

Justus Erich Bollmann and Francisco Antonio Zea

EFFORTS TO MEET THE DEMAND FOR COLOMBIAN PLATINUM IN ENGLAND OVER THE YEARS 1816 TO 1822

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The activities of the German-born physician Justus Erich Bollmann in securing a supply of Colombian platinum ore for the English chemist William Hyde Wollaston is traced from the time Bollmann settled in London in 1816. An account is also given of Bollmann's efforts in 1820 and 1821 to obtain for sale on the London market some 40,000 pounds of platinum from the Government of the then newly established Republic of Colombia, efforts which involved negotiations with, and financial advances made to, the first Vice-President of that Republic, Don Francisco Antonio Zea.

During the first two decades of the nineteenth century the only source of crude platinum was the Chocó district of Colombia, then part of the Spanish Viceroyalty of New Granada, where grains of platinum and gold occurred mixed together in alluvial deposits. The commercial export of platinum from New Granada to countries outside the Spanish empire was prohibited, and in consequence anyone in England who required crude ore for commercial purposes was entirely dependent on supplies smuggled through the port of Cartagena to Jamaica where it was handled in the main by British merchants (1).

In England the demand for substantial supplies of crude platinum arose only after the London chemist William Hyde Wollaston (1766–1828) had developed a method of producing malleable platinum in ingots large enough to have commercial applications. Wollaston kept the details of his process secret until just before his death (2), and as no one else in England at that time was able to emulate Wollaston's success, the extent of the demand for crude platinum in England was governed almost entirely by the quantities which Wollaston alone required in order to meet the

needs of his customers for malleable platinum, whether in ingot or sheet form.

Much of the crude platinum used by Wollaston was obtained by John Johnson, a commercial assayer of ores and metals in London, who presumably placed orders on Wollaston's behalf with merchants in Jamaica (3). However, from 1816 onwards Wollaston appears to have had difficulty in acquiring all the crude platinum he required; to that end he sought the assistance of others, among them the German-born Justus Erich Bollmann (1769–1821) who emigrated to the United States of America in 1796, and who was himself successful in 1813 in producing malleable platinum in quantity at Philadelphia, and went on to fabricate the first platinum boiler to be used commercially in America for the concentration of sulphuric acid (4).

Wollaston's Relations with Bollmann

Bollmann first made Wollaston's acquaintance when he called on him in London towards the end of August 1814, shortly after arriving in England on a journey from Philadelphia to Vienna (5). This was the time

when he told Wollaston that supplies of crude platinum could be obtained from the merchant firm Adams, Robertson & Co, of Kingston, Jamaica, and that smuggled ore could not be bought at Cartagena for less than five Spanish dollars a pound avoirdupois, equivalent to 1s. 6d. an ounce troy, and that the price at Philadelphia was six dollars (6).

It is perhaps not surprising that Bollmann and Wollaston should have established friendly relations with one another, for in several respects the two men had common interests and their careers had followed similar lines: both men had graduated in medicine, Wollaston at Cambridge in 1788 and Bollmann at Göttingen in 1791; both eventually abandoned medicine as a career to pursue interests in the field of chemistry; and both men achieved success in the production of malleable platinum. But whereas Wollaston profited substantially from the manufacture and sale of malleable platinum in Britain (7), Bollmann found that he could derive only a meagre income in America from the sale of his own malleable platinum, in spite of his efforts to stimulate American demand by



the creation of new uses for the metal (4).

In June 1816 Bollmann arrived at Liverpool from Philadelphia bringing his two daughters with him and intending to make his home in London for some years (8). By mid-July they had taken lodgings in London at 16 Buckingham Street, just off the Strand (9), where they were to reside for the next year or two. Bollmann's immediate objective was to establish himself as a manufacturing chemist, and Wollaston assisted him in various ways, not least by the gift of an ingot of malleable platinum prepared from seventy-six ounces of crude ore (10); possibly this ingot, weighing about 3 pounds, was intended to be used together with a bar of platinum which Bollmann had prepared from 40 pounds of crude ore before leaving Philadelphia (11), in the manufacture of chemical vessels required for Bollmann's works at Battersea.

