

The Spanish Monopoly of Platina

STAGES IN THE DEVELOPMENT AND IMPLEMENTATION OF A POLICY

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The discovery of platina towards the middle of the eighteenth century in alluvial gravels worked for gold in the Spanish South American viceroyalty of New Granada, and the interest which this new metal aroused among European scientists as its presence became known, eventually induced the authorities to recognise the situation and then to take action to control it by means of a royal monopoly. Here, in the first of this two-part paper, governmental action is related to European discoveries up until the time when the usefulness of platina was firmly established.

For much of the eighteenth century platinum was at the centre of attention of people carrying out chemical research. Ever since word of the existence of this new metal had reached Europe there had been an extraordinary surge in curiosity about it among European researchers; indeed, practically all the great eighteenth century chemists worked with, or were interested in, platina. Valentin Foronda, an enthusiast of the physical and natural sciences who had travelled extensively throughout Europe and who was a friend of Joseph Louis Proust, wrote in 1793:

“The news of this new metal brought about the same effects on chemists throughout all of Europe as that spawned by electricity produced in a human circle when successfully touching the Leyden jar: everyone felt the immediate effects of being overtaken by the desire to discover the essence of this new material.” (1)

Since the beginning of the eighteenth century it had been known locally within the viceroyalty of New Granada that platinum occurred in the Chocó gold deposits. However, it was not until the publication of the results of a Spanish–French expedition set-up to measure the meridian arc, and in which the two young scientifically trained Spanish naval officers Don Antonio de Ulloa and Don Jorge Juan participated (2), that this knowledge reached Europe, this being at a time when there was great interest in learning more about the natural sciences.

The initial demand for platina was relatively small and increased only gradually; at the beginning small amounts were required for the first research studies and later larger quantities were needed for the manufacture of jewellery, trinkets, and scientific and technical instruments. Of course, this growing demand could only be satisfied from the viceroyalty of New Granada, either by the legitimate trading route through Spain or as contraband smuggled from Latin America. Splitting platina – as the ore of the platinum group elements was then known – into its six components requires considerable technical and scientific know-how. The lack of any knowledge of the presence of the other elements and the infusibility of the ore could be the reasons why the material was considered to be worthless, for legitimate purposes, when it was first observed in gold-panning sites in New Granada. Its high density provided an opportunity for fraud in that it could be added to, or not removed from, gold when producing ingots. In such circumstances the platina remains widely dispersed in the gold matrix, causing only slight variations in the density of the material or the results of cupellation analysis.

In response to this type of fraud the colonial authorities eventually decided to recall all the platina in circulation and throw it into deep rivers or ravines, while mines producing large proportions of the white-coloured metal were

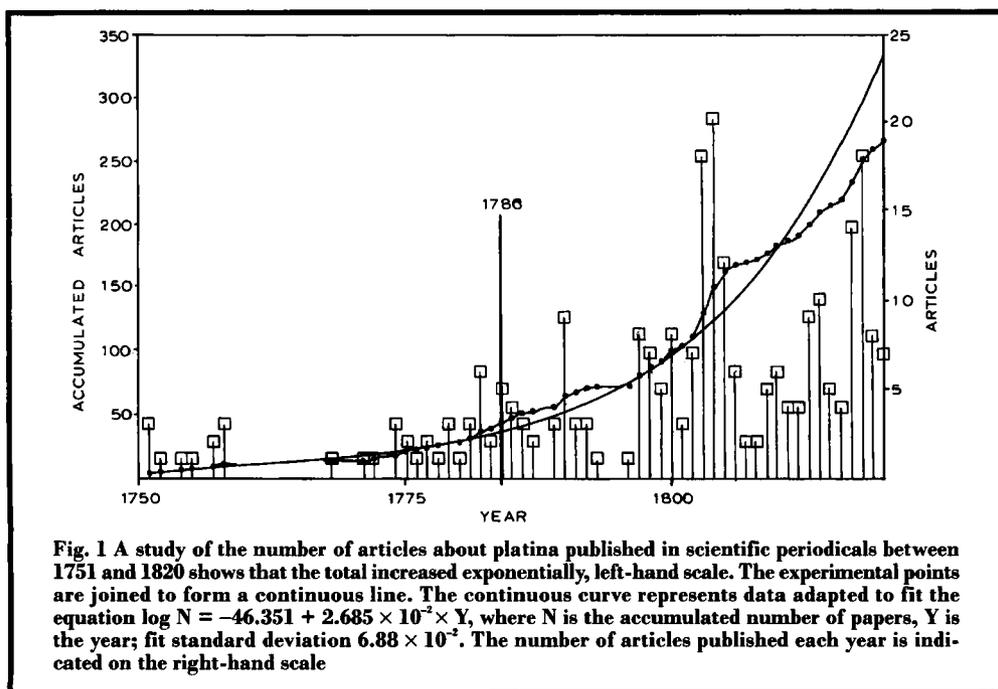
closed. In time, improved methods for separating gold and platina (3) modified the attitude of the authorities, and work was permitted at some of the gold-panning sites provided the proportion of platina was not excessively high and as long as all the platina was removed from the gold at the miner's expense (4). The presence of platina made the refining process considerably more expensive; in one reported case refining costs were increased by 20 per cent (3). Thus it was only when the existence of platina became known in Europe that every imaginable method was used in an attempt to obtain the metal.

