A Mining Engineer at Col di Lana*

By PRINCE GELASIO CAETANI

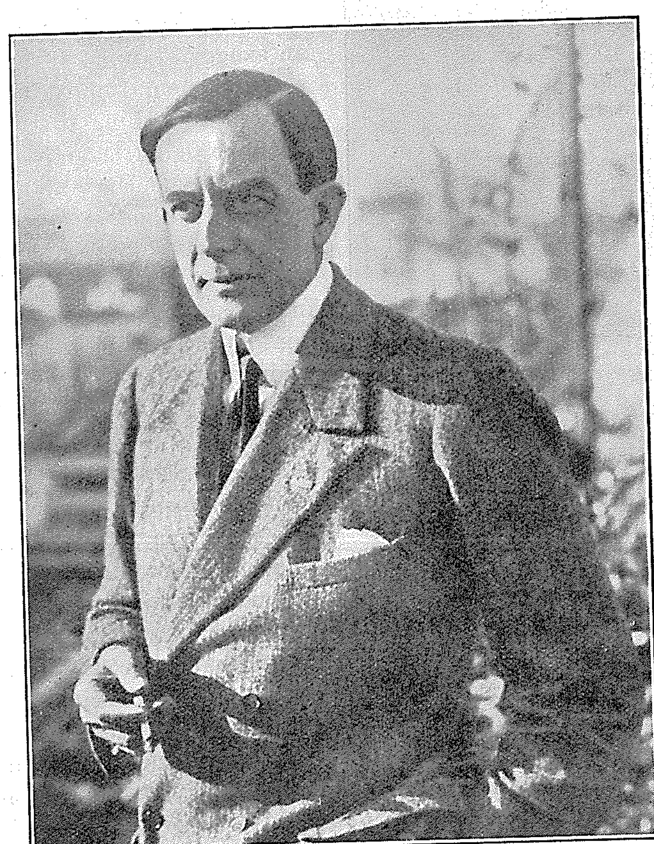
Royal Italian Ambassador to the United States

PRESIDENT DWIGHT'S invitation to be a guest of the American Institute of Mining and Metallurgical Engineers was the first of the subsequently very numerous invitations to dinner I have received from my American friends. When I received his telegram I had not yet been even formally appointed Ambassador. I cannot tell you how deeply I appreciated it. It was a hearty welcome in returning to your country which has been for me a second home and it came from the American mining brotherhood which has been my second family.

There are two distinct periods of learning in life. The first one are the years spent in school where we learn many things we afterwards forget; the second one are the years of practical apprenticeship which engrave indelible signs in a man's character and shape his life. These latter years I spent in the United States and they have influenced the whole course of my life.

I owe very much to my American friends who trained me. The earliest was Prof. Robert Peele, of Columbia University. At the Daly West mine, in Park City, Utah, he curbed my futuristic English spelling and had a hard time at it. Prof. James F. Kemp taught me that geology is a guess work just as unreliable as the prediction of international events; he taught me also that a frank, honest and loyal character will lead a man equally straight through a mining report and through public life.

Our dear friend Christopher R. Corning assumed the responsibility of getting me my first job; he wrote to F. W. Bradley who wired in reply, "Send him to the Bunker Hill and I will give him a car to push." That's how I began practical life and the first boss I had was a very big one, Stanly A. Easton; I am glad to see that he has kept growing with his mines and his plants.



Underwood & Underwood.

PRINCE GELASIO CAETANI.

Big as he may be I had one on him; a huge bluff. He asked me one day if I was capable of running the Bunker Hill & Sullivan's assay office, and I, who did not know a thing about assaying, said yes. I did run it, but it was hard work to keep up with the bluff. The old man kept tactfully out of the assay office for five days; then unexpectedly he dropped in as I was pulling out of the furnace the white hot crucibles. His appearance gave me a nervous shock which was transmitted to the end of the tongs and the whole batch of crucibles tipped over like so many nine-pins and the slag ran all over the place. Easton did not say a word, turned around and walked out. I have always been grateful for the lesson he gave me; but I made good at the end and built him a new mill.

