

TRANSPORTATION
ON THE
AMAZON AND MADEIRA RIVERS
WITH THE DISASTROUS
AMERICAN RAILROAD EXPEDITION
OF
1878.

- C O P Y -

AMERICAN GEOGRAPHICAL SOCIETY
Office of the Director.

New York

19 April 1918.

Dear Mr. Hepburn:-

I have just read your interesting paper on "Transportation on the Amazon and Madeira Rivers" etc. It is a valuable record of an important enterprise and I am very glad to have had a chance to see it.

It is unfortunately too long to print in the GEOGRAPHICAL REVIEW but I want to propose that you deposit it, as a gift to the Society, in the archives of the institution, where it will form a permanent record of your work.

It would gratify me very much to know that this can be done.

Sincerely yours,

(Signed) Isaiah Bowman

Director.

Robert Hopewell Hepburn, Esq.
921 South 48th Street
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MADEIRA AND MAMORE RAILWAY

The proposed Madeira and Mamore Railway loomed large on the horizon of public attention and in the public press as a commercial and maritime proposition during the years 1877-9.

The land-end history of this really first organized expedition to leave the United States for construction work abroad has been ably compiled by Mr. Neville B. Craig, one of the most capable and courageous engineers in an exceptionally competent corps, under the appropriate title of "Recollections of an Ill-Fated Expedition". On his return, I inquired of my son- who went out thirty years later in the engineer corps that finally completed the road- if they had had any of Craig's books with them. He said they had several as it came out when they were about to sail. At first they thought we pioneers were a champion lot of exaggerators but after three months on the line they agreed that we knew what we were talking about and later wondered why we had been so conservative. No greater compliment could be paid Mr. Craig or his book and this brochure may best perhaps be described as an abridged water-end narrative of this enterprise,- with admissible collateral digressions.

After two expensive and disappointing experiences with contracting companies in England, Colonel George Earl Church- (Civil War Veteran and an authority on Mexico and South America)- the progenitor of this 200 mile rail connection around 18 falls and

rapids, through swamps and jungles and over tributary rivers from navigable waters below to those above, came to Philadelphia and closed a contract with the Collins Brothers to build the road, hence it is frequently spoken of as the "Collins Expedition".

Some of us who had previously travelled the unbeaten paths of the South American continent were greatly surprised at the lack of knowledge by the applicants for employment both as to the destination of the expedition and the surrounding conditions. As an instance:- a young acquaintance hailed me from the usual large crowd waiting outside as I came from Messrs. Collins' office. I hear you are going out on this expedition. Yes! Won't you help me to get a position as time keeper or something? Why do you want to go? Well, if I get out there I can go up to the gold mining territory of Bolivia. Something of an undertaking! Then, if I can't do that I will go across the country to Sao Paulo, I will take out letters to people there,- 3000 miles of practically unexplored country! The thing for you to do is to buy a geography, dig up an encyclopedia, study up this country and stay at home. Some weeks thereafter on nearing the landing at San Antonio with the first "tow" to relieve the almost starving forces on the railroad, a lugubrious voice wafted over the intervening space from among the men gathered on the rocks - "I wish I had bought that geography, dug up that encyclopedia, studied up this country and staid at home." However, he got back safely and is content to roam no more.

Our own Company (Mackie, Scott & Co. Ltd.) was associated with the parent organization (National Bolivian Navigation Company) and the only connection with Messrs. Collins was an agreement to

transport their material, provisions, etc. from Para' to San Antonio, Brazil, via the Amazon and Madeira rivers,- a generally accepted round trip distance of over 3200 miles. There were two departments in our organisation,- the Amazon, from Para' to San Antonio with headquarters at Para', and the Bolivian, all above the projected railroad with expected headquarters at Cochabamba, Bolivia. Mr. Davis was engaged to take charge of the first and the writer, as General Manager, for the second. Our relations to the contractors and the field work of the railroad were incidental. It had been arranged for me to sail from New York for Para' in April and make a preliminary trip if possible to the upper rivers, return and meet my corps at San Antonio, the Northern terminus of the line. This plan was interrupted by the receipt of a telegram to report in Philadelphia. A "squall" encountered during an experimental trip with one of the tugs on the Delaware River eliminated any desire on the part of Mr. Davis to take charge of such boats on an ocean trip. But the boats had to be taken out and could not "coast" down as time was an important factor, so the writer - ignoring family and friendly objections and protests - consented to substitute for Mr. Davis.

Had what occurred since anteceded us,- a similar sized "river" tug attempting an outside trip from one of our ports to some southern island lost with all hands, the name board only drifting ashore; "a little naval tug" (but 42 ft. longer and three times the tonnage of the Brazil) reported lost in a storm between Norfolk and Boston; the "ocean-going" tug Moran recently "turned-turtle" off Atlantic City and still later the "sea-going" naval tug Cherokee

of 273 tons lost off Ocean City, N. J., - the willingness to relieve Mr. Davis might have been less prompt and jaunty. It is not always easy to determine afterward just what decided us to take a certain line of action. Perhaps in this case a sea-confidence established by experiences in various blows in various degrees in various waters had an influence, possibly a sub-conscious assurance - as one put it on our return - that "there are those not born to be drowned whatsoever sinister end may await them" had its effect. Anyhow it was done.

THE OCEAN VOYAGE OF TWO RIVER TUGBOATS.

The two "river" tugboats BRAZIL and JUNO (it had been intended to rename the JUNO, BOLIVIA, but the importance of prompt departure did not admit of the necessary delay to accomplish it) left Queen St. wharf, Philadelphia, on the afternoon of May 6th, 1878 for the ocean voyage of 3200 miles via St. Thomas and Barbadoes to the City of Para', Brazil, the entrepot to the Amazon River. There were a total of thirty men enlisted for this trip.

A few personal friends of those most directly interested in the adventure and some relatives accompanied us down the Delaware river and each assumed a forced air of cheeriness to aid in keeping up the collective spirits of the party. Shortly after lunch on our way to the breakwater a leak was discovered in the bulkhead separating the storeroom from the fresh water tank in the BRAZIL; it was repaired as well as conditions would admit and we, bidding our friends adieu, plowed on for the accomplishment of what was then considered a unique and experimental undertaking.

After leaving the Delaware Breakwater we laid our course straight for the Island of St. Thomas, 1400 miles away. Both boats had their bunkers filled and their decks covered the entire length with bags of coal piled two deep.

The BRAZIL with only 86 tons carrying capacity, started with 79 tons of coal, 20 tons of fresh water and all her stores, etc.; the JUNO was overloaded in like proportion. It was remarked in going down the river that the guards of both boats touched the water; their normal position when properly loaded was two feet clear.

There was a night and day of anxiety crossing the Gulf Stream when it was impossible to remain in a bunk unless strapped in. As we watched the JUNO careen until her keel seemed visible we feared she would turn-turtle with every roll. Captain Denkin, we learned later, watched the BRAZIL with equal concern. We however reached the eastern side safely, but with a loss of some eight tons of coal washed overboard from the deck of the BRAZIL and fifteen tons from the deck of the JUNO. It was strongly suspected in the latter instance that some of the crew assisted Neptune.

The third day out the boats became separated and the next we saw of the JUNO was at anchor in the harbor of Charlotte Amalia, St. Thomas Island, four days later. The evening of this day we found that all the fresh water had leaked from the tank and making its way under our stores had run into the bilge and been pumped overboard. We had only a fourth of a barrel of fresh water left. From this time until our arrival at St. Thomas the suffering was severe and in some cases extreme, particularly among the firemen.

We had encountered more or less rough weather since crossing the Gulf Stream, but -(until our fresh water gave out)- we only experienced the expected discomforts incident to small boats in big waters; difficulty in cooking and serving meals, waves coming aboard and men washed into the life lines (ropes stretched on stanchions prepared in advance for such possibilities) until 3.00 P.M. the sixth day out from Philadelphia and the evening before we arrived in port when, contending with forced draft against strong head winds and heavy seas, a comber smashed into us and the engine broke down. We did not carry sufficient sail to make headway in such a sea but were able to get enough canvas stretched to keep headed into the wind while both engine room watches were put to work to make repairs - if possible. Fortunately with six hours of anxiety and labor we were able to patch up sufficiently to enable us with careful handling to reach our first stopping place. That night eight fierce squalls swept over us and mercifully showered rain in torrents on us. All available canvas was stretched, buckets, pitchers and cups were held at every dripping corner and spout. The water-famished men rushed to the extended sails and drank long and deeply while gloating in the deluge drenching them through and through. A home letter recently given me states that during the last day's run to St. Thomas it became necessary to relay the firemen every half hour; the relieved man was stretched out on the roof for his time off and drenched with salt water.

The next afternoon we sighted St. Thomas island, ran cautiously around its eastern side with a strong current against

us, threaded our way into its nearly landlocked harbor and let go anchor at 7.00 P.M., just forty-five minutes after the JUKO had arrived. We remained here over five days repairing and getting the BRAZIL ready for sea again.

This Island is now a possession of the United States. The legendary castles of Bluebeard and Blackbeard are situated some two thousand yards apart high up the ragged side of the mountainous island and are of very similar construction, rough, circular, loopholed towers with look-outs from the turreted tops. From their elevated yet protected positions these two reputed brothers are supposed to have kept an unceasing watch over miles of ocean and when spying a sail went forth from their harbor to play the antics of the "Hun".

Accepting the courtesies of the Captain of the Port we took an evening off to visit his home in the mythical castle of Bluebeard. The view was well worth the exertion required to ascend the acclivities. The lofty mountains clothed in semi-tropical beauty, the undulating hills sloping in symmetrical sweeps to the very waters edge, the picturesque town with its quaint buildings nestling at our feet, the harbor dotted with shipping and the ocean spread out as a map beyond, all bathed in the mellow light of the moon and blending as a painting depicted upon a boundless canvas.

We witnessed an entertaining custom on the main street of the town. Standing at our hotel doorway we heard in the distance sounds like a strange mingling of many voices with music. We hastened in the direction from which it came and met a company of Danish soldiers headed by a band. This troop was surrounded by

a large collection of negroes of both sexes, who as the soldiers marched kept up a rude chant in time to their steady tread and when the band started to play burst out in wild shouts and danced with the most uproarious merriment, monopolizing the whole street.

Ants, plums and mosquitoes cause more demoralisation than Indians, tigers and snakes in jungle work; so annoyances and discomforts figured larger than dangers in our trip. It is recorded that such things as the taste of wood from the barrels containing fresh water, which during our four days water-famine would have been considered a Godsend, water in the fore-castle and cabins, everything and everybody soaked, galley and boilers using salt water (no condensers on board), a vile smell believed to come from a poor oil used instead of varnish as a finish for woodwork and the destructive adhesion of all wearing apparel to it, off or on, and one shorn wig that stuck on contact caused the greater complaints and even threats of cases for damages before the American Consul.