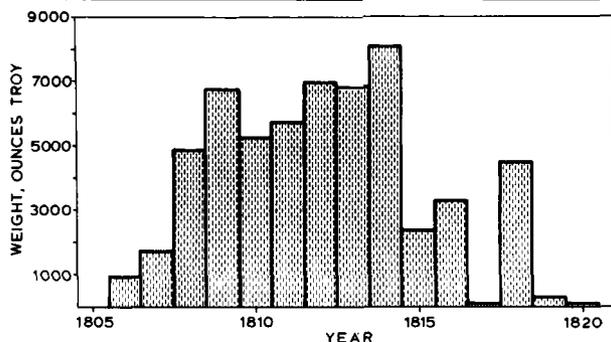
Platinum Supplies for Wollaston from 1817 to 1820

Wollaston's stock of crude platinum reached a peak of 8,037 ounces troy at the end of the year 1814. However, the large reduction in stock which occurred during the following year, see Figure 1, doubtless made Wollaston realise that unless he could augment the supply of

Justus Erich Bollmann 1769–1821

German physician who acquired a knowledge of chemistry in France before going to North America where he became the first person there to prepare malleable platinum in bulk. He failed to encourage a large demand for this metal in America and moved to England in 1816 and set up a chemical works in London for the production of acids and pigments. In 1817 and 1818 he was instrumental in providing William Hyde Wollaston with much needed supplies of platinum ore, and in 1820 he began negotiations with the Colombian Republic for 40,000 pounds weight of platinum ore to be made available for sale on the London market.

Fig. 1 The quantities of unused crude platinum ore held by Wollaston at the end of each year from 1806 onwards



crude metal likely to reach him through the efforts of his London agents, he would not be in a position to produce sufficient malleable platinum to meet the needs of his customers in 1817 and possibly also in subsequent years. This may account for the instructions given by Wollaston no later than early August 1816 for 500 dollars to be obtained and sent to Jamaica provided a supply of crude platinum could be shipped from there at five dollars per pound, or even at six dollars should that prove to be necessary (12).

From Wollaston's account with the London bankers Thomas Coutts & Co we know that two payments totalling £220 were made to Bollmann by draft in 1817 (13), and these were almost certainly connected with the supply of 1,400 ounces of crude platinum which Wollaston listed in his accounts record of chemical expenditure (14). This quantity was augmented later in the year when 4,000 ounces were provided by an unnamed agent, possibly James Paterson, whose account with Wollaston was then closed (15).

A note in Wollaston's hand and dated 8 December 1817 records Bollmann's promise

"to write to M^r Vaughan of Philadelphia for 100 or 200 lb Crude Pl at 6 Dollars on my account" (16).

This was John Vaughan, a member with Bollmann of the American Philosophical Society, who earlier had obtained a supply of crude platinum for Bollmann's use at Philadelphia (11). Vaughan was not able to

respond fully to Bollmann's latest request but he did manage to supply 684 ounces and this reached Wollaston in July 1818 (17). Earlier in the year Wollaston had received 8,689 ounces from his agent Johnson (18), from which he was able to start producing the malleable platinum needed for five platinum boilers; these were delivered before the end of the year to acid manufacturers in Glasgow, London, Belfast and Dublin (19).

In October 1818 Vaughan received another

Date	Description	Amount (£ s d)
Jan 29	Johns book	2 7 2
Feb 26	Pollatt & Co	2 15 -
Mar 9	Johns book	2 9 8
	Pollatt & Co	- 9 -
14	Ground and Gold	10 - -
	Johnson for clipping Plat ^a	1 4 -
	8 lb Pr. Blue of Skilbeck	3 7 6
29	Johns book	2 7 10
June 29	Bollmann for Pl	14 6 -
Aug 2	Johns book	2 19 2
Oct 3	do	2 9 11
21	Ground and Gold	10 - -
26	Johnson for scrap Plat ^a	1 5 -

Part of a page in Wollaston's notebook in which he recorded his expenditure on platinum operations. The payments made to Johnson and Bollmann in March, June and October 1820 relate to quantities of scrap platinum which Wollaston purchased from them at the rate of five shillings per ounce troy

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letter from Bollmann concerning crude platinum (20), in which he was asked:

“to send more on the same Terms, and in the same way, whenever you have a Chance of procuring it”.

However no more platinum reached Wollaston from Philadelphia, and it would seem that little was available even in Jamaica. Only two deliveries were made to Wollaston in 1819 through agents in London: 600 ounces from Hodgson, probably John Hodgson a South American merchant of Bucklersbury (21); and 400 ounces from Johnson (22).