The Spanish government tried to keep abreast of the situation by founding a royal monopoly, which controlled the platina collection system in New Granada and its shipment to Europe, and by establishing a dedicated factory in Madrid where the metal was processed. Various problems, including the low price paid for unprocessed platina and the international political circumstances at the end of the eighteenth century, largely frustrated Spanish plans and favoured direct trade between other parts of Europe and America.

The Spanish contribution to the study and supply of platina has already been considered on a number of occasions (5-13) but the founding of the royal monopoly has not been researched previously. Here we will approach the topic by linking European scientific discoveries with the Spanish bureaucratic management which led to the creation of this monopoly. The founding of the platina handling system and the Madrid refinery will not be considered.

European Scientific Activity and Platina

During the eighteenth century a total of 92 articles on platina were published in periodical scientific journals alone, that is excluding any other type of publication, and this number increased to 264 by the year 1820. By studying the period from 1751, the year in which the first paper was published, to 1820, when William Hyde Wollaston discontinued his production of platinum, it appears that the total number of papers published increased exponentially; a relatively important initial period was then followed by a 13-year lapse, see Figure 1.



Two insignificant positive deviations occurred in the plot of the accumulated paper numbers; the first of these, between 1780 and 1793, corresponds to increased interest in refining and smelting. The second is somewhat more pronounced and took place between 1803 and 1810, and is attributed to the discovery of the other elements of the platinum group and also to controversy generated mainly between France and England (14). This pure exponential dependency collapses around 1810 when the accumulated index falls, which could suggest that we then have a logarithmic curve, indicating saturated exponential growth, which is characteristically found in science (15).

Thus two stages can be distinguished in the platina research carried out in the last quarter of the eighteenth century, the so-called Century of Enlightenment, and the early years of the nineteenth century. Only a meagre number of papers were published during the first stage, which ended with Pierre François Chabaneau's success in refining platina. An increased overall interest in the elements of the platinum group was evident during the second stage, which was ended in Spain by the French invasion in 1808 and in the rest of Europe with the discontinuation of platina imports into England by Wollaston in 1820.

