not over 200 meters - farthest apart - about one mile from the river - back of the Sitio do Matto. I found these trees in a clearing NOV-21. before breakfast they occur in the

midst of light woods, on a tolerably level sandy plateau elevated a few feet above the highest floods - 10 feet or more.

I should think, judging from the natural growth that a agriculture might succeed here without irrigation, by planting at once at, or toward the end of the rainy season - say in April - getting the crop in July. [Prof. Derby is of opinion that this place a mile from the river has formally been cultivated; because it is comparatively clear - as if it had been cleared by man. I am not sure, however that it has, not been cultivated, or that it was cleared by man. The river does not reach it.]

The other trees in the woods where these large Bamiquidas grow, are comparatively small; though they are numerous, and the ground has a natural growth, at this time, of bushes and weeds under and surrounding the small and large trees. The wood for Steamers is cut a little farther out than when we were.

Thur. Nov 20th Sitio do Matto 173

We remained here all day - our men, and others living here, with whom we bargained, getting wood at 5 to 6 milreis - for 1000 sticks.

During the day we had numbers of visitors - female largely in the majority. One young Indian lady, of about 50, had never before seen herself in a looking glass - till she looked into the Cabin looking-glass. Some of the others appeared quite astonished and would only glance at the glass; but a few stood and looked admiringly at themselves.

This place has about 100 houses, more or less; but not one good house. Many of them are at present untenanted; but the Professor (teacher of the School) who with his wife and baby, called, says that the people are now cultivating, in the island, and that when the river becomes high are fleeing their plantations! They will return and occupy the houses.

A Chapel was begun many years ago, but there is nothing but the adobe walls & tile roof - There is a usual large wooden crib in front on the river bank; but there is no padre.

The people appear to be good natured and polite, though uneducated. The Professor says there are nominally 30 scholars; but now rarely more than 10 attend and were not more than two or three some times. When they come back from the island, they have the greatest notions. They learn reading and writing. (I am reminded of our Indian Agency Schools, at home - which are more failures - why that they cost the people [the government] a good deal of money.) This gentleman is bright, and not very dark. His wife is light and the baby a little lighter.

Most of the Sitio is elevated above the high floods - having a river front of excessively hard indurated clay 25 ft. high. The clay has a large admixture of sand. The river is rising. A fine clear day.

74 Friday Nov. 21 - Sitio do Matto.

During the night it rained; but we did not get as much leakage into the cabins as before. The top covering must have been better fixed.

The river has risen nearly half a meter since we have been here, and it is still rising. There must have been general rain above here. RIVER ROSE 0.685 meters = 2.25 ft. in 44 hours

Prof. Derby, Sr. Sampaio, and I walked back, about a mile to see the Curatá tree growth; Barriguda - ^{it is} not a palm; but a soft wood, inside, with a hard, thin bark, resembling a palm bark. Somewhat in appearance like our beech bark [See page 72]

We saw four - characteristically alike; but quite different in the special shapes of their enormous trunks - 20 ft. in circumference. "Big-bellied" tree is I believe the name.

There is no likelihood of our getting off before noon -

River has been rising for 44 hours, at the rate of 0.057 ft. per hour = $\frac{5}{8}$ inch

0.685 METERS = 2.25 Ft in 44 hrs.

Ilha Sitio do Matto is cultivated. It is more than a league long - but narrow.

We have now on board fully 4000 sticks. That should ensure 30 hours of running in 3 days.

A Ferry here used to carry Cattle across the river. It was here in Halford's time.

Fri. Nov. 21 - Sitio do Matto. 75

about 300 meters a ft. of Id. I. 115³

2.10 Start - We run right across to Island - over the shallows 2 m. long -

2.15 The island is very narrow - and cutting ^{2-3 1/2 3 3/4 4} some. The old channel is shown along this island; but I think the main channel is now on L.B. but the river is up-fully 2 miles above low water now.

2.19 Opp. middle of town. 2.22 opp. last house. We are obliquing toward L.B. 1600 ft. wide

2.25 a "Barra" opp. here, on L.B. It is on map. I. 115. 150 M. from L.B.

Pleasant looking L.B. steep slope much grass on it and pretty picturesque clumps of trees.

2.42 Opp. House, and top Cult. - on L.B. Banks 15 to 16 ft. ^{ab. water} Looking ahead, we saw a barca come out of the Barra do Rio Corrente, and pass on toward the island, and it is now heading down.

