

RG 1136 5.698

S.I. Bailey

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Sat. Feb 2 '89Thursday Feb 7 '89

Sun Feb 3 Left S.F. Sat noon - 2 P.M. San Jose Pac. Mail -
noon on board also some telescopic apparatus used in Cal. on
long 120° total eclipse of the sun - stove used in Pan.

Dist- 23 fm Sail S.E. till Thurs. when heading rounded Cape S. Lucas
southern most part of Lower Cal. we sail about East - a
little north toward Mazatlan Mex. made a few two

Feb 4 Sat 31°
long 117° 53' clouds till Thurs. watched sun set in sea. Discovered

Dist- 250 m. suddenly - Coast of Cal. the over Cal. apparently bare & rarely
inhabited. Saw Cerritos Island - has 2 above &

Sun Feb 5 - Sat- 27° 38' Have seen various water fowl - small whales:

long 115° 17' Dist- 238 m. Gophers in large numbers, flying fish & sea turtles -

Wed. Feb 6 Sea very smooth with gentle swell - very different from
the Atlantic -

112° 32'

240 m

Friday Feb 8 arrived at Mazatlan early morning -

Feb 7 Went ashore in small boat mailed some letters - City of 10,000 -

long 109° 12' Sat 22° 54' 15,000 inhabitants - large vessels are obliged to anchor out one or

two miles - Streets narrow with houses made outside but often
with beautiful courts & gardens within - Rooms & corridors

all open in Spanish style into central court - Spanish race
dominant but many Indians & negroes. Day cloudy & so not
appreciably warm - Visited clubs & P.D. & found amusement in
practicing Spanish - Took breakfast at noon in hotel.

Took breakfast with a fair allowance of fried & warm
food. Found a man in a store who when asked if he spoke
English said "I speak but only a few". Left M. in
evening. Bright house on high rocky promontory at entrance
of harbor. Said by officers who visible 20 miles away.

Sat Feb 9 Sailing S.E. along coast of Mex.

noon long 105° 42' Lat 20° 11' weather getting uncomfortably warm but

Sun. Feb 10 '89

Long $102^{\circ} 17'$ Lat $17^{\circ} 46'$ Course S. 53° E.

Weather rather oppressively warm.

→ Mon. Feb 11 arrived at Acapulco Mex. about 2 am.

The harbor here is very fine but not large. It is completely shut in by high hills. The entrance is in shape of horn shoe. When the S.S. had anchored it was hard to see where we had entered. Many cocoanut-palms. Indians brought to the ship oranges, limes, bananas & various curiosities for sale. The seems to be a large percent of pure-blooded Indians either descendants of the aztecs or tribes under their control. Left A. about noon. Sailed S.E. along the coast of Mex. View along coast somewhat monotonous but beautiful, green low lands near shore & in the background the blue jagged outlines of the Sierra Madre Mts.

→ Tues. Feb 12 Lat $15^{\circ} 44' 30''$ Long. $95^{\circ} 56'$

Course varied during the afternoon sailing across the Gulf of Tehuantepec. Here the wind is blowing quite a gale, causing a grateful change of temperature.

Nearly always at this season of the year a strong wind is said to sweep down across the narrow neck of land from the Gulf of Mexico & spreads out like a fan in the G. of C. The Pres. terminus of the proposed ship's railway was pointed out. but Mr. Benson a civil engineer said that owing to the wind mentioned above it would be extremely difficult for vessels to beat up to the R.R. against it - sailing vessels during certain seasons - Mr. Benson gave us a rule for determining dist. of coast line. Take sq. root of height of observer above sea add $1/7$ with the result will be the dist. in naut. miles. Rather uncertain?

Mr. Robinson Subt. of Railroad in Guatemala - He was acquainted with Barrios Pres. of Guatemala who attempted to unite the C. A. Republics & was killed - Mr. R. spoke highly of Barrios - Mr. R. says there is called republics of C. A. are in reality only despotisms of a most perfect type - Pres. has power almost absolute power & no one dares to oppose him his put aside if he attempts to do so - Elections are but farces - Revolutions are frequent but usually futile - as in Mex. the Indians are force. enslaved - only the laws the fear if in debt to an employer can be made to work it out - Most of the lower classes are in debt to the owners of the great plantations & not being able to get to get out cannot get away - Future of these republics looks dark. There is a middle class composed of those of mixed blood. who have cut loose from the church & have not any faith - They are more quick and intelligent than the Indians but are a dangerous class ready for insurrection & riot - The condition of semi-slavery though sad is claimed to be necessary for the maintenance of prosperity - The people are incapable of self government. Some say that the trouble is the lack of good government but apparently the trouble lies deeper in the character of the people.

Wed Feb 13. Lat. $14^{\circ} 51'$ Long. $92^{\circ} 12'$.

Arrived at occ. about 5 m. from Mex. border in Guatemala. A new fort with iron pier & sentry house & a few other buildings - Country level & thickly wooded for some miles from coast - In background lofty peaks of Cordillera - There are conical & forested volcanoes. Saw Lacand about 45 m. away said to be 14000 ft high. Taja mules 10800. Took on 1500 sacks of the

Thurs. Feb 14 1889

Arrived at Champerico in the night. There as it were no harbor. only open roadstead. Iron pier built out for lighters. Railroad from Champerico inland 30 miles.

Rain in the most extensive coffee growing districts of Guatemala. Rain heavy in rainy season & no ground. hence frequent washouts. Coffee in G. grows at elevation of 3000 - 4000 ft. - sometimes 5000 but danger from frosts. Shrub very numerous about the vessel at anchor. Size about 8 ft. long.

Friday Feb 15 - Arrived in San José G. early morning when roadstead. iron pier. Small place. some few good buildings. Hotel good, and where cost \$25.00.



Volcanic cones along coast of G. Tacaná 14000. Tajumulco 10850. Santa Maria 12460. Jumbil 11709. St. Thomas 10336. Apitlan 11633. Atatenango 12890. Tuzo 12603. Agua 12334. Tuzo active though no signs of it visible.

Sat. Feb 16 Arrived early morning at Apajutla, El Salvador. Same wharfage as before. My name. not so flat a country as Guatemala. Coast 20 or 30 ft. above sea & sloping up to lofty mountain range & several volcanic cones. one of these Izales is active.

By day very seven minutes, usually with considerable regularity a column of smoke or vapor is seen rising from the opening which is near summit. This rises gradually a minute or two when it is perhaps a mile high. It then becomes detached from the cone & floats away. This occurs about once in seven minutes. At night at these times a column of fire is seen to rise to a considerable height & sometimes a stream of fiery lava flowing down the mt. for a long distance. This stream can be observed by day also by the clouds of vapor above it. The fire lasts only for a very short time showing that the outburst is of very short

duration but that the cloud rises slowly. However the lava is even longer than the fire above - appar. taking same time to cool below the point of luminosity - This volcano distant from the coast some 30-40 miles is called the light house of Salvador owing to an unmistakable beacon to sailors far out to sea - The name San Salvador given in books is said to be incorrect for the country by gentlemen acquainted with the country - It should be El Salvador -

Sun. Feb 17 arrived in early morning at La Libertad - El Salvador. a little port of 3 (?) churches - Country somewhat abrupt and rising into high mts - with numerous vol. cones. During day a whale prob. 50-75 ft. long played about the steamer diving several times directly under the ship & frequently coming to the surface to breathe - Weather warm but cool breeze.

Mon. Feb 18 '89 arrived in a.m. early at Corinto Nicaragua Good harbor - almost entirely fronted & of good size - The boatmen here used vans made of wood with  shaped blades tied on with cords  We went ashore & walked about about a little. Soil sandy. Succeedingly warm at a little market we bought some fancy goods - fruit and had quite an amusing time with the natives buying fruit - Latitude 15 - about the same here as S in Lima

Tues. Feb 19 arrived in the P.M. at Punta Arenas, Costa Rica. Port of some consequence. R.R. leads from here to San José de Costa Rica - Capital of the Republic - Went ashore in small boat with Irving. High landing - Steam apparatus for raising merchandise - when we entered the little town a small girl came running up & putting a little bouquet of flowers in Irving's hand demanded 10c. of me. which I gave thinking it quite a bright scheme but when the children were repeated by others I objected - Town not very fine. Situated on Gulf of Nicoya a fine sheet of water extending northward many miles above P. Arenas -

Friday Feb 22 1859

Sailing S.E. toward Panama - at noon lat $8^{\circ} 34'$
long. $82^{\circ} 44'$. Nothing of special interest. at times faint
outlines of Costa Rica & Colombia.

Sat. Feb 23 - lat $7^{\circ} 8'$ long $80^{\circ} 14'$.

Sailing S.E. & S.E. exhibition of Spanish manners on
board. Shamed of Nicaragua en route to Europe -

Took some interest in an apparently but soon became
so fabricating & boasting that I cut him.

He took offense at a fancied slight by an Englishman
and armed himself with a revolver ready to shoot at the
slightest provocation. He had been sitting in the Eng. man's
chair - who wanted it & hinted as much. The Span-
iard threw the chair overboard when asked why, said
he would pay for it &c. He told the Englishman that
he was no gentleman & was very much surprised
when he was not asked to fight. afterward he asked
me what I should do if told that & I told him I
should pay no attention to it at all. that we did
not believe in that sort of business. He brooded over it
however & drank some of rum, armed himself ready
to shoot the Englishman. on the slightest provocation
the provocation was not quite finally saying he was
a coward he drew his revolver & fired over board in
a bravo spirit. He was immediately disarmed.

Sailing up the bay of Panama we saw a most remarkable
phosphorescent display. Mr. Coddington an Eng. gentleman
who had sailed over nearly the whole world had never
seen it surpassed. The water out from the vessel for
several feet was a mass of light. bright enough to dis-
tinctly light up the side of the vessel. The crests of the
waves for a great distance away were visible by their

own light. In front of the vessel the spray dashed up by the bow was very beautiful. But the most unique exhibition was what seemed like the fireworks called "devil chasers" now & then ~~many~~ together would appear a mass of light, which suddenly breaking into parts would dart ~~in~~ in every direction & for a long distance. This must have been due to fish which in schools at first were scattered by the vessel and these darting here & there gave the appearance described. Whether these fish were themselves phosphorescent or by their movements excited the water so, I could not determine. The appearance was of the former.

Our trip by the San José has been interesting but somewhat wearisome. The time of transit 22-23 days is considerable time for 3500 miles in these days of rapid transit. This is due to the quality of the vessel, there being no competition and also to the frequent stops for freight.

The company was not especially pleasant - one drinking shamed - one artist crank. Several members of the genuine codfish aristocracy - detracted from the pleasure of the trip. The Captain ^{Russell} though personally pleasant was exceedingly profane & offensive even in presence of ladies to his officers & men.

We were not sorry to be approaching Panama to change of steamer. The steamer itself was comfortable. Our state room looked out of the dining saloon which was cleaned & used as a parlor at other times. All the waiters ^{under} ~~followed~~ were Chinese & quite good & servicable. Food was fair but not over 1. Ruth was sick some of the way though not excessively. Irving & I were pretty well. Irving had a cough when he left S. Francisco but it disappeared after we got into warm weather.

Sunday Feb 24 - 1889

Arrived in Panama in early morning. Intend to remain on board with families till vessel sails south - Took a small ^{steam} boat ashore early in morning hoping to meet my brother - He with the same idea of catching us before we could leave steamer had taken a small boat out. Both steamers and we caught a glimpse of each other in passing - I went to the Grand Central Hotel & waited till he returned - The bay of Panama is a beautiful sheet of water with many vessels of various nations - The city is beautiful in the distance some parts rising in sort of terraces - Took a carriage to hotel. Curious winding streets - The Cathedral off hotel was seen to-day being Sunday. Baked in this day there was seen by the widely distribution of prizes in the lottery. During competition bet. the P. S. N. Co. & the Chilean line got low rates from P to Callao - \$160. - in Columbian money for M. R. & J. - being shown in \$32. in Amer. Gold piece. Reg. fare \$116. Engaged rooms on Bolinas of P. S. N. Co. Visited La Boca mouth of the canal every where was evidence of great losses in abundance - abandoned boats & machinery of great cost. Work is practically suspended - Doubtless there has been gigantic fraud in this enterprise - as well as folly - Poor prospect of ever being completed - On the way we passed through the hospital grounds of the Canal Company. a truly magnificent & humane arrangements. Great number of shacks & very comfortable buildings for invalids - owing to few laborers now employed, buildings not full - on way back passed the company's burial grounds. Endless rows of vaults with simply a number above what dreadful mortality the climate of the canal region & the attendant dissipation caused - Said to be 40 aif. kinds of fever here -

Mon. Feb 25 - 89

Returned last night before in small boat and sailed by two half loads - Rush, Dr. & I went ashore in small steamer just before noon - did a little shopping - owing to its being a free port - Panama is said to be a favorable place for trading but we found it cheated as we were in a great hurry - M. R. & Dr. took trip to Bolivia - I returned later in small boat in time to get aboard comfortably - Present present families of Panama are largely to be numerous come put into the canal. Future of the city looks rather gloomy.

Tues. Feb 26 - Sailing S. out of light - found a considerable part of the time - weather quite warm.

Fri. Mar 1. Guayaquil - Trip up the Gulf of Guayaquil very interesting. Passed the Island of Puna, where Pizarro landed so long under great difficulties & laid foundation of future success - City of S. 60 m. up the Gulf - channels often tortuous and in places shallow - S. a city of some size with some good buildings - exceedingly warm & said to be very unhealthy - On an elevated spot near the city was an open building said to be the hospital - From the Gulf of S. Chimboraço is sometimes visible but could not see it -

Sat. Mar 2 Touched at Tumbes across the border of Ecuador in Peru. No town visible. Boats came down the river bringing freight -

Sun. Mar 3 Spent a Payta (or Paita) a place of some importance but desolate in the extreme situated at the foot of a bluff at the very edge of the sea. A R.R. leads up along a cut in the bluff & thence inland to Piura - a very desolate place with only one green thing visible - a small tree. It is said that they used to paint the fences green but changed the color as the goats & mules ate it all off hoping to find it green. Whole coast here & desolate but in background the mighty Cordillera -

Mon. Mar 4 '89

Rio de Janeiro - expected quite a considerable breeze but it is carnival time and people were drunk - took about in the night however some people among them some criminals said were highway robbers certainly rather rough looking characters - It formed a gloomy picture the dark night, the electric light streaming out over the water, the rolling of the steamer in the swell - & the tossing of the little boat below - the faces of the passengers watching and of the prisoners with their chains as one by one they were crowded into the little half barrel hoisted on board -

The method of landing observed along along the Pacific at ports where there is no fair harbor nowhere is here any - where there is a long swell is to put the person in this half barrel with the back higher & secured by a windlass worked by steam - the prisoner hangs out over the sea or the boat as the S.S. rolls and is pulled in if he arrives in the small boat right side up - at Payta cattle were taken aboard - they are brought along side by flat boats and a rope is fastened around the horns & then this is hauled in by a steam winch. No matter how strong or obstinate the cow or bull, he has to go & is dropped inside the rail - on lower deck -

It is rather cruel no doubt.

Tues. Mar 5 '89 Last day before reaching Peru.

Rio de Janeiro Superior to San Jose in many particulars electric light & better officers in general - more polite though somewhat quiet & reserved - State rooms all on upper deck - forward ones most desirable - M. R. Jr. & I got two staterooms adjoining & opening into each

where. Dining room quite pleasant & food good. The most obj. thing was condition of lower deck. There is no proper storage but only cabin & deck passengers. These deckers simply have the privilege of the lower deck & bring all their own baggage &c. - men women & children in one large open space - with the cattle & fowls about them all in together. The only furnishings were a few canvas hammocks but there were not enough for all. Most made their own beds on the floor. This condition of things seems savage & is indeed so but this class of people are used to it - & the worst of it is not such a trip which is for a few days but the fact that all of life is spent in circumstances about the same. Yet they seemed quite content - & smoked in peace -

Wed. Mar 6 89

Arrived in Callao in early morning. Steamer does not go to wharf till late in day & every body goes ashore in small boat. On run with men "Teleros" who wished to take us ashore at various points. Engaged a man to take us ashore & deliver our baggage in hotel (Ing & Gr.) in P. Lima - for some 5 or 6 soles. Had some difficulty in getting things thru. Customs house owing to curiosity of officials who thought us good subjects - one man professed great interest in us. He seemed to find some difficulty until I asked him if could not buy him some things & thought expressing great honor in face & words at the idea took what I offered & seemed disgusted with the amt $\frac{1}{2}$ Got thru finally for \$3. Prob. if we could have spoken Spanish with any success it would have given no trouble but they took advantage of our inability -

arrived at English & French Hotel - about 1 P.M. very hungry & tired though "English" no English was spoken. The hotel at Calles is large & fine with many bits of all nations & more business like tenanted than any city seen since leaving San Francisco -

Region between Calles & Lima rather green & interesting - no real rain in all this region but agriculture carried on by irrigation -

Thurs. Mar 7 - Called on Gonsalves & Co. - received some money from Cambridge. Mr. Gonsalves took us to station & introduced us to Mr. Stubbet - chief of Oroya R.R. - Mr. Lilly Pres. of R.R. quite ill. Met Mr. Bont Amer. Consul - owing to damage from rains several no trains run above Chosica, Met Mr. Mulloy who introduced us to Prof. Habich at School of Mines - also met Mr. Johnston & Mr. Shondyke.

Fri. Mar 8 met about Lima somewhat - visited National Library Received free pass on O.R.R. from Mr. Stubbet -

Sat. Mar 9 - left for Chosica at 8 a.m. reached C 10 a.m. R.R. leads along the valley of the Rimac a small but rapid flowing river - owing to the water taken from it all along its path for irrigation & from evaporation & few tributaries - It is said to be "Smallest at the largest end". Valley indeed very fertile by irrigation. Sugar cane - many fruits - corn etc. Passed by many ruins of ancient Indian villages always placed up on the barren hill sides where they did not encroach on the tillable lands. Many traces of ancient roads & canals often in good condition. Valley at C. broader than previously - green & beautiful mts around very precipitous - no chance for shore near hotel. Climbed Mt back of hotel in afternoon. Small plateau at altitude of 3500 feet above hotel - Summit at 5600 feet above sea level -

Sun - Mar. 10. 89

Remained at hotel and arranged for trip or not, next day - Mr. Mulloy wishes us to return to Lima & get orders on the Gobernador to furnish what we wish. But we prefer not to ask too many favors or crowd the natives - Mr. M. not the perfect gentleman we might wish. Exceeding sensitive & taking offence unless his opinions are followed in every thing. He proposes to go to B. tomorrow but "a Dios" -

Mon - Mar 11 89 Mr. M. returned to B. M. & I with guide. started for mt. on N. of valley which we ascend from the mt. back of house. Hard climb of several hours. losing the path once & indeed not much of path at all. Fine view - good site for buildings - hard sand. trees of some size. no water. It is said to be quite possible to send goods up by mule or llama back.

Tues. Mar 12. Returned to Lima. - Raining since found where in mountains from Nov - Mar. more or less. In Lima & along the coast the same seems true. It is foggy or cloudy in Lima from about May to Nov. & during this time the weather is not cold & very disagreeable - although there is said to be no rain. There is so heavy a fog or drizzle that it amounts to rain.

Mt. Meigs 17m high chile is mentioned as a favorable site for lofty station. Vinocaya & Puno not spoken of - also Arequipa.

Wed. Mar 13 Called on Mr. Shandyke. former sub. of Arequipa R.R. thinks there is no S. hor. at Puno. cannot say about V.C. or Ang. Called on Mr. C. & Sr. Pao Soldan, sec. of Lima Geological Society. an ornamental institution of prob no great scientific value.

Thurs - Mar 14 89

Mr. Cilly advises Chosica for station unless we can go to Matucana or better to Jaiza or that vicinity. Future of the O.R.R. very uncertain. Called on Dr. Ramondi & he called this Chosica region "Mi Costa ni Montaña". Some larger of vrnugas at Matucana. Sick in the afternoon.

Fri. Mar 15 - Dr. Montoya member of Peruvian Congress introduced us to Sr. Delgado. "Ministro de Hacienda" who in turn presented us to the President. Caceres. Caceres treated us cordially. Sr. Delgado a graduate of Sec. Dept. of H. College. The President's Palace is on the Grand Plaza - on another side of which is the great Cathedral of Lima. This Palace was built by Pizarro and in it he was killed by the "Men of Chili". This Palace extends on a whole square. we entered by a large archway guarded by soldiers. Through long corridors. Our cards were sent in by an attendant to the Minister. We were admitted through a locked & guarded door into the secretary's room. Afterward he took us by a private door into a large court up some flights of stairs through a guarded door, along a guarded corridor to a locked door. There our cards were sent in & soon we were admitted into a reception room furnished with chairs & upholstered in Green Satin. Thence into another room of large proportions upholstered in Blue Satin. After a few minutes the Pres. came attended by one of the members of his Cabinet. Pres. C. is a tall slim & rather old looking man. in whose face one can read the marks of privation. came to give Passien. The position of Pres. in Peru is not one of power. From Pizarro to the present time few of the proud viceroys or Presidents have been able to do

quietly in bed. Revolution is not the exception but rather the rule.
Sat. Mar 16 met Sr. Chorro a meteorologist. who claims to know
 everything with knowing. Prob. no very great man.

Climate in Lima now not bad but usually foggy in early
 morning starting till middle of forenoon.

Mon. Mar 18. 89 Visited Callao in morning were about freight.
 Called on Prof. Habich at School of mines. Great deal of
 fun in Lima.

Tues. Mar 19. Made arrangements w/ Chorrillo
 met Mr. Christy from Boston and Mr. Ball of B. & O.
 Mr. C. interested in mine in Bolivia near Co. Leticia.

Wed. Mar 20. went with families & baggage to Chorrillo.
 Mr. Shubert gave us the service of Antonio Vera an employee
 of the R.R. as guide & interpreter for a trip of exploration to
 Chichila - as the R.R. is not running we are going by mule
 back. Dr. Schmidt, German traveler going with us.

