

Romantic Andacollo

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ABOUT thirty miles south of the port of Coquimbo, Chile, nestling in one of the western outliers of the main Andes range, lies the little mining town of Andacollo, a place whose history and traditions make up one of the most romantic pages in the life story of this southern republic.

The beginning of Andacollo is shrouded in the penumbra of the pre-Columbian era, but its first mining activity probably dates from about the years 1440 to 1460. It was in the middle of the fifteenth century that the Inca Tupac-Yupanqui, grandfather of Atahualpa, conquered this part of Chile. His domain extended even as far south as the present site of Santiago, and perhaps farther, but was maintained with increasing difficulty against the fiercely independent and indomitable tribes of Araucanian Indians of the South.

In the region of Andacollo, however, the authority of the Incas was well established. They were the first to wash gold from the gulches of the district. Remains of old Inca workings could still be recognized, up to a few years ago, in some of the high-lying ancient stream beds protected from the rainy season washouts which each year destroy the diggings in the modern gulches of the present drainage system.

These workings were distinctive in that the Incas, contrary to the practice of the Spaniards and their successors, carried the gold-bearing gravel to the water, leaving clean workings. The Spaniards, on the other hand, carried or conducted the water to the workings, leaving the tailings near the site of the diggings. Old Spanish manuscripts also refer, in the archaic idiom of the colonial epoch, to workings made *en tiempo de los gentiles*, (in the time of the heathen). In the tremendous gold-washing activity of the last few depression years most of these vestiges of Inca workings have been destroyed.



Washing gold, after a shower, in a street in Andacollo.

The real history of Chile begins with Diego de Almagro's expedition in 1536. Peru had been conquered by Francisco Pizarro with the help of Almagro. The highest and most amazing ransom ever exacted in the world's history had been wrung from the ill-fated Inca Atahualpa. The story is well known: Pizarro made a mark with his sword on the wall of the room where his captive, Atahualpa, was confined, to which mark the Inca sovereign was to fill the room with gold as the price of his freedom. Atahualpa fulfilled his part of the contract and Pizarro afterwards, in one of the most abominable instances of black perfidy on record in all history, treacherously executed the unfortunate Inca. According to Prescott's estimate, in his classic "Conquest of Peru," the value of the ransom was about \$15,000,000 or about \$25,000,000 at present gold values. Added to this was the loot from the Temple of the Sun in Cuzco, which had also been stripped of its golden ornaments.

Where did it all come from? Where was the principal primary source of this vast accumulation of gold? This,



Inca Tupac-Yupanqui, who reigned 1439-1480. After an original painted in the sixteenth century by a descendant of the line.

naturally, was the question uppermost in the minds of Francisco Pizarro and Diego de Almagro. It must be admitted that they were at that time in position to obtain reliable first-hand information, probably more trustworthy than any obtained later when the Indians were on their guard. They knew the directions from which llama trains bringing in cargoes of gold for the ransom were coming. None too gentle inquisitorial, third-degree methods applied to the as yet wholly unprepared Indians who brought in these remittances of treasure furnished additional data as to the immediate and ultimate sources of this gold.

It appeared that a region far to the south was one of the principal primary sources of the golden hoard and the ambitious and costly expedition of Diego de Almagro was decided upon. Early in 1536 the epic journey was begun. It was not a colonization project. Gold was the only motive. The expedition suffered incredible hardships and met with increasing hostility from the natives the farther south it advanced. No gold was found, which is hardly to be wondered at in view of the resistance of a now thoroughly aroused aboriginal population, determined to frustrate the sanguinary invaders whose atrocities had brought them so much misery. Almagro's band of gold seekers did indeed pass within about 25 mi. of Andacollo on its way south. Shortly before, at Coquimbo, Almagro had punished a number of



Spanish conquistador, Diego de Almagro, after a cut in Marco's "South America."

Indian caciques by burning them alive. The stupid cruelty of the Spaniards was in strong contrast with the mild but intelligent conquest of the same country by the Inca Tupac-Yupanqui about eighty years previous.