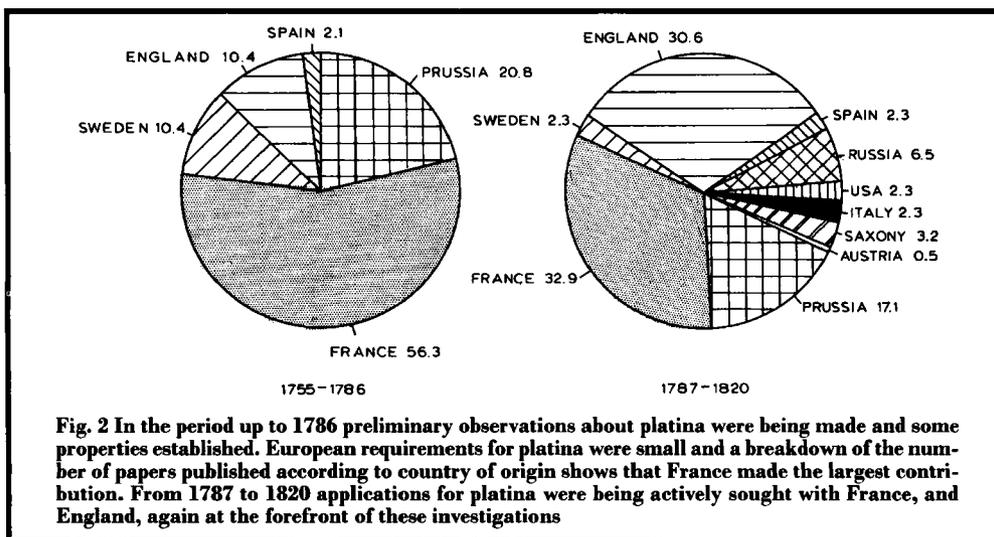
During the first stage (1755–1786) the most

elementary observations were made about platina, some properties were established and it was defined as a noble metal. Efforts were concentrated on overcoming refining difficulties and a number of applications were tentatively suggested. At this time European requirements for platina were small. As can be deduced from the distribution of published papers according to country and geographic area, see Figure 2, that the largest contribution was made by France (56.3 per cent) which was therefore the country with the greatest need for the metal.

The activity in the second stage (1787–1820) was again focused primarily on the refinement of platina, with the aim of endowing the metal with the malleability required for any probable use. Applications began to grow, modestly at first but with greater vitality later. The research effort was now shared between France and England, with the emphasis being on applications for the platinum group metals, rather than on establishing the properties of platina, as occurred during the first stage.

Spanish Government Activity Regarding Platina

The brief report about platina that was given by Ulloa and Juan in their "Historical Account" (2) spread rapidly, aided by official support for the dissemination of news of their achievements (16).



This information which was published in 1748, together with the results of work carried out on platina by Charles Wood and reported to the Royal Society in 1750 by William Watson (17), marks the beginning of European research on platina.

In 1751 Hensik Theophil Scheffer expounded his findings about platina to the Swedish Academy of Sciences (18). Between 1754 and 1757 William Lewis presented four papers on platina to the Royal Society (19), and in 1754 Andreas Sigismund Marggraff reported his work to the Prussian Royal Academy of Sciences, in Berlin (20). In France, work by J. J. Le François de Lalande (21), and by Pierre J. Macquer and Antoine Baumé (22), appeared in 1758.

News of the discovery of platina spread to widely read, informative publications. In 1751 two letters on platina written by W. Watson to Georg Mattias Bose, professor of natural philosophy at the University of Wittenberg, appeared in the recently founded journal *Physikalische Belustigungen* (23). Just months later two articles on the same topic were published in the French *Journal Oeconomique* (24). In 1764 another article on platina appeared in the *Gaceta de Madrid* (25).

The studies reported are indicative of the state of opinion, and of the interest aroused in the European scientific community, by the presumed existence of a new noble metal in the Spanish dominions. This interest made it necessary for the Spanish Government to become informed of the location and the amount of this metal.

The Initial Spanish Response

At first very little was done in Spain about platina, with the exception of a paper which Bowles supposedly wrote in the 1750s, at the request of Ulloa, but which was not published until 1782 (26).

In 1765 the platina issue had become sufficiently important to interest the Junta General de Comercio (Board of Trade), the Spanish fiscal authorities, it now having been established that platina was a new noble metal analogous to gold in some respects (18). On June 14th, 1765 the Marquis of Esquilache sent a repre-

sentative from the Board of Trade to Julián de Arriaga, Secretary to the Office of the Indies, requesting information on platina; specifically its geographical location and the possibilities of mining it (27). The answer, dated July 30th, gave all the information then available at the "Casa de la Moneda" or mint. This included its appearance, size, colour, high density, infusibility, feeble attraction to magnets, and the fact that it did not alloy with gold. In reporting how to separate it from gold only fusion and amalgamation were mentioned, not the method of inquartation which was also used (3).