Illustrative of the arrogated privilege of harbors of refuge to find strangers and take them in, we found that it was not unusual for repairs of ships in St. Thomas to be protracted "from six weeks to three months", and though "we arose at 5.00 A.M. "and started after coffee to rush this man here and that man there, "sitting or standing alongside of a lathe or an anvil, demanding, "expostulating, cajoling until 6.00 P.M. in an effort to expedite "matters, yet the minimum attained was five days time and \$1500.00 "costs."

It had been necessary to put one man in chancery during our stay in Charlotte Amalia for drunkenness and insubordination. The Chief of Police warned us of a conversation between two of our firemen of the BRAZIL, overheard by one of his men, in which they threatened to "make it warm for us at sea". This spirit of requital had been provoked by the refusal to supply them with money while in port, - as per orders. They had been paid in advance covering possible excess time to Para'. A mistake, - first, they should not have been paid in full and second, men should have a small amount of spending money in port on a voyage. This discontent in addition to exasperation caused by delayed work did not add to the gaiety of life during these days of duress, however we finally completed our repairs and filled our bunkers and fresh water tanks.

We left St. Thomas at 2.00 P.M., May 18th. We passed the Pusey, Jones & Co. side wheel steamer EL PROGRESO outside the entrance to the harbor and learned that she had left Wilmington, Del. on May 4th, two days ahead of us, had coasted down and was arriving at St. Thomas five days behind us, - a difference in running time of seven days.

We encountered a very severe storm on our way from St. Thomas to Barbadoes Island. How severe can be judged by the fact that a Royal Mail Steamer of 2000 tons register was twenty-four hours making her usual run of one hundred miles in ten hours from Barbadoes to St. Vincent Island during the same time. Many seas came aboard and the spindrift swept as high as the tops of our smoke stacks. The water supply was again threatening and neglect to oil a guide

caused a hot bearing and a broken gib which took us two hours to repair. Captain Denkin missing us came back with the JUNO to learn the cause and give assistance if needed. Whether or not these mishaps were part of the scheme of "revenge" reported by the police in St. Thomas we did not discover, but "irons" later for a couple of mutinous firemen exploded further designs if any there were.

Our two storm battered and disreputable looking boats slipped into Bridgetown harbor, Barbadoes Is., about midnight the 20th, making the run of 400 miles in two days and ten hours. We had four red crosses on our funnels as a company insignia and it may be recalled that England and Russia were not of the same opinion about Constantinople in 1878, - therefore the Russian emblem, a red cross, had particular significance at that time in an English harbor. After the three days of buffeting we decided on a late matin. The anticipated rest was interrupted early with the announcement "a man-of-war's boat approaching, Sir!" from our ex-United States Navy quartermaster. We were soon boarded by an Ensign from a large English cruiser in port for the purpose of investigating where these "diminutive boats" came from, their destination and what they were. We learned that none of the officers of the man-of-war had ever been in the United States and therefore had never seen an American tug-boat. The Ensign was a well set-up, fine looking, courteous young fellow and became much interested in our log and the inspection of the vessel. He expressed astonishment at "the recklessness in undertaking such an ocean voyage in such craft".

The interesting episode of gratuitously towing a full rigged American ship, that was in trouble, out of the harbor with the JUNO against both tide and a head wind is related in Mr. Craig's Recollections.

The officers and crew of the man-of-war and the inhabitants of Bridgetown, who had gathered on the quay, gave us an enthusiastic "send off" as we started on the last leg of the journey.

Mr. Smith (a Confederate veteran who had had some thrilling experiences in blockade running during our Civil War) a representative of a Baltimore china and glassware house, who in St. Thomas had suddenly become enthused with the business possibilities for his people in Para' and the excitement of a sea trip in a tug-boat, had come to me to ask to be taken out with us. We had demurred, but a congenial companion on board was a temptation and we had finally consented provided he would go to the American Consul and formally release us from all responsibility and liability,- this he had done and had been thereupon signed on as assistant steward. The "excitement" from St. Thomas to Barbadoes evaporated his Para' enthusiasm and he now said he had decided to try the trade in Bridgetown, but was told that he was booked for Para', that his trunks were in the hold and that his company had been so much enjoyed thus far it had become indispensable. He had had enough,- but went to Para'.

We left Barbadoes at 6.00 P.M. on the 21st. For several days we continued to have head winds and heavy squalls with furious rains and we and our quarters were drenched. The occasional "glassy" sea and tropical day were revelled in. Reviewing the memories of

youthful literature descriptive of these localities we unanimously concluded that there were several Jonahs on board. Everybody was bruised and sore from being knocked about and Captain Denkin hailed us to say that he would not be able to sit down until his contusions healed.

The JUNO dropped entirely out of sight on the 23rd. We ran back and found the cause to be another broken gib. We supplied a spare one and were soon under weigh again. Encountered strong head currents about Lat. $7^{\circ} 10'$ N, Long. $55^{\circ} 55'$ W, course $S 45^{\circ} 25'$ E; frequent heavings of the log showed a speed that should have given us a run of from 225 to 230 miles while our sights only gave 188 miles for the 24 hours. On the morning of the 25th, with squally weather and a choppy cross sea, passed through heavy "tide rips". The man at the wheel, from the appearance of the water, shouted "breakers ahead".

In heaving the lead at 10.00 A.M. on the 27th, we brought up river mud in nine fathoms of water some fifty miles off the mouth of the Amazon and over a hundred miles from Sabinas Light Ship stationed at the navigable entrance to the river. Though still in the ocean and out of sight of land, we were steaming through nearly fresh water. We had read and heard that the waters of this great river rushed out of its several mouths and displaced the sea for many miles but had scarcely credited it until proven by this personal experience.

The next startling occurrence was the signal from the JUNO at 5.00 P.M., "no more fuel". Disconnecting the propellor shaft the BRAZIL took her in tow and all went well until 2.00 A.M. on

the 28th when the hawser parted causing a short delay. Squalls and heavy downpours of rain were frequent and we were far from comfortable, no attempt was made to sleep. Early on the morning of the 28th the Chief Engineer of the BRAZIL shocked the remaining composure out of us by reporting only seven or eight tons of coal left. With the JUNO in tow, nearly 100 miles from a safe anchorage and a four mile current against us the outlook was not cheerful. The remaining coal was ordered sacked and issued to the firemen in small quantities. We decided to keep on as long as steam could be kept up. The distance to Para' when our last fuel should be under the boilers would determine our future action. Fortunately while sacking the coal the engineers found the bunkers extended beyond the bits and another chance was vouchsafed us.

At 7.30 A.M. we passed Sabinas Light Ship and were soon in Marajo Bay where we coaled the JUNO and proceeded up the Para' River under forced draft, - ran by and saluted the U.S.S. ENTERPRISE. Anchored off the city of Para', one hundred miles from the sea, with less than three tons of coal on both boats, at 6.30 P.M., May 28th; 22 days, 3 hours and 30 minutes out from Philadelphia, and actual running time of 16 days, 6 hours and 45 minutes.

We were congratulated by the officers and men of the ENTERPRISE and by the people ashore for accomplishing what had been tried but never before achieved.

The success of our trip is accredited with the inauguration of the "ocean-going" tug.

THE CITY OF PARA'.

The high sounding titled city of Santa Maria do Belem do Gran Para' is situated on the Rio Guajara or what is commonly known as the Para River,- an elbow of the Amazon connected with it by various intersecting crossals or natural canals. It is 90 miles South of the Equator and had a population of 35,000 in 1878. The town is built upon low but slightly rolling ground hemmed in on every side except the river front by the rank and dense vegetation of the "Forest Primeval" and its encroachments required constant attention. The business part of the place was not particularly attractive to foreigners though there were some very good stores and some excellent buildings. The houses and buildings were mostly one story high, square and built of brick or stone plastered over, or of adobe - sun dried mud or clay bricks. There were exceptions in the heights of the structures even to three stories, particularly on the quay. The main streets down town were partly paved but in the suburbs the roads were miserable and full of rut holes, the pavements were very narrow, irregular and ill laid, so that both custom and comfort combined to make the streets preferable for pedestrians as well as for all other travel. The Theatre Building was very fine, a semi-modern Corinthian style of architecture, built of Ferruginous Brazilian stone with columns of Portuguese marble; it was said to have cost \$400,000; Sunday evening was the most favored time for entertainments. The Hospitals, of which there were two, were well conducted and as cheerful as such institutions can be

made and it was claimed that all the stone for the construction of one was brought from Portugal. The Hotels were not up to our standards of comfort and the cooking would not have thrilled the heart (or stomach) of an epicurean. Lizards crawled up the walls and cockroaches abounded. Some of us did not suffer greatly from the bed bugs and fleas but others of our party was fastidious and waxed wrathful and said hard things as they bounced out of their hammocks and pantomimed around the room when these diabolical specimens put in an active appearance. It was very amusing to hear the shivering description of a recent arrival as he depicted his feelings while watching the slow and easy progress of a lizard across the ceiling just over his head, expecting it every moment to drop into his hammock or bed.

The residences of the "Elite" of the city were mostly in one of the suburbs called Nazareth. The houses of this portion of Para' were large, airy and comfortable and with few exceptions confined to one floor, terraced and surrounded by pleasant yards; the whole villa was very attractive. Palm Avenue - a street quite decently kept and famed for the row of Palms, their large and spreading foliage far up the trunk almost interlacing and making a complete arch, extending a half mile on either side of the way, similar to but not so impressive as the Avenue in the Botanical Gardens at Rio de Janeiro - was the great thoroughfare for walks and drives. There is a church - churches and cathedrals are legion in South America - in this section called from its site the "Church of Nazareth". Its peculiarity is based upon the same principles

as the legendary one of Germany; anyone stricken with a perceptible ailment goes to the shrine of this sanctuary and prays for relief, promising if cured to place a cast of the diseased member or part of the afflicted anatomy in an appointed receptacle for such contributions. Many are the quaint relics deposited in this sanctum sanctorum. When with a party of Officers from the U. S. Man-of-War ~~ENTREPRISE~~ we visited the place a few of our party bribed the attendant and secured souvenirs from the collection. Among other curious things was a complete plaster ship; we learned on inquiry that the donor had been in imminent peril at sea, had prayed via the Church of Nazareth for succor, was saved and had dedicated this model of the vessel to the shrine as a thank offering.

Para' was the best town in the Amazon Valley and we could all agree with Prof. Orton after a return from the first few months experiences up the river,- "that Para' in comparison was delightful".

There were some very creditable customs among the traffickers of this locality, one of which was the interesting practice of driving the cows around in retailing milk and milking the requested quantity under the eyes of the customer,- a calf usually accompanied each cow and its age was supposed to be an assurance of the freshness of the cow. Whether the calves belonged to the cows or were hired out was a much debated question.

The local habit of working was very exasperating to one fresh from America du Norte, a slow, easy, indifferent way of moving with holidays twice a week when time was wasted in the riotous dis-

charge of rockets and firecrackers by daylight. Patience had ample opportunity to be perfected or subverted while helplessly watching a string of a dozen or more carriers with wicker baskets on their heads containing some 50 pounds of coal deliberately meander down a pier to load the barges; it was worse up the river when steamers took on wood, - every stick was counted and it was asserted that if a dispute arose it was all taken off and the count begun over again.

