

LOG OF A TRIP TO PERU

July 1, 1959

We left the Tiajuana Airport at 3:30 PM, July 1, 1959, on a trip to Peru. Our aim was to see the Inca Ruins, the evidence of their civilization, and for me---to study the geology along the way. Our daughter Lucia and her husband Marvin Sippel, drove us to the Tiajuana airport to see us off, and I managed to get a good seat by a window(not over the wing)-- with a two dollar tip.

I took pictures like mad all the way down the west coast of Mexico, the plane having crossed the head of the Gulf(Sea of Cortez)and then followed the coast line all the way to Mazatlan just a liitle off shore. We arrived at Mexico City about 10:30 at night, after a stop at Guadalajara, with much thunder and lightening.. Took a taxi to a hotel where we had very nice accommodations. Next morning we took a guided tour of the University of Mexico. A boy attending nightschool there took us around. He showed us through the new dental section which is built on an old lava flow. They just cut the building blocks right out of the lava where they built the building.. Nearby we saw a very fine home built in this lava bed with its unusual landscaping. Our guide said it cost 12,000,000 pasos----one million dollars in our money.

Back to the airport and caught a Pan American plane to Panama City,\_\_\_ via the capitols of Guatamala, San Salvador and Panama. They made a half hour stop at each airport so that everyone could get off and go through the terminal building shops, a formality that appeared intended to allow the tourists to buy gifts for the folks back home.

One tourist bought a stuffed frog at one shop and a stuffed aligator at another shop close by---the real thing with skin and hide will polished. The skill of using leather is well understood in latin lands.

Arrived at Panama City international airport at 10:30 AM, where we were to lay over for 4 hours to catch the Panagra Plane to Lima. This is a big fine airterminal with a building and other facilities said to have cost over \$6,000,000. The local Panagara representative said that the President of Panama put 4½ million of it in his pocket.

Panama City to Lima. July 5/59

We arose while it was yet night in Lima, left the Hotel Bolivar at 5:45 AM and arrived at the airport about 6:30. Lima has a very nice International Airport that in some ways is even better than Mexico's International. The building is better made and the main waiting room all finished in marble and brass. Went up to the longue for a cup of coffee, toast and jam---all very good. Got on a plane(Fuwsett Airlines) was able to get a good seat by the window, the plane was not crowded. Their planes are not pressureized so we had to suck on oxygen tubes. There were two stewardesses and a purser who smoked oxygen tanks too.

They have an almost constant fog at Lima which extends in to the foot of the mountains, but the plane soon climbed through the fog and into the bright sunshine and I began to get some beautiful shots of the Andes foothills with their red and golden-bround mountain isnth early morning light. Heading for Cusco,we met the Andes at an angle to the direction we were going. The range at this point are aligned almost north & south and we were headed southeast.. The Andes are incredibly high and dry, abd rugged. At an elevation of about 8,000 feet we began to see many little stone corrals where the Indians keep their sheep at night.

Finally the pasture lands give way into small, quilt-patch fields where irrigation takes place. This front range is about 15,000 feet high and very uniform in height and width, at least where we saw it, a high and dry plateau that extends for many miles with here and there a volcanic peak extending another two or three thousand feet higher. Like any other mountain range of great size, the granite is in the middle and the metamorphic rocks on either side. In the case of the Andes, the granite forms the main width of the high plateau;--is met on the east side by nearly vertical stratified rocks that are highly mineralized. This band is only a few thousand feet wide where we passed over it, and I saw two mining operations there.

The volcanic cones are in a line on either side of the granite and most of them are in the 19,000 to 20,000 thousand category. A little farther east the highest peaks are very angular and jagged and appear to be quartzite or some other very hard stratified rock--not volcanic. The plane passed very close to some of these very spectacular 20,000 foot peaks with sheer cliffs and pinacles of ice that could hardly be surpassed anywhere. I was on the wrong side of the plane but a nice lady did give me her seat by the window for a few minutes. However, I got many good shots of the Inca farms and pastures. It is absolutely amazing what these people did and are still doing. They think nothing of climbing a near-vertical mountainside to plant and tend a little barley field 30 or 40 feet wide and a few hundred feet along the mountain side. These are irrigated fields from the snow just above. One wonders how many mouths such small fields can feed, and how long.

