

THE HISTORY OF THE ANVIL DEPOSIT

About 500,000,000 years ago, when the most advanced forms of life had just started to develop shells and external skeletons, the Anvil Range was not the stable, inland area we see today. It was a volcanic mountain chain, far out in some furrunner of the Pacific Ocean, and the site of earthquakes and violent explosions. Hot molten rock from the earth's core was poured out on the sea floor - instantly vaporizing great volumes of water and shattering the rocks to fragments.

The land areas in these mountains were still barren of all life, but in the seas, away from the areas of volcanic activity, primitive organisms were abundant and their remains can be seen today in the fossil record. In the shallow seas, where the sun provided warmth and light to stimulate growth and the action of waves and tides kept the water oxygenated, life was most plentiful. Here strange plant-like animals - crinoids - sieved the water for plankton with their long tentacles, which waved at the end of a sinuous stem that was rooted on the sea bottom. The hard parts of the stems - ossicles - were formed of calcium carbonate and now make up part of the limestones which are found in the area.

The bottom of the deep sea, however, was dark, cold and stagnant. Organisms that lived near the surface of the sea sank to the depths when they died, and formed a black, sulphurous organic ooze at the bottom. One enterprising species - the graptolite - had solved the problem of swimming in the deep sea by growing its own water wings, and the harness that kept the animal attached to the floats was shaped a bit like a serrated tuning-fork. With the aid of its water wings, the graptolite was able to cover a lot of ground in ancient seas and when it died, the tuning-forks were preserved in the black oozes. They can be found today in the black carbonaceous slates in the Anvil district, and because of their owners' roving nature, provides the geologist with a valuable chronological link with similar rocks all around the world.

The residents of Faro owe their livelihood to those stagnant, black, sea bottoms, for they provided the ideal environment for the formation of ore deposits.

The reason for the existence of the volcanic mountain chain was, as it is in the Pacific of today, that two "plates" of ocean floor were moving, relative to one another - in fact, one was sliding underneath the other, and descending towards the earth's core, getting hotter as it sank. Similar movements are responsible for most of the earthquakes that occur today, and the subsequent melting of the sinking plate provides the fuel for most of the world's volcanoes. However, the rise of the molten rock through the earth's crust can be compared to the workings of a still. Heavy material rises slowly, some material crystallizes on the way up, and some material is boiled off - namely the water, with silica, iron and sulphur in solution, and also a lot of the rare elements that do not readily combine with rock-forming minerals. This boiled-off material - called a hydrothermal fluid - bubbles its way up through the molten rock, then seeps through the cracks in the solid rocks above to pour out on the sea floor. On contact with the cold, stagnant, sulphurous oozes, the silica, iron and rare elements are all precipitated to give a mineral deposit which consists mostly of silica, in the form of quartz, and iron sulphide, in the form of pyrite or "fools' gold." Over nine-tenths of the Anvil ore deposit consists of quartz and pyrite, but that last tenth contains the real gold, and of course, the silver, zinc and lead which make up most of the value of the deposit.

The outpourings onto the sea floor were in a sort of chemical sequence - firstly the silica and pyrite formed an extensive sheet mixing in with the black oozes, and then more localized activity precipitated a mass of pyrite with significant amounts of copper and gold. The zinc and the lead came next, with the lead outlasting the zinc and bringing the silver with it. In the final stages, barium-rich fluids precipitated a barite cap to the deposit, and then the waning mineralizing activity covered the whole pile with more silica and pyrite. The fluids were expended, the fumaroles became cold and slowly the black oozes covered the deposit.

The deep sea basins were gradually filled with sediments eroded from the volcanic mountains that surrounded them. They became shallower and less stagnant and soon limestones were being deposited on top of the sedimentary pile. Meanwhile, around the now deeply buried deposit, the oozes were having the water pressed out of them and becoming hard rocks. The volcanic chain was growing, becoming hotter and starting to yield to the great forces produced by the movement of the two ocean plates that gave birth to it. The heat and the forces began to act on the deposit, causing it to change shape and recrystallize, and its layers to buckle and bend like a crumpling carpet.

Then, about 200,000,000 years ago, the forces became so intense that the whole volcanic mountain chain, along with the sedimentary rocks that had been laid down on its flanks, was moved bodily eastward, closing the basin that existed between it and the mainland - the Canadian Precambrian Shield, one of the oldest landmasses in the world. The collision of the volcanic chain with the mainland generated a new set of forces and a new burst of heat. The early folds in the deposit were refolded, and the liquid magmas were intruded into the deposit, further altering it. The whole pile of sediments was squeezed upward and eroded to become a land-locked mountain range, perhaps with mountains over 10,000 feet high, until all the force and energy of the collision had been vented, and the movements stopped.

From that time, about 50,000,000 years ago, to the present, that mountain range has been gradually worn away by the action of wind and weather, broken up up frost and dissolved by falling rain. Thousands of feet of overlying sediments have been removed, leaving just a thin skin over the deposit - just thin enough for mankind - a newcomer a mere 1,000,000 years ago - to be able to pierce and remove and show the metals the light of day for the first time in their long history.

The deep sea basins were gradually filled with sediments eroded from the volcanic mountains that surrounded them. They became shallower and less stagnant and soon limestones were being deposited on top of the sedimentary pile. Meanwhile, around the now deeply buried deposit, the oozes were having the water pressed out of them and becoming hard rocks. The volcanic chain was growing, becoming hotter and starting to yield to the great forces produced by the movement of the two ocean plates that gave birth to it. The heat and the forces began to act on the deposit, causing it to change shape and recrystallize, and its layers to buckle and bend like a crumpling carpet.

Then, about 200,000,000 years ago, the forces became so intense that the whole volcanic mountain chain, along with the sedimentary rocks that had been laid down on its flanks, was moved bodily eastward, closing the basin that existed between it and the mainland - the Canadian Precambrian Shield, one of the oldest landmasses in the world. The collision of the volcanic chain with the mainland generated a new set of forces and a new burst of heat. The early folds in the deposit were refolded, and the liquid magmas were intruded into the deposit, further altering it. The whole pile of sediments was squeezed upward and eroded to become a land-locked mountain range, perhaps with mountains over 10,000 feet high, until all the force and energy of the collision had been vented, and the movements stopped.

From that time, about 50,000,000 years ago, to the present, that mountain range has been gradually worn away by the action of wind and weather, broken up up frost and dissolved by falling rain.. Thousands of feet of overlying sediments have been removed, leaving just a thin skin over the deposit - just thin enough for mankind - a newcomer a mere 1,000,000 years ago - to be able to pierce and remove and show the metals the light of day for the first time in their long history.