Thurs. Mar 21 1889 Trip to Chichila

Left hotel at Chorrillo at 8:30 a.m. It being a long day ride we had
 arranged to start at 5 a.m. promptly but another party who had
 planned to start at 7 did not get started till 9 a.m. so that we
 were in style. Impossible in this country to start in early morning
 if one depends on natives for help. During the train's running
 only up to Chorrillo, it is now a very busy place. all freight
 has to be taken above by mules donkeys & llamas. The yards
 about the station are busy in packing with parties horse trucks
 back starting for interior. also with animals being loaded with
 freight. Very insignificant kind of merchandise is loaded on the
 backs of these animals. household furniture &c. but most of
 freight is provisions some going up & some down. There
 are usually in C. now 2-4 drives of llamas. very slow.
 There are from 25-75 llamas in a drive. Each will carry
 not more than 100 lbs. of iron is put on the neck & down

and refuse logs. They are driven by two or three Indians who walk behind fanning them & keep them in motion. The looking of these llamas is very amusing. Naturally the animal objects to being loaded & attempts to escape - by running about among the the herd. Each Indian has a long string made of llama hair which has various uses. In the first place it is for throwing stones at the straggling or lagging llamas or to throw around their necks to hold them by when the placing is better as well. The llama if angered will spit from the nostrils with great force an acid fluid which if it strikes the face or hand will cause smarting & it is said sores. When once caught the llama will stand quite still & suffer his load to be fastened on. This is done by means of llama hair strips which are pulled as tightly around under the animal's belly as the strength of the determined Indian will allow. These mountain Indians are apparently pure blooded Indians. They speak the -- or ancient language of the Indians as well as some Spanish & are in many cases not more than 5 ft. high. There is quite a good road from Chos. for a considerable time leading along the side of the Rincon Valley & thus avoiding the fertile land. This road which prob. dates back to the time of the Incas is rough even for animals - being in some places paved with large boulders but usually simply cleared from such obstructions as would render it impassible. After some distance above Chos. the road begins to trail along the side of the mountains, is now narrow & in many places smooth rock now slippery by the feet of numerous animals. This part only some 4 feet wide and overhanging the valley of the river hundred of feet below. Sometimes we could see below the last descent

body of some animal that had been crowded on the side by some other animal - a few days before two natives riding one horse fell down this forest on the hill. Accidents - at this time when the path is often crowded by herds of animals going in opposite directions are frequent - we took breakfast - about 12 o'clock in Curochaena a little indian village - Our "hotel" was the straggling mud hut of one of the natives. Built of cane + mud + with earth floor. Antonio ordered the meal for us - the food waited till it was cooked. The food is the genius of the place was an enormously fat indian or perhaps half negro - woman who occupied a chair next opening out of the dining room. She sat on the ground in this room with a little dung fire above her on one side her dishes near on another side + every thing she forwarded within reach in different directions her legs were often at an angle of 90° whatever the convenient location of her pail of dish water for cleansing the dishes after each course as the number was limited. This working household guardian was short, clever + low necked down after the manner of the tall men dwellers of more favored lands -

The building was of this description
 right corner plastered with a kind of adobe
 sometimes seen with wattle -
 no windows, no chairs except boxes
 rough table of old boards - no furniture

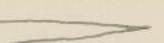


in the house except in room 3 a sort of
 bed of poles of wild cane. In it were a nest of Guinea fowl
 on the floor was for sale chicken a sort of native beer
 and also pipes a native rum or brandy very strong -
 as this region is the worst for Yungas a sort of fever which
 causes great pains + produces ugly sores. + is said to be caused
 by the water contains minerals. we tried some of the chicken

It was not very hot. For our meal we had fresh "Chupe" a soup made of dried meat, various vegetables with eggs - one who has seen this dried meat hanging about in the sun. eating & drinking is not at all British Chups - but being they furnished me hastily ate it with frantic endeavors to think of something else. After this we had some eggs in rice and a fowl - with one exception the best - cleanest I ever met on intimate terms. All this time I had the pleasure of balancing myself on a small box with the imminent danger of falling backward through the door among the 9. fig while in full view through another door was the Frenchman's game washing over dishes in dirty water & wiping them with a filthy rag. I ^{without milk} completed our repast & they thus refreshed us gladly resumed our journey after paying 1 real each for our refreshment. Some time before reaching Matucana it began raining & soon grew dark. The practical limit of rain is about half way between Matucana & Chusica. The rains had washed away the road & in the darkness we came near riding into the Rinca as the road stopped thus we attempted to go across through some fields. In the distance we could see a light which we knew to be Matucana. We soon came to a large wall which could not be passed by our animals. So leaving the animals we attempted to go around. but we seemed to have hit on an endless succession of walls. We hardly got on one when we came out another. Fortunately Antonio had telegraphed ahead for accommodation at the hotel & for a man to be a lookout for us. So that a man was sent down the road with a lantern & was now approaching. He led the way back to our animals which we mounted

went back the road about a mile to a side road which led up on the R.R. track - along this we rode - about two miles to Matucana where about 8 PM - a comfortable little one story house of several rooms though very primitive comfortable and with very good food - elevation of Mat. 7788 ft above sea level.

Friday Mar 22 Matucana in deep valley SE by E to NW by W.

High mountains all about prob. in many cases 12000 to 15000 ft. high above Matucana the road winds along the bottom of an exceedingly narrow valley with precipitous sides along which cut in the rock the path must go at times when the valley at bottom is so narrow that the run takes it all. The day before we passed the Torngas bridge - a splendid structure high above the valley on our right 500 ft. high - along the valley we occasionally see the line of railway high above us cut in the side of the mountain sometimes very looks like three lines one above the other  by no other way could it climb so rapidly - at San Mateo we took breakfast - the mt. sides are green & beautiful elevation 10500 ft.

While waiting for breakfast Marshall tumbled over with "enroche" or Mt. sickness. we laid him out on the ground, taking the baggage of some villainous looking pariah who saw him fall & offered no assistance - he felt better after a little and after smelling of garlic considerably which he advised by many local prob. did little good. & eating some breakfast which doubtless helped him he was O.K.

Breakfast accommodations here about = Uroschacra - It began to rain about the middle of the afternoon - this added to the effect of the grand wild scenery - the most rugged trail on the trip. The valley narrowed to a mere chasm in the lofty mts - the path wound about crossing the mts on shaky bridges - & climbing up the side the "Punto de los Safronillos" a spot where the R.R. crosses

ent. of the solid rock on one side of the valley high up
 enters by a tunnel on the other. Far beneath the main
 road runs along one side of the river until near the
 R. R. bridge when it crosses a stream which comes pouring
 out of the solid wall on one side & then winds along
 the side of a precipice - climbs by artificial stone
 steps until finally it winds out several hundred
 feet higher into a more open part of the valley.
 At the entrance to this region the wall at least 3000 ft.
 high overhangs the path some twenty feet &
 making a protection from the rain. The stream that
 came from the rock has its source in an unknown cress
 of the mts - when the workmen were blasting for the
 tunnel they broke into this underground stream which
 henceforth ran out through the opening - around at
 Chicha early in evening - a struggling village with two
 small hotels & a considerable Indian population -
 terminus of O. R. R. though the track had been graded
 considerably further - the intention being to carry it to
 Oraya & the Cerro de Pasco Silver mines -

Sat. Mar 23 mt sides about Chicha green though many
 summits covered with snow. Quite cool - fire necessary to
 comfort. Elevation 12220 ft. - I was not troubled with the
 altitude although there was a slight feeling of dizziness
 especially manifest when making any motion or walking
 Chicha is only a few hrs ride from Const. of Cordillera -
 did not wish to take time to go further. Scenery beyond
 just not so wild & more open than below - while strolling
 about have taken some measurements with M. & the
 Dr. a bull came tearing up the hill - with two or three
 Indians after him - he was almost as big as before we saw
 him - one side was a high cliff 60 ft high & on other side

some native huts. In thought an additional elevation would not cause us any further touch of snow & concluded to try the view from the top of the house - snow began for the bull who was nearer was - ripped up his pants as he grumbled one side - giving him a very narrow escape - valley at Chiles small & deep. Returned to Matucana today Monday Mar 24 owing to break in road caused by water over land burst at Pungu we cannot return to Chivina today visited some indian village high up on the northern side of the valley. Time of ascent - 1^h 55^m made back. went up by one road returned by another. Mt sides covered with flowers Heliotrope being most abundant & growing in large bushes several feet high in great abundance so that the whole air was fragrant with it. at last we came to a little indian village of some twenty houses. They seemed friendly. Raine gotatoes & some other fruit for sale & an offer of some work in the valley for the owner of the hacienda.

House very primitive. we took lunch which we brought & some very good milk furnished by the natives at a little hut. They keep some very good cows & goats. House of mud & cane one story no rooms, no furniture, a few ad plates & cups, a few earthenware for milk & water. earthen floor with piles of potatoes &c. How they passed the night doubtless no doubt they take their clothes & such all together on the floor. no windows very dark inside. There was a very bright little girl some ten years old with a most cheerful smile. She was caring for her little brother who could just walk and washing her hair. Her hair was long, thick & jet black. She had a dish of water with which she washed her head then in the most extravagantly earnest manner twisting & scrubbing her hair into a hobble's angle, I wondered how she would comb it. However after a while she took a

large wooden comb & beginning at a point in the middle - she succeeded by a tremendous pulling & tugging in get it straight - but with an amount of pain & effort that a more civilized child would never have endured - then she polished it up with a piece of finer comb & tying it up with a diminutive piece of faded ribbon looked the picture of contentment. I took quite a fancy when she had such a bright disposition.

On our way down we passed another village much like the first - alt. of these villages about 10,000 ft -

On this trip to Chichila we saw two or three times a native woman sitting in the doorway - washing her hair - which seems like a mania with them as they do not seem especially particular about other parts of the person - but a kind of suspicious shake & which undoubtedly serve for a diff. purpose in the night - This is quite common.

Mon. Mar 25 Went by mule back as far as Cerechaca.

Passed by Rompa bridge which had been carried away by a cloud burst during our trip to Chichila. It seemed impossible - the fall of rain in the immense stretch of mt. side far back in the interior must have brought down immense quantities of great boulders which knocked out the central pier & caused the collapse. Both up & down there was only a trickling stream which I could jump across - at Cerechaca took special train for Chosica - this train was up with engineers to examine Rompa bridge disaster.

Wed. Mar 27 Made a trip by mule back with Indian guide to summit of a "cerro" north E. of Chosica. At the P. Valley some 4 or 5 miles round trip & no much as place was very poor.

Thurs. Mar 28 1891

Spent the day with Antonio trying to find the easiest way to "Mt. Harvard" which seems our most choice for present. Went up by a route now down the Valley - traversed by the main one - which we select for repairs -

Mon. Apr. 1 unpacking boxes, goods.

Tues April 2 Set up the "wonder house" in part. where it is good order.

Wed - Thurs April 3, 4 unpacking goods to.

also went up to see how Antonio was getting on with charis on mule road.

Fri Apr. 5 to Mon Apr. 10. Busy in Charis attending with various things necessary to get our station established on Mt. St.

Tues. 11 went to Summit to arrange for establishing building furnishings. [See art. in Lewis Herald].

Wed April 17 - Sat May 8. This spent in getting buildings furnishings in order. Had Antonio to help me most of the time. For two weeks had a person this somewhat - older wife is cook & help. She was so lazy & dirty - however that we doubted them we paid them $\frac{2}{30}$ per mo. Antonio a few ^{by 14} came when they left worried - we pay him $\frac{2}{8}$ per mo. Shortly after Antonio's father came & work. we pay him at first $\frac{2}{15}$ per mo.

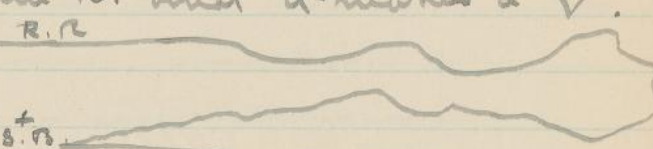
Thurs. May 9 Bought Ruth & Irving at Wilay. Stone is at but no piñon or awning & things pretty rough. but she is home sick at hotel. Irving was on horse in front of me & enjoyed the trip. Ruth did well & did not mind the ride as much as I feared although she got pretty tired. She was making trail on foot, brush & with Berta Selesof.

mt. st. May 10 - Nov. 8 - 1889

Spent for most part on mt. st. and occasionally a visit to Lima. Time spent in work with meridian (Cholamita and Bache tel. - owing to cloudiness it seems wise to try some other locality - we have planned a trip South. to test climate in various localities.

Nov. 8. Ruth Irving Marshall & I leave mt. st. and go to Chelavica. While going down the steep climb we wished to take a photographable I got on the mule & started her a bit up the hill. Either the saddle came off first or else she kicked it off. at least. She began to kick and the first thing I knew the saddle slipped back over her tail and I rolled down the outside fortunately receiving no injury beyond a bruise on my buttocks. - arrived in good order at the hotel.

Sat. Nov. 9. Took Irving up to the Vinas bridge on mule. - view of m. st. - at present - traffic is going on over whole line to Chila well - work at Vinas bridge. Passengers & freight are carried across here also by a swinging carriage running on a cable over head - pulled by men - they are putting in a steam engine & motor cable & will build a better carriage - the present one having a rail - board road the cut some 10 ft high looks rather risky when filled with passengers - on both sides of the river here at V but especially on the r. side are ancient terraces in some cases more than a 1000 ft - above the valley. There is one green spot about 2000 ft or more above R. Valley of the V. valley - which looked green today and is said to be cultivated. There is some water

from V. river. There are also some other marked terraces
of ancient inhabitants between V and Chusima. Returning
I found it took 8 1/2 minutes for train w/ cars from a point
directly over the San Bartolome station which station
is from 3-4 miles and very ancient. Prob.
at this point R.R. is 200 ft above station. It makes
a very curious curve when B. what it makes a V.
something like this 

The grade is very steep. ^{S. N.}
along here about 4 ft. in every 100 ft. - -

Sun. Nov. 10 Went to Lima in P.M. Mrs. Stubbins
and Mr. Dyer came up in morning. We dined with
Mrs. + R. P. + S. with Mr. Dyer. Stave rooms at Sursum
in the Portal on the Grand Plaza opposite the President
palace. This is an extensive white T.E. hotel but
no meals served here. R. troubled considerably by arthritis

Mon. Nov. 11 attended some business. We also visited
the pantheon the burial place of Lima. The bodies
are never put in the ground but usually in above
ground vaults. These are niches in long thick walls of
brick and adobe. and just large enough for the coffin
They are rather 4 or 5 tiers high + arranged alternately



as a few of the wealthy have private
under ground vaults with elaborate
down + made of stone or marble. with a monument above.

The price of one of the ordinary vaults is said to be 60 soles
for life & had almost said but rather for death. When
his son to paid the vault to be sealed + marked + to chapel
when secured forever. Poorer people however are put in
for the payment of 3 soles for 6 mos. at the end of this
time if the friend advance another payment the body remains
but if not it is taken out + buried in the ground ^{in another} elsewhere

The bodies of Spaniards are put into a common vault for a few days then buried. This is in a different from cemetery. While here we saw a burial of a poor man. The priest led the whole procession. The coffin followed borne on the shoulders of some stout Indians. & the relatives of the dead followed, all on foot. They placed the coffin in one of the clerical vaults & the priest said a brief ceremony - a woman probably some of the family took part in the ceremony. Each present took a handful of dirt & threw it on the coffin. Then while the priest recited a mass with voice & music laid in the vault & the ceremony was completed - a woman put the ring of the dead into the coffin with crosses & garlands.

Nov 10th. visited the exhibition grounds where the city is to give today a lunch with the President. As Saturday or Sunday was the birthday of the President he declared a three days fast. Wednesday, Thursday & Friday - was holiday. no body was expected to work & shops were closed except for a short time in the morning. there are said to be 50 or more regular fast days in Peru. So that with Sundays there are about $\frac{1}{3}$ of the days for nothing etc.

Wed Nov 13. expected to sail this afternoon but boat is late & do not sail till tomorrow. Visited the vault of the Cathedral in the P.M. and saw the tombs of several Archbishops and a particularly decayed skeleton with some fragments of skin still clinging to it. said to be the bones of Pizarro on enquiring if any part of these bones could be bought the guide showed another said no.

However I have great doubts whether I ^{can} use these bones and great doubt but what a few ^{other} people only used would buy some. In this country however bones are too cheap to pay much for.

Thurs. Nov 14 Left Salinas in am. about 9 o'clock by S.S. Santa Rosa for Mollendo.

Friday Nov 15 Stopped a short time at Tumbador Mora & a woman says she had met. Later we stopped at Pisco - a town famous or infamous for its drinks and probably the author of the drink of the same name.

Saturday Nov 16 Stopped about noon at Chala a little town in the sand with nothing green in sight. In general there fields are on a rise but Chala is not. Water here is about 10 miles - a very dreary looking place. Some boatmen about the S.S. eagerly sought up the exhaust pipes to throw over board by the men who were butchering a bull or cow - some mines inland from this point I believe.

Sunday Nov 17 arrived in early morning at Mollendo port of Arequipa. The old port of Islay some miles up the coast is now abandoned. The people to being chiefly transferred to Mollendo when the R.R. was built. The coast at M. is quite rocky with brown numerous very good beaches. There is no proper harbor at M. but a small island (not quite separate from mainland) juts out and forms a cove which gives a shelter for boats.

S.S. anchor out about a mile or less. There is an oil stake out - the stormy weather it is said to be very heavy. The R.R. terminates on a short wharf. Built of R.R. iron. In ordinary weather landing is perfectly easy & safe. In experienced not the slightest difficulty

Mr. Mat. Cord an official of the R.R. says the landing is never dangerous. no life having been on land - & only by accident - never come iron. M is on surf some fifty feet above the sea. is said to be healthful. Region along the whole coast. Fairly barren & dry. In many cases here on further inland a great deal of white volcanic sand, very fine, like flour. so that in walking through it - boots & mantles become white. The surf is flour beating against. the rocks has worn gutters & passages making very picturesque effect. Water for us comes all from Quezima about 100 miles - 107 miles by rail but pipes cut across in some places.

In general they follow the R.R. as they are originally built in wherever wobbly the locomotives with water. At intervals are reservoirs for this purpose also cut off in order to lessen the pressure on the pipes - 8th pipe Mr. Griffith American Consul. who has kept also some meteorological records for ¹⁰ yrs. called on us. He has a pleasant home. also met at his house Mr. W.F. Cord - stones here are chiefly of wood brought from some where as there is no building material except possibly stone. Numerous seals were shown feeding on surf. no more whales till Mon. morning. weather at this port - continuously cloudy & foggy during our stay day & night. In Lima during our last stay there weather was comparatively clear. but nearly always considerable haze & high clouds. all along the coast from Callao on. the same low cloud & fog seemed to prevail much as in Lima & Callao during cloudy season. At Mollendo I am told this is when expected for some months to come. # dead hotel at M. and moderate island


Mon. - Nov. 19 1909

B

Started for Arequipa about 8 am. For some 15 miles the RR runs southw. along the shore of the ocean. Then branches E along near the fertile valley of the Tambo. From Tambo to Cacha - cando the road is exceedingly crooked with innumerable curves with sharp up grade. This is necessary to climb the hills which separate the coast region from the more elevated Tambo. Some of these hills at this season are quite green with certain coarse plants & is all washed a great number of years for a few months. There is no water however. but the low cloud fog which hangs about these hills is sufficient to cause the vegetation. From Cachando to about Vitor some 40 miles is the Pampa a region perfectly bare & desolate of drifting sand & rock but - shows of great fertility if water could be supplied at the stations where a little water issues from the pipes there is luxuriant vegetation. Mirages are frequent the ground in the distance appearing like water or blue like clouds reflected in water. A marked feature of the Pampa is the sand dunes - called . There are of remarkably similar angular form. present shaped with the outer curve toward the windward side while is South W. slope ² the side ² toward the wind is a gentle slope but the ² leeward side ² perpendicular & coming low point at the front a. t. b. they are about 6-10 feet high in centre & perhaps 20 feet long - Toward the leeward side of the Pampa. they are very numerous probably several hundred being in line at once. They are said to change their position moving slowly 15-30 feet a year. The sand of which they are composed is very fine of a light grey & apparently different in quality from the other constituents of the soil. The apex of these dunes is very sharp -

The remainder of the course to Arequipa is quite rugged & the course somewhat tortuous winding along for some way the side of a deep valley in the bottom of which is the fertile strip by the river Chili -

The view of Arequipa as we approach is very pretty with the symmetrical beautiful cone of the Misti behind it in whose very lab it lies - The sky was very cloudy until we reached the W. side of the San Juan the low clouds & fog of the coast are said never to cross this. At least it grew much clearer as we crossed it. We found Arequipa somewhat cloudy though however on our arrival. At six P.M. it was hazy at about 8 P.M. it was quite cloudy - at eleven it was quite clear. At 3 a.m. it was clear & again at early morning & dawn. The apparent conditions are clear in morning growing hazy & cloudy later in day perhaps to a maximum in early evening & clearing away before midnight. This was my first night's impression. From conversations with Mr. Román & others they substantiate this view but further obs. will likely modify it -

The present season & for the next three months are said not to doubt - truly to be the cloudiest months of the year. At other seasons they said to be nearly cloudless. A kind of fuel used considerably on the locomotives and on hills is a moss which grows on the lofty sides in quite solid masses perhaps 2 feet in diam. & a ft. or more deep.  composed of numberless small branches called - Yareta - In the interior however during of various animals about the only fuel -

Tues. Nov 19

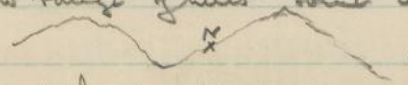
In morning Mr. Romania called + took us to the English + in fact - all mens - club - walked about - town some - what - Buildings usually of volcanic stone - of one story + walls very thick - walls of our building - hotel - about 4 feet thick - nearly all buildings have heavy arched stone roofs - there are precautions against earthquakes - In various places saw the marks of the last great earthquake - Called on Mr. Cantuarias + presented letter from Mr. Stubbell + from Sen. Delgado - Received three passes on all these roads - Arranged to go to Puno in special train with Mr. Cantuarias the Genl. Ingt. of the roads - visited the Cathedral + went on the roof - Fine view of city - Pop. 30000 inhabitants - No exact census ever made - The morning early was quite clear - growing hazy with light cirri during day - Evening quite cloudy at 8 P.M. and it went cloudy till I retired at 11.30 P.M. Late in night however it was abt. clear though just before morning it was cloudy again -

C

wed. Nov 20.

In morning after coffee went to Simba 2 miles from Arequipa took a bath in public swimming place. This is fed by two large springs from each of which flows a large stream took breakfast with Mr. Romania - He has an English wife + his wife's mother also lives with them. Very pleasant family -

D

In afternoon packed trunk for tomorrow start to Puno - also took horizon from roof of hotel Americano where we are stopping. Horizon $S + 3^{\circ} 10'$ $N + 8^{\circ} 55'$ $W - 2^{\circ} 10'$ E cutoff
 $rev. \quad 0 \quad 00 \quad 5 \quad 20 \quad + 1 \quad 40 \quad at$
 $mean + 1^{\circ} 55' \quad + 7^{\circ} 8' \quad - 0^{\circ} 15' \quad + 6^{\circ}$
 Horizon south is low range of hills some 5-10 miles distant. by dome of church
 Horizon north is  done by the lofty summit of Chachani 19000 ft high but coming within two peaks -
 In afternoon called on Gibson + Co + got $\frac{1}{2}$ 2.00 - Steller for Puno

La Paz + Puzco - also visited the wool establishment of Gibson & Co and saw vicuña wool. with now about 5 shillings per pound. Alpaca wool with 26 pence and common wool of chuk with some 9 or 10 pence. wool is all sent to England.

Day quite cloudy - growing more so toward night. about noon there was a very marked solar halo quite like a rainbow in appearance. the red inside well marked. dew - about 15°. thought by natives when a sign of rain. rain has been scarce for here three years - river Chili is low.

Day cloudy and evening quite cloudy till I retired at 10 P.M. At 2:45 a.m. also cloudy but less so at 4 a.m. and at daylight.

Thurs. Nov 21. Left Arequipa in special train by night. M. Cambaracas. Subd. of R. R. Alt. of Arequipa 7500 ft. Day grew quite clear till later part of afternoon. Late afternoon twilight quite cloudy at later stations + Puno.

18th from A. Yuma. alt. 8400 - there are some springs about mile from station. water is bottled & sold in a hotel.

Scenery on to aguas Calientes very interesting many curves steep valley & fine view of distant mountains - mists not of the time. alt 18600. Chanchani 19000 with M. and in the distance the Shushil summit & nearby spurs covered for down with snow of Corachuma - 22800 ft.

at Pampa de Arrieros, 12500 ft., stopped for breakfast - a very fine breakfast & sweet table. Beyond ^{from} Pampa de Arrieros alt. 7200 m from a point 13413 ft is a fine iron bridge over the river ^{for a bridge} chili 175 ft high + 286 ft long. at Vincocaya 14300 ft is a very good hotel and a very good horizon all about - It would offer very convenient necessary to a stay of reasonable length. Shall take the hor. when ret. but it is nearly a level plateau with no high hills in any direction. Took a lunch here. Prob. should

as his sleeping room they looked clean & comfortable.
 V. is 96^m from A. from here to Cusco alt. ^{112 miles from A} 14666 ft. the
 highest point on the road. the country is almost perfectly
 level. a broad extended plateau. It was quite a surprise to
 me to find the summit of the cordillera such a level &
 not at all impressive region - at Lagunillas are two
 beautiful lakes. Saracocha + Cachiapascana alt.
 13696 + 13486 - ft. one (S) is 16 m long. abundance of ^m good
 cattle along the shores. these lakes were said by Mr C. were salt
 fresh water outlets. It seemed however as if the R.
 Juliaca had its origin in the lower. & a much of this
 locality quite an outlet also forming with the other the R. J.
 one one side of the plateau. above mentioned. the water flows N.
 forming the Chile R. & flows into Pacific. on the other side to Titicaca
 from C.A. to Juliaca, the junction of the Cuzco riv. there is
 constant descent. from S. to Puno 29^m + 218 miles from A
 is a slight descent. Reached P. about 8 P.M. scarcely no
 lights about. Quite cold. got some Indians bearing our small
 baggage to Hotel Inca. leaving behind our car. after remarkable
 way in the dark streets we got to hotel & raised the "value"
 got some dinner from there. went to bed. set 125.40.