Almagro returned to Peru a beaten and disillusioned old man and this failure for a time thoroughly discredited the early first-hand data obtained at the time the ransom for Atahualpa was being brought in. This information in itself was probably in large part correct, but the expedition was bungled. Chile is a large country and the gold-producing districts of the Incas were probably few. To begin with, all of the northern half of Chile, even though gold is now produced in a number of districts, may be excluded, since the Incas did not mine lode gold but only washed placer gold, and in that desert region no water was available for their placer operations, except on an insignificant scale.

In the southern part of Chile, from Santiago south, the dominion of the Incas in Araucanian territory was too precarious to permit the establishment of any important placer gold washings, nor are there any well authenticated records of Inca workings in that section. Such gold as was found in the southern part of Chile was probably discovered by the Spaniards themselves. This practically eliminates all but Andacollo and one or two minor districts as gold producing fields at the time of Almagro's expe-

dition. Furthermore, Andacollo is about the only district whose later proved production, that is, the output since the Spanish conquest, was of such a quantum as to stamp it a principal contributor to the golden hoard of the Incas.

Five years after Almagro's disastrous attempt, Chile was again invaded by the Spanish conquistadors under the leadership of Pedro de Valdivia. This time the dominion of the Spaniards was firmly established. Many placer gold districts were discovered and worked by the Spaniards, especially around Santiago and several hundred miles to the south, and for about sixty years to the close of the sixteenth century the gold production of Chile was the greatest in its history. Andacollo was one of the producers, but it was not pre-eminent—the cream of this field had long since been skimmed by the Incas. The coarse and easily recoverable gold, the first fruits of virgin placers, had already been harvested by the "heathen," and it could not make a showing like the smaller but still rich and untouched fields to the south.

But it was not until the end of the sixteenth and the beginning of the seventeenth century that Andacollo really came into its own. The Spaniards had met with reverses and had been forced back north by the revitalized and indomitable Araucanian tribes, who had reconquered most of the territory and with it the productive gold fields to the south of Santiago. The gold production from the now nearly exhausted fields near Santiago, still held by the Spaniards, had also fallen to a low ebb. Andacollo then appeared for the first time in the role of the country's lifesaver. It was of this century, a century of misery and poverty, that the Chilean historian and author, Vicuña Mackenna, wrote: "And nevertheless, during the long and painful course of the seventeenth century, there was one mining field whose copious riches sustained the reign and with its output prevented a veritable cataclysm. This was the famous Andacollo field, of which the Presidente, García Roman, in a letter to the king dated April, 1607, said, 'Andacollo is one of the rivers in the world of gold.' It was thus that the gold of Andacollo served as a pillar to Chile in the midst of a crisis, a long century in duration, and was a

powerful aid in keeping it alive." Even in that century, 300 years ago, the name of Andacollo had already become so deeply rooted in the folklore of the country that, in legal documents and contracts, payment clauses stipulated *en buen oro de Andacollo*, i.e., in good Andacollon gold.

During the eighteenth and nineteenth centuries, year after year, for a few months during each recurrent rainy season, the natives of Andacollo washed and rewashed the hundred times turned-over gravels. In the nineteenth century the disseminated copper deposits of this major mineralized zone afforded a new source of revenue for Andacollo. With a technique adopted from gold-washing practice, low-grade chalcocite ore was concentrated in bateas (wooden gold pans). It is probably the only place in the world where the gold pan has been pressed into service as a concentrating device for copper ores, but a million tons of tailing remains as testimony of the magnitude of these primitive ore concentration operations.

In these two centuries Andacollo became famous for an entirely different reason. It was the site of the shrine of "La Virjen del Rosario." The setting was favorable and the environment proved a fertile medium for the growth and spread of the cult. The apparently inexhaustible or annually reborn wealth of the placer deposits was interpreted as a token of some form of miraculous intervention. The fame of La Virjen del Rosario spread to foreign countries. Pilgrims to the shrine on the annual holy day, Dec. 26, came not only from Chile, but also from Peru, Bolivia, and Argentina. Andacollo became a South American Lourdes. The little village of 500 inhabitants on its day of glory teemed with several thousand devotees.

