

The Platinum of New Granada

MINING AND METALLURGY IN THE SPANISH COLONIAL EMPIRE

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The first important source of platinum to be discovered was in the western part of what is now the Republic of Colombia, then part of the Spanish American colonies and known as New Granada. This article recounts the early history and exploitation of these deposits, which have been worked continuously since the earliest expeditions of the Spanish Conquistadores.

There seems to be no doubt that the first mention and identification of platinum in European literature is that by the Spanish officer and scientist, Don Antonio de Ulloa, in the book published in 1748 which described his visit to New Granada and other parts of the Spanish empire in South America in 1736-1746 (1). What he said was: "In the district of Choco are many mines of *lavadero* or wash gold . . . several mines have been abandoned on account of the platina."

The region in which this happened was a maze of river valleys in the south-western part of what is now the Republic of Colombia, then part of the Spanish colonial province of New Granada, occupying the north-west corner of the South American continent. Where it was present, the platinum concentrated with the gold in the washing operations in the form of white alluvial grains like small shot, accompanied by heavy black magnetic sands (the name was a rather derogatory diminutive of *plata*, meaning silver). Separation could only be effected laboriously by amalgamation of the gold with mercury or by visual picking-over with a knife or forceps.

Ulloa's mention is merely the record of a casual observation, and for a more definite

The title page of the book by Juan and Ulloa, published in Madrid in 1748, describing an expedition to New Granada and other Spanish-American colonies and containing the first reference to platinum

account we must turn to a man who preferred to be known only by the initials M. L., who spent three years in Peru and read a paper in Paris in June 1785 on his experiences (2). He records that the only neighbourhood where there is any considerable occurrence of the material is in the two provinces of Novita and Citara in the district of the Choco. The gold and platinum occur mixed together in alluvial deposits and the grains





A map dating from about 1730 showing the Spanish colonies in South America. Platinum from the Choco district on the west coast of New Granada was shipped from the ports of Vera Cruz, Puerto Bello and Cartagena, often through a gauntlet of pirates operating from the Caribbean islands

of both are about the same size. The proportions of the two vary in different localities and might be one, two, three or four, or even more ounces of platinum per pound of gold. The greater the proportion of platinum to gold, the less inclination there was to work the mine and it might even be abandoned, since the total amount of precious metals in these mines was more or less constant and, the more platinum there was, the less the amount of gold obtained from the same amount of labour and costs.

Pre-Columbian Indians and Incas

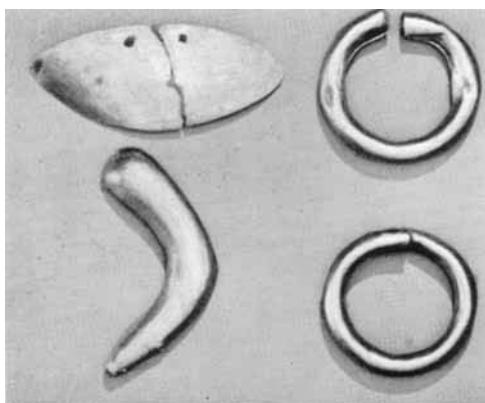
Naturally this annoying substance had been noticed many years before Ulloa's visit and rumours of its existence and properties had even reached Europe. In 1790 the Spanish Minister Izquierdo brought to the notice of the Abbé Rochon the well-known Scaliger rumour, dating from 1557, that was described

in *Platinum Metals Review* in July 1957. There was also the Spanish Emery mentioned by William Lewis in 1763, which from his description must have been a mixture of native platinum and magnetic sand (3). But even before that, the pre-Columbian Indians of the neighbourhood had interested themselves in the mineral and P. Bergsøe (4) has described how certain finds in the river sands of Ecuador show that they had mastered the soldering of platinum grains by means of gold, and the means of alloying them with gold, silver and copper. The former technique produced small articles of adornment such as those shown in the illustration overleaf, and the latter process larger articles such as handles and utensils.