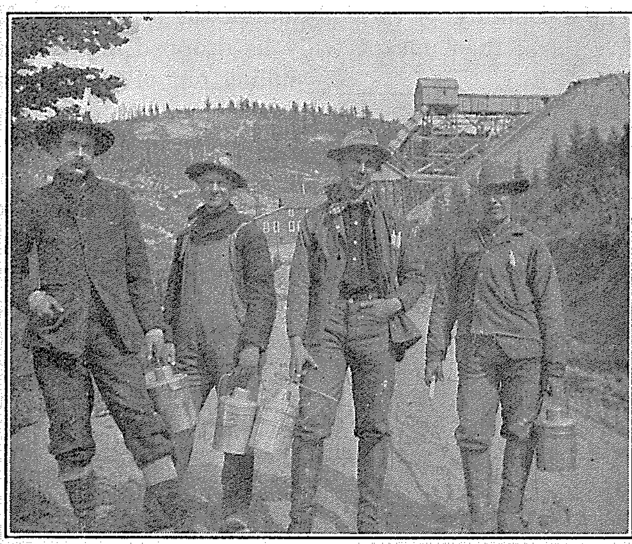
I am grateful also to the Kellogg telegraph operator for having taught me United States geography. He asked me by phone if a certain telegram was intended for Newport, Rhode Island. I told him, "No, you idiot, Newport is on the main land." I am going to have a look at that island this summer. Gentlemen, I could talk to you by the hour of my American experiences, but time is limited.

Your president has asked me to tell you something about how I applied the mining knowledge acquired in the United States on the Italian front during the war. I have never yet talked in public about my war experiences and in particular about the blowing up of the Col di Lana. The reason for it is that I am sick and tired of hearing people pile upon me the merit of a feat to the creditable accomplishment of which three

*Address delivered at the annual dinner of the Institute, Waldorf-Astoria Hotel, New York, Feb. 21, 1923.

engineers, Bonfioli, Grimaldi and I contributed in equal measure. Grimaldi also lost his life in the war, and nobody remembers him. That's not fair. But I will not refuse the president's request, for I owe to the American mining brotherhood a good part of my engineering success in war. I will give you a short account of the mine work we accomplished.

Col di Lana is a cone shaped mountain in the Dolomitic Alps, 9000 ft. high, which extended itself into the heart of the Italian line. It was the eye of the Austrian army that spied every road of access, that looked right into our rear. We had to blind that eye, and in the attempt to scale the bare and precipitous flank of the mountain, 10,000 of our plucky little Italian tommies lost their lives. Col di Lana had the voracity of a jaw crusher.



Caetani, Schmidt, Judd and Law, Columbia University students, in their digging clothes at Park City, Utah, June, 1902.

Pure chance sent me to that sector to replace an officer who had fallen. When I presented myself to the Colonel, asking whether I could go up there he gave me a good calling down. He said he did not want any greenhorns about the premises who would make him lose the position; next day, however, he let me go.

We had gotten almost to the top of the peak but could not succeed in making the last step and poke a finger in the Austrian eye. We were 200 ft. from the top, hanging with our fingers and shoe nails on the icy cliffs. The surface of the peak itself was so small, not larger than the roof of the Waldorf-Astoria Hotel, that our guns from the surrounding mountains three miles away could not smash the enemy's trenches. And when ours or theirs tried, we and the enemy shared the punishment. Time and again our plucky little soldiers tried to rush the gap but the machine guns mowed them down and their gray bodies remained to freeze on no-man's land.

One day Colonel Perelli of the army division came up and asked me what I thought best to do. I told him, "Let's get under their seats and blow them up." And so the mine was started. This was the 13th of January, a lucky date.