Friday Nov 22 Rose at 6:30. morning today light clouds.
 took a walk to the hills just out of city. here I had 35-40 per-
 cent in amplitude of hills facing the lake. 4 the N.E.
 hills about the town very close about 1000 ft high.
 a very desirable locality could be obtained on a horse. very
 ascending hill 1000 ft high dist of 1/2 - 1 mile. very good
 church. street narrow steep with straw roads or tiles. pitched
 roofs. quite picturesque. more later must be marked.
 made some views thought some curiosities. prob. 200 women
 selling food & all kinds of goods. At 10 o'clock left Puno for the
 Rose on special train with Mr C. soon reached Juliaca

Elev. 12,500. nearly level plateau. Splendid horizon -
 fine hotel very beautiful place to live.

The whole trip from S. W. Sta. R. is very level the RR in
 many places for long distances being as straight as a modern plain.
 and quite broad. Shrub in however on both sides & fr. by dist.
 out mts. numerous indian villages of considerable size & very
 numerous scattered farm buildings almost entirely of indians in
 all cases. Immense herds of sheep - also many cattle blankets &
 at Pucara 35 m from P. is quite a large village. Some 30 or 40
 indian women of the race Aymara with white hats

The 3rd & 4th angles hat with fringe about broad rim -
 were with large assortment of native pottery - expecting to go to
 Cuzco I delayed buying some till my return. But on returning
 there were no women at the station. The village was nearly a mile
 away & train was stopped 5 m. The last of the Incas was
 said to have made his home here. a little way from
 here between towns Mar. C. had the train stopped for us to
 see the Inca Chichas. a few rods from the track
 is a hole in the soft lime stone rock. about 6 in diam
 and 3 or 4 ft deep. at the bottom it looks out just how
 large I could not see. at the bottom is a boiling that
 is bubbling spring - the water had a very alkaline
 taste, resembling strong mineral water as it doubtless
 was. & not unpleasant. while viewing the spring there
 was quite a severe hail storm & it continued storming
 & very cold all the rest of the trip. At Santa Rosa the
 R.R. turns. the weather was exceedingly cold & strong all
 the Sunday here being covered with snow. my wife & I
 we gave a trip to Cuzco - in return to Puno soon.
 arriving at 8 P.M. Mr. R. stopped at Juliaca -
 all along this plateau the country is quite thickly
 peopled with indians. They live in wattle & adobe.

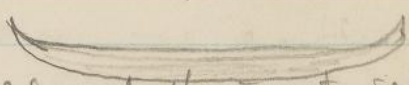
hills & go bare footed & open with both hands spread in
 spite of the bitter cold. They seem to be fairly contented
 in spite of the wintered lot & seem fairly cheerful &
 often quite merry. The des. in spite of the gloom of the
 people is undrawn. Yet they are very poor. The land
 here are owned in great estates by peninsians.
 These Indians require here 32 sols per year for watching
 the cattle = about 24. They also raise a little barley
 and two other cereals that will grow at this altitude -
 Quinoa and Cañagua. They are so poor that they
 seldom taste meat although a whole sheep sells for
 \$1.60 cl = .40. These people are old in many respects -
 very ignorant of course. They are undoubtedly more of
 than in ancient times the poor. Their life is similar.
 At night they are especially careful to cover the head with
 a cloth with ear flaps & putting a poncho on head & shoulders.
 leaving the feet legs bare. These get exceedingly tough by
 exposure. Took dinner with Mr. C. and his family - at the
 station & afterwards went on board the S. to start across the
 Lake Tit. in early morning. Left M. Mr. Provencal Board
 & in the Cabin on lounge as they seemed better than berths.

high grade
 clear at
 Puno.

Sat. Nov 23. Started soon after 5 a.m. from Puno.

Little steamship of 60 tons one of the pair on the lake.
 Called the Yahuá, captain Salaverry. who was one of
 the commanders of the "La Union" in the Chilean war -
 Mr. officer Auguste Pantrat. These men proved very friendly.
 and actually returned in our description book about the
 view ruins &c. - Capt. S. drew plan of route des. island &c.
 He changed his course so that we approached close to the end
 of the island Titicaca & could see the ruins of one of the
 great palaces & possibly the sacred rock. Passing down the
 west side of the island we rounded the southern point

where it is very abrupt & rocky. at the south end is a large pleasant sheltered bay with beautiful slopes & many house cultivated fields - Corn cannot be raised in this region, it is said. Pass along until we could see up the eastern side of the island we could see the very well preserved ruin of another palace of the Incas - & with many houses of the natives - a little S.-E. we found Coati the island sacred to the moon. Capt S. had the boat pass around the E. side of the island instead of its usual course W. so that we had a splendid view of the temple of the virgin of the Sun - It seemed the best preserved of all many of the doorways being at perfect. Took photographs of it & of the points along the island - we reached the narrows which are some 3 or 4000 yards wide & deep - just before dark. An interesting indian village on each side of the narrows - here the natives have a few wooden boats with sails for transporting their cattle themselves - an unusual means of conveyance as nearly all the natives use a half boat half raft called bolsa. It is rather peculiar made of reeds bound together with a Sq. cord sail & propelled also by long poles.



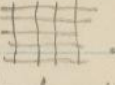
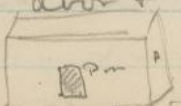


There is a low river about the edge & they rest some foot or so out of water - very really rocky but a raft - there are thousands of them on the lake. The whole S. shore of the L. is quite thickly populated & many of them are fishermen - The Capt says however that they do not go across the broader parts of the lake with them. Storms are frequent at this time of year & great violence - People are very fearful Mr C. who was 15 yrs a prisoner for P. S. N. Co. & was never sick was sick one day here - he had storm they are obliged to keep their heads for

Day & night
quite cloudy }

The two steamers and seven fork ^{60 ton} were made in England as gun boats - & were brought from Laena by animal before R.R. was built. The fuel used is nearly always llama dung in solid form. This is collected by the Indians & costs about 15-centavos - about 10cts per sack of something like 4 bushels - so the steamer takes 8 sacks per hour costs \$1.20 ^{per hour}. Coal is worth in Puno about 35-soles per trip to 4200 lbs. or about 6 soles per hour as it takes 400 lb per hour. This old boat works well - though it ~~has~~ ^{has} some trouble. The Yerata before mentioned is also considerably cheaper than coal. The mt view of the "Cordillera nevada" the angle of Bolivia was most magnificent - a tremendous range of lofty jagged peaks mostly covered for thousand of feet in some cases all nearly down with snow. Specially mag was to Lampu 2/8/12. It being one great pile of snow in some part must have been 1000 ft or more deep. Also Huayna Potosi & many other points covered with clouds & snow. Day fine but quite cloudy.

Sun. Nov 24 1889

went ashore about 7 am. and started for La Paz $\frac{1}{2}$ to later. in coach
(not covered) with 4 horses. Road for 8 miles to 1st changing station
the fertile lands apparently free from stones & almost completely
under cult. nearly all the way W.P. is level road the cultivated
lands dotted with the little farm hubs of the Indians -
this dist. said to be 500,000 fables. View of Sierra Nev. very
grand striking. Indians with strong complex. of Indian red & yellow
olive mixture & dressed in bright clothes. they are most
always dressed first with a bright col. cap. with ear plugs.
on this invariably a little round hat. a shirt or the under
garment with bright col. patches. pantaloons of black or some
color with drawers of white & the pants reach down to the
ankles and are very loose. Behind they are slit up
to the knees & show the drawers beneath. whether by style
or custom cannot say.  The road is covered in many
places by runs of almost ice cold water as they flow
from the snow mts a few miles north. these waters however
do not seem to mind walking thru this water - with their
bare legs & feet & ask. to cold winds. Indians plowing &
sowing. No corn grows but grain from mentioned -
Plows are very primitive  of two sticks of
wood one put into the other & a handle held in
one hand while with other holds a rope attached to bulls or
oxen. to plow pt. c cattle attached. they plow along
in light furrows a little apart & then across. .
they sometimes attach a handful of grass at d to
turn out the soil better. Houses here are all small
of adobe mixed with small stones grass roofs. small
low raised door & usually one hole for window about
6 in sq.  In evening we have to stop -
we changed horses twice before reaching La Paz - Dist. 4 L.P.

from Chililaz. Said to be 36 miles or more - took a bus -
 Chile L.P. in arch valley which arch suddenly
 from the plateau - elev. prob about 13000 ft -
 and L.P. some thing less than 12000 - view from it very beautiful
 looking down on L.P. red tiled roofs + green gardens - They say in
 Bol. "after Paris - to Paz -". Paved streets + rather good buildings
 Road from a. runs down in many curves with city beneath
 Park 30000 inhab. Mostly Indians who dress in very light
 clothes - visited the market in Pm - not only a central market
 at but sides of streets border. sqs crowded with women selling
 most any thing in line of food + clothing. much var. of fruits -
 Day mostly cloudy with cold wind + numerous thunder
 showers in dist - every cloudy + stormy with light lightning.
 music in the Plaza near Hotel "Central" however -

Evening the whole dist from Chil. to a. has a good - L.P.
 however is a high valley - night raining - some three
 bands playing in sq - Soldiers marched round the bands -
 continually - even quite striking music. soldiers. officers
 Indians + Monks. priests + electric light - with thunder storm
 for back ground - Insp. of Bol. Indians app. well to do
 so far as food goes - Contented. Soldiering comb. of cholera -
 off. by Spanish in plenty of gift. Gov. mostly
 Revs frequent. Recent attempt to assassinate Pres. contin-
 ual display of soldiers. Gen. amb. very interesting
 but not a desirable place where in.

Mon. Nov. 25 - spent day in looking about town +
 buying curiosities - sometime in markets, women
 do all the business except in some cases meat.

bought some vicuña fur etc. night raining

Tues. Nov. 26 Started for Chililaz at 7:30 AM.

arriving there about 2:30 PM everything raining but
 till some inches on way - made some picture in

Chililaya y Lake + Indian balsa in foreground.
 Left in S.S. at 4:30 but very little wind (narrow)
 channel at first. Boat stuck in mud several times.
 We carry anchor forward in small boat + then
 pull boat wit with wind ast - Temp. of water
 over short distance ($\frac{1}{2}$ m?) from shore 58° F. Temp. of air 52° F. ^{Time about 5 P.M.}

Wed Nov 27. At 7 A.M. at entrance of Puno Bay.
 Temp. of air 42° . of water 57° .

Colest time of year in water July + August.
 Sometimes ice forms on edge of lake. Mate says
 the temp. is sometimes as low as $12^{\circ} - 14^{\circ}$ F.

Rainy season Dec - Feb. Occasional snow.

Stopped all night on boat + took dinner with Capt
 S. Night quite clear except for scattering
 clouds. Sky when free from clouds was especially
 clear + stars steady. Made some views of Puno.

A Thurs Nov 28 Left Puno 1 A.M. - and arrived in
 Arequipa about 6:30 P.M. Unable to get 8x10 views of
 Vico Caya on acct of short stop + trouble with camera.
 M. now on trip with me (or +3) with small camera.
 Fair hotel at V.C. and within few rods a desirable
 horizon. Newly level plateau with low hills in
 distance. A not very bad place to live.

A Fri. Nov 29. - Mon. Dec. 2. Sick in bed at Arequipa
 hotel - am. with violent nausea etc.

Weather record (M.H.B.) Thurs. Nov. 28 Perfectly clear
 first part of night - very clear. prob. same all night.

Fri. Nov 29. cloudless. as det. from count. Sat. Nov 30.

cloudless. at 8 P.M. stars - counted 8 stars in Pleiades with moon

A M. R. says 2 out of 3 days during rainy season may be expected
 to be the same. (?) Sky very clear down horizon. Stars very steady.

sky clear down
 horizon - 10°
 during day.

- B Sun. Dec 1 light thin clouds in early evening + up to 11 P.M. -
few in long thin streaks at 4:30 a.m. - clear.
- D Mon Dec 2 light thin clouds all day + more at 7:30 P.M. - a little
better at midnight and about same at dawn. Prob. would
allow more later part of night with B.T. but not M.F.
- B Tues. Dec 3 quite cloudy at dusk + until 9:30 P.M. -
at 12:45 - mer. clear but low clouds so haze in E. + S. in W
+ S.W. one cloud very near mer. at 4:30 clearer with a
few clouds as above but less of them.
- D Wed. Dec 4 light clouds all day and all night -
thinner. Dec 5 light clouds all day and in evening growing some -
what clear at 10 P.M. but cloudy at dawn. Did not make it
from 10 - about dawn - but prob. light clouds in most of sky -
- D Fri Dec 6 few light clouds in morning - and through the
day - at 8 P.M. sky clear except in S.E. + stars quite
bright + steady, with full moon - sky also comb. clear two
hours later and at 3:45 a.m.
- A Sat Dec 7. went to Mollendo - arriving about 3:00 P.M. made
some views of harbor for obs. - night clear + sky morning in M. -
But morning of 8th very cloudy - Prob. cloudy about 12 midnight.
- Sun Dec 8. cloudy till we left on S.S. "Imperial" 8 a.m. time
for So. - Capt. Stewart.
- Mon Dec 9 - Tues Dec 10 sailing south - Mon. stopped at
Arica + Tues stopped at Iquique - went ashore + saw the
mine got 100 from Mr. Burke agt of G.B. & Co here - also
met Dr. Morriam Amer. Consul. who gave me letter to
Mr. Wheelwright at Antofagasta. Iquique quite large town with
good stores horse cars + carriages - Great industry is the
mine last mo 'm 2 million kilos of nitra exported -
- Wed. Dec 11 - arrived at Antofagasta about 2 P.M. -
went ashore - met Mr. Barnett agt of G.B. & Co
who offered to assist me - saw Mr. Wheelwright -

No rain aft. till Friday. Day clear. Last two days + nights coming down coast have been clear. Evening in Antofagasta very clear till 10 P.M. - Said to be nearly always clear on Pampa - but in night just before morning sky cloudy.

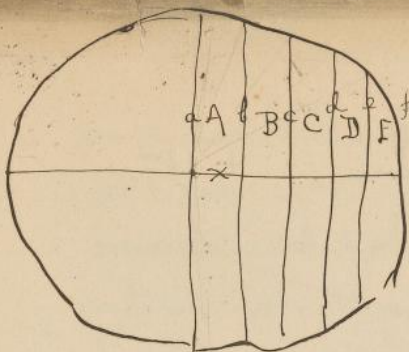
Thurs. Dec 12 Rather cloudy in morning perhaps "Caman chaca" - clouds low + dense. from N.E. - apparently resting against high hills about town - some diff in direction of clouds. prob. formed in vicinity by condensation in cool of early morning of moisture exp. by hot sun of yesterday. Antofagasta on low plain near sea. red reduction with near town - crude waste, looks like coarse rock but shows salt in its structure. Crushed +



carried with y. building where prob. dissolved in great vats + effluvia exp. in large open vats to crystallize out very many of these vats. Growing more cloudy during day. At first apparently resting against side of hills but later prob. higher - than hills tall. extending beyond them - although people here say that they are local like Pampa nearly clear. Took dinner with Mr. Sims. Whelphright. Evening quite cloudy - till 9 P.M. - and later in night.

Friday Dec 13 morning very cloudy. Left Antof. at 7:30 for interior; road winds round with south then E. + after reaching Pampa general direction N.E. about 20 m W Pampa + at there prob about 2000 ft. Pampa rises nearly continuously till Calama which is said to be about 7000 ft high.

At station of importance a few miles in on the Pampa Cienetas Station marked here an Englishman says that the "Caman chaca" is very common. and at all seasons. Sometimes very night for a week. that it also occasionally climbs ball points on Pampa even



Sphere - Homogen -

Let R = radius -
 x = alt. of segment = $\frac{R}{n}$ (n = no. of equal div.)

Let A, B, C, \dots = spherical segments of equal altitudes x .

Let a, b, c, \dots = lengths of radii of bases of segments -

Let $\alpha, \beta, \gamma, \delta, \dots$ = areas of bases.

then:

$$R^2 = b^2 + \frac{R^2}{n^2}$$

$$b^2 = R^2 - \frac{R^2}{n^2}$$

$$c^2 = R^2 - \frac{4R^2}{n^2}$$

$$d^2 = R^2 - \frac{9R^2}{n^2}$$

$$a = R$$

$$b = \sqrt{R^2 - \frac{R^2}{n^2}} = \sqrt{R^2 \left(1 - \frac{1}{n^2}\right)}$$

$$c = \sqrt{R^2 - \frac{4R^2}{n^2}} = \sqrt{R^2 \left(1 - \frac{4}{n^2}\right)}$$

$$d = \sqrt{R^2 - \frac{9R^2}{n^2}} = \sqrt{R^2 \left(1 - \frac{9}{n^2}\right)}$$

the only var. is num. of segs -
 meaning 26, 25, 36 etc etc

$$\alpha = \pi R^2$$

$$\beta = \pi \left[R^2 \left(1 - \frac{1}{n^2}\right) \right]$$

$$\gamma = \pi \left[R^2 \left(1 - \frac{4}{n^2}\right) \right]$$

$$\delta =$$

$$= \pi R^2$$

$$= \pi R^2 \left(1 - \frac{1}{n^2}\right)$$

$$= \pi R^2 \left(1 - \frac{4}{n^2}\right)$$

$$= \pi R^2 \left(1 - \frac{9}{n^2}\right)$$

to to

$$A = \frac{R}{2n} \left[\pi R^2 + \pi R^2 \left(1 - \frac{1}{n^2}\right) \right] + \frac{\pi R^3}{6n^3}$$

$$= \frac{R}{2n} \left[\pi R^2 + \pi R^2 - \frac{\pi R^2}{n^2} \right] + "$$

$$= \frac{R}{2n} \left[\frac{2\pi R^2 n^2 - \pi R^2}{n^2} \right] + \frac{\pi R^3}{6n^3}$$

$$= \frac{R}{2n} \left[\frac{\pi R^2 (2n^2 - 1)}{n^2} \right] + "$$

$$= \frac{\pi R^3 (2n^2 - 1)}{2n^3} + \frac{\pi R^3}{6n^3} = \frac{3\pi R^3 (2n^2 - 1) + \pi R^3}{6n^3} = \frac{\pi R^3 [3(2n^2 - 1) + 1]}{6n^3}$$

$$= \frac{\pi R^3 [3(2n^2 - 1) + 1]}{6n^3}$$

B

$$= \frac{\pi R^3 [3(2n^2 - 5) + 1]}{6n^3}$$

Calculus work checks depending on numbers - viz how hotel - Rikful at

when $n = 5$. substitute.

$$\begin{aligned} A &= .62 \\ B &= .57 \\ C &= .47 \\ D &= .32 \\ E &= \frac{12}{2.10} \\ &= 5.71 \end{aligned}$$

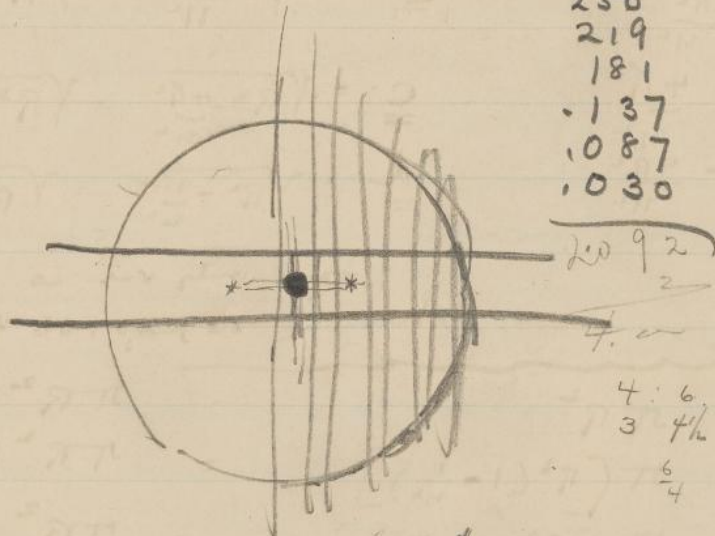
rel. probable sphere = 4.15-
or called 3.14

28
91
18
14

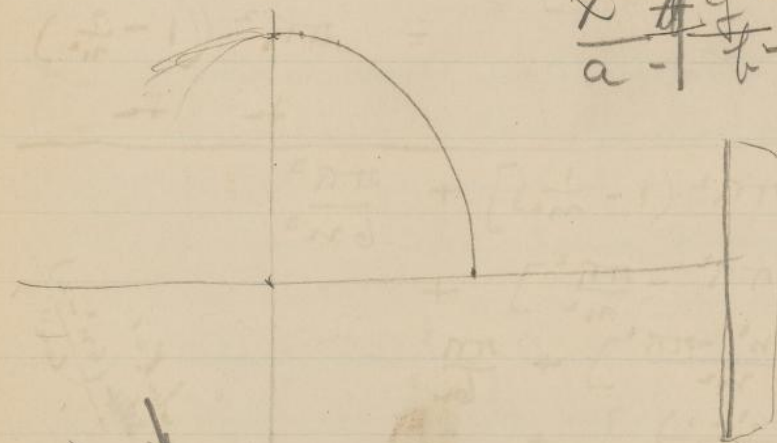
when $n = 10$.

313
306
294
275-
250
219
181
137
1087
1030

157
153
147
138
125-
110
91
69
44
15-
126
122
117
110
100
88
73
55-
36
12



$$\frac{x^2 - \frac{4}{2}}{a - \frac{4}{2}} = 1$$



37 1/2
38

as far as Calama - "Camauchaca" comes for hour, then disappears for time to return - to very dense + wet. Carmen also - now directed exact for water distilling + prob. will later be entirely forsaken - the R. way comb. has contracted with firm to put in water pipe from river beyond Calama to Antof - a distance of some 280 miles more or less - when this is done the water will be furnished thus - At present all water used is distilled either from sea water or from water of salt springs at various points wells are found yielding plenty of water but always salt - Pampa central bt. C.A. + Sierra Gorda is at present a busy place as the Co. is getting out nitrates - all the nitrates of these regions is Sodium nitrate - with other So. comb. - when this field is exhausted they whole town will double in num. Sierra Gorda. Small town - eating house - decent, no hotel with rooms. Said when a chance to get a bed in some other house - with dinner there -

Reached Calama about 6:30 P.M. considerable green verdure of some varieties + few cattle - River here formed from hot one fresh to the salt water - so that water is poor but used by cattle + poor scrubby + subhal vegetation -

Weather cloudy in Antof. when left but clear by time reached Pampa. Old ditches left behind - very clear all day till nearly to Calama. clouds all day however low down near horizon in E. toward Cal. Rainy season in interior. Quite cloudy in early evening at C. Afternoon cloudy. in Eastern side of Pampa. Best location ditches bet. C. Antof + Sierra Gorda. Gentleman who has been his months at Pampa Central says that only 1 bad night in 2 mos. that night there was the Camauchaca other nights comb. clear. Cloudy later in night + in early morning - ~~at~~ light haze clouds -

A

Sat. Dec 14. Cloudy in morning. Left Calama - about 8 am. Calama town chiefly depending on mines - very few hotels - Bkpt at

Sierra Gorda. Reached Panfha Central about 11 a.m. - Mr. Pérez
 received me pleasantly & gave me a very pleasant large room.
 Building has flat roof & would make good place for tent. M.P. work.
 Horizon very good. Mr. P. says occasionally "Camauchera" - more abundantly
 in winter - more May - Aug. - Says last (Fri) night - was pleasant at P.C.
 Light clouds all day. Mr. P. says. wind from N in a.m. & from
 S in P.M. - Says there is nitrate enough about many years -
 Some one else hinted that it was likely blown out - said was 800
 persons employed in nitrate bus. altogether on this line -
 Sky in P.M. quite clear toward S & S.W. & cloudy toward N & N.E.
 wind at surface quite strong - from S.W. clouds often nearly
 motionless. at sunset sky clear enough for work with M.P.
 few light cl'ds toward east. 8 P.M. very clear.
 comb. w. & ophiurids visible w/ naked eye. 11 Pleiads can
 hold in eye as group together. 2 stars visible in neb. of Orion -
 stars very steady & bright toward east - where there is a low
 bank of haze. the stars show clear to horizon. prob 4-5 mag
 hor. & just about true hor. No. not more than 10° above
 & E + W. about the same. Clear till 10:30 P.M. -
 at about 1 a.m. light clouds in N & E. but not on
 meridian - alt. low in N. at 4 a.m. light clouds in
 sky. part of sky.