After the Inca invasion in the fifteenth century the newcomers took over the alloying technique and in due course the Spaniards, after their conquest in 1526, developed it into

a manufacture of sword-hilts, buckles, snuff-boxes and other such objects. There are several mentions of these things in the literature, with sometimes the comment that the alloy was "a brittle metal although heavier than gold". E. P. C. Meyer, writing of the Spanish archives (5), mentions that some of these documents "refer to the shipment of quite large quantities (in one case 18 lb) of alloyed metal which was called platina"; he attaches the date of 1735 to this statement. William Brownrigg, writing in 1750 (6), states that "the Spaniards have a way of melting it down either alone or by means of some flux; and cast it into sword-hilts . . . and other utensils; . . . A gentleman of Jamaica bought five pounds of it at Carthage for less than its weight of silver and it was formerly sold for a much lower price".

D. J. Krunitz, writing in the *Hamburgisches Magazin* for 1759 (7) refers to the Spanish alloy thus: as these (the hilts etc.) "do not lose their brilliance in the air and do not become tarnished or rusty, excellent concave mirrors for telescopes can be made from this metal. When it is mixed with copper the corrosion of the latter is hindered and, without diminishing its malleability, a hardness and density is conferred which enables the metal to be used for several purposes to which copper itself cannot be applied". Finally, the Abbé



Platinum-surfaced gold pendants and platinum nose rings made by pre-Columbian Indians, found at La Tolita in Ecuador and now preserved in the Museum of the American Indian, New York

Rochon reports as follows (8): "During the time I resided at Corunna in 1770 the Intendant General of Galicia . . . made me a present of a small ingot of platina which was combined with a great deal of zinc and red copper; this ingot, which weighed about 8 ounces, was in Spain considered as a very rare and curious specimen. Buffon afterwards gave me two dishes of a mixture altogether similar which had been manufactured at Lima." Later the Abbé was himself making reflectors for telescopes out of an alloy of platinum with copper, arsenic and tin.

Counterfeiting of Gold

It also became known to the Spaniards that platinum could be alloyed to some extent with gold without changing its specific gravity or its appearance, and also that its heavy alloys with silver and copper could be gilded, and so profitable frauds made possible. They must have become aware of this quite early because Lewis (3) quoted from J. J. Becker (1635-1682) a mention of the debasement of gold by means of something extracted from Spanish Emery. Then the well-known mineralogist E. M. da Costa says (6): "In January 1742/3 there were brought from Jamaica in a man-of-war several bars (as thought) of gold, consigned from different merchants of that island to their different correspondents here, as bars of gold. These bars had the same specific gravity as, or rather more than, gold, and were exactly like that metal in colour, grain, etc. A piece of one of these counterfeit bars was sent to the Mint to be tested and it was found to be 21 carats 3 grains worse than standard." (that is, it contained very little gold at all).

Brownrigg reports (6) that a Mr Ord, a former Factor to the South Sea Company, once received, in payment for £500, ingots where the gold was mixed with such a quantity of platinum that it had become brittle and fragile so that he could "not dispose of it, neither could he get it refined in London, so that it was quite useless to him". In the *Encyclopaedia* of Diderot and d'Alembert



The main platinum area in the Choco district of New Granada was the Condoto river, seen in the foreground running into the San Juan river. Mining has been carried out here from the earliest days of the Spanish conquest in the sixteenth century, and is continued today with modern dredges by the Compania Minera Choco Pacifico, whose camp, named after Andagoya, one of Pizarro's lieutenants, lies at the junction of the two rivers

(1774) there is a story that some Dutchmen who had had a similar fraud practised upon them, when next visiting the place where it had occurred, sought out the guilty Spaniards and hanged them from their yard-arms.

Smuggling and Piracy

In spite of all this, the interest of scientists in Europe in platinum was only aroused when some of the actual metal in its native state arrived there and was examined in the laboratories by qualified persons, who published their results in adequate reports. The first occasion on which this happened came at the hands of Charles Wood, described as "an assay-master of Jamaica and a skilful and inquisitive metallurgist". To explain the presence of such a man in Jamaica at that time

(about 1740), it must be borne in mind that many of the Caribbean islands had been occupied by enterprising people from England, France, Holland and even Denmark to conduct flourishing trades, in both smuggling and piracy, at the expense of the wealth of the Spanish American empire as it was transferred from the continental coast home to Spain by sea. So, for the best part of two centuries these islands had been the centre of considerable trade.