Arrived at Cusco airport some 2 hours and 20 minutes after takeoff and began to see some real primitive conditions, but they do have a good airstrip and two new tourist hotels. Were driven to the hotel in

a cab over cobblestone streets, very narrow with the water gutter down the middle of the street.. Cusco was 65% destroyed by a big earthquake in 1915, and had to be almost entirely rebuilt except for some old churches which were well-made and mostly laid on pre-Inca foundations which were earthquake proof, the big cut stones notched down a little to keep them from sliding to & frow.

Went to our rooms to get ready and soon tookoff on a tour to Pestic and Urabomba. Our guide and driver was the hotel manager and pretty well educated, spoke good english. He told us that Cusco now has a population of 50,000, but when the Spaniards took over there was a native population of over 200,000 people. He told us that the Spaniards killed most of them by starvation and over work in slavery. Many of the beautiful works of art, tombs, walls, covered water ditches and terraces were distroyed, looking for treasure.

The population of the Inca Empire has been estimated at 16,000,000 about 12,000,000 in what is now Peru, and only now is it getting back to about 10,000,000 people. The amount of irrigation and terracing that are still visible is absolutely amazing and increditable. At the height of the Empire they were farming three times the area of land now in crops. These old terraces extend near to the tops of the mountains---just below the snowline at 17,500 feet, and the bottoms of the gorges some eight to ten thousand feet below were still cultivated to the enth-degree. Long streatches of the Urabomba River were lined with heavy rock walls to retain the river within these walls and maintain the good land on either side for farming.. The lower slopes of the canyon walls were beautifully terraced too with fine rock walls. I had read and looked at the pictures in the National Geographic of this Inca Empire but never had the faintest notion of the size of the

operation. This was the biggest, the best planned and the most magnificent civilization in the new world, and in some respects, has never been surpassed. From the pictures in the National Geographic, I imagined that these terraces were only in a few good locations. They are everywhere.

We were up early Monday morning and off to Machu Pichu, which is about 60 or 70 miles northwest of Cusco.

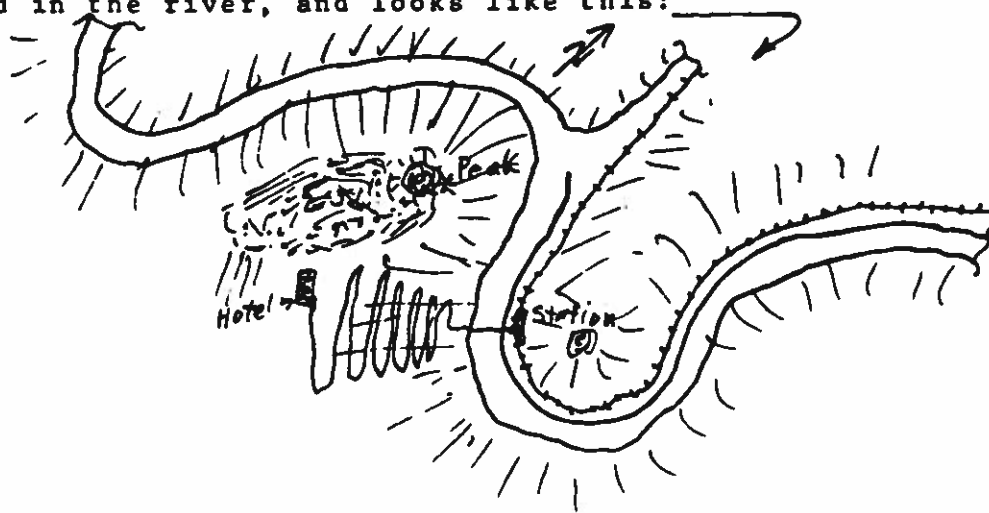
There was a mixup on the rail cars and I went by myself, the other three in our party stayed behind and did not catch up until about 2 hours later. The narrow gage railroad takes off up a mountain west of Cusco in a series of switch-backs. An Indian boy rides on the steps of one car and his job is throwing the switches. The cars move forward and then backward as they go back and forth up the side of the mountain. The Hotel company has three eight passenger rail cars pulled with a gas engine, and an old International truck bus that was equipped for railroad transportation. So the train moved up the mountain by going forward a few hundred yards and then backing up a few hundred yards, the switch boy getting off the train to throw the switch, backwards or forwards. Our train got over the hill after a time and then started down the other side in a hurry going around the turns at considerable speed. The top of the pass above Cusco is 13,500 and from there it follows down along the Urabamba river, stopping at a few stations and a siding or two where they met the trains coming from Machu Pichu. As we came over the pass we could see a whole row of 20,000 foot snow peaks.