Furthermore, this answer indicates that the use of platina was not prohibited, "since it is good for nothing", but it warned that precautions should be taken to prevent its fraudulent use for adulterating gold. This observation confirms the varying attitude of the colonial authorities, which ranged from initial prohibition, when the metal was put to fraudulent use, to subsequent tolerance, when a particular mine did not have an excessively high platina content (4). Finally it proposed that experiments should be undertaken to try to establish possible uses for platina.

In the margin of this reply a short note, possibly written by Arriaga, states:

"Having been duly informed of the information herein contained, Sir Squilace [the Marquis of Esquilache], relating all that is on file at this Secretariat: instruct the Viceroy to ship Platina."

With the exception of the petition made by Juan Wendlingen in 1757, which was never fulfilled, this was the first occasion on which platina was officially requested to be shipped to Spain. A quintal of platina, or four arrobas, was explicitly requested (28), although in the subsequent regal mandate dated 30.07.1765 a request was made for two quintals (29). [One arroba contains 25 pounds, thus one quintal is 100 pounds].

In response to this, on January 18th, 1766, Viceroy Messia de la Cerda sent one arroba and 22 pounds of material which was then in his possession to Spain via Cartagena de Indias (30), and ordered more platina from Chocó to enable the shipment of two quintals to be completed (31). The reason that some platina

had not been pitched into a deep river but was then available at the Santa Fé de Bogotá Mint was due to a request made eight years earlier by the Jesuit Friar Juan Wendlingen, Chief Cosmographer of the Indies, who in 1757 had requested platina for his studies, but never received it “for not having taken the necessary measures to do so” (32).

The summary of the answer sent by the viceroy to Arriaga had the following note written in the margin:

“having arrived, the requested item shall be placed at the disposal of the Board: and inform the viceroy that what was requested shall not be shipped until thorough experimentation proves whether or not it is a worthwhile object.” (31).

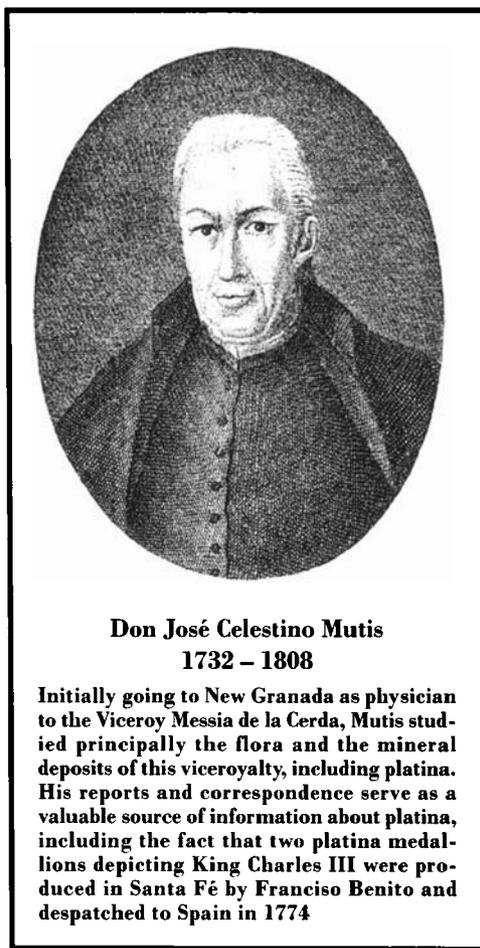
If Arriaga was instructing the viceroy not to ship any more until further notice (33), it would appear that a sufficient quantity of platina had already been received to enable a study to be made of its usefulness. The platina arrived in May 1767 and was delivered to the Board of Trade (34). As far as is known, however, no investigation was carried out and the whole affair was put off until the proverbial “tomorrow”.

Introductory Observations on the Second Shipment

The platina issue was revived seven years later by a letter dated June 15th, 1774, from Manuel de Guirior, the new viceroy of New Granada which announced the success of another attempt to melt down and work platina. As proof of this claim the viceroy sent to Julián de Arriaga, for delivery to the king, two platina medallions each carrying an effigy of Charles III. One was made in platina and copper, in the ratio of 1:1; the second was all platina (35).