In 1741 Wood bought some samples of the so-called platina, which he was told came from Cartagena, the port of New Granada. They consisted of the mixture of native platinum and black sands as found in the mines, some native platinum separated from the sand, some that had been "melted", presumably



There is still some production of platinum by native miners, employing the same hand methods used since the Spanish conquest. Here they are working along a high bedrock area which had recently been exposed by one of the dredges

with copper, and part of the pommel of a sword. These he brought home to England early in 1749 and showed them to his friend Dr. William Brownrigg, a well-known student of chemical affairs, who has already been quoted in this article. Brownrigg practised as a doctor in Cumberland and his attention to the sciences was confined to his spare time. Further, he was of a very retiring disposition and made no direct communication to the scientific world, preferring to do this through the agency of suitable friends in London, of whom the chief was William Watson, a well-known authority on electricity and a Fellow of the Royal Society of London.

Establishment of the Properties of Platinum

Wood sent samples of his platinum to Brownrigg and the latter was considerably interested. He encouraged Wood to subject the material to certain rudimentary tests, which he did, establishing some of its fundamental physical and chemical properties. These he discussed with Brownrigg, who in-

tended to repeat the tests, but, apart from later re-trying the effect of cupellation, he does not seem to have found time to do so. Eventually, feeling the need to publish information about this peculiar substance, he wrote to Watson on December 5th, 1750, sending him the specimens, a report of Wood's observations on the occurrence and properties of the material and some comments of his own, asking him to communicate this to the Royal Society. Watson hastened to comply and on December 13th, 1750, he read the letters to that Society and presented the specimens to them (6).

Further publication took place in two letters written by Watson to Professor G. M. Bose, of Wittenberg, dated January and May 1751, which summarised the contents of his address to the Royal Society. These letters spread the news effectively on the Continent and we have the authority of the French chemist Fourcroy that "these first attempts, which announced very extraordinary properties, made a great commotion in Europe, at a time when the discovery of a metal as singular

as this appeared to be was a phenomenon entirely unexpected. Then the great chemists of Europe set to work on platinum and its distinctive properties”.

The platinum reached them in small quantities, begged from their acquaintances in Spain, to which country it continued to be sent as an interesting curiosity. A quantity obtained by the Swedish jurist Rudenskjold formed the basis of the well-known work of Scheffer, published in 1752. An even more important series of researches, because much more comprehensive, had already begun in England at the hands of Dr. William Lewis,

but he was unable to extend his work to its full scope until the beginning of 1754 when he obtained 100 ounces of platinum from the Spanish ambassador in London. A further quantity of this London metal went to Professor Euler in Berlin who passed it on to A. S. Marggraf for his research on the subject. The French then came in and, after the publication of the pamphlet *La Platine* in Paris in 1758, Macquer and Baumé obtained a pound of platinum from the Spanish botanist Ortega and carried out their work upon it. In this way, the more important facts about platinum were firmly established by 1760.

The concluding part of Mr McDonald's article will be published in the next issue of 'Platinum Metals Review'

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Measurement of Surface Moisture

In the study of metallic corrosion much use is made of specimens exposed at outdoor research stations, but wide variations in the results observed can often be attributed to differences in climatic conditions. Obviously a major factor in corrosion is the persistence of free or even of absorbed moisture on the surfaces of the exposed specimens, and the interpretation of exposure data from a number of locations would be made very much more reliable if an instrument could be developed to record the period of time in which a specimen is actually corroding due to the presence of moisture.

The need for such a device was recently realised by the ASTM Committee on Corrosion of Non-Ferrous Metals, and an offer to undertake its development was made by

P. J. Sereda of the Division of Building Research, National Research Council, Ottawa. Two progress reports have now been published describing the investigations leading to a successful means of measurement of time-of-wetness (*ASTM Bulletin*, No. 228, February 1958, p. 53, and No. 238, May 1959, p. 61).

The method adopted, based on a suggestion by F. L. LaQue, involves the measurement of the potential developed between a corroding metal specimen and a platinum electrode placed in immediate proximity, surface moisture serving as the electrolyte. Preliminary trials have proved promising, and an attempt is being made to develop a field instrument in which periods of wetness would be indicated by a time recorder.