The trip down along the Urabamba river gorge is one of increasingly tremendous grandure. A few miles down the canyon another branch of the river enters from the east, and the river becomes a rushing torrent of white water most of the way. By this time the walls of the canyon are seven or eight thousand feet high and getting deeper.. Suddenly, we rounded a bend and saw a snow peak pyramid ahead at least 19,000 or

20,000 feet high, the upper 5000 feet covered with snow like one vast icicle. The tops of these high peaks are very sharp and draped with hanging glaciers where ever any amount of snow can stick. The snowline on this side of the Andes is about 15,500 feet, while on the western dry side it rises to about 17,500 feet. these immense peaks (and there are plenty of them) are certainly something grand to behold.

In the lower reach of the Urabamba gorge where these snow peaks crowd the canyon wall, the rise is from 7,000 to 19,000 feet and in some places to 21,000 feet. It took real men to match these mountains and the Incas certainly did!

We alighted from our car and got into a small 12 passenger buss that took us up some 17 switchbacks to the new tourist hotel at Machu Fichu. The views from here are out of this world! I took a walk with the guide through the ruins which cover about 20 or 25 acres in a mountain saddle. From the top-most tower, one can see 20,000 foot peaks to the east and to the west, and range on range of lesser mountains. Below, the Urabamba is only a faint line thousands of feet below---looking down what is almost a cliff. The main peak close above Picchu, has a first name that means peak, it forms a granite tower, looming almost perpendicular from a bend in the river, and looks like this:



According to our guide, there are many different stories about Machu Pichu, historical and archological and it was his opinion that nobody actually knew the real reasons for many of the things there, that most of it was pure theory. He says that not more than 600 people lived at Machu Oichu, because the water supply was not sufficient for more. I doubt this because the number of men required to build this massive monument over time and maintain it against the jungle etc. would have required a much greater population. Food was grown on the terraces and that would have required considerable water. There must have been a wetter climate than is apparent there today. The labor required to shape all of the granite stones so perfectly and to lay them up in place is something to think about. Present day Indian labor is restoring some of the stone work that has fallen down by earthquakes or pushed apart by tree roots when the place was covered with jungle. Hiram Bingham and crew, spent the years from 1911 to 1914 in clearing the jungle growth from the place and restoring the very steep terraces on the west slope or cliff, which were used as retaining walls to preserve the big buildings and monuments on the top from falling into the river below.

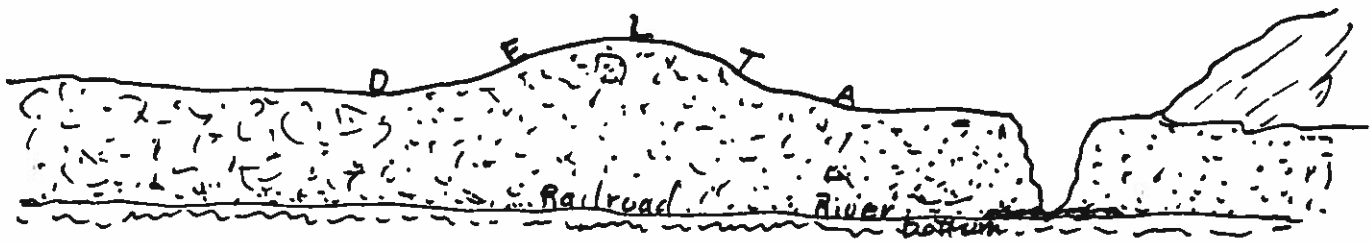
Some people say that all of Machu Pichu was built by the Incas, while others say that a pre-inca people did the really fine stone work which is so beautifully fitted and shaped to fit the contours of the mountain top. Most of the lower parts of the walls are of fitted stone while the upper parts are just rough rocks chinked up with smaller stones and mortor. Many large boulder were used as they lay in place with rock walls fitted against their contours, or stone steps cut into them. The work accomplished was certainly prodigious, and so remarkable that one wonders how man today could lift these huge stones into place and work their surfaces to a perfect fit....the work of gods before the Deluge.