2.48 River 1500 ft. but begins to narrow some above. ^{Petombá Jm. Inham}

2.56 River 1000 ft. 900 ft. - 2.58 House on L.B. Cult. on top - corn. River makes a little turn & runs a little. Map is nearly the same as it now appears - a little way only below mouth of Rio. The barca has run to the island and respectfully wait 3.05

3.12 Opp. lower side of Rio ^{2 m. open} it is a 120 meters wide. at the mouth it is about 150 meters wide.

3.14 opp. Upper Pt. (side) of Rio. ^{Ilha is cutting.}

3.21 Over the river running along just above head of Ilha Sitio do Matto two new islands in our sight above head of Ilha, and a large sheet on L.B. where channel used to be - just above mouth of Rio do Corrente

^{in passing the mouth the boys dipped up a bucket of the clear water when they were just on, margin, when the two waters interlocked.}

The Corrente is a beautiful stream, as far as I see up at least 3/4 mile. Curves just as on map. ^{The water of the Corrente though a brown color is now comparatively clear. The contrast with the muddy S.P. is marked.}

The Ilha Sitio do Matto is cultivated all the way to the extreme head, and the river is now eating away some of the cultivation.

3.28 We are now across opp. far head of the island and

channel. The R.B. channel.

76) Fri. NOV. 21

3.34 - 150 meters from R.B. heading Still toward it.

3.37 I. 114.

This R.B. side along here is a mixture of river forest, and cultivable and some cultivated land where it appears subject to overflow.

3.40 The new island and sand bars about the Ilha São do Matto, still (now) to our Rt.

Some of the Mandioca is within 1/2 meter now of the present water. This channel is now 1500

3.43 feet wide from R.B. to sand bars about new island.

3.48 The irregular alluvial sandy flats between the river and the forest along here are cultivated.

4.04 We are near the L.B. side now.

4.30 The same general character of stream and shores for the last half league - a little top cultivation occasionally - along I. da Canab^{ra}ba.

4.50 Opp. Island Itabirava - ^{however,} which stands behind I. da Canab^{ra}ba, and the small island Itabirava. 1200 ft. wide.

This was part of the estate, (many years ago) of the Conde da Ponte. whose Fazenda is on the R.B. side [back] below the lower end of the large islands.

4.50 I. 113

5.00 Opp. up. pt. of Ilha da Canab^{ra}ba. I suppose now we see the Ilha da Itabirava - the large

5.08 Opp. the lower end of small Ilha da Itabirava. Channel 1500 ft. (1/2 ft. a. present water) ^{cultivated.} Here we incline away some from L.B. toward Mid.R.

5.15 The Mount or serrate at Lapa is now in full ahead - we are about mid-way - steering obliquely across toward head of island.

5.20 Head of I. da Itabirava small - sharp like a knife edge - 1/2 mile at least.

5.27 The head of large island - which is (100 meters to 1/2 ft) now a 1/4 mile above head of smaller island.

Friday NOV. 21 - approaching the Lapa. 77

Both islands are cutting at their heads. Both are very sandy, mixed with a little loam. Both are cut to sharp knife edges now - though the larger island immediately widens out below head, even faster than map shows.

5.32 Heading obliquely for R.B. The Lapa Mount standing up clear and dark, but very distinct a little to Rt. from Curru ahead.

River wide, calm, lake like; and the scene beautiful! ^{Handsome perspective of the river and about LAPA.}

5.35 Now running along R.B. 40 to 50 meters out. Some cultivation and occasional houses on R.B.

5.47 200 meters from R.B. This shore appears to have been cut away considerably since Halford's map was made. The river is now wider - (2000 ft. ^{or more}) to the bar on L.B. side.

5.54 Somewhere about opp. lower end of Ilha do Sr. Bom Jesus on the map there is only sand behind island. Opp. ^{near} up. part of island channel about 1500 ft.

6.02 Opp. head of Ilha do Sr. Bom Jesus, at low water it is all sand behind - but at this stage - at least 2 meters above some water runs down behind.

Beautiful cloud scenery - of setting sun!

6.06 Opp. the Fazenda - which is on L.B. side. It is low, near the river, and not very high.

6.13 Still near mid river - a little wind begins from the East - we steer nearly South.

6.15 We begin to incline a little toward our landing place at LAPA.

6.25 A large bar in front - along which we run in 1/2 miles to 1/2 water - dusk.

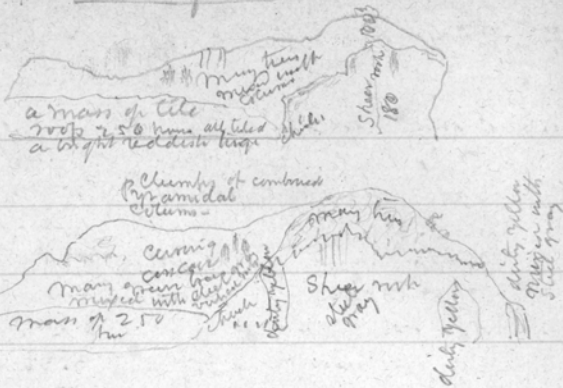
6.28 Opp. water pouring - between bars - wady bars.