We worked three months; there were three officers, Bonfioli, Grimaldi and I (our infantry comrades nicknamed us the "Three Musketeers") and 80 picked miners. First thing to do was to survey exactly the position. The charge of the mine had to vary as the cube of the depth of overburden, and an error of 10 per cent. would have meant failure. Surveying through loop holes was a difficult job. Fortunately I had with me the Brunton compass which had followed me in my wanderings from the Taku Inlet of Alaska to the deserts of Arizona. I owe a great debt of gratitude to our former president, D. W. Brunton. I don't know how I could have done my work without his little instrument . . . nor how I could have shaved in the dugouts. People talked a good deal of that mysterious instrument and someone told the story that we used it to dig through the ground. That was somewhat of an exaggeration.

Gentlemen, I must make a long story short. We started tunnelling towards the center of the peak for about 150 ft.; thereby we got very deep underground because the surface above rose rapidly.

From the end of the tunnel we drove a 42° raise with the intention of getting close to the surface right under the enemy's first-line trench. I wanted to get in contact again with the outside world and be sure of our depth below the surface. I wanted to check the Brunton compass.

Upon the suggestion of two of our miners, we had an 18-ft. sectional wood-auger forged. The rock was soft and decomposed. From the roof of the raise we drilled almost vertically until we broke through to the surface. My fear was that the auger-bit might drill into the trousers' patch of some Austrian sentry sitting on the ground. Our calculations were right; at 16 ft. we struck ice.

By that time the Austrian sentries were feeling our blasts under their feet. They notified headquarters that we were mining the Austrian position. Headquarters answered not to get uselessly excited; that the Italians were probably only mining for shelter. They lost three days phoning up and down and we owed our success to this delay.

Towards the middle of March the enemy started countermining. We had started again drifting horizontally and were gaining depth. On the seventh of April the Austrians blasted their first countermine, but the shot had been placed too high and was somewhat off the line. The shock, however, was very heavy and part of the ceiling of our tunnel caved, burying Bonfioli and four soldiers. We got them out alive and started again. Not one of the miners shirked before danger.

The Austrians then sank three shafts trying to locate us but we had gained further depth and passed under their drifts at not more than three feet distance. We could hear them walking and dragging the sand bags full of dirt. The prisoners told us afterwards that they heard us talking, but I don't believe it because we did not talk very loud, I can assure you!

On the 15th of April we loaded five tons of 95-per cent. gelatine in two chambers about thirty feet apart and tamped the galleries. At 10 p.m. of April 17 I went

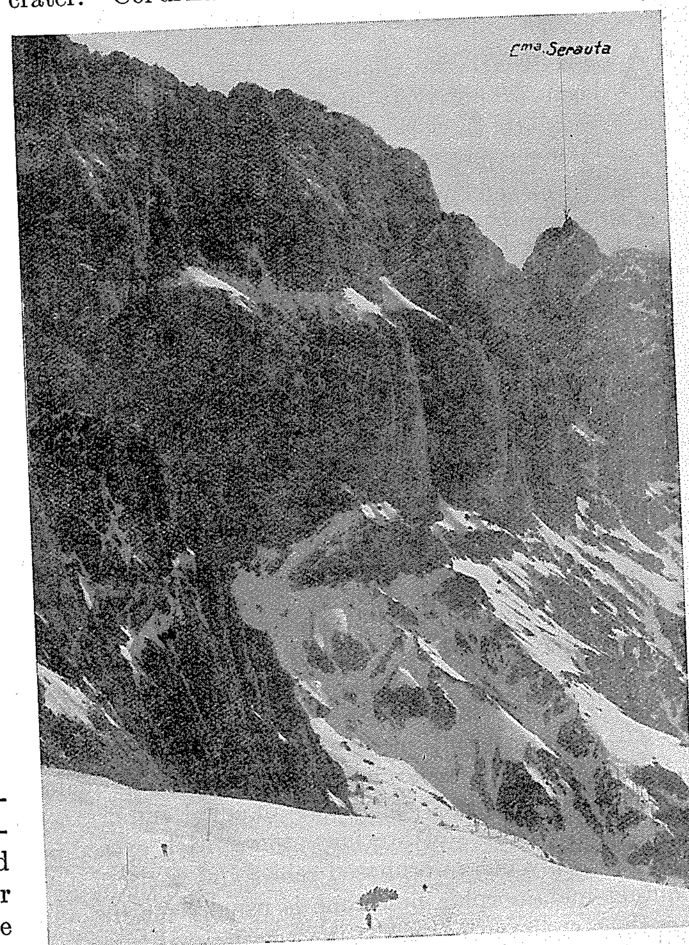
PRINCE CAETANI AS AN OFFICER IN THE ITALIAN ARMY.