- A Sat Dec 15. Sky clear at 8 a.m. - w/alt. few low clouds
 near hor. & remained so all day - Sun quite hot -
 Wind not so strong as yesterday in P.M. - w/alt. better
 red. at night. evening completely clear. seeing same as
 night before. stars visible somewhat - Indirect light - intensity
 nearly if not quite 90° from hor. at 8:15 P.M. same
 night before. Begins a little S. of W. and extends to a point
 North of Zenith. heat here about 22° S. - clear till 10:30 when
 wind. at 1:30 a.m. light clouds toward N. & E. S. & W. clear
 Prob. would not interfere with work South of Zenith. at 4:30 a.m. sky

newly clear again -

- A Mon. Dec 16 - At 7 a.m. sky quite clear, not a cloud except a small low bank of haze toward E. - rising some 5° above horizon. Sky very clear all day - Went down to Camen alle on brometide in a.m. returned about noon. Train took down some 50 laborers some with families - Watched them pick out & get into their new homes - long low houses divided into separate apartments each room 10 to 12 ft sq. - built of rock & adobe - & roofed with split-bamboo all plastered in & out. about 7 ft. high no window & small door. Each room is for 4 men. or when married for a family. a few of the houses have a window in them each man & family brought their household effects. For a family there are usually two or three mattresses a very few dishes some benches a coarse blanket & some tin buckets (made of old kerosine oil tins) there were a few bottles & chairs among the company but there seemed to be no luxuries - yet there seems to be no need of such things - wages in Chile are quite high. The best men it is said make 4 or 5 pesos per day ordinary ones 2 or 3 - 1 peso - about 50 cts. - they have the appearance of knowing badly & also of never having known anything better than their present life & seem not anxious to improve it. In general the unknown seem more energetic than in Peru - are choleric. dh. some few quite black but mostly light. Some very good looking men & women - men work by piece so much better in getting out the nitrate. work done with long pointed iron bars & shovels. Every evening completely clear. 8:30 P.m. very clear. comp. w. 5 octants distinctly vis. w. naked eye. sight in E & N.E. stars can be seen clear to hor. can see constell. Musca, gal. on hor. dishio " " some stars not above 5° mag. - Zodiacal light as before. clear till 10:30 P.m. - at 1.30 sky growing somewhat cloudy toward E & N.E. - at 4:30 sky rather cloudy. light - cirri -

1889

Tues. Dec 17 morning rather cloudy - scattering light rain - at 7 a.m. growing clearer however - till at 8:00 sky clear except wind E. - rather low down - Returned to Antofagasta in P.M. - sky clear until among hills near coast then began to grow cloudy - Coming down through the hills could see the edge of the M.D. about half way across hills - about on level with Pampa - arrived in A. - sky nearly all cloudy - alt. cloud at y Pampa about 2000 ft - down sea level - at Curritos the ~~night~~ ~~cloud~~ ~~Antofagasta~~ ~~R.R.~~ ~~sea~~ - old couple said that the night I ~~was~~ ~~at~~ ~~Calama~~ ~~+ also~~ ~~night~~ ~~at~~ ~~P.C.~~ there was Camanchaca at Curritos - the boy comes gliding at dark along the ground very rapidly from S.S.W. - soon another cry but so that they cannot see across the R.R. track not more than 20 ft. - sometimes but all right but more often look down then go - tower again - perhaps very clear blueness - Station on Antofagasta R.R. - Station Dist. P.A. - in K.M. alt in meters -

Salas	36	516	This station is on western edge of Pampa
Curritos	82	880	The Camanchaca is produced here
Carmen Alto	121	1290	and it is cloudy from Mt. rain
Salinas	127	1338	at Calama - Formable only blueness
Pampa Central	137	1382	Carmen Alto + Sierra Linda - Pampa
Sierra Linda	171	1615	central hot site probably -
Calama	209	2265	only occasionally Camanchaca here

very very cloudy in Antofagasta - night cloudy -

Wed. Dec 18 morning cloudy. Left Antofagasta in P.M. for Valparaiso in S.S. Bolivia Capt. L. boat very full on deck around with deck passengers - it being full above & below - there chiefly going to Copacabana to attend Xmas religious festival.

Thurs - Sat - Dec 19 - 21 en route to Val.

Sun. Dec 22 arrived in Val. - whole Chilean coast very bare & very much + quite to afternoon. Got showing traces

of green about half. met. by Mr. on boat. Saw a little of the city. Some good buildings. outsk. of town seen at the steep sides of very narrow quebradas. no streets running along par. with shore + cliffs are very formidable, which there so much so that it is impossible to build in some localities. there being in two places elevados where people to their houses from street level.

Mon. Dec. 23 Did some business in day. Arranged to go to Antofagasta taking in buildings of "Compañía de Salitros de Antofagasta" if advisable. Evening went to Santiago. Country between V + S is for some distance up deep valleys fringed largely R.R. with among steep hills climbing into the interior. For some distance the side of S. the R.R. runs along a very pretty valley. There is considerable snow in this region. at certain seasons ("full winter") but people do not depend upon it for crops but on irrigation. In south of Chile in some localities rain is sufficient. S. very fine city (for S.A.) some very expensive & beautiful private residences. S. Swallows up most of the wealth of Chile. very body going there after getting rich. Fine public buildings, all public squares made of brick + stone.

V is bad for ast. work. even in dry season fog most of the time coming usually late in night. Hazy this - some - sometimes all night. shut in by hills also. Some fine sites but. V + S. Port S. itself is as good as any place known - has good horizon. lat. $2^{\circ} - 4^{\circ}$. Port not more than 2° N. + S. Broad plain - In S. some 5 m. or so when there is some rain but or three quite bad. as in obs. lat. 200 working nights - but questioned said not 200 nght. for M.P. work not for B.T. work. Got record met. for '86-7. outside of S. e.g. at Copiapo no record has been kept. Prob. the obs. shown that Copiapo is very clear at all seasons" is not of much value. This port clearer than S. however. Unusual often is that Atacama region is remarkably clear than the S. region.

met Mr. Greene. a trouble (misadventure) + Mr. Gene Allen. Winter
Spent some time at V. + saw the city. Ascribed San Juan
very pretty Spent time here yesterday.

Tues Dec 24 Returned to V. in evening arriving there about
11 P.M. in + some other gentlemen met me at depot. They were
going out with the horse as it was time on + the town celebrate
all night visited a public sq. where some were dancing on
platform. also the market. where the works were trimmed
+ prepared for festival. various instruments gave the music
while the people danced the national dances. I drank milk
+ brandy. This dance consists of a wd of handkerchief (planta-
terio) ht. man + woman carried on while dancing. Some time
this is accompanied by indecent songs as we saw later.
Masquerade ball in theatre. we went into gallery. Fair-
show women chiefly masked but men not. Largest attraction
one woman with lights - danced with her partner the rest dance
surrounded by an admiring crowd of young rakes. their
gestures were as indecent as possible. Flew disgusted.
Wed - Dec 25 - 4 men. Boat was to sail today but postponed -
went about town some. but slow crowd. much drinking +
fighting in back street. Did some work.

Thurs. Dec 26 - Some business in Asu. Bought some news of Chile
for B. Bought in S. a package for Irving. In P.M. went about the P.M.
Capt Potts. very obvious but as lower deck is packed full of cattle
chiefly men. Left V about 8 P.M. -

Fri Dec 27 - Sun Dec 29. en route to Caldera. Stopped at
Caldera. at about 9 a.m. Took breakfast with Capt Potts before leaving.
C. a rather unattractive town of little business now owing to
failure of most mines in interior. Took train for Cobischo at
1 P.M. Cobischo town of considerable size in rather fertile valley
the Rio Cobischo flows down a little below the town where it
disappears in the sand - used up. People hope that it's impor-

have will be regained by R.R. from Argentina coming across the
Cordillera & connecting with the Cop. R.R. 2 trains per week from
Cop. to Juan Jodry & Chancillo - Left Ma. bus to investigate
the locality & have decided to try Pampa Central for present.

Went hotel - Sky very clear except near hor. at night - but in am.
after light fog came in fairly from W. started till left at
9. am. - 35 yrs old today -

Mon Dec 30 Returned to Caldena. S.S. Imperial arrived about 5 P.M.
went aboard at 7 P.M.

Tues. Dec 31. Sailing to Caldena at small & barren port of Chancillo
val: & Salsal - Town dark full of cattle - Boat fully passengers -
In same stateroom with Chilean of a miner -

→ Wed. Jan 1 1890

arrived in early morning at Antofagasta. Found goods are in
Custom - everything all O.K. - Took dinner with Mr. Wheelwright -

Thurs. Jan 2 1890 Mr. Sumner promises us a pass on R.R.

Mr. Carvalho also will assist us by order to go to shore & P.C.
Called on Mr. Lewis at smelting works. Found him very
pleasant - Introduced to Mr. & Mrs. Barr - salt & brine of
works - various duties - One silver lead & copper - are bought
from the miners all along the coast - reduced - on is
assayed - made of proper sized pieces just as they go - mixed
in various ways & with flux - & put into furnaces -

These are kept running night & day - of fire goes out whole
furnace has to be knocked up & built over. Sometimes
run a year. Impurities drawn off above & metal below -
Lead & silver metal (2 of silver) run in large bars -
These afterward placed in iron & flame passed over them & also
blast of air - the lead is oxidized w/ litharge & metal
silver settles bottom & poured out later in bars
weighs about 100 lbs & worth about \$1000 -

A-

Fri. Jan 3. Took train in am 7:20 for Omaha Central arriving ^{clouds in night: low & night very good moon} at 2:30 P.M. Was pleasantly surprised to find no connecting rooms for me here. Instruments not arriving telegraphed for them - light cloudy & some at night but clear night for M.P.

A-

Sat. Jan 4 Found instruments - came in night train - mounted the photometer on roof - no saw constant come. from change of dec. & added it at angles about 10° from horizontal. Got it mounted during day. In evening attempted to get on level star but as the moon was full I was hindered by same. Clouds light during day which did not all disappear at sun set - but could have begun work with M.P. at dark started till I went 12 P.M. & doubled more -

Wind is very strong in afternoon blowing from S.W. This morning the wind was quiet - after a little but blew quite fresh from S.E. later. Stars taken great precautions in mounting M.P. so that cannot blow over - Took 8-3 time by sextant with star compass. equal altitudes at $10^h 48^m$ and $11^h 21^m$ by local time pieces \therefore Mer. at $11^h 05^m$ - By Naut. almanac - 1885 of M.P. having first pt in axis $5^h 02^m + 6^h 21^m$ R.A. of Capricorn $+ 2 = 11^h 21^m - 11^h 05^m = 16^m$ - clock slow 16^m

A

Sun. Jan 5 - light clouds in am - but growing quite clear in P.M. - wind quite strong in P.M. - evening very clear till late and fresh - all night - wrote letters at R. & this morn. . . .

B

Mon. Jan 6. Morning very clear. wind E gentle. Somewhat cloudy during day. M. came at 3 P.M. found in evening when moon got up for that had to wait with lens. spent some time adj. photometer. evening somewhat cloudy but clear nearly or quite all the time on Mer. except for M.P. Nearly all clear 11-12 P.M.

A

Tues. Jan 7. Morning very clear but light clouds toward noon when in 2. Took time at noon with sun - only up part stick. Time after noon = $12^h 3^m$ by our corrected time. N. almanac Eq. of J = $6^m 36^s$ A. mean time $12^h 6^m 36^s - 12^h 3^m = 3^m 30^s$ giving J. i.e. time slow $3^m \frac{1}{2}$. At $12^h 20^m$ my watch (3 slow) = S.T. clock $19^h 32^m$ - at $1^h 6^m$ my watch $1^h 19^m$ Sid Time (Sid. cl. had first 1st on M.P. & was moved forward 2^m + reg. baric). evening clear. Completed the adjustment

of M.P. and trip short series.

Wed. Jan 8, 1890 clear & fair. + quite clear during most of day.

A Reg. of S.T. clock changed: 12^h 50^m watch = 20^h 2^m. S.T. clear

arranged during day a screen to protect lampia hood but it failed to work. time variable to 10^m series as clock anticlock had not arrived coming clear except near horizon.

Thurs. Jan 9, 1890 sky in clear with light clouds & haze.


watch 16^h 3^m = S.T. 23^h 20^m. Sid Cl. was in part + reg. changed

B Sky cloudy light clear in streaks all day + till dark. Not visible after dark. but visible more or less after moon rose about 10 P.M. Took a series with M.P. but stopped when moon rose.

Friday Jan 10 sky same as Thurs. light scattering clear growing

B less till sunset. visible more or less till quite dark. Series with M.P. no clouds visible on horizon till moon rose when they were rather odd wing. haze so near moon. shade of not on it.

Part of shelter instrument came today + was put in place. So far work has been at some difficulty owing to wind. Moving at slight & building seeing at.

B Sat. Jan 11 - sky same as yesterday - quite cloudy. Part of clock house for M.P. came + put in place. fastened down with nuts & screws + held by guys.  clock house is 2 feet 7 ft high 6 ft wide & about 12 ft long - winged back at first. Series begun + rejected. Later another short series stopped by clouds.

A Sun. Jan 12 Sky very clear all day. more trial + studied.

sky completely clear all day bright except very low cloud about 30° above hor. in E.

A Mon. Jan 13 sky very clear all day except low cloud in E about 2° above hor. no sign of cloud where elsewhere. Took time at noon & found watches slow. mine 4^m slow. set it forward 4^m + changed reg. triple -

series clear. Long series about 2 am few clouds.

A Tues Jan 14 Few clouds in morning grow. more cloudy during day but quite clear later at 4 P.M. completed clear except 15° in east.

evening very clear. Long series 210. no clouds seen in night

B Wed. Jan 15 somewhat cloudy during day & also in evening series not ¹²¹ in 8 but interfering by clouds several times -

D Thurs. Jan 16 clear in a.m. & 1st half of P.M. - became very cloudy about 4 P.M. & remained almost completely cloudy during evening till retir. at 12 P.M.

Fri. Jan 17 sky clear or nearly so all day -

A - night also clear till about 2 a.m. series ²⁰¹

Sat. Jan 18 day clear except for few sea birds - night clear & clear.

A though foggy low down in some places few clouds at sunset but all disappeared - series ¹⁵⁸ till 12 mid. clear then -

Sun. Jan 19 quite clear all day and in evening - clear till 12 P.M.

A Mon. Jan 20 clear nearly all day - took time at noon. very much 3rd set back 3rd & req. change. evening very clear series of 302 stars ^{max. no.}

A Tues. Jan 21 clear all day & evening series 222 -

A Wed. Jan 22 very clear all day & evening. long series

A Thurs Jan 23 very clear all day & evening. series 207.

shook of earthquake about 9:00 P.M. shaking buildings somewhat while we were at work -

B Fri. Jan 24 clear all day except that the low cloud in East is higher. Today toward evening it extends in places 10°-20° above horizon & nearly W.S. & around a little north W.M. evening clear till about 11 P.M. & clouds in E. & W. low. at 11. long 1st in fire stopped series. 107 stars.

A Sat. Jan 25 clear in morning & during day day -
Thin clouds just after sunset in S.W. but disappeared at dark & sky clear till 12 M. moon D.

A Sun. Jan 26 clear day & evening except clouds at sunset - like Sat. & some haze during day.


A Mon. Jan 27 clear day and night - series not in 8.

A Tues. Jan 28 clear day and night Monday was first quarter moon but find we can run series taking over 9.5 in low dec.

as 70 - 80 and not P.C.

A Wed. Jan 29 clear day + night - after 10.11 a.m. run the P.C. stars without special aid - the moon was quite bright - slight earthquakes P.M. about 3 o'clock -

B Thurs. Jan 30. Some light clouds in a.m. and during day - also first of evening but later sufficiently clear for series though quite hazy - late heavy shower of earthquakes in evening -

A- Fri. Jan 31. Steadily clear during day and night - moon just before dark - half bright. features of moon show very distinctly - moon  could plainly see large crater or not projecting etc. with naked eye & detail of plains &c. should very clearly backed eye - (prob Aristarchus)

C Sat. February 1. Never clear all day. few light clouds - evening too cloudy to work - light fleecy clouds & haze - made some obs. on moon. drew small drawing of naked eye view of moon. From obs. of Cassiopeia

made with sextant - some true since results as follows.

From S. L. 1874 - obs. of Cassiopeia $12^{\circ} 37' 40''$

mean $12^{\circ} 38'$

P.D. = $37^{\circ} 22'$

60 32

37 22

- $23^{\circ} 10'$

Latitude of

P. Central

about $-71^{\circ} 41''$

obs. alt. $121^{\circ} 28'$

60 32

121 45

60 32 30

of 33

60 32

B From north of S. A. Henry rr. from Paris about $-71^{\circ} 41''$

Sun. Day some light clouds. Evening few light clouds in a.m. clear - but morn. 5. clear during whole evening & also well with north - not a bit time.

D Mon. Feb. 3 - Forenoon quite cloudy - and also all the afternoon and evening. no series possible -

A- Tues. Feb 4 Day nearly clear. few clouds. night clear toward S. - growing clear later in all dire. at 1 a.m. all clear except low in N + E.

A Wed. Feb 5 Day very clear. night clear also except few low clouds

A Thurs. Feb 6 Day clear & light sun scattering clouds - night clear -

A Fri. Feb 7 Day clear except few scat. clouds - took time at noon. my watch 1st fast. Set right. Some clouds in P.M. but night very good.

A Sat Feb 8. Scat. clouds during day. cloudy at sunset - but clear at dark & very good night -

- B Sun. Feb 9 '90 Scattering clouds during day - part of morn cloudy also, heavy clouds off. from East - but clear before midn. except low clouds - see horizon -
- B Mon Feb 10 Some light clds during day - night clear except low clouds in early evening, growing clearer later - ^{stalled half hour by clouds +} ^{series 180} pretty good ^{3/4}.
- Tues Feb 11 Some light clouds during day & haze - night ^{series 179} good at first - but growing haze with low clouds later.
- B Wed. Feb 12 scat. clouds during day & haze - night m. cloudy for morn. numerous heavy clouds -
- Thurs Feb 13 light clds & haze during day, clearer toward evening except in W & E. night haze with clds E & N is a consid. alt. series with m.p. but rather dry from haze -
- A Friday Feb 14 very clear all day and night except usual low cld E & N.E.
- A Sat. Feb 15 - - - - -
- Sun. Feb 16 quite clear all day though cld in N.E. morn
- A - with higher than two days preced. but night very good
- B Mon. Feb 17 quite clear all day & in early evening - about 8 P.M. suddenly cloudy ^{later} till about 10 P.M. - clear till ^{series 197} nearly one - when only clouds in N.E. & S. but increasing
- B Tues Feb 18 - Scattering clouds in forenoon but afternoon growing clearer very clear at sun set except low cld E & N. evening clear except heavy clouds in E - till about 11 P.M. when sky suddenly became very cloudy, later however nearly clear & perhaps quite so later in night - [Said to be very heavy storms in interior]
- A Wed Feb 19 quite clear all day and night -
- B Thurs Feb 20 very clear in forenoon. Some heard that Jupiter the m. int. of Jupiter night - have affected measures by being so close to morn. find by careful examination that the corner Dec. 48° - 58° bomb slightly out with 1/10 of morn. when col. is at point (point. post. Hence at Dec. 50° & 55° possibly when col. has been less than - 2 mag. may have been reduced .2 of a degree. No when sun affected & hence in lamp zone. Took time now watch 6 1/2" bar. sq. ch. diff. set back 6".

night - but. By clear all day, & only evening but. Slightly cloudy, & little before
8... P.M. and remaining ^{more or less} cloudy till 12 P.M. Later in night - however clear -

B - Frid. Feb 21 morning very clear. ex. low cloud E - clear all day but -
cloudy soon after dark & remaining so till about 12 P.M. Prob. clear later
part of night. clouds seem not to come from E. but ^{up from} from east &
may or may not be due to the strong water in the interior -

D Sat. Feb 22 Some scattering clouds during day and evening. Quite cloudy during part
part of night & prob. more or less clouds all night -

B Sun. Feb 23 Scattering clouds during day - early evening clear
cloudy from 8 - about 12 - clear - later -

B Mon. Feb 24 Quite clear during day with some scat. clouds
night. clear at first. clouds short time then clear -
with much - M. P. & P. & P. Packed for Mt. Harvard. Arranged with
Stugo. Va. Derrance - clerk at Cambridge - wrote met. record -
for some months. Record of cloudiness at 4 hrs. per day, 8 AM, 12 AM, 8 PM, 12 PM
& 4 PM. has been 10 per cent month - in the month - ^{at least last 11 years} 7 months broken
only last -

Tues Feb 25 - Packed boxes to start for Antofagasta -
arrived in A. about 5 P.M. - evening cloudy -
Wed. Feb 26 -

Outline of History of Philosophy -

Dr. Emil Schwegel -

outline S. J. B. 1890. mt H.

§

Introduction -

1. Philosophy - Science of Principles
2. History - @ Objectively - Dev. of nature & spirit - (b) Subj. history of obj. hist.
3. Methods of treating hist. - (a) Empirical - facts; Critical ex. of facts: Phil. understanding of facts
4. Sources of information (a) Phil. works. (b) fragments. (c) reports of disciples
(d) Validity of such reports dep. on famill. with both Philosopher & his writings & on the reporter.

The Philosophy of Antiquity -

5. Char's of anc. Phil. - unthinking belief in the minds own unity with itself and Nature. - Very religious - all Phil's reflect. of the period but advanced
6. Not among these fathers of N. but Oriental who took refined were worked up in Persian Persuasion - India - Confucius - free utilitarianism
Theont. spec. the generalization of male & female -

The Philosophy of the Greeks -

7. Sources of Knowl. Phil. works - fragments - Refer. to them by other philosophers
8. Orig. in Greek fancies - influence of Homer & Hesiod small - Orphic poems & cosmology of Pherecydes ethical reflect. shown in proverbs & poems ^{direct influence} had quite
9. Periods of dev. of G. Phil. - 1. Preval. Phil. Cosmology - Nature
2. " " Ethics & Logic - man -
3. " " Theology - God rel. to man.