P.M. anchor. (I. 112.)

"Sen-^{ra} Bom Jesus de Lapa"

"Capella na Pedra Calcárea"

at 10.55 a.m.



at 11.03 a.m.

Senhora Bom Jesus do Lapa.

10.45 Start from Lapa.

River fell last night

- 11.08 Foot of present extreme lower end of I. do Medo. It has extended down stream since Halped's time a long distance below the old foot, and the part is now only a few feet above present water. ^{the side of the island is} through it is cultivated. (Cultivated.) (Lower.)
- 11.15 about opp. where island formerly ended. ~~below~~
- 11.20 The channel we are in is bet. island and L.B.
- 11.27 We run now near L.B. 3.3.3^o-3^o - (Chan 200 meters)
- 11.27 opp. up. end of Island do Medo. low sandy. Sand bar extends 500 meters above island (5 hundred) [Island over a mile long] L. 111.
- 11.37 opp. up. end of bar extending above island. ~~the bar~~
- # The bar on map, on L.B. above island, is gone. the
- 11.37 Channel is now on that side where the bar was. The river has been cutting the L.B. side of late years.
- 11.43 now out 200 meters from L.B.
- 11.45 opp. lower end of bar, 250 meters to our left. It is partly submerged. ^{partly} partly some island (new growth).
- 11.51 opp. up. end of sand bar [1/2 mile long] This is not on map. It is say 200 meters from R.B. Shore.
- 11.53 opp. lower end of small island over toward R.B.
- 11.54 opp. break in bank of L.B. down to level of present water. In the neighborhood of Pambú on L.B. and Campos on R.B.
- 12.04 opp. up. end of small island over toward R.B. This island is about 1/2 mile long - and cultivated. # It did not exist in Halped's time. River above island is 2500 ft. wide. ^{R.B. and} L.B. not cultivated; unless back, out of sight.
- 12.10 Sand bars - partly submerged begin, mid river - some river very wide. ^{Running S. by E.} L.B. clayey loam - Cult Channel on L.B. side - where we run
- 12.22 Fazenda do Pambú - on Map - about here
- 12.29 " " " " " "
- " " Some little cultivation to edge of cutting bank Coam L.B.
- 12.30 opp. depression in L.B. marked on a stream in map. ^{one of the}
- 12.34 " " " " " " ^{perhaps} " " " " ^{Sand}
- 12.36 " " " " " " L. 110. we incline away from L.B.
- 12.36 about opp. head of the long sand bar

50 Saturday Nov. 22 about Lower end I. 110

12.37 We are obliquing across - passing above the head of the long sand-bar referred to as Canoe, with a white umbrella in it has about kept pace with us for half an hour.

12.42 The bars have so changed, and the houses are so invisible that it is difficult to land marks; but the island "do Pambu" is about 1/2 mile above here. River here 2000 feet.

12.45 Some of the map bars remain; but I cannot place them accurately. The water being up about 2 meters, we might even run over them, if they are low.

12.50 opp. lower end of bar below Ilha do Pambu. This bar hides the view of the lower point of the island - but it is about where I note it below.

12.55 Seventy or so meters from R.B. - cutting, sandy, low. a very strong 2 1/2 mile current. [8, 9, 10, 11, 11, 11] (1° PM) meters deep

1.00 about opp. Lower end of Ilha do PAMBU. This island lies over a giant L. B. channel 1200 ft. The bar, hiding it, continues up river. (This bar (and the island) reduces the width, deepens the channel, and causes the now bent the R.B.

1.05 Heading away from R.B. oblique to right.

1.10 Cult. corn, on R.B. (woods about below) on top

1.12 Upper end of bar this side of I. of Pambu.

The Ilha do Pambu is of medium height, has much small tree growth, which hides whatever of cultivation there is.

1.22 We have run over to it (30 meters off). The upper part of the island (on R.B. side) is cutting. meters deep 9, 8 1/4

1.27 Island does not cut above this now it runs to a point sandy only 1 1/2 meters above present water.

1.28 opp. up. point of Ilha do Pambu. Low sandy. I think there is little, if any change from the map behind this island on L. B. side. 4, 3 1/2, 3

1.31 opp. lower end of a bay on our right - it is mainly submerged at the lower end.