By the end of 1819 Wollaston had virtually exhausted his stock of crude platinum, see Figure 1, but he had hopes of getting 5,000 ounces in February 1820 by virtue of an agreement made with Sartons & Co in the previous September (23). In the event Wollaston obtained no crude platinum whatsoever in 1820, and he was able to buy only 67 ounces of scrap malleable platinum of which 57 ounces came from Bollmann (24). Another 17 ounces of platinum were supplied by Bollmann on 1 November 1820 (25) but no payment for this appears in Wollaston's accounts. However in a subsequent reference to this item (26) Wollaston wrote:

“Rec^d of D^r Bollman an old plate but much more is due since 1818”.

Perhaps this comment has some relevance to a payment of £200 which Wollaston had made to Bollmann in August 1818 (27).

Orders for a further seven platinum boilers were placed with Wollaston by the end of

March 1820 (28), but to meet these orders he would have needed say 5,000 ounces of crude or around 3,800 ounces of malleable platinum. The experience of an associate, William Cary, who took delivery in London in 1820 of some malleable platinum purchased from the firm Cuoq, Couturier et Cie in Paris (29), made Wollaston realise that he would suffer a large financial loss if he were to buy malleable platinum from Paris in order to make the seven boilers already on order.

Two notes in Wollaston's handwriting provide evidence of a renewal of his own efforts to obtain supplies of crude platinum (30). One note dated 12 April 1820 reads:

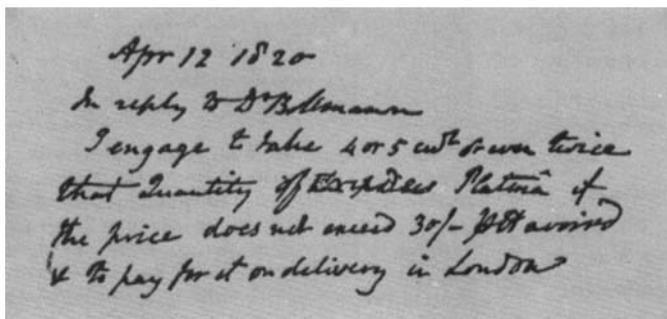
“In reply to D^r Bollmann I engage to take 4 or 5 cw^l or even twice that Quantity of crude Platina if the price does not exceed 30/- p lb avoird & to pay for it on delivery in London”.

The other note, dated April 1820, reads:

“Henry having spoken to Hibbert & Co respecting crude Platina & asking Quantity I reply that I would gladly lay out £1 000 at a price not exceeding 2/6 p oz Troy”.

Wollaston's letter to G. W. & S. Hibbert, a London firm of West Indian merchants, was forwarded by them to Taylor & Simpson, at Kingston, Jamaica, and they replied to Hibbert & Co. as follows:

“Upon enquiry amongst the Spaniards we find that this Article has never been brought to this Island, but in very small Quantities & from the Information we have yet received, we have not been able to ascertain that the Quantity can be materially increased by offering an adequate encouragement for its import. We shall however continue our enquiries, and should we gain any



Apr 12 1820
In reply to D^r Bollmann
I engage to take 4 or 5 cw^l or even twice
that quantity of Crude Platina if
the price does not exceed 30/- p lb avoird
& to pay for it on delivery in London

Wollaston's aide-mémoire which reveals Bollmann's involvement in April 1820 in an effort to obtain up to half a ton of crude platinum for Wollaston

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information that may appear useful to Mr. Wollaston we shall communicate it to you—five Dollars and a half p' lb is the price usually paid for it here" (31).

It is scarcely surprising that such a reply should have been received from Jamaica at that time, for the revolutionary struggle against Spanish domination must inevitably have had a considerable impact on the amount of metalliferous mining undertaken in the Chocó district in 1819 and 1820, and thus on the quantity of crude platinum available.

News of the declaration by the Congress of Angostura on 17 December 1819 of a new Republic of Colombia, formed by the union of Venezuela, the Viceroyalty of New Granada, and the Province of Quito (now Ecuador), undoubtedly raised in Bollmann's mind the possibility of securing approval from this new republic for the export of platinum ore to Britain. An opportunity to explore this possibility occurred in the summer of 1820 when Don Francisco Antonio Zea, the republic's first Vice-President, arrived in

London hoping to establish commercial links between Britain and Colombia (32).