up for the last time in the raise and connected the electric wires. I was alone and in the silence of the underground world could hear someone picking hard and hastily above my head. That same night a prisoner told me that they would have fired their countermine three days later.

At 11 p.m. all our garrison was withdrawn into the several galleries. The last sentries were retired shortly afterward. Our trenches remained for a moment completely deserted in the ice-cold night. The air was calm and from the clear sky the full moon illuminated the whitecapped peak with its cold bluish light. Bonfioli, Grimaldi, another officer, and I were seated at the entrance of a gallery, 300 ft. from the center of the mine. At 11.35 we received orders and pulled the strings of the detonators.

There was a dull noise, a slight tremor; I thought the mine had failed and rushed to the nearby entrance illuminated by the white glare of the moon, when suddenly all became dark. A cataract of earth and rock was burying everything. When the stones stopped falling I crawled out of the half obstructed entrance. The snow cap of Col di Lana had become black. The whole topography had changed. Everything was silent, deserted, dead.

At that moment all our guns on the surrounding mountains opened a recklessly quick fire upon the Austrian rearway. The mountains were sparkling with flashes and after a few seconds the storm of shells and shrapnel arrived howling over our heads, the sky became illuminated by the flashes of the bursting shells. Our soldiers crawled out of the galleries, walked quietly up to the peak and occupied the huge crater. Col di Lana was ours at last!



MOUNTAINS NEAR THE COL DI LANA.

The next day the Austrians found out what had happened and concentrated the fire of all their guns on the crater of the mine. Hell never came nearer heaven than that day on the summit of Col di Lana.

Towards the north side of the peak, on the enemy's side where the fire was hottest, an Austrian, half buried at the entrance of a gallery, was calling for help and mercy. A young Sicilian infantry corporal made up his mind to save him and with a few of his miners crossed the fire zone and started to work; the enemy saw them enter the mouth of the tunnel and attempted to bottle them up by shelling the entrance. But they stuck to the job; for three days they worked to save their unfortunate enemy under constant danger of sharing his fate; but they saved him.

Gentlemen I, have come to the end of my story and of the time allotted to me. As you see, I have not attempted to give you a witty after-dinner speech or a diplomatic message. I have just told you a yarn of our mining life which leads up to the anecdote of the little Sicilian corporal, and proves that, whether in peace or in war, you can always count upon a mining man doing his duty.

Geologic and Geographic Occurrence of Precious Stones*

By Sydney H. Ball

ALTHOUGH the geology of metallic minerals has been exhaustively studied, little attention has been paid to the occurrence of precions stones. In these notes, only such localities and occurrences as have furnished material to the jewelry trade are considered.

The world's production of rough gems in normal years is worth annually about $80,696,000; of the total, the diamond accounts for 94.3 per cent.; and sapphire, amber, emerald, ruby, jadeite, turquoise and opal together amount to another 4.6 per cent.