Saturday - Nov. 22. I. 109. (87)

We are obliquing across to R.B. Lower end of. The partly submerged bar on our right continues up river and emerges at upper part into a low island. There was a small bar in Abel's time

1.31 opp. I. 109. Lower end.

[The Country, the shores, the islands, the trees, and the cultivation, when it is seen, all have a healthy, pleasing aspect - entirely different from the lower part of the Upper San Francisco.]

1.38 opp. upper end of island bar on our right. [This is only about 100 meters below I. do Campo Largo.]

1.41 opp. lower end Ilha do Campo Largo. (40 m. off.)

We run on L. B. side of the island in a channel 1200 ft. wide. This island has many small trees; but it is cultivated, in part.

1.52 within 50 meters of L. B. which is not cutting. good tolerably steep bank, with trees at intervals. Some large trees within 30 meters of river

1.58 opp. upper end of Ilha do Campo Largo. But across a channel 40 meters wide, there is another low island - not yet fit for cultivation, a sort of continuation of the island - not on map. It was a bar only, in his time.

2.02 We are in mid channel only 800 ft wide - running up.

2.06 a little bar, close to our right - mostly submerged at first it then becomes an island

2.07 opp. upper point of the "low island" just above referred as a continuation of I. do Campo Largo

2.08 This island now close on our right, is a new one - not on map. It is cultivated. At the lower end it is only a meter above present water in corn, which looks green and healthy; but the flood may cover it before it ripens. a pity!

2.14 We run between this nameless new island and the R.B. Heading now toward R.B. The channel is now 1200 ft. wide.

The lower part of I.

82 Saturday Nov 22. on I. 109.

2.24 Opp. Upper end of New Island - an ^{an} ^{river} ^{run} ^{ning} ^{of} ^{Torona} ^{R. B.} Strong ^{and} ^{current} ^{on} ^{this} ^{shore} - but it is not cutting - or scarcely any. Cultivation ~~is~~ ^{is} ^{surrounded} ^{by} ^{woods}. More ^{like} ^{our} ^{woods}. 50 meters from shore.

River pretty muddy.

There is a bar on L.B. Side the other side of the New Island.

Huts, not houses in connection with the ^{little} ^{settlement} ^{at} ^{the} ^{river}.
River - 1400 ft. ^{but} ^{widening}, ^{up} ^{stream}.

There is on the map an unnamed island close along this R.B. shore - I think that the land next to the river here may be this island; but I cannot trace beginning or ending.

2.31 Heading away from R.B. - when we reach mid river we head up, some, but the general steering is obliquely across the wide river.

[If the Pilot would make more acute angles we could save some distance but sometimes I suppose there are bars in the way.]

2.42 We are opp. ^{upper} ^{part} ^{of} ^{an} ^{island}, ^{which} ^{is} ^{only} ^a ^{bar} ^{at} ^{the} ^{lower} ^{end} - ^{an} ^{L. B. side} ^{of} ^{River} ^{is} ^{only} ^a ^{bar} ^{at} ^{the} ^{lower} ^{end} - ^{meters} ^{from} ^{the} ^{island}.

There is another island (after a channel of 40 meters width) immediately above the other.

These islands are not on the map; but there are very large bars along this part of the river shown in the map on the L.B. shore.

2.42 I. 108 - ^{here} ^{is} ^{some} ^{current} ^{along} ^{it}.

I think that the large bars shown in this neighborhood on the map have since become cultivated lands.

2.47 We are now heading away toward R.B. but gradually inclining up near mid river.

2.55 Now in turn heading up toward the island, a mile or more ahead. [I. da Volta]

2.58 [Pretty view above, seeing the water opening to the right of the island and the picturesque shore on our right, with the swaying Cascais shore ahead on our left, with remarkable and beautiful clouds above and a clear, blue sky above the clouds.] 3.00 P.M.

Saturday, Nov. 22 - on I. 108. 83

3.05 We are running better now than we did several hours back. We are heading to run to the L.B. side of the Island (Halford Channel).

3.06 [Now he heads the other side - now it's xx I mean saw such piloting. I don't wonder that Henrique gets mad - now and then.]

Upon the whole we head for the island and on both sides get.

3.15 opp. Campo Largo.

3.21 Opp. Volta de Baixo - where we are to stop to let off our passengers -

Dr. ^{Commandante}
Sr. ^{Sub Delegado}

And the Engineer says he must examine one of the cylinders - that there is some thing wrong with it. A screw loose perhaps.

3.22 Stop - just opp. ^{lower} ^{part} ^{of} ^{island} da Volta.

3.24 My watch lost 22 minutes.

3.46 I set it again - at 3:46.

I find that we have invited our guests - Commandante and Sub-delegado to dine at 5 - and after that to send them across the river in our yawl - so I think we will remain here for the night -

So it proved. It was past 5 before dinner was finished, and half past 5 by the time our Yawl returned. I had previously sent word to the Engineer that we could go no further to day - He wants to do something with one of the cylinders.