An anonymous report entitled “Ynforme sobre la Platina”, describing the current position regarding platina, and its possible uses and advantages, probably accompanied the letter and the medallions. This report is not mentioned in the letter, however, nor does it appear with the rest of the documents in the General Archives of the Indies. None the less two factors support the belief that it was sent.

The first is a hand written note, signed by José



**Don José Celestino Mutis
1732 – 1808**

Initially going to New Granada as physician to the Viceroy Messia de la Cerda, Mutis studied principally the flora and the mineral deposits of this viceroyalty, including platina. His reports and correspondence serve as a valuable source of information about platina, including the fact that two platina medallions depicting King Charles III were produced in Santa Fé by Francisco Benito and despatched to Spain in 1774

Celestino Mutis, which appeared at the end of a copy of the report, and which indicated that the medallions were dispatched together with the report written by the viceroy on June 15th, 1774. Two copies of this report are conserved at the Madrid Royal Botanical Gardens, one of them being signed by Mutis (36). The second piece of evidence is the fact that this report is the only place where mention is made of Francisco Benito. He was the engraver at the Santa Fé Mint and the man whom the Madrid authorities considered to be solely responsible for the innovative work.

In addition to Benito, the only other person mentioned was the vicereine who was reputed to be the promoter of the work, although her only contribution was to commission the

production of the medallions from the metal supplied. The research took place in Santa Fé (35), possibly at the Mint and under the direction or with the direct assistance of Mutis who lived in Bogotá from 1770 to 1777, which would explain why he wrote the final report. It is assumed that platina fusion, not refinement, was carried out via the formation of alloys, so reducing the fusion point significantly and increasing the malleability of the metal, although not without problems.

In his report Mutis demonstrated that he was well informed on the researches carried out in Europe on platina. He mentioned that Ulloa was responsible for foretelling the discovery of platina, and he was familiar with the work of Morin – “La platine, l’or blanc, ou le huitième métal” (37) – although he did not quote it by its title. He confirmed his knowledge of the work of Morin by reference to a translated version of the book “A Collection of Experiences with Platina” which he claimed was being translated in Bogotá by a devotee, who was, perhaps, himself. Significantly this title concurs with the subtitle of Morin’s book “Recueil d’Expériences faites dans les Académies Royales”. Additionally, Mutis also referred to experiments on platina undertaken in Sweden, London and Venice, which had also been mentioned in Morin’s publication.

Mutis was interested in advancing the “knowledge, change and use of the precious and extremely rare metal” and suggested several uses for it, all of which had been proposed previously by Morin. To justify the introduction of platina Mutis claimed that it was easy to melt down, but what he assumed to be pure platina – “a highly brittle and hard metal” – must, in fact, have been an alloy since at that time the technical facilities available were not capable of melting platina, especially if it was in an unrefined state.

None the less this apparent demonstration of the use of platina revived interest in it. As a result a government official, Francisco de Zalamea, travelled from Santa Fé de Bogotá to Chocó to obtain further facts about platina and its uses. The information that he obtained

about the sites where the unwanted metal was dumped was to be made use of at the end of the 1780s to facilitate platina extraction (38).

The letter written by the viceroy and the two medallions were sent by Arriaga to the Board of Trade, for the attention of Miguel de Múzquiz, Minister of the Treasury, on September 30th, 1774 (39).

In his reply dated January 26th 1775, Múzquiz admitted to Arriaga that the investigations ordered in 1767 had not been carried out on the platina received, but said that they would now go ahead (40). This newly initiated research, however, was not carried out but a series of measures involving platina were taken and resulted in a royal mandate dated 3.02.1775 (41). In this Benito was requested to provide detailed information about the processes used but not to disclose them to anyone else and for maintaining his silence he was to be awarded compensation, determined by the viceroy. With regard to platina, Guirior ordered that

“it is not to be pitched as has been the custom to date, but rather it is to be safeguarded by royal officials, as metal belonging to H.M.”

and furthermore that no one in all of America is to work with the metal.