The laundry methods were primitive. The linen and underwear were pounded between stones as substitutes for washboards and it usually took two or three weeks to get them returned; a strong suspicion prevailed that this clothing of the "Gringos" was hired out in the interim on holidays and Sundays to aspiring natives.

The lower classes dressed (or undressed) very close to nature; the young children entirely so. They lived in floorless and windowless huts, the doors admitting the only light and ventilation to the dwellings. The towns and villages on the Amazon and Madeira Rivers consisted of anything from ten to one hundred houses and the same conditions and manner of living prevailed. There were exceptions of course but not many. The natural richness and productiveness of the land with the enervating climate engenders this lassitude, contempt for the luxuries of life and indifference to habitation.

Prof. Orton in his work on South America denominates Para' as the New Orleans of the Amazon Valley, and it is the boast of its citizens that the United States could be dropped into this basin

and not touch a boundary line, this conveys an impressive idea of the great periphery of this immense but unsettled territory. The numerous sand banks and shoals blockading the main outlets of the Amazon River preclude a rival city to Para' on the opposite side of Marajo Island. Its commercial supremacy was unquestioned. There were four lines of ocean steamers calling regularly and some thirty steamers operated by companies - of which the Amazon Company stood first - whose headquarters, shops and depots were here and brought all the trade of the rivers to this port.

The merchants of Para' almost exclusively controlled the exports and imports of the Amazon basin. The manner of conducting this trade was not always up to the standard of the commercial ethics of idealists, but promised to preserve the monopoly of it to them for an indefinite period. According to the then laws of Brazil a creditor could compel a debtor with his whole family to drudge out the payment of his claims. These merchants essayed to retain the owners of estates and rubber lands continuously in their debt and this was one of the great difficulties that confronted Americans when they attempted to compete for the traffic of this region. A debtor was therefore not likely to change his business relations with slavery confronting him. The debtor class did not seem to possess the means or stamina to eliminate its indebtedness nor did there appear to be any ready way of eradicating the evil. When the sufferers were obviously so inoculated with this system of dealing that they were indifferent to any innovation or improvement, it was not an encouraging prospect for the intro-

duction of American fabrications other than through the already established houses.

The postal methods in Para' were quite aboriginal. Upon the arrival of the mails the call letters were all thrown upon the sill of a large window entirely exposed to the view and examination of everyone who entered the building. After they had remained in this receptacle for some time they were transferred to a large table just back of the official railing and anyone could help himself by simply asking for the letters; not even a name was asked or required, and it is easy to imagine the safety of important letters under such circumstances, especially with a number of "Collins' Deserters" around having as easy access to our mail matter as we ourselves had. Sometimes it was and sometimes it was not amusing to have one or more friends hand out letters saying, - "we feared they might be lost so took them with ours".

The larger steamers anchored off what was known as Forte-da Barra, three miles below the city, but in recent years Para' has built modern port works enabling the largest steamers to dock alongside commodious warehouses with electric travelling cranes. There are many other improvements in the city, the principal streets are well paved and lighted by electricity, a water and sewer system is installed and an excellent trolley service. New and comfortable hotels have been built and there are several attractive parks and squares. In fact the entire city has been modernised.

TRADE.

It is well known that the aggregate productions of the Amazon Valley are vast and valuable, but when the numerous tributaries from which this aggregate must be collected is considered it changes much of the proclaimed Eden for immigrants into vast reaches of desolate and uninhabited wilds. If a business venture in this part of Brasil is contemplated it will be wise to have it conclusively shown by both investigation and visit that the marts are open to competitive trade.

In 1878 the Madeira River district exported some 700 tons of rubber annually or about one ton per mile. It was collected by steamers traversing the river and obtaining a few tons at irregular intervals and this method was followed in collecting all the other varieties of products, - oil of capibai, Brasil nuts, guarana, dried fish ("peracaru"), etc. They did not cultivate the indigenous plants in this section, they may have improved and nourished slightly what nature had given them but that was all.

In this connection a somewhat irrelevant generalization on the subject of our business prospects - as a country - with South America may not be incongruous.

From an excess of supply over demand we, as a nation, are compelled to look abroad for an outlet for our super-abundance of manufactures, merchandise, cereals, cotton, etc., and the countries to the South of us appear - and are - attractive as an absorbant for our relief. The fervid eloquence of those who have never known these people either in their business or social relations is likely to be misleading when they declaim of the ease

with which the future commerce of Latin-America can be secured.

England, France and Germany have for years carefully studied their foreign trade in all its phases, bearings and relations and have taken advantage of every favorable circumstance and condition to forward and forge their intercommercial relations upon all the countries and states with which they have dealings. They gave from six to twelve (and sometimes more) months credit in South America while we, as a rule, required a deposit on orders - the residue to be paid on delivery of the shipments at their destination - or cash upon presentation of the Bills of Lading to the consignees in the port where the materials and goods were loaded. Our competitors did not "subsidise" their numerous steamship lines, but granted generous mail and other "considerations", - a distinction without a difference.

Our maritime attempt at this time was a fiasco. If we seriously propose to obtain a preponderance of South America Trade and Exchange - which by the natural laws of commerce should always have been ours - we must strive for it. We can ultimately get it if a sincere effort is made with the determination to persevere in the face of all obstacles and disappointments and - to succeed. The ships of England, France and Germany were more numerous than ours and the money that built them was procured at three per cent. while the money that built our competing steamers cost six per cent. and the wages of our mechanics and seamen were much higher than theirs. We therefore must establish direct banking relations and by our geographical advantages, with Government aid to the merchant

marine, overcome these handicaps; we can then hope to meet our contestants "across the Pond" successfully. The quality and price of our goods must establish confidence and inducement; deception or so-called shrewdness might in an hour destroy the labor of months. These conditions will be as existant after the European war is over as they were in the late seventies,

After circumtouring the South American Continent in 1877 from Northern Brazil to the Straits of Magellan, then up the West Coast to Panama, diverging into interiors en route, the writer presented these opinions at a large meeting of citizens in the Board of Trade rooms in Philadelphia and they were endorsed by those present who were interested in and familiar with South American commerce.

Mr. Raymond G. Carroll and other recent writers on this subject have justly scored American exporters for lack of judgment in neglecting to make thorough and intelligent investigation of conditions and requirements in the South American Countries by capable and responsible representatives, authoritatively accredited, in order to be informed as to what can be successfully marketed (particularly the kind, class and colors of goods.- thereby hangs another tale) in each province. Give them what they want, not send what it is thought they should buy. Educate them if wished to other and better things after having secured their confidence and friendship. There are some things also to observe on the converse side.

Our people should recognize and appreciate the great pioneer work of the National City Bank of New York in establishing branches throughout this Continent. The Ishmaelite and Iconoclast are abroad

in the land and can see only selfishness in such undertakings, - having no National spirit themselves they cannot understand it in others.

As a people South Americans were not friendly at heart to foreigners. There were exceptions but this fairly expressed the national feeling. Due doubtless to faults on both sides.

The prompt and energetic action of Brazil in the prevailing world war has proven not only the latent possibilities of her people but also their great development and advance under a Republican form of government, whatever personal esteem we may have had for "Dom Pedro". The more commendable in contrast with the surprisingly desultory policies of Argentine and the inertia of Chile.

Mileage on the Amazon and its tributary rivers as given was unreliable and I understand is still without definite determination. A single comparison will show the diversity of computations.

From	To	Lieut. Herndon.	Prof. Orton.
Para'	Santarem	738 miles	643 miles
Santarem	Obidos	85 "	50 "
Para'	Serpa	1078 "	843 "
Para'	San Antonio	1558 "	1419 "

Between Tabatinga on the Brazilian frontier and the Ocean - 2100 miles - the average current in the Amazon River is three miles an hour and between the Rio Negro and the Sea - 1000 miles - the fall is nearly one inch to the mile.

THE FIRST TRIP TO SAN ANTONIO

We were delayed in starting up the river seven days more than necessary by the remissness of our consignee, Mr. Pond, in

clearing us at the Customs House. Mr. Pond was acting as the agent at that time for the contractors, during a temporary absence of Captain Lima in Rio de Janeiro. This gentleman's (Mr. Pond's) penchant to relate the precarious condition of Messrs. Collins finances did more to injure their credit in Para' and to reflect upon this enterprise than all other influences combined. Captain McLane of the schooner "ANTHONY" was sadly wrought upon by the statements of Mr. Pond and the asseverations of gratuitous and equally ignorant informants, - "that the Madeira River was not navigable during the months of June and July for vessels drawing over eight feet of water", and his vessel drew fourteen. He therefore became very anxious to discharge his cargo into lighters in Para' harbor. He would come to us in all kinds of moods, from desperation to despair, requesting permission to discharge at once and not risk losing his vessel in a rash attempt to take it to San Antonio. Believing that he would levy on the cargo for his charter fee, some \$4000., as soon as his vessel was unloaded and delay the provisions so badly needed on the railroad it was impossible to consider his wishes and he was ordered to be ready to start at an hour's notice; he protested but acquiesced quietly when the hour of departure arrived.

We started from our anchorage at 12.30 on the morning of Friday, June 7th, with the JUNO towing the three masted schooner D. M. ANTHONY loaded with 700 tons of railroad iron, coal and provisions and a 200 ton iron lighter loaded with 128 tons of coal. We were at last "off" to test the power of our small boat for nearly 1700 miles of incessant steaming against varying currents.

Starting down Para' River, around the point of Oncoas Island, across Marajo Bay, by the mouth of Tocantins River, into the Jararaco River, into the Eugenio River, into the Breves River, we finally entered the natural passage called Para'-Aturia, the narrow upward bound channel to the Amazon. This Para' or canal is very narrow and very deep, we did not get bottom with 33 feet of our lead line. It is so narrow that one channel is used for steamers going up the river and the other for steamers coming down to Para'. It is doubtful if there is any place in this twelve miles that two steamers could pass each other with safety; thence into the Tajapura, into the Furo-Companhia, passing en route several towns, villages and huts dotting the forests here and there, and entered the world renowned Amazon River at eleven o'clock Saturday night, 35 hours out from Para'.

The forests thus far on our way were beautiful and grand. One could readily conceive the enthusiasm of a Naturalist as he drank in these wonders of the botanical world; the slender graceful Palm with its branchless trunk crowned with dome shaped foliage, the vine clad trees forming the luxuriant arbors of nature, the brilliant Parasites clinging in beautiful yet deathful embrace to giant trees, the great ferns and the wonderful orchids with plants and tendrils innumerable and unknown, all combining to produce a labyrinth impenetrably dense except to Indians, Boa Constrictors and other denizens of these wilds.