Report Good navigation to this point on Island 108.

84) Sunday - Nov 23. I^a da Volta

5.43 Start. ^{water fell 3/4 inches} Upper end I. 107 ^{Island is very sandy.} 500 to 900 ft. channel about 500 ft wide at this end of island.

5.54 About - L.107

5.56 The L.B. appears to have cut some since Halfed's time as instead of narrowing, it widens and is here 1000 ft. The convex bend (on the map) has evidently been cut away.

It is a grand navigation now! Channel is on I.B. side. 7 to 8 meters deep at least. The Pilot's system of running is somewhat different from the way I would run the steamer, but at this moment I don't know in can run almost any where.

6.03 " Sangrador, on L.B. No house, but appearance of cultivation on L.B. about opp. AS Pedras - the other side of island, on R.B.

N di. Our soundings along here will show less than half of the channel depth. We are running mid now, and the channel is on L.B. side.

6.26 opp. the Up. end of Ilha da Volta. The bar at head on map is not now visible. 43 minutes running length of island. This would make the island about 2 1/2 miles. It is so on map.

6.31 we steamed directly over the place of the bar at head of island least depth - 4 meters.

6.34 We are now 200 meters from R.B. - run up Riv 1600 ft.

6.42 opp. lower end I^a do Bebedor. Channel to R.B. about 100+ meters. BOA VISTA (on I.B.) Fazenda do Assassinho Guimaraes

a number of the people gathered on the bank. The large house, is a little above foot of island. 6.45 opp. the large, new plank house, tiled house. L.B.

6.50 opp. Lower end I^a d Batalha. which laps and hides I^a do Bebedor. The channel between these islands is filling up. This island Batalha - also hides the Ilha do Cafeika - which is on close to the R.B. side of Riv. There is a bar, on map on I.B. but now visible.

Sunday - Nov. 23. I. 106.

6.55 about at I.106 lower end. ^{ft. of Island - 500} 1/4 M. above

7.02 The main riv - in which we run, is 1200 ft. + Wooded shores along L.B. Island partly cult. Then seems to have been little change from map.

7.07 Channel is against island - cutting - clayey loam. Apparently we are not going to run the old (map) channel, but to run between the islands Batalha and Palma.

7.12 Opp. Lower end of I^a da Palma. Chan. 700 ft. ^{in start}

7.15 opp. upper end of I^a da Batalha. there 2 angles. a tiny island just above near I^a da B.

The RIO DAS RAAS enters from R.B. opposite here, as shown on map. ^{50 to 60 ft. for a guess} The little islands prevent us from getting a view new of the river mouth. Chan. here 800 ft. Barra do RIO DAS RAAS. on the map the Rio is shown to be at least 200 meters for a mile on the map.

7.27 } opp. a water shade on I^a da Palma. ^{It looks as if there was a channel cut across the island - though it may be only an indentation from this side. Chan. 200 meters. but the channel widens above to 250 meters.} R.B. side beautiful. ^[Looks Rio like] Wooded, not cultivated. The I. da Palma is considerably cultivated 500 acres.

7.39 } Island opp. is very low. 1 1/2 fathoms ab. ^{from water} [Not one Palm tree visible on I da Palma.] I think this is where water runs across when the river is 1 1/2 meters higher, meeting the "indentation" head of I.

7.47 } This channel is here 250 meters - widening to 500 m. at 5.5. (8:05 AM) I. 105.

8.03 Opp. Upper end of I^a da Palma. The little island just above its head, on map is gone.

8.10 opp. Palma (one good house, tiled roof - 5 or 6 ft. high) whether it is larger or smaller than Halfed's time is a question. Palma is not as far above the head of the island as the map shows.

8.12 } opp. lower end of unnamed island, on R.B. There. This is quite different from map; but this sandy island may have been cut away at its lower end.

9.07 } opp. upper end of one island. Water channel behind it. The main reach is 1/2 mile above - a small island.

9.18 } opp. upper end of another island. I think that the main R.B. is just opp. I think so.

86) Sunday Nov. 23^d on I. 104.

11 minutes slow, Watch. (9.20 - change to 9.31) and
9.31 Start again - here Suppm abt L. 103 $\frac{1}{2}$
not far above island without name.

River 1500 ft. wide, but it may be an island (new) one
and I now see that it is another, sand bar
green island
9.36 Opp. head of said sand bar green island, on R.B.
[Even the land above that may still be island.]