Nat. Phil. always where man was in all these periods -

10. Period I. + div. 1. Ionic Nat. Phil's. Physicists - nat. prin's of things
visible phenomenon - matter psychically imbued.
2. Pythagoreans - sought principle to account for form of things & found it in mathematics in number and figure -
3. Eleatics - sought unity & immutability of being -
4. Later Nat. Phil's accepted immutability - but believe in plurality. change due to comb. & severance of elements.
"Nous" or soul - but the atoms were materialists -
11. Phil. of earlier Ionic Phil's - hylogism - i.e. matter imbedded with life -
all matter has life - life depends on matter -
Thales - Anax. Anaximenes sought est. prin's of things -
dev. i.e. origin & decay -
12. Thales of Miletus - 1st Greek Phil'r 640. B.C. Regards water as origin of all things
(taught) -

13. Anaximander of Miletus - B.C. 611. By Equity all returns to its origin -

used the term principles for nat. substance - one formed from "acropor"
from it ophorie, as heat & cold &c. come. thus, motion arise as condensations
of air. immens. world. earth a cylinder at the centre - one fluid - life by heat.

14. Anaximenes - disc. of 13 - air 1st prin - earth flat like plate -
15. Heraclitus of Ephesus - Fire basis - Flux of all things constant process
of subs. - the fire = divine spirit. all things grow & w fire -
Strike leads into harmony back to fire - Fire soul identical. Monistic & Hyloistic.
16. Pythagoras of Samos. 582 B.C. - moved to Crotona Italy - found society -
polit. eth. relig. - all cure is metempsychosis & various eth. regulations
- pos. math. - thelog. - spec. Various followers. Philolaus who made a book -
Euphantus taught - that earth revolves on axis - many other disc's -
rigidness in society - spec. doc's about + musical - harmony of spheres -
space bet. worlds same as mus. strings - tables of contraries headed by limit
& illimitation - number harmony. Soul. God
17. Eleatics - thelog. from ex. Xenophanes. metaphys. dev'd as doc. of being by
Parmenides. Dialectically defended in opp. to vulgar view in plurality of
objects & change by Time - & assim. to earlier nat. Phil. by Melissus
18. Xenophanes - also minor moved to the Italy repudiated the anthropomorphi
& anthropotheti representations of God by Homer & Hesiod - & promulgated the
doctrine of the One all powerful God - He is all eye - all ear - & controls
all
19. Parmenides of Elea. 510 B.C. - unity of being founded on conception of being -
only being is. Being fills all space. Plurality & change a semblance -
2. opp. principle light & night - comes w fire & earth -
20. Zeno of Elea 490 B.C. - attempt to show that suppos. of manifold leads to absurd.
& arguments - 1. motion cannot begin & - 2. Achilles & tortoise - 3. Flying arrow
is at rest - 4. Half duration of time = whole.
21. Melissus of Samos - attempt to dem. that One is all. Continuity of
substance rather than identity of being -
22. Later nat. Philas's - Held immutability of subs. - but also plurality of
unchanging substances - changed relations produce all app. changes -
Empedocle & Anaxagoras taught divine spirit - Hylozoism of earlier Phil -
superseded by severance of spirit from matter - atomists were materialists -

24.

Anaxagoras of Clazomenae - 500 B.C.

all origin & decay - as mingling and unmingling - unlimited number of
 primitive elements - called seeds of things but by later writers called
 "homoeomeriae." Orig. an odorless mixture of them - but divine mind
 brought out order. Order in Nat. causes, & divine mind only when
 other cause failed -

25.

Democritus - Abdera 460 B.C. Democritus - Atomic Phil.

Full & void both exist. Full consist of atoms intrinsically alike - but
 disting. by form position etc. True soul comb. of round atoms.
 Sensation due to material images coming thro' the senses. Eth. end of man happiness.

26.

Period II Prevailing Anthropological -

To sec. period belong 3 d.s. - 1. Sophists - 2. Socrates & Plato & Aristotle -
 3. Stoics - Epicureans & Skeptics -

1. Sophists - regarded mainly conditions of phenomenon of perception
 representative & desire - 2. Socrates considered man phenomenon of thinking
 & might willing & hence man's relation to world - while Plato & Arist.
 lay more stress on this relation & also on Nat. Phil. - regard man as a
 unit of society - 3. Stoics & Epicureans - regard man as man independent
 Skeptics lay more stress on independence of man & by neg. of all systems show way ^{for new}.

27.

Sophists made the transition from philosophy of nature Cosmology
 to that of man the subject - Reflec. ext. only to the Subj. as an
 individual and - suffic. to found a science of morals.

28.

Protagoras of Abdera ^{born} 490 - author of Rhet. esp. in Athens.

Individualist - held with Heraclitus the eternal flux of things
 Man the measure of all things - all things are as he measures them
 as they are or are not.

29.

Gorgias of Leontini - nihilist - 427. 1. nothing exists. 2. If anything
 existed it would be unknowable. 3. If any thing existed & were knowable it
 could not be communicated to others -

30.

Hippias of Elis - poet in math. art. & Rhet. shows the eth. stand
 point of Sophist in remark that law is tyrant of man since it
 compels them to act against their will -

31. Problems of Cera. of benefit to later Phil. by destruction of words
investigation of synonyms -
32. Various later Sophists - granted exclusive recognition to individual - opinion
truth of the individual - Best known Polus - the Rhet -
Thrasymachus - who identified right with might + many others -
many of the most cruel men in Athens to accept opinion of Sophists -
33. Socrates 470 - B.C. agreed with Sophists in making man free study -
went further however + studied higher relation of the subject to
the obj. world - Knowledge + virtue - all virtue dep. on knowledge i.e.
moral insight. Virtue can be taught - Believed in his demon-
guided induction + definition for rebut. of false theories -
accusation. 399. Subverts youth + corrupts morals, offends
against state. + - true + false - death unwarranted by disciples -
34. The disciples of Socrates, many called "partial disciples"
turned their attention to one part ^{or other} of the double Socratic
problems of the principle of knowledge + virtue -
the Megarian school of Euclides to dialectic investigation + the
Cynic sch. of Antisthenes + Hedonic sch. of Aristippus to
ethics - Xenophon not specially gifted as Philosopher -
He + others were disciples of Socrates - + some maintain the wise
man a idealist sought by association with Socrates to ^{strengthen} ^{development} intellectual

35.

History of Peru -

Fragments para la Historia de Arequipa -
extraídas de varios autores y de Manuscritos antiguos
y modernos y de las Narraciones de los Conquistadores
por el D. D. J. G. V. - Arequipa 1847. -

Arequipa said to have been founded by Mayta-Capac,
Fourth Inca, in 1170. - Name "Ari quepay" means
"Si quedars" - yes stay here. - This is the
etymology by Calancha. But Padre Blas Barla
according to Garcilasso de la Vega, says it signifies
"trompeta sonora" - the town of Yanahuara
Cayma, Sibaya & founded at this time & Ac-
quired of Antiquilla & Asequia alta first.
In 1539 Spanish settled present city of Arequipa
~~Acquis~~ Esquias alta enlarged by Spanish in 1642.
(Few Spanish came to newly few years before 1539)

- Terremotos y Pesles in Arequipa -

xxx. To the east (Arequipa) has the end of the Cordillera which
runs del Norte hacia el Sud-este and in it is found the Volca-
nos which have produced the ravages of Arequipa in different shocks
a little after the foundation of Arequipa, by the preaching of Villos and
his companions and the ^{moral} conduct of its inhabitants, it enjoyed
tranquility & comfort. Soon after that arose jealousies and
quarrelling, and contentions appeared, various diseases and
warrings. The mind was estranged from the reading of
spiritual books, preaching & mortification (of self). The women
became fond of style and dissolute luxury. Public di-
versions were begun and a free intercourse between both
sexes. In such a condition of affairs, at about half past
eleven of Jan 22, 1582, without any noise, began such a
shaking of the earth that it seemed as if the world would

be destroyed. The shaken mountains cut down enormous rocks and in the city, fell houses, temples, towers & all in one confusion. None were left except in bad condition, that of San Francisco and de la Merced. Vicinas, Francisco deer and foxes descended to the city, and walked about unafraid, & mixed with the people.

The Alequias cast their water over all Arequipa. The burkies & dust suffocated & made terrible.

Many persons were saved, being dropped out through roofs injured with broken legs & arms.

And only died buried about 30 persons.

In what is now the port of Islay, was submerged a market which contained water, wine & brandy. Of the vases were destroyed with their cases.

The greater part of the birds died and a plague of flies & rats ensued.

In the Convento de Predicadores, the people agreed to hunt for the image of Nuestra Señora del Rosario, and after removing the covering of rocks & mud, they found it in its niche in the wall without any injury.

In a special Oratory, was an image of Maria Santissima and at the foot of it was a lady with her child of two years, showing it to the M.S. at this moment came the earthquake. The mother fell & forgot ~~the~~ ^{her} child. The house fell and the mother did not remember her little daughter till ^{afternoon} ~~evening~~.

Then with the kindness of a mother she brought certain persons to open the entrance to remove the "Santas" & rubbish. On discovering the image, she exclaimed - Oh Mother of God, what have you done with my little daughter? With difficulty they kept on disentering & found the little creature behind the image without

any injury. Turned the citizens forward with the confession
 of. and the priests were consolation on that fatal day.
 all assembled to disinter those many persons who
 obtained the Sacrament. On the afternoon of night the venerable
 father Alonso Ruiz, genit., had erected in the main plaza
 a cross + commenced a mission exhorting the faithful
 to penitence. In his daily sermons he repeated that
 other and greater castigation would over them unless
 they profited by this first admonition of God. He
 succeeded in separating many from the path of evil.

Have been

There have been earthquakes in Arizupa
 which have caused great disaster.

Such have been, that of Nov 25, 1604. at 130
 P. M. that of 1613 May 20 1666 April 25-1668
 Oct-28-1687 Aug 22 1775 May 15 1784.

In the year 1589. arrived at Panama certain parties
 of negroes afflicted with the pest. From those came many
 within city and little later appeared simultaneously
 small pox, measles, scarlet fever, & burning fever.

The invalids began with head aches + kidney pains. Fever
 drowsiness, and some with such delirium that shouts
 were heard on the streets. Many threw themselves by the
 acquiras to cool themselves where died.

To ~~many~~ some were afflicted with a carbuncle in the
^{these} Sacro
 Sacral bone with such agonizing pains that they died
 in a few hours. So many were the dead that
 they buried them in open trenches in the plazas.

The priests gave prayers God powerfully in the altars
 passed the days + nights in the houses for the streets
 assisting the sick and dying and there were

six or eight persons about each priest, disputing -
 with each other about taking him to murder to their
 friend. The religious bore many all the weight
 and hence knew well the necessity of the people.
 Many priest died of the Contagion.
 After that year houses were established and a
 public procession from the Cathedral, on the day
 of the Glorious San Sebastian.

This scourge last. Priests and people made
 15 days of exercises, laboring much the priests.
 but the fruits occupied the whole year in this
 operation.

In 1719 there was another ^{general} epidemic in Peru
 in which perished in this bishopric about the third
 part of the whites and two thirds of the Indians.
 This pest consisted of great heaviness & goodness of the
 head. Swelling and pain in the whole body, lassitude
 of the nerves & complete debility. Scurvy & effusion of blood
 by the mouth & nostrils from the impure & frozen.

Began in July. Striking winds from the S.W. being
 noted. Ordinarily men perished of those who suffered
 in the most than those who had effusion of blood.
 An Indian attacked by the pest, supported with four -
 helped to like some wines from a large pot and
 got better & recovered, and afterward many were cured
 by the same. It is said that to Maria Santissima
 de Cayma, many owed their health.

In 1600. Feb. 15. the Arequipa felt a
 strong & continued movement of the earth. The 18th, first
 Friday of "Cuaresma", as night came on the
 movements were repeated, until 10 P.M. there was
 a strong movement, and all night there were

sensible shaking. On the morning of the 19th there was a noisy
 movement caused by the eruption of the Volcano of Omate
 known as Quimistaquillas. The inhabitants of Arequipa
 rushed to the ~~confessional~~. On 24 houses were counted
 about about 200 shocks. The sky was darkened and
 thunder & lightning were experienced followed by a rain
 of white sand which covered the whole country. (Camp?) The
 thunders were similar to artillery and on account of the
 obscurity caused by the dust & sand all was horror
 and confusion. The inhabitants covered their eyes
 with shawls and wounded themselves with different in-
 juries calling on God for mercy. On this voyage
 passed until Sunday, first of "Cuasuma," on which
 morning they applied themselves, with some light, to
 remove the ashes from the roofs. It was now so heavy that
 they threatened to fall. At midday the obscurity returned
 and at 2:00 P.M. it appeared like midnight. and the
 shocks were repeated. The 24 of Feb. was so gloomy that it
 seemed to be the day of judgment. The people became skeletons,
 were not even able to converse with the priests because they
 were unable to distinguish themselves, one from the other.
 Processions were made & the people went all barefoot, making
 penitence & begging mercy. For many days the processions
 were repeated & the candles were not put out ^{at night}.
 On Feb 28 on the strongest shock of all & the last houses
 were thrown down. At three of the afternoon of this day
 returned the rain of sand and the torment of thunders and
 darkness. But the Lord caused a strong gale to blow
 from the side of the East which cut the tempest to the sea -
 until the 2nd of April. The sky was not truly clear from
 the cloud and that day was the greatest for on seeing
 again the light of the Sun.

During this time took place many prostitution marriages. One subject was found who having arranged to Spain, and into his fortune in ingots; he called a ^{priest} priest & entrusted to him a paper in which was written his name & that of his woman & children, the place where they lived & the addition that the fortune was for them.

It was not known that the volcano had occasional such ravages. ~~After~~ After many days it was known that the volcano Huaina putina, range of Quims-taquillas of the curacy of Omate, 22 leagues from Arequipa to the S. E., had erupted. The pueblo of Quimistacas, a league & a half from the mentioned volcano, remained buried with a hundred inhabitants. The quebrada next to the volcano, about $\frac{1}{4}$ a league wide and very deep, remained leveled. The pueblos of Chiqueomate, Lloque, Thalgata, Colana and Checa perished utterly. The ^{teniente} lieutenant of the curacy of Puquina escaped with a few others. After a month he went to Omate and found its inhabitants cooked into fire. Ascended to Urbina and found that in Chicchillaque, Sasallaque and Cacabasa certain had escaped thanks to the ~~storm~~ ^{terrors}. They told him that they had seen burning stones of enormous size thrown from the volcano. The ashes extended through the air for a distance of 200 leagues & the volcano remained destroyed from its ^{planned} shape.

It is held for certain that the eruption took place after certain witchcraft by the Indians of those pueblos, with whom the devil had a conversation near the Tambo River, in the form of a serpent with a human head and threatened them

because they had received baptism and forgotten their ancient religion. In the manuscript of that time it is found that the river of Tumbes was attacked ~~and~~ by mackerel and "labas" and held back for 28 hours from water. That on releasing it, destroyed the whole Tumbes valley. except the people who saved themselves in time on the ~~left~~ ^{bank of the river} sides of the valley. On the hills is still seen the immense height to which the water rose when the dam broke. The valleys of Tlor, Liguas, Mages, + Moquegua, lost much land by the ashes, which in some parts ran like a torrent. Even large trees were uprooted or remained buried. In Quila a diel existed, suffocated - and others buried by the ashes. The cloud of dust lasted nine continuous months, and many persons left for other countries. The lands of Arequipa were sterile and only wheat ^{yielded} produced a little. The Magistrates had to bring provisions from a great distance. The Bishop of Cuzco, D. Fernando Mendoza, sent 100 loads of corn and ^{dry} meats to succor the poor & the communities. This disaster ought not to be forgotten by the Arequipanians.

Ubr de gebe-
 white-throat 30, 40, 50
 nells.

Book of Vol. II of
 the Cronica, P^{re}-history
 of Peru. Order of
 N. P. S. - Augustus.
 Chapter 11.

(Continued since 1654. Little before
 this Torres must have written
 this)

This work is continued
 by P. Fray Bernando de Torres
 of a Cronica by P. Calancha)

Says that a P. Alonso Ruiz
 prophesied as ~~was~~ just
 alarming - said.

12 mo after the volcano
 erupted + Pagote del Cielo
 sobre todos.
 after an short time came
 the great earthquake of
 1600,

el Gran Diccionario
 Historico &c.

por Don Joseph de
 Moravel y Casa delante
 de la Real Acad. de la Hist. &c.
 Vol. ~~II~~ I.

1753

says.

that in 1600 vomited lava
 burnt stones - ash &c. with
 such great volume & noise that
 it was heard in Lima
 De Laet. Historia del Nuevo
 Mundo. Sanson.

W. S. 2.60
 butter, 1.20

DMS.

- 1 Man with Δ 4
- 2 { Gave show presents in white & white lace
one between black drapery.
- 3 cross IN R1
- (whole procession lined on both sides
by children in gaily costumed &
candles unlighted. 5 P.M.)
- 4 various marshalls with
candles for distribution.
- Six Mr. Lewis 3 boxes of
wood with candles for dist.
(Beaver chest in view)
- Jesus's Christ. worn by about
12 men. Scent crown & halo
and in white lace. & gilt.
- White robing women throw
rose leaves over the.
- Stand at feet of
Christ.

(Large caddis are green.
 those home by men
 + boys. of chills pink
 white blue
 frequent halts.

5:00 orderly of 10 or 12 pieces
 music + chanting by
 crowd - on side now
 men.

(as little chills by night.
 next boys other large
 boys + men. on side with)

(woman in balcony passing
 by a boy (and other) dark.
 now leaves to see more)

5-7 Masters of Ceremonies in 3
 full dress. (Gentlemen).
 (non candles)
 (without hats all)

Bear of chert glass &
 gilt chert dend with
 crown with rose leaves.
 preceded by 5 women in
 black scattering rose leaves
 & two women with mace
 Bear borne by 4 men
 attended by 12 soldiers with
 muffled muskets & two
 officers & every hour
 of 12 gentle & position
 Prof. - Sub. present &c

Marshall
Candles.

6.

12 priests as guides
from the right church
to Burdock in Church
under a canopy
borne by 6 men.

Candles.

(women with ^{given} candles)
(boys at half mast)
12 little girls dressed in
pink and white with candles.

Then the mother of ⁷
 Jesus arrayed in splendid
 velvet & gold but with
 with 7 sword piercing
 her heart.

preceded by faint
 women with incense
 large detachment
 of soldiers

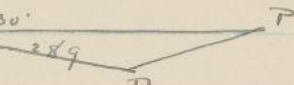
St. - St.

3

Determination of distance of point in Rinac Valley near R.R. from Mt. Standard. by 3rd theodolite
Friday Oct-18 1889

From house to a point on neighboring hill distance was measured by tape line -

Ground not level. $H = 8^{\circ} 30'$

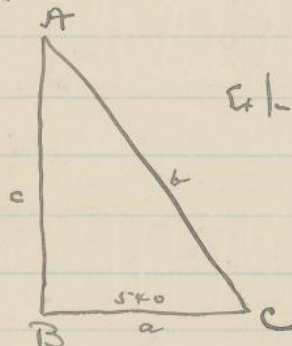


Distance $H \rightarrow P = 578$ ft -

Angle $H + P$ assumed equal - also assumed $H = P$ below -

Hence base line $HP = 540$ ft -

$$\left\{ \begin{array}{l} \log \cos A = 0.83030 \\ \sin C = 9.44034 \\ \log a (289) = 2.46090 \\ \log c = 2.73154 \\ HP = c = 538.9 - \text{round number } 540 \text{ ft} - \end{array} \right.$$



Ex. - $\left\{ \begin{array}{l} A = \text{point in Rinac valley} \\ B = \text{angle at house} \\ C = \text{angle at } P \end{array} \right.$

$$\text{angle } B \left\{ \begin{array}{l} 306^{\circ} 00' \\ 202^{\circ} 55' \\ 103^{\circ} 5' \end{array} \right. \begin{array}{l} \text{within} \\ \text{across} \end{array} \begin{array}{l} 305^{\circ} 50' \\ 202^{\circ} 45' \\ 103^{\circ} 5' \end{array}$$

$$= 103^{\circ} 5'$$

$$\left\{ \begin{array}{l} \log \cos A = 11.50900 \\ \sin C = 9.98523 \\ a = 2.73239 \\ c = 4.22672 \\ c = 1685.5 \text{ ft} - \end{array} \right.$$

$$\text{angle } C = \begin{array}{l} 247^{\circ} 6' \\ 172^{\circ} 0' \\ 75^{\circ} 6' \end{array} \begin{array}{l} \\ \text{reversed} \\ \end{array} \begin{array}{l} 247^{\circ} 23' \\ 172^{\circ} 12' \\ 75^{\circ} 11' \end{array}$$

$$= 75^{\circ} 8' 30''$$

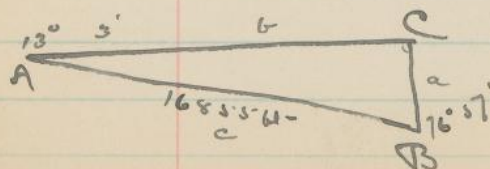
$$\text{angle } A = 1^{\circ} 46' 30''$$

3 mi 1015 ft = 3.2 - mi. Dist in straight line from

house on Mt. Standard to valley of Rinac near R.R.

elevation of Mt. St. above Rinac valley -

angle A measured at Mt. St.



$$\left\{ \begin{array}{l} \log c = 4.22672 \\ \log \sin A = 9.35373 \\ \log a = 3.58045 \end{array} \right.$$

$$a = 3806 \text{ ft. elevation.}$$

The point in valley taken is some 3 miles below Chusica. Elevation of Chusica given at 2832 ft - Bay Ancond Bar - elevation of Mt. Ancond above sea 6500 - 6650 - or above Chusica 3668 - 3818 - Probably pt. observed is 100 to 200 ft. lower than Chos.

Oct. 18 89

Today set up a stick in the ground vertically by means of Carpenter's level. The direction of S. + S. is known quite exactly - when the shadow of stick was apparently just south allowing for equation of time the error was only 39^s - assuming that the clock which had been set by time obtained by setting the Bache Tel. on known star - this time may have been possibly wrong a few minutes wrong -

Obs. Oct. 18	shadow obs. South. clock	^{mean time} 11 ^h 45 ^m 45 ^s
		Eg. D 14 54
	+ 39 ^s	12 00 39
Obs. " 19	" " " "	11 ^h 46 10
		Eg. 15 4
	+ 1 ^m 14 ^s	12 1 14

El Misti

Sr.

[The fol. which are from a manuscript of F. Javier Delgado]

**** Se halla situado el Misti al N.E. de Arequipa a la dist. de diez millas, por elevación, segun el sabio T. Don Mateo Paz-Soldan en su obra "Geographia del Peru" o a quatro leguas como generalmente se afirma, en una de las ramas occidentales de la gran Cordillera de los Andes, presentando, en la linea que segun las montañas de la misma cadena, la posicion de N.O. - S.E. approx., y tiene la forma de un cono perfecto, amplio en su base y truncado obliquamente en su vertice, en el que se ven dos picos de los cuales es el mas elevado el del lado NO. La altura del volcan es de 18500 pies. sobre el nivel del mar! y damos la preferencia a esta medida sobre otras que diversas personas le asignan a aquel, porque ha sido comprobada varias veces por el habil naturalista D. Juan L. de Ravarita en sus expediciones al misti con un barometro aneroides que posee de una precision admirable - "Presencia del Misti", dice el Sr. Paz-Soldan en su citada obra "cubierto de un hermoso manto azul, como un soberano acompañado de dos moles gigantescas como el, cual si fueran sus ministros, uno a la derecha (NO) el Chachani; y otro a la izquierda, el Pichu pichu, ambos retirados de el como a 20000 varas, como si tuvieran fallar al respeto a su soberano".