The sleepy routine of the nineteenth century prolonged itself into the first third of the twentieth, when, with dramatic suddenness, Andacollo sprang into the limelight for a second time in its history as the country's lifesaver. The world depression was on. The nitrate fields and copper mines were closing down in the north of Chile. Tens of thousands of hungry and ragged unemployed came trooping to the south. Revolution was in the air. Without exports, the nation's credit began to falter. The Chilean

peso weakened and finally cracked, falling to one-eighth of its value in the course of a few months in the middle of 1932. However this new catastrophe automatically brought a new remedy. The price of gold varied inversely with the depreciation of the currency. The unemployed throughout the land began washing gold from the worked-out placers of former times. The Government supplied rockers, wooden gold pans, picks and shovels. It also bought the recovered gold dust but at a considerable discount which of course immediately encouraged the clandestine bootleg buyer.

By far the most important of the rejuvenated gold fields of the republic was Andacollo. Almost overnight the population of the sleepy village jumped from 500 to 20,000. A seething, pushing, sweating mob of ragged gold washers jammed the narrow streets. But they were now holding their heads high. They were no longer jobless mendicants looking for relief. There were no bosses; every man for himself, a rugged individualist. Practically all were novices in the art of gold washing but they soon learned. There were no beggars. It was either work or quit eating. They worked; each man for himself, as little or as much as he pleased. Some of them worked even by moonlight.

The gulches were first attacked and the exhausted gravels of innumerable previous washings turned over again. When all of the available space in the gulches was taken up, workers began creeping farther and farther up on the hillsides, washing the thin capping of eluvial gravels. Burros driven by the women and children of the workers' families carried water to the workings. Small patches of alfalfa fields and orchards in the valleys where old-

time residents of Andacollo had built their little homes were invaded and turned over. Resistance of the owners was useless against sheer force of numbers. Houses were undermined, trees uprooted, roads caved in. Only by the utmost vigilance was it possible to keep the human moles from undermining the foundations of the temple of the shrine of La Virgen del Rosario, as this was situated in an especially tempting spot in the valley. After three years of such activity, the landscape of the Andacollo district resembled nothing so much as a devastated, shell-torn battlefield in France in 1918.

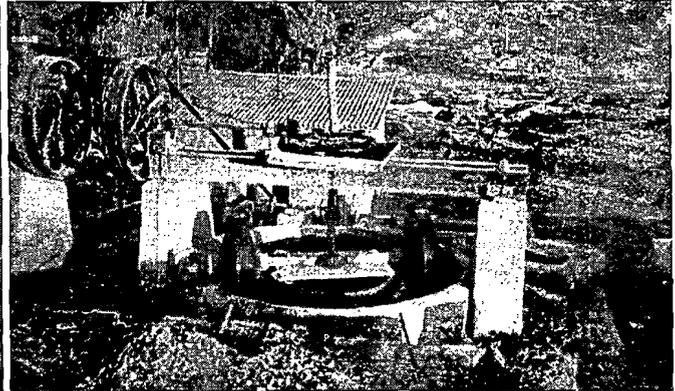
Official records show that in the three years, 1933, 1934, and 1935, the Government bought 1,557,211 grams of gold in Andacollo, worth a little more than one dollar a gram at world prices. However, as the Government price was considerably below the world market price, and as gold dust is not a bulky article, bootleg buyers probably smuggled out over hill trails at least an equal amount. Roughly about \$3,000,000 from the worked-out placers of this district was produced in three years. An interesting question that naturally presents itself is this: if in three hectic years the production from the repeatedly worked-over gravels was \$3,000,000, what might have been the total production of this field in the 400 years since the advent of the Spaniards? Only fragmentary statistics are available, but piecing these together, a conservative estimate would not be less than 50,000,000 grams or roughly \$50,000,000.