Marcy's vivid impressions of this profligate vegetation grow with time and experience in the jungle:-

"The first impression will be one of stupefaction,
"speedily followed by disenchantment. Instead of the light
"and space one has been led to expect, a greenish twilight
"will show every object at the same uniform tint. Instead
"of the umbrageous glades and broad foot paths through which
"one has wandered in imagination, ^{an} /inextricable entanglement
of leaves and branches savagely armed with sharp thorns and
"claws will arrest his progress at every step. Laden with
"the exhalations of the soil and the perpetually decaying
"vegetation, the air - dense, humid, hot, enervating, satur-
"ated with offensive odors and overpowering perfumes - will
"react on the brain and nervous system. Every object exag-
"gerated by a singular optical illusion will assume an air
"of mystery and strike with dismay by its very contour.
"The decaying trunk half smothered with foliage will suggest
"the idea of an enormous Jaguar crouching in the shade. In
"the liane of the Strychnos one will fancy he sees an Anaconda
"ready to swallow its prey and in the various species of run-
"ners so many snakes suspended from the branches of the trees.
"Let a breath of wind but stir these mysterious forms and give
"them the semblance of life and the trees, the liana, the run-
"ner will begin to roar, to bite, to spring up. In the midst
"of profound silence strange sounds will suddenly be heard of
"which it will be impossible to explain the cause - low rumb-
"lings, curious knockings, gratings, cracklings, now here, now
"there in the dense thickets, feeble sighings, vague complain-
"ings, stifled groanings which he will be tempted to attribute
"to human voices will chill the blood with an indefinable terror."

Yet this wonderful prodigality of nature grew terribly monotonous as mile after mile of the same unvarying scenery met the eye. While looking upon these wilds one never feels the same enthusiasm as that which thrills the senses when gazing from some mountain height upon a panorama of hill and dale, light and shade, with green pastures and running waters variegated with the civilisation of farm houses and cultivated fields. The botanical beauty of these forests undoubtedly contributed to the exaggerated reports and opinions of the wealth and productivity of the Amazon Valley. Most writers of this region were scientists and naturalists and their practical judgments were warped through their enthusiasm over the luxuriance of nature.

The Amazon river is apt to disappoint the expectations of a visitant familiar with it only as the largest tributary of the ocean on the globe. The waters are of a disagreeable yellow color and so muddy that the prospect of using from them the sole beverage for some considerable time predisposes one to denominate the whole water system of the Valley a delusion and a snare. The river is so dotted with islands that it is in only rare instances a view of its real width is obtainable. It is not an unnatural result after weeks of navigation upon its waters to describe the Amazon as only a muddy river full of islands and hedged in by an unending jungle. Its grandeur as a stream and the beauty of its wonderful forests dwindle into an annoyance and a complaint. Yet it has an average width of five miles and an average depth of 60 feet for 1000 miles of its length, and is navigable for light draft steamers 3000 miles. A trip up and down this 3000 miles in

a speedy boat with a clear, awninged upper deck and protected shelters for retreat during severe showers, commodious quarters, good cooks and suitable food, stopping when, where and as desired, would be delightful, - but these were not our conditions.

There was little opportunity for us to acquaint ourselves with the various species of fish populating the river. The Piraracu and Lamantin were great staples of food when dried and with farina and rice composed almost the sole subsistence of the poorest classes. Wonderful stories were told of the voracity, fierceness and hostility to man of the white and red porpoises, the sword fish, the electric eels and other innumerable denizens of the water. Myriads of dangers were proclaimed to beset the daring swimmer.

We passed the town of Gurupa', 300 miles from the ocean, June 9th. This odd looking villa is supposed to have been originally established by one of the Dukes of Nassau in 1620 and there still remained the ruins of an old fort though nearly overgrown with weeds and brambles. Gurupa' is the furthest point up the river where the current is effected by the tides from the ocean although they are perceptible along the banks as far as Obidos, 250 miles above.

We passed the mouth of the beautiful, clear Tapajós river June 11th. Upon the right bank not far from its mouth was the town of Santarem, one of the most flourishing places in the valley. It was some 20 miles back of this town that a colony of "Southern Refugees" settled in 1867. They became disgusted with the country and the results of their labors and straggled off until but a very small remnant was left. It was at Santarem that Commander T. O.

Selfridge rescued and took on board the Enterprise, a little orphan girl of one of these Argonaut families,- and thereby hangs an interesting episode. From Tapajos to the Madeira both banks of the Amazon were lined with cocoa plantations on narrow strips of land back from the river and less than 300 feet in width.

Two days later we passed the town of Obidos. This is the last known spot on the Amazon where the tides from the ocean are in the least discernible as previously stated. Obidos is very prettily situated on elevated ground; and old fort possessing a few obsolete guns commands the "Dardanelles of the Amazon"; the river here is only one mile wide with a current rushing through the neck at a rate of over four miles an hour. There was a considerable cattle trade from this section, the rolling country affording good pasture.

We arrived at Serpa, our last town on the Amazon, June 17th, having made nearly 1000 miles against an average three mile current in 10 days and 10 hours. We stopped here to overhaul machinery preparatory to encountering the difficulties of navigation in the renowned Madeira river, which empties into the Amazon 30 miles above. Serpa is situated on a sixty foot elevation upon the left bank of the river. There was a population of 600 to 700 and a custom house for provincial exports. We were detained eighteen hours and took occasion to see the town, which was a dubious looking settlement but with buildings a little better than the average villages along the route. Learning that Mr. J. W. Stone, an American from Massachusetts, owned a fazenda a mile down the river, we decided to pay our respects to him and if possible acquire at least some reliable general information. We were cordially received and enter-

tained with many interesting chapters from his early experiences in this locality and vicinity, which experiences, however, did not enhance the attractiveness of the country to us. We availed ourselves of the opportunity to obtain a supply of mutton and tobacco. Was the tobacco strong? Strong would be putting it too mildly. We found an unmixed pipeful produced all the sensations of a raging fever. It became thereafter "a half way house" to us. Mr. Stone also was impregnated with the risks of navigation and dangers from fevers and Indians on the Madeira. If we had been looking for assurance and encouragement we wouldn't have found any of it thus far. We here met the first party of "refugees" from the railroad. They related their adventures rafting down the Madeira,- suffice it to say these were followed in various ways by numbers of others.

The principal southern branches of the Amazon River are the Tocantins,- which rises in the mountains of Goyaz, the rich mineral district of eastern Brazil, is navigable during high water to the first rapids 150 miles from its mouth, Brazil nuts almost the only trade,

Zingu,- is navigable beyond Souzil, 90 miles, exports were nuts, rubber and estopa,

Tapajos,- wide but shallow above Santarem, is navigable for light draft vessels 175 miles to Itainba, exports rubber, hides, lumber, tobacco, coffee, cacao, farina, copaiba, sarsaparilla, nuts, &c.

Madeira,- fuller description follows.

Purus,- rises in the richest part of the Andes, is navigable for 1000 miles to Hyutanahan. At a distance of 600 miles from its

mouth has a depth of not less than 12 ft. all the year, is remarkably free from islands and rapids, is very serpentine in its course, reputed healthy, had more inhabitants along the banks than any of the other rivers, exported rubber, copaiba, turtle oil, sarsaparilla and fish.

Juruá,- is navigable for 500 miles to Marary and by light draft steamers nearly 500 miles further, is free from snags, the exports are similar to those from the Purus river,

and from the North the Rio Negro,- the head waters of this river are a comparatively short distance from the sources of the Orinoco,- is navigable for 546 miles to San Gabriel, exports piassaba (a valuable substitute for hemp) sarsaparilla, drugs and the finest of woods. It was near the rapids of this river while canoeing up stream that we tried unsuccessfully to converse with an Indian boy paddling his canoe down to the tune of "Hold the Fort"; good missionary work thereabouts somewhere.

We completed overhauling the machinery of the JUNO and got under weigh from Serpa at 5 A.M. June 18th, leaving the coal barge tied to the bank for our return in order to continue the trip under as favorable conditions as possible.

MADEIRA RIVER.

We passed into the now famed Madeira river - the largest affluent of the Amazon - against a four mile current at 12 o'clock the same day.

Rio Madeira means river of wood,- a name derived from the large quantities of trees annually carried down by its waters in

flood. Numbers of these trees become water-logged and sinking, form barriers to navigation as snags only less dangerous than the flotilla from which they have become detached. A noticeable percentage of these trees were cedar and this fact allured my son - George H. Meyburn - mentioned earlier in relation to Mr. Craig's book - to engage in a canoe-exploration of "the deserts of the Beni" river with the object of locating any big tracts of this timber that might be found in the forests from which the trees were supposed to have come. The Madeira is formed by a confluence of the Beni and Mamore' rivers. The first exploration was made in 1716 and the fatality of its fevers and the dangers of its navigation had descended in a regular succession of literature, legends and tales. It is the great river for turtles, one of the principal luxuries in the diet of the natives. Many are of great size. The cry of Tataruga! Tataruga! would resound in glee from pilots and Custom House officers at the sight of turtle heads appearing above the surface of the water as we ran by. They always urged us to anchor and go after them. It was very interesting to watch the semi-civilised Indians in the process and act of shooting turtles. We would occasionally see them engaging in this sport or source of living. Their canoes were usually ranged in a line with the first one anchored or attached to a snag and the others fastened in succession, each to the one ahead at apparently regular distances. In each canoe one Indian stood in an extreme end with arrow fitted in bow inclined toward the water and prepared for instant use. They were in rows of six or more and the shooter would stand erect and rigid for an hour at a time. When a school of turtles approached, their progress

quicken by a swift current, ocular ranges were taken, upward sped the arrows in mid-air (incredible as it may seem) and descending with accelerated velocity the arrow-heads were driven through the thick shell back of the turtle. It is seldom they miss the moving targets. The shaft of the arrow was joined to an elongated spear shaped head in a neatly fitting groove fastened together by a coil of gut or strong twine so that as the turtle dove, which it did after being struck, the flint or iron head remained imbedded in or below the shell while the shaft, unreeling, floated on the surface of the water, not only retarding the movements of the turtle but also indicating its whereabouts. The Indians casting off, followed, caught the shafts and pulled their prey hand over hand into the canoes. It is almost unbelievable that ignorant aborigines should have obtained by simple practice such mathematical accuracy. The Indians occasionally shot directly at the heads of the turtles which, with a small part of their backs, were all that was visible above the water, but if they missed these small targets they lost their turtles as the arrows glanced off or did not have sufficient force, except at short distances, to penetrate their hard backs.

There was much discrepancy in the various reports and accounts of the Madeira. As it annually rises and falls some 48 feet it will be conceded that there was plenty of latitude to disagree upon, particularly when it is remembered that the famous river Nile averages less than 30 ft. in its annual overflow. The people of Para', even those who made a pretense of being informed on the subject, knew little or nothing about the real conditions existing on the river. There were no two parties of navigators

who agreed upon its length. It was said to be everything from 450 to 750 miles long from its mouth to San Antonio. It is very tortuous, one bend required a run of 40 miles of water to gain an air line distance of 18 miles. The changes in the regular channel during floods made navigation at low water extremely hazardous in a number of places for vessels exceeding six feet of draught. It is more muddy than the Amazon and in consequence it is impossible to see below the surface. It was certainly an uncomfortable stream to navigate at times.