Estas tres montañas forman una inmensa curva a la cabecera de la ciudad, y alcanzan casi la tercera parte de su horizonte, uniendose a ellas las demas cadenas de cerros y colinas que lo cierran, a la manera de un ejercito que rodea el sagrado recinto de su reina y formando, desde el misti un anchuroso y pintoresco valle. ****

son los caminos que han seguido las expediciones al milí en los siglos anteriores y en el presente: El mo. el de Chiguata, pueblo situado a cuatro leguas al E de Arequipa. Tomando como punto de partida de la ascension el Alto de los Hecchos ! y el otro, por el lado opuesto siguiendo la quebrada de Chilina + + + + +

Podemos afirmar que todas concuerdan en los puntos mas importantes. En ellos se habla de la inmensa fatiga que causa la ascension, ya por la rapida pendiente y lo desigual del terreno en unos puntos y por las rocas y peñoleras inaccesibles que a menudo cortan el paso en otros ! ya por el enrarecimiento de aire, a medida que la altura aumenta haciendose dificil la respiracion - experimentandose el terrible Soroche, y habiendo llegado el caso de producirse hemorragias de sangre y otros accidentes - ya por el intenso frio que embarga los miembros del cuerpo - y por los fuertes vientos que corren en los elevados lugares ! necesitandose una poderosa fuerza de voluntad para resistir a tantos peligros. Se manifiesta desmayo cuando se sufre, cuando al cabo de penosos esfuerzos hechos para alcanzar una eminencia que se cree sea el crater, solo se ha conseguido pisar uno de los colosales pedraños de la gran Escala de la montaña, desde el cual se divisa otra cima que debe vencerse y de esta otra superior produciendo el desaliento o una viva ansiedad por llegar al termino de la jornada. Se pinta con entusiastas frases los mil variados panoramas que presenta el grandioso espectaculo de la naturaleza a la salida del u. o. del sol. y con palabras

de terror la impresión que causan la tempestad de la ~~atmósfera~~ y los ruidos y temblores de la agita en las terribles entrañas del coloso, y el siniestro aspecto de las grietas y respiraderos que en gran número existen en el cuerpo de este y en su cráter, de los que salen vapores sulfurosos.

***** El Sr. Dr. D. José Moscoso Melgar, que subió con Mr. Faeb y otros en el año 1878 hasta el cráter del misti, permaneció dos días en ese lugar con aquel ashenans y nos ha referido que se hallaban poseídos de un profundo mal estar que embargaba casi totalmente sus facultades, y envueltos por las nubes, recordándose solo cuando se despejaba la atmósfera i que no tenían apetencia ninguna, y que el agua parecía viscosa y el alimento estaba, pudiendo pasarlo solo con algunos tragos de café. *****

Hay una particularidad digna de notarse en el cráter en la obra del P. Traveda titulada "El Suelo de Arequipa convertido en Cielo". Se cita un manuscrito del R. P. Fr. Alvaro Melendez, dominico, natural de Serez de la Frontera, y que fué parroco de Chiguata en el que se habla de una expedición al misti el 1º de Mayo de 1677, por el mismo P. Melendez y otros, y dice que en el callegón situado entre los cráteros — "hallaron vestigios de una casilla de piedra, y algunos palos de leña, y estos pueden ser los restos de sacrificios que hacían allí los indios en tanto de la gentilidad — que refiere el Padre — se hallaron en este volcan

que tambien en el tiempo en que este sujeto estuvo en el Remo, que fue muchos años antes habria curiosos que escalaban esta eminencia con la tradicion de haber escondido los indios en su cumbre algunos tesoros. Pues bien despues de doscientos años el Sr. Romana confirmo

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Various de los expedicionarios al misti
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vieron en el crater, maseones, cochinillas
y aun un fazarito que vino a posarse
en el volcan en momentos en que se
salaba una vista fotografica de esos ^{lugares}
en la punta s.o. de la cima del volcan y
hacia la parte exterior existe una gran
cruz de fierro. De ella tenemos los si-
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que tambien en el tiempo en que este sujeto estuvo en el Rimo, que fue muchos años antes habria curiosos que escabaron esta minucia con la tradicion de haber escondido los indios en su cumbre algunos tesoros. Pues bien despues de doscientos años el Sr Romana confirma a este aserto, diciendo: "En esta planicie (la del ~~Callegon~~ mencionado) se ve con extraneza el delmeamiento de una habitacion hecha con piedra pequena y como si se emplegara a formar sus paredes de ese material, tiene como diez varas, y juntas a el hay otros dos mas pequenos a sus estremidades." "xxx" Difícil será comprender el objeto de tal entretenimiento en semejante punto. Por solo entretenimiento no es creible se continuasen tal trabajo, particularmente no hallandose la piedra muy a la mano en este lugar". Que misterio se encierra, pues, en ese edificio? Que divinidad tenia sus aras en ese lugar, alado a los rumbos? o que tesoros se ocultan alli! Varios de los expedicionarios al misti en el año de 1878, nos han afirmado que vieron en el crater, moseones, cochinillas y aun un fagarito que vino a posarse en el volcan en momentos en que se sacaba una vista fotografica de esos ^{lugares} en la punta N.O. de la cima del volcan y hacia la parte exterior existe una gran cruz de fierro. De ella tenemos los siguientes datos - En una relacion del matemático D. Francisco Velez. y otros que

con el Subieron al misto, en año 1787 y cuya copia auténtica se conserva en el Archivo municipal dice: "Desde la hora a que se presentaron en la cima comenzaron a hacer Señas con mantas que enarbolaban los indios y el resto de ellos se ocuparon en levantar una cruz de fierro que se halló caída, que había mandado subir el ^{Miguel} Ilustrísimo Obispo de esta diócesis. Fray Miguel Pamplona en 22 de Julio de año pasado de 1784, la qual se clavó nuevamente afanzándolo con piedras para su mayor subsist. Tiene de altura dicha cruz tres varas, y de brazos una y media con el peso poco mas o menos de cuarenta libras, es bien labrada y en forma de bandera del mismo fierro representando bajo dichos brazos el Escudo carmelitano." En la relación hecha por el Sr. Juan Sprunghi de su ascension al volcan el 15 de Agosto de 1872 dice: "A las dos de la tarde llegamos a la piedra mencionada que ^{tiene} 8 pies de altura y a las 3 nos ocupamos de enderezar la cruz - que estaba un poco inclinada. Esta medirá unas 6 pies fuera de tierra y pesará dos arrobas. Tiene su frente hacia Arequña - el Señor Col. José Maria Ugarteche volvió a levantar la cruz en su expedicion de 14 de Mayo 1878 hecha con motivo del desgraciado fin que tuvieron los expedicionarios Srs. Ryder y Rothwell, y trajo un numero 8 de la cruz - que nos obsequio hecho de platina de fierro

de una linea de espesor y que mide 18 centímetros de largo por 18 de ancho -

La cruz no puede verse ni a req. sino con poderosos anteojos ***. Muchos de los expedicionarios que han subido al volcan por el lado de Chiguata, tanpoco han visto la cruz - pero esto se explica perfectamente, porque esa ruta conduce al interior del gran cráter; y la cruz se halla al lado opuesto a Chiguata; de manera que para verla es necesario subir por el de Chilina; porque rodear la cima es empresa llena de dificultades como lo acredita la desgraciada expedición de los ingleses a que nos hemos referido, quienes subiendo por el lado de Chilina, mandaron sus bestias a Chiguata, y llegando hasta la cruz - en que pusieron una bandera y dejaron sus tápelas, halladas por el Sr. Ugarteche - quisieron dar la vuelta al volcan y cayeron precipitados en las quebradas que forman los inmensos pliegues de su masa -

De tres de las expediciones que visitaron el volcan en año de 1878 formó parte el intrepido excelente fotógrafo D. Ricardo Villalba y tomó varias vistas de los dos cráteres y otras fajas. Las cuales exhibió en un gran panorama, al que concurrieron millares de personas a contemplar la terrible hermosura de esos lugares - Es muy sensible que el Sr. Villalba no quisiese proporcionar a nadie la colección de esas vistas llevando a Europa las chiches - *****

II -

Pero el vulv es un volcan en actividad? ***** [siguiente]

opinioes, certamente vapor e vapor gases at times] **
 En la obra del P. Gravada que hemos citado, dice,
 al referirse al manuscrito del P. Melendez - que
 el 28 de Marzo de 1677 se notó en Arequipa una
 densa nube de humo que coronaba toda la
 cumbre del volcan que fué reconocida por la
 expedición que mandaron los Cabildos Eclesiástico
 y Real de comun acuerdo, la cual confirmó
 que era humo de azufre, y vieron el cráter
 muchas aberturas de donde Salio divisoando
 por dos de ellas, las mayores, unas como
 llamas de fuego - En otro lugar refiere que
 otra expedición de los licenciados D. Pedro
 Porcúel y D. Sebastián Hermán, curas de
 Andahuas y Cabana, que vieron lo mismo
 concuraron aquel, echaron reliquias
 de santos y fijaron una cruz muy grande
 en su mayor altura, y dijeron misa a
 medio volcan en la plazuela - " Será esta
 la cruz que existe y que en la relacion de
 D. Francisco Velez - que hemos citado se afirma
 que fué mandada colocar por el Obispo Fr.
 Fray Miguel Gonzales - No sabemos decirlo.
 En muchos dias se ha visto tambien salir
 gruesas columnas de humo del volcan
 en diversas épocas, especialmente en Nov. 1874
 produciendose grande alarma en la Ciudad.
 ** - Respecto a la eructacion del volcan
 tenemos los siguientes datos. En un manuscrito
 de los Jesuitas titulado "Historia de la
 fundacion del Colegio de los P.P. Expatriados"
 de Arequipa en que se habla de la eruct-

lago del volcan de ... ocurrida en
1602, manuscrito cuya copia mandada sa-
car por el ilustrado párroco de Caima
Br 3. hemos visto, dice: "Es fama que
este volcan en tiempos pasados vomitó
fuego y tierra por ... y que vino á
dar en agua." En la obra titulada "Noticia
y Description de las Indias" por el Capitan Don
Bernardo de Vargas Machuca caballero Castellano
natural de la villa de Simancas, dirigido al
Licenciado Paulo de Saguna, presidente del
consejo real de los indias - Madrid 1599. al
hablar de los volcanes de la cordillera de
los andes dice: "Otro está en Arequipa que
reventó una vez con tan grande temblor
que derribó gran parte del pueblo y arrojó
de sí mucha agua, y como pasase por
el pueblo, representaba en las casas caídas
con que hizo mucho daño, y echó a perder
gran cantidad de vinos que se cogen allí
muchos". En la Cronica de la orden
Franciscana de la provincia de Charcas
escrita por D. Diego de Mendoza, impresa
en Madrid en 1655 - de la que se copia
un capitulo en los "Documentos literarios
del Peru" se dice que la reventazon del
mistó antes del descubrimiento del riuo
por los Españoles asoló todos los valles
del Conborno. ~~xxx~~

III -

Respecto á la altura, dimensiones etc.

de 10 - 15 leguas de la circunferencia (at base $\frac{1}{2}$ legua ^{frontera})

altitud que'n by D. Yates Haenke 22 246 ft - Castellanos

" " " Señor J. Romaña 18 550 ingles

Other measures by Haenke - pie's Castellanos -

Diam. mayor del volcan - 1958 1958

" menor ó transverso 1049 1049

Profundidad del primer gran crater desde 140 - 350

Diametro mayor del 2º crater ó actual 550

" menor del mismo 174 - 209

Circunferencia de la ~~base~~ cuando

al punto Arequipa 17 leguas

circunferencia de la cima 5 "

[For measures by Sr. Romaña see extracts from his articles]

IV

Para terminar, consignaremos aqui todas las expediciones al Misti, de que tenemos noticia -

En el manuscrito de los Jesuitas de que hemos hablado se hace la descripción del Crater de tal modo que acredita que ya conocido en ese tiempo -

- 1.

En el manuscrito del P. Melendez, que cita al

P. Gravada, se habla de las siguientes expediciones, con motivo de la gran humareda del volcan: de quatro arrestadas, que mando el corregidor D. Juan Meza y Ayala y que no pudieron llegar mas que hasta la mitad del Misti:

- 2.

del P. Melendez con Juan Solís y dos hijos suyos ambos Sebastianes, Domingo de Rojas y su hijo Mateo y cuatro indios mas: todos los que subieron el 1º de Mayo 1677: - de D. Fernando Bravo Beaumont

- 3

cura del Sagrario en compañía de un padre y otras personas - y de una expedición

- 4

segunda del Cura Beaumont con diez o doce

- 5

caballeros distinguidos.

- 6 En la relación de D. Francisco Velez, se habla de la expedición del Ilmo Sr Obispo Sr Miguel González - 22 de Julio 1784. No llegó a ella, pues los otros de su comitiva colocaron la cruz en la cima,

- 7 De la misma relación se deduce que el Gobernador Intendente de Arequipa mandó la expedición del matemático D. Francisco Velez. Otros que llegaron a la cima etc. - 3 de Dec. 1787.

- 8 El año de 1795 subió al mismo el Sabio Naturalista de Carlos IV. Don Fades Haenke y nos dejó las medidas de aquel que hemos apuntado; aunque el Sr. Paz Soldan lo pone en duda el mismo Sr. Paz Soldan nos habla, en su

- 9 "Geografía del Perú" de las siguientes expediciones:
 10 del Romano D. Francisco Valdez de Velasco, y otros;
 11 de Middell con el medico Blockhause - afirmando que la primera que no llegó a subir y dudando de que las demás lo verificasen.

- 10 ? i de Haenke ;
 11 de Puntland

- 12 Solas se realizaron en la primera mitad del presente siglo, de la cual época sabemos también de las que hicieron un Sr Casimiro Masías :

- 14 y mucho después el Sr D. Eugenio L. de Rosaura con otros quienes gozaron del raro espectáculo de una tempestad desde una altura superior.

- 15 En 1864 ó 65 - el Sr D. Felix A. Renant que vino a regresarse de muy cerca del cráter el Sr D. Juan Sperungli subió en Agosto 16 de 1872 con algunos otros solo dos llegaron a la cima - quienes hallaron la largura del

S. D. Roberto Marsham que habia ascendido en el 17 Junio 1863-

- 18 El año de 1878 hubo entusiasmo por ascender el Misti y se organizaron varias expediciones de Sr Juan de la Romana + otros. Dec 22 1877;
- 19 Obto de " " " " " " Jan 7 1878 ;
- 19 y Obto de " " " " " " " 22 1878 .
- 20 De los presbiteros Dr. D. M. Palma + otros Jan 31 1878
- 21 " Sr Ricardo Villalba + otros Feb 5 1878
- Gran expedicion con el Sr Rodolfo Falk.
- 22 celebraron astrónomos alemanes (ni all some 30 or more persons with some soldiers &c Feb 15-1878 about 20 reached the Summit) Mr. Falk permaneció tres días en el calijon de los dos cráteres del volcan acompañado de aquellos. Solo del Dr. Museo Melgar, sus observaciones en ese lugar parece que se dedicaron a averiguar las corrientes atmosféricas, la temperatura, grado de humedad del aire, y a otras relativas a sus temas geológicos y astronómicos, segun lo dijo la prensa. i pues Mr. Falk guardó respecto al volcan la mas absoluta reserva, quedandose con sus estudios meditados para dar los a conocer en su obra que ^{de} iba a publicar en Europa, sobre su viaje en America.
- El 11 de Mayo salio de Areq. la expedicion de los
- 23 Drs. Esteban Ryder, William Rothmel y C. W. L. Bulpitt los dos primeros murieron como dicho ante
- 24-26. {Three expeditions sent out however these two englishmen who were killed These sent expedition closed the year 1878}
- 27 Expedition Nov. 23 1889. about a dozen gentlemen (13) slept at alto de los helios, began ascent at 6 am. at 4 P.M. only 4 arrived at the Summit

they made a photograph of the 4 who reached the summit
 & began the descent at 5:10. *lindando en el solo 42 m.*
y enumeración de pesos en Aniquila a las
 11:30 P.M.

note. So far as I see by their acts the only Englishmen
 who have ascended the Mts were the two who were
 killed and the Companion probably also who crested.

(Translation)

[the fol. is an outline of the ascent of Sr. Juan P. de
 Román, made Jan 22 1878. Mr. Román made in
 all three ascents -] Published in the Revista Católica of Aniquila
issue of Feb. 4, 1878.
 started at 5 am by road that leads to Tambo de Leon
 where breakfast was taken. thence by horse back
 instead of the royal road which had been previously follow-
 ed they cut with left by a path which leads directly
 to the elevated "camino del Botadero" and where is found
 a little camp called Bella Vista where was met the
 residence of the Indian Quispe, who on a previous expe-
 dition was found together with his wife in the crater
 collecting Sulphur to sell. about 50 lbs of Sulphur he got
 each time taking two days for ascent. this sells in city
 for about 8 pesos per quintal. He was engaged to go
 with the expedition. at Bella Vista the expedition divided
 into two parts - 1st of Sr. Sr. Marina, Pita, Ugarte, &
 photographer Villalba - there were to go on the old route
 usually followed. 2^o Sr. Ugarteche & Román & the
 Indian Quispe. who went by the side of Tambo much
 more with north. the latter route much more difficult.
 at 1 P.M. they separated. the first div. fol. the "camino
del Botadero" to the "Alto de los Huesos" graphically
 so called from its being a lofty plain with monumental
 pyramids of whitened bones of the four animals that

not perished by fulgure mabuse. Left our skeleton
 in a quarter of an hour reached this place of bones -
 and hunting along the flank of the mountain with
 South ~~east~~ touched the point which determines the
 the line of ascension already used - At 2:40 P.M.
 we began this slowly, for the roughness of the ground
 permitted nothing else till 4:10 when it became
 impassable for horses, these were left - we continued on
 foot - leaving behind that rock which on other
 occasions gave us a less uncomfortable spot -
 we went on till 7 P.M. - when darkness
 stopped us - at the side of a rock which was there
 + tried to arrange a well as possible for passing
 the night on the ground. we were at an altitude of
 14,000 ft - and the therm. gave 2° below zero - which
 promised badly for the night. The cold increased
 and the scant clothing permitted not an instant
 of sleep - this fact contributing greatly with
 fatigue + sorrow on the fol. day -

At 3.00 a.m. we started + with all our energy tried
 the ascent and overcoming the inclination "medanos"
 of sand and [psilobolias] rocks with which the path
 is strewn attained we took 20 varas from
 the summit where we stopped to content place some
 vents (or breathing holes), which in our previous
 trip the snow + storm prevented - They are small
 13 in number and in activity - a few minutes
 later we arrived at the summit, leaving a little behind
 our intrepid photographer, who by his powerful
 will was able to keep on arriving later + went
 to work without resting - there we met Fr. Romania
 Scherzer who had awaited them since 4 a.m.

Mr. Remann report his own party a full
 taking the path which the Indians was accustomed to
 follow. guided by him. we ascended horseback half
 an hour. when from the roughness & stickiness they
 refused to proceed. we advanced on foot with
 last buttresses on this side. These are clothed in
 a scant-vegetation *paja de puma* volcanically
 called Stipa Ychu. I half covered by the sand
 which the strong wind moves. Observed also on other
 class of vegetation, not found on other side
 called Baccharis lucarum. Probably on other
 sides of the Volcan the plant may be found in
 greater vigor. It should be seen that this route was
 exceedingly more difficult than the old highway.

After an altitude of 13000 ft - when the stickiness &
 sand increased. making advance very painful & almost
 impossible in places. at 2:30 we arrived at a rock
 composed of basalt & trachite which materials volcanic
 we passed over in 25 minutes, to them again was
 path of impenetrable sand. which is necessarily difficult
 of ascent. becoming especially so from rareness of air
 and violent storms. After two hours we came
 upon other rock strata characterized by the comp.
 of dif. lavas. of a bright red color due to oxide
 of iron. From this point the temperature rapidly
 lowered. without any change we continued until arrived
 at other similar great rocks, showing very marked
 cuts perhaps due to the action of electricity.
 as very violent storms of light & thunder abound
 here. we thus continued on with successive strikes
 of rock and sand, until sunset when we had to
 rest & prepared the torches for lighting about.

magnificent Sunset - !!!!! we advanced a little farther
 yet till quite dark. when we looked about for place
 to rest. no good place. all ground very slick. Some
 fatigue. Hemorrhage from nose caused by decreased
 pressure of air. Need of further precaution. a good
 remedy is Sulphate of Aluminum - always take it along
 during the outing could see flashes, lightning on the
 other side of Cordillera but from distance could hear ^{nothing}
 with some interval between them. could be distinctly
 heard two subterranean noise very distinct & strong
 also saw a meteor. at length appeared the moon.
 and as we were not slick from cold & discomfort we
 decided to go on by moonlight - It was Eleven at
 night when we started again. moon on the wave
 & behind the vast slope in pale light leaving the
 chasms dark & black between - makes so weird
 & gloomy a scene that it brought on melancholy.
 this makes the way now the most difficult from
 huge tall & craggy rocks that intercepted the path.
 It was only with danger of life & by wandering our
 hands that we made our way along in some places
 thus we went on patiently till 3 am when we
 proceeded fast ahead of us about two squares away
 a great smoke (humaredas) this was due
 to the fact that we were close to the Summit
 some 300 ft. Hurrying on in hope to arrive
 soon at the Summit we encountered a wall of rocks
 10-20 metres high. and vertical in structure indi-
 cating it of volcanic origin - from its center &
 sides ascended the smoke that illumined by the
 moon we had seen. This was produced by
 round openings in the rock some 5 inches in

diameter and in distinct directions - Counted eleven
 of these all completely active, exhaling a pale & fetid
 vapor. This rock completely stopped our way -
 and indeed we could not have advanced for fear
 of being stifled by the fetid gas -
 We turned to the South & continued on for the 300 ft
 + which we thought would take us to the Summit -
 A little later we distinguished the column of smoke
 ascending calmly from the crater 200 ft ahead - No wind
 at 4 a.m. reached the Summit for the third time in our
 experience - Cold intense - dry & sharp, causing
 dull pain in face & eyes - Moon near horizon
 . Glorious view, indescribable & indescribable - Went to
 the other side where the other party entered - & awaited
 the others - Being able to make no observation we
 awaited morning in a place that offered some
 slight shelter & convenience - at length came down -
 Cold intense, at day break 12° below 70° Fahr.
 and concentrated coffee had frozen - Experiment made
 by putting thermometer under tongue & see if temp. of body
 had changed - Found to be $98\frac{1}{2}^{\circ}$ Fahr. hence no
 change - Circulation however much more rapid
 pulse 104.