However the real cream of the district had already been skimmed even before the coming of the Spanish conquistadors; the easily recoverable, rich coarse-gold concentrates of the virgin placers had already been harvested by

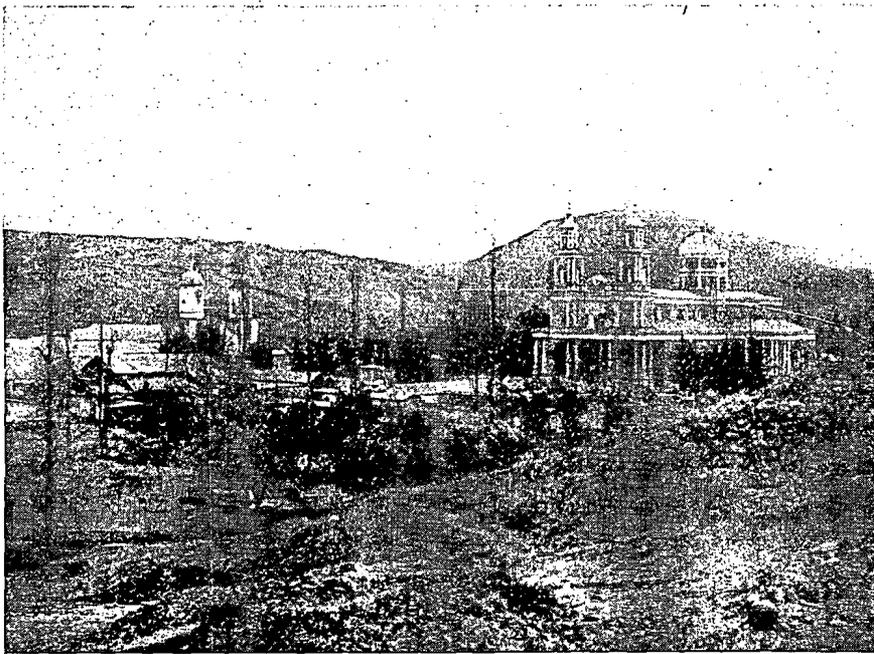
the "heathen." What the Spaniards inherited from the Incas is on a par with what the California 'forty-niners left to the Chinamen who cleaned up after them. In placers of this nature, 80 per cent or more is usually recovered by the first worker, 10 per cent by his successors, and the remainder is so fine as not to be economically recoverable by ordinary methods. On that basis, even if the Incas were only half as efficient as the 'forty-niners, the total output of the Andacollo placers since the time of Tupac-Yupanqui would have been well over \$200,000,000.

These placers lie at the very foot of the outcropping primary lode deposits from which they were derived. They are not, in contradistinction to many other large placer fields, reworked stream deposits garnered from a large area. Their source is limited to the immediate neighborhood, a few square miles of territory comprising the Andacollo district. The drainage system of the district, in which the placers occur, converges to a single outlet in a gorge about three miles below the lower fringe of the primary outcrops. Below this point the gradient becomes much steeper and no more important placers are found. All eroded auriferous material on passing beyond this barrier was swept out to the Pacific Ocean. The gold retained by the placers of Andacollo represents but a small part of the total eroded from the primary lode deposits; the greater part was carried beyond the gorge to the ocean and lost.

The rock formations of Andacollo consist of a conformable series of volcanic flows dipping about 30 deg. east. They range from rhyolites to basic andesites and diorite porphyries. This series of bedded volcanics is traversed by a NW-SE system of aurifer-



To the left, a maray in operation, and on the right a twentieth century trapiche.