9.47 Pilot says it is "all island along here" in
front of the Right bank of river. I suppose
that the bars and islands have run
together since Haklud's time, ^{and} some, then
main land, has probably since become island.
[I see a regular old island ahead,
about a mile above - which I take to
be I. da Pituba.]

10.00 The "Cova do Barrero", on L.B., on Map, is
entirely submerged - perhaps gone. Part may
have become main land.

10.12 - - - - - I. 103. = [about $\frac{1}{6}$ mile below
Lower end of Islands.]

10.17 Opp. Lower end of Ilha da Pituba

I see that the R.B. Channel ^{Course here on Upper island.} is now full of green
ish sand bar islands - partly submerged. On the
Map they are sand bars. This shows that
the R.B. Channel has been closing.
The floods flow high over these island bars,
and no one can say what shape the river
may have been after a very high flood; or
even after the ordinary floods of a few years.
The bulk of the river seems to flow in the L.B. Channel.

10.20 This channel is here only 200 meters wide. It
must be deep, but we are running in the island -
here the Convex side - through the Curve in my

10.25 gentle. 8 to 10 meters deep - near middle
600 ft. wide only

10.27 200 meters wide. wooded L.B. 40 ft

10.32 Opp. Pituba - $1\frac{1}{2}$ house - on high bank 35 ft
a dozen speckled taters - there may be
Other houses behind the trees - 600 ft. channel.
2 mile an hour current -
an elegant navigation.

Observação.

Depois de Concluidos os primeiros
 Calculos Chegou-me a Mão o ultimo
 trabalho do Sr. Menckes pelo qual a
 long. de Maceio com referencia do
Rio de Janeiro seria $29^{\circ} 41.30$ (em
 vez de $29^{\circ} 43.16$ consto^{na} em) e a
 da Obsen.^o Imperial do Rio de Janeiro
 $3^h. 2^m. 0.1$ de Paris ou $2^h. 52^m. 39.5$ de
Greenwich.

Acceptando a correção
 relativa a Maceio por ser o resultado
 de maior numero de eint^{as} Chron-
 ométricas do que assistirão do meu
 Calculo deves diminuir-se as Menhas
 longitudes com refer. do Rio de Jan.^o
 a razão de 1.86 e e (long^o E do Rio
de Janeiro) = $2^h. 52^m. 26.56$ - longitude
 da relação presente ou (- idem)
 $43^{\circ} 06' 38.4$ - (idem) Krauss.

Astronomical Positions ^{Annos 1867-68.} Eng^o
Determined by Ser. Carlos Krauss,

	Lat.	Long. W.
1 Margin of Riv. S. Francisco <i>in front of the lower point of Ilha da Cachoeira</i>	9° 25' 47"	2. 43 06. 8 ^{N. 4}
2. Joazeiro - matriz	9 24 36	2 41 51. 4
3 As Pedras - beirado do Rio	9 03 39	2 40 05. 5
4 Villa do Capim Grosso	8 59 24	2 39 32. 5
5 Margin of Riv. opp ^{bas.} Catar.	8 40 19	2 38 51. 0
6 Mis. de S. J.º Bap.º Rodellos	8 50 11	2 34 59. 3
7 Margin esq.º of Riv. opp Riachão	8 59 56	2 33 44. 6
8 Atalho, (Casa de José M. de S.º ^{el ouzo})	8 59 22	2 33 13. 1
9 Brejinho de Iara ^{otj.}	9 05 45	2 33 05. 4
10 Idg. at Margin esq.º Riv. Max.	9 13 12	2 32 25. 5
11 Volta - Casa de Oração	9 14 57	2 32 30. 7
12 Lagoiro Alto	9 18 44	2 32 12. 3
13 Lagontia	9 26 47	2 31 53. 0
14 Talhado	9 26 16	2 31 22. 7
15 Ao pé do Pico do ^{inho.} Curral	9 31 32	2 31 10. 8
16 Porto de Piranhas.	9 37 33	2 30 49

The obs.^{ns} independently of Chron. gave for
the resulting Longitudes menores em 12^s terms medio

O comprimento das presentes longitudes a 2^h 52 28. 42
Corresponde as longitudes relativas ao J. Observat do
Castello no Rio de Janeiro. S. Paulo em 24 de Março
see Page 89. for Observação. (1869)

"We shall spend three days on the
fourteen to fifteen leagues which separates us
from Varzea Redonda. x x This
section unexpectedly found itself the most
interesting part of the voyage."