The crest of this volcano is a platform more or less
 circular & has a diam. in broadest part of 2994
 feet or 998 varas. a chain of rock, very elevated
 and inaccessible especially on the North side,
 surrounds it and runs by the edge or border -
 The rest is composed of sand in the form of "Medanos".
 This platform is occupied almost completely by the
 crater - properly so called, and by an outer mouth
 exterior which is in form of a deep cut or "Quebrada"

is placed between its lip or wall and the border of the same platform - the second mouth runs in form of an arc around the crater embracing the circumference for two thirds of it and its two extremities cut the border of the platform - the cut or debouchure of one of these is not marked while that of the other forms a very broad & deep depression in the earth and it is this which in form of a quebrada is seen with advantage from the city & even more distant from ~~the~~ mountain. The crater is 1843 - but 615 varas in diameter, about 600 ft or 200 varas deep - this last is an estimate as had no suitable instruments to measure the depth - the breadth of the second mouth or cut is about 186 varas (558 ft.) and its depth between 15 & 25 varas (45 - 75 ft.) Its bottom is covered with lavas, scoria & rocks which have fallen from the wall of rock mentioned - Examining its walls we see that its strata are twisted & distorted by powerful volcanic action - In this mouth abounds sulphate of Calcium of various varieties especially Selenite and Alabaster - in pure state, some in pieces and others dissolved by iron & magnesian - It is prob. that this substance has been formed by vapors of Sulphuric Acid upon calcareous rocks in remote eruptions. Sulphur is found in any quantity of beautiful yellow, (with light green tinge); very crystalline, at the west side and upon the land which separates both mouths i.e. that of the crater & that of the quebrada, is a little plain of some 80 varas breadth & of sandy soil. In this little plain is seen with surprise the outline of a small

house made of small rocks - and as if the walls were
 begun of this material. Some 10 varas long & close with
 two smaller ones at its extremities - different to
 see why built. No material at hand. At those points
 where they are not covered with sand it is seen that the
^{interior} walls of the crater are formed of a species of rock which
 has taken a yellowish color - in some points they
 green in others due evidently to the action of Sulphurous
 vapor - In general the bottom is covered with a species
 of yellow lava, masses of Crystalline Sulphur occu-
 pying other points - The respirators internal
 which communicate with the focus and exhale the
 vapor are eleven openings situated to the South and
 contiguous to the walls in this direction -

Upon the lip or border of the crater are also met-
 respirators or chimneys of small size - we counted
 thirteen (13) on one side situated in a straight line -
 attempted to test the temp. of one of this by inserting
 it an instant. but it was blown in 1000 feet by exha-
 sion of the mercury - Blue paper was instantly
 turned red showing acid in vapor - ^{white} paper with
 acetate of lead turned black - another with arsenure
 of potash turned yellow - these showed presence of
 Sulphuretted hydrogen - Sulphurous acid detected
 by smell. Such is state of things. This activity
 need not be of recent date although it would not
 be strange if the earthquake of '68 should increase some-
 what. Tradition at least for 2 generations says
 that from time to time the volcano sends out
 smoke - and there are not wanting who claim
 to have seen flames by night - not sure
 what faith to place in these.

That the Misti has had two periods of eruption very distant from each other seems certain in my opinion from the conformation - The first that took place in ^{the most} remote times opened the crater which was of larger dimensions than the actual, as seen by the fort pit which has remained - and is that second mouth which at present surrounds the third of the crater forming the Quebrada. Many ages later was opened in the old the present crater - a less violent eruption. There is no history to verify these conclusions -

altura del volcan al borde del crater		18550
Circunferencia del mismo	1847	5541
diámetro del mismo	615	1845
Profundidad	200	600
Ancho del Callejon (Quebrada)	188	365
Diámetro de toda la flamée	998	2994

Arequipa Feb 4. 1878. J. L. de Romanos.

1889phae.proj...699B

Festival
of
San Pedro -
Patron of
Fishermen

Tales of Peru -

San Pedro - June 28 - 1890.

Today is the festival of San Pedro who in Chorillos, a small town near Lima, is the patron saint of the fishermen. In the morning a mass of some three hours duration is celebrated in the church at C. - after this the image of Saint Peter is taken from the church and borne in a carriage or on the backs of men with San Pedro. This image of Peter is kept in the church the rest of the year and is about life size. Saint Peter is carefully assisted into a boat - given a good rest and a fish line is carefully fastened to his hand. The boat is then rowed about by some of the fishermen until a fish is found with fast to the hook on Saint Peter's line. The abundance of fish makes this always possible. The image is then taken from the boat, the captured fish made fast to the finger of Saint Peter, and he is borne in triumph. Though the women followed by an enthusiastic crowd. After this a grand feast follows - a great dinner being furnished gratis with the priests and distinguished visitors and the humble followers partaking in the open houses or at the open booths. This feast is celebrated every year and is attended by many people from Lima & adjoining towns - although primarily by and for the fishermen. Nearly every one contributes to make it a success. The policy of the church is to furnish during the year all the recreation and amusement the people need and in the case of the lower classes this is really accomplished as their only amusement are the numerous church celebrations.

these houses are quite frequent there being of all kinds
some (50) fifty church festivals in the year - these
together with 52 Sundays very effectively prevent the
people from overworking - or from laying up treasures
on earth, a thing they show no special disposition to do.

The fol. story is told by this Vieja - told to him by his
Grandmother. Does not know whether it is spec. a perman
tale or not.

Suan
el soldado
y
sus
padres

John was a soldier - he had been many years in the
army and wished to go home - and die in his native place -
there he sent his commander and asked leave to go -
his commander said "My son John - you have been a good man
and now you are old you can go home" Accordingly the
payment was settled with John - as his due he received 15 cts -
Taking his "alforja" on his shoulder, he started home. The way
was long and dusty - and John soon grew very hungry -
Passing a bakery he expended his 15 cts - getting the "panes"
or small loaves of bread. Putting these in his alforja he
resumed his walk - eating a bread as he walked -
Soon he met a poor old man who asked for a little
gift money or food. Said John "I have no money - but
only these three panes - of these you can have one" -
He passed on and soon met another old man who also
asked alms. Thought John "How comes it that beggars are
so plenty on this road?" Now the old man was Jesus
who had assumed the character of an old man to test
John. So the old man John said - "I have but two breads
but what matters that - I give you one I have one
left" - So he went on eating his only bread - Soon he
came across Jesus and Peter walking together but he

did not know who they were. Jesus said - "Have you some
 food to share with us" and John divided what he had
 with them - then they all walked on together - and John grew
 very tired and lagged behind - and as Jesus walked in
 front John saw through a hole in his garment that
 Jesus carried some bread & cheese - and being very hun-
 gry John reached forward and took a little cheese & ate it -
 but Jesus said without turning "who watched me?" and
 John made no reply - again growing hungry John took
 some bread & cheese very cautiously - but Jesus asked -
 "What are you doing John?" & he was ashamed -
 then they came to a crossing road & Jesus & John said
 they must go away and Jesus said to John - "As you have
 shared your food with others you may now ask me
 for three things and I will give you them." But John said
 "It is no use you are as poor as I - Farewell" but Jesus
 said "Yes but ask me three things and you shall have
 them" So John thought and said - "Will thou O.S. - Grant
 me that when I sit down, no one not even Jesus could
 move me" O.S. - Give me a pack of cards that I can always
 win with when we I may play - O.S. Give me power so
 that when I say to any thing - Come into my "Alforja"
 it shall instantly come." and Jesus said "It is well" and
 departed - then John went on a little and the Devil came
 well dressed & wished to play cards - So they played and
 John won all the Devil's money and even his good clothes
 boots and "Chimney hat" - So John took the money
 and divided the most of it among the poor and went
 on so far the suburbs to sell - and he walked & walked &
 walked for a very long time - and at length he came to
 a great stone covered over with hyacinth leaves and seeing
 it he went down into hell - and all the Devils came

to carry him away to torment him but taking his seat
 no one could move him - and John called out -
 "Come into my alforja" and immediately all the devils that
 were near jumped into his alforja and taking it on his
 shoulder he went along the road till he came to a
 blacksmith shop - and he said to the blacksmith "for how
 much will you pound this alforja" and he answered
 "for so much" and calling his assistants they took
 their Great hammers and pounded the Alforja on the
 anvil until the devils were broken & fixed -
 Then John wished to go up to heaven and see the place -
 And he walked & walked & walked till at length he came to a
 place of great shade and there were many souls in trouble -
 Some with punishment of one kind and some with another -
 and John perceived that he was in Purgatory - and the souls
 were in torment some for a few days and some for years before
 their sins might be forgiven & the way to heaven showed them
 open - and John cried "into my alforja" and the souls
 flew into his alforja - then he took his way up the
 road to heaven, very steep - and his alforja was on his
 shoulder - and coming to the gate of heaven he gave a loud
 rap - and St. Peter opened the Gate a little & asked who
 is there and John threw his alforja with the souls in
 by St. Peter - and thus these souls escaped into heaven -
 and John took his alforja & went back to Purgatory
 and returned with another load of souls - and coming again
 to the door of heaven he rapped - and St. Peter without
 opening called out "who is there" and John said "a poor
 man selling honey of bees -" and St. Peter opened the
 door for he wished to get this honey very much
 as he had sores on his flesh ^{for} which this honey was
 very soothing - and the door being opened John threw

in the souls and while St Peter was stringing out these souls, John stepped in and sat down in Peter's chair - and Peter attempted to remove him but could not. Hence he went to Jesus and said - here is this John who is bringing in souls who have not passed their allotted time in the region of shade - and now he has taken my own seat - Did Jesus answered - I am foremost that I myself gave him the power when seated and not be moved - So that now we can not remove him - So it happens that St Peter got another chair and sat on the other side. Always John sits at the right and St Peter at the left of the door of Heaven -

a man that wants to set is very unhealthy seat -

Belief -

The mule is "maldito" - cursed - because on the way from Bethlehem he ate the little cloth of Jesus - the cloth in which Jesus was wrapped -

Maldito's

The whale is Maldito because he swallowed Jonah - Since then he has been obliged to eat only little fishes one by one -

The mule and old woman shall bring forth young in the last days - now they are Malditos - when they have offspring, it will be a sign that the "prince of the bottomless pit" is coming over the earth before the end -

Worms
in
the
heads-

Don E. claims that in the heads of men and animals there are four (sometimes but two) worms. in certain convenient places. The purpose of these worms is to consume the dust that comes into the nostrils & ears - and prevent its reaching the brain - If any thing kills these worms, misery is apt to follow from accumulation of dust in the head - [I am not able to know whether this belief is general] E. says he knows this is so as he has seen them self in the head of a shark that his uncle cut open - His uncle told him they were for this purpose - On suggesting that they might be simply parasites, E. could see no use for them nor how they could possibly get in from outside -

Stone
sucking
blood

Lio, our first cook thought it dangerous to sleep in the room provided for him & preferred to sleep on the kitchen floor. because near his room was a great rock - He thought that this great stone would suck his blood and would not sleep near it till he had sent to hima to get some holy water and sprinkled over it and all about -

Puente
de
los
Infernillos

Near the "Puente de los Infernillos" on J. C. de Orozco is a tunnel - in which at night a priest always with a cigar in his mouth is said to be seen - the Indians it is said cannot be lured across through by night for fear of meeting this priest

Don. E.

Christ
 &
 Peter.

Once when Christ was in Peru he and Peter were walking along the coast - the way was very dusty & dry - and the sun very hot - they were very weary - at length in the distance they saw a black spot - what is that asked Christ - that is Ica replied Peter. Ica explained Christ - [Ica is a unit meaning basket] - So they travelled on and came to a shore of a mule lying in the road - Pick it up said Christ - But Peter said "Oh! I am too tired, I cannot stoop to pick up a mule shoe" Christ said nothing but stooped and picked up the shoe. After a little while they came to a blacksmiths shop - and Christ said to the Smith - what is the value of this shoe. 2 cts replied the smith and Christ taking the 2 cts - soon met a small boy - with cherries - selling them for 12 for 1 ct - Christ said Here you have two cts for 24 - So Christ went along the dusty way with Peter - And as he walked saw him eat a cherry - and Peter was very thirsty - and as Christ ate one he as if by chance dropped one - and immediately Peter stooped down and picked it up & ate it - So on till the cherries were all gone - then Christ turning to Peter said - You were too tired when I asked you to get the shoe to stoop and pick it up - But so you have stooped now 12 times - to pick up the cherries -

ba c -

milk
soured
by
pregnancy -

a woman in pregnancy - is malleable - that some striking character-
istics - For example - If she touches milk or even carries
it about, it becomes sour. A woman who is with child
some 6 or 7 mos. brought some Goat milk soured which
she thought soured by her condition -

also in this condition a woman is able to handle infants
with impunity - she is "so full of poison" that the serpent
will not bite her - nor injure her if it does -

i. related a case of his Aunt near Lima who handled
such a serpent safely. Said he had seen this done himself.
[i. e. Serpents is only who trusted semi-occasionally] -

If in the morning before washing & cleaning oneself one rinses
his mouth out & swallows the saliva it will act as a purgative -

Arequipa -

city

City of some 40,000 people at elevation of nearly 8000 ft. built of white volcanic rock. gives in the distance a very beautiful effect. surrounded by the green fields of the Campesinos. these fields are more green than those about Lima. Splendid fields of wheat & other grains & alfalfa. The city is however very filthy. open esquinias run through all the streets and into these streams go all the cities' filth. children use them as a W.C. In the city are scarce any W.C.s. The people use the roofs of the houses and all alleys & back streets some of which are filthy in the extreme - all receptacles are emptied into these esquinias. But from the same are often taken water for cooking by the lower classes - who are too lazy to mind to the supply of pure river water, which are found in a few places. Also in these streams the women wash dishes and clothes & their faces & hair &c. sitting on the ground beside them. I have seen children attending to the calls of nature, men urinating, people washing & children drinking from the same stream. The people are intensely religious & will tolerate no slight on the Catholic religion. So go to which is the great thing Processions, bells, fire works & with bull fights take up the time Sundays aside from some masses in the church. Mr. Mc. Cord says that not long ago a cock fight was held for the benefit of the Holy Virgin the proceeds were wa

filthy

Religion

How
for
the
Holy Virgin

certain church - for this end. The cocks were carried thro' the streets with a placard giving the name of the church for whose benefit the exhibition was held - it was also advertised in the papers - A man of the lower class was complaining was servant of Mr. Cord. that his wages were too small. She asked him why he squandered his money gambling then. He said that that was all right in either case - the gaming place he frequented was run for the benefit of the Holy Virgin. If he won himself, he certainly gained his house now, he regarded it as so much given to the Virgin. So that in any case the outcome was good.

Egypt

When an eclipse of the Sun is coming on the people of the country are very much frightened. and build great fires of straw &c. which the Sun. when the light returns. they imagine they have been of great assistance. - ^{advent} ^{celebrity of} ^{11. 1893.} the rising ^{which} & ^{chaos} ^{observed} ^{obs.} were covered with large fires. ^{celebrity} ^{of} ^{11. 1893.}

Moon's
influence

The moon's influence is believed wherever great Planting is done in the first quarter when the moon is increasing. Corn or other food growths are attended with the waning of the moon.

Payla
story

the climate of Payla is said to be so extremely
benign that it is scarce possible to die there.
Several years elapsed after the founding of Payla
without a death. Some citizen however thought
that every well regulated town should have a cemetery
thence ^{one} was laid out, after a lapse of two
or three years more without a death - the committee
on graveyards thought some step should be
taken to clear the empty space & accordingly
sent to a neighboring part for a man just
dying of consumption. When he arrived however
he refused to carry out the program arranged
for him and actually recovered.

On the other hand, there are not lacking detractors
of the advantage of Payla who declare that the
lack of mortality is simply due to the fact
that no one will remain in Payla long enough
to die.

Payla is the port of Piura - a considerable
town some distance in the interior - a RR
connects the towns - the river Piura flows
by the town & like many rivers here is dry
in the lower part for about six months -
at certain seasons the river "comes down"
and the people go up the dry bed of the river
some distance to meet it & conduct it ~~down~~
to the town. ~~There~~ ^{At} the town is a bridge.
In the bed of the river the common people dance
until the water rises ^{up} high - meanwhile
the men ~~uncover~~ ^{gather} of society hold

festivals on the bridge above. Sometimes the
dancing is carried on till the water reaches the point
where the common people go ^{up} above on the bridge & the

others have
left

Mund

The mums, there are several in city -
Regular mums can never leave - and can
only see their relatives under certain restrictions
Some of these mummies occupy a whole square
and within their high walls there are small
houses streets and nearly everything which
constitutes a small city -

There are also mums who run schools &
will take wants of the poor. These go about
dressed in dark long white robes - they have
sweet smiling faces, but merry withal
and. They laugh with perfect good humor
One young mum, with a specially beautiful
face informed Perie I saw also that they had
plenty of laughter & sport. Indeed I can ^{hardly} imagine
any life more saintly & so serene than
that led by these women - teaching the
children & helping the poor - The pretty -
mum informed me that it was a
wonderful world with the poor was better life -
yes I said but do they wish where better -
not - answer she said but little by little
through many years - "poco a poco" we shall
help them - Such eyes as some of these mums
have - eyes so pure & sweet - that they call
mind those mother's eyes so long since closed
in their last sleep.

Amiquia
Easter's

Proceeding Easter are three fast days -
one thus - the churches are all opened and in
the evening brilliantly lighted with hundreds of candles.
The people in late afternoon leaving through the

the churches dressed in their best clothes -
 there are seven stations "siete estaciones"
 owing to the traditional seven stops of Jesus
 on the way to the cross - all good Catholics
 make prayers in seven different places on
 this day - the streets between the different
 churches were lined with people and saying
 their prayers as they went - as there are said
 in a low murmuring tone, the effect of it all
 is that of an immense swarm of bees - the
 hummings increase & diminish in a curious
 manner as throngs go by -

On Friday, no eating is done by Catholic
 families - or at the least very little indeed -
 In the afternoon early evening is a religious
 procession - Both sides of the street are lined
 up, little children dressed in their best bearing
 candles - In advance the priest walked three
 good canonized priests bearing aloft the cross -
 after came an immense image of St. John borne by
 several men - then many heavy loads - then
 a combing of green chartais - then the dead
 Christ - in a glass enclosure - afterward
 others with candles & then the mourning
 mother of Jesus, Mary - (called dolorosa)
 then women with candles - the procession
 being closed by soldiers with mounted muskets.
 The effect on the plaza with the dark sky
 behind the Cathedral & the thousands of candles
 was very striking -

on the night of Good Friday - there is a
 traditional allowing the people to do what they

9th Sunday

please on the plea that God is dead and not
know it - Many of the people feel free to take
on that night whatever they can get -
Mr. Deneke one 9th night lost all his hens
30 in number -

Prov. 1.

Quando El Misti se quita la única
El Cura se la pone -

[i.e. when there is little snow on the misti, mortality is great].

Festival
Fiesta de
Nuestra Señora
de Carmen.

July 15-17 Festival in honor of Nuestra Señora de
Carmen. ^{Patron Saint of Carmen Alto.} Altars were erected in different parts of the
Siloje just below us and processions fireworks &
feasting made up the program.

San Antonio

San Antonio is the patron saint of young girls
desiring lovers. but it is said that he serves best -
those who treat him harshly.

A young girl desired very much that a young man
who visited at her father's house should love and
marry her. But the youth showed little disposi-
tion to do so. After praying for many days to
a little image of San Antonio which she kept in
her room. she became angry at his neglect of her
interests and ^{one day} threw the stone image from her
window - Now it changed. that the young man whom

the lord was at that moment passing under her window and was struck & badly injured by the falling image. He was borne into the house and through many days was nursed back to life and health by our young lady -

As a natural result the young man loved, proposed and married the girl.

It is thus seen that San Antonio assists those who rough it that time.

San Antonio is also the patron saint of ~~Sailors~~.

Once a ship was caught in a great storm and began to leak. The sailors worked incessantly ^{with} at the pumps, and with prayers to San Antonio to assist them, but in vain. The leak continued. Finally in anger at San Antonio for neglecting them, they threw his image overboard. The leak stopped at once and finally the storm abated when to their surprise they found that the little image of the saint had found its way into the hole of the ship & stopped the water from entering more. While showing that San Antonio is a large fellow & will only assist those severely handled.

San Antonio St.
Patron St.
of Sailors.

Cock.

The cock crew when Christ was born. paying -
Jesus is born.

fox

The fox is always hungry and thirsty - so it is blind and the God is so blind a fellow.

When Christ was young he had some chickens. There were rats or fox. In punishment Christ told him that he should always be hungry & want water.

A woman had three sons. and being very sick & about to die a doctor told her that her life might be saved only by certain flowers. and her sons went forth to seek it. And the Spirit came to an old woman. Now this old woman was the Holy Virgin who had taken the form. & she said "where are you going my dear boys?" "I am going to hunt for the (Glor dechelan?) for my mother's sake. I can tell you where you can get it" she said. "Now you go through these little houses" "Go away" he answered roughly. "Then go and get me this little dish full of water" she said. "Go along" he answered. (one more thing) - Then the next boy came - & she made him the same requests & he answered the same - Then came the youngest - & she now said "where do you get those my little son?" - she told her - she said "make fine these little houses" & he washed them. Then she said bring me this dish of water. & he brought it (to her) then she said I lift up that great rock & you will find the flower you seek - she said & he went & lifted it. You do as I say & it will be well. So he went & lifted the rock & then he found the flower - then she wondered where he could hide it so that his brothers would not find it. If I put it under you hat they will find it. If under your blouse they will find it. & well I will put it in your shoes. She started along home & his brothers saw him & they ran & caught

Three
sons
Glor
de
chelan

& explained that the
youngest brother was lost -

him killed him & took away the flower - & buried him -
Then they went home & gave it to their mother & she
got well. But when the boy died a goat came & grew
up & one day who cut his nose came & he said
Well I will cut off your nose & come & make me
a flute. she started to cut off a piece. & a voice
said Do not cut off my hair! But he cut it
off & made a flute. & began to play. But the
flute said Don't play on me - for my brother killed
for the sake of the "Flor de Orlean". she got to the
house where the boy lived. & the father of the boy
said do let me see your fine flute. & he began
to play. & the voice said. Father don't play me
for my brother killed me for the "Flor de Orlean".
Then the mother took it & began to play. "Oh Mother
do". then the brother began to play. "Brother
don't do". then the father was very angry. Knowing the
truth & put the brother in prison -

A poor old man, a beggar, had two sons. & as is often
the case, one was bad & one was good. And they asked
permission of their father to go out & seek their fortune
in the world. So each took some bread & water & they
started forth. & the bad son said with good, but we
got your good food & later more. So they ate
that food - till all was gone. And as they went they found
a girl nearly dying for water. & the good boy placed him
back in the water, & later a fox eating a goose. She
saw the goose & sed the fox. & later he was
very hungry, & while this food was all gone -
and the wicked brother said. I will give you

some food if you will let me cut your eyes out. and
as he was dying of hunger he agreed. but the bad brother
cut out his eyes & then left him to die under a tree -

But from the tree a voice said to the boy, "Climb up
the water tree & your eyes will return." The boy climbed &
his eyes were restored again. And he went on & came
to the king's palace. And the bad brother said to the
king - "My brother can restore your horse -
For his horse had been stolen (stolen), but he
said, alas I cannot do this thing, but the king
said, then you must die. The man wandered about
sadly, and met the fox, who brought him the
horse. The man agreed to work for him. But early the
next morning ^{the bad boy} ~~that~~ went to the king & said, "My brother
says that if the queen throws her ring into the sea
that he can bring it back again where. So the
queen threw her beautiful ring into the sea. and
in desperation the boy dived after it, & just
as he entered the water, the fish, whose life he
had saved, brought him the ring, which he had caught.
Then he gave the queen her ring. Then he met
the goose who said, "You must have your brother
caught. He is punished at once. For we can help you no
longer. So the good boy went on his way. The next morning
the king & said, "My brother says that if you put him
in a hot oven, he will not suffer. So the bad boy
was put in an oven & it was heated hot for a
long time & when opened the bad boy was dead.
So the good boy has now honor & money returned
to cheer his aged father."

Tambo del agua de los Milagros Story + Tradition

The Animals at the birth of Christ are each - donkey, mule, cow, pig - said to have done something or said something - Investigations -

{

 govt said Christ. nació

 donkey - a donde a donde a donde

 Sheep - Bethlehem. Bethlehem

 Cow - - - - -

 Pig - no. no. no.