Temple of the shrine of La Virgen del Rosario in Andacollo.

ous veins. The average width of the veins is about 2.5 ft., but on crossing certain beds of the volcanic series the mineralization spreads out beyond the vein walls and permeates the favorable bed (manto). This impregnation may extend several hundred feet beyond the vein walls, and in places where the parallel feeding veins are relatively close together the impregnation zone on any given manto may be unbroken or continuous for from 3000 to 5000 ft. Four major mantos have been recognized so far, ranging in thickness from 40 to 200 ft. Viewing these mineralized volcanic beds or mantos, and the potential tonnage of many hundreds of millions of tons of lode material that they represent, it can readily be seen how they could account for the vast wealth that has already been recovered from their eroded detrital deposits during a period of nearly 500 years of gold washing since the days of Tupac-Yupanqui.

The ore mineral is auriferous pyrite, except in a shallow surface zone where the pyrite has been oxidized to limonite. This oxidized zone is seldom more than 60 ft. deep. The work done on the veins and mantos themselves is insignificant compared with that of the placers. The grade was just a little below the point at which the Spaniards could mine and treat with the facilities that they had and at the former gold prices. It is true that on a small scale, rich pockets and high-grade stringers have been gophered out and treated in *trapiches*

(Chilean mills) and *marayes* for over 200 years.

With the depreciation of the Chilean peso as a result of the depression, when gold shot up to a price of five to seven times its former value in pesos, some of the old existing *trapiches* and *marayes* were again pressed into service. Their operation left a fair margin of profit. As soon as the general public became aware of this, *trapiches* began to spring up like mushrooms. Even the antediluvian *marayes* were built by the dozens, as for them no capital was required, but simply a smooth round granite boulder to serve as the pestle or muller, and a small young cottonwood or eucalyptus for a rocking beam. The *maray* is hand-operated, the pestle resting in a crude masonry mortar. Strange as it may seem, these hoary anachronisms were thriving in 1935 and 1936. A *trapiche* cannot possibly make expenses on ore running less than 10 grams per metric ton, or about \$10 per ton of 2000 lb., and for a *maray* 30 grams per metric ton is necessary.

Nevertheless, this resurrection of antiquated devices is but a passing phase, an interim pending the completion of modern mills during which the individual miner with little capital is treating oxidized surface ores. Already several local companies are in the field building small mills, blocking out the higher-grade ore shoots and developing a water supply. The largest of these companies

recently completed the first 200-ton unit of a flotation mill. These small companies are in themselves but a transition step towards the eventual industrialization of the field on a large scale, when with the exploitation of the great masses of lower-grade deposits, this fifteenth century producer will finally fall into the rhythm of the twentieth century.

The principal problem for large-scale operations is an adequate water supply to treat a daily output of thousands of tons. For operations up to 1000 tons a day it would be possible to develop such a supply within the district itself, but for greater tonnages water will have to be brought in by ditch and pipe line or the ore will have to be transported to the water. As neither way implies an engineering or financial undertaking out of proportion to the tonnage of the auriferous deposits, it will probably not be long before this final touch will be given to a half millennium of activity in what seems to be the continent's oldest mining camp.

Andacollo, which has twice during its long history served as a lifeline to its country, lies close to the heart of every Chilean, and as long as this feeling of pride and gratitude tinged with mysticism persists it is not likely that the vogue of La Virgen del Rosario will diminish. Nevertheless, the romantic period of Andacollo is passing. The future, no matter how opulent, will be prosaic enough. Clanking steam shovels, whirring ore trains and humming mills hardly provide a propitious atmosphere for romance. Rather this must be visualized in the receding pageant of five centuries: in the dramatic support to the stricken nation during the depression of the twentieth century; the droning, sleepy routine of the nineteenth and eighteenth, enlivened only by the annual pilgrimage to the shrine; the faltering, struggling colony leaning on its sole golden pillar of strength throughout the poverty-stricken seventeenth; the heroic though futile quest of Diego de Almagro in the sixteenth; the blood-smudged ransom of Atahualpa; and dimly, hazily in the prehistoric twilight of the fifteenth, elusive shadows of tribute-bearing llama trains winding their way towards Cuzco, the Inca capital, from this southern vassal outpost of the far-flung empire of the conquering South American Caesar, Tupac-Yupanqui.