South Africa is the only country in which diamonds are definitely known to be derived from more than one original source. In addition to the main source, the kimberlite pipes, the Witwatersrand banket (Cambrian or pre-Cambrian) contains detrital diamonds, and diamonds also occur in a Vaal River amygdaloidal andesite, presumably a member of the Ventersdorp Series (early Paleozoic).

Granite pegmatite, which furnishes a variety of different precious stones, is the only other igneous rock which is an important source of precious stones.

Contact-metamorphic limestone and contact-metamorphic schist and gneiss are of equal importance as ultimate sources of precious stones, each exceeding the regionally metamorphosed schist and gneiss. The contact metamorphic limestone is usually marble and not the more impure ("garnetite") variety.

With the exception of the two fossil vegetable substances, amber and jet, old sedimentary rocks are negligible sources of gems. Stream gravels, including both present and terrace gravels, are by far the most important secondary sources of gems. Beach gravels, because of their relatively imperfect concentration, are unimportant except as a source of amber.

Opals have been formed by waters given off by cooling acid lavas, and agate and amethyst by those of basic lavas. No gems are formed by the process of secondary enrichment, so important in ore deposits.

In conclusion, diamonds constitute about 94.3 per cent. of the value of the world's production of precious stones. Because South Africa is a diamond-rich petrographic province, the African continent produces about 92.5 per cent. of the world's precious stones. The importance of kimberlite as a diamond producer makes basic igneous intrusive rocks the premier geologic source of precious stones, followed successively by stream gravels, fossil matter, pegmatites and descending water deposits. Due to mechanical concentration, gravels derived from rocks containing a small fraction of one per cent. of precious stones are frequently exploitable. Precious stones from gravels are of higher quality than those obtained by rock mining. Soda-lithia pegmatites are the source of a wide variety of gems. Rock weathering results in lessened mining costs and a slight enrichment, permitting exploitation in the weathered zone of rocks which at depth are unprofitable. Precious stones, although relatively stable minerals, are, in instances, altered by surface waters or by bleaching.

* Abstracted from *Economic Geology* (*1922*) **17**, 575.

Composition of Matter

RECENTLY, in a discourse before the British Association, Dr. F. W. Aston, F. R. S., offered a competent explanation for the odd decimals that the physical-chemists have attached to their determinations of atomic weights of the elements as we know them. The following is an excerpt from this discourse:

The first experimental comparison of the weights of individual atoms was made by Sir J. J. Thomson in his analysis of positive rays by the "parabola" method. Subjected to this test most of the lighter elements appeared to follow Dalton's rule, but the results with the rare gas neon suggested the possibility of the atoms of this element being of two different weights, roughly 20 and 22 respectively. In other words, the parabolas of neon indicated that it might be a mixture of isotopes, but the accuracy of measurement by this method was not sufficient to settle the point with certainty.

The requisite accuracy has been obtained by an instrument for the analysis of positive rays called the "cass spectrograph." By this device the weights of atoms can be compared to an accuracy of one-tenth per cent., and it has been demonstrated not only that neon (20.2) is a mixture of atoms of weights exactly 20 and 22, but also that chlorine (35.46) is a mixture of isotopic atoms of weights 35 and 37. Furthermore, about half the elements investigated turn out to be mixtures, some of the heavier ones consisting of six or more different constituents. Most important of all is the fact that every element investigated, with the exception of hydrogen, consists of atoms the weights of which are expressible as whole numbers on the oxygen scale used by chemists.

This remarkable generalization called the "whole number rule" has removed the last obstacle in the way of the unitary theory of matter. We now have no hesitation in affirming that nature uses the same standard bricks in the construction of the atoms of all elements, and that these standard bricks are the primordial atoms of positive and negative electricity, protons and electrons.

Erratum

IN EDITING the excellent article by F. H. Gilpin, on pages 67–69 of the February issue, the last paragraph was deleted but through an error in the print shop the two opening lines appeared at the end, whereas the paragraph above concluded the article.