On the other hand, as a matter of urgency he requested the viceroy of Peru and the President of Chile to provide details about the existence of any platina mines in their respective territories, and the value attached to the metal (42).

All the official notes sent to the viceroys, and their replies, are archived – except for those relating to the method used by Benito. This does not appear in any of the documents consulted, although it is recorded that the viceroy’s reply was received on September 2nd, 1775, together with an additional series of samples (43). The only information available alludes to the fact that “[platina] had been able to be melted down with several alloys...” (43), while another message mentions that “samples of the experiments carried out with platina melted down solely with copper and brass” (44). This confirms what had been noted previously; that the melting of platina had been achieved by the formation of alloys which have significantly reduced melting points.

It is interesting to speculate whether the claim to have melted platina was made with fraudulent intentions, and if so by whom. Alternatively, if the claim was made in good faith, did a combination of errors, ignorance and pure chance lead to the apparent fusion of platina? To date, the information necessary to answer these queries is not available, although it is likely that if it had been by chance the phenomenon would only have occurred on a single occasion, and this does not appear to have been the case.

This was not the first time that attempts to melt platina had been made in New Granada, it having been used previously for making ornaments and trinkets as a cheap substitute for silver, a fact mentioned by Mutis in one of his reports:

“Albeit the fact that small portions of platina used to be melted down in this city for making ceremonial sword hilts, boxes and shoe buckles, none of these pieces can be sighted nowadays, simply because the inhabitants have come to consider this invention absolutely worthless, and because of the requests and petitions generated by foreigners who aspired to verify its irresolute ability to be melted down, have disappeared entirely.” (36)

This reference coincides with the opinion expressed by Watson to the Royal Society in 1750, when presenting Wood’s studies on platina, when he mentions that:

“It is very probable that there is a great Plenty of this semi-metal in the Spanish West-Indies, since trinkets made of it are very common. A gentleman of Jamaica bought five pounds of it at Carthagena for less than its weight of silver, and it was formerly sold for a much lower price..... But the Spaniards have a way of melting it down, either alone, or by means of some flux, and cast it into sword-hilts, buckles, snuff-boxes, and other utensils.....” (17)

As noted earlier, the facilities for melting platina did not exist then, so it must be assumed that these objects were made of platina alloyed with either copper or silver. Thus they would consist of platina dispersed in a metal matrix, and the material would have poor mechanical properties. In all probability the objects would be silver-coloured, because otherwise Watson would have mentioned the colour, and this suggests that if the matrix was copper then the platina content must have exceeded 60 per cent.

The use of platina alloyed with copper, anti-mony and other metals was confirmed by Jean Baptiste Leblond, a Frenchman who travelled through the viceroyalties in the 1780s; by which time production had ceased because of the high contribution that manual labour costs made to the final price (45).

Further corroboration is contained in the first review written in Spain about the new metal by Munibe, who reports that:

“Around the year 1730, Nobleman Jorge de Villalonga was given a sword guard and a set of platina buckles by the first viceroy of Santa Fé as a gift although it can be assured that they did not possess sufficient bonding or consistency and that it was a brittle metal, heavier than gold in which it is intermixed.” (46)

Returning to the medallions referred to by Mutis, it must be emphasised that the involvement of the Board of Trade was not well known, since on June 27th, 1776 a new letter was received from the viceroy, which had been written on September 2nd, 1775, with the purpose of “re-examining this important matter” (43). Múzquiz responded to this on November 15th, 1776, excusing himself as the ordered investigations had still not been carried out (47). The interest of the Ministry of the Indies is made clear in an official note dated January 24th, 1779 in which Múzquiz reminded the recipients that he was still waiting for the report, so that he could act upon it (48).

Eventually this report must have been sent to the General Board of Trade and Currency, but it has not been found. It is possible that it could have supported the idea of continuing research on platina and the need to establish a royal monopoly. This would have justified the new request for platina which was sent to New Granada in December 1781 (49), and which resulted in the dispatch of a second shipment which arrived in Madrid in June 1784.