GEOLOGY. All the way down the Urabamba I looked for signs of the flood, gravel deposits, but saw none I could be sure of, since we stopped at a point 6,000 feet above sea level. The upper reaches of the gorge begin in the lower end of a large valley of perhaps 50,000 acres in extent, which is about as high as Cusco's elevation of 11,000 feet. In all of the upper part of the gorge, the canyon is very narrow and steep-walled. There is no sign of wall scower from glaciation, only loose rock and volcanic ash in huge rock slides coming right down to the rivers edge. The flow of the river is so nearly uniform throughout the year that no erosion cutbanks are seen along its sides, just a boulder-strewn water course---no sign of washouts along the railroad which was built in 1929.

As one proceed down the river gorge, the walls get higher and the river larger as branches come in. Some have large deltas that make walls along the main river, and there are a few short sections of an old and higher river shoreline, but the lower two-thirds of the part we saw is of granite with sheer cliffs in many places so that not much chance was left for river terrace deposits. However, where the few terraces do occur, there is only the one, the present river having cut at a uniform rate, keeping a narrow bed without side deposits of gravel. In other words, the remnants of the one old large terrace, is all that remains. I would say that this high deposit of the old shoreline, is the result of the first great wave of the Flood which carried the rock and gravel up the canyon where it was dropped as the water slowed and came to a stop. As the water receded slowly, it started to cut a trench against the wall on the inside of the turns and deposited some gravel on the outside of the turns. The other possibility is that the flood waters never came this high (10,000 feet) in the canyon but that the vast amounts of dust and change of world climate from the change of polar axis, caused it to



rain almost continuously for a year or two. However, this does not account for the single terrace, for there is only one, and because a continuous downpour of rain would be more apt to remove all of the rock debris and carry it out of the canyon. The huge deltas seen at the mouth of large canyons are unusual in that they are higher at the center and slope down either way--upstream and down stream. See drawing below.



A condition like the drawing above requires some explaining. How, except by the water moving up the canyon, could it have been deposited? Heavy rains on the mountains above would not produce such gravel deposits in the bottom of a deep, steep gourage.

As we returned from Machu Fichu in the evening Deep within the mighty gorge, we could see the pink tops of those 20,000 foot snow-capped spires peakin over the dark rim of the canyon. Home in time for late dinner with the Peruvians, and so to bed with cold feet half of the night but no headache from the high altitude.

Up and to breckfast by 8;30. Started tour of Cusco with our guide of the day before, Mario. He took us first to the big Inca fort which is up on the side of the mountain east of Cusco. I took some pictures of natives with their llamas and some little girls dressed in old native native costume. Our guide said they dressed them up so fine to get more money but we thought they looked better that way.

I took dozens of pictures of the rock fortress and of the glacial polish on some of the native rock outcroppings---ancient metamorphics. Mario said there were two schools of thought about the rock, one, volcani