The forests of the Madeira are somewhat more free from undergrowth than those of the lower Amazon, though they are dense enough; the trees are larger and more numerous; the noted fire wood *Pao Mullato* is found on the banks in large quantities, it is claimed to be almost equal to coal.

Eighty miles up the river we passed the town of Borba once famed for its tobacco, below which the seringa and caoutchouc (the best rubber trees) are not found. It was the terminus of transit on the Madeira under the law of 1867 making the Amazon river free to the flag of all nations. From here to San Antonio we sailed under special privileges.

We passed the U.S.S. *ENTERPRISE* just before reaching Manicore'. They sent a boat over to us to get such mail as we had for them; this gave an opportunity for a few moments chat with acquaintances in the gig. The *Enterprise* was sent out by our Government to survey the Amazon and Madeira rivers in the interest of Science or the Madeira and Mamore' Railroad, - we were never sure which.

At Manicore' our papers were examined by the authorities and we were than cleared for San Antonio.

Dense fogs and dangerous places compelled us to anchor three nights during the remainder of the trip, although it was during moderately high water.

The Steward of the Anthony had caught a toucan and was very proud of his odd bird. It was a most peculiar looking fowl,- an ordinary sized brown body with some little color distributed in spots and attached to a prodigious beak,- its whole appearance was most ludicrous. The Toucan made a raid on the chickens and the Steward went for the Toucan. The next instant the Steward was dancing about the deck with the Toucan dangling from his hand by its bill. As he hopped about he shouted - "'ave I got 'im or 'as 'e got me". The shouts of laughter that ensued were only exceeded when having extricated his fingers he stood off scrutinizing his grotesque visaged assailant and remarked "that baird is not sich a fool as 'e looks".

The afternoon of June 28th we anchored inside the bar off San Antonio and were greeted with vigorous cheers by the hungry members of the Expedition. We made the trip in 20 days and 15 hours from Para'.

SAN ANTONIO AND THE RAILROAD.

The first impressions of San Antonio as it broke upon the view in rounding a long sweeping bend some four miles down the river were unexpectedly favorable and the effect was certainly picturesque. The elevated rocky ground faced the river at two angles. The large building nearly completed for engineer headquarters and the frame cottages of Messrs. Collins and Nichols (Resident Engineer; later Chief Engineer of Bridges, New York City) made a

pleasing contrast with the quaint barracks and the huts of the natives, while the Falls blocking up the river and terminating water transit except by canoes, added to the apparent attractiveness of the place. Unfortunately these favorable impressions were thoroughly dissipated after a few days sojourn.

The first reports from the camps that came rolling back like a tidal wave to the newspapers at home were founded on facts but were much exaggerated. There certainly had been much suffering from lack of proper food previous to the arrival of the JUNO with the schooner ANTHONY in tow. Corn meal and hard-tack was the staple diet, - monkeys a luxury. Homesickness demoralized many and in one instance at least was fatal. Among the axemen brought down from our "ain countree" (the West Branch Valley) was a particularly splendid specimen of physical manhood who became obsessed to get home. The fervor of his appeal to be taken down to Para' caused a request to Mr. Collins for his discharge. It was refused on the broad ground of a dangerous precedent. It was hard to repeat it to him. We were told on our return that he sat on the landing rock watching us disappear on the horizon until out of sight, then silently went to his hammock and - died. Relating the surprising consequences to an Uncle - Brig. Genl. Surgeon Hayes - he said that real and intense homesickness came to be recognized by the Medical Department as a disease during the Civil War, the remedy was a few weeks furlough. Aptitude, Adjustment and Morale are as essential in the jungles as in war. The non-realization of expectations was a prominent factor in discontent. The luscious banana and the succulent pineapple of imagination were not, in

lieu of them was a dense, gloomy, humid, impenetrable jungle. Of the 500 odd laborers taken out by Mr. Collins for this work probably one-half or more were capable, earnest men. A considerable number of those originally selected decided on further consideration or persuasion to remain at home and sold or gave away their passes to the steamers, hence many young fellows seeking adventure and some of the vicious elements of humanity deluded by the lurid stories of a tropical Eden became part of the Expedition. Few of these were fitted to endure the climate, the hardships or the conditions. It was not surprising that progress was slow and "Tom" Collins at times became "rampant".

Snakes there were in abundance and big ones, but they had a large domain to roam over and were not often seen. Travellers and Naturalists have expressed astonishment at the paucity encountered in these regions, particularly in comparison with their expectations. Snake stories were plentiful, - "we dug a ditch during the day, it was so filled with snakes in the morning they had to be burned out before we could go to work" could be very liberally discounted. The Indians trapped and killed the larger snakes and occasionally brought a skin to San Antonio. One boa-constrictor skin offered by an Indian for barter measured over 19 feet in length.

The Indians after a first appearance were an ever present liability. Their first victims were two Bolivian Indian carriers. The arrows extracted from one of them was in the possession of Mr. C. W. Buckholz ("Chief of Surveys"), they were nearly 6 ft. long and the feather ends were "rifled". The wild Indians were ferocious, particularly the Parintintins, reputed cannibals, with the Caripunae

a near second; the domesticated were generally quiet, tractable and industrious. The arrow poison (Urury or Curare') was said not to be made from the venom of snakes as popularly supposed, but from the bruised stems and leaves of several indigenous plants mixed with other ingredients; the effect - bodily torpidity with mental activity. Shortly after anchoring one evening in the Madeira there came cries and shrieks from the shore. We went over in the dinghy to investigate the disturbance and as we approached the bank were greeted with shouts of Caripunas! Caripunas! We successively conveyed the frightened rubber gatherers to the boats for the night. They would not return to their camp the next morning unless escorted by an armed guard, so we accompanied them with our Winchesters and skirmished in, among, around and beyond their shacks without unearthing, or unjungling, any Indians. They then consented to remain although evidently still uneasy and distraught. The Indians rarely attempted an attack on a number of armed men, and in this connection it may be remarked that a hard shooting shot gun with wire cartridges containing twelve buckshot is the most suitable weapon for these forests, - pellet shrapnel; and, of course, a 38 or 45 automatic might be useful for close work.

There were tapir, peccary, deer and "tigers" (jaguars) in the vicinity of the Falls, but infrequently visible. Birds of wonderful plumage, parrots and monkeys swarmed in the forests.

Insect life beggared description; the marauding ants in armies - rank and file, sand flies, piass, flying ants, maruina, and - others. The bites of both the red and black ants infesting the woods were venomous, - a bite on the hand, as it swept a bush on

Araras Island, by a red ant became inflamed and affected the arm to the shoulder. The pests of this region defy exaggeration, but fortunately well up the Madeira the nights are frequently cool and annoyances largely cease except for the ubiquitous mosquitoes, - and such mosquitoes!

The Vampire bat is a reality.

Our meteorological records on the rivers show an average of nearly 90 degrees in the shade all these months.

San Antonio is not quite nine degrees South of the Equator and is close to the 65th degree of longitude West from Greenwich (Eng.) and was the N.W.E. terminus of the railroad, which was expected to compete favorably for the transportation of the exports and imports of Bolivia from the Eastern slope of the Andes; it is now finished and should fulfill expectations.

The Islands and places said to be especially dangerous to navigation passed en route were:- Araras, - Uroa (sometimes spelled Orua), - Manicore', - Jatuarana, - Marmelos, - Jurara, - Botas, - Popunhas, - Papagaicos, - Abelhas and San Antonio bar. None of them proved serious on this trip, though the Schooner Anthony touched bottom once without damage, but gave Capt. Molane nervous prostration and insanity until San Antonio bore in sight.

It may be an interesting fact that we passed the mouth of the Rio Duvida, now Rio Theodore, by which Col. Roosevelt reached the Madeira from his South American jungle experiences.

Islands were numerous and the ends were carefully avoided as sloping sand bars extend out from them.

There are many small lakes on both banks with narrow

outlets to the river called igapos. These lakes were dotted with huts of the seringueros, - semi-civilised Indian rubber gatherers.

Alligators abounded in the upper reaches of the river.

The rainy season on the Madeira commences in November and ends in April, - though severe sometimes torrential showers are frequent during the dry season.

From the middle of June to the middle of July the river fell over 10 feet.

The rubber of the Madeira was of unrivalled excellence and was gathered from May to February. A domesticated Indian would collect 6 to 8 lbs. a day. The tree producing such rubber grows and thrives in a soil where its stem is annually submerged by the floods to the height of 3 or more feet. The sap is milk white and is put over a smoke fire of dry urucury or nassassa palm nuts, which coagulates the caoutchouc sap. The life of a tree after tapping commenced was about 18 years.

The Guarana beans - seeds of a trailing plant - were considered a remedy for slight attacks of diarrhoea and intermittent fevers; a teaspoonful of the ground beans in a cup of warm water.

Farina was the flour of the country; did not grow in altitude above 2000 ft.; the juice was said to be a deadly poison.

The best chincona came down by canoes, or batiloes, from the Beni river; did not grow well in moist soil; is found between 1000 to 5000 ft. above sea level.

Currents were rapid and eddies were many and dangerous

for smaller boats. In stretches on the Madeira our log showed a speed of 7-1/2 to 8 miles but we were making less than 3 miles over the bottom and in one place we were 4 hours making as many miles with forced draft.

THE RETURN TO PARA'.

We left San Antonio at 8.15 A.M., July 6th, with Chas. M. Bird, Chief, and other engineers and employees invalided home in the unloaded schooner Anthony and a four-oared boat which we had obtained from Mr. Collins by accepting his challenge and "shooting" San Antonio falls in it. Mr. Collins had several staunch four-oared boats (or yawls) above San Antonio falls, chained and locked safely. These interested us. With the water in the river receding continuously, the tugs inadequately supplied with boats for the purpose, the value of one of these for preliminary examinations and soundings in dangerous places on the next trip was apparent, so we expressed a wish for the loan of one. "If you will take it down the falls", he replied with a smile, "you can have it". This was tantamount to a refusal. The next afternoon four of us inspected the boats, made a choice, broke the lock and pushed off. As we paddled out into the mile wide river someone discovered us from the bank and gave a shout. A crowd quickly gathered and towering in their midst was the sturdy 6 ft. 5 in. of "Tom" Collins, waving his familiar "staff" threateningly and bellowing at us to return. Heading for what, as far as we could see, was the best passage through this three-quarter mile of turbulent waters we shot into the rapids. A dead silence followed on the shore. There

were some thrilling moments in the eddies and among the rocks, but we came out safely with the yawl half full of water. We pulled exultingly over to the landing and found Mr. Collins awaiting us with a choice selection of expletives. At our grins he walked away muttering something about a special Providence over certain kinds of people. He was pretty mad, but he kept his word and we kept the boat.

The JUNO went aground on the bar opposite Cairal, soundings fore and aft gave 5 to 7 ft., - 500 ft. out 10 to 13 ft.; afloat again without trouble.