The delay in sending the second shipment of 12,937 castellanos of platina may have been due to the death of Viceroy Manuel Antonio de Flores. He was replaced by Juan de Torrezal Diaz Pimienta who died shortly afterwards and, in turn, was replaced in 1782 by Antonio Caballero y Góngora, Archbishop of Santa Fé

Antonio Caballero y Góngora
1723 – 1796

While Archbishop of Santa Fé de Bogotá, Antonio Caballero became Viceroy in 1782 and began his rule with a general amnesty for those involved in the comunard's revolt, and with the reorganisation of the army. He encouraged public education and religious missions. In 1783 he mounted, initially without royal authorisation, the Botanic Expedition to the Kingdom of New Granada under the leadership of Mutis. He was also the director of the Spanish plan for the collection and despatch of platina to Spain



de Bogotá. Be that as it may, in the meanwhile the metal was stored in strongboxes (caja real) in Cartagena de Indias (50).

Spanish Studies on Platina

During the last few years of the period 1751 to 1786, the studies of platina undertaken in Europe had one main objective, to refine the metal and render it malleable enough for fabrication. Such attempts were made by A. Baumé (51), N. A. de l'Isle (52), K. von Sickingen (53) and Count de Milly (54).

The Spanish government was aware of the studies being carried out by Casimiro Gómez Ortega (1740–1818), a professor of botany and an influential figure in the scientific world. Around 1776/77, on his return from a trip to Europe he visited the Ministry of the Indies and emphasised the need to foster studies of the ductility of platina, because of the tremendous interest shown by European chemists. In September 1780 he sent the results of the Count de Milly's study of platina refining to the Ministry (54), together with several objects manufactured in malleable platina. According to Gómez Ortega,

the results published by de Milly were very encouraging, but the problem remained unsolved (55).

As a result the Spanish government knew that if platina was to find use, a method of making the material malleable had first to be found. It is very likely that José de Galvez, the Marquis of Sonora and Secretary to the Indies, promoted the attempt to develop platina mining, in the belief that if this was successfully achieved other developments would follow.

What is still not clear is why work on platina refining did not begin in Spain until 1786, since all the necessary information had been available for at least a decade prior to this. Platina existed in abundance, the need to refine the metal was well known, and the lines along which European researchers had been working were heading in the right direction even though they had not yet been successful.

The delay was possibly due to the fact that at that particular time there was no chemical or metallurgical specialist in Spain capable of solving the basic problem; indeed, Gómez Ortega recognised this difficulty (55).

Another explanation could be that it was not entirely clear to the Spanish government if platina really was a noble metal, or not.

Spanish studies on platina refining were to be carried out at the Royal Basque Patriotic Seminary of the Basque Society of Friends of the Country, an organisation founded in 1763. In 1767 they had proposed the establishment of a learning centre and this was inaugurated ten years later. Because of lack of financial resources, however, each department could only offer general teaching. The remaining chairs of chemistry, metallurgy, mineralogy and mining were set up on the basis of an agreement signed by the Secretary of the Sea, and was intended to rehabilitate the Spanish military metallurgical industry (56).

Louis Proust became responsible for chemistry and metallurgy, Fausto de Elhuyar for mineralogy, and François Chabaneau for physics; the latter chair being funded by the Basque Society in order to complete the teaching staff. Apart from the teaching function, which is not considered here, both Chabaneau and Elhuyar carried out several research projects during their stay at Vergara; but Proust did not, possibly

because he was there for only a short time.

When responsibility for Vergara was transferred from the Secretary of the Sea to the Secretary of the Treasury, it became the centre for investigations on platina and work commenced immediately. At the beginning of 1786 the Secretary of the Indies, José de Galvez, Marquis de Sonora, put Chabaneau and de Elhuyar in charge of platina refining investigations and by May of that year the technical and financial studies of the methods of platina refining had been completed.

Some of the platina used for these studies had been donated to Vergara earlier by the Marquis of Castillejos so that potential uses for platina could be established (57); and part of the two shipments sent from America were also used.

Thus a significant change of emphasis had taken place. It was no longer a question of finding out if platina was useful; the metal was highly valued abroad, Spain exclusively controlled its availability and had established a process by which it could be refined. The new tasks were to organise the extraction and shipment of platina from America to Spain for refining. These will be considered in Part II of this paper.

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