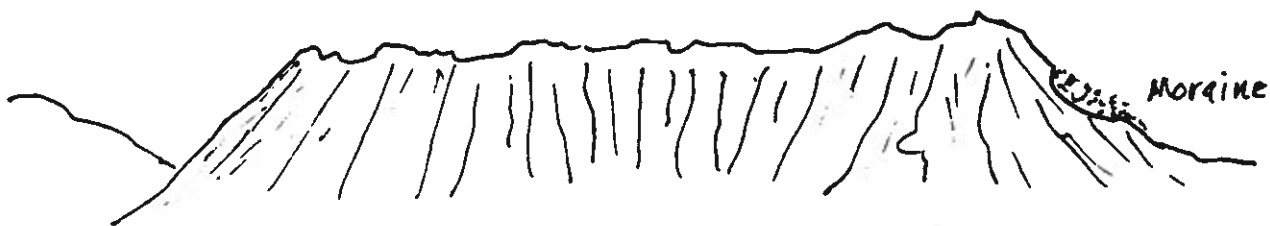
intrusion, and the other, glacial erosion. A third observation (mine) was that all the big rocks in the fortress were limestone, but the higher parts of the walls and towers were made of a near-black basalt that were cut into small blocks that one man could handle and bigger cut stones that two or four men would be required to carry from long distances.. I saw no basalt of this nature in that area. These lava blocks were carried from far away, cut to size and smoothed, but not polished. Many of the big stones in the bottom of the walls were estimated to weigh, according to the guide, one hundred tons. This is difficult to believe but it may be true because some of these are as much as 15 feet high and nine feet wide, nearly all of them of uneven shape, and fitted perfectly to the adjoining stones---big but of lesser size. The questions of how they moved these huge stones into place and fitted them so perfectly is indeed a marvel and a mystery. How thick this lower part of the wall may be is not evident because the earth has been filled in behind them, up to a floor inside the wall or building that was---. We stopped at five different ruins on this east side of the Cusco Valley.

The Incas are said to have used spears and the bow and arrow, but their main weapon was the sling. They even had special round rocks that were of an even size and polished. We saw a special rock supposed to have been a frozen Inca, one of four brothers. The archeologists are still digging out old walls and other ruins, and are far from finished.

In the afternoon we took the City tour, visiting five churches and the palace of one of the arch bishops. Also saw the jewels in one of the monistaries that were made by a half indian monk in 1720. Many of the old churches were either built of Inca cut stones or built on Inca foundations. The spanish conquerors ruined many an Inca wall in this way.

of a near cliff, and the Indians bring their milk up or down the mountains on burros. The Gloria Lache milk truck hauling in the milk cans from the outer stations. It is weighed and tested to see if it is sour or that some of the cream has been separated before being strained and poured into a tank truck to be hauled back to the main plant in Arequipa.

We saw many flowers and shrubs in bloom at these high altitudes. The road rises to more than 12,000 feet where we saw herds of llama, goats and one herd of Alpacas. There is lots of water here that drains out of the big mountain northeast of Arequipa. This mountain is said to be a blowout volcano, because it is a high ridge in a half circle. But I see no good evidence of a blowout. It looks to me like a volcanic eruption along a fissure, not half of a volcanic crater.



On the east side, high up, we saw a small glacial moraine just at the foot of the snowline. All of these mountains Misti, Chanchani and Machu Fichu, have small glacial moraines on the wet side of the peaks, but they look as if they had lasted only from one to ten years. Just heavy snows that slid down to the bottom of the snowline, or a little below, sort of furrowing out the steep lava slope.

We came back from this ride without incident except for a flat tire. Met a broncho-buster riding on a very wild and scared horse. Also got picture of two girls giggling and jiggling on a burro. We ate lunch by an nice stream of water and a stone bridge and got back to Arequipa at 4:30. Went to get money from the plant man, then to Faucett Airlines where we got out tickets confirmed, and a letter from Faucett Airlines

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saying that there was no round trip from Arequipa to Cusco to Lima. Had supper at the Hotel with the kids and so to bed.