I left the JUNO with Mr. F. A. Snow, Asst. Resident Engineer M. & M. R. R. in our Collins boat July 8th, to go on board the ENTERPRISE anchored off Araras Is. for the purpose of examining their survey of the Madeira as far as accomplished, and await the arrival of the BRAZIL and tow which was expected daily with Mr. Davis and my associates for the upper rivers work. The traditional hospitality and geniality of our Naval officers was fully exemplified during our sojourn with them.

The Amazon Co. steamer Javary from Para' was signaled to stop at 1 A.M. July 10th for us to get information. Dr. "Jack" Pennington, our Corps physician, and a Princeton classmate, was a passenger on his way up the river for me. He reported our party for the Mamore' and other rivers assembled in Para' and his description of conditions there decided us to return immediately. The quickest way to accomplish this was to go to San Antonio and back on the Javary.

The Bishop of Para' and his coadjutors were on board making a visit to the various and varied missions of his diocese on the river in conjunction with a vacation resulting from a spiritual and spirited controversy with the Emperor of Brazil. It appeared that the Bishop had promulgated an edict of ex-communication against Dom Pedro for the heresy of being a Free Mason and the Emperor had countered by incarcerating the Prelate for the heresy of lese Majesty. Released, this outing seemed to be a prelude to an expected adjustment of differences. Capt. Tallman of the Javary was a pleasant, likeable fellow but very excitable and equally loquacious. He was not in sympathy with the point of view of his clerical passengers. One of them, an Italian priest, spoke English, was companionable and entertaining, all of which proved interesting and diverting.

In the possibility of still going on with the proposed upper rivers work I arranged at Humayta for Pilots, Indians and canoes to accompany us in taking our steam survey launch, Santa Maria, and light draft boats, Beni and Mamore', for freight service through or around (portage) the eighteen rapids and falls as might be best accomplished. Three years thereafter I was told by one of our recently returned argonauts that these were still looking for me, - time and affairs wait on the Madeira.

Near Abelhas we met the steam launch from the Enterprise on its way to San Antonio, - anchored, dead, with boiler tubes choked up with mud. Lieuts. Blocklinger, Perkins and Sparrow in charge had a strenuous time, flanked and supported by the entire American representation on the Javary, three of us, arranging with

Captain Talisman for a tow to San Antonio. After unceasing garrulity and much negotiation a compromise charge of \$25.00 was effected. Lieut. Blocklinger and his party had succumbed financially in the tussle of getting the launch from Araras Is. to Abelhas. On appeal I dug up a carefully stowed away \$20.00 U.S. gold piece - our last reserve - and, as I find in a recently returned home letter that "by all of us emptying our pockets completely of cash the deal was closed twenty-five cents short. Over which we had hearty laughs." It was quite grandiose to play banker for the U. S. Navy even if only in a small way and with the last coin. Above Jamary we met the steamer Canuman returning from San Antonio with Commander Selfridge on board. The launch and party - to our regret - were transferred and my gold coin was returned.

Reaching San Antonio July 16th we found Mr. ("Tom") Collins seriously ill, the medical department out of quinine, the supply of other medicines nearly exhausted, food very low, fever and scurvy increasing and general demoralization prevailing, - except among most of the members of the Engineer Corps, who recognized (noblesse oblige) that they were there to stay until the railroad should be completed, until invalided home or until laid away in the "Banana Patch", named in irony of the one, lone, barren tree in the place selected for a cemetery. We left July 18th impatient to reach Para', straighten things out and return with the much needed medicines and provisions.

We ran through an igarape' - so narrow that the branches of the trees overlapped the paddle boxes of the side-wheel steamer

into a beautiful, clear, small lake to take on rubber from a camp of gatherers. It was a scorchingly hot day. Dr. "Jack" Pennington, Lawford and myself, were the only passengers on board. The lake appealed to us so attractively we decided to take a swim, - that is Lawford and I did. Jack had been fed up on the dangers lurking in tropical waters for the inexperienced, unwary or reckless and desecated volubly on the voracious alligator, the rapacious porpoise, the ferocious sword fish, the deadly electric eel - ad infinitum, while we disrobed. We were not to be dissuaded by his collated aquae terrores with the temperature raging and the water alluring. He watched us from the deck expectantly. Nothing untoward happening, suffering from the heat, he finally decided to take a chance. As he came hesitatingly down the gangway I climbed stealthily into the paddle wheel of the steamer and as he dove went after him and gripped him by the ankle. A vicious kick nearly dislocated my neck and when I reached the surface filled with water and laughter he was plunging wildly for safety perforating the atmosphere with howls. Arriving at the gangway platform he pulled up his thought to be dissevered foot, looked amazed, glared at us shouting in the water, went dignifiedly up on the steamer, dressed and - took a drink. Later, after due expression of (Galilean) contrition on my part, he admitted that he thought he had been fatally attacked and could actually feel the blood pushing from his mutilated pedal extremity as he struggled steamerward; mind over matter.

Other experiences were more serious. The engineer of the Brazil was so badly bitten in the waters near Para' it became necessary to send him home.

In the run from the Madeira river up the Amazon 90 miles and the Rio Negro 12 miles to Manaus, the first impression on approaching the mouth of the Negro is that it should be the continuance of the Amazon rather than a tributary, but this idea is dispelled later. As previously mentioned, the waters of the Amazon are very muddy and the waters of the Rio Negro - as the name signifies - are very dark; a distinct, visible demarcation line is formed at the junction of the two waters, so sharply defined that a vessel crossing this line will have its bow in black and its stern in yellow waters, or vice versa.

Manaus, with some 6000 inhabitants in '78, is situated on what might properly be called an inland bay 4 miles wide rather than a river 12 miles from its junction with the Amazon. It is located on low hills, was said to be healthy and was the port for steamers plying the waters of the Purus, the Negro and the Solimoes - as the Amazon is termed above the mouth of the Rio Negro. The Cathedral, with its twin towers, occupied high ground in the center of the City and was a majestic edifice costing, it was claimed, \$500,000 in money and 15 years in time to build. The houses were mostly of one story, neatly constructed, plastered outside or covered with tile and painted variously. Its possibilities as a trade rival of Para' was evident even then to a reflective observer. In 1910 it was electrically lighted, had a fine theatre building, an excellent trolley service, good streets, regular lines of ocean steamers, a population of 50,000 and was^a recognized commercial competitor of Para'.

Early in the morning succeeding our arrival the Enterprise was sighted steaming up the river for the purpose - we learned later - of smoothing the ruffled feathers of the President of Amazonas Province by extending the usual attentions paid to ethnarchs, which Commander Selfridge had overlooked in entering the Madeira - a part of the President's domain - and in consequence was ordered out of the river. There seemed to be considerable excitement aboard the Brazilian flotilla (a side-wheel gunboat and three steam launches each mounting a howitzer) anchored nearby, also in a distant mud fort and throughout the town: flags were being furled in great haste and there was much scurrying about of uniformed officers. On came the Enterprise imposingly. We interviewed our Captain and learned that the courtesies due a visiting man-of-war had been prohibited by order of the President. Commander Selfridge and the Enterprise were to be ostracized. The Captain remained forward, we sauntered aft. Waiting until the Enterprise had anchored we pulled the halyards, flung our vessel's Brazilian flag to the breeze, saluted and made fast. Amusement was apparent on our man-of-war as the salute was returned. When the expanded bunting was discovered there was a wild Captain on the Javary. He declared this defiance of orders would cost him his license as Captain and we would be jailed. Our efforts to convince him that he would be the big man of the town when the excitement was over were unavailing. Commander Selfridge sent his gig over and took us on board the Enterprise. An official visit by Commander Selfridge in full naval togs, a return visit by the President, a regulation salute from the Muzzle-loaded Columbiads of the Enter-

prise - breaking all the window glass in the town, shaking buildings and huts like an earthquake, nearly creating a panic and endangering the twin towers of the Cathedral - restored amity, and the Captain of the Javary was the lion of the hour with the populace, - and we were reinstated in his favor.

One of the surprises to the traveller on an Amazon steamer was the ease, confidence and safety with which Pilots followed the sinuous channel of the river about, among and between the innumerable islands day and night at full speed without range lights.

We reached Para' at 5.45 P.M., August 9th, and saw from the deck of the Javary a Brazilian gunboat anchored between the Brazil and the Junco. Calling to Capt. Smith on the Brazil nearby, we were startled to learn that both boats were "under arrest", - interned. Capt. Lima representing Messrs. Collins and Mr. Keasby of our Corps, came out in a shore boat for us. It may not be inappropriate even after these many years to express the remembrance of the pleasure of their hearty welcome and that of the others associated with us.

Mr. Mackie had not yet arrived as expected. Confusion worse confounded reigned and animosities prevailed. The President of the Province of Para' and Mr. Davis had become involved in a controversy, insignificant in its origin, that threatened to develop into an international imbroglio. It was Mr. Davis' Department. The tugs were tied up and it was imperative that a start be made at the earliest possible moment to go up the river with the medicines and provisions lying in Para' and relieve the desperate conditions existing at San Antonio and on the line. Diplomacy and

attempted adjustments signally failed. It was a Gordian Knot problem so - it was cut.

THE TRIP TO SAN ANTONIO DURING LOW WATER.

We were again belabored with opinions of the futility of any attempt to take the Brazil - drawing some 9 feet of water with bunkers filled with coal - up to San Antonio during the low water season, especially as the Amazon Co. would not risk navigating the Madeira with vessels drawing over 4 ft. Even Capt. Lima succumbed when the Pilots also opposed the venture and wagered me "a dinner for our group" that San Antonio would not be reached without assistance from the Madeira river steamers. This all sounded very familiar but was more positive and persistent than previously in the case of the Juno and schooner Anthony.

Notwithstanding these dire prognostications we left the harbor at 1.45 A.M. August 9th with the Brazil packed with coal and towing two full loaded 200 ton iron lighters or barges. Messrs. Geo. M. Keasby - also "a Princeton man" of Dr. Pennington's and my time - and Gorham of our party and Moore (selected by Mr. Collins and appointed a Vice-Consul at San Antonio) accompanied us. Dr. "Jack" Pennington, Mr. Lockwood, Mining Engineer, my acting secretary Lawford and the others of our corps remained in Para' to await the arrival of Mr. Mackie and explain the cause and occasion of the coercive measures adopted in order to get away, which he refers to appreciatively in his experiences at Para' related in Mr. Craig's book.

At 2.20 A.M. the gland of the throttle box was blown off, smashed into the wainscoting of the engine room, stripped off the

crown of the Asst. Engineer's straw hat as cleanly as if cut with a knife, without touching his scalp, shattered the engine room head light, blew the "stuffing" in all directions, scalded the legs of the Chief Engineer and burned his face severely. There was a roar, a rush of blinding, suffocating steam and a panic. A yell to Keesby and we bolted for the sides of the Pilot House just in time, as anticipated, to prevent the two pilots from decamping by opposite doors. Capt. Smith sped to the engine room, Gorham and Consul Moore took flying leaps from roof to deck, ignoring ladder, climbed over bulwarks and straddled the taut hawser of the first of the lighters in line behind until the rope began to sag from the greater headway of the barges, when they scrambled back on board with equal alacrity. They afterward averred that half the crew did likewise, but this was discredited. The Engineers - Mr. Spalt, Chief, Mr. Price, Assistant - and Capt. Smith stood manfully to their task, succeeded in opening the safety valve to full width and emitted all the steam. We patched up and got under weigh at 4.05 A.M.