Nov. 5. We found the central stream
to measure only 300 fathoms (braças)
[2160 feet] and its Compartim^{to} nar-
rowness was set off by a narrow swelling
on the right side, like a normal feature.
I was surprised to see so many signs
of labor, cultivation extended to the
water side, and long lines of hedge
ran down the gently sloping bank. x
x "Wherever there is irrigation etc etc"

Now, all the Cultivation that
there is, or has ever been, on the four-
teen or fifteen leagues, is confined to
the river bank slopes; the Cultivation
begins at the edge of low water and
extends twenty or thirty yards in
some places more, to about high
water; and that is all there is of
it! The hedges, or brush fences, and some-
times planted bushes, separate the little
plantations; many of which are
less than an eighth of a mile long.
A plantation 660 feet long, by 66 feet
wide (many are smaller) contains
just one acre. There may be 8
acres in a mile of length. In
some places, where the slope is very
flat, and on low islands, there is
much more in a mile; but there
are many stretches of miles, (higher up
the river, where there is no Cultivation
along the river - where the banks are
too steep, and where the river cuts.

No where that I have seen, has
Capt. Benton taken the pains to
make this matter clear to readers.
Perhaps it was not clear to him.

"The material of the rapids is sandstone lined and pudding'd with large and small water-worn quartz pebbles, often forming clear thin-plate blocks. On the banks are found iron-pitied Canga, and large blocks of amygdaloid, and boulders conglomerates. The base is a fine, pink syenite, like that of Xilotic Cataracts. Where the violence of the water extends the rock is iron-plated with the usual glaze; it is black, as if coated with tar, and the aspect is grimy in the extreme.

On the right, or Bahian side, the Channel has a perpendicular fall xx a tall, longitudinal hogback, of slopes of the Itapirica) dark and slippery sandstone conglomerate, rises between the South-western and the Central Channels. The Central Channel is divided from the third or North-ward branch by a "mal-pais" of polished black rock, radiating heat and fire afar, not unlike a lava field. During the depth of the dries, the jutting stones approach one another, and a man with a leaping-pole might cross dry-footed the whole Rio de São Francisco. [This is a very considerable "exaggeration" or diminution to the actual width; although it is greatly confined, very deep and swift.]

xxx Nowhere had I seen such gigantic "Caldeiras" pans and pot-holes, turned by the water-lather, some of them 15 ft deep by half that dia. and the sides and surface were jolly as the Itacolunite rock tumbled into a hole. xx. These places should be carefully searched for gems" xx. They are applied for tanning, the lips are white, and the pits are full of tanned liquid." xv. Below the rapids, here the syenite, the proper material for sphinxes and obelisks, crops out of the white and tree-scattered sand as in smooth, bold, and rounded knobs."

xx. The gate is formed by a rounded hill, the Serra do Paari" on the left or N.E. bank and on the opp. side, by the Itapirica, a long straight curtain of bluffs - almost perpendicular to the bed,

It is not difficult to be eloquent in praise of the São Francisco River; but an engineer must recognize his lurking eloquence in favor of the multiple formation of the gorges.

Page 184 "Sands that will fructify every manner of plant and grain cast into their bosom, shoals of fish to feed the poor, a wealth of precious stones and ores, a channel easily connecting with the outer world." But the age shall come, and the day has dawned, when men shall flock to these unknown regions, when gardens, groves; and banks of art, shall adorn the river side, when town and village shall whitewash the plains, and when the voices of a happy people shall be heard where the profound solitude and silence are now broken only by the moan of the dove, by the scream of the night-bird, and by the baying of the wild dog."

"So be it" (Burton)

Preceding the above - page 183.

"I cast my eyes" xx them on the banks whose beautiful woods concealed the rich champagnes. The river, a natural Peri of navigation, despised by and despising art, rich in a thousand kinds of produce, fertilizing in its sinuous course millions of acres, was full of saw cut human life" xx Lands, etc." see above

The above refers to the Rio das Velhas - not to the São Francisco.

Page 439
* Captain, Burton's hypothesis "In former times they were parts of a dam, which, intercepting the stream, contained aloft, the water found a "soft place" burst thro' the wall, and formed the present Cachoeira." As soon as I find a place soft enough in my brain, I will give this hypothesis a place. At present it is all dam and too hard to let it in. Who told the Captain?

96) VOL 11 - Burton - Page 6
Between Sabará + Jaquára
The river is 20 leagues 1,118,490 meters
Breadth 44 to 47 meters - ^{68 miles} _{140 to 150 ft}
Slope 0.4135 m per kilometre

Stream deeply incised.
Hardly any breadth of valley
The banks, often perpendicular, gravel
sand, or dark puggy clay.
Between Oct + Jan, deeply flooded banks.
16 to 20 palm trees - (11 to 14 ft)

According to M. Lias, the river at Sabará
stands 695 meters above sea-level
and at the confluence 432.3 meters
Dis - 666,080 m = 361.28 miles or 120.43
geographical leagues; and thus the
general declivity is 0.3941 m per kilometre.
1.20 ft - per kilometre.