 12.5

 Son of David.

 all the straw:

Story of bodies some are found on Chachani & walls in Misti
Catholic tradition - E. 9 -

Powerful chief, ago ago, ^{up for Lucas} came from Coast to cultivate Chuli valley -
had heard from chance person who had come down from
Mts of beautiful valley - Bureti Saquin - became rich - and other
wealthy - give chief name - other chief, both in their jealousy -
leaves & goes to Chiguata. other son - son like old &
rich - Dign. that such much like buried in high place -
Chief of Arequipa - done Chachani - afraid of volcano - Chief of Chig -
close Misti - some the walls - to be buried there or perhaps
and men frightened & the body rolled down into crater -
— after ages - white man dug out the skull &c
from Chachani & also saw run in Misti - Superstition
gone & taken instrument from the Misti

The tale of allautay -

Worked in the Skin of a Bear -

Not
orig. Pm -

From Indicações de mi Carta - 183 - 4ra carta -

This was a man who was soldier in the army - and always conducted himself with great valor and notable gallantry. He lived perfectly while a certain war lasted but when this was finished, they gave him full permission to go where it might please him and do just what he liked. His parents had died and already he had no home. He asked his brothers to receive him in theirs until the war should again open and he should be able to return to the army. But the brothers, who were not good, answered him, that they could do nothing for him and that he might seek a livelihood for himself. Since the poor fellow possessed nothing more than his gun, he took it down and set out into the world.

II

He arrived at a place where was visible nothing more than a circle of trees. There he seated himself in the shade thinking over his hard fate. Well Sir he said (whiningly) as I have no money, nor know any employment which can earn me any, except that of war. Now that there is peace, not a cursed thing am I good for, and I have for the future no other recourse than the most sad one of dying of hunger.

At this instant he heard a noise and raised his eyes and saw before him an unknown one clothed in green, very well dressed like him, but he showed the familiarity of having for feet and legs two horses feet.

I know what you are in want of. The Unknown said to him. Is it not true that you need money?

yes! Sir, you have hit it right - that is the thing which I find very scarce.

"You shall have all you wish and more. but first I must have evidence that you have no fear. For you must know that I give nothing to cowards. Soldier and Coward can not be," said the youth. You may put any test words, oaths which, I swear to you, will satisfy you completely.

Well then, replied the green man. Look behind you. The soldier turned his head, and saw coming behind him, growling in a way not at all assuring, an enormous bear. "Now you will see" he exclaimed. Little brass for me! you will see how good an account I give of such a bear." And aiming with his gun, he shot and left him dead on the instant.

I see in fact, said he of the green, that courage is not lacking, but yet, I am going to make other proofs. I promise everything, answered the soldier, excepting only any thing that may prevent my eternal salvation.

"You shall judge for yourself," replied that singular individual! who already, the soldier had perceived was the Devil. or a very near relative.

For six years, continued the devil - you must never wash yourself, nor comb your head or hair. nor cut your nails nor say any prayers - I will give you clothing and a cloak which you will wear all that time. If you die within these seven years, you will belong to me; if you live more than the seven years, you will be entirely free, and shall have greater riches than you can long for."

III.

The soldier thought of the extreme misery, in which he found himself, and considered that one who had so many times seen death on battle fields, might well face it in that seven years' proof.

"I accept the propositions which you make me," he said to the green man. The devil took off his own clothing and gave it to the soldier, saying to him - "As long as you wear this apparel, whenever you thrust your hand in your pocket, you will find a handful of gold coin." Afterward he pulled off the skin from the bear, and gave it to him. "This will be your cloak and will serve you also for a bed. For you must use no other, your name will be hereafter - 'Bear Skin'" and the devil disappeared.

IV.

The soldier put on the clothing, and thrusting his hand in the pocket, saw that the devil had not deceived him.

He threw over his shoulder the bear skin and resolved to roam over the world enjoying a very pleasant life and denying himself nothing, since he had money in plenty. The first year the man was still presentable, but the following year already he had the aspect of a monster. His looks completely covered his face. His beard was a tangled forest. As soon as people saw him, they would run away terrified, as in the presence of a wild beast. Nevertheless, as he had arms for all, he requested the poor that they should not say that he should not die until the end of the seven years - and looked as a good man, he always found some one to give him hospitality. (Is this one of Grimm's?)

The man who promised his 12th son to the Devil

A man very poor - worked in field - very blue - ^{Man} came
 & him asked what was the matter - and he said I am awfully
 poor & have a large family to support. He say by the tail
 that it was the devil; & the devil said "I will give you
 all the money you want if you will give me your 12th son when he
 is 12 yrs old - & he promised - He lived in luxury
 for a long time but at last he had a 12th son - & he grew near
 to the age 12 - The boy saw that his father was very
 dejected & he determined to learn what was the trouble &
 one day he took a big knife & went to his father & said
 I will tell you if you don't tell me what is the trouble -
 He said - a few yrs ago I was very poor & the devil
 promised me to - & the boy said "Then, mind father
 I will go & get the paper which you gave him." So he
 started out - & went along & went along & - Pretty soon he
 came to a lady & donkey & lady in a field - and she
 asked "When are you going my dear boy" - She said
 "Oh I am going to get ~~some~~ papers which my father
 gave to the devil" she said, "You can't go to that
 point" - So saying she gave him a punt with a sign
 of a cross & said - all on it - and she said - "Get
 on the donkey she will lead you to a big rock" -
 So he went on till he came to the rock &
 walked 3 hrs as the woman had told him -
 So he walked & entered - & the devil jumped
 at him from all sides but fell back when they
 saw his sign - & he found the devil who had
 the contract - & he said where are those
 papers - ^{Give them} the devil said - Here they are

the boy said - Bugle you fine, put in your dent
 would it please better, put in your own
 finger - The furnace lighted up splendid &
 he said Goodbye the devil left -
 Rats 3 men on the rock it opened the
 mounted his donkey went back to the Virgin -
 and she asked - Did I forget your papers?
 the boy said yes - I thank you very much
 for being so kind as to give me this shirt
 he changed his suit again, & returned
 when John turned in peace -



Francisco Chavez says that the natives believe that an individual
 supernatural dwells in the mountains. He is "dueño de los
 cerros". Called "Saque" (which is the) aywara for
 "Tiejo". A boyish spirit, but in man form
 not seen but often heard - when Douglas was away
 Chachani - heard noise like donkey - asked what it
 was - Chavez reply - "Saque" - "What is Saque?"
 S. Probably this is explanation of ceremony - summit of
 mountain where first reached it - a Munis says
 that Chavez always came - bottle of wine & put it
 into earth for paying respect to Saque -
 & often coca also - the Kuhn way -

1. The first part of the paper is a

 2. The second part of the paper is a

 3. The third part of the paper is a

 4. The fourth part of the paper is a

 5. The fifth part of the paper is a

 6. The sixth part of the paper is a

 7. The seventh part of the paper is a

 8. The eighth part of the paper is a

 9. The ninth part of the paper is a

 10. The tenth part of the paper is a

Popular Knowledge on astronomical matters

where the moon rises -

- 1 Mrs. S.I.B. says. west -
- 2 " sticks ^{Princess murders wife.}
- 3 " Anderson - thinks a long time tries to remember the location & surroundings of her old home - and answers "North" - (Great laughing). Finally says. wait, let me see. ^{collected by Prof.} no I am mistaken. Now I remember in the west - (Great laughing) "what are you laughing at. because it doesn't rise at all."
- 4 Mrs. Guyer. says west - promptly -
- 5 Mrs. Goodridge " East -
- 6 Miss Poulson. kindergarten teacher - west.
- 7 Mrs. Dunn. didn't know
- 8 Mr. B. East.

Meteorological Apparatus and Methods and study the chapter on the psychrometer, pages 364-375; this will show the condition of our knowledge up to 1887. Since then some advance ^{has been} made by Grossman, but more especially by Ekholm, in the theory of the action of the wet-bulb at low temperatures and Ekholm is now engaged in preparing numerical tables that will reduce this theory to practice. He will find Ekholm's memoir in the "Ofversigt" of the Stockholm Academy, 1894, p. 3, in Swedish, or a summary of it in the Zeitschrift a few months later. The international, qualified meteorological Committee have given a ~~unanimous~~ approval of Ekholm's theory and in their meeting of August, 1894 have recognized the approximate ~~rule~~ rule recommended by Kämtz about 1860, according to which when the bulb is covered with ice one may subtract 0.5 or 0.45 C. from its readings and then use the Tables of Jelinek based on Regnault's formula. The use

For consultation with Prof. Pickering.

2.

Yes - at least two years.

Met. Station - future work - how many years - books & monthly work. superintendence -

(New General Catalogue)

Silvering formula & aff. & materials for 20" reflector.
2 1/2" dining clock, & work.

work of 5 months
of time
& permits

Aequia Futura work & purchase.

Long exposures, good scheme for all instruments. for study of
structure of sid. universe. 13", 8", 24", 2 1/2", 20" etc.

Variables fixed. 8" for 5" or both as many as for 5" & 16 inches
13" or the finder occasionally troublesome.

New Merc. barometer. for solar work for chief in old issues
Field glasses for var. star work. "see facts".

Clocks, some good not too small clocks for instruments
a good alarm clock for table star press

oil a #1. clock or watch oil for clocks etc.

Write and publication of -

Illustration of clusters, photographs better than photos.

author work (for R.A. notes) - 13"

2 ribbons " 13"

New assistant

Send Bruce by picking up the change by the boat and relaying
see it aboard in New York & meet it in Holland

(2)

Things to do & get in W.S.

Visit - Concord - Aunt Ohio.

• Franklin - Mr. & Mrs. Rombl. Wid. Drummey. Ruthie.

• Boston - Marshall, Aunt Ray. ^{Carry note} John Smith, Adde Farham, Adde Palmer.

• Dillon & Co. obs. people. Mrs. Laura M. Washington Anderson -

• Mrs. Drummey.

Buy 500-1000 visiting cards for Ruthie time.

• P.O. plants, Drum.

John man Art of M ach

John Coburn Art of W.C.
10-20 sets of photographs

+ Visit Blue still & other careless methods -

+ Good clocks for obs. - fine large clock - dit for Bureau.

+ Carry some peruvian glower to peeds - bean timbo n.

+ Get some seed good potatoes small corn n. glow ends - also any plants at obs n.

+ Collars cups & shirts self showing -

+ 2 hot water rubber bags -

• Travel bag & trunk case combined? Ruth has given 20 sets June 4, 1911

+ Ruth present - Drum - servants

+ cuff fasteners.

+ Blue albums of papers stays in Spanish for S. America.

+ Carry Miscel. obs. books & any other records bearing on West work.

+ Carry photo zets & R. A. G.

+ Get life insurance policies for Ruth & she can be found.

of Jelinek's table is however only appropriate when the wet and dry-bulb thermometers have not been aspirated and when the pressure is about 30 inches.

The only proper method to get wet and dry temperatures is by a strong aspiration or whirling and then Ferrel's formula and tables must be used but even these will not give proper results if you neglect the barometric pressure which enters into the formula ^{although} ~~but is~~ oftentimes overlooked. Prof. Bailey says nothing about his pressure, or the ventilation of his thermometers or the covering of the wet bulb with ice or water. If I assume that his pressure was 22 inches, the bulb unventilated and covered with ice I make his vapor tension to have been 0.018; dew-point -19 and ^{his} relative humidity 3 per cent; all of these by the old Regnault formula and by the extensive tables that I had Mr. Upton compute for the use of our high and dry stations and which are published in the "Annual Report, C.S.O.", 1881, pages 1138-1177.

Ferrel's formulae and tables are given in the "Annual Report, C.S.O.," for 1885 and also in his "Recent Advances"; but a new edition of these was published by Prof. Russell in our "Instructions for Voluntary Observers", in 1892 and this is a slight improvement on all former tables in that it is adapted not only to ventilated or whirled thermometers, but also to the new values of vapor tension from ice, as determined by Prof. Marvin and which agreed closely with those of Juhlin that Ekholm proposes to use. Prof. Russell's principal table is calculated for barometric pressure 29.4 and if Prof. Bailey wishes to use Ferrel's for-

3.

mula and the new table of vapor tensions given by Russell in his table IV he will have to compute a special table for the low pressures experienced in Peru. Of course, however, it will be hardly worth his while to do this unless he proposes to determine his temperatures very accurately with the whirled thermometer, or an equivalent aspiration.

For curiosity I have computed the vapor tension, etc by Ferrel's cylindrical rigorous formula as given on page 375 of my treatise for bulbs covered with ice and well ventilated, at a barometric pressure of 22 inches, the temperatures being dry bulb, 62.5 and wet-bulb, 39.5, as given by Prof. Bailey and I find that the vapor tension at 39.5 is 0.2415; at 62.5 it is 0.565; the actual vapor tension is 0.051; the actual dew-point + 5.3 and relative humidity 9%. The figures would not have been appreciably different from this if the wet bulb had been covered with water and well ventilated but would be different if there were no ventilation; however in this latter case the temperatures observed would be affected by unknown errors to such an extent as to make ~~xxx~~ refined computations useless.

If Prof. Bailey computes such special tables they will be sufficiently accurate for his past and present work and until Ekholm's formulae and tables are published, after which the latter should be used.

Thanking you for referring Prof. Bailey's letter to me I will just add that I hope that you will induce him or Prof. Pickering to attend and co-operate with the international, meteorological congresses, as does Mr. Rotch.

Yours truly, *Cleveland Abbe.*

3905-487, 328, 486, b, c, a, 2 T

8" + 13" tel -
usual -

Left 25' b a mag & bgr than a -

T₁₀ 1, 2, 3. S in 1 -

2:00 p.m. f₂ h, g, d, 10. Drawing of his image. Struck b

June 5 1891 -

7:00 w Cent - 13" - moon under

4 a₃ b₃ c₃ d₂ d₁ e₁ f₁ g₁ h₁ k₁ l₁ -

8:30 k & l near limit of visibility

P.M. h₁ - 13 g - both van in St. - observed -

June 6. 91 -

7:00 w cent 13" + 8"

7:30 a₃ b₃ c₂ d₁ e₁ f₁ g₁ h₁ k₁ l₁ -

P.M. q I cannot find see -

h₁ l₁ also van in St.

See Nov Nov. 1891 -

July 12. 91 - No moon clear -

cent. confusion - difficult - see how -

M₁₅ - not so confusion - w but diff -

STG

18. m₁₅ a₃ b₃ c₂ d₁ e₁ f₁ g₁ h₁ -

Str on ink - stars about to only dimly

seen. Str unharsh - note -

To carry on trip to U.S.

Barometer for Comparison?

Met. records, reductions, notes, etc.

Gunlock yepices

Silver for trip to Panama & return

Gold

round trip ticket

Plitting paper & all records of M3 & M5

"Shaver chair

Radio for cards

St. Boyde diploma

Books to read & study - 3 for. Sem.

Take or send before all ready books 15", 8", met.

City of expenses in U.S. Oct. 47 Inc. - etc.

General letter

Shirts &

Donner suit

Donner coat & hat

Citizens suit

Donner

2 sets of socks

Donner coat

(2) Trencher robe (2)

Handkerchiefs (2)

Gloves

Collars

Cuffs

Waistcoats

Neckties

Shirts (100)

Under shirts

Drawers

Donner shoes

Donner shoes

Trunk case &

Trunk trunk

Combs

Soap

Trunk powder

Trunk clothes - brush

Trunk brush

Trunk brush

Trunk brush

Trunk brush

Donner

Father

Aunt Maria

Eta

May

Winnie

Mr. Romel

Mrs. u

Grandma

Mrs. Raymond

Rich. D. J.

John Smith

Marshall

Emma

Addie Baker

John Baker

Mrs. C. Pickering

Mrs. u

Mrs. Fleming

girls

etc.

paper

envelopes

stamps

photos grey

RTS

acid book

pens

pen - ink

Visit

Tilton

Franklin - Mrs. R.

Concord

Mrs. Abbott

Mrs. Abbott

relatives

Boston

Raymond

John P.

Mrs. J. P.

M. H. S.

Ruthie

Cambidge

Mrs. Raymond

Observatory

Misc.

Ban. & J. P.

Mrs. Chace

Young & Sons

Black & White

Washington

Anderson

Net. obs.

Langley

Sept 47 Inc. over

Forget

1 day in U.S.

2 days in U.S.

3 days in U.S.

4 days in U.S.

5 days in U.S.

6 days in U.S.

7 days in U.S.

8 days in U.S.

1
For consultation with Professor Pickering.

✓ Bruce. ~~past work done~~. adjustment of lenses & tilt piece. ~~charts~~

✓ following after power, images, ~~position of plates done~~
Scheme of work. size of plates. aluminum plate holders? ^{see 2nd sketch}
what would be focal length & definition of outer comb alone.

✓ Building - ~~done~~: advantages of freedom from draws: comfort in
following. appearance. saving of room & exposure
size of materials - hanger needed dish of tilt piece
length of piece vertical height height of arm position of support to
piece back of building pit:

✓ 13"

app. for following. scheme of work - chair for obs. following
spec. work - High stars (to 6.2) with one prism see any height, any angle of rest
or other stars with 2-3 prisms - for head - light. for back
piece must have plates

✓ 8"

Scheme of future work. Long exposures - List of unfinished work
100 plates is it advis. to run with full moon.

✓ Electric lighting

(expense of oil & electricity - motor power - motor & wind
storage batteries - not with oil terrible nuisance - cost of gas)

✓ Draper's registering camera

Pickering for from people all
perhaps better spent all 3 sets

✓ Stellar parallel plates; quality necessary to. Examine some - sets

✓ (Is Pictor proper place for piece of Bruce? carry purple.)

✓ Meteorological. carry notes of all kinds - making more notes -

✓ Value occurrences of diff tables - conduct also Prof Davis -
not. rec. W.D. their slab work & Arrang.

Peculiar Peruvian Names -

Jesus is a common name - e.g.

Jesus

Jesus Maria Calderin was our dress maker & lived with us several weeks. Jesus is also a name used for men as well.

Maria is used for both men & women - e.g. -

Maria

Jose Maria Peña, the well known large wholesale house of Anguila Peru.

Dios is common - not alone however - e.g. in "La

Dios

Patris" Anguila May 16 '95. Due a commemoration signed by Juan de Dios Lora y Cordero - (Lithes John of God Parot [Gust] and Phish.

It is well known that when small children have the name Juan de Dios, they are called "Dioscito", & a gentleman once told me that he heard a "chocho" call out to his son. "Dioscito", "Little God" "come here at once & make your face".

Several

Several names are often used, so as which of the families name on both sides - often a convenience. When married a lady adds her husband's name to her ^{keeping} own name - e.g. - and not using her husband's given name at all -

This is inf. done where they have special pride in keeping up a family name on their own or a child on his mother's side. Many however do not do it. e.g. -

Carmen Rey de Garcia Calderon.

Victoria L. de R. de Garcia Calderon

The de Romanas & the Romanas are different. To call a de Romanas simply Romanas formally would be a slight.

Dobores.

Girls are sometimes called Dobores - such a one is said to have married a man named Barriaga (the name is certainly common enough.) In that case her name would be Señora Dobores - de Barriaga - which comes to about "Belly ache".

New BookPhotographic Astronomy.

1. Historical Survey.
2. General Theory.
3. Solar Photography.
4. Lunar Photography.
5. Planetary Photography.
6. Photographic Stellar Charts.
7. Photographic Stellar Spectra.
8. Miscellaneous.

Weather to record - Arequipa

Fr. Dec. 7 B.

" 8 C.

" 9 B.

" 10 B.

" 11 B.

" 12 C.

" 13 D.

" 14 D.

" 15 B.

" 16 D.

" 17 B.

" 18 D.

" 19 D.

Letter from Mr. Barclay of Feb. 6. '90

says. no attempt made to keep record
as requested owing to almost-continued
rain & cloud - says it is an unusual
season. quite fair, but no thunder storms
& clouds do not clear up.

Letter of Apr. 9 -

says rain stopped Mar. 23

all nights clear from " " to Apr 6. quite

fine Mar. 28 -

Apr 6. A

" 7 A

" 8 A

" 9 A

" 10 A

" 11 B

" 12 A

" 13 A

" 14 A

" 15 A

" 16 D

" 17 D

" 18 D

" 19 B

Arch. Barclay
Arequipa

Panama Central - continued -

1890								
Feb 25-	A	Mar 28	A	Apr. 28	C	May 29	B	June 29 D
" 26	A	29	A	29	D	30	D	30 A
" 27	A	30	A	30	A	31	D	July 1 A
" 28	B	31	A	May 1	A	June 1	D	" 2 D-
Mar 1	C	Apr. 1	A	2	D	2	D	3 D-
2	C?	2	A	3	A	3	A	4 B
3	C?	3	A	4	A	4	B	5 A
4	A	4	A	5-	A	5-	D	6
5-	A	5-	A	6	D	6	D	7
6	A	6	A	7	A	7	A	8
7	A	7	A	8	B	8	D-	9
8	A	8	A	9	D	9	D-	10
9	A	9	A	10	D	10	D	11
10	A	10	D:	11	C	11	D	12
11	A	11	A:	12	A	12	D	13
12	B	12	A	13	D	13	D	14
13	C?	13	A	14	D	14	D	15-
14	A	14	A	15-	C	15-	D-	16
15-	A	15-	D	16	A	16	B	17
16	A	16	A	17	D	17	D	18
17	A	17	B:	18	A	18	A	19
18	D or C.	18	A	19	D	19	A	20
19	A	19	D	20	D	20	D	21
20	A	20	A	21	A	21	D-	22
21	A	21	D	22	B	22	D	23
22	A	22	D	23	B	23	D	24
23	A	23	A	24	C	24	A	25-
24	A	24	A	25-	A	25-	B	26
25-	A	25-	A	26	D	26	D	27
26	A	26	D	27	C	27	D	28
27	A	27	A	28	B	28	D	29

University Press.

(Established 1639.)

JOHN WILSON, *President.*HERBERT H. WHITE, *Treasurer.*

JOHN WILSON AND SON,

INCORPORATED.

Cambridge, November 5, 1898

S. F. Bailey, Esq.'

Cambridge.

Dear Sir:

We have gone carefully over your manuscript on Peru, and we figure that if set up in the same size page as "American Cruiser", proof of which we enclose, but with one size larger type, the manuscript itself will make about 150 pages. Adding 24 full-page illustrations, the volume would run about 200 pages; and upon this basis we take pleasure in submitting the following estimate:

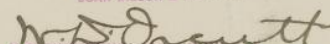
Composition and electrotyping,	\$179.16.
Presswork, 500 copies,	65.
Paper, 22 1/2 x 32 - 85 lb.	61.63
Binding and dies, approximately,	75.
Manufacture of 24 half-tone cuts, at \$5. each, . . .	<u>120.</u>
Total,	\$500.79

Awaiting your advice, we are,

Yours very truly,

University Press:

JOHN WILSON & SON (INC.)


 General Manager.

Thrice

A Dream
by
one

dedicated
to all who dream of better things.

Book I ~~A.D. 2000~~ the sixth century.

Conty Pan.

Shubnigah white man you.

{ Taken to Angwapa. low Indian hills - Death of chief. Took a desert life
& made King.

Dev. of an absolute power of one man, who dev. Indian makes an ideal
little Kingdom by division of labor & absolute control.

Love marriage. 2 children 1 boy & 1 daughter & boy wither & die. ^{Wounded}
or dies. Failure of hope of love, a permanent nature of equals by aff.
death. Burial on Chachani. of many & perhaps fainter.

Book II ~~A.D. 2000~~ the nineteenth century.

Samban. Young man & girl fairly. my power. Took death in sacrifice
for accidental crime. struggle with power & social conditions. ^{power & time}
Dreams a colony. where also like himself shall live in equality. ^{little personal freedom}
Carry out the ^{freedom} ~~freedom~~ of the colony in ^{freedom} ~~freedom~~ & I. failure from
the colony. it only began to give me. Run down it love &c.

Book III ~~A.D. 2000~~ the twentieth century.

Believe & time - improvement of world. Scene? in ^{5th Avenue} ~~anywhere~~
work out possible solution of equal in state or colony. with
social & political equality. but a great personal freedom as
possible -

Letters Written

1892-

March ?
" 30
" "
" 21
" ?
" 31
" "

Wm. Dunning

"

Father

Etta

Marshall.

"

Ben & Gail

1849pnae.proj..699B