Zea and His Mission to Europe

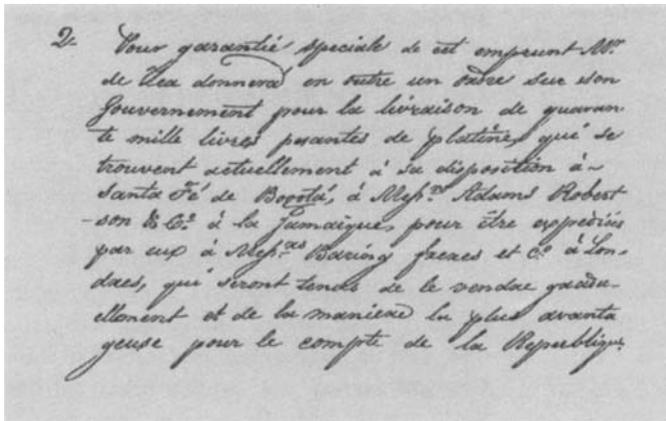
Francisco Antonio Zea was born of Spanish parents at Medellín, capital of the province of Antioquia, New Granada, where his father was deputy governor and notary public (33). After studying at the seminary of Popayán he became professor of natural sciences in the University of Santa Fé de Bogotá, and in 1791 and 1792 took part in a botanical exploration of New Granada carried out at the behest of the Spanish authorities. He went to Spain first in 1797, and six years later was appointed to a second chair of botany at the Botanical Garden of Madrid; in 1804, on the death of Cavanilles, holder of the first chair, he succeeded him and also became director of the Garden, both posts being held by him for the next five years (34).

In 1815 Zea returned to the South American continent where he offered his services to Simón Bolívar whose forces were fighting for a more just and egalitarian society free from Spanish domination. Bolívar and Zea were named in February 1819 as President and Vice-President respectively of the republic of Venezuela (35) by a Congress assembled at



Francisco Antonio Zea 1766–1822

Former professor of natural sciences at Bogotá, later director of the Botanical Garden in Madrid, and subsequently one of Simón Bolívar's associates in the fight to gain independence for the Spanish American colonies. As Vice-President of a free new republic of Colombia, Zea came to England in 1820 to establish commercial relations, and he was soon involved in an effort to obtain delivery in London of a large consignment of platinum



Second clause of an agreement signed by Bollmann and Zea in respect of a loan of £20,000 for the republic of Colombia. It states that as a special guarantee for the loan Zea will instruct his government to provide a merchant firm in Jamaica with 40,000 pounds weight of platinum, so that it can be forwarded to London and sold by stages in order to yield the maximum return for the republic

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Angostura (later named Ciudad Bolívar); and in the following December when the same Congress decreed the union of Venezuela and New Granada, Bolívar and Zea were elected by Congress to hold the corresponding offices in the new republic of Colombia (36).

On 24 December 1819 Bolívar appointed Zea "Envoy Extraordinary and Minister Plenipotentiary of the Republic of Colombia, to establish political and commercial relations with the Powers of Europe" (32). For this mission Zea was provided with a *Manifesto* addressed to the French foreign minister and to ambassadors of other countries present in Paris (37). On the same day he also received a document signed by Bolívar and the Colombian foreign minister, José Rafael Revenga, expressing the republic's desire to settle all debts occasioned by the war for independence and to re-animate the country's agriculture and the operation of its mines. For these purposes Zea was authorised to negotiate and contract a loan in Europe of from two to five million pounds sterling, to stipulate the terms and conditions of the loan, and to apply "the most productive branches of the public revenue" for the liquidation of the loan and the payment of interest (38).

Soon after arriving in London in June 1820 Zea was besieged by numerous creditors who earlier had provided loans totalling about £140,000 to aid the patriots in their struggle for independence (39). Realising that something had to be done to placate the feelings of these

creditors, Zea decided to defer efforts to raise a new loan; instead he proposed to a committee representing major creditors that he would issue transferable debentures to all creditors in respect of their claims, bearing interest at ten or twelve per cent according to whether payment was made in England or Colombia, respectively. This proposal was accepted, and in November 1820 the committee formally notified Bolívar of the arrangement made with Zea and of the consequential issue of debentures (40).

Zea's Association with Bollmann

From the text of a reply forwarded by Zea to Revenga in March 1821 we know that in the previous May a communiqué from Revenga was addressed to Zea asking him to investigate the advantages which could result from the exploitation of Colombian platinum (41). This communiqué would have reached Zea in London about the end of July 1820, and from the contents of Zea's reply there can be no doubt that Zea consulted Bollmann on the subject. One can imagine Bollmann's delight on learning that a figure of forty thousand pounds of platinum had been mentioned in Revenga's communiqué as being in the Colombian mines.