The slope of the upper São Francisco
between the Paraopêba River and
and the rapids of Pirapora - 0.4890

Page 204 - Capt Burton - writes:

"The Pirapora is a serious obstacle
It is not insurmountable, but it would cost more
money, and take a longer time to remove,
than all the most serious obstructions upon
the Rio das Velhas.

No work could be carried on in the rainy
season and the inundations would
damage the labor done during the dries.

xx Above it also the Rio São Francisco
becomes a mass of rapids, and when you
clear one you are within hearing of another.
Canoes ascend with difficulty to the mouth
of the Abaeté. M. Lias accurately sur-
veyed as high as the embouchure of the
Paraopêba, and he found that no exper-
iment could be made in the 100 leagues.

VOL 11 - Burton - Page 6
Dimensions of "Parque Jaquára."

Built of hard Vinhatico and Canelle
woods - with ribs of Pau d'Arco
105 feet long and iron plated bottom.
24 " broad } Weight 32,000 lbs
24 inches deep } Greatest part ^{metal}

Unloaded draws 4 inches -
increases 1 inch per 4 tons -

Carries ^{down} 72 tons, 22 inches deep.
between Macakubás + Jaquára.
Makes Sabará in 12 days from
Jaquára - returning in 2 or 3 -

Page 203

"M. Lias makes the length of the
Pirapora obstacle a total of one kilometre,
and the difference of level 3.55 metres.
This would give a velocity of only 3 to 4
metres or yards per second.

The estimate for opening 40 leagues
Canalizing up the Pirapora 1,400:000 \$
To the Cachoeira Grande 4,100:000 \$
To the Porto das Melancias 3,200:000 \$
Say \$ 870,000

Say 4,500,000 dollars.

Capt. Burton makes the fall 6 ft and 7 ft
= 13 ft total - separated 700 yards.
"During the "dries" no ajôjo can pass.

Extract from Capt. Britton's "The High-lands of Brazil" - Vol 11 - Page 422.

"Yet the land is good, producing in abundance maize and manioc, beans and ground-nuts, sugar-cane and rice, in the places where it is not flooded by the streams, whilst cotton rotted, as usual, in the uplands."

This was within of the land not far from Varzea Redonda. It conveys a remarkably erroneous view of the facts. The maize and manioc, beans and ground-nuts, sugar cane and rice, are produced only where the land has been flooded by the stream; and the few, scattered wild cotton trees that he saw, will not flourish on the uplands in ordinary seasons. Nor will any thing else grow there but large cactus, and thin, stunted trees, making what is known as Sertão; excepting with the aid of irrigation.

Page 216.
"If you see the Paraopeba the breadth of the United stream is 140 meters and the max. depth 3.25 meters, with a discharge of 180 c (130) c.m. per second. Referring to the Das Velhas River = 7,800 cubic meters per minute = 275,964 c. feet per minute or 2 1/2 times the extreme low water flow of the Ohio River.

Possibly it is a misprint - it is a very bad one.

Berres = 1 grain (0.892 gr. Troy)
Vintem = 2 " (2.25 Portuguese) = 20 reis = 1/2 a Carat
Vintem (Vintems) unity of measure
Meia-pataca = 16 grains
" Oitava = 32 " 29 5/2 3,25
Cruzado = 45 " 1640
Sello = 480 reis (quite obsolete)
Oitava = 64 grains (72 grs. Portuguese) = 640 reis = 17.44 carats. = 32 Vintems = 16 Carats

Above 4 vintems, considered large
Most useful probably six vintems or 3 carats.
See page 150 also.

Grain diamonds	12 to 18 per Carat = 75	Shill.	Paris 1863	Paris 1866
1 to 5 grs.	88	96 francs	110	25000
6 to 7	107	125	140	150,000
8-9	120	145	160	25
10-11	148	156	180	30
12-13	160	175	200	375,000,000
14-15	185	190	220	125
16-17	195	205	235	1,390,000,000
18-19	210	250	290	
20	220	285	325	
24	280			
8 Carats	2500		2750	
10 "	4650		5100	
12 "	5650		6200	
16 "	7800		8000	
20 "	12,500			

The Parisian Table March 1853, gives
First water, 25 to 30 to the Carat, per carat 72
" 18 " " " " 78
" defective & second water " " 60
Third do " " " 45
Rough Eight stones per carat " " 90
Double sq. of wt. x 2 = for comparison value
Waked stones double, square x 2 =