Near Obidos we passed the steamer Purus conveying refugees from the famine stricken Province of Ceara up to Manaus. The "600 picked men" from among these people "for work on the railroad" were supposed to be on board.

Lounging in the smoking room (on the roof) of the tug the Consul, under the seductive influences of a full moon and the dolce far niente of the tropics, confided to us that his pre-eminent vocation was a Knight Errant Reformer. After recovering our equanimity we - one and all - offered ourselves for preliminary

experimentation as a preparation for probably interesting experiences at San Antonio,- within the shadows and possibilities of the "Banana Patch". He excoriated our earthliness in high-brow diction. Practical problems did not dismay us, but such etherealness,- we were squelched.

The throttle box gave us trouble all the way up the Amazon and we reached Serpa, August 17th, with four iron clamps, an army blanket and a fireman's shirt over it.

Entered the Madeira again August 18th, stopped at Araras Is. to get our Collins yawl that had been left there.

Commander Selfridge in his report to the Government bears testimony from his experiences on the Madeira that "to make soundings in a rapid current of 3 miles an hour with a row boat was "no easy matter." We, also from experiences, heartily agree with him and more current in a smaller boat decreases the "ease" very perceptibly.

Soundings from the Fazenda on the left bank of the river above the E.N.E. point of the noted Uron Island gave 6-1/2 fathoms to 11 ft.; upper end 4-1/2 to 7 fathoms; off sand bar 3-1/2 to 5 fathoms. Opposite the mouth of the Rio Atininga there was a long, low sand bank in the middle of the river.

Anchored off Manicore' at 12.50 A.M. in 2-1/2 fathoms of water. Ran aground at 8 A.M. before reaching channel,- 6 ft. of water at bow of tug and 11 ft. all around; got off lump easily. Soundings off Manicore' and long sand bank above 7 to 2 fathoms. Soundings off Segunda Jatuarana Is. 4 fathoms to 11 ft.,- strong current. Anchored off Segunda Beju Assu Is. in 3-1/2 fathoms of

water. Under weigh at 5.40 A.M., - current very strong. Soundings off sand pit 5 to 3 fathoms. At Marmelos Is. current by the log 6 miles per hour - no headway for over a half hour - sand bank on left, rocks on right; soundings from tug 5-1/2 fathoms to 11 ft., from lighters (one on each side with bows extending beyond tug and drawing only 4 ft. of water) to 6 ft. Ran aground opposite the village of Boa Intente, - soundings 10 to 7 ft. Below N.E. point of Muocara Is. passed a line of rocks extending half way across the river, - soundings off rocks 4 fathoms to 16 ft.

Boarded Amazon Co. steamer Jurua from San Antonio at Villa Jurara wharf to obtain the latest information of conditions on the railroad. The report was distressing and increased our anxiety and determination to get through at all hazards.

Ran aground off Jurara Is. in 8 ft. of water. The Collins yawl - with four oarsmen from crew - had been invaluable so far and from here to our goal it saved us more than once from hopeless failure. Soundings here proved it impossible to go further in the customary and only accepted channel with its stretches of eight and less feet of water. The pilots threw up their hands and refused to make any further effort to go on; the Reformer Consul iterated and reiterated "I told you so in Para" until the threat of an involuntary river bath silenced him. We returned with the tug and tow below and to the other side of the Island, soundings 5 fathoms to 10 ft. Anchored and went out in row boat. Keasby stood behind the compass in Pilot house of tug to plot course and estimate distance as I signalled him from the yawl when we had not less than 10 ft. of safe water. It was a serpentine way that

was located after some labor and weariness but gave from 5-1/2 fathoms to 13 ft. With a leademan on tug and each lighter we ran through without a hitch. The Pilots grinned and salamed.

There was one pilot for the Amazon and another for the Madeira rivers. They relieved each other for certain periods during the day when the one in charge knew there was a long stretch of entirely safe navigation. Our amazon pilot on this trip was a short, stout, quiet, good-natured fellow; the one for the Madeira was a tall, brawny domesticated Indian with saw-shaped teeth, filed or ground down to a point, and when he smiled it was suggestive of Parintintins, Caripunas, boiling caldrons, wild orgies and a fore but a good pilot withal.

Off the mouth of Rio Tres Cases and village opposite we struck bottom near right bank, backed off and swinging around went up toward left bank, - soundings 3-1/2 fathoms to 16 ft. There were ugly locking rocks protruding above the surface of the water on the northerly side of Botas Is. above the mouth of the river of same name, and a dangerous current. Went badly aground after passing these rocks at 12.50 P.M. August 24th. In getting off were caught in the current and eddies and swirled around like a canoe twice toward the rocks; let go two anchors, wouldn't hold, took them in; a line run to the shore broke with a snap; backed sterns of tug and lighters into sand spit and as the bows swept past the rocks drove full power ahead for their lowermost points until the current carried the sterns clear when we shut off steam and dropped down stream to safety. It was the nearest we had yet come to disaster and defeat, - too close to be comfortable. As we manned the yawl to

pilot asked to accompany us. These pilots were learning something. The Indian stood up forward in the boat apparently indifferent to the leadman near him but watching the signals to the tug while noting various objects, - rocks, trees, &c. As the anchor was being raised on our return to the tug he asked to be permitted to take us through. The passage was if anything more sinuous than the one worked out at Jurara and we hesitated, but his importunity won and we took the risk with, however, the three leads going and standing near him alongside the compass with our rough plat. He was astonishingly successful. Soundings 4-1/2 to 2 fathoms. Anchored in 5 fathoms of water at 6.25 P.M., but changed location at 7.30 because of strong eddies turning us around and around.

High bluffs on banks and sand bar in river on Northerly side of Paraibas Islands, - soundings on Southernly side 4-1/2 fathoms to 9 ft.; current 5 miles an hour; went through without trouble.

Let go anchor off Southernly side of Popunhas Is. in 10 ft. of water. Took to yawl for an examination, - soundings going through from tug boat and both lighters 4-1/2 fathoms to 11 ft. Southernly side of Purus Is. narrow channel with rocks exposed and awash and sand bars, - soundings 3-3/4 fathoms to 6 ft.; Northerly side 6 to 2-3/4 fathoms. Anchored above Salamao Is. at 9.30 P.M. in 2 fathoms of water. Under weigh 5.45 A.M. Touched and scraped a rock on port bilge with leads giving four and more fathoms, - no damage. Above Villa Machados passed a long sand bank with large quantities of drift wood and branches of trees stranded.

Struck snags three times in close succession off S.W. point of middle (or 2nd) Papagaio Is. with lead giving five fathoms of

water. Thumped hard on snag fifty minutes later off upper (or 3rd) Island; anchored off Northern side at 4.35 P.M. in 9 ft. of water off Starboard and 10 ft. off Port lighter, - hard bottom. A sand bank ahead entirely across the river with only six feet of water over it barred our way. Crossed to Southern side of island in yawl and started to sound up the river; went aground in mid-stream; the water was so turbid it was impossible to see six inches below the surface, pushed off. Aground in the middle of the great Madeira river in a row boat! No obtainable channel; crossed back to Northernly side above island and returned to Tug. Pilots again refused all responsibility if an attempt were made to go on. Fortunately the two Custom House officers previously carried had been eliminated (expurgated as one put it) in the settlement of the wrangle at Para'. All kinds of hindsight criticisms and foresight expediencies were vociferated, including the exhilarating suggestion to wait for an Amazon Co. steamer to take cargoes from lighters to San Antonio and we return to Para' and - salvage. Keasby and Capt. Smith had remained silent during this competition in loquacity until one asked - what are you going to do? The men on the railroad were in our minds and on our hearts. "Drive through that sand bank. There is a four mile current and as we cut in it should wash out a channel with the propellor - if the blades don't break - churning the floesam into our wake. Anyhow we'll take the chance." We moved the safety valve weight out to the full limit, doubled firemen at boilers, put on forced draft and drifted slowly down stream to get a good start. Some - like Mark Twain with the Bedouins - took to the rear (stern of a lighter) as a Masterly strategic base. The Pilots remained on the tug with us watching curiously. We started up stream blowing off

steam. As we gained headway everything shakable and creakable shook and creaked. When we hit the bar and the sand flew over the bow of the Tug, the Pilots threw their hats on the deck and jumped on them, ranting profusely and gesticulating wildly. We battered our way through slowly, surely, effectively and reached five fathoms of water on the upper side with steam down to a minimum. Re-arranged things to normal conditions and took yawl to sound out what we had left behind us; found over 12 ft. depth of water and running like a mill race. Went on our way rejoicing (temporarily) and let go anchor below Abelhas Is. at 7.55 P.M. in two fathoms of water.

It was from the above incident that the Madeira pilot declared to Captain Lima, after our return to Para', that we had wheels under the Tug.

Went out in yawl at 4.15 A.M., August 27th, to explore the "dangerous and much feared" channels on both sides of Abelhas Is. There were exposed rocks off bank of river near E.N.E. point of Island; soundings on Northernly side from E.N.E. point to sand bar and rocks off Westernly end 3-1/2 fathoms to 7 ft.- no channel. Crossed river above Island, - soundings 4-1/2 ft. to 6 fathoms; down stream on southernly side 5 and more fathoms, deep water; above Villa Abelhas 4 to 4-1/4 fathoms; opposite Village and among the rocks 3 fathoms to no bottom at 6 fathoms; below Village and back to E.N.E. point 2-1/2 fathoms to no bottom at 5 fathoms. All hard bottom. Pilots for the third time refused responsibility though our Indian took the wheel. Hove anchor and under weigh at 8.40 A.M. with the three leads going from tug and each lighter. Engine stopped suddenly crossing over with rocks below us - not

bearing - a few anxious minutes. Off W. point of Island throttle box started, 4 clamps and a blanket again,- spare fireman's shirts exhausted; more rocks on port side,- soundings 3-1/2 to 6-1/2 fathoms.

Struck a snag with keel of tug at 1.10 P.M. in a stretch of supposedly safe navigation about half way between Conian and Pariquitas Islands, no damage,- soundings 2-3/4 to no bottom at 6 fathoms.

Sand bar, snags and strong current off Marion Island.

While passing N.E. point of Jamarisinho Island, with soundings of 8, 6 and 3 fathoms, suddenly went aground in 7 ft. of water, backed off and anchored in 5 fathoms at 7.55 P.M.