Some time later Zea received instructions from Bolívar to proceed to Madrid in order to conduct negotiations for a peace with Spain (42). This instruction caused some embarrassment to Zea whose finances had already been strained by expenses incurred in Europe on

y en otros puntos, se veria muy al contrario
 se se adoptara el proyecto q.^o el ilustrado Doctor -
 Bollmann a quien se debe el invento de la me-
 da para preparacion de este metal, propuso años pasa-
 dos al Banco de Inglaterra de acuñar de él
 una moneda representativa de sus fondos por
 substituirlos a los billetes. No hubo otro obstaculo
 para Realizar esta idea que el temor de no encon-
 trar bastante Platina para mantener el establecim.

Portion of Zea's reply to a letter from Revenga enquiring about the advantages that could accrue from the exploitation of platinum abounding in the Colombian mines. In this extract Zea mentions a project proposed years earlier to the Bank of England by Bollmann, namely the minting of a platinum coinage, and states that no action was then taken for fear that insufficient platinum would be available

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behalf of his government. When Bollmann heard of this he offered to procure a loan of £20,000 for Zea, on the understanding that debentures would be issued at the same rate as had already been agreed with other creditors. This offer was accepted, and when a formal agreement was drawn up and signed on 7 March 1821 a special guarantee was included to the effect that Zea would give an order on his government

"for the delivery of forty thousand pounds weight of platinum, which is actually at its disposition at Santa Fé de Bogotá, to Mess:^{rs} Adams Robertson & C^o at Jamaica, in order to be despatched by them to Mess:^{rs} Baring Brothers and C^o in London, who will hold it for gradual sale and in the most advantageous manner for the account of the Republic".

Zea also agreed to instruct Barings to use the profit derived from the sales of this platinum exclusively for the payment of interest and of the principal of debentures issued in connection with this particular loan (43).

Bollmann arranged for £20,000 to be deposited with a banker, Edward Hancorne, and for withdrawals to be made by Zea as and when necessary. The debentures were listed in Hancorne's name, but from Bollmann's will (44) it is clear that at least £3,000 was con-

tributed by Bollmann himself. Zea then set out for Madrid but his peace mission proved unsuccessful because the Spanish government would not agree to any proposals based upon Colombian independence (45).

Before the end of 1820 Zea was back in London and he proceeded to consult Bollmann about the possibility of exploiting the stocks of platinum in the Colombian mines. In his reply to Revenga, which was accompanied by a copy of the agreement made with Bollmann, Zea began by stating the fundamental difficulty in expanding the trade. He explained that the current demand for platinum in Europe came only from those involved in the manufacture of certain items of chemical apparatus, or in the striking of medals: Jeannety and Cuoq in Paris, and Wollaston in London. He feared that the release of as little as 900 pounds of platinum on the market could depress the selling price, so that one could not expect to dispose of 40,000 pounds even in ten years. However he thought it would be quite different

"if the project proposed years ago to the Bank of England by the illustrious Doctor Bollmann were adopted . . . of minting coins representing your funds and to substitute them for notes".

Zea said that the sole obstacle to the realisation

of this project hitherto in England had been the fear that there might not be sufficient platinum available to maintain an adequate supply of the metal. But in view of the large quantity mentioned in Revenga's letter, Bollmann believed that the republic could profit considerably from the execution of this project or of another which he would propose to the Colombian government, both of which were aimed at paying off the national debt. Zea also reported that steps had already been taken to interest Baring Brothers & Company in these projects, adding that Bollmann's forthcoming visit to Colombia, as an old and intimate friend of Barings, would doubtless decide them "to look after not only our debt, but also all our interests in Europe". It was vital, said Zea, that his dealings with Barings should be completed as promptly and precisely as possible, for which purpose the 40,000 pounds of platinum, or more if larger quantities had been amassed, should be placed at their disposal (46).

Bollmann's Reception in Colombia

Probably the main purpose of Bollmann's journey was to call first at Kingston, Jamaica, in order to instruct Adams Robertson & Co on the action they would have to take when the large consignment of platinum reached there, and then to proceed to Bogotá to oversee the despatch of the metal to Jamaica. It seems likely that he would also have sought to purchase platinum ore specifically for Wollaston's use, for he had received advances totalling £620 from Wollaston's bank account in recent months (47), and in the will made by Bollmann just before leaving England he acknowledged a debt of £700 due to Wollaston (44).