TUESDAY, July 13, 1959

Up betimes, got shower and shave (good shower in Arequipa Hotel) got everything packed into three bags including burro bag, and then went down to pay our hotel bill. It came to 1,148.50 soles for the five day stay, included meals and heater in room. The kids ate dinner with us most every night too, so the cost was about \$7.00 per day, 31 soles to the dollar. Food and service was very good, the only complaint was a poor bed which sagged down in the middle. Taxi service is cheap too, can go to almost any place around town for 5 soles. We took a ride up the river over a very rough road the three of us, for ten soles. I certainly would recommend a vacation in Peru as a very good buy. Kay bought more pictures of llamas from the old lady on the front steps, we put the baggage in the taxi and went down to Quinta Bates at 10:00. Next---we took a walk down town to see a big cathedral built in 1847, and on the way I took pictures of fancy iron lattice windows and doors. The new cathedral don't hold a candle to the old churches in Arequipa although it is much bigger. It hasn't the fancy stone workmanship or the beautiful golden alters. In 1847 the days of gold in Peru were gone. The other old church of San Francisco, was built in 1689 and is ten times more worth looking at than the other.

Back to Quinta Bates for lunch---had guinoa, the peruvian Inca small grain that once took the place of rice and other small grains now used. It was very good and served with boiled cabbage and steak that was the best I have tasted anywhere. How this indian cook managed to turn out such a perfect steak out of such meat is more than I can understand. And the perfect setting in the garden patio of this old mansion built

in 1838, the dry mountain air, the sunshine, the good company, and the memory is perfect.

Son got us a taxi and we left for the airport at about 12:30. The airport is at 8170 feet and right up against the foot of Chanchani. They have a small building, but nice, and about 2 acrs of loading ramp paved with Cr blocks 20" square. I was in a rush to get a good seat on the plane for pictures and forgot to shake hands and say goodbye to Son and Dede. Much ashamed!

The trip from Arequipa to Lima is along the coastal range and the coastal plateau, crossing many huge canyon valleys that appear to be from 2,000 to 3,000 feet deep---all farmed up in small fields, and looking back up these canyons from the plane one sees those 20,000 foot snow peaks in the far distance. This coastal desert range is absolutely of tree <sup>bare</sup> or plant through most of the distance and huge sand dunes are a special feature, some of them climbing the steep mountains as much a 2000 feet to a bench where they display all kinds of shapes and forms. I took over a hundred 35 mm pictures, some showing tidal wave action, (or so I thought) and many more sand dune pictures to add to my collection. At one place along the coast, right down close to the ocean, but on a steep mountain side, there was a section of 2 or 3 square miles covered with trees and grass, and on either side absolute barren desert. I noticed that it was covered with a thin patch of fog. I suspect that this small area has some special affinity for fog and the deposition of moisture, the slope of the land or some ocean current. When we were still about 100 miles from Lima, we met a fog blanket angling in from the ocean and up against the foot of the mountains, and was solid all the rest of the way. The plain turned out over the ocean of fog to come directly in toward Lima, I guess to avoid hitting a foothill or mountain. I should say

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we were well impressed with Faucett Airlines. Their planes run smoothly and are clean inside and out. Instead of dirty oily motors and soot-covered wings like so many American plains. Perhaps because labor is so cheap and they are not over crowded all the time. They have a very good record as far as accidents are concerned.

Arrived at Lima airport about 5:00. Got conformation and our bags checked for flight to Mexico City. Then got taxi up town to get Dede's silver. Got to store and counted out each fork and spoon, and the boss finally wrapped it all in a very small package that Kay could carry on the plane under her arm. Ate next door in a sidewalk cafe where the soup was very good and the sandwich fair---for both, 44 soles. Walked down the shopping street which they close to auto traffic at 6.00 Got taxi out to their beautiful airport where I spent an hour waiting and writing up this day's log.. Finally got off for Mexico City About ½ hour late. The hostess gave instructions how to get life jackets out and into. She was scotch, the purser was dutch---all on Canadian Sirlines Had pretty good rest at night in the reclining seats at 38 degrees and arrived in Mexico City about on time. Here we found that we needed tourist cards and should have gotten them in Lima at the Mexican Council. If we had been going through to Los Angeles we would not have needed them. Anyhow, we had to pay \$6;00 more for tourist cards, but the immigration inspector was very kind and got us on the next plane, saving us some 4 hours. this was a very unusual bit of kindness that this man did that was not any part of his duties! THANK YOU ALL FOR LISTENING!

All this copying of longhand notes, thirty years later--4/6/89

AOK