Under weigh at 5.55 A.M. Above the Village of Boa Jardim anchored with starboard lighter lead giving 2 fathoms and port 10 ft.; took to yawl. Up river close to Island on Northernly side 5 fathoms to 8 ft.; out into midstream 4 to 3 fathoms; down stream 2-1/2 fathoms to 9 ft.; hard bottom. Pilots more tractable. Went through without trouble.

Soundings below Tamandua 5-1/4 fathoms to 8 ft.; off sand bar and rocks opposite village 5-1/2 to 2 fathoms; above 4 fathoms to 11 ft.; then more rocks. Blowing a gale.

Rounded bend and sighted San Antonio; cheers, rejoicings and congratulations.

Soundings over San Antonio bar; Port lighter 2-1/2 to 7 fathoms,- Starboard 7 ft. to 6-1/2 fathoms.

Alongside landing San Antonio at 2.25 P.M. August 28th, An enthusiastic greeting from wan faced and haggard eyed men. It

was worth many times what had been risked and endured.

On again - off again and abbreviated references to soundings can at best convey only a slight conception of the labors and hazards involved in hours of row boat work under a tropical sun, in rapid currents and dangerous eddies and subjected to short but violent down-pours of rain unknown and unimagined in temperate climes. All credit and praise to associates, officers and crews - even to the occasionally scared and recalcitrant Pilots - who spared not themselves to bring relief to sick and starving men: the highest and best of all human endeavor,- "I serve".

The Reformer Consul, too, who - having arrived safe in goods and sound in body after great doubts, many trials and much tribulation of spirit - gave vent to his pent up feelings and revised opinions to Mr. O. F. Nichols, Resident Engineer, in the vociferation - "By Gad! they did it."

Conditions on and about the railroad were growing worse and worse with startling progression. The provisions we had brought up could at best last only a limited time and the fatalities from fever, scurvy, dysentery and other malignant diseases were increasing disastrously. I find in a memorandum book that of the 54 originally comprising the Engineer Corps only 26 were left, that laborers escaped in row boats commandeered during "the dark of the moon", on rafts, as stowaways on river steamers, not the order of going but go in any chanceable way, and some who made a wild attempt to reach Bolivia through the forests were enshrined in the jungle without leaving a trace of the manner of their effacement, that out of the remaining force there was an average of less than 100 working daily. Yet

what had been accomplished under these disheartening and discouraging conditions was pronounced astonishing by our American successors 30 years later. The personal equation is a deciding factor in contests of man with man or man with nature, so the rugged energy and dogged fortitude of "Tom" Collins, Contractor, under such difficulties, harassments and dangers, supplemented by a capable and courageous staff, was the saving grace of the situation until litigation ensued and the adverse decision of the courts defeated further continuance. Those who lived and stuck realized the full measure of the risks and faced them, not without anxiety and perhaps fear, but resolutely and with steadfast purpose. The beginning of the end was in sight unless financial support could be speedily obtained.

Mr. Keasby and I had decided on our way up the rivers to get Indians and a canoe after our arrival at San Antonio and make a reconnaissance of the falls and rapids for a hundred or more miles to get a personal knowledge of the obstacles to be overcome in conveying our steam launch and larger boats to the upper rivers, but prevailing uncertainties caused us to abandon the project.

THE RETURN TRIP.

We left San Antonio at 5.30 P.M. August 31st with Buchholz, "Jim" Stewart, Eustus, Joseph & Blifer of the Engineer Corps, Capt. "Jim" Brown and Asler of the Office force, Dr. Coates and his young son, Harold, on the Brazil and 20 employees on the lighters, - all invalided home.

Struck bottom several times above Cavalcante, - soft rock - no damage nor delay.

Positive orders had been issued to Capt. Smith and the Pilots

to anchor a couple of hundred yards above the sand bar at Papagalos Is., that we had driven our way through going up, in order to locate the cut definitely and take soundings before venturing a passage. Our Indian Pilot assured the Captain so confidently of his ability to run through successfully, save time and surprise us that a reluctant consent was given to the attempt. He surprised us but didn't run through or save time. We were aroused from work on a report to the home office by a shock and a broadside swing against the bar, with the push of a four mile current adding an almost hopeless condition to the situation. It was 2.40 P.M. by the clock and Sept. 1st by the calendar,- memorable time and date. There are occurrences so exasperating in their effects and so threatening in their possibilities that words are utterly inadequate - inane. The Pilot had missed his goal by some sixty yards. Expecting to have our steam launch with us on the next trip up and going down the river light, we had returned the four-oared boat to Mr. Collins at San Antonio and so were left with only the dinghy of the tug for river work. Upon examination we found ample water in our forced channel. We tried unavailingly to kedge off,- the bottom was smooth and hard and the anchor too light to hold. The only result was an indiscriminate "spill" as Buchholz (later Chief Engineer of the Erie R. R.) and myself dumped the anchor from the bow of the small boat, followed by yells of Alligators! Alligators! Good Bye! Farewell! from the tug as we swam out to recover the oars, climbed up on the bottom of the boat and paddled shoreward. These gleeful greetings were an assurance that there were no alligators in our immediate vicinity,- otherwise shootings would have substituted shoutings.

Our own supply of provisions was not abundant. Two barrels of hard tack constituted the entire provender furnished for the 20 men on the lighters and we were not expected or prepared to feed them. It was not a cheerful prospect. To work out a theory the necessary force was ordered to remain at call until all others had turned in after which, about 11 P.M., we went to work; put anchor chains from the lighters under the tug fore and aft, gave all the lift possible from hand winches, got up full head of steam, wriggled, swung, pushed slowly ahead and drove hard astern until we worked free, ran up stream, took to row boat and signalled channel,- went through with the three leads going and anchored in 18 ft. of water below at 2.10 A.M. There were some real and relieved expressions of surprise from our Engineer friends at sunrise.

No more foolish chances were permitted. Soundings were made from our dinghy -(a single oared row boat accommodating four at most, but in this work restricted to a leadman in the stern, with Keasby and myself relaying each other at the oars as we pulled against the current to go down stream as slowly as possible) - at all dangerous and doubtful places before attempting to go through and we became as alert and agile in the swift currents and swirling eddies as lumber jacks on a log drive. Notwithstanding our precautions we bumped three times on bottom off N. point of Uroa Island,- no damage. The water in the river was near its lowest stage.

The imperceptible drift, inevitable under existing conditions, from home proprieties and ideals is vividly portrayed by Mr. Craig in his description of our burial service on the Madeira. The presence of "Our Queen", wife of ex-Senator King of Pottsville, Pa. and Mrs. O.

F. Nichols, wife of the Resident Engineer, were the restraining and correcting influences in their presence and devoted services at San Antonio.

We arrived at Serpa September 21st with the last of our coal under the boilers. Reprovisioned as much as possible, overhauled machinery and took on 3000 sticks of wood, - 300 sticks estimated as equivalent in calories to a ton of coal; our firing more than doubled this number of sticks.

In the nearly 1000 miles down the Amazon from Serpa to Para' we bought 16,000 sticks of wood at an average cost of \$12.75 per 1000. Neither fireboxes nor draft were adapted for such fuel, so progress was slow, awnings burnt up, wood work blistered and the incessant dropping of hot sparks from the short smoke stack was as destructive to our tempers as to our scant habiliments. One doesn't give thought to apparel when navigating the Amazon and its affluents, - minimum possibilities are the rule. We were 5 days and 3 hours making this run, which could have been done in 3 days with 14 tons of good coal.

The obstacles to navigation in the nearly 700 miles length of the Madeira river are after all comparatively few and could be overcome or removed at a relatively small cost and make it possible for ocean steamers to go to San Antonio during high or low water,

We ran up to the wharf at Villa Bella on the Amazon for more firewood. The 20 men on the lighters had been greatly incensed at our refusal at Serpa to take along one of the "runaways" from the railroad, declared by Dr. Coates to be "a bad and dangerous man". Indulging freely in caohasa (a crude distillation from the sugar

cane, - an aqua fortis) ashore, they came aboard primed for trouble and determined to force his passage to Para'. A few demonstrative shots were fired in the air from their revolvers and violence threatened, but the emute was suppressed before words became deeds. With more age we would probably have taken the fellow down even if a "deserter". It was tough to leave him but these were troublous and strenuous days. Still disgruntled these men refused to assist in loading the wood. All of us from the Tug turned to and tackled the work. As stated, each stick was counted - uno, dos, tres, quatro, cinco, Taille'; with taille' a mark was made by the tellers representing five. We worked with such vim that the owner of the fazenda (endorsing the description of a steamer Captain who had taken some of the Expedition from Para' to San Antonio, during which trip they at times helped load wood, that the Americans du Norte drink much coffee write many letters, work like h---) declared we had many more than the 2000 sticks counted. The counters were his men, we stood pat on the record and after much gesticulating volubility he acquiesced. We did not unload and count over as was said to be the custom with disputes. We had voluntarily fed these 20 men from our galley since leaving San Antonio. Orders were issued to suspend further rations. After the next meal time they came to ask the cause. "No work, no food". They promised good behavior for the future and to load wood thereafter, this was accepted and satisfactory relations were re-established.

Villa Bella produces the bananas that Prof. Agassiz pronounced the most delicate and delicious of its species in the world; it is small and grows only in a limited area like the famous large, seedless

blood orange of Bahia, Brazil; neither being transplantable or transportable, it is said.

Entered Marajo Bay at 9 A.M. Sept. 11th and dropped one lighter astern; dropped the second in line astern a half hour later.

Our delayed arrival, from Madeira experiences and wood fuel, caused anxiety in Para'. Capt. Lima smirked an "I told you so" smile and croakers re-croaked their predictions. Mr. Mackie, who had arrived in the interim, decided if after another day nothing was heard from or of us, to start out with the steam launch on a search. A very dubious undertaking and more than likely to have ended as did the attempt of the launch of the Enterprise to go from Araras Is to San Antonio on the Madeira or - worse. But of such is the real American spirit - when aroused.

We arrived off Para' at 7.10 P.M. (after the sunset gun) and as we dropped anchor let go on a long blast from the big whistle of the Brazil that cracked the atmosphere and sent sound waves ricocheting over the City.

Lighted candles suddenly appeared from the windows of the hotel facing the river, waved vigorously to and fro by our associates as a welcome. Mr. Mackie somehow bamboozled a permit and a boat out of the Custom House officials and came out to us. Keesby, Gorham, the R. N. Engineers and myself returned with him.

Capt. Lima paid his bet with equanimity at his house in Para', notwithstanding the Pilot's revelations and his innate suspicion of "wheels under the tug".

A copy of the "Hepburn-Keesby Map" - a product of this trip created considerable interest when taken out by my son on the succeeding and successful American Expedition thirty years later.

Mr. Mackie says in Mr. Craig's Recollections, that he gave a copy to Commander Selfridge and that it was duly incorporated in the Maps issued thereafter by the Navy Department and - others. We have not - yet - seen or heard of any acknowledgment.

Notwithstanding exactions, vicissitudes and vexations, these exceptional and complex experiences were valuable to us - who survived.

Robert Hopewell Hepburn