We know that before the end of March 1821 Zea provided Bollmann with a letter addressed to Francisco de Paula Santander, who was then Vice-President of the Department of New Granada (48), and so from that letter or from Bollmann himself Santander would have heard about the agreement to sell Colombian platinum on the London market. To Bollmann's dismay he found that no platinum was held at Bogotá for his collection, and that Revenga,

who had been sent to Spain by Bolívar, was no longer foreign minister. Bollmann then addressed himself to Revenga's successor, Pedro Gual, who instituted a search of official papers and then informed Bollmann that nothing had been found in his ministry to show that Zea had given advance notice to the government of his intention to enter into a contract with Bollmann. Gual explained that even if the platinum had been collected and held at Zea's disposal, the government would still be free to decline to honour the contract if it were thought to be detrimental to the national interest. Gual felt that in this instance the government could not, without very good reason, agree that Zea should grant special guarantees to one particular individual, because other British creditors could then quite rightly complain of underhandedness and bias on the part of the Colombian government (49).

On 6 September 1821 Santander was appointed Vice-President of Colombia (50) and it could well be that having heard of Bollmann's proposal for the minting of a platinum coinage, Santander was instrumental in getting a law passed by Congress meeting at Cúcuta, whereby the executive power was authorised to proceed to mint platinum coins. A clause in the Act which was signed on 29 September 1821 stipulated that if difficulties were to arise when purifying the crude platinum, then an experienced person could be invited to Colombia bringing the necessary tools with him so that the work could be carried out at a suitable town (51). Bollmann was clearly the most likely person to be invited in such an event.

The same Act also reserved to the State the exclusive right to trade platinum outside its own territory, the penalty for illegal export by private persons being loss of platinum and a fine of fifty dollars for every pound of metal confiscated.

Santander appears to have persuaded Bollmann to propose to Barings that they should make a loan to the Colombian government, to be repaid at the end of twenty years, in return for which Barings would be granted exclusive right to operate the salt mines at

Zipaquirá. Congress authorised such a loan on 11 October 1821, and on the following day a provisional agreement was signed by Gual, on behalf of Santander, and by Bollmann in the name of Barings. The first clause in this agreement is of particular interest, for it reads:

“Baring Br^s & C^o engage to lend to the Governm^t of Colombia 2 mill. hard dollars at an Interest of 8%—in which amount are to be comprehended the debentures granted by F. A. Zea in favour of E. Hancorne”.

This agreement was to be ratified by Barings in six months, failing which it was to be void (52).

On 11 November 1821, the day before Bollmann left Bogotá, he sent Bolívar a letter in which he expressed himself very satisfied with his journey and “enthusiastic with the idea that it will have many advantageous consequences” (53). What these consequences were may never be known, for Bollmann had only reached Kingston, Jamaica, on his way back to England when he died of yellow fever on 10 December 1821 (54).

Epilogue

Barings took no action to ratify the draft agreement concerning the Zipaquirá salt mines when it reached them in mid-February 1822, possibly because by then Zea had taken steps to raise a £2,000,000 Colombian loan by public subscription in London, as authorised by Bolívar in December 1819 (38). Debentures for this new loan were issued by Zea on 13 March 1822 (55), and about that date there was published in London an English translation of a French memoir on the platinum refining process developed by Jean Robert Bréant, to

which the following comment had been added by the translator as a footnote:

“This valuable memoir derives peculiar interest from the large importation of the above ore, daily expected from South America, in consequence of the negotiation between M. Zea and some London merchants” (56).

Only Zea would have been in a position to reveal such information to the translator, and he could only have done so if he was unaware of the outcome of Bollmann’s deliberations with Gual at Bogotá.

Those interested in the history of platinum have wondered how it was that with a large quantity of platinum apparently becoming available in London in 1822, Wollaston should have chosen not to pursue what for him had earlier been a most profitable business. From the facts revealed now for the first time it is evident that no such delivery ever took place and thus Wollaston had no choice.

As for Zea, who was then suffering from dropsy, this was his last involvement with platinum; his health had been declining for some months and he died at Bath on 28 November 1822 (57).

Acknowledgements

The assistance of Baring Brothers & Co Ltd, and of the Syndics of Cambridge University Library, in making their archives available for study is gratefully acknowledged. Copies of Bollmann’s letters were kindly provided by the American Philosophical Society at Philadelphia, and by the New York Public Library. For the provision of copies of documents in the Colombian national archives I am indebted to the efforts of Señora Maria Clemencia de Bohórquez, Librarian at the British Council’s office in Bogotá, and of Dr. Jaime Duarte French, Director of the Biblioteca Luis-Angel Arango, Banco de la República, Bogotá.

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